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Cocaine Treatment: Research and Clinical Perspectives

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Treatment of Cocaine Abusers: Issues and Perspectives

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INTRODUCTION

The objectives of this monograph are to explore current knowledge and thinking about major issues in the treatment of cocaine abuse and dependence, review available findings from studies of treatment of cocaine clients, and set forth recommendations for research and practice. This volume is based on a technical review meeting that took place at the National Institute on Drug Abuse (NIDA) in August 1990 and the subsequent development of chapters. Leukefeid and Tims present recommendations from this review meeting in the final chapter of this monograph. Some studies represented here are completed, others report preliminary results, and some present treatment perspectives and models. This monograph is not intended to be comprehensive but rather to provide a survey of promising avenues of investigation.

The evolution of drug abuse patterns over the past two decades has seen shifts, from heroin as a primary focus to a drug scene In which poiydrug abuse patterns are common and new drug abuse problems have emerged. Cocaine is of particular interest because of its rapid epidemiological spread, the heterogeneity of its user populations, and the difficulty of developing adequate treatments. Unlike heroin, for which there are effective agonist- and antagonist-based treatments, cocaine has no standard treatment. There is an array of generic treatments that were largely developed for treating other drug abuse problems and a research base that is young but growing in some promising directions. This chapter considers the present state of knowledge regarding cocaine treatment populations and comorbidities, pharmacological agents used in the treatment of cocaine abuse and dependence, NIDA's medications development program as it relates to cocaine, the use of behavioral and psychosocial treatment approaches to treating cocaine abusers, and treatment outcomes.

EPIDEMIOLOGY

Prior to 1980, cocaine abuse was considered a minor, albeit serious, drug abuse problem. Cocaine was identified in admissions to federally funded treatment as a primary drug of abuse in only 5.8 percent of the cases reported by the Client-Oriented Data Acquisition Process for 1981 (National institute on Drug Abuse 1982). In 1990, the percentage of NIDA's National Household Survey population 18 to 25 years old having "ever used" cocaine was 19.4 percent, and 2.2 percent reported having used during the past 30 days (National institute on Drug Abuse 1991), down from 4.5 percent in 1988 (National institute on Drug Abuse 1990). Among those ages 26 to 34 years, the figures are 25.6 percent lifetime and 1.7 percent in the past 30 days, down from 2.6 percent in 1988. The percentage of those ages 16 to 17 having used cocaine in the past 30 days was just less than 1 percent in 1990. Thus, although cocaine use appears to have peaked in the household survey population, it remains a major problem for which effective treatments are urgently needed.

When considering the epidemiology of cocaine use, two facts stand out: first, that cocaine use increased dramatically during the 1980s although it has apparently peaked, and second, that the use of cocaine is a diversified phenomenon, both in terms of the populations involved and the patterns of use. Clayton (1985) called attention to data showing that, in the early 1980s cocaine use was not concentrated solely in the more affluent social strata but could be seen as common across classes and occupational groups. Rouse (1991) examined route of administration and reports that, in 1985, intranasai use ("snorting") was overwhelmingly the preferred route among those older than age 18, whereas smoking or freebasing was reported by 45.6 percent of the adolescents who had used cocaine. Smoking or freebasing was reported by about one-fifth of cocaine users age 18 and older. Rouse pointed out that the advent of smokable "crack" cocaine in the early 1980s eliminated some of the immediate physical hazards associated with freebasing, and this, together with the low price of crack cocaine, occasioned the increase in the popularity of smoked cocaine, especially among the younger population. Household survey data do not present the complete picture where cocaine is concerned. Certain subpopulations that are especially deviant have especially high rates of use—arrestees, for example. Wish and O'Neil (1991) presented urine test data obtained from arrestees in eight U.S. cities during 1988, with cocaine-positive specimens obtained from more than half the males in five cities and more than two-thirds of the female arrestees sampled in those cities. Responses to questions about their preferred route of administration ranged from 11 percent (Detroit) to 37 percent (Houston) of the males and from 15 percent (Detroit) to 59 percent (New Orleans) of female arrestees reporting a preference for injecting cocaine, either alone

or in combination with heroin. Both snorting and smoking or freebasing were also reported by large percentages of males and females.

NATURAL HISTORY

Although knowledge of the natural history of opiate abuse is rich, few studies have addressed this aspect of nonopiate abuse, particularly cocaine abuse. The availability of many primary cocaine clients provides the opportunity to study cocaine abuse careers and develop a body of knowledge essential to understanding the initiation of, prolonged use of, and treatment outcomes for cocaine abusers. it has been believed generally that cocaine abusers typically use the drug for only a few years before entering treatment. Khaisa and colleagues (Pretreatment . . ., this volume) report data to the contrary. There is no real knowledge of the extent to which cocaine use careers continue into middle age or abruptly cease as users mature.

CLINICAL ISSUES

Cocaine is a drug that presents complex and difficult clinical issues. in an excellent review of the behavioral pharmacology literature on cocaine, Johanson and Fischman (1989) examined such behavioral effects of cocaine administration as sensitization, tolerance, and conditioning. Although some effects of cocaine cannot be ascribed to conditioning, Johanson and Fischman observed that the overwhelming evidence in the literature is that cocaine has “extraordinary reinforcing properties.” They also cited the numerous reports of its toxicity, including cardiovascular changes and crises, cerebrovascuiar accidents, hyperpyrexia, and cocaine-mediated damage to other organs or tissues (e.g., gastrointestinal tract, kidneys, and liver) as well as damage related to route of administration (e.g., nasal passage injuries, lung abnormalities, and infections acquired through injection with contaminated needles).

Further complications to providing effective treatment are seen in the variety of cocaine users, with differences in socioeconomic backgrounds and lifestyles, as well as involvement with other drugs, impairment of social functioning, and psychiatric comorbidities. Cocaine use drives and elicits a variety of behaviors that place individuals at risk in several ways, including behavior associated with criminality, sexual behavior, perinatal exposure, and the use (especially intravenous [IV] use) of other drugs. Cocaine has frequently been cited as associated with compulsive sexual behavior (Washton and Stone-Washton, this volume) and the exchange of sex for drugs, particularly crack cocaine.

Despite the numerous risks, recent evidence (Khaisa et al., Pretreatment . . ., this volume) suggests that many individuals have been long-term users of

cocaine prior to entering treatment. In view of these and other data, such as recent studies reported by De Leon (1989, this volume), Havassy and Wasserman (1992), and Schottenfeld and colleagues (this volume), it is not surprising to note numerous physiological, psychiatric, and social complications presented by those entering treatment for cocaine dependence.

TREATMENT APPROACHES

Consideration of what treatment strategies are potentially effective for cocaine-dependent clients must take Into account the biobehavioral nature of drug dependence: that treatment has several tasks; and that the treated client must function in a social environment fraught with stresses, social pressures, and temptations. Just as methadone and naltrexone have provided useful pharmacological adjuncts for treatment of heroin addicts, pharmacological treatments may assist in providing relief of craving and the unpleasant states associated with cocaine withdrawal, retaining clients in treatment, and preventing relapse. However, treatment must be viewed as having a structure that integrates stabilization (whether it includes pharmacological agents), learning, social support, and strategies to prevent relapse. The client must be withdrawn from the drug and the drug lifestyle, given a treatment environment that supports recovery, engaged in learning processes as part of rehabilitation, and provided a continuum of care that enables the client to function in a drug-free lifestyle after leaving the more structured phase of treatment.

Given the diversity of clinical and philosophical backgrounds in the drug abuse treatment field, which is relatively new and evolving, it is not surprising that models of treatment have emerged in a fragmented way. Researchers are focused on testing specific interventions, either alone or in combination. In clinical practice, programs have been developed that draw together strategies on a pragmatic basis, using elements of cognitive-behavioral and 12 -step approaches, such as those described by Washton and Stone-Washton (this volume). The model of neurobehavioral treatment described by Rawson and coworkers (this volume) presents an outpatient program that approaches recovery in stages, each with particular tasks addressed by therapeutic and educational components, and includes achieving abstinence, preventing relapse, and working on relationships. Several other models are described in this volume and elsewhere in the literature, including behavioral approaches and psychotherapies. Treatments are delivered in a variety of program environments-inpatient, residential, and outpatient.

COCAINE USE BY METHADONE CLIENTS

Cocaine use by methadone clients presents a major problem. In a review by Condelli and colleagues (1991) various aspects of cocaine abuse by this population and its treatment are considered. Clients presumably stabilized and being successfully treated for opiate dependence commonly abuse several other drugs, especially alcohol and marijuana. Cocaine, although clearly of concern, was viewed by methadone programs as of secondary concern prior to the advent of widespread crack cocaine use and IV use of cocaine. That view is not a valid perspective when considering the risk of infection to IV cocaine users and the increased sexually transmitted risk of human immunodeficiency virus common to crack cocaine users (especially females). Continued cocaine use during methadone maintenance militates against engagement in a recovery process and is therefore of added concern. The interaction of cocaine with methadone has been cited as contributing to increasing cocaine use by this group of clients. Kosten and coworkers (1988) note that some of their methadone patients apparently found the combination of methadone and cocaine pleasurable, comparing it to a "speedball," and that the clients reported that cocaine had "taken over their lives" to a greater extent than their previous opioid use. Kosten and colleagues (1989) also speculate that opioid antagonist treatment may reduce cocaine use by depriving cocaine-using clients of relief from the dysphoria, or postcocaine "crash," which methadone apparently provides. The reports of high prevalence of antisocial personality disorder among methadone clients (Kosten et al. 1988; Woody et al. 1985) further point to difficulty in engaging them in therapeutic alliances. The difficulty in developing effective interventions for the subset of methadone clients who use cocaine has been recognized, and two major lines of development of interventions have been pursued: pharmacological treatment and behavioral treatments. Kosten (this volume) cites studies of dopamine agonists that have met with some success and the mixed results in trials of tricyclics. He also reports that methadone clients who crossed over to buprenorphine dramatically reduced (and often ceased) their cocaine use, perhaps because of the opiate antagonist effects. Behavioral approaches such as those reported by Stitzer and coworkers (1986) and Grabowski and colleagues (this volume) also may be useful in reducing cocaine use by this population.

PHARMACOLOGICAL TREATMENTS

The search for pharmacological agents useful in treating cocaine withdrawal, preventing or reducing craving, blocking euphoria, and otherwise stabilizing clients has attracted widespread attention. Gawin and coworkers (1989) addressed the problem with a double-blind trial of desipramine hydrochloride and found substantial reductions in cocaine use as well as in craving for cocaine in the treated group. Much lower rates of abstinence were found

for both lithium carbonate and placebo. Numerous other trials of tricyclic antidepressants were conducted in the mid- to late-1980s with mixed results (Kosten, this volume; Carroll, this volume). Other pharmacological agents have been suggested by researchers as potentially useful, including dopamine agonists and antagonists, anticonvulsants, and narcotic antagonists (Kosten, this volume).

NIDA'S MEDICATIONS DEVELOPMENT PROGRAM

NIDA initiated a program in 1988 to systematically identify and test pharmacological agents potentially useful in the treatment of drug abuse and dependence. This program was formalized as the Medications Development Division of NIDA in 1990 (Johnson and Vocci, this volume). The major objective was to expeditiously support the necessary work to obtain approval by the U.S. Food and Drug Administration of medications for treatment of drug dependence. In many cases, these medications already have been approved for other indications, and thus a major part of the testing (ie., preclinical studies and safety determination) has been completed. With this in mind, and with the benefit of numerous open trials conducted by researchers in the field, NIDA began its search for medications.

BEHAVIORAL APPROACHES

Pharmacological agents are only part of a treatment strategy, and they address specific aspects (e.g., withdrawal, stabilization, reduction of craving, or treatment of comorbid conditions) in a program of treatment that must accomplish a range of tasks, Many of these tasks are addressed by nonpharmacological (i.e., psychosocial) interventions in programs an in the community. The acquisition and maintenance of drug dependence involves learning. At the level of responses to drug stimuli, both classical and operant paradigms are useful. O'Brien and colleagues (this volume) have explored the former and have conducted experiments that suggest that extinction of such conditioning may be a useful approach.

Grabowski and coworkers (this volume) review behavioral treatments, both in general application to drug abuse treatment and with reference to cocaine. They suggest that the limited available evidence points to the value of treatment strategies that involve analysis of client behavior and environment, identification of sources of reinforcement, and systematic use of behavioral contingencies that support drug-free lifestyles. They stress the potential value of behavioral approaches, both in terms of "providing insight into the behavioral pharmacology of cocaine use and the current problem" and preparing the field to deal with "future stimulant epidemics." They identify the formidable task of altering major events and reinforcers in the patient's environment and gaining effective sources of information about events in that

environment. Monitoring biological markers is stressed as a valuable source of clinical and research information, and the feedback provided by drug screens is cited as both a powerful diagnostic and therapeutic tool. A recent study of a behavioral intervention using a version of the community reinforcement approach suggests that this approach holds promise for helping clients achieve abstinence (Higgins et al. 1991). Grabowski and colleagues (this volume) also examine the role of pharmacological adjuncts in behavioral interventions and recommend that the design of pharmacotherapies take into account their value as reinforcers.

RELAPSE PREVENTION INTERVENTIONS

If drug abuse can be characterized as dysfunctional coping, learning healthier coping strategies is an approach that has support in the clinical and research literature. Following the work of Marlatt and Gordon (1984), researchers such as McAuliffe and coworkers (1991) have employed relapse prevention approaches that involve acquisition of interpretive skills and learning to respond to social and environmental cues in ways that support continued abstinence rather than a return to drug use. Such approaches have been incorporated in various forms into existing treatment programs and aftercare. The importance of relapse prevention strategies has been underscored in the work of such researchers as Wallace (1990). The importance of social support in maintaining treatment compliance, reducing denial, and maintaining abstinence is recognized in the social network therapy of Galanter (1988). Thus, effective relapse prevention approaches may include both internal and external resources for coping.

PSYCHOTHERAPY AND PHARMACOTHERAPY

It has been suggested, based on work with opiate addicts (Woody et al. 1983) that some classes of drug abusers may benefit from psychotherapy. Carroll (this volume) examines the use of psychotherapy as a treatment for cocaine abuse, with attention to types of drug abusers, appropriate types of psychotherapy, and use of psychotherapy in conjunction with pharmacotherapy. She reports that, in a trial of two types of psychotherapy, cocaine clients experienced some improvement, although main effects were not evident. However, those classified as high-severity cocaine abusers were more likely to become abstinent when treated with relapse prevention therapy than when treated with interpersonal psychotherapy. Those classified as low-severity improved regardless of which therapy was used. The same pattern was seen with regard to high vs. low severity of psychological symptoms (based on Addiction Severity Index ratings [McLellan et al. 1985]). Although overall improvement was noted for the sample, results were in some ways disappointing. Attrition was a major problem in both conditions. More than half the clients enrolled in the trials failed to attain stable abstinence during

the treatments. Although some findings suggest that psychotherapy may have value in improving retention in pharmacotherapy, the evidence is too incomplete to do more than speculate. Carroll suggests that the depression research literature may offer insights for evaluating psychotherapy (and pharmacotherapy) for cocaine abusers, Cautioning that the absence of a standard pharmacotherapy for cocaine abusers is a problem, Carroll points to the potential value of identifying clinical subtypes based on drug use and psychiatric severity. The evaluation of psychotherapy in relation to pharmacotherapy is a complex matter, with potential for clarifying the response of client types to each and for improving or potentiating response to pharmacological treatments.

PROGRAMS AND ENVIRONMENTS

Inpatient vs. Day Treatment Modailties

Alterman and colleagues (this volume) also present preliminary results from a study of inpatient treatment vs. day treatment for a sample of black male cocaine abusers at the U.S. Department of Veterans Affairs (VA) facilities. The treatment in both programs consists principally of group counseling focusing on overcoming denial and coping with problems and stresses of daily life as well as individual counseling as needed. Psychotropic medications, when needed, also are available in both modalities. The day treatment program is available for 27 hours per week during weekdays, whereas inpatient treatment is on a continuing basis. Clients from each condition also are encouraged to attend self-help meetings while they are enrolled in treatment. Assignment to the treatment conditions was random, and findings were presented for 94 subjects at baseline, 78 at 4-month followup, and 56 at 7-month followup. Dropout rates were higher in the day treatment condition, with 87 percent of inpatients vs. 52 percent of day hospital patients completing treatment. However, both conditions had major reductions in cocaine use at 4-month followup, with 83 percent of day hospital subjects and 54.5 percent of inpatients providing negative urine specimens: at 7-month followup, cocaine-negative urine screens were provided by 57.9 percent of available day treatment subjects and 85 percent for available inpatient subjects. In addition, significant improvements at the 4- and 7-month followups were found in other (nondrug) areas of functioning, using the Addiction Severity Index (McLellan et al. 1985). It also was observed that day treatment subjects entered aftercare treatment at a rate several times that of the inpatient subjects.

The Matrix Model

The Matrix Model (Rawson et al., this volume) is built on an eclectic, pragmatic borrowing of concepts and approaches from other researchers

and therapists. The intellectual debt owed Washton and others is explicitly acknowledged. The approach borrows elements from cognitive-behavioral, psychoeducational, family therapy, and other perspectives and views recovery as a sequence of stages, each having its own dilemmas, challenges, and tasks. In particular, the following needs must be addressed: achieve abstinence and stabilize: deal with the false beliefs regarding abstinence and the risk of relapse that arise after the early stages of treatment; address the sources of stress inherent in relationships and everyday life; and relearn numerous beliefs about life, drugs, stress, and relationships. This is a long process and requires a major commitment, not only by the individual but also by the individual's spouse or significant other. At each stage of recovery, issues must be addressed on behavioral, cognitive, emotional, and relationship levels; and issues, beliefs, and behaviors must be clarified and reassessed.

Cocaine Abusers in Therapeutic Communities

Therapeutic community (TC) programs provide treatment for many drug abuse clients in the United States. De Leon (this volume) reviews available data from studies of TC clients, with particular focus on clients whose primary drug abuse problem is identified as cocaine abuse. Although the overall rates of psychiatric disturbance for crack cocaine users do not appear to be greater than those of other TC clients, De Leon states that such indicators as suicide attempts are several times those of other drug abusers. In examining retention in treatment, De Leon found that the general pattern was similar for primary cocaine and noncocaine abusers. He suggests that, given the relationship between time in treatment and outcome, this pattern is indicative of probable similar treatment outcomes. Treatment outcome studies for cocaine clients in therapeutic communities are needed.

COMMUNITY OUTREACH AND THE NEED FOR TREATMENT

In considering community outreach to the many IV drug users, many of whom have never been in treatment, McCoy and coworkers (this volume) report on cocaine use by injection drug users (IDUs) in treatment (primarily methadone) and another sample of street IDUs recruited by indigenous outreach workers as part of the NIDA-sponsored National AIDS Demonstration Research Project in the Miami area. Sixty percent of those in the street IDU sample reported having received no drug abuse treatment services at any point during the 5-year period preceding the enrollment interview. Cocaine injection was much more pronounced among the street IDU sample than among the treatment IDU sample, and within the street sample, cocaine injection was more prevalent than heroin injection. The authors report that 90 percent of the street sample had injected cocaine, 62 percent had injected heroin, and 60 percent had injected both in combination (i.e., as a speedball). Using a short-term counseling and training intervention, the researchers were able to follow

up both samples of IDUs at 6 and 12 months. Decreased use of cocaine was reported for both samples, with the largest decrease in the use of speedball, the most common form of cocaine use, although no reduction was found for crack cocaine. In addition, the authors report that, during the 6 months following entry into the study, 11 percent of the street IDU sample gained admission to treatment. The authors posit that substantial numbers of IDUs not currently in treatment are, in fact, candidates for treatment and would be willing to enter if staff resources were made available for placement.

RELAPSE

It has been estimated that two-thirds of relapse in drug abuse clients takes place within 3 months posttreatment (Leukefeld and Tims 1989). Havassy and colleagues (this volume) have examined conceptual issues related to cocaine relapse and reviewed research findings on relapse and its prevention. Defining relapse involves several conceptual problems, and cocaine is a particular problem because of the tendency of cocaine users to binge rather than use continuously. Slips may occur, and criteria of continuous abstinence may result in erroneously pessimistic reports of outcomes. Moreover, a lapse to cocaine use may precede long periods of abstinence and may be part of a learning process in recovery. It is suggested that a standard definition of relapse include a minimum period of abstinence prior to the lapse and a return to given levels of use for a specified time. Among factors that have been suggested as important to relapse are route of administration (cocaine smokers have a higher relapse tendency than intranasal users), use of other drugs (especially alcohol), having something to lose, rigorousness of abstinence goals, and social support. The potential significance of psychopathology to relapse and the importance of a sense of personal well-being also are addressed, as is the need for incorporating social support, valued relationships, and a sense of well-being into behaviorally based treatment approaches.

OUTCOME STUDIES

Treatment outcome studies that allow inferences regarding the effectiveness of treatment programs and modalities are in various stages of implementation and completion. Large-scale studies of treatment outcome that are presently available were conducted on treatment cohorts that included relatively few who could be characterized as cocaine dependent. Large-scale multiprogram studies of outcome through 1989 were limited largely to opioid and polydrug abusers (Tims et al. 1991). NIDA has under way a large, national outcome study of clients with drug abuse diagnoses of cocaine dependence under the Drug Abuse Treatment Outcome Study program. However, outcome data from this study will not be available until late 1994.

Individual outcome studies presented in this monograph and elsewhere provide encouraging data pointing to favorable outcome patterns and effectiveness of programs for treatment of cocaine-dependent clients. Khalsa and coworkers (Combinations . . . , this volume) report an outcome study of cocaine-dependent male clients treated in various combinations of VA programs. These included short-term (21 -day) inpatient programs, outpatient treatments, and referral to community self-help groups. The inpatient program utilized a 12-step model, with individual and group counseling, as well as drug education. Outpatient treatment also used the 1 P-step philosophy, with physician visits followed by individual and group counseling. Self-help involved attendance at Alcoholics Anonymous or Cocaine Anonymous meetings. Data collection was at admission, and at 1 and 2 years postadmission, although only the first-year postadmission data are reported in this volume. For this group, intranasal use of cocaine was not common (10 percent pretreatment vs. 5 percent posttreatment), with crack cocaine smoking being the preferred route of administration. Overall, dramatic reductions in cocaine use were observed when the 12-month preadmission period was compared with the 12-month postadmission period. For the sample, preadmission use of crack cocaine was approximately 45 to 65 percent of each month during the 1 P-month period vs. 22 to 37 percent at followup. Similar dramatic reduction in cocaine use classified as “severe” was reported pretreatment to posttreatment (65 to 75 percent mean time preadmission vs. 17 to 22 percent during followup), and mean percentage of time not using cocaine increased from 5 to 20 percent pretreatment to 58 to 69 percent during followup. Also observed were declines in alcohol and other drug use. However, no statistically significant changes were found in social behaviors, with the exception of drug dealing, which decreased dramatically. Regarding time abstinent from cocaine, an increase was observed in all groups, but the increase was significantly greater in those whose treatment consisted of either (1) inpatient plus high-intensity outpatient or self-help or (2) high-intensity outpatient or self-help (although the number of clients in this group was relatively small). The most commonly selected treatment combination was the inpatient plus intensive outpatient or intensive self-help, which also was found to have the best outcomes. Clearly, client motivation to enter and become engaged in intensive, longer term treatment is an important area for further study, as are the components of treatment programs and associated experiences that elicit such engagement and retain clients for the duration of treatment or return clients to treatment if relapse occurs.

CONCLUSION

Cocaine abuse and dependence are extreme problems and constitute one of the central challenges to the drug abuse treatment field. A variety of avenues of investigation are being pursued in search of knowledge regarding effective treatments. Some promising leads, pharmacological agents, and techniques

that appear to be somewhat effective have been identified and subjected to systematic testing. Some approaches are believed to be potentially useful in combination (e.g., psychotherapy and pharmacotherapy), but much remains to be clarified and resolved. For example, the issue of client subtypes needs elaboration in relation to available treatments. This monograph examines some of the major issues and presents a survey of available approaches and findings,

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Outpatient Treatment of Cocaine and Crack Addiction: A Clinical Perspective

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INTRODUCTION

The treatment of cocaine and crack addiction is one of the most critical issues facing the substance abuse treatment field today. Unfortunately, the skyrocketing demand for treatment has made it impossible to wait for results of carefully controlled research to guide the delivery of treatment services. Clinicians on the front lines of the treatment delivery system need information that might assist them in dealing with an increasingly difficult-to-treat patient population of crack addicts and polydrug abusers. This chapter offers recommendations for treating cocaine addicts as outpatients and is based entirely on clinical experience and not on results of carefully controlled research. Thus, the reader is asked to view the authors' clinical recommendations within that context. Clinical issues and techniques discussed in this chapter are addressed in greater detail in previous publications (Washton 1989 *a;* Washton and Stone-Washton 1990).

PROGRAM DESIGN

Structure, intensity, and frequency are the keys to making outpatient treatment effective. The first goal is to replace the patient's habitual drug use with habitual attendance at the program and to make abstinence a singular priority. This usually requires a highly structured outpatient regimen that combines individual, group, and family counseling; education; urine testing; and self-help. The program must provide patients with an enhanced support network to deal with drug triggers (cues) and to resist the continuous availability of cocaine in their everyday environment. This requires multiple weekly counseling sessions-at least four or five per week-to solidly engage the patient and to break the compulsive cycle of cocaine use.

Dividing an outpatient program into sequential stages helps to structure the tasks that must be addressed in the natural progression from early abstinence issues to relapse prevention issues to longer term recovery issues (Washton

1989*a*). Although any such division of the treatment process is somewhat arbitrary, it provides patients and counselors with a general "roadmap" that orients them toward achieving specific objectives. Not only does it give shape and structure to the program, but it also gives patients a sense of accomplishment when they graduate from each phase.

The Washton Institute's intensive outpatient program is divided into three phases, each of which focuses on a specific set of tasks and goals (Washton 1989*a)*. The basic structure and content of these phases are guided by a series of films (Washton 1987) and workbooks (Washton 1990) that contain written exercises for the patient and guidelines for the group leader. The first phase (12 weeks) is devoted to breaking the addictive cycle. The major goals are to establish initial abstinence, assess the severity of the patient's problem, and enhance his or her motivation to change. Patients attend four group sessions and one individual session per week. In the second phase (4 weeks), the focus shifts toward solidifying abstinence and learning specific relapse prevention skills (Washton 1988). Patients attend two group sessions and one individual session per week. The third phase of the program consists of either (1) a 12-week continuing care group that provides peer support and focuses on developing a long-range recovery plan or (2) an open-ended, recovery-oriented psychotherapy group that addresses a range of topics, including relationships, self-esteem, sexuality, and adult children of alcoholics issues. Patients decide with the help of their counselor which of these two alternatives is better suited to their needs. Throughout the entire program, all patients are urine tested at least twice per week and routinely encouraged to attend self-help meetings-Cocaine Anonymous (CA), Narcotics Anonymous (NA), and/or Alcoholics Anonymous (AA). Family members attend an initial 4-week education group and may elect to enter a longer term codependency group.

The first stage of treatment, interrupting the compulsive drug use cycle, must begin in the first session. The job of the evaluating clinician includes enlisting whatever the patient's apparent motivation is to quit and to identify specific measures the patient must take to short-circuit his or her impulses to continue using cocaine. These early efforts must focus pointedly on basic habit-breaking strategies to interrupt the cycle of use. Before the first interview ends, the counselor and patient should have jointly formulated a very specific and detailed 24-hour abstinence plan for avoiding exposure to drugs, drug users, and dealers. This means constructing a structured, moment-by-moment plan of how to spend time, whom to spend it with, and what to say to anyone who offers drugs. It may mean planning a different route home if the usual route is a trigger to buy, use, or think about using drugs. Sometimes, a new patient is paired with a "buddy" (a stable program member or graduate) who will accompany him or her to a self-help meeting and be available to lend

support when needed. Before the first session ends, patients are reminded that a urine sample will be taken at the next visit to keep them accountable for their actions and to thwart the impulse to have one last fling and use, rather than destroy, their remaining drug supply. Patients are asked to set aside at least 2 hours for the initial evaluation because extra time is needed to go over the first workbook unit, "Tips for Quitting Cocaine" (Washton 1990), with the newcomer to create a personalized plan for remaining drug-free until the next contact (usually the next day).

Sometimes it is necessary for the patient to ask a trusted friend or relative for help on a "search-and-destroy mission" to rid his or her home or car of all drug supplies and paraphernalia. The first step is purely behavioral and focuses intensively on breaking the cycle of use, not on overhauling the patient's lifestyle, although at some later point, it clearly will need to be overhauled. This step is routinely bypassed in inpatient treatment and is often the weakest part of programs that rely solely on environmental control to establish abstinence. Outpatients should be helped to learn early that they must assume full responsibility for their own behavior and must take an active role in their recovery because nothing and no one is going to "cure" their addiction. The challenge of outpatient treatment is to guide the patient carefully through the "minefields," "boobytraps," and "steep inclines" of daily life and teach him or her how to avoid drug triggers, dealers, and users and how to manage feelings rather than chemically escape from them.

There is no medical need to hospitalize cocaine addicts for the purpose of managing a "withdrawal syndrome." Technically speaking, there is no withdrawal syndrome after abruptly stopping cocaine. That is, the body has never developed a need for cocaine to maintain homeostasis, and so there are no withdrawal symptoms that require medication such as those administered to alleviate abstinence symptoms in alcoholics or heroin addicts. However, there are often unpleasant rebound symptoms after stopping heavy cocaine use. The person feels lethargic and generally out of sorts from depleting the stores of dopamine and other brain neurotransmitters that are needed to maintain a normal mood state. But most, if not all, of these symptoms disappear on their own without medication over the course of a few days. Sleep and regular meals work fine for most patients.

Those patients who do need hospitalization often do well with an abbreviated stay followed directly by intensive outpatient care. It is rare to find serious medical complications that have resulted from cocaine abuse, which is contrary to media sensationalism that plays up the deaths and disasters. It is usually the patient's thinking patterns, behavior, motivation, and lifestyle choices that need intensive and expert attention, not his or her body.

ARE COCAINE ADDICTS REALLY DIFFERENT FROM ALCOHOLICS?

Although cocaine addiction and alcoholism have much in common, they differ in clinically important ways. It is a mistake to view the cocaine addict as just an alcoholic who happened to get involved with a different drug. It is also a mistake to stick rigidly to the belief that "a drug is a drug is a drug" as justification for refusing to treat cocaine addicts any differently from alcoholics and for refusing to "give in" to the cocaine addict's "grandiosity" or need to be "special." All patients who seek help deserve to be treated as individuals and to receive treatment that meets their individual needs. Some of the most clinically important differences between cocaine addiction and alcoholism are listed below.

1. The opposite psychoactive effects of cocaine-a central nervous system (CNS) stimulant-and of alcohol-a CNS depressant-n the human brain mean that the types of relapse triggers that stimulate the addict's desire for the chemically induced high often will be very different. Cocaine amplifies sensory experience, whereas alcohol modulates it. Although most cocaine addicts use (and abuse) alcohol to come down from cocaine, many never have chosen alcohol for chemically induced highs. That is partly why cocaine addicts often see no reason to give up alcohol and have a great deal of difficulty accepting the need for total abstinence.

2. There is often a strong sexual component to cocaine addiction, especially in males. Cocaine use frequently is associated with sexual fantasies, with sexual acting-out behaviors, and, in some cases, with a full-fledged sexual compulsion-any one of which can become a strong relapse trigger for cocaine use if not addressed from the outset of treatment (Washton 1989*b).*

3. Unlike alcohol, cocaine rarely (if ever) causes noticeable psychomotor impairment and leaves no telltale odor on the user's breath. Cocaine intoxication generally does not cause people to stagger, slur their speech, or fall down. Therefore, it is more difficult to detect: in addition, alcohol is far more likely than cocaine to be associated with intoxicated drivers, drunk driving arrests, driving-while-intoxicated (DWI) charges, and auto crashes with personal injury.

4. Cocaine is associated with fewer medical problems and fewer deaths than alcohol. Contrary to media sensationalism, annual cocaine-related deaths in the United States are a tiny fraction of those caused by alcohol or cigarettes, and unlike alcoholics, few cocaine addicts seek or are referred to treatment because of medical problems alone. The dangers associated with cocaine stem primarily from its extraordinary addiction potential and its ability to alter the user's brain function and behavior.

5. Cocaine is illegal; alcohol is not. In society's view, cocaine addicts are deviants who have only themselves to blame for their addiction. They are criminals deserving punishment, not sick people deserving treatment. This negative, moralistic attitude sometimes spills over into the treatment setting. Counselors may be particularly intolerant of the cocaine addict's manipulativeness, guardedness, deviousness, and noncompliance. These behaviors lead many counselors to feel ineffective and frustrated. Destructive counter-transference reactions (strongly negative, countertherapeutic responses to a patient's behavior) may get played out in the name of "limit setting" and in attempts to avoid "enabling" patients who are noncompliant. This is a major obstacle in treating cocaine addicts but one that is rarely addressed.

6. Addiction develops much more rapidly with cocaine than alcohol, often within a few weeks or months, and especially when smoked as freebase (crack). Thus, the dynamics of cocaine addiction are different from those of alcoholism, including its impact on the individual and the family. Cocaine addiction can be likened to a rapid-onset trauma that stuns its victims, compared with alcoholism, which progressively and insidiously debilitates the drinker over a much longer period. The cocaine-affected family is less likely to show the deeply ingrained systemic aberrations and codependent relationships so commonly seen in alcoholic families.

7. Cocaine addicts often feel better so quickly after stopping cocaine that their motivation to remain in treatment may evaporate just as quickly.

8. Last, but certainly not least, the power of cocaine conditioning is awesome. Cocaine cravings are undoubtedly more troublesome in early abstinence than any analogous phenomenon seen with alcohol or other drugs. Almost anything and anyone in the cocaine addict's life can become a conditioned trigger for cocaine cravings and relapse. Moreover, settings, circumstances, feelings, and experiences previously associated with cocaine use often retain their ability to set off powerful cravings and drug-seeking behavior long after the cocaine use has stopped. Medications and nutritional supplements, although widely publicized, are not very effective in suppressing cocaine cravings, and it appears that the best strategy is to teach patients specific cognitive and behavioral techniques to short-circuit cravings and counteract the strong euphoric recall for the cocaine high (Wallace 1989; Washton 1988, 1989*a).*

Should cocaine addicts be treated separately from alcoholics and other drug abusers? Not unless the program has had very poor success in treating them together. Some programs may have to go through an interim phase of creating a specialized cocaine treatment track to acquire the experience, confidence,

and skills that are needed to effectively treat cocaine addicts and alcoholics together. Cocaine addicts do not need separate programs or entirely new treatment approaches, but they do need treatment that addresses their special needs. Treatment of the cocaine addict is not identical to that of the alcoholic, especially in the early stages where clinical differences between these patient subgroups are most pronounced (Washton 1989*a).* Clinicians must be knowledgeable about cocaine and the particulars of cocaine recovery. It can be difficult for a patient to place trust in a clinician who, for example, does not know the difference between an “eighth,” a “quarter,” and an "ounce” of cocaine or that crack and freebase are the same drug. Every cocaine addict who comes for treatment needs assurance that the clinician offering help has a thorough working knowledge (not a superficial book knowledge) about cocaine and other drugs. The clinician need not have used or been addicted to cocaine, but he or she must be able to anticipate and deal with the predictable problems that cocaine addicts commonly face at each stage of the recovery process.

MOTIVATING THE UNMOTIVATED

The first treatment goal should not be to convince the patient that he or she is an addict since accepting the identity of “addict” Is not a prerequisite to getting clean and sober, which is the first and foremost goal of an outpatient program (Washton and Stone-Washton 1991). Besides, getting into debates and power struggles with cocaine addicts over this issue is countertherapeutic and a major cause of early dropout. Patients who claim to have gotten a little “carried away” with cocaine, but do not see it as a serious problem, do not necessarily have intractable denial that needs to be assaulted. This difficulty in seeing the problem in a realistic light is an early (and predictable) stage in developing the motivation to change and is not unique to addicts (Prochaska and DiClemente 1986). A power struggle over this issue will surely drive the patient away and will seem to confirm the self-fulfilling prophecy of the clinician who still believes that patients have to “hit bottom” before they get serious about recovery (Miller 1985). This is a therapeutic blunder-a failure to “start where the patient is.”

Forming a good working relationship with the patient is the basis for positively influencing his or her behavior. Giving cocaine addicts permission to resist and to be ambivalent fosters openness and a willingness to take personal responsibility for their own actions (Zweben 1989). When clinicians are extreme in their opposition to alcohol and other drug use, patients become reluctant to share their drug fantasies and are likely to *act* out rather than *talk* out their secret impulses to get high. However, the clinician who instead joins with the patient around shared goals and can convey understanding, empathy, and respect will often be able to engage even a highly resistant patient in the treatment process and help him or her to begin to honestly explore his or her

true attachment to drugs. A patient's inability or unwillingness to accept that he or she has a problem may not be evidence of intractable denial; it may just mean that he or she is in a very early stage of change and that it will take time and a good bit of respectful coaxing to move that patient forward into the next stage of change. Understanding and being able to identify the predictable stages of all human behavioral change will allow clinicians to maintain the perspective needed to avoid unnecessary frustration and equip themselves with the understanding they will need to help patients see the need for changing.

Prochaska and DiClemente (1986) have identified several stages of change and the types of interventions that work best within each stage when people attempt to overcome addictions, either on their own or with outside help. In the "precontemplation" stage the person is actively practicing the problem behavior but does not perceive it as a problem, although others do. Precontemplators invest no effort in thinking about or attempting to change and, thus, are not ordinarily seen in treatment unless forced by such circumstances as an arrest, DWI, or positive urine test that threatens his or her job. In the "contemplation" stage, the individual begins to experience ambivalence about the problem behavior, considers doing something about it, but does not enter treatment since he or she is still not convinced that the behavior is serious enough to warrant such action. The contemplator may remain in this stage indefinitely ("I'll quit tomorrow"), vacillating back and forth about whether to change (barring such unforeseen circumstances as those mentioned above), thereby reflecting the ambivalence and motivational conflict that are so characteristic of this stage.

In the "determination" or "decision" stage, the balance tips in favor of change (for whatever reasons, whether internal or external), and the individual "shops around" in typically human fashion for the easiest, quickest, and most painless and face-saving way to change. In the "initial action" stage, the individual makes an active attempt to do something about the problem behavior, either alone or with outside help. Most treatment programs are geared toward this stage (i.e., establishing abstinence) and are generally not prepared to deal with people in earlier or later stages of change. The "maintenance" stage Is the real challenge in overcoming addictions. For example, it is usually much easier to stop using cocaine than it is to stay permanently stopped. The challenge during this stage is to consolidate gains already made, to continue making positive gains, and to avoid relapse.

The most important goal in the early sessions is to join with the patient around shared goals and to instill trust and hope by conveying understanding, empathy, respect, and confidence. Adopting an objective wait-and-see attitude or joining the resistance may facilitate the therapeutic alliance. The first step in

treatment (establishing total abstinence) is often quite a bit ahead of where the entry-level patient is ready to begin. Part of the inhibition that counselors feel about working at this stage of treatment with outpatients may stem from what we call “enabling phobia.” By refusing to work with patients who do not immediately curtail all drug use and admit to having a lifelong disease, counselors miss the opportunity to facilitate the patient’s progress through the initial decisionmaking phases of change, and they miss opportunities to help patients avoid more severe suffering and damage that will result from continuing drug use. (What other field of health care encourages its practitioners to tell patients they can benefit from treatment only after they deteriorate further and suffer intolerable pain?)

The clinician must be willing and able to start where the client is, recognizing fully that at the beginning of treatment the program and the patient are not always focused on the same goal. Frequently, the patient’s hidden agenda is to eliminate the consequences of cocaine use without eliminating the cocaine use itself; in addition, many cocaine addicts do not want to stop using alcohol and/or marijuana. Clinicians must avoid getting locked into power struggles around these and other thorny issues that arise with resistant patients (Zweben 1989). Rather than insisting on absolute compliance, the clinician can form a therapeutic alliance with the patient around a proposed trial period of total abstinence, which is explained as necessary to assess the nature and extent of the patient’s attachment to psychoactive drugs. Not every cocaine addict who appears at the door of a drug clinic is ready to enter a full-scale intensive treatment program. For example, some patients need intensive individual counseling before they are ready even to consider entering a group or full-scale program. Others require education and feedback about their drug involvement before developing sufficient motivation to sustain and make use of more intensive treatment.

The Washton Institute’s program attempts to address this need by offering an 8-week basic training course (called Substance Abuse Treatment for People Who Don’t Think They Need It). Patients are asked to remain totally drug- and alcohol-free throughout the course while they realistically explore the nature of their attachment to psychoactive drugs. By putting the emphasis on examining the patient’s attachment to drugs rather than insisting that he or she accept the identity of “addict,” a therapeutic alliance can be formed around this "time-limited experiment” by giving the counselor a golden opportunity to join rather than fight the patient’s resistance. Patients attend a basic training class (group) twice a week and document their abstinence with supervised urine and breathalyzer tests. Patients who complete this course then may be eligible to enter the full-scale intensive outpatient program or to receive other supportive services.

Counselors must be careful not to convey low expectations and promote a self-fulfilling prophecy of treatment failure with patients who are at first poorly motivated and resistant to accepting your view of *their* problem. No one has a crystal ball for predicting treatment outcome, and first impressions can be deceiving. For example, many patients who are extremely resistant at first become very involved with the recovery process.

The challenge is to work creatively with (not against) the patient's resistance to bring about change (Zweben 1987). Resistance is to be expected: It is one *focus* of the therapeutic work, not a distraction. It is essential that the counselor meet the patient at least halfway to get the treatment going, because success in this effort rests on cooperation, not coercion.

A useful metaphor to describe the respective roles of the patient and counselor is that of a hiker and guide setting out together on a mountain trail. The role of the guide is just that-to guide, not to carry or control, the hiker along the trail; to keep the hiker moving in the right direction; to alert him or her to potential dangers; to teach basic survival skills: to motivate and encourage, especially when the going gets tough; and to respectfully correct mistakes. However, the hiker will have to take each and every step on the climb and exert his or her own energy and determination along the way to reach the desired destination.

BONDING

An outpatient program constantly competes for the patient's loyalty and attention with the ever-present lure of cocaine. Because the treatment can be effective only if the patient shows up, getting new patients to bond quickly to both their clinician and group is critical. All group members in the authors' program are supplied with a continuously updated telephone list and are encouraged to make contact with at least two other members every day. When patients miss an individual or group session, the clinician calls immediately after the session, and other group members are urged to call as well. It is critical that outpatients know that their attendance at all scheduled sessions is absolutely essential and that when they fail to show up they are definitely missed.

URINE TESTING

Urine testing is essential in outpatient treatment. It helps to create a safe environment for the patient, to enhance trust between the clinician and patient, and to provide an objective measure of treatment progress. The purpose of urine testing is not to catch patients in lies but to instill greater confidence in the treatment. Cocaine addicts usually appreciate the value of mandatory

urine testing because it helps them counteract their impulses to use and to hide their use. Not being able to hoodwink the clinician or the program can keep a patient from devaluing his or her treatment. And, with accurate urine surveillance, family members and employers can breathe a little easier and be more supportive of the recovering outpatient when they no longer feel the need to scrutinize his or her every move for signs of possible drug use.

The following steps should be taken to maximize the clinical value of urine testing: (1) All samples should be supervised (witnessed) to prevent falsification. The practical problem of having sufficient staff members to supervise urine samples can be overcome by, for example, a buddy system in which patients give urine under the rotating supervision of a same-sex group member who signs for having monitored that sample. (2) Urine samples should be taken routinely at least every 3 to 4 days so as not to exceed the sensitivity limits of standard laboratory testing methods. (3) Samples should be tested by enzyme immunoassay or radioimmunoassay methods to ensure accuracy, and all positive results should be confirmed by a second test (Verebey 1987). (4) The samples should be routinely tested not only for cocaine but also for amphetamine, opiates, marijuana, benzodiazepines, and barbiturates, (5) Patients should be tested throughout the entire treatment program and not be taken off urine testing until solidly in recovery. Even then, occasional testing can be helpful.

COCAINE AND COMPULSIVE SEXUALITY

As many as 70 percent of cocaine addicts entering the institute's treatment program are dually addicted cocaine and sex (Washton 1989*b*). Cocaine-related compulsive sexuality contributes to chronic relapse, treatment failure, and perpetuation of high-risk sexual behaviors that may foster the spread of acquired immunodeficiency syndrome. Undiagnosed and untreated compulsive sexuality is one of the most common, preventable relapse factors in cocaine treatment today. The following are key points to consider.

The strong connection between cocaine and compulsive sexuality stems from the fact that many users experience strong sexual stimulation from cocaine, perhaps more so than from any other drug. Cocaine produces hypersexuality characterized by obsessive thoughts, feelings, and fantasies that lead to sexual acting-out behaviors of every kind. It increases libido and reduces inhibition, a dangerous combination that often sparks marathon cocaine and sex binges. These drug effects are considerably more intense when cocaine is smoked (or injected), rather than snorted, because of the substantially higher dosages that are delivered to the brain by rapid absorption methods. Since binge use, rather than daily use, is the norm for most cocaine addicts, many users manage to avoid or delay the onset of tolerance and the accompanying sexual dysfunction

associated with chronic cocaine use. To assume that all cocaine addicts are sexually dysfunctional is incorrect.

The clinician can assess a patient's cocaine-related sexual behavior by asking such specific questions as: Does your cocaine use ever involve sexual thoughts, fantasies, or behaviors? If so, during what percentage of your drug use episodes does this happen? Do you engage in any of the following behaviors while high on cocaine: compulsive masturbation, encounters with prostitutes, compulsive intercourse, compulsively viewing peepshows or pornographic movies, switching from heterosexual to homosexual sex, dressing in clothing of the opposite sex, or sadomasochistic sex? Unless asked such specific questions as these, most patients will not spontaneously volunteer information about their compulsive sexuality because they are usually too ashamed and guilty, fear being labeled as "perverts," and/or assume that their sexual behavior is irrelevant to treatment of their cocaine problem. Compulsive sexuality is more common among cocaine-dependent males than females and is more common among cocaine freebase smokers than snorters.

Sexual addiction or compulsivity is defined by the same criteria that are applied to other addictions: loss of control, compulsion, and continued involvement despite serious adverse consequences. It is the individual's pattern of sexual behavior and the degree to which it interferes with his or her functioning that define it as compulsive. No single sexual practice, no matter how bizarre, should be categorized as compulsive merely because it deviates from societal norms. (Although there is much debate about whether sexual compulsions are truly addictions, the terms are used here interchangeably.)

Drug-related compulsive sexuality must be treated directly and as a primary problem that is part of a dual addiction pattern, even when the patient had no history of compulsive sexuality prior to involvement with cocaine. The patient's sexual addiction does not automatically disappear when he or she stops using cocaine. Sexual feelings and fantasies often trigger powerful urges and cravings for cocaine. Many patients become trapped in a "reciprocal relapse" pattern in which compulsive sexual behavior precipitates relapse to cocaine and vice versa.

Although both addictions must be treated, abstinence from cocaine and all other psychoactive drugs is the first and foremost goal of early treatment. Until total drug abstinence is established, it is impossible to address the sexual addiction. The authors ask the dually addicted patients to completely refrain from all sexual activity during the first 30 days of treatment. This gives the clinician an opportunity to teach patients how to differentiate between "normal" and compulsive/addictive sex, how to identify sexual relapse triggers, and how

to respond to them safely. We have generally found that sexual issues are best handled in same-sex groups with same-sex therapists.

HANDLING "SLIPS"

Clinicians working in outpatient settings must be prepared to deal therapeutically with patients who are actively using drugs and with those who return to using one or more times after temporary periods of abstinence. All such slips are best avoided, but should they occur, they must be addressed as mistakes and motivational crises rather than tragic failures or willful noncompliance (Marlatt 1985). Slips can be valuable learning experiences (although always dangerous and never encouraged), especially when the patient is helped to figure out why the slip happened and how to prevent it from happening again. Slips often turn out to be much more effective than lectures, for example, in convincing resistant cocaine addicts to stop using alcohol or marijuana.

Many programs adopt inflexible, "get tough" attitudes about patients who slip. It is common practice to summarily terminate patients who fail to maintain complete abstinence within the first few days or weeks of outpatient treatment. The patient who has one or more slips is often labeled an outpatient failure and told to go into a residential program. Although it is a delicate balancing act to avoid being an enabler on the one hand, and a hard-liner on the other, it hardly seems appropriate to terminate the patient for engaging in the very behavior that brought him or her to treatment without first making a concerted effort to figure out more precisely why drug use is continuing. Saying that the patient is "unmotivated" or "noncompliant" is an inadequate explanation. Studies have repeatedly shown that the longer addicts stay in treatment, the better they do (Washton 1989*c;* Cooper et al. 1983). Most dropouts in outpatient programs occur within the first 60 days. Thus, keeping patients in treatment through this difficult startup period, despite initial slips and relapses, can markedly improve the chances of a successful outcome.

How should clinicians respond when a patient says that he or she has used drugs or a urine test indicates that this is so? How many slips are too many for a program or group to tolerate? It is essential to point out discrepancies between a patient's stated intentions (e.g., "I want to stop using drugs") and his or her actual behavior (drug use). A group member who repeatedly slips and then fails to utilize the group's or clinician's advice should be temporarily suspended from the group and seen individually to work through motivational problems and establish a period of continuous abstinence (e.g., 30 days) before earning the privilege to reenter the group. It is counterproductive to specify in advance exactly how many slips or positive urines will lead to suspension from the group since this is tantamount to giving group members

permission to have one less slip than this specified number. In making such decisions there are no pat formulas or other substitutes for the clinician's good clinical judgment combined with the collective wisdom of the group.

SELF-HELP

Treatment, no matter how effective, is time limited and often leaves a void in the patient's life that substantially increases the potential for relapse. The 12-step programs of CA, NA, and AA have been helpful to many thousands of addicts throughout the world, and it is generally wise to encourage all patients to at least try to get involved with one or more of these self-help fellowships. Despite encouragement, however, many patients reject self-help and either flatly refuse to attend meetings or fail to attend them for very long. This is another area in which the clinician must avoid getting into power struggles and must look instead for ways to creatively work through, rather than attack, the patient's resistance. For example, strong rejection of self-help can be used as an opportunity to explore the patient's resistance to the recovery process as a whole (Zweben 1987). Although one's chances of sustained recovery are likely to improve with self-help involvement, there is no basis for insisting that self-help presents the one and only pathway to permanent change. It is regrettable that some programs either directly or indirectly drive out of treatment cocaine addicts who refuse self-help.

IS OUTPATIENT TREATMENT EFFECTIVE?

A recent uncontrolled study at this facility compared treatment outcome following either inpatient or intensive outpatient treatment in 60 drug addicts, most of whom were employed cocaine or crack addicts. Forty actively addicted patients came directly into our intensive outpatient program. The remaining 20 patients entered our outpatient aftercare program, where they joined graduates of the intensive outpatient program after completing 28 days or longer of inpatient treatment at various facilities in the New York metropolitan area and elsewhere. Patients in this study represented 60 consecutive admissions to our programs who remained in treatment for at least 2 weeks. All met DSM-III-R criteria (American Psychiatric Association 1987) for severe psychoactive drug dependence. Eighty-five percent were cocaine addicts and were about evenly divided between cocaine snorters and crack smokers. The remaining 15 percent were addicted to opiates or sedative-hypnotics,

Nearly all these patients used alcohol and/or marijuana in combination with their drug of choice. Ninety percent were employed at jobs ranging from blue-collar worker to office worker to executive. Whether a given patient received primary inpatient or outpatient treatment was determined in most cases by insurance coverage and whether he or she happened to contact the outpatient

program initially or was in one of the inpatient rehabilitation programs that later referred the patient to the institute for aftercare. Few patients had deliberately chosen one type of treatment over the other. Most were following the recommendations of a family member, employee-assistance counselor, or treatment professional. Although numerous uncontrolled selection factors (both clinical and nonclinical) affected whether a given patient received inpatient or outpatient treatment, the clinical profiles of the two comparison groups were strikingly similar with regard to drug use, addiction severity, employment status, previous treatment history, and other relevant patient characteristics.

The results were as follows: Aftercare completion rates were nearly identical for inpatients (77 percent) and outpatients (74 percent) as were posttreatment abstinence rates: 68 percent of the outpatients and 64 percent of the inpatients were abstinent at 6- to 24-month followups according to urine tests and clinical interviews. Nearly half (46 percent) of the abstinent patients were continuously abstinent during the entire treatment and followup period. Thirty-three percent slipped at least once to their primary drug, and 23 percent slipped at least once to alcohol or marijuana but not to their primary drug. Premature dropout was synonymous with relapse: Among relapsed patients, none had completed treatment, whereas among abstinent patients, 87 percent were treatment completers. Cocaine smokers showed significantly lower, albeit decent, abstinence followup rates (58 percent) compared with cocaine snorters (78 percent), but followup rates for both types of users were similar with inpatient compared with outpatient treatment.

Because of the small subject sample and other limitations in methodology, results of this study are suggestive, not conclusive. The findings indicate that (1) employed cocaine and crack addicts can be treated successfully in inpatient or outpatient programs that are followed by intensive aftercare treatment emphasizing relapse prevention, and (2) intensive outpatient treatment can be a cost-effective alternative to inpatient care for many of these patients.

FINAL COMMENT

This chapter describes strategies for treating cocaine and crack addicts as outpatients. Intensive outpatient treatment, although not for everyone, can be an effective primary treatment modality for many patients. It is an appealing alternative to residential care not only for reasons of cost and convenience, but also because it supports patients while they are involved with the critical tasks of learning and practicing drug-free coping skills in a real-life setting.

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Comorbid Psychiatric Disorders and Cocaine Abuse

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BACKGROUND

An increased prevalence of psychopathology in both treatment-seeking and community populations of substance abusers has been repeatedly documented, with affective disorders and personality disorders the most common diagnoses (Hesselbrock et al. 1985; Khantzian and Treece 1985; Powell et al. 1982; Rounsaville et al. 1982, 1986, 1987; Schuckit 1985; Ross et al. 1988). By and large, psychopathology is associated with poor prognosis (Hesselbrock et al. 1985; Rounsaville et al. 1982, 1986, 1987). With the exception of depression in women alcoholics, who have been found to respond better to treatment than their nondepressed counterparts (Schuckit and Winslow 1972; Rounsaville et al. 1987), increased psychiatric severity predicts poor treatment outcome regardless of treatment modality. However, studies of treatment also point to the importance of providing specific treatments to addicts or alcoholics with specific psychiatric disorders to improve treatment outcome (Kranzler and Liebowitz 1988; Rounsaville et al. 1985; Rounsaville and Kleber 1985; Woody et al. 1985). The addition of professional psychotherapy to standard methadone maintenance treatment, for example, has been shown to improve treatment outcome for psychiatrically impaired patients (Rounsaville and Kleber 1985; Woody et al. 1983; McLellan et al. 1983); the use of antidepressant medications as an adjunct in treatment for persistently depressed alcohol- or opioid-dependent patients also has led to improved outcome (Kranzler and Liebowitz 1988; Rounsaville et al. 1985).

Although high rates of psychopathology have been documented in persons with alcohol and opiold disorders and although the relationships of psychopathology, prognosis, and differential effects of treatment are well documented in those disorders, considerably less attention has been paid to these issues in cocaine abusers. Specific areas that require further clarification include the following:

1. Is there an increased prevalence of psychiatric disorders among cocaine abusers compared with non-substance abusers?

2. How do rates of psychopathology among cocaine abusers compare with rates in other substance abusers?

3. Which psychiatric disorders are found most frequently among cocaine abusers?

4. Does psychopathology differentially affect prognosis or response to treatment?

Several theoretical issues color expectations about the relationship of cocaine abuse and psychopathology. Sociological theories on deviance would suggest that when use of a specific drug is particularly deviant in the population, users of the drug will be deviant in other respects, and greater rates of psychopathology will be found in users. Thus, with regard to cocaine, since its use is more widespread in the general population than is opioid abuse, one might expect to find less psychopathology in cocaine abusers. In contrast, given the pharmacologic properties of cocaine, high rates of psychopathology might be expected among cocaine abusers. Prolonged use of stimulants, including amphetamine or cocaine, can lead to paranoid states and has been associated with prolonged anhedonia and affective disturbances (Gawin and Ellinwood 1988). High rates of psychopathology in cocaine abusers also would be expected if cocaine is used, as many investigators suggest, to self-medicate underlying psychiatric disorders. For example, Khantzian and Khantzian (1984) believe that cocaine is used to (1) combat fatigue, depletion, depression, boredom, or emptiness; (2) increase assertiveness, self-esteem, and/or frustration tolerance; or (3) augment a hyperactive lifestyle and an exaggerated need for self-sufficiency. Rather than indicating any causal association, high rates of psychopathology in treatment-seeking cocaine abusers might be a result of Berkson's bias (ie., cocaine abusers with comorbid psychopathology are more likely to seek treatment than those without psychopathology, leading to a spurious increased prevalence of psychopathology in treatment seekers). However, an increased rate of psychopathology among cocaine abusers in epidemiologic studies of community samples would provide strong support for a clinically significant association,

This chapter first reviews the findings from several studies on comorbidity of psychiatric disorders in cocaine abusers, then discusses in somewhat greater detail the findings from the authors' comorbidity study, and finally links these findings to treatment implications.

STUDIES OF PSYCHOPATHOLOGY AMONG COCAINE ABUSERS

Several studies have investigated the association between cocaine abuse and psychopathology in both treatment-seeking and community populations (table 1). Methodological differences, including use of standardized and nonstandardized diagnostic assessments and employment of both specified and unspecified diagnostic criteria, limit the comparability of the studies and help explain some of the differences found among them. In one of the early studies of psychopathology among treatment-seeking cocaine abusers, Helfrich and colleagues (1983) reviewed the clinical records and Minnesota Multiphasic Personality Inventory profiles of 136 treatment-seeking cocaine abusers: 43 percent experienced major psychological symptoms, Including suicide attempts or psychotic symptoms. Chitwood and Morningstar (1985) used a structured interview to study 95 treatment-seeking cocaine users and a community sample of 75 non-treatment-seeking cocaine users who were located using a snowball technique. Compared with the community sample, treatment seekers reported more long-term depression (34 vs. 11 percent), as well as a higher intensity of use and more adverse consequences associated with cocaine use (e.g., job loss, separation or divorce, and drug overdose). These findings suggest that the occurrence of depression and other drug-related problems leads cocaine users to seek treatment.

Other studies of treatment-seeking cocaine abusers also have documented high rates of psychopathology, especially affective and anxiety disorders, childhood attention deficit disorder (ADD), and personality disorders. Gawin and Kleber (1986) used the Diagnostic Interview Schedule to evaluate 30 treatment-seeking cocaine abusers—33 percent met criteria for depressive disorders (13 percent, major depression; 20 percent, dysthymia) and 17 percent for cyclothymia; 3 percent had adult residual ADD. In Weiss and coworkers' (1986) study of 30 cocaine abusers hospitalized at McLean Hospital, 53 percent of the sample were reported to suffer from affective disorders (20 percent, major depression; 17 percent, cyclothymia; 7 percent, bipolar disorders; 10 percent, atypical depression). Their findings were based on psychiatric clinical interviews, the symptom checklist, the Beck Depression Inventory, and the Hamilton Depression Rating Scale. A subsequent study (Weiss et al. 1988) compared the findings in the first 30 patients with the next 119 patients admitted to the same hospital facility and documented a marked decline over time in the prevalence of affective disorders (from 53 percent in 1980-82 to 21 percent in 1982-86). Antisocial personality (ASP) disorder, which had been found in 3.3 percent of the first 30 patients, was found in 19.3 percent of those admitted in 1982-86. A history of childhood ADD was found in 4.6 percent; overall, 16 percent of patients suffered from cyclothymia or bipolar disorder. The McLean studies also documented significant differences in rates of psychopathology in men compared with women cocaine abusers

TABLE 1. *Studies of psychopathology among treatment-seeking cocaine abusers*

Study Investigators	Sample Size	Setting	Diagnostic Instrument	FIndIngs
Helfrlch et al. 1983	136	Outpatient	Clinical data; MMPI	43% major psychological symptoms
Chitwood and Morningstar 1985	170	Outpatient (TS and CC)	Structured Interview	Compared with CC, TS reported more long-term depresslon (34 vs. 11%), higher Intensity of use, and more adverse consequences (job loss, separatlon or divorce, overdose)
Gawin and Kleber 1986	30	Outpatient	DIS	13% major depression, 20% dysthymic, 17% cyclothymla, 3% residual ADD
Weiss et al. 1988	30	Inpatient	Psychiatrlc interviews; SCL-90, BDI, HDRS	20% major depression, 17% cyclothymla, 7% bipolar, 10% atypical depression
Weiss et al. 1988	149	Inpatient	Psychiatric interviews; SCL-90, BDI, HDRS	53% affective disorders (1980-82), 21% affective disorders (1982-86), 3.3-19.3% ASP, 4.6% ADD, 16% cyclothymia or bipolar
Griffin et al. 1999	129	Inpatient	Psychiatric Interviews; SCL-90, BDI, HDRS	23.5% women and 4.2% men with major depression, 22% men with ASP vs. 0% women with ASP, 18% cyclothymla or bipolar
Nunes et al. 1989	30	Outpatient	SCID, atypical depression scale, HDRS	30% lifetime bipolar spectrum, 33% unlpolar depression, 31% anxiety disorders

KEY: MMPIMinnesota Multiphasic Personality Inventory; TS=treatment Seeking; CC=community controls; DIS=Dlagnostlc Interview Schedule; ADD=attention deflclt disorders; SCL-90=Symptom Checklist 90; BDI=Beck Depression Inventory; HDRS=Hamilton Depression Rating Scale; ASP=antlsoclal personality; SCID=Structured Clinical Interview for DSM-III

(Griffin et al. 1989). Women constituted approximately 25 percent of patients admitted to the hospital for cocaine treatment. Major depression was found in 23.5 percent of women compared with 4.2 percent of men, whereas ASP disorder was found in 22 percent of men and no women. Depression also was found to improve more slowly in female compared with male patients.

Weiss and colleagues (1988) noted that patients with cyclothymia typically reported cocaine use at a time of hyperthymic rather than depressed mood and suggested that cocaine is used to augment the high or to prevent the depressed mood or that the use is a result of impaired judgment associated with hypomania. Family history data collected as part of the study documented a greater prevalence of affective disorders in family members of hospitalized cocaine abusers with affective disorders compared with family members of patients without affective disorders.

The failure in the McLean studies to use a structured interview and clearly specified diagnostic criteria may have contributed to the marked change in prevalence of affective and ASP disorders during the two periods—the change in prevalence might reflect a drift in the diagnostic interview or diagnostic criteria rather than a trend in diagnosis. A decline in the prevalence of affective disorders over the two periods (but not the increase in ASP disorder), however, also would be consistent with the deviance theory discussed above. Cocaine abusers hospitalized from 1980-82 began their cocaine use in the early to mid-1970s when cocaine use was not widely prevalent in the general population; those hospitalized from 1982-86 likely began their use in the late 1970s and early 1980s when cocaine use was much less deviant,

More recently, Nunes and coworkers (1989) reported the results of their evaluations of 30 consecutive admissions to an outpatient cocaine treatment program. They used the SCID and an atypical depression scale to determine psychiatric diagnoses. Fifty percent of the patients were found to have current affective disorder, and lifetime affective disorders were found in 83 percent. Thirty percent of patients experienced lifetime bipolar spectrum disorders, mainly of the depressed subtype, and 33 percent experienced primarily unipolar depression. Overall, 27 percent experienced atypical depression, and 80 percent experienced other substance use disorders. Thirty-one percent of the sample experienced anxiety disorders, including 12 percent suffering from social phobia. There was a trend suggesting that a family history of depression was more likely in depressed cocaine abusers than in nondepressed cocaine abusers. The investigators suggested that cocaine might be used by patients with social phobia to bolster their self-confidence and by those with depression to ameliorate their depressive symptoms.

Although the findings of an increased prevalence of psychopathology among treatment-seeking cocaine abusers might result from Berkson's bias, epidemiologic studies of non-treatment-seeking adults also document an increased co-occurrence of psychopathology in cocaine users compared with nonusers (table 2). Kandel and associates (1985) reported on the results from a community survey of 1,325 young adults in New York State who participated in earlier studies while still in high school. Based on a structured interview, thelr cross-sectional survey revealed that women cocaine users were less happy and had higher rates of psychiatric hospitalization compared with women who did not use cocaine. No association was found between depression or psychiatric hospitalization and cocaine use among males. Newcomb and colleagues (1987) studied a community sample of 739 young adults in Los Angeles County, approximately one-third of whom came from minority groups. They utilized a 7-point scale to assess intensity of cocaine use and a brief symptom checklist to assess anxiety and depressive symptoms. In their sample, 34 percent reported cocaine use (37 percent of the men and 34 percent of the women), and 5 percent reported weekly cocaine use. Symptoms of anxiety and depression were associated with cocaine use.

TABLE 2. *Epidemiological studies of psychopathology among treatment-seeking cocaine abusers*

Study Investigators	Sample Size	Setting	Diagnostic Instrument	Findings
Kandel et al. 1985	1,325	Community sample	Structured Interview	Women cocaine users are the least happy and have highest rates of psychiatric hospitalization
Newcomb et al. 1987	739	Community sample	Cocaine use 7-point scale, SCL-43, CES-D	34% use cocaine (37% men, 34% women); 5% use cocaine weekly: anxiety and depression symptoms associated with cocaine use
Anthony and Trinkoff 1969	20,862	Community sample	DIS	Lifetime major depresslon in 25.6% of cocaine abusers vs. 7.6% of those with little cocaine use; panic disorder in 15.8% of cocaine abusers vs. 1.7% of those with little cocaine use

KEY: CES-D=Communlty Epidemiology Survey-Depression

The best data regarding the co-occurrence of psychiatric and substance abuse disorders in community as opposed to treatment-seeking samples come from the epidemiologic catchment area (ECA) study (Anthony and Trinkoff 1989), which used a structured psychiatric interview (DIS) to assess psychopathology and substance use disorders in a carefully designed epidemiologic sample of adults. In the ECA study, the lifetime prevalence of drug abuse or dependence among males ages 18 to 44 was 12.5 percent. A lifetime history of major depression was found in 14 percent of men with a history of drug abuse or dependence compared with 4 percent among those with no history of drug abuse or depression. Lifetime ASP among those with drug abuse or dependence was 38 percent compared with 10 percent among those without substance abuse history. The lifetime prevalence of panic disorder was 3.2 percent among those with drug abuse or dependence compared with 0.9 percent among those with substance abuse history. ECA study data on cocaine comorbidity document an increased lifetime prevalence of major depression among heavier users of cocaine. For men ages 18 to 44 who had never used cocaine or had used cocaine one to five times, the lifetime prevalence of major depression was 7.8 percent; for those with a history of more than five times of cocaine use but no history of daily use, lifetime depression was 11 percent: men with a history of daily use for 2 weeks or more but who did not meet DSM-III criteria for cocaine abuse had a lifetime prevalence of 14.8 percent; and men with a history of cocaine abuse had a lifetime prevalence of major depression of 25.8 percent. Similarly, a lifetime prevalence of panic disorder was considerably higher in men with a history of cocaine abuse (15.3 percent) compared with men who had used zero to five times (1.7 percent), had used more than five times but never daily (2.4 percent), or had used daily for 2 weeks or more but did not meet criteria for cocaine abuse (2.3 percent). Similar rates were found with regard to patterns of use of both marijuana and heroin (tables 3 and 4).

TEMPORAL SEQUENCING OF DISORDERS

Most of the studies of psychopathology in cocaine abusers are cross-sectional and shed little light on the temporal sequence of cocaine use and psychopathology. However, McLellan and associates (1979) studied the longitudinal course of 11 persistent stimulant abusers and documented the onset of symptoms of paranoid schizophrenia in 5 of the 11 patients. Kandel and Davies (1988) have reported results, from their longitudinal study of New York State high school students, indicating that although depression predicted subsequent cigarette use (57 percent of those with depression in the initial interview reported subsequent cigarette use vs. 30 percent of those without depression), very little of the variance among subsequent cocaine users could be explained by early depression,

TABLE 3. *ECA data on comorbidity, lifetime prevalence of major depression (percent)*

Drug History	Cocaine	Marijuana	Heroin
Used 0-5 times	7.8	6.7	7.8
Used >5 times but not on a daily basis	11.0	8.0	8.7
Daily use for 2 weeks or more	14.6	13.2	17.4
Abuse/dependence	25.8	15.3	23.0

SOURCE: Anthony and Trinkoff 1989

TABLE 4. *ECA data on comorbidity, lifetime prevalence of panic disorder (percent)*

Drug History	Cocaine	Marijuana	Heroin
Used 0-5 times	1.7	1.7	1.7
Used >5 times but not on a daily basis	2.4	1.7	3.9
Daily use for 2 weeks or more	2.3	1.8	16.9
Abuse/dependence	15.3	3.2	9.2

SOURCE: Anthony and Trinkoff 1989

The most important data regarding the temporal sequencing of cocaine use and psychopathology come from the ECA studies of incidence of psychiatric disorders (Anthony and Petronis 1989, 1991). Subjects were interviewed initially and at a 1 -year followup interval to determine the incidence or new onset of psychiatric disorder. Those who reported cocaine use during the initial interview were 14 times more likely subsequently to experience a panic attack than were nonusers; users of cocaine and stimulants were 7.7 times more likely than nonusers to experience a depression syndrome: and all users of cocaine were twice as likely as nonusers to develop a depression syndrome. Somewhat surprisingly, users of cocaine only (those who did not use other stimulants) did not have a substantially increased risk of the depression syndrome (estimated relative risk of 1.1). Cocaine users also were more likely than nonusers to experience a manic episode (estimated relative odds of 11.8) or a “mania syndrome” (defined as a spell of mania, hypomania, or elation accompanied by some symptoms, such as racing thoughts, agitation, or sleep disturbance-estimated relative odds of 5.5).

THE NEW HAVEN DIAGNOSTIC STUDY

In the New Haven study conducted by the authors' group (Rounsaville et al. 1991), a consecutive sample of adults seeking inpatient treatment (n=149) and outpatient treatment (n=149) were evaluated using the Schedule for Affective Disorders in Schizophrenia lifetime version to assess research diagnostic criteria (RDC) for cocaine abuse and other psychiatric disorders, All patients met criteria for cocaine abuse or dependence. In an effort to distinguish psychiatric syndromes from transient psychiatric symptomatology associated with drug use and withdrawal, psychiatric symptoms occurring within 10 days following the last use of cocaine or other drugs were excluded in the diagnostic decision tree. Patients with a prior history of heroin dependence were excluded from the study. Sixty-nine percent of the sample was male; 64 percent was white. Most of the subjects were from lower social classes (76 percent social class 4 or 5), and most (72 percent) were single, separated, or divorced. Forty-seven percent of the subjects were intranasal cocaine users, 13 percent were intravenous users, and 40 percent smoked cocaine. The average age of the sample was approximately 26 years, and the average age of drug abuse onset in the sample was 16.6 years. Rates of psychiatric disorders did not differ significantly between the inpatient and outpatient samples so that the results have been pooled for the discussion,

Current affective disorders were found in 26.6 percent of the subjects (major depression in 4.7 percent, cyclothymia or hyperthymia in 19.9 percent, and hypomania in 2 percent) (see table 5). Current anxiety disorders were found in 15.7 percent (panic disorder in 0.3 percent, generalized anxiety disorders in 3.7 percent, and phobias in 11.7 percent). Current diagnosis of alcoholism was found in 28.9 percent. Using RDC, ASP disorder was found in 7.7 percent: using DSM-III criteria, ASP was found in 32.9 percent. A lifetime history of affective disorder was found in 61.5 percent (including a lifetime prevalence of major depression of 30.5 percent: cyclothymia or hyperthymia, 19.9 percent: mania, 3.7 percent; and hypomania, 7.4 percent). Lifetime prevalence of anxiety disorders was 22.1 percent (panic disorder, 1.7 percent; generalized anxiety disorder, 7 percent: and phobia, 13.4 percent). Lifetime history of RDC alcoholism was 61 .1 percent. The prevalence of ADD in the sample was 34.9 percent. Lifetime prevalence of schizophrenia or schizoaffective disorder was 1.3 percent.

Because subjects had been asked to date the onset of symptoms of psychiatric disorders and use of substances, the study allows evaluation of the temporal sequencing of disorders. Depressive disorders were found to precede the onset of drug abuse in approximately one-third of patients and followed the onset of drug abuse in two-thirds. Anxiety disorders preceded the onset of drug abuse in 68 percent of the patients: phobias preceded the onset of drug

TABLE 5. *New Haven cocaine diagnostic study results (percent)*

Psychiatric Diagnosis	Current Disorder	Lifetime Disorder
Major depression	4.7	30.5
Cyclothymial/hyperthymia	19.9	19.9
Mania	0.0	3.7
Hypomania	2.0	7.4
Panic disorder	0.3	1.7
Generalized anxiety	3.7	7.0
Phobia	11.7	13.4
Schizophrenia	0.0	0.3
Schizoaffective	0.3	1.0
Alcoholism	28.9	61 .1
ASP-RDC	7.7	7.7
ASP-DSM-III	32.9	32.9
ADD		34.9

SOURCE: Rounsaville et al. 1991

abuse in 87 percent of cases. Alcoholism preceded the onset of drug abuse in only 21 percent of patients. Lifetime major depression would have been diagnosed in 58.7 percent of patients if symptoms occurring within 10 days of the last use of cocaine or other drugs were included in the diagnosis, compared with the findings of lifetime major depression in 30.5 percent when symptoms that did not persist more than 10 days after cessation of use were excluded.

Like opioid abusers in prior studies (Rounsaville et al. 1982), cocaine abusers experienced increased rates of major depression, minor bipolar disorders, anxiety disorders, and ASP disorder compared with rates found in the general population. Major depression, anxiety disorders, and ASP disorder, however, were somewhat more common in opioid addicts compared with cocaine abusers. Minor bipolar disorder, alcoholism, and childhood ADD were more common in cocaine abusers compared with opioid addicts.

Both alcoholism and major depression, which were found in high rates among cocaine abusers, followed the onset of cocaine abuse in most patients, suggesting that both disorders may be a consequence of cocaine abuse. Major depression may result from both the social disruption associated with cocaine abuse as well as the pharmacologic effects of prolonged abuse. The high rates of alcoholism may result from patients' attempts to self-medicate symptoms of cocaine-induced anxiety or withdrawal and abstinence.

in the overall sample no gender differences were found in rates of major depression, which is in contrast to the findings of Griffin and coworkers (1989) and to findings about rates of depression in the community among men and women. However, within subjects recruited from an inpatient setting in the New Haven study, major depression was significantly more common among women than among men.

COCAINE ABUSE AND SCHIZOPHRENIA

In almost all studies of psychopathology among treatment-seeking cocaine abusers, including the authors' studies, the prevalence of schizophrenia and schizoaffective disorders is quite low. Rather than indicating a low prevalence of cocaine abuse in schizophrenia or a protective effect of cocaine use in preventing schizophrenia, this finding results from the exclusion of patients with schizophrenia from admission to drug treatment programs. in fact, studies document a high prevalence of stimulant use, including cocaine abuse, in patients with schizophrenia. Schizophrenic patients appear to be more prone to abuse stimulants than other drugs (Mueser et al. 1990; Schneier and Siris 1987). Although the diagnosis of cocaine abuse is often missed in clinical settings (Ananth et al. 1989) several studies document cocaine abuse in 12 to 15 percent of patients with schizophrenia (Mueser et al. 1990; Negrete et al. 1968; Siris et al. 1966; Richard et al. 1985).

High rates of cocaine abuse among patients with schizophrenia are believed to result from several factors. Many patients with schizophrenia self-administer stimulants to relieve the negative symptoms of schizophrenia (dysphoria, anergia), postpsychotic depression, or neuroleptic side effects (Dixon et al. 1990; Siris 1990). Cocaine and other substance abuse also may reflect attempts, albeit unsuccessful, at socialization.

TREATMENT IMPLICATIONS

Tricyclic antidepressants have been demonstrated to be beneficial in facilitating initial abstinence from cocaine in cocaine abusers regardless of a diagnosis of major depression (Gawin et al. 1989). Only 10 percent of the patients in Gawin and coworkers' study had major affective disorders, and the presence or absence of these disorders did not differentially affect efficacy.

Although the initial response to tricyclic antidepressants does not appear to depend on underlying psychopathology, clinically there may be some differences In how long tricyclic medications are beneficial for cocaine abusers depending on underlying psychopathology. For those without major depression, there is little rationale to continue tricyclic antidepressants beyond 6 to 10 weeks. Tricyclic antidepressants may even exacerbate cocaine use

in some patients, possibly because side effects, such as jitteriness and stimulation, may serve as conditioned cues leading to relapse (Weiss 1966). For cocaine abusers with major depression, however, it may be beneficial to continue tricyclic antidepressant use beyond the initial 6- to 10-week period to prevent recurrence of symptoms of depression. Otherwise, recurrent depression may lead to patients returning to cocaine use in an attempt to ameliorate their depressive symptoms.

Cyclothymic disorders, including mania, hypomania, cyclothymia, and hyperthymia, have been found in high rates among cocaine abusers, suggesting the possibility of utilizing specific pharmacologic interventions for these patients. Cocaine is thought to be used when patients are "high" to amplify the high and avoid the crash or depression; use also is thought to result from impulsivity and poor judgment associated with hypomania (Weiss et al. 1988). Results of studies of lithium treatment, which is effective for many cyclothymic disorders, have been conflicting. Gawin and Kleber (1984) reported that four out of five patients with cyclothymic diagnoses, treated with lithium in an open pilot study, stopped cocaine use abruptly after administration of lithium carbonate. However, Nunes and coworkers (1990) reported lithium responsiveness in one-third of cyclothymic patients treated with lithium (with response defined as 3 weeks of cocaine abstinence), but only 1 of 10 patients treated in the open pilot trial remained on lithium for any prolonged period. The possibility that there is a differential treatment response to lithium for those with mania or hypomania preceding drug abuse (27 percent of the patients) needs to be evaluated.

Cyclothymia also may reflect the affective lability characteristic of severe underlying personality disorders or atypical depression (rejection sensitivity). Although atypical depression appears to be common in cocaine abusers (27 percent as reported by Nunes and coworkers [1989]), treatment of these patients with a monoamine oxidase inhibitor (MAOI) is probably contraindicated, given the possibility of relapse to cocaine abuse and the toxic interaction of cocaine and MAOIs. Carbamazepine, which has been found to be effective in bipolar disorder and is currently under study for the treatment of cocaine abuse, also needs to be evaluated for cocaine abusers with cyclical mood disorders.

The high prevalence of childhood ADD among patients with cocaine abuse (35 percent in the authors' study, and adult residual ADD found in 7 percent of Weiss and coworkers' sample [1986]) suggests that cocaine abusers with residual ADD may be using cocaine to self-medicate symptoms. Case reports suggest that both pemoline magnesium and methylphenidate may lead to cocaine abstinence and symptom reduction in these patients (Khantzian et al. 1984; Weiss et al. 1983). However, methyiphenidate has not been shown to

be effective in unselected patients and may even exacerbate cocaine abuse by acting as a conditioned cue (Gawin et al. 1985). Further research needs to be conducted to determine whether treatment response to either methylphenidate or pemoline magnesium is related to a diagnostic subtype of cocaine abusers.

Cocaine-abusing patients with schizophrenia may benefit from several pharmacologic interventions, such as (1) neuroleptic dose reduction or change of neuroleptic (if cocaine is used to counter neuroleptic side effects), (2) neuroleptic dose increase or change of neuroleptic (to ameliorate exacerbation of psychotic symptoms associated with cocaine abuse), (3) adjunctive anticholinergic agents or amantadine (to counter neuroieptic side effects and thus reduce the need to use cocaine to counter these effects), or (4) tricyciic antidepressants (if cocaine is used to counter anhedonia, anergia, or postpsychotic depression). Siris and associates (1988) have found imipramine in conjunction with a neuroleptic effective in treating postpsychotic depression in schizophrenic patients with a history of substance abuse. The newly approved antipsychotic ciozapine, which has a low incidence of neuroieptic side effects and seems particularly beneficial in countering the negative symptoms of schizophrenia, may be particularly beneficial for cocaine-abusing schizophrenic patients. Since cocaine may be used by schizophrenic patients as a result of peer pressure in an attempt at “normal” socialization, these patients also may benefit from participation in drug-free social activities, clubs, and groups.

In addition to the search for better pharmacologic agents to treat patients with comorbid psychiatric diagnoses and cocaine abuse, a variety of psychosocial interventions also must be developed and tested. Patients with affective instability, rejection sensitivity, and borderline or ASP disorder may benefit from participation in, for example, Cocaine Anonymous or other self-help groups, in which consistent support for abstinence and 24-hour assistance from sponsors and other members may be available. Intensive, daily treatment programs also may provide the necessary level and consistency of support for these patients. As documented by McLellan and coworkers (1983) for opiate addicts with significant psychiatric symptomatology, utilization of experienced psychotherapists, rather than drug counselors, also may be beneficial for cocaine abusers with severe psychopathology.

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Clinical and Research Perspectives on Cocaine Abuse: The Pharmacotherapy of Cocaine Abuse

Thomas R. Kosten

INTRODUCTION

The development of medications to treat cocaine abuse has become a major research initiative of the National Institute on Drug Abuse (NIDA). A variety of medications already have been used to attain cocaine abstinence and to decrease relapse back to cocaine abuse (Kosten 1989). These medications generally have been selected based on two rationales, one clinical, the other neurochemical (Kosten 1989). First, because the clinical syndrome that evolves after discontinuation of cocaine binges resembles a depressive disorder, antidepressant medications may have clinical utility in alleviating this syndrome and facilitating abstinence from cocaine (Gawin and Kleber 1986). The second, neurochemical rationale follows from cocaine's effect on dopaminergic reinforcement mechanisms in the brain. Because of this dopamine connection, pharmacological agents with dopaminergic activity have been considered prime candidates for treatment of cocaine dependence. These agents might have a range of action, including either substitution or blocking agents for cocaine or agents that restore cocaine-induced neurochemical changes back to normal. These rationales are not necessarily mutually exclusive, and an antidepressant agent that reduces the clinical phenomena observed during cocaine discontinuation also might have significant dopaminergic activity that would be consistent with a neurochemicai rationale for the treatment of cocaine dependence. Other medications also have been proposed to treat cocaine dependence based on some of the other actions of cocaine, such as sensitization or its effect on nondopaminergic neurotransmitters (Kosten 1990). Examples of these agents include carbamazepine, an agent to reverse sensitization from cocaine, and gepirone, a serotonergic agonist that has antidepressant activity. Finally, agents to reduce cocaine toxicity, such as calcium channel blockers, have been examined as pharmacotherapies for cocaine dependence (Muntaner et al. 1988).

DESIPRAMINE

Although a variety of agents have been examined in uncontrolled pilot studies, randomized, placebo-controlled studies are critical in this field because a significant placebo response may occur in cocain abusers (satel and Kosten 1991). Comparatively few agents have been subjected to randomized placebo-controlled studies. The tricyclic antidepressant desipramine is the first medication to recieve substantial support for its efficacy (Gawin et al. 1989*a).* In a double-blind comparison of desipramine to lithium and placebo in 72 cocaine-abusing patients, it was found that 60 percent of the desipramine patients were abstinent for 3 to 4 continuous weeks during the first 6 weeks of treatment. In comparison, the placebo group had only 20 percent of patients abstinent and lithium only 25 percent. This was a statistically significant demonstration of desipramine's efficacy as an agent to initiate abstinence from cocaine (Gawin et al. 1989*a).* In this study there was a substantial reduction in cocaine use from a mean of 3.5 g per week down to 0.5 g per week within the first week of treatment. A statistically significant difference between the desipramine and placebo treatments at week 2 was sustained for the rest of the treatment period.

Cocaine craving also was reduced significantly with desipramine compared with placebo, although this craving reduction on desipramine did not become significantly different from the placebo reduction until week 4 or 5 in the trial. This finding was different than the original pilot studies, which suggested that cocaine craving initially was reduced by desipramine, followed by a reduction in cocaine use. Instead, it appears that a significant reduction in cocaine craving lags behind the reduction in cocaine use by about 3 weeks. Thus, the mechanism of desipramine's action in reducing cocaine abuse did not appear to be a simple anticraving agent, which subsequently led to a decrease in cocaine use.

The clinical efficacy of desipramine also has been examined in other cocain-abusing populations, including cocaine abusers who are on methadone maintenance. In a recently completed study, Kosten and colleagues (in press[*a*]) compared desipramine at 150 mg a day to amantadine at 300 mg a day and to placebo in the treatment of cocaine-abusing methadone patients, In this double-blind, randomized clinical trial, patients entered at a stable methadone dose (average 45 mg daily), and cocaine abuse was monitored using twice-weekly urines. Other outcome measures included self-reported use of cocain and assessments of cocaine craving as well as blood levels of amantadine and desipramine. Treatment retention in this methadone population was excellent, with more than 80 percent of the patients completing the full 12-week trial.

In this cocaine study (Kosten et al., in press[*a*]), cocaine craving was minimally changed by desipramine compared with placebo or amantadine. The greatest reduction in craving was found with amantadine, which dropped to 25 percent below baseline, whereas with desipramine, craving never dropped more than 15 percent belove baseline. At week 5 desipramine craving actually went 25 percent above baseline, suggesting that desipramine had no efficacy as an anticraving agent in this population. Despite this lack of efficacy for cocaine craving, cocaine use substantially declined within the first week of treatment with desipramine, with a 50-percent reduction in dollars spent on cocaine. A comparable reduction in cocaine use was found with amantadine, whereas the placebo group showed an increase in cocaine use to 140 percent above baseline through week 5. Subsequent use of cocaine by the placebo group then declined after week 5; by week 9, use was equivalent to that for the desipramine group. During weeks 10 and 11 the desipramine group showed a further decline in use, which was not shown by the placebo group. At all time points after the baseline, cocaine use by the amantadine group was less than use by the placebo group. The percentage of patients who were cocaine abstinent for at least 2 weeks was significantly greater in the amantadine group than in either the desipramine or placebo group. This increased abstinence with amantadine was found whether considering all patients who entered the study or considering only those patients who completed the 12-week treatment program. Kosten and colleagues found that, by either excluding those patients with antisocial personality disorder or focusing only on those patients with depressive disorders, deslpramine had some efficacy in reducing cocaine use, but it still did not produce a significant reduction in cocaine craving (Ziedonis and Kosten 1991). In summary, amantadine appeared to show good treatment response in this population of cocaine-abusing methadone patients, whereas desipramine failed to show a significant anticraving effect and showed a significant reduction in cocaine usage only in selected patient subgroups, as Arndt and colleagues (1990) also found.

These findings of either no change or a significant delay in reduction in cocaine craving with desipramine suggested that its potential mechanism of action in reducing cocaine use be examined more carefully. This examination was done in a laboratory study involving the administration of intravenous (IV) cocaine to subjects who were stabilized on desipramine for at least 10 days (Kosten et al., in press[*b*]). In these studies, eight challenges with IV cocaine were given, four of the challenges while on placebo desipramine, four while on active desipramine. The IV cocaine dosages ranged from 0 to 0.5 mg/kg at a fixed desipramine dosageof 150 mg daily. In these studies, the subjective effects and physiological responses to the cocaine challenges were examined.

Physiologically, it was found that the heart rate was approximately 10 beats per minute higher while maintained on desipramine than while on placebo, but this baseline change in heart rate was not associated with a substantial increase in response to acute cocaine administration. Instead, there was an attenuation in the change of heart rate with increasing cocaine doses on desipramine compared with placebo. On placebo desipramine, the heart rate change rose 12 percent from baseline at the 0.125-mg/kg dose and rose 60 percent from baseline at the 0.5-mg/kg dose. In contrast, when treated with desipramine, heart rate rose 8 percent over baseline at the 0.125-mg/kg dose and only 21 percent over baseline at the 0.5-mg/kg dose. Thus, a fairly steep dose-response curve was found for placebo desipramine, whereas for active desipramine the dose response curve was quite flat, with a slope that was four times steeper in the placebo compared with the desipramine condition.

It was thought that this substantial attenuation in physiological response also might be reflected in a reduced subjective response to cocaine while in the desipramine condition. Whereas neither high, rush, nor euphoria was attenuated during the desipramine treatment condition for any of the cocaine dosages, another measure of subjective response to cocaine—desire or craving for cocaine—as altered by desipramine, which was stimulated by the acute cocaine administration. Previous work by Jaffe and colleagues (1989) had shown that cocaine markedly stimulated the desire or craving for more cocaine. The study found that this craving for cocaine was higher at the baseline in the no-desipramine than in the desipramine condition and that the craving returned to baseline significantly more rapidly during the desipramine condition. Within 45 minutes, craving was back to baseline levels during the desipramine condition and completely fell to zero within 90 minutes. In contrast, during the no-desipramine condition, it took 90 minutes for craving to return to baseline and more than 240 minutes for it to fall to near zero levels. Thus, desipramine appeared to reduce the duration of desire for cocaine and perhaps reduce the priming effect of a single dosage of cocaine, which may lead to relapse.

Similar findings have been described by Fischman and coworkers (1990) in examining acute cocaine responses in desipramine-stabilized patients. In addition, they found a reduction in euphoria and high in the desipramine condition, but their design suffered from a lack of placebo control for the desipramine condition. Further work should examine this issue clearly and also look at the possible interaction between the attenuated physiological responses and the reduced subjective effects of acute cocaine dosing. Clearly, this conceptualization of craving is different from asking patients about level of craving over the previous 24 hours, and this more general assessment of craving used during clinical trials may not be related to the acute craving that occurs soon after using cocaine (Gawin et al. 1989*a;* Kosten et al., in press[*a*]).

BUPRENORPHINE

Other agents also have been examined in the treatment of cocaine abuse. Most prominently, recent work with buprenorphine has demonstrated the utility of this agent in the cocaine-abusing opioid addict (Kosten et al. 1989*a,* 1989*b).* Because this population has not responded particularly well to desipramine (Kosten et al., in press[*a];* Arndt et al. 1990), it Is important to find agents for this high-risk population that is spreading acquired immunodeficiency syndrome by IV cocaine abuse (Kosten et al. 1987). In a 1-month trial comparing 41 patients on buprenorphine with 60 patients on methadone, it was found that the rate of illicit cocaine in urines for the methadone sample was more than 25 percent, whereas the rate of illicit cocaine urines in the buprenorphine sample was less than 3 percent. This almost tenfold difference was statistically significant and strongly suggested the clinical utility of this approach (Kosten et at. 1989*a).* Patients who were abusing cocaine were switched onto buprenorphine; in a crossover of 12 patients from methadone, 5 who were shown to be abusing cocaine in up to 70 percent of their urine samples stopped their cocaine abuse; 1 patient reduced his cocaine use by 50 percent. The other six patients did not show any cocaine use either on methadone or when switched over to buprenorphine (Kosten et al. 1989*b).*

Double-blind, randomized clinical trials are under way examining the efficacy of buprenorphine vs. methadone for opioid as well as cocaine abuse. Although a recent study examining pharmacological efficacy of buprenorphine found no difference between methadone and buprenorphine in the rate of cocaine-positive urines during a 6-month outpatient trial (Johnson et al. 1990), some methodological issues need to be considered in its interpretation. Because of poor treatment retention and a lack of concurrent psychosocial interventions accompanying the use of methadone or buprenorphine, this issue of efficacy for cocaine abuse remains to be examined in a more intensive intervention setting.

OTHER AGENTS

Other agents that have been examined in pilot studies include mazindol, sertraline, flupenthixol, calcium channel blockers, and antiseizure medications such as carbamazepine. Pilot work with mazindol in eight cocaine-abusing methadone patients demonstrated a substantial reduction in craving and use of cocaine within 1 week, which was sustained for a month (Berger et al.1989). However, a subsequent crossover study by Diakogiannis and colleagues (1991) failed to demonstrate a significant difference from placebo, although this study was limited by potential carryover effects, a short duration of treatment (1 week), and a special population of methadone-maintained cocaine abusers.

Pilot work with sertraline, a serotonin uptake inhibitor, has appeared quite promising, with a reduction in cocaine use equivalent to that found in desipramine studies (Gawin et al. 1989*a).* Interestingly, the cocaine-craving assessments were higher than those found in placebo treatments during the first 4 weeks of treatment with sertraline, whereas cocaine use had essentially stopped. Thus, sertraline appeared to be stimulating reported craving, yet at the same time reducing cocaine usage. This association raises further interesting questions about assessments of craving as well as the relationship between cocain craving and cessation of cocaine use.

Another interesting agent has been the recent work with flupenthixol by Gawin and colleagues (19896). This injectable, long-acting dopamine antagonist was found to significantly improve retention in treatment as well as to decrease cocaine craving and use among crack abusers in the Bahamas. Because of its long-acting formulation, it can be given as infrequently as every 2 weeks. This may be a significant clinical advance as well as an important basic finding, because it is a dopamine antagonist that has shown efficacy. Animal studies have suggested that dopamine antagonists should be effective treatment agents, but to date none have been useful in human cocaine addicts, Thus, this antagonist provides an important link between animal and human pharmacology.

Finally, agents to reduce cocaine toxicity have been examined, including the calcium channel blocker nifedipine. In studies by Muntaner and colleagues (1988), it has been found that nifedipine reduces the acute effects of cocaine and attenuates cocaine-induced high and euphoria. It also may reduce cardiac toxicity from cocaine and be particularly useful in those patients who develop cardiac complications from cocaine usage. Other work with antiseizure medications, particularly carbamazepine, by Halikas and colleagues (1989) and Kuhn and colleagues (1990) has suggested that these agents may be useful in reducing cocaine craving and use. Although a double-blind, randomized clinical trial is not yet available on the efficacy of these agents, a variety of animal studies have suggested that these agents may be useful in reducing the sensitization produced by cocaine. Controlled trials of carbamazepine are clearly indicated.

CONCLUSIONS

Overall, a variety of agents have been developed for the treatment of cocaine dependence, and although few of them have been tested for efficacy in randomized clinical trials, they hold much promise for future treatments of cocaine-dependent patients. An important consideration in the future development of pharmacotherapies for cocaine dependence involves the

matching of patients to appropriate pharmacological treatments based on stages of recovery as well as predisposing and vulnerability factors such as psychopathology (e.g., major depressive disorder and possibly antisocial personality disorder).

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Medications Development at the National Institute on Drug Abuse: Focus on Cocaine

*David N. Johnson and Frank J. Vocci**

HISTORY

Congress passed the Anti-Drug Abuse Act of 1988 as a legislative response to the current drug epidemic. Cocaine and crack use was an important consideration in the development and passage of this legislation,

Cocaine has been reported to be the third most commonly abused drug, after alcohol and marijuana (Kosten et al. 1987). Epidemiological surveys indicated that, in 1988, 11 percent of the U.S. household population had used cocaine one or more times in their lives, 4 percent in the past year, and 2 percent in the past month (Alcohol, Drug Abuse, and Mental Health Administration 1990*a).* These figures are probably an underestimate of the problem because they represent a sample of only households and do not include other populations, such as those in prisons and street people, who are known to be heavy users of illicit substances. Furthermore, these surveys are self-reporting and thus have the potential to be skewed by respondents' lack of truthfulness.

In recent years, smoking cocaine has become more prevalent, Crack emerged in 1983 in the Bahamas as a cheaper, high-quality substitute for "freebasing," which required elaborate equipment and flammable solvents. Crack was easily produced by mixing cocaine with baking soda and water. It was easier to handle and use and produced a more rapid and intense euphoric effect. Approximately 31 percent of cocaine users in the 1988 National Household Survey on Drug Abuse indicated they had smoked crack within the past year. Although the ratio of male to female users of intravenous or intranasal cocaine administration has

*The opinions expressed in this chapter are those of the authors and do not necessarily reflect the opinions or policies of NIDA.

remained relatively constant at 2:1, the introduction of crack has resulted in a more acceptable form of drug-taking for women, and the ratio of men to women abusers has narrowed closer to 1.5:1 (Alcohol, Drug Abuse, and Mental Health Administration 1990*b).*

The 1988 legislation authorized up to $2.7 billion for all Federal activities in the "war on drugs." The National Institute on Drug Abuse (NIDA) received almost $300 million for use in data collection, treatment evaluation, demonstration projects, and, for the first time, the development of new and improved medications to fight drug abuse.

Of the $2.7 billion, $10 million was allocated for medications development. In subsequent years, the budget for medications development has increased as programs have been initiated and studies funded.

MEDICATIONS DEVELOPMENT

The new legislation involved the establishment of a new division within NIDA. In 1989, the Medications Development Division (MDD) was outlined, although it did not become official until 1990 (Alcohol, Drug Abuse, and Mental Health Administration 1990*c).* Its goals include the following:

1. Conducting necessary studies to identify, develop, and obtain Food and Drug Administration (FDA) marketing approval for new medications for the treatment of drug addiction and other brain and behavioral disorders

2. Developing and administering a national program of basic clinical pharmaceutical research designed to develop innovative biological and pharmacological treatment approaches for addictive disorders

3. Establishing a close working relationship with pharmaceutical and chemical companies in the United States and abroad and with medication development programs that may be found in other agencies in the United States or abroad

4. Developing a specific medication to treat cocaine overdose

MDD is currently one of six divisions within NIDA. It is composed of the following branches: Chemistry/Pharmaceutics, Pharmacology/Toxicology, Statistics, Regulatory Affairs, and Clinical Trials.

Working with pharmaceutical companies, academia, and other Government agencies, MDD plans to identify and develop up to eight new chemical entities per year. At a recent American Chemical Society

meeting on drug abuse, Dr. Duncan Taylor (senior research fellow at Bristol-Myers Squibb) stated that MDD is "the Manhattan Project for chemists in the war on drugs" (Waldrop 1989). Taylor's company currently is cosponsoring with NIDA the clinical trials of a new drug that may be of use in the treatment of cocaine abuse.

The development of these compounds can be a long and costly procedure. The Pharmaceutical Manufacturers Association has estimated that the average time and cost for a new chemical entity to be developed, from synthesis to marketing, is 7 to 11 years and $120 million (NIDA launches $20 million . . . 1988-1989). MDD has received some assurance from FDA that cocaine dependence treatments will receive expedited review. Furthermore, the treatments may be eligible for Subpart E classification (reserved for diseases that produce mortality or serious irreversible morbidity).

From a scientific and regulatory standpoint, there are three possible indications that would be useful in the treatment of dependence: (1) initiation and facilitation of abstinence, (2) treatment of cocaine-specific withdrawal symptoms (e.g., anhedonia), and (3) prevention of relapse to drug-seeking behavior.

There is currently no approved pharmacologic adjunct to the management of cocaine dependence. In outpatient clinical trials, the dropout rate is high. It has been estimated that relapse rates as high as 50 percent within 1 to 2 weeks occur in addicts (Gawin and Kleber 1988; Weddington et al. 1991). Thus, initiation or facilitation of abstinence can likely be demonstrated in 6- to 8-week trials when the right medicine is found.

There are three possible types of medications that would be of value in facilitating abstinence. The first type of medication would be limited agonist therapy (e.g., cocaine chewing gum) that may help the addict stay off cocaine. Another example of limited agonist activity would be a delayed-release sympathomimetic anorectic. (It is not clear whether substitution therapy, albeit limited, will have a salutary effect on this disorder. Moreover, the duration of therapy for this phase of treatment is unknown.)

The second type of potential treatment would be a medication that reverses or ameliorates biochemical alterations in the central nervous system and, as a consequence, reduces or eliminates cocaine intake. The "dopamine-deficit" hypothesis of Dackis and Gold (1985) and its proposed reversal by bromocriptine is an example of a potential therapy by increasing dopaminergic tone.

The third type of potential agent that might be of value in the facilitation of abstinence would be a cocaine antagonist. Such a treatment could be a true pharmacologic antagonist or could indirectly block the reinforcing actions of cocaine. The hypothesis is that an antagonist would facilitate extinction of drug-seeking behavior by reducing or eliminating the reinforcing/subjective effects of cocaine. Compliance problems may be anticipated with such a medication. A depot intramuscular dosage form may have to be developed for this purpose.

The usual manifestations of physiological withdrawal (hypertension, tachycardia, diaphoresis, piloerection, cramps, and seizures) seen in opiate or barbiturate addicts are not present in cocaine abusers. However, Gawin and Kleber (1988) have reported that cocaine abstinence results in the gradual onset of a significant protracted dysphoric syndrome, including decreased activation, amotivation, depression, and intense boredom with limited pleasure from the environment (anhedonia). Cognitive deficits also have been reported (Fischman 1984). Preceding these dysphoric events is a euthymic period that lasts from 1 to 5 days. In inpatient settings, drug craving decreases in a monotonic fashion during this euthymic period (Weddington et al. 1991). The early withdrawal syndrome noted following cessation of cocaine is not life threatening, nor does it appear to require pharmacologic intervention for symptom management.

There are several types of agents that might be developed for the treatment or reversal of symptoms associated with cocaine withdrawal. Agents for the treatment of cocaine-associated anhedonia, cognitive deficits, and possibly cocaine-related depression are examples of the types of agents that may be developed.

Agents for the prevention of relapse to drug-seeking behavior fall into two general categories. The first type of medication is an antagonist that could block the effects of cocaine. The second type is an agent that affects the response to conditioned stimuli associated with cocaine abuse.

Although there are no prototypic agents that block the response to conditioned stimuli, laboratory techniques are available that present conditioned stimuli associated with cocaine abuse. It is possible to measure the increase in desire (craving) for cocaine associated with these conditioned stimuli and test which drugs may reduce or eliminate it.

Finally, agents that will manage patients in acute cocaine overdose situations need to be developed. For the most part, these probably would be cocaine antagonists, like naloxone, which is used for opiate intoxication.

NEUROBIOLOGICAL RATIONALE

Dopamino and Cocaine

Like other abused stimulant drugs, cocaine has multiple effects on endogenous neurotransmitter systems. The accepted explanation of cocaine-induced euphoria is related to the compound's profound inhibition of dopamine reuptake systems, This increases the concentration of dopamine in the brain, particularly within the pleasure centers and reward pathways (Bozarth and Wise 1986). If these pathways are antagonized with dopamine blockers (neuroleptics) or if they are chemically destroyed (6-hydroxy-dopamine) or surgically ablated, the behavioral effects of cocaine in such procedures as self-administration are eliminated (Wise 1984). Ritz and colleagues (1987) identified a cocaine-binding site in the brain that has been associated with the compound's reinforcing properties. This binding site appears to be on the dopamine transporter or dopaminergic nerve terminals, Woolverton and colleagues have reported a decrease in D, binding sites in rats (Kleven et al. 1990) and in monkeys (Farfel et al. 1990) after chronic cocaine administration.

Serotonin and Cocaine

In addition to blockade of dopamine reuptake, cocaine is thought to produce an increase in serotonergic tone in the synaptic cleft by inhibiting reuptake (Hall et al. 1990). It has been reported that cocaine is actually more efficacious as an inhibitor of serotonin uptake compared with dopamine uptake (Lakoski and Cunningham 1988). Furthermore, serotonergic fibers emanating from the raphe magnus have been shown to inhibit the release of dopamine (White et al. 1987). It is not known whether the effect of cocaine on the serotonin system enhances or modulates its effect on the dopamine system. Agents that modulate the serotonin system may be tested for alteration of cocaine's effect.

Opiates and Cocaine

Recent evidence has suggested that there are comodulatory interactions between endogenous opioid and dopaminergic systems in brain, DiChiara and lmperato (1988) reported that μ-agonists (morphine, methadone) stimulate dopamine transmission in the mesolimbic system, whereas κ-agonists reduce it by the same extent. Furthermore, morphine suppressed cocaine self-administration in squirrel monkeys (Kosten et al. 1987) whereas buprenorphine—a μ-partial agonist—also suppressed cocaine self-administration in rhesus monkeys at doses similar to those that suppressed opioid-

maintained responding (Mello et al. 1990). These data suggest a link between the opioid system and the other systems responsible for the reinforcing effect of cocaine in nonhuman primates. However, recent data from the University of Michigan (Winger and Woods 1992) failed to replicate Mello's data, as much higher doses of buprenorphine were required to suppress cocaine self-administration than were required to suppress alfentanil self-administration.

The extrapolation of these animal data to the clinical setting requires caution, especially because it is well-known that addicts coadminister opiate agonists with cocaine. In one recent study, Johnson and coworkers (1991) reported that heroin addicts given 6 mg of buprenorphine or 60 mg of methadone daily for up to 18 weeks did not reduce their cocaine intake. Nonetheless, the link between the opiate and the dopaminergic systems needs to be explored.

TREATMENT RATIONALE

Reversal of Cocaine Deficits

Binding studies of long-term cocaine administration to animals have shown increased β-adrenergic, α-adrenergic, and dopaminergic receptor sensitivities. In addicts, this increased dopaminergic receptor sensitivity has been hypothesized to explain the abstinence-induced dysphoria and craving (Kleber and Gawin 1984). Since chronic tricyclic antidepressant treatment has been shown to down-regulate ß-adrenergic and dopaminergic receptor sensitivities (as a compensatory response to presynaptic uptake blockade), it has been suggested that antidepressant agents, such as desipramine, could reverse the neuroreceptor adaptations to cocaine abuse and facilitate a neuronal homeostasis in addicts (Hall et al. 1990).

Blockade of Cocaine-Related Effects

Seizures associated with cocaine use, or overuse, have been reported. Because the addict uses more and more cocaine to satisfy his or her habit, it is possible that this stimulant can result in the "kindling" phenomenon of seizure production. Animal studies have shown that cocaine administered in subconvulsive doses over a period of time will result in the production of convulsions (Post et al. 1976). Carbamazepine, an antiepileptic agent, has been used with some success to prevent the effects of prolonged cocaine exposure (Post et al. 1987) and also as a treatment for craving (Halakis et al. 1989).

Abstinence Therapy

Drugs currently under investigation for the first phase of cocaine withdrawal (abstinence initiation) include antidepressants (imipramine, desipramine, sertraline, and fluoxetine), an antiepileptic (carbamazepine), and an anorectic (mazindol). These compounds are believed to treat some of the symptoms of the withdrawal. Other drugs that have shown efficacy in blocking the reinforcing properties of cocaine include the calcium channel blockers (nimodipine, nifedipine) and lithium, a compound useful in the treatment of manic-depressive illness. However, dopamine receptor blockers, such as haloperidol, perphenazine, pimozide, and sulpiride, have been reported to increase the rate of self-administration in animals (Woolverton and Kleven 1988), an effect that may be consistent with the antagonist properties of the dopamine blockers.

Maintenance Treatment

For maintenance therapy, dopamine agonists have been prescribed, including amantadine, bromocryptine, methylphenidate, and L-dopa. These compounds have been alleged to reduce craving (Gawin 1988).

Relapse Prevention

There are no known cocaine antagonists (Gawin and Kleber 1988). These compounds would be useful in preventing relapse. Psychotherapy has been shown to be of limited value (Gawin and Kleber 1988).

Overdose Therapy

As stated above, there are no compounds that are known to antagonize the toxic effects of cocaine. Overdose therapy is currently limited to supportive treatment, including β· blockers to attenuate the cardiovascular effects and anxiolytics to support the psychological well-being of a patient (Millman1988).

TREATMENT DRUGS

Many treatment compounds are in the early preclinical stages of investigation, and others are currently in clinical trials. The preclinical development of candidate compounds is centered on modifying cues and behaviors associated with addiction, which generally involve self-administration and drug discrimination studies in rodents and nonhuman primates. The propensity of the compound to produce physical dependence or to maintain the physical dependence of other abusable substances is determined. In addition, drug interaction studies are

carried out because most cocaine addicts are polydrug users and the interactions between a potential therapeutic agent and cocaine are considered necessary data to support the safety of a potential medication to the addicted population.

In MDD, compounds that are effective in antagonizing the effects of cocaine and that have an acceptable toxicity profile will be submitted for clinical testing, once the Investigational New Drug application has been approved by FDA. Phase I clinical trials are concerned with the safety of the compound in human volunteers after single or multiple doses. Following are some of the compounds that have been studied by NIDA or by outside investigators.

Compounds Under Study

Desipramine. Anhedonia is a common symptom in affective disorders. it also is seen in a large percentage of addicts during the withdrawal phase. The first clinical study using desipramine in cocaine addicts was reported by Tennant and Rawson (1983). These investigators found that 60 to 85 percent of the subjects remained free of cocaine or other abusable substances while on the drug. Subsequent reports (Giannini et al. 1986; Giannini and Billet 1987; O'Brien et al. 1988; Gawin et al. 1989*a)* indicated an effectiveness in treating the depression, although craving scores remained elevated.

Bromocriptine. Bromocriptine, a dopamimetic agent that appears to facilitate binding of dopamine to postsynaptic receptors, has been the subject of countless preclinical and clinical studies. Hubner and Koob (1990) reported that the drug attenuated cocaine self-administration in monkeys, whereas Campbell and colleagues (1989) found that the drug suppressed cocaine-induced behavioral arousal in rats. Several studies in humans have indicated that bromocriptine is effective in suppressing the symptoms of withdrawal in cocaine addicts (Dackis et al. 1987; Giannini et al. 1987, 1989; Tennant and Sagherian 1987; Teller and Devenyi 1988; Kumor et al. 1989). Kumor and colleagues (1989) also indicated that the drug decreased cocaine's hypertensive effect in patients but did not alleviate the "rush" seen with cocaine administration. Dackis and colleagues (1987) suggested that bromocriptine also was effective in suppressing cocaine-induced craving in addicts.

Bromocriptine also has been tested in a Phase II clinical trial in cocaine addicts (D. Gorelick, personal communication, June 1989). The results have not been analyzed yet. Thus, the potential efficacy of bromocriptine remains to be determined.

Amantadine. Amantadine, another dopamine agonist, was studied in preclinical and clinical tests. Sannerud and Griffiths (1988) reported that the drug attenuated self-administration of cocaine in baboons. Furthermore, experienced baboons would not self-administer amantadine. In studies with humans, Gawin and colleagues (1989*b)* found that amantadine was less effective than placebo in suppressing withdrawal in addicts, whereas Tennant and Sagherian (1987) and Morgan and coworkers (1988) found that it was effective in suppressing withdrawal symptoms and craving.

Dopa. Although dopa has been suggested as being efficacious in treating cocaine addiction, there are few studies that have shown efficacy. Rosen and colleagues (1986) reported that 100 mg of L-dopa in combination with 10 mg of carbidopa (BID or TID) was effective in ameliorating the signs of withdrawal in human cocaine addicts.

Apomorphlne. Apomorphine, a direct-acting dopamine agonist, did not alter cocaine-induced locomotor activity in mice, although it did suppress amphetamine-induced hyperactivity (Riffee et al. 1988). There have not been any reported studies of apomorphine in cocaine addicts, perhaps because of the compound's well-known emetic potential.

Nimodipine. Pani and coworkers (1990) found that nimodipine decreased cocaine-induced dopamine release and increased motor stimulation in rats. Trouve and colleagues (1990) found that nimodipine decreased cocaine-induced hypertensive effects in rats.

Lithium. Pretreatment with lithium has been shown to block many of the behavioral and biochemical effects of cocaine (Kleber and Gawin 1988). Case study reports have indicated a diminution of cocaine-induced euphoria in human volunteers and a reduced cocaine intake in addicts (Mandell and Knapp 1976; Resnick et al. 1977; Gawin and Kleber 1984). However, in a more recent study, Gawin and coworkers (1989*a)* did not find any significant amelioration of cocaine abstinence with lithium carbonate.

SUMMARY

NIDA's MDD is faced with the formidable task of identifying, characterizing, and developing new chemical entities to combat substance abuse. The primary challenge is to find one or more medications that will be useful in treating cocaine addiction, withdrawal, and abstinence. In addition, a treatment for cocaine overdose is in progress. Methodological approaches include testing compounds that alter endogenous neurotransmitters and compounds that suppress conditioned cues and stimuli. Compounds that

appear efficacious in these tasks and that have a satisfactory safety profile will be studied in humans.

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Developing Treatments That Address Classical Conditioning[1]

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INTRODUCTION

Drugs that produce prompt, pleasant feelings in the user tend to be taken excessively. In addition to producing reliable and rapid changes in affect (feelings), drugs of abuse produce changes in numerous organ systems such as cardiovascular, digestive, and endocrine systems. Such pharmacological effects may not be perceptible to the drug user, or these effects (e.g., tachycardia) may simply contribute to an overall feeling of excitement. These changes occur repeatedly within the context of a drug-seeking and drug-using environment. Thus, there are environmental cues that are consistently present before the user experiences the effects of the drug. In addition to the appearance of the drug, the people, sights, sounds, odors, and situations that often are associated with drug use can become predictors of the onset of drug effects. The user need not consciously be aware of these cues for an association to occur. With repetition, the cues may provoke a chain of behaviors leading to drug administration. The same stimuli may also begin to produce automatic changes in various organ systems in advance of the drug being received. These predrug effects in drug users can be demonstrated in a laboratory situation by giving experienced users a placebo when drug is expected. The observed nonpharmacological changes have been considered to be a form of learning and have been the focus of study for many years (Wikler 1948).

The learning factors involved in drug dependence have been examined from both respondent and operant conditioning perspectives. Environmental cues that have been associated with drug use in the past can evoke physiological changes (autonomic responses) that the experienced user interprets as drug craving or withdrawal symptoms. These symptoms may, in turn, motivate voluntary drug-seeking (operant) behaviors. If the drug seeker succeeds in finding the drug, the chain of behaviors is again reinforced by the pleasant drug-induced feelings (brain effects) and by the drug-induced pharmacological effects on various other organ systems.

CYCLES OFREMISSION AND RELAPSE

Typical treatment of addiction requires a period of detoxification or gradual removal from the addicting drug by the administration of decreasing doses of the drug or of a replacement drug from a similar category. Detoxification is followed by rehabilitative measures usually involving group or individual counseling or psychotherapy. After leaving the hospital or rehabilitation center, the treated, drug-free former addict may report occasional unexpected episodes of a sudden compulsion or drive to obtain the drug. In these instances the relapse may appear paradoxical. For example, a male patient has completed a rehabilitation program: he has returned to his job: he is reunited with his family; he can present an apparently genuine and logical argument that he never intends to touch the drug again, And then, as one patient said, “I bumped into a guy that I used to do coke with and my heart started pounding and I started shaking. Then I went on automatic pilot.” Although it is possible that some of these patients are making up stories to evade responsibility for the relapse, they appear sincere, and there is a consistency to their reports. These relapse anecdotes suggest that there are involuntary factors involved and that learning produced by repetitive drug use may play a role in the mechanisms of relapse.

From the perspective of the clinician, cessation of drug use (detoxification) is just the beginning of treatment. Even a 28-day rehabilitation program has no impact unless there is some program to deal with the proneness to relapse when the former addict returns to his or her usual environment. As is the case with chronic medical illnesses such as arthritis, addictive behavior has a proclivity to return repeatedly, even after apparently successful short-term treatment. Even without treatment there are interruptions in regular drug taking. During the years of active drug use, there are often periods when the addict temporarily stops taking drugs. This may be by choice in an attempt to stop or reduce drug use or by force, such as when he or she is arrested. Detoxification may be accomplished with medical assistance or by abrupt stopping of the drug of abuse. However, detoxification, even when accompanied by brief treatment, rarely has a lasting effect. True success is measured by the function of patients over the weeks, months, and years after an initial detoxification,

The typical addict may continue drug use for years before seriously trying to break the habit by entering a treatment program. Although the length of time before requesting treatment varies, the effects of daily compulsive drug use produce long-term changes in a person. These changes mean that the reactions of the drug user are different from the way they were before beginning drug use. Thus, it is not surprising that the reasons for relapse after treatment may be different from the reasons that caused the patient to begin using drugs (O’Brien et al. 1986). Both psychosocial and biological factors probably contribute to the phenomenon of relapse. A critical part of treatment is analyzing those factors that increase the likelihood of relapse after a period of abstinence.

Followup studies have examined the factors that have been associated with relapse. For drug dependence disorders in general, multiple factors have been found to be important in influencing long-term outcome. The presence of a psychiatric disorder in addition to addiction significantly worsens prognosis (McLellan et al. 1983), and clinical evidence suggests that social and economic conditions and drug availability in the community play a role. Withdrawal symptoms that persist for months (Martin and Jasinski 1969) may also increase the risk of relapse. The combination of animal and human laboratory evidence plus clinical reports (Wikler 1948; O'Brien 1975) suggest that learning factors also play a role in relapse.

STUDIES OF CONDITIONING PHENOMENA

One of the first scientists to study relapse among addicts was Abraham Wikler (1948). Wikler (1948, 1973*a)* noted the similarity of certain relapse phenomena to Pavlovian conditioned responses (CRs). Wikler observed withdrawal-like signs in opioid addicts who were participating in group therapy sessions in the U.S. Public Health Service Hospital in Lexington, KY. These patients had been completely drug-free for at least several months and therefore should not have had any signs of opioid withdrawal. But when they started talking about drugs in group therapy, Wikler observed yawning, sniffling, and tearing of the eyes—signs of an opioid abstinence syndrome. He was aware of studies from Pavlov's lab in the 1920s (Pavlov 1927) showing that the effects of morphine could be conditioned, and he postulated that conditioning had occurred in his patients.

Wikler labeled this phenomenon "conditioned withdrawal," speculating that environmental stimuli had acquired the ability through classical conditioning to elicit many of the signs and symptoms of pharmacological withdrawal. He further hypothesized that cues formerly associated with drug effects or drug withdrawal symptoms might play an important role in triggering relapse to drug use in the abstinent opioid abuser, Wikler also pointed out that the adaptation to drugs could be conditioned, a phenomenon later explored in a series of elegant studies by Siegel and colleagues on conditioning of drug tolerance (Siegel 1975, 1978; Siegel et al. 1978, 1981). Wikler developed a rat model for studying morphine withdrawal, and in subsequent experiments he demonstrated that withdrawal signs could be conditioned in rats (Wikler and Pescor 1967; Wikler 1968; Wikler et al. 1971). Goldberg and Schuster (1970) Davis and Smith (1974), Siegel (1975, 1978), Siegel and colleagues (1978, 1981), and others (Le et al. 1979; Poulos and Hinson 1982) confirmed that many drugs from different pharmacological classes can produce CRs. Conditioned opioid withdrawal responses have also been experimentally produced in human subjects (O'Brien 1975; O'Brien et al. 1975, 1977). For a detailed review of CRs reported in animals and in humans, see Grabowski and O'Brien (1980).

CATEGORIES OF CONDITIONED RESPONSES

Studies in human subjects have demonstrated that CRs can be drug-like or drug-opposite depending on the circumstances (O'Brien et al. 1986, 1988). The authors and colleagues at the Addiction Treatment Research Center have attempted to classify these responses according to the proposed mechanism of their origin and the conditions under which they can be demonstrated.

- Drug-opposite CRs
  - Conditioned withdrawal
  - Conditioned tolerance

- Drug-like CRs
  - Conditioned euphoria ("needle-freak" phenomenon)
  - Placebo effects of drugs (under certain circumstances)

Drug-Opposite Condltloned Responses

Repetitive use of the same drug can produce CRs that are opposite to the effects produced by the pharmacological action of the drug. For example, opioid injections produce *elevations* in skin temperature in human subjects, but stimuli that have repeatedly preceded opioid injections will reliably produce *reductions* in skin temperature when presented to experienced opioid users. This reduction in skin temperature begins before the person receives the drug. Thus, it cannot be a pharmacological effect, and it is presumed to be a CR. There are many other examples of drug-opposite CRs that can be demonstrated by polygraphic measurement of physiological changes, by ratings of effects that subjects perceive (subjective effects), or by observer ratings of subject behavior. The drug-opposite responses can mimic the drug withdrawal syndrome. If these responses occur just before a dose of the drug is received, they subtract from the drug effect, resulting in an attenuation of drug effects. The attenuation of drug effects produced by CRs can be classed as a form of "tolerance" and may form a partial explanation for the diminished drug effects commonly seen with repeated administration under similar circumstances of the same dose of a drug (Siegel et al. 1978).

One of the reasons given by opioid users for continuing opioid use is the avoidance of withdrawal symptoms. But viewing addiction as being motivated solely by avoidance of withdrawal symptoms is clearly incomplete. Furthermore, the appearance of conditioned withdrawal symptoms in former drug users does not fully explain the high rate of relapse in former users. Although the phenomenon of *conditioned withdrawal* was the first type of conditioning considered by Wikler and is still closely associated with his name, Wikler (1973*a)* also emphasized the importance of *reward* mechanisms in the maintenance of drug-taking behavior. In opioid addicts, however, physical

dependence and withdrawal symptoms are very common, especially in those applying for treatment. The presumed mechanism for the development of conditioned withdrawal is shown in figure 1. Because in most opioid addicts some withdrawal symptoms will occur several times per day, there may be thousands of pairings of environmental stimuli and withdrawal symptoms during the life of a patient before he or she seeks treatment. In the laboratory, O'Brien and colleagues (1975,1977) have shown that after as few as seven pairings between mild methadone withdrawal symptoms (unconditioned response, UR) and a neutral stimulus (conditioned stimulus, CS), such as a peppermint odor, humans begin to show signs of withdrawal (CR) when exposed to the odor alone. These CRs have been found to be long-lasting in an animal model (Eikelboom and Stewart 1982), and they have been found to occur when the subject is reexposed to the CS long after detoxification from drugs. Therefore, this mechanism could explain the stories repotted by Wikler (Wikler and Pescor 1967; Wikler 1968) and others (O'Brien 1975) concerning onset of withdrawal symptoms when a drug-free patient returns to an environment in which withdrawal symptoms had occurred in the past. This mechanism would also explain the reactions of drug-free former addicts when shown, while in the laboratory, visual and auditory cues previously associated with past drug use (O'Brien 1975; Teasdale 1973; Ternes et al. 1980; Sideroff and Jarvik 1980).

Conditioned tolerance is a term applied to another mechanism by which drug-opposite responses might be produced by conditioning. Siegel and others, in a series of experiments utilizing morphine, alcohol, and insulin (Siegel 1975, 1978; Siegel et al. 1978, 1981; Le et al. 1979; Poulos and Hinson 1982) presented evidence that drug tolerance could be considered, at least in part, to be a classically conditioned phenomenon. As shown in figure 2, the drug

Unconditioned Stimulus Opioid is metabolized and disappears Receptors are evacuated	→	Unconditioned Response Rebound activity, such as adrenergic or cholinergic (e.g., tearing, rhinorrhea, tachycardia, nausea, diarrhea), drug-opposite effects
Conditioned Stimulus Drug-procuring or drug-using environment: sights, sounds, smells, situations, fantasies	→	Conditioned Response Mild version of above symptoms, drug-opposite effects

FIGURE 1. *Conditioned withdrawal (dependent subject)*

disturbs homeostatic equilibrium resulting in a reflex response against the drug as the organism attempts to regain equilibrium. This reflex response (UR) counteracts the effects of the drug. The environmental cues (sights, smells, situations) repeatedly associated with drug procurement or injection provide a signal (CS) that, after repetition, can trigger homeostatic responses that are opposite to the effects of the drug (tolerance) in advance of the drug's being received. The conditioning of tolerance was termed "counter-adaptation" by Wikler (1973*b).* Siegel and colleagues' studies (cited above) demonstrate that the learned aspects of tolerance follow the pattern of classically conditioned responses.

Ehrman and colleagues (1992*a)* have demonstrated apparent conditioned tolerance in a group of detoxified opioid addicts who were studied on four separate occasions under double-blind conditions. The subjects received either unsignaled infusions of a moderate dose of opioid (4 mg hydromorphone) or a self-injection of the same dose. On the two other occasions, the subjects received an unsignaled infusion of saline or a self-injection of saline. When the opioid was given without warning by an infusion (unsignaled), the subjects showed a significantly greater physiological response to the drug than when the same dose was "expected" (self-injected). The authors' interpretation is that the unsignaled nature of the infusion of opioid prevented any warning that would have triggered the onset of drug-opposite or conditioned tolerance responses. On the occasions when the opioid was expected, the conditioned drug-opposite responses reduced the observed drug effect. This interpretation was supported by the saline self-injection occasion, which showed greater drug-opposite responses presumably because there was no opioid in the injection to oppose the CRs.

Conditioning clearly does not explain the entire phenomenon of tolerance, but the magnitude of the portion produced by conditioning may be significant, Siegel and colleagues (1982) showed that situation-specific tolerance can

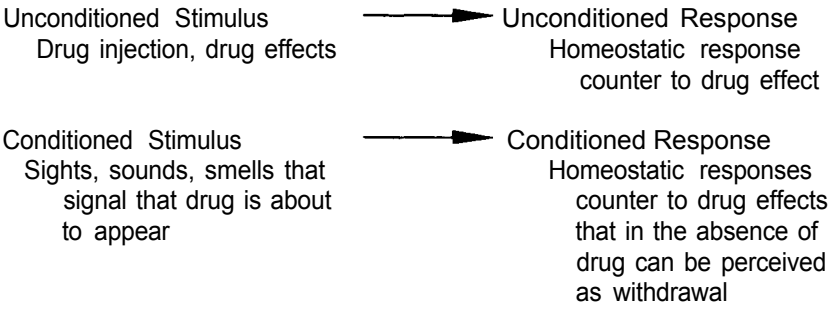

FIGURE 2. *Conditioned tolerance (dependent or nondependent subject)*

protect against the deadly effects of an opioid overdose. When rats experienced with morphine received a high dose of the drug in an environment different from the conditions under which they had learned to expect morphine, rapid overdose signs ensued and death occurred in some animals. In contrast, another group of rats with the same experience of morphine exposure showed significantly less drug effect and no deaths when given the same high dose of morphine in the environment where morphine was expected.

Conditioned drug-opposing (tolerance) responses can occur in opioid users who have used only intermittently and thus have never been physically dependent on opioids. This is because even intermittent users generally develop tolerance. Learned tolerance responses can develop according to the mechanism described in figure 2. The learned tolerance responses will be evoked by drug-related stimuli, and they will be opposite to the effects of the drug, thus resembling opioid withdrawal responses. Similarly, a user such as a physician or pharmacist who has had enough opioids consistently available to avoid repeated episodes of withdrawal could still show conditioned withdrawal-like responses even though true pharmacological withdrawal had never occurred. In this situation, the learned tolerance would be based on a CR that is drug-opposite and physiologically similar to a withdrawal response. If the former addict encounters stimuli that were previously associated with drug use (CS), the CR would produce symptoms that may be perceived as withdrawal-like. Typical drug users who have had repeated episodes of withdrawal in a specific environment will thus have two mechanisms for producing conditioned withdrawal-like symptoms: the first by the "conditioned withdrawal" paradigm described in figure 1 and the second by the "conditioned tolerance" mechanism described in figure 2.

Drug-Like Conditioned Responses

Drug-like CRs can also be produced by pairing distinct stimuli with drug administration. After repeated pairing, the stimuli by themselves can produce drug-like effects (Grabowski and O'Brien 1980; Lynch et al. 1973). Pavlov's original report (1927) of morphine conditioning described a CR that resembled the unconditioned effects of morphine. Similar findings of drug-like conditioning have been reported by others in dogs (Lynch et al. 1973; Collins and Tatum 1925; Rush et al. 1970) and in rats (Goldberg and Schuster 1970; Miksic et al. 1975; Numan et al. 1975). Drug-like conditioned effects have also been described in human studies (O'Brien 1975). Such a conditioning mechanism may form a partial explanation for what are known as the "placebo effects" of drugs. A variety of subjective and physiological responses have been reported when research subjects or patients are given an inert substance when they are expecting an active drug. The conditioning explanation presumes that drug-like or placebo effects have been conditioned by past exposure to drugs under similar circumstances. The authors' research over the years has provided

clues as to which conditioning paradigms are most likely to produce either drug-like CRs or drug-opposite responses. Confusion occurs in trying to understand these drug-conditioned phenomena because both drug-like and drug-opposite effects can be learned. Both animal and human data suggest that stimulants such as amphetamine and cocaine are more likely to produce drug-like CRs, whereas opioids in human subjects produce more prominent drug-opposite responses, particularly in response to stimuli associated with preinjection rituals. However, drug-like effects in opioid addicts in the laboratory have been demonstrated after self-injection (O'Brien 1975; O'Brien et al. 1980; Meyer and Mirin 1979). Thus, it is possible to observe opioid-opposite and opioid-like effects sequentially in the same opioid addict subject while he or she prepares and injects placebo material in the laboratory.

Drug-like effects are found clinically in patients known as "needle freaks" (Levine 1974). Typically, these are individuals who may formerly have been physically dependent on opioids but are currently using drugs intermittently or using low-potency opioid supplies. These individuals report euphoria from the act of self-injection, and they have also been observed to show physiological signs such as pupillary constriction after injecting saline (O'Brien 1975). A similar finding was reported by Meyer and Mirin (1979). Some needle freaks have been detected among applicants applying for methadone treatment. Federal regulations limit the use of methadone maintenance (except in certain special cases) to individuals who are already physically dependent on opioids at the time of application for treatment. If there are no signs of withdrawal in an applicant for methadone, the opioid antagonist naloxone may be given as a diagnostic test for the presence of dependence (Blachly 1973). Even a very small dose of naloxone will precipitate withdrawal symptoms in a person physically dependent on opioids. Occasionally, the authors and colleagues have observed the naloxone injection to produce mild euphoria instead of withdrawal in applicants for methadone who claim to be addicts and who show the scars of chronic drug injections. Subsequently, we observed sedation and reports of euphoria when these subjects self-injected saline in the laboratory. Thus, the euphoria observed after naloxone was not a pharmacological effect of naloxone, but likely a CR to the injection procedure that served as a CS (O'Brien 1975).

There have been few direct observations using physiological and psychological monitoring of human addicts in the act of self-injecting addicting drugs. Our group reported a series of such studies (O'Brien 1975; O'Brien et al. 1974; Levine 1974) that described self-injections in detoxified opioid addicts being treated with the opioid antagonists cyclazocine or naltrexone. Several experimental protocols were used that involved maintaining patients on opioid antagonists that block the pharmacological effects of opioids. In one series of experiments, the patients were randomly assigned to self-injections with either saline or opioid; in others, the patients were tested with both saline and opioid

on different occasions. These experiments began with prenaltrexone trials in which the subject's responses to unblocked opioid was compared with saline under double-blind conditions. Subsequently, we conducted "extinction trials" in which the subject repeatedly self-injected opioid or saline while being maintained on the opioid antagonist for up to 6 months. The findings were that saline self-injections were usually reported as pleasurable and identified as a low dose of opioid. This reaction to saline was assumed to be a drug-like CR (placebo effect). The effect was greatest when the subjects injected themselves under naturalistic conditions resembling the patient's "shooting gallery" with the patient expecting to get "high." The drug-like effect was diminished but still present when the patient was placed alone in a more artificial setting, such as a recording chamber, with various electrodes and strain gauges attached.

We found that drug-like effects in most patients did not persist with repeated trials as did the drug-opposite effects described above. After several unreinforced trials consisting of either saline injections or blocked opioid injections in patients pretreated with an antagonist, the drug-like effects disappeared. The drug-opposite effects persisted in these patients, however.

Meyer and Mirin (1979) used a different design and also observed conditioned opioid-like autonomic effects in human subjects. Their subjects were all recently detoxified inpatients who were given either naltrexone or naltrexone placebo under double-blind conditions. The subjects were then permitted to self-inject known amounts of heroin that they had earned by performing a simple operant task. The subjects who received naltrexone placebo, in effect, had the opportunity to inject heroin unimpeded by naltrexone, and they injected it nearly the maximum number of times permitted by the protocol. However, the 22 subjects who received naltrexone had the rewarding effects of heroin blocked by this antagonist. Eleven of these subjects stopped injecting heroin after fewer than 5 trials, but the other 11 subjects took an average of 16 doses of heroin despite the presence of naltrexone. These 11 subjects were found to be different from those who stopped quickly in that they showed distinct autonomic changes during and after the injection procedure. These physiological responses resembled opioid effects and continued even after the first three blocked injections. Meyer and Mirin (1979) interpreted these autonomic changes (pupil, heart rate, and blood pressure) as conditioned opioid-like effects, and they found that these autonomic changes had disappeared (extinguished) by the time the subjects decided to stop injecting. Unlike the outpatient studies described above, the Meyer and Mirin protocol did not require the subjects to continue to inject unless they wished to do so. Patients did not continue injecting past the point at which their response to the procedure changed from positive to neutral, and this probably explains why unpleasant or withdrawal-like symptoms were not reported.

Therefore, the evidence for conditioned opioid-like effects in humans is based on clinical anecdotes and on the laboratory studies involving self-injection described above. These CRs are elicited by the complex CS of preinjection rituals and the act of self-injection. In most subjects the opioid-like CR is extinguished quickly, and then withdrawal-like CRs are elicited by the same CSs that previously produced opioid-like effects.

SPECIFICITY

A question that arises concerns the specificity of responses to drug-related stimuli. Are these responses present in non-drug users? Ternes and colleagues (1980) compared the reactions of opioid addicts to those of nonaddicts viewing the same stimuli. It was found that nonaddicts showed signs of arousal when viewing scenes of drug-taking behavior, but they showed rapid habituation compared with opioid addicts in the study who persisted in their arousal and withdrawal-like responses. Another study of specificity has just been completed among cocaine addicts. Ehrman and colleagues (19926) compared the responses of cocaine addicts and normals to neutral stimuli, cocaine stimuli, and opioid stimuli. The normals showed nonsignificant reactions to all sets of stimuli. The cocaine addicts showed significant responses only to the cocaine-related stimuli and not to the opioid-related stimuli.

Additional studies of the responses demonstrated by abstinent drug addicts have shown that they interact with negative mood states. Recent work from our laboratory has demonstrated that depression, anxiety, and anger increase the responses in opioid addicts to opioid-related stimuli. After making these observations, Childress and colleagues (in press) designed an experiment in which negative mood states were elicited in addict volunteers using a hypnotic procedure. In this study, negative mood states increased the response to drug cues, and euphoric states reduced the response.

CLINICAL RELEVANCE

One way of assessing clinical importance is to determine whether modification of CRs can influence the course of addiction. Using a variety of patient populations, we have attempted to extinguish or reduce presumed CRs in patient volunteers and compare their clinical course with that of control patients who do not receive extinction therapy. We first studied the CRs associated with chronic opioid use, speculating that some of these responses (particularly conditioned craving and withdrawal) could lead to drug use in the abstinent patient (O'Brien 1975; O'Brien et al. 1986; Childress et al. 1984, 1986*a;* McLellan et al. 1986). The responses targeted in our extinction program included subjective responses such as "craving," feelings of "high," and feelings of drug withdrawal. We also have studied the effects of

the extinction program on autonomic responses such as changes in pulse, blood pressure, skin resistance, and skin temperature. The procedure for modifying these responses was based on a process of systematic, gradual exposure to drug-associated cues without the possibility of reinforcement (actually receiving a drug). The general approach in this series of studies has been first to select cues that reliably elicit subjective and physiological responses in the target population and then to attempt to reduce these responses through repeated, nonreinforced exposure (extinction).

We found that conditioned opioid-like responses extinguished rapidly in most patients, but responses that were opposite to the effects of opioids (withdrawal-like physiological responses and subjective craving) were very resistant to extinction (O'Brien et al. 1974, 1980; Childress et al. 1986*b).* We first studied detoxified and long-term drug-free patients, some of whom were therapeutic community graduates, We also studied methadone patients in a large-scale treatment-outcome study employing extinction trials (Childress et al. 1984, 1986*a).* Drug-related stimuli were found to be reliable elicitors of conditioned opioid-related responses, particularly conditioned craving and conditioned withdrawal, even in a methadone population. With 20 or more extinction sessions, conditioned craving was significantly reduced, but conditioned withdrawal signs and symptoms were still present in response to opioid-related cues.

RESPONSES TOCOCAINE-RELATED STIMULI

Over the past several years, most of the patients applying for treatment in our program have been cocaine dependent or were cocaine abusers. Cocaine is cheap and widely available in Philadelphia. Most of our current research, therefore, is focused on cocaine dependence (O'Brien et al. 1992). Cocaine use generally is episodic. Whether the user has stopped taking cocaine because of toxicity, incarceration, or admission to hospital for detoxification, there is a strong tendency to resume taking cocaine after a short abstinent period. When detoxified former cocaine users are confronted with stimuli previously associated with cocaine use, they report cocaine craving despite their expressed and apparently genuine intention to refrain from returning to drug use. Some report intense urges to use cocaine along with arousal and palpitations when they encounter stimuli as diverse as seeing a friend with whom they had used cocaine or seeing any powdery substance such as sugar or talcum powder. Some users interpret these responses as beginning to feel a cocaine high when they get close to the drug, but before it even enters their body. Detoxified formerly cocaine-dependent patients also experience similar responses when they encounter drug-buying locations, a pharmaceutical odor, or almost anything that has been repeatedly associated with getting and using cocaine. These stimuli appear to act as a trigger for arousal and cocaine

craving. After years of using cocaine, there are usually numerous stimuli within the patient's normal environment that have strong links to cocaine.

There are numerous studies in animals showing the conditioning of responses to cocaine and other stimulants (Post et al. 1987). In human cocaine-using subjects, we have conducted laboratory studies of reactivity to cocaine-related cues (O'Brien et al. 1990; Childress et al. 1987). We found significant effects of cocaine-related stimuli compared with control stimuli on autonomic measures such as skin temperature and skin resistance and on subjective measures such as feelings of craving, withdrawal, or being high. A subgroup of patients who had spent a period of 26 days in rehabilitation treatment in a hospital environment after detoxification from cocaine was also studied. All these patients expressed the strong intention of remaining abstinent after leaving the hospital. The patients were shown cocaine and neutral stimuli on separate days in a balanced order while being monitored in a laboratory setting. The results were similar to those in patients recently detoxified; there was strong reaction to the cocaine cues, and many of the rehabilitated patients reported surprise at the severity of their responses. The additional 28 days of treatment had no apparent effect on the reactivity to cocaine-related cues.

It is of interest that not all patients in treatment for cocaine dependence showed reactivity to cocaine-related cues. At least one-third of these patients were adamant "nonresponders," insisting that the cocaine-related stimuli triggered no craving, arousal, or other responses. For these patients, physiological arousal (as reflected in either decreased skin temperature or a fall in galvanic skin response) was sometimes present, even though the patients denied experiencing any subjective reaction. The subjective and physiological data were analyzed for the total sample, including those who reported no effects from the stimuli used. The average temperature reduction in response to cocaine-related stimuli for the entire unselected group (including nonresponders) was approximately 2.5 °C. Among those classed as responders, however, dramatic reductions of 5 to 8 °C (in response to cocaine-related stimuli) were not uncommon.

CLASSIFICATION OF THE COCAINE-RELATED RESPONSES

Reactions to opioid-related stimuli among opioid abusers could be classified as drug-like or drug-opposite. This is because opioids affect several systems in specific ways. Opioid-like effects observed in our studies are rush, euphoria, pupillary constriction, slowing of the heart, lowered blood pressure, warming of the skin, and increased skin resistance. Withdrawal effects are the opposite of the preceding list plus yawning, tearing, sniffing, and nausea. Classification is much less clear among cocaine users, The physiological effects seen in abstinent former users when exposed to cocaine-related

stimuli are decreased skin temperature, increased heart rate, and increases in skin conductance. These are the signs of both stimulant drug effects and nonspecific arousal. Some patients report high-like effects; others simply report craving or even "crash" feelings. Animal studies show clear conditioning of cocaine-induced hyperactivity, a drug-like response. A most intriguing study of the CR for cocaine comes from direct brain studies using the microdialysis technique in the region of the nucleus accumbens in rats (Kalivas and Duffy 1990). Increased dopamine was recorded in this region after each dose of intraperitoneal cocaine. The dopamine responses increased with successive cocaine doses (sensitization). After repeated exposure to cocaine injections, the animals were given a saline (placebo) injection under similar conditions on a different day. The response in the nucleus accumbens was a small but significant augmentation of dopamine, presumably conditioned by the prior experiences with cocaine. This work will have to be replicated, but it raises the possibility that the formerly cocaine-using patients experience a similar augmentation of limbic dopamine when they are exposed to cocaine-related stimuli. The peripheral measures of arousal would be consistent with this interpretation. The central dopamine increase could provide a priming effect in former users and precipitate a relapse to cocaine use.

COCAINE TREATMENT STUDY

Traditional treatment approaches have intuitively recognized the power of drug-associated stimuli, Therefore, abstinent patients are warned to avoid people, places, and things associated with prior cocaine use. In reality, complete avoidance is very difficult, even in a well-motivated patient. Patients need additional tools for coping with and reducing drug craving. Our research treatment strategy consists of systematically exposing patients to stimuli that they are likely to see when they leave the treatment program (O'Brien et al. 1990). Patients are given repeated exposure to cocaine "reminders" while they are in a safe environment in an attempt to reduce the craving and arousal often triggered by these stimuli. This strategy complements an avoidance approach, and it is a potentially useful adjunct to traditional abstinence-oriented treatment programs. This treatment approach is based on the view that cocaine reminders are classically conditioned stimuli that acquire their "reminder power" through repeated pairings with cocaine's pharmacologic effects over the natural course of a patient's drug use. By repeatedly exposing the patient to cocaine reminders without cocaine, it should be possible to reduce or extinguish the power of such cues to trigger the CRs (e.g., arousal, craving) that could lead to drug use and relapse to addiction.

To prevent relapse, all categories of relapse-producing factors should be addressed, including pharmacological, social, occupational, medical, legal, and family issues. If conditioning factors play a role in relapse, the influence of conditioning probably varies with the individual patient depending on the

relative importance of other relapse-producing factors, Thus, the extinction procedure has been integrated within the context of a treatment program that addresses a wide range of issues thought to be important to the recovering addict. Initial exposure to drug-related stimuli should be conducted in a protected therapeutic setting to minimize the possibility of drug use in association with the strong craving/arousal triggered by the cocaine reminders. The stimuli should be tied closely to the patient's cocaine history, particularly to his or her preferred mode of cocaine administration (intranasal, Intravenous, or smoked).

Our early studies among cocaine subjects also taught us that the CRs produced by cocaine could be highly varied and complex. When smoked or injected, cocaine results in a rapid onset of euphoria and pleasurable sensations, often followed, only a few minutes later, by dysphoria, nervousness, and extreme drug craving. These biphasic effects are further complicated by the appearance of toxic symptoms (e.g., suspiciousness, paranoia) after high doses, long binges, or even a long history of less frequent use. Finally, after termination of use, patients may complain of crash feelings that may include depression, irritability, and fatigue. Any of these affective and physiologic effects of cocaine could become conditioned to the many environmental stimuli consistently associated with cocaine use.

We recently completed a randomized trial of cocaine-dependent patients assigned to extinction or to a control group. This was an 8-week outpatient study. The results of this randomized clinical trial of passive cue exposure or extinction are reported in detail elsewhere (Childress et al., submitted for publication). Briefly, the patients randomly assigned to extinction showed better retention in outpatient treatment and a higher proportion of clean urines than the control group. Both of these differences were significant at the 5-percent level. These results were encouraging because the extinction sessions were well accepted by the patients, and the technique can be applied by nonprofessional drug counselors. However, despite the improved results, full extinction of the responses was not accomplished, and relapses continued to occur, although they were less common in the extinction group. These results suggested that an active procedure should be tried to enhance the results of passive extinction.

ACTIVE PROCEDURES TO COMBAT CRAVING

Clearly, detoxified cocaine abusers can experience conditioned craving and arousal to cocaine reminder stimuli. These responses can be both intense and persistent, meaning that the abstinent cocaine abuser may be vulnerable long after detoxification is complete. Although the program of extinction described here is effective in reducing craving to cocaine-related stimuli presented in the context of the laboratory or clinic, patients can still

report craving in the natural environment. Two approaches to improve generalization from the lab to the street are currently being evaluated. One approach is an attempt to increase the generalization of extinction by the use of even more realistic stimuli (e.g., the sight of real cocaine) and stimulus contexts (e.g., in vivo repeated exposures). Previously, we have been reluctant to employ in vivo exposures near "copping" corners or shooting galleries because of possible risk to both patients and clinical staff. Somewhat less dangerous stimuli could involve the patient's own home or the use of neighborhood videos taped from a moving car. A second approach involves the use of several other techniques in countering or reducing conditioned craving and arousal, such as training of alternative behaviors (e.g., competing responses, thought blocklng, relaxation response) as a useful adjunct to more conventional treatments for cocaine abuse (e.g., counseling, therapy, and relapse prevention techniques).

We are currently conducting a randomized clinical trial of active techniques to combat craving. The experimental treatment involves evoking responses to cocaine-related cues in the clinic and coaching the patient in the use of a behavioral technique to combat the response. The pilot work suggests that this technique will be more successful than a passive cue exposure technique. The patient learns a set of active coping devices and has the opportunity to practice them in the clinic with the help of a therapist. This increases the patient's confidence that he or she can resist the responses that occur when confronted with cocaine cues in the patient's natural environment. In addition, the new extinction procedures include (1) more individualized cocaine reminders to benefit patients who do not respond strongly to the standard test stimuli and (2) more extinction sessions, in an attempt to more completely extinguish the persistent physiological arousal that occurs in response to cocaine cues.

USE OF RESPONSE TO COCAINE-RELATED CUES AS A MEDICATION SCREENING DEVICE

A potential application of the response to drug-related cues is the screening of new medications to aid in the maintenance of abstinence. For cocaine dependence, it is unlikely that any single treatment approach will be effective. The University of Pennsylvania group has been trying to find more effective medications for cocaine dependence and devise a way to combine the effects of various treatments such as medications and behavior therapy. Our group has just completed a preliminary study of the effects of a putative medication for cocaine dependence on the magnitude of the reaction to cocaine-related cues. The purpose was to determine whether potential medications could be tested for their effects on craving and arousal evoked by the drug-related cues in the laboratory. Medications that seemed to reduce the reaction to cocaine-related cues might then be tested in a controlled clinical trial to determine their overall clinical efficacy.

Patients volunteering for a trial of amantadine therapy were tested for their reactivity to cocaine cues before receiving either amantadine or placebo (Robbins et al. 1992). They were tested again after 7 to 10 days of stabilization on the medication (either amantadine or placebo). The two groups of patients had similar reactions to the cocaine cues on the first occasion, but after stabilization on the medication, the patients assigned to amantadine had significantly greater reactions to the cues than did the patients assigned to placebo. This effect may relate to the prodopamine activity of amantadine. The clinical significance of this finding is not clear at this time. In our efforts to develop predictors of successful medication for cocaine dependence, we will have to test many potential medications and correlate the findings in the test model with clinical outcome. Thus far, the clinical outcome studies with amantadine are equivocal, but we are in the process of comparing the results of cue reactivity with the clinical outcome.

SUMMARY

Repetitive use of psychoactive drugs produces a variety of learned behaviors. These can be classified in the laboratory according to an operant/classical paradigm, but in vivo the two types of learning overlap. The classical CRs produced by drugs are complex and bidirectional. There has been progress in classifying and predicting the types of CRs, but little is known of mechanisms. New techniques for understanding brain function, such as microdialysis probes in animals and advanced imaging techniques (positron emission tomography and single photon emission computerized tomography) in human subjects, may be utilized in conditioning paradigms to "open the black box."

Because the existence of CRs in drug users is now well established, clinical studies have been instituted to determine whether modification of CRs can influence clinical outcome. A recently completed study in cocaine addicts has produced evidence that outcome can be improved by a passive extinction technique over an 8-week outpatient treatment program.

NOTE

1. This chapter was presented in part at the 26th annual meeting of the Association for Research on Nervous and Mental Disease, 1990 (see also O'Brien and colleagues [1990]) and at other National Institute on Drug Abuse technical reviews.

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Neurobehavioral Treatment for Cocaine Dependency: A Preliminary Evaluation

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INTRODUCTION

The emergence of the cocaine epidemic in the 1980s placed unforeseen demands on the addiction treatment system. Reports from data collected by the 800-Cocaine Hotline, which began in 1983, provided a clear indication that many people were seeking information about problems resulting from cocaine abuse (Gold 1984). Other indications of drug abuse trends documented that during the first half of the 1980s the United States was profoundly affected by a major increase in high-dose cocaine use (Kozel and Adams 1985). During 1984 in Los Angeles, the development and widespread use of smokeable cocaine (known first as freebase" and later as "rock" or "crack") intensified concern over the spread of cocaine use. These developments, plus the deaths of several sports figures and celebrities, with subsequent media coverage, alerted the American public to the dangers of cocaine use.

In response to this media attention and because of the psychological and medical problems created by chronic high-dose cocaine abuse, a demand for cocaine dependency treatment services rapidly emerged. Clinical researchers in the addictions field began to address the cocaine epidemic by developing a variety of treatment strategies that used several pharmacologic approaches to ameliorate the cocaine withdrawal syndrome. To date, no medication has received widespread acceptance as an effective treatment for cocaine dependency (Johnson and Vocci, this volume).

Numerous nonpharmacologic strategies for treating cocaine users have been suggested by clinical researchers. Crowley and associates (1987) have utilized contingency contracting procedures with cocaine abusers as a behavioral method of controlling cocaine use. Siegel (1984) has suggested slow, long-distance running as a valuable tool in aiding the

cocaine dependency recovery process. Smith (1984) has recommended the incorporation of peer-group therapy strategies and involvement in self-help programs as being of value in treating cocaine abusers. Resnick and Resnick (1984) have reported the merits of exercise and deep muscle massage as methods to help cocaine abusers cope with poorly tolerated emotional states. A research group at Lexington Hospital in New York City under Michael Smith has reported that acupuncture appears to provide significant benefits in relieving cocaine craving (Chicago Sun Times 1989).

Washton has developed a structured outpatient treatment approach combining behavioral techniques, cognitive strategies, educational information, family involvement, self-help groups, and urine testing (Washton 1986, 1987). Washton has reported that this combination of procedures appears to provide patients with a set of tools that allows them to stop cocaine use and initiate positive lifestyle changes that promote continued abstinence. His initial reports on treatment outcome are encouraging: Of 127 patients who entered treatment, 65 percent completed the 6- to 12-month program, and 75 percent were drug-free at 1- to 2-year followup (Washton et al. 1988). In addition, he reports that there was a significant positive relationship between length of time in treatment and drug-free outcome.

THE NEUROBEHAVIORAL MODEL

The Matrix Center was established in 1983 in southern California to develop a viable model of outpatient treatment for cocaine abusers, Known as the neurobehavioral model, it utilizes information and strategies derived from clinical research on addiction in an intensive treatment experience. The treatment materials have evolved from applying concepts described in theoretical and applied research to the needs of cocaine abusers attempting to stop cocaine use. The materials used in treatment are original, but the ideas that generated these materials were developed in many of the addiction research centers in the United States,

The work of several research groups has been particularly important in. the development of this treatment approach. The Yale University research group, directed by Herbert Kleber, has been extremely helpful in providing an understanding of the biochemistry of cocaine addiction and in identifying key issues concerning the biological readjustment experienced in cocaine recovery (Kleber and Gawin 1984). The work of researchers at the Philadelphia Veterans' Affairs Medical Center (O'Brien et al. 1990), particularly that of Charles O'Brien, Thomas McLellan, and George Woody, and at Johns Hopkins (Stitzer et al. 1985), including George Bigelow and Maxine Stitzer's work, has been of tremendous help in developing cognitive/ behavioral strategies and focusing on the need to evaluate clinical efforts

empirically. The structure of the treatment model has been influenced by Washton's (1989) work. The cognitive/behavioral orientation to the problem of relapse reflects the approach developed by Marlatt and Gordon (1985) and Gorski and Miller (1982). The family portion of the program has been influenced by the thinking of Salvador Minuchin (1974) and Duncan Stanton (Stanton et al. 1982). The value of effectively educating clients about addiction has been incorporated from the work of David Smith, Donald Wesson, and their associates (Smith 1984; Wesson and Smith 1985).

The neurobehavioral approach to cocaine dependency has been constructed to address the types of dysfunction that exist when cocaine abusers enter treatment. No presumptions are made about underlying psychopathology. The needs of the clients have been determined by a behavioral analysis of the types of problems encountered by cocaine abusers as they proceed through a period of cocaine abstinence. More than 1,000 cocaine abusers have been treated with the methodology. The experience of these clients has been the source of the data for the model.

STAGES OF RECOVERY

To construct a treatment model that addresses the needs of cocaine abusers in a systematic way, it has been necessary to separate the problem areas into distinct categories: behavioral, cognitive, emotional, and relationship. The treatment focuses on particular issues in each of these areas that emerge during the stages of recovery experienced by clients during the first year. Characteristic periods for the stages of recovery are as follows:

- 0 to 15 days postcocaine-withdrawal
- 16 to 45 days postcocaine-honeymoon
- 46 to 120 days postcocaine-the wall
- 121 to 180 days postcocaine-adjustment
- 181+ days postcocaine-resolution

Typical issues and patterns of problems occur across the course of the stages of recovery from cocaine dependency. They are categorized within the stages as follows:

Withdrawal Stage

During withdrawal, clients are disoriented, depressed, and fatigued and feel very much out of control. They do not understand what is happening to them and require explicit direction during this period.

Behavioral

Increased need for sleep
Behavioral inconsistency
Impulsive, erratic behavior
Anergia

Emotional

Depression
Anxiety
Self-doubt
Shame

Cognltlve

Difficulty concentrating
Cocaine cravings
Short-term memory disruption

Relationship

Hostility
Confusion
Maladaptive coping responses
Fear

Honeymoon Stage

During the honeymoon stage, cravings are reduced, mood improves, energy increases, and confidence and optimism return. Frequently, it feels to the client that the problem is over. Activity is often scattered, inefficient, and frenetic, Return to alcohol use and discontinuation of recovery activities may occur because the client sees no obvious need for continued caution.

Behavioral

High energy
Poorly directed behavior
Excessive work
Alcohol use

Emotional

Optimism
Overconfidence
Feelings of being cured

Cognitive

Inability to prioritize
Abbreviated attention span
Inability to recognize relapse potential

Relationship

Denial of addiction disorder
Desire for things to return to "normal"
Conflict between family and treatment

The Wall

This period is viewed as the major hurdle in the cocaine recovery process. Relapse vulnerability increases as clients experience low energy, anhedonia, difficulty concentrating, irritability, loss of sex drive, and insomnia. Clients often perceive that these conditions will persist indefinitely.

Behavioral

Sluggishness, anergia
Sexual disinterest/dysfunction
Insomnia
Discontinuation of treatment, recreational, and/or occupational behaviors
Resumption of alcohol/marijuana use

Emotional

Depression
Anxiety
Fatigue
Boredom
Anhedonia
Irritability

Cognitive

Cognitive rehearsal of relapse
Euphoric recall of cocaine use
Increased frequency of cocaine thoughts and cravings
Misattribution of emotional reactions
Difficulty concentrating

Relationship

Mutual blaming
Irritability
Devaluation of progress
Threatened separation/ expulsion from home

Adjustment Stage

There is often a great feeling of accomplishment at having completed the wall stage. This can result in a sense that finally everything should go "back to normal." Clients who successfully deal with this stage begin to "adjust" to the continuation of lifestyle and relationship changes that began in previous stages as the new definition of "normal."

Behavioral

Return to alcohol use
Return to high-risk situations
Decrease in abstinence-promoting behaviors
Return to "normal life"

Emotional

Reduced depression
Reduced anxiety
Reduced irritability
Continued boredom
Loneliness

Cognitive

Reduced frequency of cocaine thoughts and cravings
Questioning of addiction

Relationship

Emergence of long-term relationship problems
Resistance to assistance with relationship problems

Resolution Stage

Completion of the intensive 6-month program signals a shift from learning new skills to monitoring for relapse signs, maintaining a balanced lifestyle, and developing new areas of interest in the resolution stage. For some clients, individual psychotherapy or relationship issues emerge that may indicate a need for additional attention.

Behavioral

Emergence of other excessive behavior patterns (e.g., gambling, sex, work, eating, alcohol use)

Emotional

Emergence of psychodynamic material

Boredom with abstinence

Cognitive

Questioning the need for long-term monitoring and support

Relationship

Conflict between recovery principles and relationship needs

PROGRAM FORMAT

When the neurobehavioral approach is used, the goal of treatment is to provide a framework within which cocaine abusers (1) cease drug use, (2) remain in a treatment process for 12 months, (3) learn about issues critical to addiction and relapse, (4) receive direction and support from a trained therapist, (5) receive education for family members affected by the addiction and recovery, (6) become familiar with the support of self-help programs, and (7) receive monitoring by urine testing. The components of the program are constructed to eliminate drug use and maximize acquisition of relevant information while retaining the greatest number of clients in treatment. On admission, clients enter Phase I of the program. The schedule of program activities is delineated in table 1.

Individual Sessions

An unusual aspect of the neurobehavioral model is an intense focus on the use of individual sessions, with a professional therapist serving as the primary treatment agent. Group dynamics are secondary to the individual, one-to-one connection between client and therapist. Therapists are master's degree counselors who have received an additional 120 hours of specialized training at the Matrix Center before they are assigned caseloads. Their approach to working with clients requires that they use a combination of skills and that they function simultaneously as teacher and coach. The work of Richard and Elaine Resnick (1984) has made critical contributions to the development of this treatment philosophy. The therapist fosters a positive, healthy

TABLE 1. *Matrix Center program schedule*

Phase I (Months 1-6)

Client Schedule		Family/Spouse Schedule	
	Month 1		Month 1
Monday	- Educational group	Monday	- Educational group
Thursday	- AA meeting	Wednesday	- Family group
Friday	- Stabilization group		
Weekly	- three Individual sessions	Monthly	- two conjoint sessions
Weekly	- one urine test		
Monthly	- two conjoint sessions		
	Months 2-3		Months 2-3
Monday	- Educational group	Monday	- Educational group
Wednesday	- Relapse prevention group	Wednesday	- Family group
Thursday	- AA meeting		
Weekly	- two individual sessions	Monthly	- one conjoint session
Weekly	- one urine test		
Monthly	- one conjoint session		
	Months 4-6		Months 4-6
Wednesday	- Relapse prevention group	Monthly	- one conjoint session
Thursday	- AA meeting		- Group/individual sessions as needed
Weekly	- two individual sessions		
Weekly	- one urine test		
Monthly	- one conjoint session		

Phase II (Months 7-12)

All clients attend a weekly group for an additional 6 months.
Individual/couples therapy and urine testing are also available.

KEY: AA=Alcoholics Anonymous

relationship with the client and uses that relationship to reinforce positive behavior change. The interaction Is realistic and direct but not confrontational or parental. Therapists are trained to view the treatment process as an exercise that will promote self-esteem, dignity, and self-worth. A positive relationship between client and therapist is a critical element for client retention.

The content of the 45-minute individual sessions is structured to include specific information and a set of exercises. There are 52 individual sessions scheduled in the first 6 months of intensive involvement. The sequence of sessions is structured to present Information in an order that corresponds with the timetable of issues usually experienced by the clients in the recovery process, although there is flexibility for attending to individual client issues. The individual sessions are not open-ended counseling sessions or indepth psychotherapy sessions. Frequently, part of each session deals with the session topic and part allows the client to discuss other current problems. A sample of the session topics include rating withdrawal symptoms, teaching thought-stopping procedures, presenting time-scheduling techniques, dealing with drug-using friends, monitoring personal behavior change, reviewing nutrition and exercise habits, dealing with the wall, examining control issues, exploring emotional responses to recovery, learning introspection techniques, and integrating skills learned in treatment into lifestyle changes.

Educatlonal Group

The 12-week educational group is presented to clients and their families in a classroom setting. The educational component includes such program topics as the biology of addiction-describing such concepts as neurotransmitters, brain structure and function, drug tolerance, and the relationship between exercise and endorphin; conditioning and addiction—including such concepts as conditioned cues, extinction, and conditioned abstinence; medical effects of stimulants on the heart, lungs, reproductive system, and brain; and addiction and the family—describing how relationships are affected during addiction and recovery. Eight other topics are covered for a total of 12 lectures.

Stabilization Group

On Friday nights during for the first 4 weeks of treatment, clients participate in the stabilization group. The four topics covered in this group contain the key elements to staying sober through the following weekend: scheduling time, dealing with triggers, alcohol and secondary drug use, and activities to fill leisure time. This group is typically a small one that is very directed. It

provides a nonthreatening introduction to group situations for people who are unfamiliar with or uncomfortable in groups.

Relapse Preventlon Group

The relapse prevention group is a central component of the neurobehavioral treatment package, and it has a specific purpose and a specific format. There are certain things this group is not: It is not an encounter or sensitivity group, an assertiveness-training or growth group, a self-help or 12-step program, or a stress-reduction or open-ended "whatever is on your mind group. The group provides a setting in which information about relapse and relapse prevention can be shared. Signs of impending relapse can be identified by staff and clients. Clients heading toward relapse can be redirected, whereas those who are on a sound course of recovery can be encouraged. The group setting allows for mutual client assistance within the guiding constraints of the group leaders. Topics include dealing with fatigue, addict behavior, truthfulness, relapse justification, sex and recovery, balance, holidays and relapse, cocaine dreams, and reestablishing trust.

Family Group

The family group covers a 12-week series of topics designed to assist family members in coping with the stimulant user in recovery. As with the relapse prevention groups, these are not traditional therapy groups. They are run by a professional therapist and a coleader, a client who has completed the family group. Each group is structured with a didactic presentation of an addiction-related topic followed by discussion. The goal of the group is to refocus family members on their own issues and give them a forum for asking questions and expressing concerns and fears. Topics include effective communication, codependency, healthy intimacy, family rules, limitations of living with an addict, and relapse and relationships.

Conjolnt Sessions

During the first 6 months of the program, a minimum of seven conjoint sessions are scheduled that are facilitated by the client's individual therapist. These typically are conducted with the patient and spouse/significant other. However, they can also be used for a child, employer, or friend. There are specific issues that are discussed at each stage of the recovery. The material is structured to encourage communication between the client and family member about positive areas of change, to identify problem areas, and to devise strategies for dealing with problems. These sessions are helpful in defusing problem situations without initiating an intensive couples counseling process.

Urine Tests

Urine samples are collected randomly on a weekly basis. Full toxicology screens are used for approximately 10 percent of a client's tests; the other tests are for drug of choice only. This allows for regular urine testing without the excessive cost of full screens. Positive urine tests are used as points of discussion in individual therapy sessions. They provide an indication that some aspect of the treatment plan is inadequate or incomplete. Urine tests are not used for punitive or legal monitoring purposes.

Alcoholics Anonymous Meeting

Each of the Matrix offices has an AA meeting on the premises one night per week. These meetings are standard AA meetings, run according to AA's traditions. Clients are strongly encouraged to participate in these meetings as part of their recovery plan. Approximately 60 percent of the clients attend the AA meetings at Matrix and/or other outside meetings. Zweben's work (1986) has been of great assistance in describing the key issues that must be considered to effectively integrate the cognitive/ behavioral, professional therapy aspects of recovery with the more emotional/spiritual orientation of the self-help programs,

Relapse Analysis

An important aspect of relapse prevention training is how to handle a relapse if one occurs. Within the neurobehavioral model, the manner in which a relapse is handled is standardized by the use of a structured exercise. The exercise aids the client in viewing relapse as part of a process rather than as an isolated event and allows the therapist to understand the issues and events that occurred preceding the relapse, which may provide clues for the prevention of future relapses, The goals of the relapse analysis are to: (1) prevent similar relapses from happening without the client being aware of how or why they occur, (2) encourage the client to focus on the larger picture of the context in which the relapse occurred as opposed to the isolated event, (3) reframe the self-deprecation that often follows a relapse into an acceptance of the addiction, (4) remove the fear and mystique from a relapse episode and give the client a workable plan for staying drug-free, and (5) acknowledge the feelings the client is experiencing and help him or her understand that the behaviors can be controlled even though the feelings cannot.

Phase II

The Phase II component of the program covers months 7 to 12. The only structured activity recommended for all clients is a weekly Phase II group.

These groups address somewhat different issues for men and women. For many men, the Issues tend to focus on career adjustments, self-image changes, and lifestyle modifications. For many women, the issues tend to center on relationships, sexual abuse, and self-esteem. In addition to these groups, individual therapy sessions and couples therapy sessions can be included during the second phase for clients who desire to remain in ongoing therapy.

PROGRAM EFFECTIVENESS

The neurobehavioral program has been constructed in a way that facilitates evaluation and replication. The structured manuals used by the therapists promote the delivery of a treatment experience that is consistent across all clients. These manuals have been formalized through a grant from the National Institute on Drug Abuse (NIDA) (Rawson et al. 1989). A second phase of this NIDA project is a controlled clinical evaluation of the treatment model.

One pilot study (Rawson et al. 1986) was conducted to gain a preliminary assessment of the treatment program. In spring 1985, an independent research associate was hired by Matrix to follow up three groups of cocaine abusers at 8 months after their initial evaluation. The subjects in these groups were cocaine abusers who had entered Matrix for an evaluation session and had self-selected one of three treatment options: (1) no formal treatment (voluntary involvement in AA, Cocaine Anonymous, or Narcotics Anonymous); (2) 28-day hospital-based, AA-based inpatient treatment; or (3) outpatient treatment for 6 months with the materials developed at Matrix. In each group, 30 subjects were followed for 8 months after the evaluation session, and a structured interview was conducted with each subject.

The pilot data were promising and clinically valuable. The subjects who had attended outpatient treatment reported lower rates of cocaine use than did those in the hospital-based and the no-treatment groups. There appeared to be a positive relationship between alcohol consumption and relapse to cocaine use. The relationship appears to be an important clinical issue in the achievement of cocaine abstinence. The outpatient subjects reported satisfaction with the treatment experience that was significantly greater than subjects who had hospital-based treatment or who had not entered treatment. Although the conclusions drawn from this pilot study were limited because of the quasi-experimental design of the study, there was the strong suggestion from participants that the materials and clinical strategies produced a useful experience that helped them achieve cocaine abstinence.

MATRIX OPEN TRIAL 1986-89

The neurobehavioral model has been implemented in a standardized manner since 1985 by the Matrix Center. In two of the four Matrix Center offices, Beverly Hills and Rancho Cucamonga, a large-scale open trial has been conducted to provide a foundation for future systematic studies of the model. In this open trial, 486 of the subjects interviewed volunteered to participate in the model (Beverly Hills, n=314; Rancho Cucamonga, n=172). In the Beverly Hills office, the source of funding for the treatment was patient fees or private insurance for 85 percent of the participants ($4,500 per 1 P-month treatment episode). An additional 15 percent were treated pro bono. In the Rancho Cucamonga office, 20 percent of the subjects paid fees or used private insurance; 80 percent received treatment subsidized by the San Bernardino County Health Department. All subjects who received subsidized treatment paid for treatment on a sliding scale with the minimum fee of $10 per week. Subjects were not terminated for failure to pay. The catchment area served by the Beverly Hills office included the affluent areas of Beverly Hills and Westwood and the middle-class areas of San Fernando Valley. The Rancho Cucamonga off ice drew subjects from the lower income areas of Pomona, Ontario, and Fontana as well as blue-collar areas of San Bernardino and Riverside counties. The geographical and treatment funding differences in the two sites resulted in samples with some clear differences. Table 2 presents some aspects of the subject characteristics.

As table 2 illustrates, the Beverly Hills sample was somewhat older, had more education, and had a higher annual income. The sex ratios and marital status of both groups were approximately equal. In both sites a majority of subjects were Caucasian/Anglo, although the Rancho Cucamonga office had a somewhat higher percentage of blacks and Hispanics.

Table 3 illustrates the drug and alcohol histories of the sample. The samples were similar on all measures except route of administration. In the Beverly Hills sample, 51 percent used cocaine Intranasally as the primary route of administration. In Rancho Cucamonga, crack was smoked by 65 percent of the subjects. Both groups of subjects had substantial histories with cocaine and other drugs, and about two-thirds of both groups used alcohol three or more times per week.

The picture that emerges from tables 2 and 3 is that the subjects in this open trial were 20 to 40 years old and had used cocaine about 7 years; almost half had experimented with other dependency-producing drugs. Two-thirds admitted significant amounts of alcohol use on admission.

TABLE 2. *Subject characteristics in the Matrix 1986-89 open trial*

Characteristic	Beverly Hills (n=314)	Rancho Cucamonga (n=172)	Total (n=486)
Mean age in years	30.8	27.6	29.6
Males	72%	77%	74%
Females	28%	23%	26%
Mean years of education	14.2	12.6	13.5
Mean annual legal income	$27,900	$16,700	$23,930
Marital status			
Single	56%	50%	54%
Married	30%	35%	32%
Divorced	6%	10%	7%
Other	8%	5%	7%
Ethnicity			
Caucasian/Anglo	83%	63%	76%
Black	12%	20%	15%
Hispanic	4%	16%	8%
Other	1%	1%	1%

The majority were male and Caucasian/Anglo. In Beverly Hills, the subjects had higher incomes and more education, and a larger proportion used cocaine intranasally. In Rancho Cucamonga, the sample had both lower incomes and less education, and almost two-thirds used crack.

The mean length of participation in the treatment program was 18.2 weeks. In Beverly Hills, subjects averaged more than 5 months in treatment, whereas those in Rancho Cucamonga averaged more than 3 months. One of the causes of the discrepancy between the two samples is that in Rancho Cucamonga, 20 percent of the subjects dropped out during the first 2 weeks. In Beverly Hills, this early dropout rate was 8 percent. Conversely, in Beverly Hills, almost one-half (48 percent) finished the intensive 6-month phase of the program, whereas only 22 percent of the subjects in Rancho Cucamonga completed this phase of treatment.

TABLE 3. *Drug and alcohol history of subjects in Matrix 1986-89 open trial*

History Factor	Beverly Hills (n=314)	Rancho Cucamonga (n=172)	Total (n=486)
Mean duration of cocaine use	7.9 years	6.1 years	7.2 years
Mean amount of cocaine used in the 30 days before admission	18.0 g	20.5 g	18.6 g
Primary route of administration			
Intranasal	51%	26%	43%
Smoked	43%	65%	51%
Intravenous	6%	9%	6%
Percent with significant other drug history (excluding marijuana)	48	41	46
Percent with significant alcohol use on admission (three or more times per week)	72	68	71

Of those subjects who completed the 6-month phase, similar proportions in both sites completed the treatment program with no cocaine use detected by urinalysis or self-report (Beverly Hills, 44 percent; Rancho Cucamonga, 40 percent).

Weekly urine samples were taken on a random basis as part of the treatment program. Samples were screened for cocaine and amphetamine. In those cases where a subject self-reported cocaine use, a urine test was deferred, and a positive result was recorded. Occasionally, samples were overlooked for the week. Therefore, in table 4, the number of samples per subject does not equal the number of weeks in treatment. The results illustrated in table 4 indicate cocaine use was roughly equivalent in both groups. Overall, nearly 9 of 10 (88 percent) of the samples taken were negative for stimulants.

To document the involvement of subjects in the treatment program, table 5 lists the amount of involvement in three categories of program participation. As illustrated in the table, subjects attended about 80 percent of the

TABLE 4. *Program completion/urinalysis data from subjects in Matrix 1986-89 open trial*

Factors Measured	Beverly Hills (n=314)	Rancho Cucamonga (n=172)	Total (n=486)
Mean number of weeks in treatment	21 .0	13.2	18.2
Number of subjects who completed 6-month Phase I	151 (48%)	38 (22%)	189 (39%)
Number of subjects with no drug use during treatment	66 (44%)	15 (40%:)	81 (43%)
Percent who failed to complete first 2 weeks of treatment	8 (n=28)	20 (n=35)	13 (n=63)
Number of negative urinalysis results	15.8	10.2	13.6
Number of positive urinalysis results	2.1	1.4	1.8
Percent of negative urinalysis results	88	88	88

scheduled individual therapy sessions while in treatment. In contrast, the attendance at group sessions was less reliable. Subjects attended just more than one-half (54 percent) of the stabilization, educational, and relapse prevention groups. The poorest attendance in any of the formal program components was in the family group, where participation was only about one-quarter of the scheduled sessions (24 percent). Interestingly, the attendance in the family component appeared slightly better at the Rancho Cucamonga site (32 percent vs. 22 percent).

These data support the clinical impression that the primary attraction of this treatment model is the individual session. Although many subjects reported enthusiasm and interest in the group components of the program, their attendance suggests that they preferred the individual

TABLE 5. *Program compliance data for* subjects *in Matrix 1986-89 open trial*

Data Measured	Beverly Hills (n=314)	Rancho Cucamonga (n=172)	Total (n=486)
Mean number of weeks in treatment	21 .0	13.2	18.2
Percent of scheduled individual sessions attended	82	78	81
Percent of scheduled group sessions attended	53	55	54
Percent of family activities attended	22	32	24

sessions. However, it should be noted that individual sessions were rescheduled frequently at the convenience of the subjects. Group sessions were held at fixed times and could not be shifted to meet individual subject schedules. Therefore, part of the reason for the better attendance can be explained by the greater flexibility of scheduling of individual sessions.

The clinical impression of the authors is that subjects whose family members participate in treatment have better treatment retention rates than those with no family participation. This impression is particularly strong in the Rancho Cucamonga off ice, where more low-income subjects were treated. The involvement of family members appeared particularly critical for promoting retention in treatment at this site,

As noted in the introduction of this chapter, the neurobehavioral model hypothesizes the existence of certain stages of cocaine recovery. The evidence for these stages has been based solely on clinical impression. In the studies under way, several standardized tests and scales are being used to investigate the existence of these stages. In addition, a collaborative research project with the Department of Nuclear Medicine, University of California, Los Angeles, is allowing for position emission tomography scan analysis of subjects at different times following cocaine use (Baxter et al. 1988). It is hoped that some biological evidence will be discovered that will help determine the nature of these presumably biologically based stages.

Figure 1 depicts the dropout rates of subjects in the open trial across the first 25 weeks of the program. As noted in this figure, of the subjects who terminated before 26 weeks, more than 20 percent did so in the first 2 weeks. This high dropout rate corresponds with the withdrawal stage noted in the model. For the next 4 weeks, the rate of dropouts is only about 7 percent per 2-week block; this lowered rate of dropouts corresponds to the honeymoon stage described earlier. Although there is considerable fluctuation in the dropout rate over the next 10 weeks (weeks 7 to 16) overall, the dropout rate is 10.2 percent. This somewhat elevated dropout rate corresponds to the wall stage. Finally, during the last 10 weeks of the 6-month block, weeks 17 to 25, the dropout rate falls to only about 3.1 percent per 2-week block. Although these figures have not been compared statistically, the pattern of the dropout rate does correspond to the pattern of stages observed clinically.

Limitations of the Open Clinical Trial

The data presented in this section are not intended to validate scientifically the efficacy of the neurobehavioral treatment model. They are intended to provide some perspective on one body of work conducted with a relatively large group of cocaine users. Because of the peculiarities of the sample, the generalizability of the findings is limited. At the present time there are no followup data available to address the extremely important question of how these subjects fared after completion of formal treatment involvement. However, it is hoped that data presented in this open trial can provide some perspective on issues of importance in the treatment of cocaine dependence. Some of the working hypotheses generated by the experience of this open trial that are being tested in controlled research are presented below.

1. Positive followup status is positively correlated with increased time in treatment.

2. Attendance at treatment activities is negatively correlated with drug use in treatment.

3. Amount of family involvement in treatment activities is positively correlated with client involvement in treatment activities.

4. Amount of AA participation is positively correlated with positive followup status and negatively correlated with drug use in treatment.

5. Amount of alcohol use is positively correlated with cocaine use during treatment and at followup.

6. Medication may increase participation in treatment activities and retention in treatment.

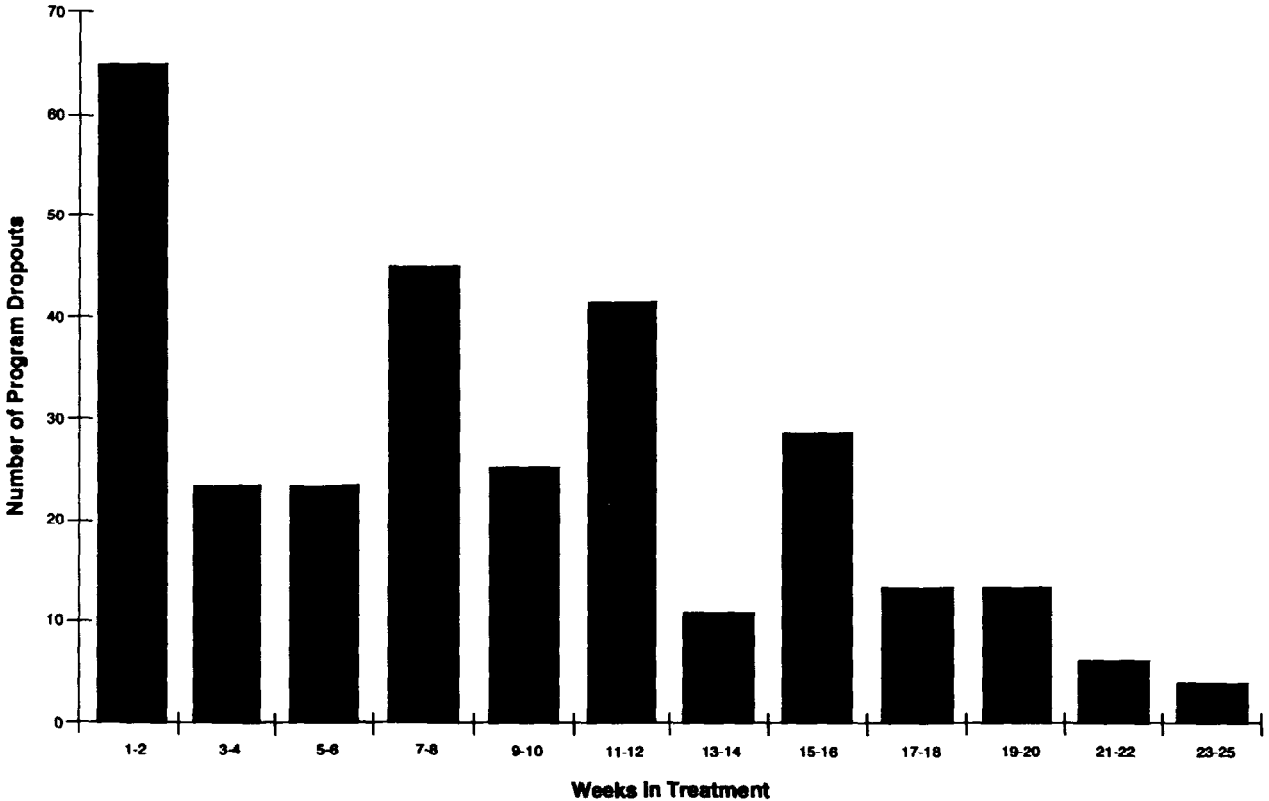

FIGURE 1. *Rate of program dropouts*

7. Positive followup will be positively correlated with lifestyle behavior change during treatment.

FUTURE DIRECTIONS

The keys to further development of a treatment method such as the neurobehavioral model described here are replicability and controlled evaluation. To refine the treatment method in a way that increases its effectiveness or broadens its applicability to other treatment populations, it is first necessary to be able to replicate the approach systematically. To promote the replication of the method, a detailed 350-page manual has been developed in conjunction with NIDA (Rawson et al. 1989) that contains all the treatment handouts, educational sheets, and written exercises organized into the different treatment components. In addition, each treatment component is accompanied by a therapist's guidebook that orients the therapist or group leader to the manner in which the materials are to be used and the desired effect of discussing the topic material.

To evaluate this treatment model systematically, a controlled clinical evaluation of the model is under way. In this study, 100 cocaine abuser volunteers are being assigned randomly either to the neurobehavioral treatment program or to a comparison condition consisting of referral to available community resources. A variety of psychological data, treatment compliance data, behavior change data, and alcohol and other drug use data is being collected on all subjects during the treatment period and at a series of followup interviews. Results of this study should demonstrate whether participation in the neurobehavioral program activities produces a measurable impact on cocaine use during treatment and at followup.

In a study being headed by Felipe Castro, Ph.D., through San Diego State University, the neurobehavioral model is being evaluated as part of an inpatient-outpatient study. in this project, data from 120 stimulant users who participate in the neurobehavioral model program will be compared with that from a group of stimulant abusers who participate in a 28-day inpatient program and with a group who received no formal treatment. As the design of this study does not involve random assignment of subjects to groups, there will not be a controlled comparison of the efficacy of the treatment approaches. The primary focus of this study is to determine whether a patient profile can be constructed that will identify those subjects who would be most appropriate for either of the treatment approaches. In addition, use of the Addiction Severity Index (McLellan 1985) and the Lifestyle Survey (Castro 1993) should provide some valuable data on the relationship between drug use and prosocial behavior change.

Another potentially useful application of this neurobehavioral approach is the delineation of an explicit framework within which to test new pharmacologic, medical, or psychological strategies. Many of the pharmacologic strategies for cocaine dependency treatment have been evaluated separately from any well-defined ancillary treatment methodology. This is unfortunate because the chaotic circumstances that most cocaine addicts are in at the time of treatment initiation make it extremely difficult to assess accurately the value of a specific therapeutic intervention. For example, a medication that might reduce cocaine craving will not provide assistance with the social disorganization, family disruption, financial stress, and other emotional obstacles with which the cocaine abuser is faced in the first few days of abstinence. It is possible that a useful pharmacologic approach may be dismissed as not useful because its effects are overwhelmed by nonpharmacologic issues. Similarly, some strategies may be useful at later stages in the recovery process. To evaluate these effects, it may be necessary to work with cocaine abusers for weeks or months into recovery. The neurobehavioral model may provide a standardized methodology within which these additional strategies can be assessed. An evaluation of desipramine for cocaine and methamphetamine dependence is under way using the neurobehavioral method as the treatment structure. Particular attention will be given to assessing the value of either of these medications during the withdrawal and wall phases of stimulant recovery. Further evaluations of the neurobehavioral model will attempt to systematically explore the benefits of acupuncture and exercise at different stages in the recovery process. In addition, several other studies are in preparation to evaluate the model with cocaine-abusing methadone maintenance patients, pregnant crack-smoking women, and stimulant-abusing schizophrenics. Studies under way are listed below.

- Inpatient/Outpatient Patient Matching Study, Rancho Cucamonga Office, Felipe Castro, Ph.D., Principal Investigator, Richard Rawson, Ph.D., Co-Principal Investigator

- Neurobehavioral Model Evaluation With Random Assignment, Glendale Office, Richard Rawson, Ph.D., Principal Investigator.

- Desipramine Double-Blind Evaluation: Research Demonstration Project, Beverly Hills and Woodland Hills Offices, Richard Rawson, Ph.D., Principal Investigator, Walter Ling, M.D., Co-Principal Investigator.

- Gepirone for Cocaine Abuse, Beverly Hills Office, Walter Ling, M.D., Principal Investigator.

SUMMARY

The treatment of cocaine dependency in the 1980s has required the use of a broad range of strategies. Although there are some promising approaches for treating certain aspects of the cocaine withdrawal syndrome, there is no empirical evidence that provides a clear direction to the future development of a comprehensive treatment approach. The neurobehavioral model is an initial attempt to structure information, support, and encouragement across a series of stages that are experienced by cocaine abusers as they progress through the first 6 months of their recovery. This model attempts to sequence strategies in a way that will correspond to an expected timetable of problem emergence during recovery from cocaine dependency. Individual sessions with trained therapists are used extensively to move clients through the recovery process. Relapse prevention techniques have been used extensively within a relapse prevention group format and in a standardized relapse analysis procedure. This model has been standardized into a manual that allows for replication and evaluation. Current research efforts are under way to assess the usefulness of this model as an independent treatment approach and as a framework for evaluating other potentially useful cocaine dependency treatment strategies.

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Psychotherapeutic Treatment of Cocaine Abuse: Models for Its Evaluation Alone and In Combination With Pharmacotherapy

Kathleen M. Carroll

INTRODUCTION

Lines of research on psychotherapeutic and pharmacotherapeutic treatments for cocaine abuse have largely developed separately, with more rapid proliferation of randomized clinical trials of pharmacologic than psychotherapeutic treatments in recent years. Although most clinical trials evaluating pharmacologic agents have included some psychotherapeutic component, psychotherapy has assumed an essentially supportive role in these studies, limited to fostering treatment retention and enhancing compliance with medication. The contribution of psychotherapy per se has not been a focus of studies evaluating pharmacologic treatments for cocaine abuse.

What evidence exists for the efficacy of psychotherapy as treatment for cocaine abuse? What is an appropriate model of psychotherapy research in cocaine abuse? Should psychotherapy be conceived as an independent treatment to be used alone or in combination with other treatments, as the "backbone" of a treatment program to which adjunctive treatments may be added, or as an adjunct to other forms of treatment such as drug counseling or pharmacotherapy? This chapter has two parts: (1) a detailed review of the only randomized clinical trial to date that had adequate historical controls contrasting different psychotherapies for cocaine abuse to evaluate the relative efficacy of psychotherapy and pharmacotherapy and (2) an explication of possible models for conceptualizing and evaluating the contributions of psychotherapy and pharmacotherapy, alone and in combination, to the treatment of cocaine abuse.

PSYCHOTHERAPEUTIC TREATMENTS: EMPIRIC EVIDENCE

Although few psychotherapeutic treatments have been evaluated in clinical trials, the large number of articles describing various psychotherapeutic approaches as treatment for cocaine abuse suggests the intuitive appeal of these approaches. Approaches described thus far can be broadly categorized as those that are either primarily interpersonal or psychodynamically oriented (Rounsaville et al. 1985; Schiffer 1988) or treatments that are primarily behavioral or cognitive-behavioral in orientation (Anker and Crowley 1982; Carroll et al. 1991*a;* O'Brien et al. 1988). Several articles have described psychotherapeutic approaches delivered as a component of multimodal treatment programs (Rawson et al. 1990; Washton 1986); most authors have emphasized the value of self-help groups such as Cocaine Anonymous (Millman 1988). Reports that have included outcome data consistently point to difficulties met in treating cocaine abusers with a primarily psychotherapeutic approach, including high rates of treatment dropout (Anker and Crowley 1982) mixed compliance with treatment, and high rates of relapse after initial periods of abstinence (Rawson et al. 1986).

Randomized Clinical Trials

Only one randomized clinical trial evaluating purely psychotherapeutic approaches for cocaine abuse has been completed to date. This study (Carroll et al. 1991*b)* sought to assess the feasibility of purely psychotherapeutic treatments for cocaine abuse and to contrast two widely different forms of psychotherapy. Forty-two ambulatory cocaine abusers were randomly assigned either to relapse prevention (RP), a cognitive-behavioral approach adapted for cocaine abusers (Carroll et al. 1991*a),* or to interpersonal psychotherapy (IPT), a short-term psychodynamic approach (Rounsaville et al. 1985). Dropout was high in both conditions, but rates of attrition were significantly higher for IPT, with 62 percent of subjects in IPT vs. 33 percent of those in RP failing to complete a 12-week course of treatment.

Significant differences by treatment type were not seen on most measures of outcome but did emerge when subjects were stratified by pretreatment severity of cocaine abuse: Among the severe users, those treated with RP were significantly more likely to become abstinent than high-severity subjects treated with IPT (54 vs. 9 percent). Subjects with lower levels of severity tended to improve despite type of treatment received. A similar pattern was seen when subjects were stratified by pretreatment severity of psychological symptoms: For subjects higher in psychopathology, those in the RP group were much more likely to become abstinent than those treated with IPT (58 vs. 14 percent). In parallel to Woody and

colleagues' (1983) findings for psychotherapy outcome with methadone-maintained opiate addicts, the author and coworkers found that cocaine abusers with concurrent depressive disorders tended to improve regardless of treatment received. Cocaine abusers with antisocial personality (ASP) disorder were significantly more likely than those without ASP disorder to drop out of treatment and tended not to improve in treatment.

This study suggests that (1) at least some cocaine abusers can be treated successfully with a purely psychotherapeutic approach and (2) overall response to treatment as well as response to specific forms of psychotherapy may be mediated by patient characteristics. Limitations of the purely psychotherapeutlc approaches evaluated here were also revealed: Attrition was substantial in both treatment conditions and most marked early in treatment (80 percent of all subjects who dropped out of treatment did so by week 6). Moreover, although subjects in both conditions demonstrated significant improvement over baseline levels on most measures of outcome, more than half the subjects (23 of 42) failed to become stably abstinent during treatment.

PSYCHOTHERAPY ALONE COMPARED WITH PSYCHOTHERAPY AND PHRMACO THERAPY COMBINED

Are the limitations of psychotherapy suggested by this study unique to a primarily psychotherapeutic approach? Given that pharmacotherapies are generally perceived as faster acting and more potent than psychotherapy (Karasu 1982), improved treatment retention or initiation of abstinence in cocaine abusers receiving pharmacologic intervention might be expected. In particular, abusers' expectations for medication effects might foster greater retention during the Initial weeks of treatment, when rates of attrition are highest.

Because data from direct comparisons of psychotherapy with pharmacotherapy are not yet available, outcomes from this study of psychotherapeutic treatments (Carroll et al. 1991*b)* may be compared with results from a controlled clinical trial of pharmacotherapies for cocaine abuse also performed at Yale. In that study (Gawin et al. 1989) 72 ambulatory cocaine abusers were randomly assigned to desipramine (DMI), lithium (Li), or placebo (PLA), each delivered in combination with IPT. Subjects treated in the pharmacotherapy trial can be regarded as historical controls for the psychotherapy study because the following conditions were met (Pocock 1976): (1) Subjects in both studies were recruited and treated in the same clinic: (2) IPT was delivered by the same therapists in both studies: (3) the two samples were almost identical on pretreatment measures of demographic and psychiatric variables as well as baseline intensity of cocaine use: (4) identical subject eligibility criteria

were used in both studies, with the exception that subjects in the psychotherapy study did not require medical clearance for pharmacotherapy; and (5) subjects in both studies were evaluated using identical assessment Instruments and procedures. Although the two studies were conducted as distinct investigations and the likelihood of self-selection may limit the strength of conclusions based on a comparison of the two studies, this comparison is useful in demonstrating current conceptions of psychotherapy and pharmacotherapy as treatment for cocaine abuse.

Data contrasting rates of treatment retention and initiation of abstinence from both studies are presented in table 1. The Gawin and colleagues' pharmacotherapy study (1989) evaluated outcome through 6 weeks of treatment, whereas the psychotherapy study evaluated outcome through 12 weeks. Because psychotherapy is generally assumed to require more time to exert its effects (Elkin et al. 1988*a),* retention and abstinence data are presented for both periods.

Several speculations emerge from this comparison regarding the roles and actions of psychotherapy and pharmacotherapy in the treatment of cocaine abuse for (1) treatment retention and (2) initiation of abstinence. Considering treatment retention first, the 6-week retention rate for IPT

TABLE 1. *Comparison of pharmacotherapy and psychotherapy studies*

	Pharmacotherapy+Psychotherapy (Gawin et al. 1989)			Psychotherapy Alone	
	IPT+DMI (n=24)	Li LIPT (n=24)	IPT+PLA (n=24)	(n=21)	IPT (n=21)
Percent remaining at 6 weeks	75.0	45.6	41.7	71.4	52.4
Percent abstinent at 6 weeks	58.3	25.0	16.7	33.3	28.6
Percent abstinent at 12 weeks	—	—	—	57.1	33.3

KEY : IPT=interpersonal psychotherapy; DMI=desipramine; Li=lithium; PLA=placebo; RP=relapse prevention

SOURCE: Reprinted from Carroll et al. 1991*b* by courtesy of Marcel Dekker Inc. (New York).

alone in the psychotherapy study (52 percent) was slightly higher than that for the IPT+PLA combination in the pharmacotherapy study (42 percent). One interpretation of this finding is that the addition of expectations for medication effects in the IPT+PLA combination did little to improve treatment retention over IPT alone. Instead, expectations for medication effects may have resulted in slightly greater attrition when expected benefits of the medication were not forthcoming. Also of note is the rate of retention through 6 weeks for RP alone in the psychotherapy study (71 percent), which is comparable to that for the IPT+DMI combination (75 percent). This suggests that nonpharmacologic interventions may have considerable power for keeping cocaine users in treatment, even in the absence of pharmacotherapy. Although retention for the IPT+DMI combination was markedly higher than that for IPT+PLA, the role of active pharmacotherapy in fostering treatment retention is not clear, because a pharmacotherapy alone condition was not included in the pharmacotherapy study.

A comparison of abstinence rates in the two studies shows support for the expectation that the pharmacotherapy-psychotherapy combinations would exert effects more rapidly than psychotherapy alone. At 6 weeks, the abstinence rate for subjects receiving the IPT+DMI combination was 58 percent: abstinence rates for the two psychotherapy-alone conditions were lower and comparable to each other (33 percent for RP and 29 percent for IPT). For RP, an additional 6 weeks were required to match the abstinence rate for the pharmacotherapy-psychotherapy combination (the abstinence rate for RP increased to 57 percent at 12 weeks). This suggests that RP, a skills-training approach, requires additional opportunities for coping skills to be practiced and implemented.

The lower rate of abstinence at 6 weeks for the IPT+PLA combination (17 percent) in the pharmacotherapy study in contrast to that of IPT alone (29 percent) in the psychotherapy study is also of interest. Several factors may account for this discrepancy. First, self-selection may have resulted in more psychotherapy-responsive subjects in the psychotherapy study, which may have resulted in better outcome for IPT. Second, for the IPT+PLA group in the pharmacotherapy study, a negative-placebo effect (Klerman 1963) may have undercut the efficacy of IPT; that is, patients' expectations for medication effects may have resulted in their making less effort through other means to reduce their cocaine use. A third possibility exists that is of particular interest: Although IPT in both studies was delivered by the same therapists, differences in conceptions of the role of psychotherapy in the two studies, and hence the context in which the psychotherapy was delivered, may have differentially affected the efficacy of IPT. In the pharmacotherapy study, medications were the change agents of primary interest, and great emphasis was placed on protecting the integrity of the pharmacologic components of the treatment.

Psychotherapy was conceived as the "ground" against which the impact of the pharmacologic agents could be assessed and was not evaluated as a primary change agent; hence, delivery of the psychotherapy was not systematically monitored or evaluated. This also may have conveyed to subjects expectations that psychotherapy was a less important or less effective component of treatment. Conversely, in the psychotherapy study, the psychotherapies were conceived as powerful change agents, efforts were made to ensure that subjects received an adequate "dose" of psychotherapy, and therapies were administered optimally. Hence, the improved outcome for the IPT-alone condition in the psychotherapy study over the IPT+PLA combination in the pharmacotherapy study may reflect delivery of a more potent form of IPT.

To summarize, data from the above comparison suggest that (1) nonpharmacologic treatments may have an important role in fostering treatment retention: (2) pharmacotherapy may be a more rapidly acting form of treatment than psychotherapy for cocaine abusers: and (3) the often-cited limitations of psychotherapy as treatment for cocaine abuse (e.g., high attrition, moderate rates of treatment success) are only partly addressed by combining psychotherapy with desipramine as a pharmacotherapeutic approach.

MODELS FOR THE EVALUATION OF PSYCHOTHERAPY AND PHARMACOTHERAPY

The comparison of this pair of studies also provides two illustrative models for psychotherapy as treatment for cocaine abuse: (1) as a necessary but largely nonspecific support to pharmacotherapy (Gawin et al. 1989) and (2) as an effective, and in some cases sufficient, treatment in and of itself (Carroll et al. 1991*b).* The first model suggests that psychotherapy has limited usefulness beyond fostering compliance with pharmacotherapy and implies uniformity of effects from psychotherapy. Data from this comparison suggest that this model of psychotherapy may, in part, have resulted in underestimation of the potential effectiveness of psychotherapy. The second model assumes a broader role for psychotherapy and suggests improved outcome may result from preservation of treatment integrity. Furthermore, it assumes that different forms of treatment may offer unique and specific contributions to outcome.

Which model of psychotherapy is likely to result in more fruitful treatment research with cocaine abuse? Before considering research questions that would follow from adopting different models of psychotherapy as treatment for cocaine abuse, it may be instructive to review models of psychotherapy research from other psychiatric disorders as potential guides for psychotherapy research with cocaine abusers.

Opiate Dependence

Successful treatments for opiate dependence have generally involved some combination of psychotherapy and pharmacotherapy, most convincingly demonstrated by the disappointing results typically achieved when either modality is used alone. Purely pharmacologic approaches have generally yielded poor retention and limited outcomes, but marked improvements have been noted when a psychotherapeutic component is added to pharmacologic interventions such as medication-assisted detoxification (Rawson et al. 1983), narcotic antagonist programs (Resnick et al. 1981), and methadone maintenance (Woody et al. 1983). Conversely, although it is almost impossible to engage opiate addicts in treatment with a purely psychotherapeutic approach (Rounsaville and Kleber 1985) delivery of psychotherapy within methadone maintenance programs has enabled investigators to rigorously contrast different psychotherapeutic approaches and identify those addicts who benefit most from professional psychotherapy over standard drug counseling during methadone maintenance (Woody et al. 1983; Rounsaville et al. 1983). Therefore, all trials demonstrating efficacy of psychotherapy for opiate addicts have generally involved psychotherapy-pharmacotherapy combinations, and pharmacotherapy may be a necessary condition for successful psychotherapeutic intervention with opiate addicts.

Can this model be applied to the treatment of cocaine abuse? Development of a pharmacologic equivalent of methadone for the treatment of cocaine abuse is not imminent. Available pharmacologic agents for the treatment of cocaine abuse do not approach the effectiveness of methadone for keeping addicts in treatment and reducing illicit substance use. Furthermore, results from our studies and others (Rawson et al. 1986) suggest pharmacologic intervention is not essential for all cocaine abusers. Hence, the current model for psychotherapy research among opiate addicts, in which psychotherapy is evaluated as an adjunct to the modal form of treatment (methadone maintenance), has limited usefulness as a model for psychotherapy research with cocaine abusers.

Depression

A more useful model for evaluating psychotherapy, alone and in combination with pharmacotherapy, may come from research on the treatment of depression. In this area, there is a large body of empirical evidence on the efficacy of different psychotherapies, pharmacotherapies, and combinations thereof (Conte et al. 1986; Elkin et al. 1989). Well-designed studies have addressed differentiated questions regarding specificity of the different forms of treatment and subtypes of depressives for which different treatments may be most effective (DiMascio et al. 1979; Imber et al. 1990) and conceptual and methodological issues involved in comparing and

combining psychotherapy and pharmacotherapies have been addressed in detail (Elkin et al. 1988*a,* 1988*b;* Hollon and Beck 1978).

Current models for research on the treatment of depression may serve as useful guides for psychotherapy research with cocaine abusers, given several parallels in the two disorders and their treatment. In the treatment of depression, as in the treatment of cocaine abuse, response to available pharmacologic and psychotherapeutic treatments is incomplete (Karasu 1990*a;* Morris and Beck 1976); relapse after remission of symptoms is frequent (Angst 1973); patient groups are heterogeneous and may include subtypes with differential response to treatment (Karasu 1982); and each form of treatment (psychotherapy and pharmacotherapy) may address distinct symptom areas (Klerman 1975). This body of research has led to current models of treatment that allow for different etiologies of depression, variability in clinical manifestations of depression, heterogeneity in patient groups, and variation in response to available treatments. This model also holds that each form of treatment is powerful and potentially unique. As Karasu (1990*b,* p. 276) has noted:

> . . . no single therapy is uniformly successful for all the concomitants of the depressive disorder. For instance, biological variables may override psychological ones, or the reverse. In addition to determining whether treatment should consist of drugs combined with psychotherapy or of psychotherapy alone, examination of the (different) psychotherapies lends itself to a more discriminatory use of each . . . . . Psychotherapy may be used not only by default, that is, to increase compliance with medication or as an alternative for patients who cannot or will not respond to pharmacotherapy, but in itself as an independent intervention,

One could easily substitute “cocaine abuse” for “depression” in the quotation above as a potential guide for evaluating psychotherapy and pharmacotherapy for cocaine abuse. Because it is unlikely that any single treatment or form of treatment will be adequate for all cocaine abusers, research should address differentiated questions regarding the roles and specific contributions of a variety of treatment approaches: What are the indications for psychotherapy and/or pharmacotherapy for cocaine abuse? Are different psychotherapies differentially effective with different types of cocaine abusers or in combination with different pharmacologic agents?

Although treatment research in depression may offer useful models for evaluating psychotherapy and pharmacotherapy, there are important differences between depression and cocaine abuse as well as among

available therapies that limit the extent to which models from treatment research for depression can be applied to cocaine abuse. Chief among these differences is that available pharmacologic agents cannot be considered "standard" treatments for cocaine abuse as are antidepressants in the treatment of depression. The promise of tricyclic antidepressants for cocaine abuse (Gawin et al. 1989) has not yet been widely replicated. In particular, the efficacy of tricyclic antidepressants as treatment for cocaine abuse may vary by the treatment modality in which they are administered (Kosten, this volume). Nevertheless, as new therapies for cocaine abuse are evaluated, it is possible to draw from research on psychotherapy and pharmacotherapy in the treatment of depression to conceptualize various roles for psychotherapy as treatment for cocaine abuse.

ROLES FOR PSYCHOTHERAPY AS TREATMENT FOR COCAINE ABUSE

As Sole Treatment

Initial reports suggest psychotherapy alone may be adequate treatment for some subgroups of cocaine abusers (Carroll et al. 1991*b;* Rawson et al. 1986). This leads to two general types of research questions regarding psychotherapy as sole treatment for cocaine abusers: First, which subgroups of cocaine abusers will respond to purely psychotherapeutic treatments? This line of research could include success profiling, in which characteristics of subjects responding well vs. poorly to specific psychotherapies are identified retrospectively. For example, psychotherapy "responders" might include cocaine abusers with lower levels of severity, those who can sustain periods of several weeks of abstinence between episodes of cocaine use, or those who are prone to relapse in identified high-risk situations. An example of this type of research from the depression literature is Rush and colleagues' (1982) finding that depressives with cognitive distortions respond better to cognitive therapies for depression.

This line of research would also lead to direct comparisons between psychotherapy and other forms of treatment, particularly pharmacotherapy. In the treatment of depression, many investigations directly contrasting psychotherapy and pharmacotherapy have appeared. These have focused largely on (1) contrasting the efficacy of psychotherapy with that of pharmacotherapy as a reference condition (Elkin et al. 1985) and (2) attempting to discern the mode of action and specificity of each form of treatment (Imber et al. 1990). In the treatment of cocaine abuse, direct contrasts of psychotherapy with pharmacotherapy might address similar questions. For example, with respect to time course, the effects of drugs may be apparent earlier in treatment than those of psychotherapy, where effects may require more time to become manifest but endure longer

than the efforts of pharmacotherapy. Such a finding would have important implications for treatment: If the effects of pharmacotherapy were found to be transient, pharmacotherapy would be an appropriate intervention if it were used to foster initial abstinence, stabilize the patient, and increase availability for psychotherapy, but might be inappropriate if pharmacotherapy alone were expected to bring about lasting improvement.

Direct contrasts between psychotherapy and pharmacotherapy also would allow detection of specific effects associated with each form of treatment. For example, pharmacotherapy may differentially reduce craving related to alterations in postsynaptic receptor sensitivity (Gawin et al. 1989), whereas some forms of psychotherapy might better address craving that resulted from classical conditioning of particular cocaine cues. Similarly, whereas pharmacotherapy may help abusers achieve initial periods of abstinence, psychotherapies may better address their motivation to alter substance use, resolve issues related to drug availability, and improve their coping skills. This type of research also could provide guidance regarding indications for psychotherapy or pharmacotherapy for different types of cocaine abusers.

A second general type of question that could be addressed in research evaluating psychotherapy as sole treatment for cocaine abuse has to do with the efficacy of different types of psychotherapy. In the treatment of depression, there have been many studies contrasting different forms of psychotherapy; in general, this body of work has supported the effectiveness of active psychotherapies over controls but has not demonstrated the superiority of one form of psychotherapy over another (Luborsky et al. 1975; Smith and Glass 1977). In the treatment of cocaine use, evaluation of IPT and RP revealed no main effects for treatment but suggested more severe cocaine users as well as those with higher levels of psychiatric severity had better response to RP than to IPT. Widely used models of treatment, in particular those derived from the 12-step model, have not been contrasted with other forms of treatment to discern which subgroups of cocaine abusers may respond to different forms of psychotherapeutic intervention.

As Support to Pharmacotherapy

In this model, psychotherapy is seen as providing a minimal supportive structure against which the efficacy of drugs can be evaluated. A psychotherapeutic component is included largely to “warm up the drug,” fostering patients’ retention in treatment and compliance with pharmacotherapy (Docherty et al. 1977; Elkin et al. 1988*a).* Few researchers would consider feasible a design in which pharmacotherapy was administered without any supportive or relationship elements (Elkin et al. 1988*b;* Karasu 1982, 1990*b).*

As noted above, psychotherapy as support to pharmacotherapy has been the dominant model in those investigations that have evaluated pharmacotherapies for cocaine abuse. Investigators frequently describe their designs as evaluating drugs as adjuncts to "treatment as usual," which usually consists of psychotherapy or counseling. However, as was suggested in our comparison of psychotherapy and pharmacotherapy studies, in pharmacologic trials nonpharmacologic components are likely to be deemphasized relative to the medications being evaluated. Psychotherapy is likely to be implemented as a support to pharmacotherapy rather than as a robust treatment in its own right. Thus, whereas the research question may be posed as What is the incremental effectiveness of adding pharmacotherapy to treatment as usual?," in clinical trials of pharmacologic agents, this often translates in practice to "What is the relative effectiveness of active medication or placebo in the context of minimal supportive clinical management?"

Limiting conception of psychotherapy to that of a minimal supportive condition in pharmacologic trials is likely to have a number of effects, because the effectiveness of a minimal supportive condition is rarely equal to that of an active psychotherapy (Luborsky et al. 1975; Smith and Glass 1977). In this context, psychotherapy is seen as essentially inert; thus, the content, goals, and methods are typically not specified or monitored, with the result that all psychotherapies are conceived as uniform. Active or curative elements that would be included in a psychotherapy condition in which treatment integrity was preserved may be absent, thereby undercutting the efficacy of the therapy. The unique contributions of psychotherapy are likely to go underemphasized and unassessed. Conclusions regarding the efficacy of psychotherapy based on pharmacologic trials (where psychotherapy plays a secondary, supportive role) are likely to underestimate the potential efficacy of nonpharmacologic treatments.

As a Complementary Treatment

In this model, the efficacy of psychotherapy or pharmacotherapy alone typically is contrasted with the combination of the two. Here, each form of treatment is conceived of as having specific and unique therapeutic properties that may interact in a number of ways. Uhlenhuth and colleagues (1989) have described four models for such effects: additive (in which the effect of the combined treatments equals the sum of their individual effects), potentiation (in which the effect of the combined treatments is greater than the sum of the two individual treatment effects), inhibition (in which the effect of the combined treatments is less than the sum of their individual effects), and reciprocation (in which the effect of the combined treatments equals the individual effect of the more potent intervention). In the treatment

of depression, most research on psychotherapy-pharmacotherapy combinations has supported an additive or reciprocal model and has tended not to find evidence supporting inhibition (Rounsaville et al. 1981) or potentiation (Conte et al. 1986) of effects.

There are several advantages to evaluating psychotherapy as a complementary treatment to pharmacotherapy for cocaine abuse. First, because psychotherapy is no longer relegated to a "supportive" role, it can be administered at full strength and therefore allow maximal effects to emerge and be detected. Psychotherapy and pharmacotherapy are assumed to work through different mechanisms (e.g., DMI to reverse cocaine-induced neuroadaptation and psychotherapies such as RP to improve an abuser's ability to cope with or avoid high-risk situations and relapse) and affect different symptom areas.

Thus, a major potential advantage of psychotherapy-pharmacotherapy combinations in which the integrity of each treatment is protected is that there may be improved outcome for more symptom areas from integrative treatments than from either treatment alone. Assuming psychotherapy and pharmacotherapy differentially affect different symptom areas, by increasing the number of symptom areas potentially improved through combination treatments, it is possible to dramatically improve the "hit rate" among cocaine abusers, who typically present with a heterogeneity of symptoms and problems. Such a model also allows for detection of treatment specificity and can guide future efforts toward patient-treatment matching.

Another advantage to evaluating combination treatments is that potential drawbacks associated with either treatment may be offset by the other. For example, the provision of support through psychotherapy may reduce the potential negative impact of side effects arising from most pharmacotherapies. Similarly, instillation of hope through administration of a drug may support continuing participation in treatment during the early stages of treatment when a developing therapeutic alliance may be fragile or until coping skills are mastered and integrated.

If variations in severity of cocaine abusers who present for treatment are considered-the multidimensionality of cocaine abusers' problems and the heterogeneity of cocaine abusers presenting for treatment-the potential value of evaluating both psychotherapy and pharmacotherapy as effective and unique treatment components is further underscored. Extein and Bowers (1979) differentiate between state disorders, described as time-limited, autonomous, and unresponsive to psychotherapeutic intervention (e.g., psychoses, severe anxiety, major depression), and trait disorders, defined as "dysfunctional qualities which individuals tend to develop and carry

throughout life and which become manifest as predictable patterns for interaction and response to stress. Such patterns tend not to be responsive to medication but respond better to psychosocial treatment" (Extein and Bowers 1979, pp. 690-691). State and trait disorders are conceived as independent, but one or both may be present in any one individual.

Cocaine abuse (and other forms of substance abuse) can be conceived as having attributes of both state and trait disorders, in varying degrees among different abusers: Pharmacotherapy or other forms of medical intervention are generally essential when "state" disorders are present (e.g., withdrawal symptoms associated with physical dependence, some forms of drug craving, cocaine-induced psychoses) that would not be expected to respond to psychotherapy. Similarly, psychotherapy may be indicated for those trait aspects of cocaine abuse on which pharmacotherapy would be expected to have little impact (e.g., fostering motivation to reduce substance use, restricting availability of cocaine, avoidance of situations associated with use, development of non-cocaine-using social supports).

With a state/trait model of substance use disorders, the unique action of each form of a particular approach can be investigated toward developing a model of treatment that is comprehensive and nonexclusionary. At lower severity levels, in the absence of state disorders, psychotherapy alone may be adequate. At higher levels of severity, the presence of state disorders may indicate the need for a combination of psychotherapy and pharmacotherapy, although in some cases the state disorder may be so dominant that it may be futile to initiate psychotherapy until the state disorder resolves and the patient becomes available for psychotherapy.

The potential advantages of evaluating both psychotherapy and pharmacotherapy as robust treatments for cocaine abuse, in particular the emergence of maximal effects of each treatment type, detection of the unique contributions of each form of treatment, and the opportunity to rigorously evaluate potential benefits of psychotherapy-pharmacotherapy combinations, also introduce several complexities for researchers. There is substantial literature outlining conceptual and methodological issues in such comparisons, notably those related to differences in each approach's nature and timing of effects (Elkin et al. 1988*a),* mechanism of action and assessment of outcome (Elkin et al. 1988*b),* and method of treatment delivery (Docherty et al. 1977). These complexities are also instructive because they highlight major conceptual differences in two unique treatment approaches. This line of research has contributed to the understanding and treatment of depressive disorders and may hold promise for the treatment of cocaine abuse.

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Behavioral Treatments of Cocaine Dependence

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INTRODUCTION

Cocaine abuse has presented special problems in treatment. These arise from the pharmacological, behavioral, and environmental factors surrounding its use. Furthermore, most drug abuse treatment efforts to date have focused on two legal drugs (alcohol and, more recently, tobacco) and on illegal use of opiates. The stimulant abuse that has occurred over many decades has not produced a focus on the development of effective treatments. Therefore, the current focus of the National Institute on Drug Abuse on cocaine treatment is particularly important. First, it will provide insight into the behavioral pharmacology of cocaine use and the current problem. Second and equally important, continued research will prepare us for future stimulant epidemics as innovative pharmacological and behavioral modalities for treatment of this subset of drug abuse problems are discovered. Behavioral interventions constitute one important category from which these treatments will arise and which will provide effective interventions either alone or in combination with other strategies.

The terms “behavioral intervention,” “behavior modification,” “behavior therapy,” and “behavioral treatment” describe a variety of approaches for treatment of drug abuse. The terms often are used interchangeably. In its original use, each emphasized some conceptual principles over others, although all derived from the broader underlying behavioral framework. As might be expected, each tended to focus on specific techniques from the broader armamentarium. The emphasis of the scientists and clinicians derived in part from specific empirical observations and theoretical assumptions about the determinants of drug abuse. Nevertheless, these approaches necessarily have many features in common. The most important unifying elements are detailed analyses of specific events surrounding drug abuse and a direct relation to a supporting body of basic scientific principles of behavior. Thus, whether one focuses on respondents (classically conditioned responses), those describable in the operant conditioning (or “instrumental learning”) paradigm, or some combination of the two, obvious similarities emerge.

The classical conditioning approach to opiate dependence and drug taking has been thoroughly described and systematically applied to drug abuse elsewhere (Wikler 1948, 1965, 1974; Wikler and Pescor 1967; Wikler et al. 1971; O'Brien 1975; O'Brien et al. 1974, 1977, 1980, 1981; Childress et al. 1989; also see reviews, Grabowski and O'Brien 1981; Grabowski and Cherek 1963) and by O'Brien and colleagues (this volume). This chapter focuses on operant conditioning approaches, first presenting the general approach and methods for evaluation and treatment plan development, then discussing how these approaches have been employed for treatment of abuse of a variety of drugs, and finally describing current behavioral treatment research for cocaine abuse.

A BEHAVIORAL APPROACH TO DRUG ABUSE

Within the behavioral approach, drug taking is conceptualized as operant behavior, that is, behavior that operates in its environment and is maintained by its consequences. Drugs of abuse are considered to function as reinforcers and in that regard share many of the same characteristics of other powerful reinforcers such as food, water, and sex. Drug taking is considered to be an orderly form of behavior that results from the interplay of fundamental biologic and behavioral processes.

Empirical support for the behavioral approach to drug abuse treatment stems from the observation that laboratory animals self-administer most of the same drugs that are abused by humans (Griffiths et al. 1980). Cocaine, amphetamines, opioids, sedatives, and ethanol are all self-administered by laboratory animals. The animal need not have a prior history of exposure or physical dependence on these drugs for them to function as reinforcers and maintain drug-taking behavior. The temporal patterns of drug ingestion in laboratory animals and humans are generally similar. Manipulations of drug availability, drug dose, response requirement or cost factors, and other environmental factors have similar effects on human and nonhuman drug taking. Thus, the causes of drug self-administration and dependence must lie at the level of basic biologic and behavioral processes that are shared across species (Bigelow et al. 1981; Griffiths et al. 1980; Stitzer et al. 1983).

This model of drug abuse has permitted researchers and clinicians to effectively extrapolate and apply scientific principles already available from research on other types of behavior. The research has generated a great deal of empirical knowledge concerning the dynamic role played by environmental, pharmacological, and, more recently, genetic variables in the reinforcing effects of drugs. This perspective also has fostered some innovative treatment interventions, which are characterized below. Most of the research has involved drugs other than cocaine, although promising studies have been conducted in treatment of cocaine dependence as well.

Research with other drugs is discussed to provide an adequate sampling of this approach to drug abuse treatment and some insights into the rationale behind the behavioral work being conducted with cocaine. The critical feature is the focus on the relationship between drug taking and its consequences and establishing a similarly persistent relationship between treatment attendance and its consequences.

Much of the existing work on operant approaches has been undertaken in the examination of opiate dependence (Glosser 1983; Iguchi et al. 1988; Milby et al. 1978; Stitzer et al. 1986, 1977, 1983). This follows from three features: First, the dominant drug problem and area of study with the greatest momentum for many decades was that of opiate dependence; second, components of standard opiate dependence treatment made this drug-abusing population particularly attractive for clinical research; and third, there was the practical, popular, and perhaps misguided impetus to find effective, "nondependence-producing" analgesics. Operant strategies and other treatment research probably focused on this population because of the unique opportunity for continued access and followup resulting from methadone treatment. The results of such research have strongly suggested that behavioral interventions can be powerful tools in treatment. They may "stand alone" in some cases or may be applied in a context of comprehensive treatment that incorporates traditional strategies.

EVALUATION AND TREATMENT PLAN DEVELOPMENT WITHIN THE OPERANT FRAMEWORK

Clinicians implementing operant behavioral interventions use many traditional and well-validated instruments in their research and treatment strategies. Thus, standard psychiatric diagnoses based on *Diagnostic and Statistical Manual of Mental Disorders (Third Edition, Revised)* (DSM-III-R) (American Psychiatric Association 1987) criteria are obtained, and standard instruments such as the Profile of Mood States, the Beck Depression Inventory (Beck et al. 1961), the Hamilton Scales for Anxiety and Depression, and the Addiction Severity Index (McLellan et al. 1985) are among common elements of evaluation. A hallmark of behavioral treatments is the use of objective behavioral endpoints. Drug taking is often a clandestine activity, and monitoring biological markers of drug use provides an objective endpoint in lieu of direct behavioral observation. Therefore, drug screens are used as an essential, powerful diagnostic and therapeutic tool.

Extensive, precise, and specific data surrounding the problem behavior are another hallmark of behavioral interventions. A detailed analysis of a patient's current circumstances may aid in the development of the intervention plan. Two broad categories of behavior are carefully examined. First, drug seeking, drug taking, and their correlates are precisely described.

Second, alternative behaviors along with social adjuncts and environmental modifications are specified in detail. This process permits drafting of detailed individualized treatment plans. Beyond this, efforts often are made to incorporate patient recording of ongoing behaviors before specification of the final elements of treatment. Subsequent recording may permit modifications of the intervention to facilitate achieving the treatment goals; this feedback element is a ubiquitous and essential feature of behavioral treatments. These procedures must be relatively simple and clear whether recording by patients or significant others is required because they may otherwise be quickly discarded or foiled.

The focus of treatment plan development is to alter major events and reinforcers in the patient's environment. Specific procedures provide important access to behaviors that are difficult to observe or influence directly because they occur in the natural environment. For example, drug screens permit monitoring of otherwise inaccessible activity. Behavioral interventions may make use of treatment adjuncts (such as methadone dosage or take-home privileges) that can provide powerful incentives and consequences for modifying a spectrum of behaviors (Grabowski et al. 1984). Another approach is to involve individuals (spouses, employers) or agents (licensing boards) in the environment who provide unique control of positive reinforcers and aversive consequences in the patient's life (Grabowski et al. 1984).

REVIEW OF TREATMENT RESEARCH

Many treatment facilities implement procedures that are described as behavioral interventions but clearly are not. For example, the edict "use drugs and you're out" is not a systematic behavioral therapy procedure, although it certainly can alter behavior and reduce client load. In other programs, which claim to adhere to the work of O'Brien and coworkers, the statement "try to relax" is touted as a relaxation, desensitization procedure, but it falls short of the careful systematic efforts characteristic of effective behavioral treatments. The three examples discussed below underscore the efficacy of behaviorally based contingency-management procedures in treating alcohol and opiate abuse. There are no examples in the literature of highly focused interventions involving cocaine and addressing only this aspect of the patient's behavior, but the general approach could be effective with some patients exhibiting this form of drug dependence.

Contingent Application of Treatment Adjuncts

Higgins and colleagues (1986) examined the effects of contingent vs. noncontingent delivery of a methadone dose supplement on relapse to illicit opiate use in the context of a methadone outpatient detoxification program. Following a 3-week methadone stabilization period, patients were randomly

assigned to a contingent, a noncontingent, or a control treatment group. All patients received the identical dose reduction schedule. Members of the contingent and noncontingent groups could obtain daily methadone dose supplements up to 20 mg, but contingent group members could obtain supplements *only* if their most recent urinalysis result was opiate-negative. This clearly specified relationship between behavior and its consequences defines a fundamental element of behavioral interventions. Control subjects did not have dose increases available. The contingent group presented significantly lower opiate-positive urines (14 percent positive) than the noncontingent (36 percent positive) or control (50 percent positive) groups. In addition, the availability of extra methadone improved treatment retention and increased clinic attendance above levels observed in the control group.

Stitzer and coworkers (1986) directly compared positive and aversive consequences for urinalysis results. For one group, dose *increases* were contingent on negative urine screens. For the other, dose *decreases* were contingent on positive urine screens. The results in terms of positive urine screens were about the same. However, four of nine patients in the condition emphasizing aversive control dropped out. Thus, the power of the *positive* reinforcement procedure resided not only in maintaining comparable drug-free urines but also in retaining patients in treatment. The ability to sustain treatment-oriented behavior and retain patients is a critical advantage in providing treatment and reducing human immunodeficiency virus transmission and other drug and disease problems. These results were replicated in a later study by Iguchi and colleagues (1988). In this systematic replication, access to methadone take-home doses was the treatment adjunct manipulated.

Pickens and coworkers (1973) described an experimental intervention with a 27-year-old alcoholic. The patient was hospitalized in a psychiatric ward and was permitted to consume his preferred alcohol-containing beverage ad lib. It was determined through observation and interview that virtually all drinking involved social exchange. After a prolonged and stable baseline of 30 to 40 drinks per day, a specific contingency was implemented. The patient was instructed that he could not socialize while drinking; he was required to remain in his room and drink alone. Further, all patients and staff in the ward were told to ignore him while he carried a drink. Over the next 30 days, his intake gradually decreased to zero. Subsequent interventions included use of disulfiram and providing assistance in obtaining employment. The critical initial step of this intervention was precisely identifying the correlates and consequences of alcohol consumption, followed by redefining the maintaining behavior-consequence relationship to achieve the identified therapeutic endpoint.

Involving Individuals/Agents in the Natural Environment

O'Brien and colleagues (1977) have described the utility and potential benefit of including respondent extinction and relaxation procedures as behavioral components of a broader cocaine treatment program. Aside from these respondent-based interventions, only a few systematic interventions in the literature use clearly defined operant behavioral techniques in combination with other interventions; three examples are described.

Anker and Crowley (1982) and Crowley (1984) described a treatment for cocaine-abusing professionals that included psychotherapy, pharmacological treatment where appropriate, and contingency contracts for interactions in ongoing relationships and for drug use. Contingency contracting regarding drug use involved preparation of letters to significant boards, the Drug Enforcement Administration, the professionals' employers, or others who could apply significant aversive consequences. The contingency was simple, and the consequence substantial; the letter was mailed to the board, agency, or significant individual if both halves of a divided urine sample were positive for cocaine. The difference in results for patients on and not on the contract was impressive for both studies. At 3 months none of the original 35 patients who refused contracts were still in treatment, whereas 26 of 32 contract acceptors were still in treatment and abstinent.

Two important points derive from this study. Anker and Crowley (1982) maintained data on contract acceptance. They found that it increased from 10 percent of the initial sample to 70 percent of later patients. This suggests that Anker and Crowley were investigating new territory and became more persuasive at obtaining consent as they gained experience with the procedure. Clearly, implementing behavioral-based approaches requires careful clinical intervention.

The Crowley (1984) studies suggest that treatment plans with severe consequences should be carefully planned with the patient who must be informed of the advantages and disadvantages. Patients initially may be refractory to participation in treatment plans with severe consequences, Patients may be less hesitant in consenting to treatment plans that emphasize positive reinforcement contingencies, Procedures such as those first described by Boudin (1972) which involve a patient making a deposit of items or cash that he or she "earns" back through negative drug screens, may have more appeal than contracts that levy a negative consequence for a positive screen. Two-edged contingencies involving earning back **a** bit at a time through successive negative screens while forfeiting a bit at a time for positive screens may have considerable power and advantage in controlling cocaine use and promoting abstinence.

REVIEW OF ONGOING STUDIES

Most interventions described above utilize behavioral techniques in the context of comprehensive treatment programs that provide additional services such as counseling, psychotherapy, and medical care. However, the behavioral techniques targeted just one aspect of the patient's life—drug taking. in cases in which drug taking is the dominant and perhaps only problem, rather than one of many, the singular focus on drug taking may suffice. When many aspects of a patient's behavior and life have problems, when he or she has few social skills, and when he or she requires vocational and educational habiiitation, a program with much broader scope may be essential to producing a meaningful therapeutic result (Thompson et al. 1984). Behavioral interventions may have more lasting influence if they are used to bring about multiple changes outlined in an encompassing treatment plan. The likelihood of success is highly dependent on the extent to which major changes in the patient's lifestyle are achieved: that is, reliance on drug reinforcement must be suppressed, and alternative sources of reinforcement for prosocial behaviors must be increased.

Community Reinforcement Interventions

A promising baseline treatment for cocaine dependence is that derived from a Community Reinforcement Approach (CRA) described 20 years ago by Hunt and Azrin (1973). Several subsequent studies (Azrin 1976; Azrin et al. 1982; Sisson and Azrin 1989) were similarly systematic, and others examined some parallel situations, but none with equivalent detail and precision.

Higgins and coworkers (1991) have developed an intensive and comprehensive outpatient program for cocaine dependence encompassing Azrin and colleagues' CRA with highly specific contingency-management procedures. Treatment is 3 months in duration, and clients attend twice-weekly individual and marital therapy. Employment counseling is provided to unemployed clients or those whose current employment, such as "drug dealing," supports cocaine use. The rationale behind the use of the contingencies is to obtain initial cocaine abstinence, whereas the rationale of the extended CRA is to make significant changes in lifestyle (i.e., increase prosocial behaviors that are incompatible with a drug addict lifestyle) such that therapeutic gains are maintained when the contingencies are removed. The result is to ensure that the newly established behaviors can be sustained in the patient's environment by naturally occurring contingencies and reinforcers beyond the period of treatment, in Higgins and coworkers' (1991) program, the contingencies are placed on cocaine use only. Urine specimens are collected four times per week and analyzed onsite for the presence of benzoylecgonine. Negative specimens earn vouchers redeemable for retail

items in the local community. The value of vouchers progressively increases with each consecutive negative urine, and resets to the initial value with a positive urine, to reinforce the target behavior of continuous abstinence from cocaine. Purchases with the vouchers are supervised by clinic staff, and the goal is to have clients use them to increase their involvement in new drug-free social and recreational activities.

A pilot study was conducted to begin assessing the efficacy of this intervention. Thirteen consecutive admissions who met DSM-III-R criteria for cocaine dependence were entered. For comparison purposes, results obtained with those clients were compared with 15 subsequent consecutive admissions who met the same diagnostic criteria and received standard 12-step-based alcohol and other drug counseling.

The only significant population differences were that the latter group reported less cocaine use and had fewer intravenous cocaine users (the majority in the behavioral treatment were intravenous users and in the standard treatment were intranasal users) than clients in the behavioral treatment. With regard to results, all clients who were offered the behavioral treatment accepted it, whereas 12 of 15 offered the standard counseling did so. Significantly more clients receiving behavioral vs. standard treatment completed the 12 weeks of therapy (85 vs. 42 percent). Those in the behavioral treatment also did significantly better with cocaine abstinence. For example, 78 percent of the clients receiving behavioral treatment remained continuously cocaine abstinent for 4 weeks vs. 25 percent in the standard treatment (figure 1). At 6 weeks, those numbers were 60 percent vs. about 10 percent, respectively. The behavioral treatment was clearly superior to the standard treatment.

in considering these results, it is important to remember the results of Gawin and colleagues' (1989) controlled trial with desipramine, which might be considered one of the better results for treatment of cocaine dependence. They were able to obtain 3 to 4 weeks of continuous cocaine abstinence in 59 percent of the desipramine group vs. 25 and 17 percent in the lithium and placebo groups, respectively. It appears that substantially fewer than 59 percent of those receiving desipramine were able to maintain continuous abstinence for 6 weeks, although the exact proportion is difficult to determine from the report.

Overall, the results obtained with this behavioral treatment appear to be at least as efficacious, if not more, than the results obtained by Gawin and coworkers (1989) with desipramine and psychotherapy. The treatment appears to be acceptable to patients, retains them in treatment, and maintains impressive cocaine abstinence. Of course, as with any new treatment, final judgment on the efficacy awaits outcome of a controlled trial

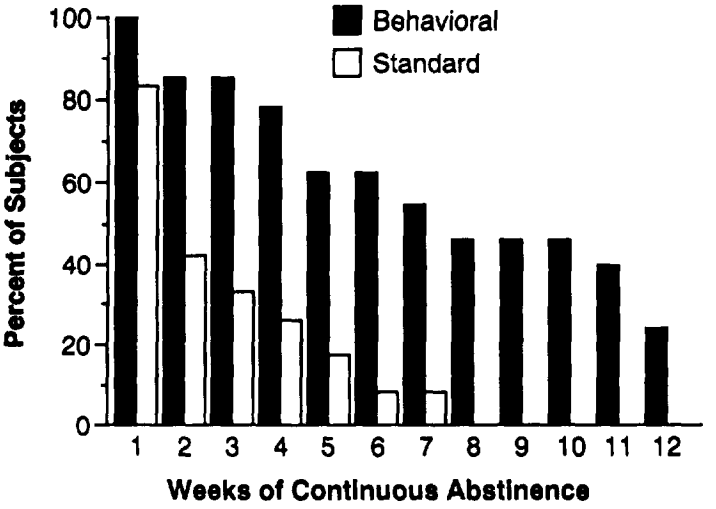

FIGURE 1. *Percent of subjects in each treatment who achieved periods of continuous cocaine abstinence of 1 to 12 weeks duration. Scheduled specimens that were not collected were treated as cocaine-positive.*

SOURCE: Adapted from Higgins et al. 1991. Copyright 1991 by American Psychiatric Association (Washington, DC).

with random assignment. Such a controlled trial is now under way at the University of Vermont.

Behavioral treatment may have an additional advantage with special populations or when supplemental pharmacological interventions cannot be used or convey no advantage. For example, many of the drugs commonly used in drug abuse treatment are contraindicated, with the exception of methadone, because of presumed fetal effects. Patients receiving the drugs commonly used for treatment of inactive or active tuberculosis (TB) may preclude concurrent administration because of hepatotoxic effects. Thus, extensions and modifications of community-based approaches may prove effective in the difficult population of drug-abusing pregnant women and for TB-positive patients during drug abuse treatment (Elk et al., in press). Specialized studies using elements of these procedures are being implemented at the Substance Abuse Research Center, University of Texas Health Science Center.

Community reinforcement programs have several potential difficulties. First, they can be labor intensive and costly. Second, they have some potentially intrusive elements. However, in response to the first concern, the cost is no greater than that of many standard treatments implemented in traditional treatment settings, and costs are considerably less than those incurred for inpatient treatments. Furthermore, the cost of not providing treatment—or worse, providing treatment of unknown efficacy or one with potential harm—is greater than that of providing a costly but effective treatment (Havassy 1990). The second criticism may have greater validity. That is, the community reinforcement model can be intrusive (e.g., spouses or employers may be informed of urinalysis results). Thus, for example, patients may agree to participate at a time of particular vulnerability. Some argue the view that any level of intrusiveness that produces a positive result is acceptable. Nevertheless, it is essential that the clinician be aware that the cocaine-dependent population is particularly vulnerable. Vulnerability is not unique to cocaine treatment: One need only consider the case of cancer patients who agree to the misery and, often, low success rates of chemotherapy. Patients may agree in their acute distress to unnecessarily invasive treatments. Behavioral interventions must thus be tailored to ensure maximum benefit with minimum intrusiveness.

Behavioral and Pharmacological Interventions

The framework of behavioral pharmacology and operant techniques permits us to systematically focus on two complementary features of pharmacological interventions. First, as with all other pharmacologically oriented disciplines, possible direct pharmacological actions and interactions of drugs are considered with due attention to sites of action and current theories of neurochemistry. Second, therapeutic agents are examined in terms of their functional properties with respect to behavior (table 1). Thus, an integral component of selecting drugs for treatment should include consideration of the functional properties and their application based on contingent reinforcement, extinction, and punishment.

Many investigators are examining the efficacy of pharmacological agents as adjuncts in the treatment of cocaine (Johnson and Vocci, this volume). As noted by Bigelow (1990), there are currently no agents for which data demonstrate clinically significant efficacy in heterogeneous populations of cocaine users paralleling methadone in treatment of opiate dependence.

An example of consideration of functional properties is an ongoing study at the Substance Abuse Research Center, University of Texas Health Science Center, examining the efficacy of a treatment combination involving behavioral procedures with fluoxetine as the pharmacological adjunct. The rationale for the selection of this drug was based on consideration of

TABLE 1. *Examples of functional properties of abused drugs and therapeutic medications*

Property, Mechanism, and Principle	Abused Drug	Medication
Positive reinforcer (replacement/agonist) and reinforcement	Opiates Cocaine Nicotine Alcohol	Methadone Methylphenidate Nicotine Benzodiazepines
Positive reinforcer/neutral (replacement/agonist and blockade/antagonist) Reinforcement/extinction	Opiates	Buprenorphine
Aversive (metabolic inhibitor) and punishment	Alcohol	Disulfiram
Neutral (blockade/antagonist) and extinction	Opiates Nicotine	Naitrexone, LAAM Mecamylamine

NOTE: This categorization is approximate and *focuses on behavioral characteristics;* for example, LAAM is a partial agonist pharmacologically but is behaviorally neutral in terms of the effect sought by users: benzodiazepines have behavioral properties overlapping with alcohol but are not pharmacologically parallel.

functional properties of drugs. First, the drug may have modest reinforcing properties, although it cannot be viewed as a replacement therapy in the mold of methadone for heroin. Second, the drug has few “noncontingent” punishing effects (unpleasant side effects) when compared with other antidepressants. Third, it has been suggested that it may attenuate cocaine reinforcement, and thus, extinction may apply. Although none of these properties alone are of sufficient strength to sustain treatment-oriented behaviors, they may contribute to positive outcomes. The important issue is the focus on stimulus and behaviorally relevant properties of agents used as adjuncts rather than psychiatric effects or neurochemical actions alone. In fact, when psychiatric, neurochemical, and behavioral analyses point to potential utility of the same agent, the consideration again must be developing appropriate contingencies for behavioral and pharmacological advantage.

FUTURE DIRECTIONS

There is substantial need to examine component behavioral interventions singly and in combination for efficacy in the treatment of drug dependence generally and cocaine dependence in particular. Refocusing some of the traditional questions and determinants of treatment is also necessary.

Gawin and Ellinwood (1988) described a model of escalating treatment involvement based on severity of dependence. Treatment research has focused on this view in response to this traditional delineation of the problem. Total drug taken and pattern of self-administration are important; however, we recommend that the combination of historical and current circumstances surrounding other features of behavior are equally important. Furthermore, there is likely an interaction between severity as defined by pattern and dose and the strength of other features of the behavioral repertoire. For example, those patients who use cocaine moderately but who have few other reinforcers (social supports, employment, opportunities derived from educational level) may be much more difficult to treat and sustain drug free than someone who regularly uses high doses but who has extensive personal resources. Therefore, the need for careful analysis of individual behavioral characteristics and differentiation of requisite elements of treatment becomes essential. Following the traditional view, treatment research has focused on dose and pattern of cocaine use as a dominant determinant of treatment form. Treatment research should identify the need for treatment intensity based on other factors. This direction for research is parallel to traditional matching studies in psychiatric treatment,

In those cases that are most severe on all dimensions, the strength of the community reinforcement model is of particular importance. It must be thoroughly studied, and those elements useful to the treatment of drug abuse should be used. As was mentioned, a controlled trial comparing community reinforcement vs. standard drug counseling is under way. In addition, behaviorally based interventions such as CRA will likely serve as an important treatment context in which pharmacological agents may be used as adjuncts to alleviate biologically based problems while taking full advantage of their functional behavioral properties. Pharmacotherapy may or may not be a necessary component of effective treatment for cocaine dependence, and its utility is likely to vary across patients. These are empirical issues that must be addressed in carefully controlled studies.

In the domain of pharmacological interventions, the breakthrough in approach that must occur is conceptual. There is a need to attend to the functional behavioral properties of the drugs and to conduct treatment research with this perspective. Behavioral pharmacological research has demonstrated that a major strength of methadone in treatment has been its usefulness as

a positive reinforcer that can be used to sustain treatment-oriented behavior and shape new behaviors. The narcotic antagonist naltrexone has been similarly discussed in terms of its behavioral effects; it can serve as a vehicle for extinguishing drug self-administration, but like the current cocaine pharmacotherapies, it will not sustain treatment-oriented behavior. Cocaine treatment research must focus on taking advantage of effects of drugs that can serve to enhance behavioral elements of treatment. Thus, for example, some drugs with stimulant effects may have utility in the treatment of cocaine dependence under well-defined behavioral regimens, although in the absence of such regimens the results are equivocal (Khantzian et al. 1984; Gawin et al. 1985). In this case, the critical features of treatment using a replacement model might be attributable in part to the joint action and structure of the behavioral contingencies in relation to the medication that is a positive reinforcer. The same analysis should be conducted when consideration is given to examining the utility of other drugs in treatment. Clearly, it is difficult to establish compliance with drug regimens when the agents have inherent punishing side effects and few reinforcing effects. This analysis should be a major point for discussion in treatment research and should supersede the putative neurochemical theorizing that underlies most treatment research discussions.

CONCLUSIONS

The systematic approach to establishing contingencies is a strength of comprehensive behavioral approaches or the implementation of behavioral approaches in combination with other therapeutic strategies. Within other therapeutic conceptual frameworks, there is a similar need for systematic analysis, The long-term goal will be development of more comprehensive solutions to the wide range of possible drug abuse problems. It will also contribute to understanding the mechanisms and possible treatment for other biobehavioral disorders. Conversely, we should examine the armamentarium of behavioral procedures used in treatment of behavioral medicine problems as potential valuable tools in the treatment of drug abuse disorders because many commonalities exist.

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Day Hospital vs. Inpatient Rehabilitation of Cocaine Abusers: An Interim Report

Arthur I. Alterman, Charles P. O'Brien, and Marian Droba

INTRODUCTION

There have been few studies of the comparative effectiveness of standard psychosocial treatments for cocaine abuse and dependence (Gawin and Ellinwood 1989). Given the recency of the widespread abuse of cocaine, the development of effective treatments for this disorder is clearly at an early stage. The Philadelphia Veterans Affairs (VA) Medical Center was not prepared in 1987 to deal with the problems posed by the influx of many individuals seeking treatment for cocaine abuse and dependence. The literature existing at that time on psychosocial treatments consisted of only a few, largely uncontrolled studies on small numbers of patients (Anker and Crowley 1982; Rawson et al. 1986; Siegel 1984; Washton 1986). Several preliminary pharmacotherapy studies (Kosten 1989) also had been described. Most impressive were Washton's description (1986) and Washton and colleagues' (1986) findings (also see Washton and Stone-Washton, this volume) for their intensive outpatient treatment program of cocaine abuse and dependence. This treatment program basically represented an extension of their work with alcoholic patients to the cocaine-abusing population. Because there was a long-standing successful day hospital rehabilitation program for alcohol-dependent men at the center, it was natural to consider extending this intensive treatment form to cocaine patients. Also leading to this conclusion were the discouraging results of initial efforts to treat patients seeking treatment for cocaine abuse with several weekly outpatient groups. Thus, in conjunction with the National Institute on Drug Abuse's (NIDA) award of a Treatment Research Center grant to the Addiction Research Center (ARC) of the University of Pennsylvania, it was proposed to develop a day hospital rehabilitation treatment for cocaine abusers. Following this development, it was proposed to compare the effectiveness of this program with that of standard inpatient treatment for cocaine abuse and dependence.

A randomized assignment comparison study of day hospital vs. inpatient rehabilitation treatment for cocaine-abusing and cocaine-dependent men has been conducted for 2 years. One hundred four subjects thus far have entered into the study (52 day hospital and 52 inpatient). This chapter is an interim report that describes baseline, 4- and 7-month posttreatment entry outcome findings. Baseline findings are for 94 subjects (48 day hospital and 46 Inpatients); 4-month outcome findings are based on 78 subjects (41 day hospital and 35 inpatient); and 7-month outcomes are based on 58 subjects (28 in each group). The followup rates for both periods are more than 90 percent for each group. The lower numbers reported for the two followup periods in this chapter reflect delays in data entry and followup time lags.

METHOD

Subjects

The research subjects were 94 men seeking treatment for cocaine abuse and dependence at the Philadelphia VA Medical Center. Prospective candidates had to meet the following requirements to qualify for study participation:

- Be 59 years of age or younger.
- Be eligible for and willing and able to accept either inpatient or day hospital rehabilitation treatment for approximately 1 month.
- Have a relatively stable residence for purposes of followup contact and be willing and able to provide several informants who would be able to help contact a participant for followup evaluations. The former determination was made by the ARC's intake unit.
- Have no history of a psychotic disorder on the basis of psychiatric examination.
- Have no indication of dementia revealed by psychiatric examination.
- Be determined, on the basis of medical examination, to have no major medical problems requiring inpatient treatment.
- Qualify for a Diagnostic and Statistical Manual of Mental Disorders (Third Edition, Revised) (DSM-III) (American Psychiatric Association 1987) diagnosis of cocaine abuse both on the basis of an unstructured psychiatric interview and on a computerized version of the National Institute of Mental Health Diagnostic Interview Schedule (DIS) (Robins et al. 1981).

- Fail to qualify for any current substance abuse diagnosis other than for cocaine, alcohol, or marijuana.

- Be male.

Forty-eight subjects were randomized into day hospital treatment and 46 into inpatient rehabilitation. Table 1 shows the sociodemographic and substance-related historical characteristics of the two groups at intake to the study. With one exception, the groups did not differ from each other. Inpatients were more likely to have had previous drug treatment (54 percent) than subjects assigned to the day hospital group (31 percent).

As a group, the subjects were males (in keeping with the presenting population at our VA Medical Center), were about 33 years of age, had about 12 years of education, and were almost entirely black. They averaged less than 3 years of cocaine use, although they had been drinking alcohol to intoxication for more than 7 years. There was little evidence of use of drugs other than cocaine, alcohol, or marijuana.

More information on recent substance use is provided in table 2. The table indicates that, at intake, the subjects in the study were using cocaine about 13 times a month and were spending about $600 monthly for drugs. Relatively few of the subjects had not consumed alcohol in the past 30 days.

TABLE 1. *Baseline data on two groups of randomized cocaine patients*

Variables	Day Hospital (n=48)	Inpatient (n=46)	p
Sociodemographic			
Age	33.9±6.1	33.4±5.2	ns
Education (years)	11.9±2.0	12.3±1.2	ns
Race (percent black)	97.9	95.7	ns
Employment income-past 30 days	466±538	361±395	ns
Percent currently married	14.6	21.7	ns
Percent with stable living arrangements	95.6	93.5	ns
Substance related			
Percent ever treated for alcoholism	20.8	28.3	
Percent ever treated for drug abuse	31.3	54.3	0.04
Years of alcohol use	10.1± 8.39	8.7±6.7	ns
Years of drinking to intoxication	8.8±8.4	6.5±5.8	ns
Years of cocaine use	2.7±2.4	3.2±2.9	ns
Years of marijuana use	9.2±7.7	7.5±17.1	ns

TABLE 2. *Four-month substance abuse findings for two cocaine treatment groups*

	Day Hospital (n=41)		Inpatient (n=35)		p*		
Variables	Intake	4 mo.	Intake	4 mo.	Group	Time	G x T
Abstinent from alcohol (%)	1.8	55	6	53		d,i	ns
Days intoxicated-past 30 days	7.3	2.5	6.2	2.2	ns	<.001	ns
Not intoxicated (%)	40	68	29	68		d,i	ns
Days cocaine use-past 30 days	13.1	2.0	12.6	2.3	ns	<.001	ns
Did not use cocaine (%)	0	65	0	61		d,i	ns
Days of marijuana use	3.8	0.8	5.2	1.2	ns	0.001	ns
Dollars spent on alcohol past 30 days	48	10	34	6	ns	0.003	ns
Dollars spent on drugs past 30 days	609	57	599	99	ns	<.001	ns
Alcohol composite score †	0.23	0.12	0.22	0.10	ns	<.001	ns
Drug composite score †	0.26	0.09	0.26	0.10	ns	<.001	ns

*G x T=group by time interaction effect
†Composite scores range from 0.00 to 1.00, with 1.00 being the most severe
KEY: d=day hospital (p<.05); i=inpatient (p<.05)—McNemar test for the significance of changes

Information on other areas of functioning at baseline is provided in table 3. Individuals in both groups had worked an average of 10 days in the past month and reported having psychological problems 10 days out of the past 30. Again, it can be seen that the day hospital and inpatient groups did not differ significantly at baseline.

TABLE 3. *Four-month non-substance abuse findings for two cocaine treatment groups*

	Day Hospital (n=41)		Inpatient (n=35)		p*		
Variables	Intake	4 mo.	Intake	4 mo.	Group	Time	G x T
Days working-past 30 days	9.40	12.22	10.03	15.45	ns	0.004	ns
Employment income-past 30 days (in dollars)	405	606	353	722	ns	0.005	ns
Illegal income-past 30 days (in dollars)	86	38	118	0	ns	0.081	ns
Days psychological problems-past 30 days	9.87	5.15	11.14	5.24	ns	0.002	ns
Medical problems composite score	0.25	0.22	0.16	0.17	ns	ns	ns
Employment composite score	0.65	0.63	0.68	0.59	ns	0.054	ns
Legal problems composite score	0.09	0.05	0.07	0.00	ns	0.001	ns
Family/social composite score †	0.25	0.13	0.33	0.14	ns	<.0005	ns
Psychological composite score †	0.26	0.15	0.25	0.15	ns	<.0005	ns

* G x T=group by time interaction effect

† Composite scores range from 0.00 to 1.00, with 1.00 being the most severe problem level

In conjunction with this study, data also have been collected on the baseline characteristics of study nonparticipants. At this time, these data have been examined in only the most preliminary fashion. The impressions are that about 40 percent of the patients eligible for participation accepted randomization into the study. The major reason for nonparticipation was a strongly verbalized desire to be treated in a particular treatment setting. Relatively few individuals were disqualified on the basis of residential instability or for the existence of serious medical or psychiatric problems.

General Procedure

Prospective subjects were provided with complete information about the project before they signed informed consent forms. They were then randomized (Gellerman series) to 1 month of either day hospital (n=48) or inpatient (n=46) treatment by a project research technician.

Day hospital subjects were given $15 for completing a baseline assessment test battery and $10 for providing urine samples and completing each followup interview. They also were given tokens for daily weekday travel to the program as well as coupons to be exchanged at the canteen for lunch.

Inpatient subjects were given the same compensation for the study assessments and were provided roundtrip train fare to the inpatient treatment program at the VA Medical Center at Coatesville, PA, 35 miles away.

Research Assessments

A 3-hour baseline battery of tests was administered by a research technician to all subjects during the first study week. This battery consisted of the Addiction Severity Index (ASI) (McLellan et al. 1991), the DIS, measures of social stability/support/resources, measures of Alcoholics Anonymous involvement, and counselor ratings of patients' motivation for susceptibility to treatment. During the course of treatment, some of these measures were obtained again, supervised urine samples were obtained for drug urine screens, records of attendance were kept, and patients' reports of treatment received and treatment-cost data were obtained. The modified followup ASI was administered 4, 7, and 13 months following entry into treatment. Urine samples were obtained at these times to the extent possible.

This chapter reports on the treatment completion rates for the programs and on treatment outcomes at 4 and 7 months for the patients as reflected in ASI scores and urine drug screen data.

Because the ASI is critical to the study, this instrument will be described in further detail. The ASI is a 45-minute semistructured interview that provides sociodemographic and substance use history information as well as recent problem level in seven areas of functioning-alcohol use, other drug use, medical, employment, family/social relations, legal, and psychological. Composite or factor-like scores can be derived in each of these areas and can provide an overall summary of problem level. Several studies have shown that the ASI yields reliable and valid data (Kosten et al. 1985; McLellan et al. 1985; Rogalski 1987). An abbreviated, 20-minute version of the ASI is used to assess subject status at a given period after entry into treatment.

Treatments

Except for the difference in settings, the two programs are quite similar. The day hospltal program is in operation for 27 hours weekly during weekdays (6 hours each Monday through Thursday and 3 hours on Friday), whereas inpatient treatment is obviously residential and provides approximately 48 hours of treatment weekly. Both programs are 28 days to a month in duration. The major therapeutic modality in both programs is group meetings that focus on overcoming denial and helping patients learn to cope with everyday problems and stresses. Individual counseling is available on an as-needed basis, and ancillary psychotropic medication is available in both programs when needed. Both programs provide education about the effects of addiction; both provide recreational therapy and encourage participation in self-help groups. Such groups are provided on the grounds in the inpatient program, whereas attendance in community meetings is required and monitored in outpatient treatment. Both programs offer medical care, although more care usually is provided in the inpatient program.

RESULTS

This chapter reports program completion data and baseline vs. followup ASI and urine drug screen data. Change was analyzed using two-way repeated measures analysis of variance procedures for continuous data. The McNemar test for the significance of change was applied to categorical data for each of the groups (e.g., percentage abstinent), and x^2 was employed to compare the two groups for rate of change.

Treatment Completion

Inpatients (40 of 46, or 87 percent) were significantly more likely (x^2=11.81, 1 df [degree of freedom], p=.0006) to complete treatment than were day hospital patients (25 of 48, or 52 percent).

Four- and Seven-Month Substance Abuse Outcomes

Table 2 (4-month outcomes) and table 4 (7-month outcomes) reveal considerable self-reported (ASI) reduction in virtually all alcohol- and other drug-related behaviors at both 4 and 7 months following entry into treatment. An indication of these improvements can be seen in the finding that, whereas virtually none of the subjects had been abstinent from cocaine at baseline, more than 60 percent reported abstinence at the 4-month followup. Another example is the reported reduction in the frequency of cocaine use from 13 to 2 times in the past 30 days at the 4-month followup evaluation.

TABLE 4. *Seven-month substance abuse finding for two cocaine treatment groups*

	Day Hospital (n=28)		Inpatient (n=28)		p*		
Variables	Intake	7 mo.	Intake	7 mo.	Group	Time	G x T
Abstinent from alcohol (%)	19	56	7	44		d,i	ns
Days intoxicated-past 30 days	6.1	2.2	5.7	2.7	ns	0.012	ns
Not intoxicated (%)	48	63	37	56		ns	ns
Days cocaine use—past 30 days	12.8	3.2	11.6	3.3	ns	<.001	ns
Did not use cocaine (%)	0	59	0	46		d,i	ns
Days marijuana use	3.6	2.5	3.9	1.3	ns	ns	ns
Dollars spent on alcohol-past 30 days	34	6	33	15	ns	0.003	ns
Dollars spent on drugs-past 30 days	521	79	476	358	ns	0.012	ns
Alcohol composite score†	0.20	0.06	0.20	0.11	ns	<.001	ns
Drug composites score†	0.25	0.10	0.24	0.09	ns	<.001	ns

*G x T=group by time interaction effect
†Composite scores range from 0.00 to 1.00, with 1.00 being the most severe
KEY: d=day hospital (p<.05); i=inpatient (p<.05)—McNemar test for significance of changes

The two groups were found not to differ significantly on any substance abuse variable at either the 4- or 7-month periods. The reductions reported at 4 months generally appear to have been maintained at 7 months, with one exception. The amount of money spent on drugs appears to have increased at 7 months for the subjects who had received inpatient treatment. It should be noted, however, that this effect did not achieve statistical significance.

Urine drug screen data were available for about two-thirds of the subjects at each of the followup periods. Forty-nine urine drug screens (of 78, or 64.5 percent) were available at the 4-month followup evaluation. Seventeen of

twenty-seven (63.0 percent) of those obtained for day hospital patients were negative for cocaine as contrasted with 12 of 22 (54.5 percent) of those obtained from the inpatient subjects. The two groups did not differ significantly in this respect. Thirty-nine urine drug screens (of 56, or 69.8 percent) were available at the 7-month followup evaluation. Eleven of nineteen urine drug screens (57.9 percent) obtained for the day hospital group were negative for cocaine as contrasted with 13 of 20 (65 percent) of those for the inpatient group. Again the groups did not differ significantly. Thus, the ASI (self-report) findings with respect to abstinence from cocaine generally were supported by the urine data. Additionally, the urine data support the ASI finding of little decline in the level of functioning from the 4- to 7-month followup evaluation,

With respect to *non-substance-related* functioning (tables 3 and 5), the ASI data indicate significant improvements for both groups at both followup periods with respect to family/social, psychological, and employment problem levels. Group differences were not found in these areas (see interaction terms [labeled G x T in the tables]). There was little indication of improvement in medical problems at either period. There was some indication at the 7-month followup period of superior employment functioning for the inpatient subjects as shown in the significant interaction effects for employment income and for the employment composite score.

DISCUSSION

Although inpatient treatment resulted in a markedly higher rate of program completion than day hospital treatment, the interim findings of this study revealed few differences in the status of the two groups 4 and 7 months after entry into treatment. Similar findings were revealed by interview-based ASI and urine drug screen data. This finding of no differences in the outcome of inpatient and outpatient rehabilitation for cocaine dependence is consistent with a small body of random-assignment comparison studies of inpatient vs. outpatient rehabilitation treatment for alcohol dependence (Miller and Hester 1986). Regarding the failure to find outcome differences between the two groups, preliminary data on treatments received in the two programs have been based on a measure recently developed by McLellan and colleagues (1992), the Treatment Services Review. This B-minute interview obtains weekly patient-reported information on treatment received in the seven ASI areas. Preliminary analysis of these data indicated that inpatients received significantly more medical treatment and day hospital patients received more psychiatric treatment, but they did not differ in the quantity of treatment received in the remaining five areas. Thus, if amount of treatment determines the effectiveness of treatment, there is little reason for expecting superior results from inpatient rehabilitation.

TABLE 5. *Seven-month non-substance abuse findings for two cocaine treatment groups*

Variables	Day Hospital (n=28)		Inpatients (n=28)		p*		
	Intake	7 mo.	Intake	7 mo.	Group	Time	G x T
Days working—past 30 days	12.87	12.70	11.15	17.15	ns	0.105	0.109
Employment income-past 30 days	484	518	393	923	ns	0.013	0.042
Illegal income—past 30 days	52	437	95	0	ns	ns	ns
Days psychological problems—past 30 days	8.89	4.58	12.42	3.04	ns	<0.0005	ns
Medical problems composite score	0.23	0.13	0.14	0.14	ns	ns	ns
Employment composite score	0.60	0.58	0.68	0.53	ns	0.021	0.052
Legal problems composite score	0.05	0.04	0.08	0.03	ns	ns	ns
Family/social composite score †	0.23	0.13	0.32	0.17	ns	0.003	ns
Psychological composite score †	0.23	0.08	0.24	0.07	ns	<.0005	ns

* G x T=group by time interaction effect

†Composite scores range from 0.00 to 1.00, with 1.00 being the most severe problem level

Several other questions related to the effectiveness of the two treatments need to be addressed. One question is whether patients whose prlmary route of cocaine administration is smoking respond more poorly to treatment than those reporting intravenous or intranasal use. This question cannot be evaluated at this point because all but 6 of 94 patients in the study reported smoking to be their primary route of cocaine administration. A second question is whether patients who are also alcohol abusers or alcohol dependent respond more poorly than those who do not receive an alcoholism diagnosis. Of the 94 subjects in the study, 52 (55 percent) were determined also to be either alcohol abusers or alcohol dependent on the basis of the DIS and DSM-III (American Psychiatric Association

1987) criteria. Preliminary analysis of these data revealed few differences in outcome between these two subgroups of cocaine patients. It is instructive that the substance use differences found between these two subgroups at entry into the study were primarily restricted to years-of-use measures. The groups did not differ significantly in the quantity or frequency of recent use of cocaine, marijuana, or alcohol. Thus, the failure to find status differences in the subgroups 4 and 7 months after treatment entry may not be surprising. Finally, the explanation for the better employment outcome for inpatients at 7-months posttreatment entry is not entirely clear at this time, although discussions with the staff members of both programs suggested that more emphasis was placed on postrehabilitation employment in the inpatient program.

CONCLUSIONS

The findings of this interim report revealed the following:

- Randomized day hospital patients and inpatients were found to differ on only one of numerous historical, demographic, and baseline characteristics,

- Inpatients were more likely to complete the initial 1 month of rehabilitation treatment.

- Significant reductions in *substance-related problem* levels were found for both groups at both the 4- and 7-month ASI followup evaluations. No group differences were revealed. Improvements shown at 4 months were generally maintained at 7 months. These conclusions were supported by urine drug screen data.

- Significant reductions in legal, family/social, and psychological problem levels were revealed for both groups at both followup periods. There was no reported improvement with respect to medical problems. At the 7-month evaluation, there was some indication of a superior level of employment-related functioning in those subjects who had received inpatient treatment.

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Cocaine Abusers in Therapeutic Community Treatment

George De Leon

INTRODUCTION

The pervasive use of drugs at all levels of society and particularly the shift in drug use patterns are well established. Most evident is the predominance of cocaine/crack use within a context of polydrug abuse, including alcohol. These changes in drug use raise new questions concerning the relevance and effectiveness of the existing drug treatment modalities. They emphasize the need for different approaches, both outpatient and residential, for treatment of cocaine abusers. As yet, however, there are no firm conclusions about treatment effectiveness for cocaine abuse, although data on this question are developing in a number of ongoing studies.

Therapeutic communities (TCs) have always treated clients with histories of cocaine use. Studies of admission profiles in the 1970s indicate that cocaine use was not the primary drug of clients, but rather one substance in a general pattern of polydrug abuse (De Leon 1971,1976,1980). For example, approximately 60 percent of the 1974 residents and 73 percent of the 1971 residents in one large urban TC reported some use of cocaine in their lifetimes, and many had used cocaine in the year before entering the TC.

However, there is little known now about the efficacy of the TC for primary cocaine abusers. The effectiveness of long-term residential TC treatment has been documented in a number of studies (Hubbard et al. 1984; Simpson and Sells 1982; De Leon 1984, 1985). Results are most favorable for primary opiate abusers, although significant reductions are obtained for other drug use, including alcohol, cocaine, and amphetamines (De Leon 1964, 1987). However, these findings precede the cocaine epidemic of the 1980s.

Notwithstanding the lack of outcome studies, expectations are that the effectiveness of the TC should not differ remarkably for cocaine abusers. The TC approach to treatment remains essentially the same regardless of the primary drug of choice. This approach is described in other writings on the TC perspective of addiction, the addict, and the recovery process (De Leon 1986; De Leon and Rosenthal 1989). Substance abuse is a disorder of the whole

person, requiring a multidimensional approach to treatment. The drug of abuse is less relevant than the behavior, attitudes, values, and lifestyle of the abuser.

These assumptions concerning the effectiveness of the TC for cocaine abusers highlight the need for scientific data on the clients. Thus, this chapter provides a comprehensive description of the profiles of individuals admitted to the TC, a significant majority of whom are primary cocaine abusers. Findings are presented from several studies that focus on three major issues: (1) trends in primary drug and psychological profiles of admissions to TCs, (2) psychopathology and cocaine abuse in terms of psychiatric diagnoses and clinical indicators, and (3) the relationship between cocaine abuse and retention in TC treatment.

Material is drawn from a series of recently completed National Institute on Drug Abuse-supported studies on psychopathology and retention in TC treatment (De Leon 1988*a,* 1988*b;* Jainchill 1989). Details of methodology and statistics are contained in the original reports and publications cited in the references. The initial section of the chapter reviews the main findings in the text, illustrated by tables and figures. The last section discusses some implications for treatment and research.

TEN-YEAR TRENDS IN DRUG USE AND PSYCHOLOGICAL PROFILES AMONG ADMISSIONS TO THERAPEUTIC COMMUNITIES

Do the substance abusers now entering TCs differ from admissions in previous years? This question was addressed through a large-scale objective study to determine the extent to which the demographic, primary drug, and psychological profiles of substance abusers admitted to TCs have changed over a 10-year period. The study provided comparisons of the profiles across three cohorts of admissions to TCs: the 1974-75 and 1984-85 entries to a large traditional urban TC (i.e., the New York TC) and the 1979 entries to a consortium of seven other residential drug-free programs of Therapeutic Communities of America (TCA) from the northeast and southeast regions of the Nation. All agencies studied were long-term residential programs self-described as adhering to the traditional TC model described in other writings (De Leon and Rosenthal 1989).

The instruments, data collection procedures, and investigative team were the same for all three cohorts. Four standardized psychological tests were administered within the first 2 days of admission to residential treatment. These consisted of the Shortened Schizophrenia Scale (Clark and Danielson 1956) the Shortened Manifest Anxiety Scale (Bendig 1956), the Beck Depression Inventory (Beck et al. 1961) and the revised Beta IQ test (Kellogg and Morton 1976). The Socialization Scale of the California

Personality Inventory (Gough 1969) was administered to the 1974-75 and 1984-85 cohorts. Additionally, a Tennessee Self-Concept (Fitts 1965) and a full Minnesota Multi-Phasic Personality Inventory (MMPI) (Hathaway and McKinley 1948) were given to the three cohorts. The results from administering these instruments are described in other writings (De Leon 1976,1980,1988*a,* 1989).

Demographic and Primary Drug Profiles

There were few changes in demography across the 10 years during the period 1974-75 to 1984-85. Racial/ethnic differences were obtained between TCA (1979) and the New York TC that reflect regional differences, because the latter serves a larger urban, nonwhite majority population, There was a sharp rise in the number of primary cocaine abusers accompanied by a decrease in primary heroin and alcohol abusers. This difference in the comparison between the 1974-75 and 1984-85 New York TC cohorts is striking and removes any factors relating to program or regional differences. Clearly, the change in the proportion of primary cocaine abusers reflects the increased use of this drug reported in recent years.

Changes In the Psychologlcal Profile

Table 1 contains data for the three cohorts on the symptom scales that were common to all cohorts. The 1974-75 (New York) and 1979 (TCA) psychological scores are significantly different on IQ only. Differences are most striking between the two entry cohorts, evaluated 10 years apart. The more recent 1984-85 admissions obtained significantly poorer scores on all but the socialization scale. Thus, the 1984-85 cohort reveals symptom scores that are worse than either of the two earlier cohorts, most evidently on depression and IQ. Figure 1 plots the data for the three cohorts on selected variables, graphically depicting the trend. The large changes occurred in the 1984-85 cohort, but there was evidence of a negative trend on most of the scales between 1974 and 1979.

Psychological Differences by Demography and Primary Drug

With few exceptions, the psychological scores obtained for the most recent cohort are worse when compared with earlier cohorts regardless of sex, age, or race. Psychological differences by demography and primary drug within each cohort are described in other writings (De Leon 1976, 1980, 1984). Briefly, within the 1974-75 and 1979 cohorts, the scores are worse for females, whites, Hispanics, older clients, and nonopiate abusers (but not cocaine abusers). These differences exist for similar groups in the 1984-85 cohort, except that the sex differences are of smaller magnitude.

TABLE 1. *Comparisons on four measures of psychopathology and Beta IQ for three admission cohorts: 1974-75, 1979, and 1994-85**

Scale	1974-75 n=492 Mean	SD	1979 n=736 Mean	SD	1984-85 n=949 Mean	SD	1974-75 vs. 84-85 *t*-test†	1974-75 vs. 1979 *t*-test†	1979 vs. 84-85 *t*-test†
Beck depression	16.3	9.5	16.0	9.2	19.6	8.7	‡	NS	‡
Anxiety	9.5	4.5	10.0	5.0	10.3	4.6	§	NS	NS
Schizophrenia	7.2	4.1	7.8	4.3	7.9	4.1	‡	NS	NS
Socialization	26.1	5.5	— (n=657)	—	25.9 (n=899)	5.4	NS		
Beta IQ	91.2	14.7	86.7	13.8	82.9	13.1	‡	‡	‡

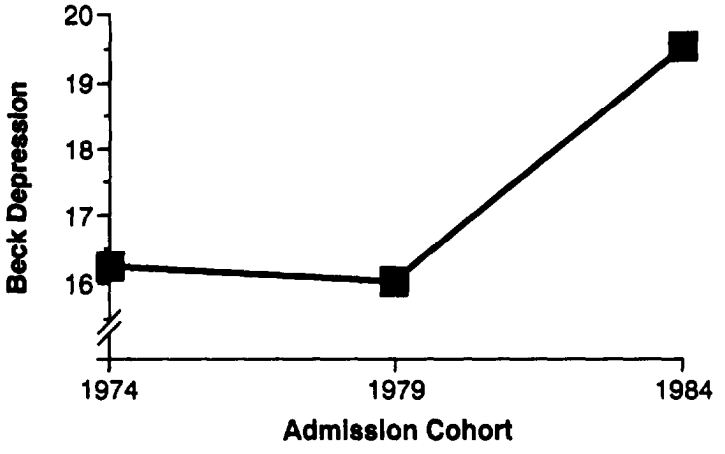
KEY: SD=standard deviation; NS=not significant

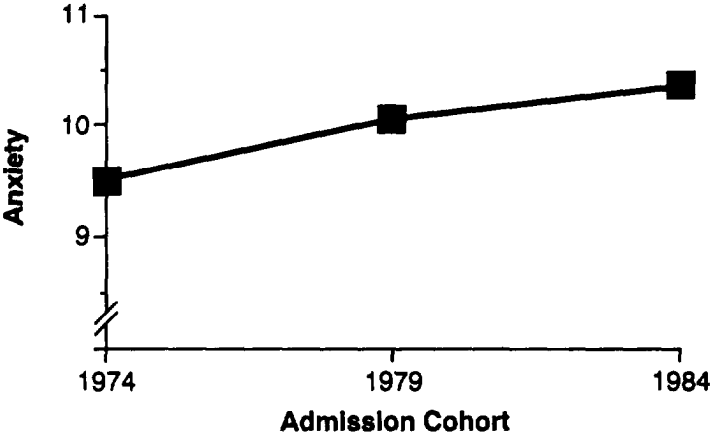
*The Socialization Scale was not obtained on admissions to the seven programs of the 1979 TCA Consortium.

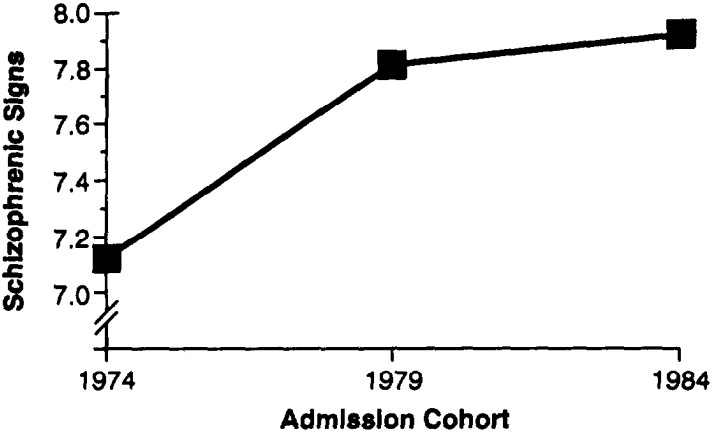
†The *t*-test for independent samples was used to assess group diierences.

‡p<.001.

§p<01.


Beck Depression
20
19
18
17
16
1974
1979
1984
Admission Cohort


Anxiety
11
10
9
1974
1979
1984
Admission Cohort


Schizophrenic Signs
8.0
7.8
7.6
7.4
7.2
7.0
1974
1979
1984
Admission Cohort

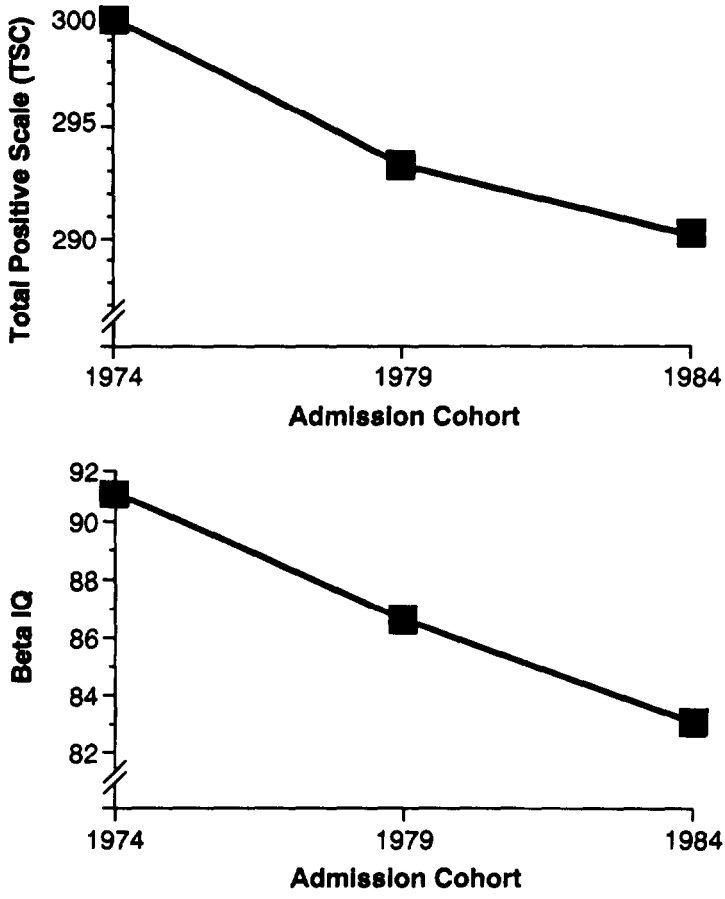


FIGURE 1. *Symptoms, IQ, and self-concept for the three admission cohorts* to the New York TC 1974-75, the seven-program consortium of *TCA 1979, and the New York TC 1984-85. Scores on all* scales *and in all years are deviant, but a* negative *trend is evident, particularly on depression, IQ, and self-esteem.*

The 1974-75 and 1979 admission groups had relatively few primary cocaine abusers, limiting their comparisons within and across cohorts. As noted, the 1984-85 primary cocaine abusers were a large plurality. In general, their psychological profiles were deviant and were indistinguishable from the other primary drug groups. Within this cohort, the cocaine abusers did reveal significantly better scores on several of the Tennessee Self-Concept and MMPI scales, particularly compared with the primary heroin users (not shown),

Overall, the results of the 10-year-trend study point to a worsening of the psychological profile across 10 years, evident in the most recent entries into residential treatment. The trend is indicated on a large majority of psychological scales but is particularly apparent in the depression, IQ, and self-concept scores. The 1974-84 change is striking, although significant shifts occurred between 1974 and 1979. It is noteworthy that the worsening trend in the recent cohort is more prominent among the males in general and heroin abusers in particular. Primary cocaine abusers yield a deviant psychological picture that is generally indistinguishable from the other primary drug groups.

DIAGNOSTIC STUDIES OF COCAINE ABUSERS

Findings are presented from a comprehensive study of the prevalence and type of DSM-III-R *(Diagnostic and Statistical Manual of Mental Disorders [Third Edition, Revised])* diagnoses (American Psychiatric Association 1987) among admissions to the long-term traditional TC (De Leon 1988*b;* Jainchill 1989). Research utilizing the Diagnostic Interview Schedule (DIS) (Robins and Helzer 1985) generated the distribution of diagnoses on a sample of approximately 360 admissions to the New York TC during the period 1985 through 1987. The sample differed from the usual residential population in that it contained a higher proportion of females (purposefully selected) and fewer clients younger than 19 years (inasmuch as the DIS is recommended for individuals 18 years or older). The DIS was administered by a research psychologist after an individual had been admitted to long-term treatment but prior to transfer to a residential facility. Results are reported separately for the full sample and primary drug groups.

Prevalence and Type of Diagnoses

Tables 2 and 3 show the prevalence of type of psychiatric diagnoses obtained lifetime and during the month prior to interview (current) for three self-reported primary drug groups: cocaine abusers, opiate abusers, and "other" (usually marijuana and/or alcohol) abusers. Results are first summarized separately for the full sample and then by comparisons by primary drug.

In table 2, more than 97 percent of the full sample obtained at least one diagnosis in their lifetimes (last column). About 19 percent obtained either a drug (14.7 percent) or psychiatric (nondrug) (4.2 percent) diagnosis only. The remaining admissions (78.3 percent) obtained a drug diagnosis plus at least one other nondrug diagnosis. Of these, approximately one-half had multiple nondrug diagnoses (not shown). Thus, virtually all admissions received at least one lifetime diagnosis, with most receiving dual or multiple diagnoses.

TABLE 2. Comparative distributions of current and lifetime diagnoses *by primary drug: substance, psychiatric, and substance+psychiatric**

	Cocaine		Opiates/Heroin		Other		Totals	
Diagnosis	n	%	n	%	n	%	n	%
				Lifetime Diagnosis				
No diagnosis	7	3.0	0	0.0	3	3.8	10	2.8
Substance diagnosis only	35	15.2	7	13.7	11	14.1	53	14.7
Psychiatric diagnosis only	13	5.7	0	0.0	2	2.6	15	4.2
Substance+psychiatric diagnoses	175	76.1	44	86.3	62	79.5	281	78.3
				Current Diagnosis				
No diagnosis	51	22.2	7	13.7	15	19.2	73	20.3
Substance diagnosis only	74	32.2	23	45.1	24	30.8	121	33.7
Psychiatric diagnosis only	27	11.7	6	11.8	11	14.1	44	12.3
Substance+psychiatric diagnoses	78	33.9	15	29.4	28	35.9	121	33.7

*Table modified from Jainchill (1989).

NOTE: Cocaine, n=230; opiates, n=51; other, n=78; total, n=359. There are no significant x^2 differences across the three primary drug groups.

A current diagnosis (drug or nondrug) was obtained for nearly 80 percent of the study sample. About 46 percent of these had either a current drug diagnosis only (33.7 percent) or a nondrug psychiatric diagnosis only (12.3 percent). A third revealed both drug and nondrug psychiatric diagnoses in the month before admission. Most of these clients were symptomatic in both the past (more than 1 year before treatment) and present, although the diagnosis may have changed.

TABLE 3. *Distribution of DSM-III-R diagnoses among admissions to residential drug treatment by primary drugt*

Diagnosis	Cocaine n	Cocaine %	Opiates/Heroin n	Opiates/Heroin %	Other n	Other %	Chi-Square Probability	Totals n	Totals %
Organic brain syndrome	8	3.69	6	4.38	1	1.96		15	3.9
Affective disorders									
Mania	4	1.75	0	0.00	3	3.85	*	7	2.0
Major depression	25	11.21	7	14.00	11	14.47		43	12.3
Dysthymia	36	16.14	9	18.00	14	18.42		59	16.9
Bipolar disorder	0	0.00	0	0.00	1	1.28	‡	1	0.3
Atypical bipolar disorder	5	1.79	2	4.00	1	1.32	‡	8	2.3
Schizophrenic disorders									
Schizophrenia	4	1.75	0	0.00	5	6.41	*	9	2.5
Sohizophreniform	0	0.00	0	0.00	0	0.00		0	0.0
Anxiety disorders									
Obsessive compulsive	9	3.95	2	3.92	8	10.26		19	5.3
Phobic disorders	59	25.88	17	17.17	23	29.49		99	27.7
Agoraphobia	29	12.72	9	17.65	19	24.36	*	57	16.0
Simple phobia	29	12.72	11	21.57	15	19.23		55	15.4
Social phobia	22	9.65	8	15.69	8	10.26		38	10.6
Panic disorder	5	2.19	2	3.92	2	2.60	*	9	2.5
Generalized anxiety	66	31.73	17	42.50	24	36.92		107	34.2
Other disorders									
Antisocial personality	97	42.92	20	40.00	39	50.00		156	44.1
Somitization	0	0.00	0	0.00	0	0.00		0	0.0
Anorexia	0	0.00	0	0.00	0	0.00		0	0.0

TABLE 3. *(continued)*

Diagnosis	Cocaine n	Cocaine %	Opiates/Heroin n	Opiates/Heroin %	Other n	Other %	Chi-Square Probability	Totals n	Totals %
Pathological gambling	10	4.42	5	9.80	7	8.97	‡	22	6.2
Psychosexual dysfunction	98	42.29	21	42.00	24	31.17		141	39.8
Bulimia	0	0.00	0	0.00	1	1.52		1	0.3
Posttraumatic stress disorder	16	9.41	2	9.52	7	15.56		25	10.6
Ego dystonic homosexual	4	2.40	0	0.00	1	2.17	‡	5	2.1
Transsexualism	1	1.05	0	0.00	0	0.00	‡	1	0.8
Substance abuse; dependence disorders									
Alcohol	77	34.07	22	44.00	42	53.85	*	141	39.3
Abuse	24	10.62	8	16.00	13	18.67		45	12.5
Dependence	9	3.98	0	0.00	4	5.13		13	3.8
Abuse+dependence	44	19.47	14	28.00	32	32.95		90	25.1
Barbiturates	23	10.18	16	31.77	12	15.38	***	51	14.2
Abuse	3	1.32	1	1.96	0	0.00		4	1.1
Dependence	11	4.85	3	5.88	8	10.26		22	8.1
Abuse+dependence	9	3.96	12	23.53	4	5.13		25	7.0
Opioids (heroin)	34	14.91	47	92.18	17	21.80	***	98	27.3
Abuse	1	0.44	1	1.96	1	1.28		3	0.8
Dependence	11	4.82	4	7.84	5	8.41		20	5.8
Abuse+dependence	22	9.65	42	82.35	11	14.10		75	20.9
Cocaine abuse	193	85.02	29	56.85	82	79.49	**	284	79.1

TABLE 3. *(continued)*

Diagnosis	Cocaine n	Cocaine %	Opiates/Heroin n	Opiates/Heroin %	Other n	Other %	Chi-Square Probability	Totals n	Totals %
Amphetamines	13	5.73	12	23.83	11	14.10	***	38	10.0
Abuse	2	0.88	1	1.96	3	3.85		8	1.7
Dependence	7	3.08	5	9.80	4	5.13		16	4.5
Abuse+dependence	4	1.76	8	11.78	4	5.13		14	3.9
Hallucinogen abuse	14	8.17	4	7.84	14	17.95	**	32	8.9
Marijuana	74	32.46	28	50.98	43	55.13	**	143	39.8
Abuse	30	13.16	11	21.57	18	20.51		57	15.9
Dependence	18	7.89	8	15.89	8	10.26		34	9.5
Abuse+dependence	28	11.40	7	13.73	19	24.36		52	14.5

*p<.05; **p<.01; ***p<.001

†Table modified from Jainchill (1989).

*The chi-square must be interpreted with caution because more than 25 percent of the cells have expected counts less than five.

NOTE: Cocaine, n=223-227; opiates/heroin, n=50-51; other, n=78-77.
Column values represent incidence of disorder and therefore can exceed 100 percent within a category such as anxiety disorder. Row totals represent prevalence or number of diient people in each group dig the disorder and can be added across columns to the totals.
Generalized anxiety: cocaine, n=208; opiatesl/heroin, n=40; other, n=65
Bulimia: cocaine, n=213; opiates/heroin, n=41
Posttraumatic stress disorder cocaine, n=170; opiates/heroin, n=21; other, n=45
Ego dystonic homosexual: cocaine, n=167; opiates/heroin, n=21; other, n=46
Transsexualism: cocaine, n=95; opiates/heroin, n=15; other, n=21

Table 3 shows the prevalence of all diagnoses for the full sample of long-term residential admissions (last column). Among the nonsubstance abuse diagnoses, the order of occurrence was antisocial personality (44.1 percent), psychosexual dysfunction (39.8 percent), phobias (27.7 percent), generalized anxiety (34.2 percent), and all affective disorders (33.8 percent [mania, major depressive disorder, dysthymia, bipolar disorder, and atypical bipolar disorder]). The percentages for other diagnoses were small.

Among the substance abuse diagnoses, the order of occurrence was cocaine abuse (79.1 percent; there is no dependence diagnosis for this drug in DSM-III-R), alcohol abuse/dependence (39.3 percent), marijuana abuse (39.8 percent), and opioid abuse/dependence (27.3 percent). Diagnoses were similar by demography (not shown), although univariate analyses of lifetime diagnoses yielded several gender-related differences. Proportionately more females obtained a diagnosis of major depressive disorder, all phobic disorders, and psychosexual dysfunction. A greater proportion of males were diagnosed with antisocial personality and with multiple substance abuse diagnoses.

There were no statistically significant ethnic differences on any of the nondrug psychiatric diagnoses, although nonblacks showed higher incidence in virtually all diagnoses (e.g., all depressions, phobias, and general anxiety). Moreover, the nonblacks revealed a significantly higher prevalence of all substance abuse diagnoses other than cocaine abuse. Overall, nonblacks appear to be generally worse than blacks in prevalence of both nondrug and drug diagnoses.

Diagnoses Among Cocaine and Noncocalne Abusers

Tables 2 and 3 provide a statistical comparison among three self-reported primary drug of abuse groups. Lifetime and current diagnoses rates did not differ by primary drug, although more primary opiate abusers revealed dual disorders. Type of nondrug diagnoses did not differ among the groups, with the exception of schizophrenia (most frequent in primary “other”) and phobias (least frequent in primary cocaine abusers and most frequent in the primary “other” group, particularly agoraphobia).

The distribution of substance abuse diagnoses indicates that the majority of the sample were frequent users of more than one drug. However, there were significant differences by primary drug. Among cocaine abusers, a diagnosis of alcohol, amphetamine, and marijuana abuse/dependence was less frequent. Among the primary heroin abusers, a diagnosis of barbiturate and amphetamine abuse/dependence was more frequent. And among the primary “other” drug group, a diagnosis of hallucinogen abuse was more frequent.

Thus, the primary cocaine abusers revealed a generally lower prevalence of all other drug diagnoses. However, a diagnosis of cocaine abuse remained prominent regardless of primary drug. More than half the primary opiate abusers obtained a diagnosis of cocaine abuse. A greater proportion of the primary "other" group also obtained a diagnosis of cocaine abuse (79 percent) than a diagnosis of marijuana abuse (55 percent). Notably, a diagnosis of alcohol abuse/dependence was frequent in all groups but least so among cocaine abusers (34.1 percent) than among the primary opiate and other groups (44 and 54 percent, respectively).

Overall, the large majority of admissions to the TC revealed at least one nondrug psychiatric disorder in their lifetimes in addition to substance abuse or dependence. More than a third of admissions had a current or continuing history of mental disorder in addition to their drug abuse. The most frequent nondrug diagnoses were phobias, generalized anxiety, psychosexual dysfunction, and antisocial personality. There were only a few cases of schizophrenia, but lifetime affective disorders occurred in more than a third of the sample.

Primary cocaine abusers (self-reported) revealed a diagnostic picture that was similar to that of the primary opiate and primary "other" groups, although the overall prevalence of all their diagnoses was generally less. Thus, diagnostically, all drug of abuse groups are considerably disordered, but primary cocaine abusers entering the TC appear less disturbed.[1]

CLINICAL INDICATORS OF PSYCHOPATHOLOGY

Two related studies further explored psychopathological changes assessed on clinical indicators among clients seeking admission to the New York TC. The first assessed the incidence of violent behaviors, suicide attempts, and inpatient psychiatric hospitalizations. The second study provided a more direct inquiry into the association between primary drug and suicide in the 1986 cohort.

Study 1. Suicide Attempts, Psychiatrlc Hospitalizations, and Violent Behaviors

The incidence of three clinical indicators was assessed across the 4 consecutive years (1983 through 1986) for representative samples of admissions. The demographic and primary drug characteristics are similar across each year (except for a dramatic increase in primary cocaine abusers in 1986). Results showed that there was a significant increase in two indicators—suicide and violent behavior—for the 1986 admissions compared with those in the previous year. There was only one significant difference by demography. Nearly twice as many females as males had

attempted suicide at least once (27 vs. 14 percent; $p<.05$). A similar sex difference occurred in the percentage reporting a psychiatric hospitalization, although it is not significant (because the absolute percentages are small). The results did not reveal significant differences in any of the indicators by primary drug.

The clinical indicator study provided only indirect evidence of a relationship between cocaine abuse and clinical problems. It examined changes in rates of indicators in sequential samples of admissions with increasing proportions of primary cocaine abusers. Nevertheless, the increase in violence and suicide rates in the 1986 cohort appears to be associated with the predominance of cocaine abusers seeking admission to the TC during that year. This hypothesis was directly tested for suicide rates in study 2.

Study 2. Suicide Attempts, Cocaine and Crack Abuse

This study focused on differences in suicide rates among three self-reported primary drug groups: cocaine abusers, crack abusers, and noncocaine abusers, (Analysis of violent behavior In this subsample is yet to be completed.?) The sample consisted of all successive admissions to the New York TC over a 3-month period (October 1 through December 31, 1986; n=240).

Table 4 shows that the demographic characteristics were male (72 percent), black (68 percent), and 19 to 26 years of age (50 percent). Almost 75.8 percent of the sample reported cocaine as their primary drug of abuse; most were crack abusers (50.8 percent of the sample); 67 percent were cocaine abusers. The demographic distribution within each primary drug group was similar, although there were some differences in proportions (e.g., more females and blacks in the crack group and fewer younger clients in the noncrack/cocaine group). Except for higher proportions of primary cocaine abusers, the characteristics of this 3-month admission sample were reflective of all admissions in 1986.

Table 4 presents the suicide attempt rates (at least one suicide attempt during an individual's lifetime) and the psychiatric hospitalization rate across three primary drug of abuse groups: cocaine/crack abusers, cocaine/noncrack abusers, and noncocaine abusers. Suicide attempt rates were 18 percent overall; the attempt rate among crack abusers was two to four times greater than those of the other primary drugs of abuse (26.2 percent, cocaine/crack; 11.7 percent, cocaine/noncrack; 6.9 percent, noncocaine).

The suicide attempt rate was similar by demography, with the exception of gender. Females revealed significantly higher rates.

TABLE 4. *Crack vs. noncrack: A profile by demography and selected psychiatric indicators (admissions to New York City TC, October through December 1986)*

Demographic Factors	Crack		Cocaine Noncrack		Noncocaine		Totals	
	n	%	n	%	n	%	n	%
Sex								
Males	80	65.6	50	63.3	42	72.4	172	71.7
Females	42	34.4	10	16.7	16	27.6	68	28.7
Race								
Black	91	74.6	36	60.0	35	60.3	162	67.5
Hispanic	22	18.0	13	21.7	14	24.1	49	20.4
White	9	73.4	11	18.3	9	15.5	29	12.1
Age (years)								
<19	33	27.0	7	11.7	20	34.5	60	25.0
19-26	59	46.4	34	56.7	27	46.6	120	50.0
>27	30	24.6	19	31.7	11	18.9	60	25.0
Psychiatric indicators								
Attempted suicide	32	26.2*	7	11.7	4	6.9	43	17.9
Psychiatric hospital	9	7.4	2	3.3	1	1.7	12	5.0
Totals	122	50.6	60	25.0	58	24.2	240	100.0

*Significantly greater (x^2=5.066, p<.05)

The percentages of suicide attempts persisted across all drug groups (not shown). Thus, the results indicate that, among primary crack abusers, a significantly higher percentage report at least one suicide attempt compared with the other primary drug groups, Moreover, their rates do not appear to be confounded by demography.

The pattern for psychiatric hospitalizations was similar to that of suicide attempts in showing highest rates for crack abusers and lowest for noncocaine abusers, However, the percentages were too small for statistical significance.

Overall, in the initial study, an increase in violence and suicide attempt rates appeared to be associated with the predominance of cocaine abusers seeking admission to the TC in 1983 through 1986. A second study more directly confirmed a relationship between suicide attempt rates and crack abuse.

RETENTION IN TREATMENT FOR COCAINE ABUSERS

Do cocaine abusers reveal differential tenure in residential treatment? The importance of this question is highlighted by well-documented research showing a direct relationship between posttreatment success rates and length of stay in residential TC treatment. The main findings are reported for univariate and multivariate analyses of retention in treatment. The study cohort consisted of all admissions to the New York TC during the period from January 31, 1986, to April 30, 1987 (table 5). They were primarily male (67.4 percent) and black (84.3 percent), and a small majority was older than 20 years (56.0 percent). Most individuals (90.3 percent) had entered treatment voluntarily (not legally referred, i.e., probation or parole), and most (93.1 percent) were first-time admissions (not shown).

The sample reflected a spectrum of drug abusers with pluralities among those claiming their primary drug to be cocaine (32.7 percent), crack (31.8 percent), heroin (7.4 percent), and marijuana (20.9 percent). Primary cocaine plus crack abusers constituted more than 63 percent of the cohort, but there were differences by primary drug with respect to demography. Proportionately higher percentages of crack and cocaine abusers were obtained for females and blacks and higher percentages were obtained for primary marijuana users among clients younger than 21 years of age.

Short- and Long-Term Retention by Primary Drug

Table 6 presents the retention results for all primary drug groups. The 30-day, 90-day, 180-day, and 300-day retention rates for the full cohort were 72.5, 53.7, 41.2, and 34.0 percent, respectively. There were few statistically significant differences in short- or long-term retention by primary drug. However, primary alcohol and crack abusers showed the highest 30-day retention rate.

Multiple regression analyses examined client predictors of retention, ("Crack abuser" was not separately coded in these analyses.) The magnitude of the multiple correlations was modest, and the variance explained was small. The client variables that were significantly related to longer retention were legal referral, higher baseline employment, higher IQ, client readiness for treatment, and client estimate of needed length of stay. Notably, primary drug was not a consistent predictor of retention with the contribution of these other client variables removed.

Overall, primary cocaine and crack abusers were a large majority of the recent admissions to the New York TC. Univariate and multivariate analyses of approximately 1,200 admissions revealed that short- and long-term

TABLE 5. *Primary drug and demographic characteristics of all admissions to the New York TC: January 31, 1986, through April 30, 1987*

Demographic Factors	Cocaine		Crack		Opiates		Marijuana		Alcohol		Polydrug		Other		Totals	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Sex																
Males	262	66.8	235	61.7	68	76.4	174	67.2	39	76.5	9	75.0	21	67.5	608	67.4
Females	130	33.2	146	38.3	21	23.6	76	32.6	12	23.5	3	25.0	3	11.5	391	32.6
Race/ethnic																
Black	251	64.0	265	74.8	30	33.7	158	61.0	34	66.7	7	58.3	6	25.0	771	64.3
Hispanic	77	19.6	60	15.7	33	37.1	60	23.2	7	13.7	4	25.0	7	29.2	248	20.7
whites	62	15.6	35	9.2	25	28.1	31	12.0	9	17.7	1	8.3	11	45.8	174	14.5
Other	2	0.5	1	0.3	1	1.1	1	0.4	1	19.6	0	0.0	0	0.0	6	0.5
aGE																
<19	70	17.9	92	24.1	8	9.0	112	43.2	11	21.6	1	8.3	5	20.8	299	24.9
19-20	78	19.9	61	16.0	9	10.1	61	23.6	11	21.6	3	25.0	6	25.0	229	19.1
21-26	129	32.9	136	35.7	20	22.5	60	23.1	17	33.3	4	33.3	8	33.3	374	312
≥27	115	29.3	92	24.1	52	58.4	17	6.6	12	23.5	4	33.3	5	20.8	297	24.8
Total	392	32.7	381	31.8	89	7.4	250	20.9	51	4.3	12	1.0	24	2.0	1,199	100.0

TABLE 6. *Retention in treatment by primary drug for all admissions to the New York TC: January 31, 1986, through April 30, 7987*

	30 Days		90 Days		180 Days		300 Days*	
Primary Drug	n	%	n	%	n	%	n	%
Cocaine	272	69.4	194	49.6	139	35.5	115	29.3
Crack	299	78.5	216	56.7	165	43.3	135	35.4
Opiates	66	74.2	50	56.2	40	44.9	33	37.1
Marijuana	169	67.6	136	54.4	111	44.4	95	38.0
Alcohol†	42	82.4	31	60.8	25	49.0	21	41.2
Polydrug†	2	16.7	2	16.7	1	8.3	1	8.3
Other†	19	79.2	15	62.5	13	54.2	6	33.3
Total	869	72.5	644	53.7	494	41.2	408	34.0

*Ten months represent the retention potential for the full cohort of 1986-87 admissions during the study period (see De Leon [1989] for a discussion of the RFP).
†Excluded from statistical analysis because of sample size.

retention did not relate to primary drug differences. Other client factors such as readiness for treatment, however, were of some importance.

IMPLICATIONS FOR TREATMENT AND RESEARCH

This chapter reports findings from several studies on psychopathology and retention among admissions to the TC, the majority of whom were primary cocaine abusers. The research was completed mainly in one large urban TC in New York, although one study compared data obtained on 1979 admissions to a consortium of seven other TCs.

Although the present findings are stable, generalization of conclusions concerning cocaine abusers in other TCs or other treatment modalities may be limited. The New York TC is representative of long-term traditional TCs in urban areas. As noted earlier, other treatment settings—inpatient and outpatient, public and private-are serving clients of different socioeconomic backgrounds. Thus, similarly designed studies are needed to identify the varieties of cocaine abusers in terms of psychological status, retention, and treatment outcomes. Nevertheless, the research presented provides some implications for treatment and research. These are discussed in terms of the major areas of inquiry.

RESEARCH IMPLICATIONS

General Psychopathology

The psychological profiles of all entry cohorts are in the deviant range regardless of the testing year. The main characteristics of depression, anxiety, poor socialization, and low self-esteem are similar in each year, across demography and primary drug, including cocaine. Moreover, these profiles do not differ from those of substance abusers in general (Rounsaville et al. 1985; De Leon 1984, 1989). The constancy of the symptom picture and MMPI personality profiles (not shown) corroborate clinical observations and research that TCs have always treated substance abusers who have displayed a variety of psychological problems in addition to their drug abuse.

The diagnostic findings also support the general conclusion that regardless of drug preference, substance abusers who come to the TC reveal a considerable degree of psychological disturbance in addition to their drug problems. Multiple diagnoses are prevalent, including Axis I (nonpsychotic) and Axis II (mainly antisocial personality) disorders (American Psychiatric Association 1987). The relatively infrequent incidence of schizophrenic diagnoses and the moderate frequency of affective disorders reflect the TC's exclusionary criteria for clients with these disorders. Notwithstanding these criteria, multiple disorders are prevalent in the overwhelming majority of admissions.

Broader multimodality studies are needed to assess the differences in psychopathology by primary drug, particularly among cocaine abusers. Of special importance is the issue of clarifying the psychological differences among the increasing numbers of "well-socialized" cocaine abusers seeking treatment in fee-for-service outpatient drug treatment, mental health settings, and with private practitioners.

Cocaine Abuse and Psychopharmacological Effects

The psychological and diagnostic profiles are similar across the primary drug of abuse groups. This fact substantiates the general conclusion that most drug abusers share common psychological symptoms and personality characteristics. The primary cocaine abusers reveal fewer occurrences of multiple disorders, suggesting that primary cocaine abusers may have somewhat less pervasive psychological problems. However, there may be drug-specific effects that precipitate violence and/or suicide attempt episodes. For example, TC staff and clients report on the destabilizing effects of crack use that appear to lower thresholds of tolerance for irritation, frustration, or provocation.

The clinical impressions in the TC accord with developing psychopharmacological research on mood states and neurotransmitter relations. However, further research must clarify these relations in terms of interactions among dosage/extent of use, situational parameters, and individual psychological factors.

Outcome and Retention in Treatment

Outcome data are not reported in the present review. However, the cocaine abusers reveal no differential retention rates compared with other drug of abuse groups. If retention persists as the main predictor of outcomes, then cocaine abusers should yield outcomes that are similar to those of previous studies on other drug abusers. This hypothesis awaits confirmation in posttreatment followup studies of cocaine abusers treated in TCs.

Such investigations may also require different criteria for assessing favorable outcomes to reflect the special risk features of cocaine/crack addiction such as craving, cross-addiction to alcohol, and the pervasive social use of both alcohol and cocaine. These features obviously affect the stability of outcomes and overall success rates, and they underscore relapse and aftercare issues for cocaine abusers in recovery.

The present studies confirm that short- and long-term retention rates in long-term TCs have been increasing in the past decade (Therapeutic Communities of America 1988) regardless of primary drug. Some reasons for this positive trend in “holding power” are discussed elsewhere (De Leon 1989). Nevertheless, dropout still remains the rule in all treatment modalities. Experimental investigations are needed to maximize retention in treatment among drug abusers in general and cocaine abusers in particular.

TRENDS AND BROADER RESEARCH ISSUES

The 10-year-trend study shows few differences in the demographic profiles of admissions to the TC, but the dramatic shift in primary drug to cocaine abuse is evident, Indeed, the yearly increments in the number of cocaine abusers are highlighted in the successive admissions from 1964 through 1967 in the New York TC. These trends parallel those observed in survey results of prevalence of cocaine use in nontreatment samples (e.g., national household and high school surveys). They indicate that the drug use patterns among TC admissions are reflective of those in the population, although the extent of the drug problems of those seeking treatment at TC is obviously more severe.

Most disturbing and perplexing is the increasing trend in psychological disorder among TC admissions, particularly the decline in IQ. The change

between the IQ of those admitted in 1974 and those admitted in 1979 is partly artifactual, attributable to a change in test norms of the revised Beta II IQ test. (The 1974-75 cohort was administered the Beta I test, whereas the 1979 and 1984-85 cohorts were administered the Beta II.) However, the difference in IQ between the 1979 and 1984 groups is not artifact because the same revised Beta II was used in these testing years. Moreover, the steady decline in Beta II IQ was further confirmed in additional data of the 1986-87 entries to the New York TC (not reported).

The fact of the decline in IQ cannot be questioned, but its interpretation remains unclear. One hypothesis points to selection factors across generations of drug abusers. The increased variety and number of current drug treatment options attracts the more advantaged/functional drug abusers away from long-term urban residential treatment. Thus, compared with 1974-75 admissions, the recent entries to the TC may represent a more dysfunctional group of addicts with greater social and psychological deficits.

Although plausible, the selection hypothesis is contradicted by some evidence in the present studies. For example, comparisons between the 1974 and 1984 admissions to the New York TC indicated no significant differences in socioeconomic status (SES) levels (family education and adjusted family income variables). Second, a sample of clients (not reported earlier) evaluated but not admitted to the New York TC also revealed the worsening trend in the clinical indicators and the poorest diagnostic picture (De Leon 1988*b).* Thus, the psychopathology findings were not specific to entries, but to all those seeking admission to the TC. And the most dysfunctional drug abusers were the nonadmissions to the TC. Notwithstanding this evidence, the selection hypothesis remains to be systematically tested. Trend studies are needed to assess the psychological (IQ) changes in other treatment modalities controlling for SES and other factors (e.g., education and employment).

An alternative hypothesis implicates broader social factors as contributors to the decline in IQ. Indeed, the decline may not be specific to drug abusers entering treatment, but may reflect consequences of the deepening of drug use in American society during the past 25 years. This enculturation of drug use has been characterized in other writings (De Leon 1990) in terms of three empirical facts: the increasing proportion of people at all levels of society who are involved in drug use; the expanding range of substances used; and, most relevantly for the present context, the steady decline since the 1970s in age of onset of regular use in the population.

These factors, particularly the earlier onset and longer period of substance use, may correlate with developmental gaps in social learning, intellectual functioning, and general psychological growth. Such developmental effects

would cumulate among the youth of the past two decades, those in and out of drug treatment settings.

Support for the hypothesis of increasing intellectual deficit is found not only in the drug treatment data but in educational reports that also point to a declining trend in IQ among entries into the school system in the 1980s. Nevertheless, considerably more research is needed to assess an association between the enculturation of drug use and specific psychological changes.

TREATMENT IMPLICATIONS

The findings reported and the suggested hypotheses also contain implications for modifying treatment in residential TCs for admissions in general and for cocaine abusers in particular.

Treatment Modifications

TCs have always treated psychological symptoms in addition to substance abuse. Indeed, the TC perspective views improvement in psychological status as essential to stable recovery from substance abuse (De Leon and Rosenthal 1989). Research documents the effectiveness of the TC in improving the psychological status of many clients (Biase et al. 1988; De Leon and Jainchill 1981-1982; Holland 1986). However, the more favorable outcomes are among those whose psychological symptoms are mainly associated with their drug abuse lifestyle rather than reflecting chronic, serious psychiatric disorder.

The worsening profile underscores the need for TCs to address issues of diagnosis, treatment modification, and staff composition and training. For example, treatment procedures may involve changes in the maximum planned duration of stay, use of modified encounter groups, greater emphasis upon psychotherapy, policy reconsiderations concerning psychopharmacological adjuncts, and so forth. In this regard, general changes in practice and staffing should be introduced within the basic framework of the TC model that has documented effectiveness,

Treating Cocaine/Crack Abusers

With respect to cocaine, and crack abusers in particular, some specific modifications are needed. These involve management and treatment of violent and suicidal behaviors, which in traditional TCs have usually been grounds for discharge and referral of the client. Clinical experience, supported by the research thus far, now recognizes that special psychopharmacological properties of cocaine/crack dependency (e.g., craving, severe mood alterations, and shifts in energy level) affect the course of the

recovery process during residential treatment as well as the relapse rates after residential treatment.

Several TCs have introduced the use of antidepressants early in treatment to counter the dysphoria and mood swings of the detoxifying cocaine abuser toward reducing the likelihood of premature dropout. Other programs have instituted curriculum-based relapse prevention courses in the later stages of primary treatment or as part of aftercare programming to minimize slips or full-blown relapse. These efforts are viewed as additions to, rather than modifications of, the fundamental multidimensional TC approach to recovery. This approach addresses substance abuse as a "whole-person disorder" requiring a profound change in lifestyle and identity.

Females and Crack Abuse

The studies reported and the general literature point to an increase in female admissions (most of whom are cocaine/crack abusers) to TCs. This material has highlighted the special needs of females in long-term residential treatment. Modifications of TC programming have centered on the issues of primary health care for females in general and child care and parenting for addicted mothers in particular. Some of these efforts are discussed in a recent review of studies of females in TCs (De Leon and Jainchill 1991). Additionally, some outpatient models have been launched for crack-addicted mothers who cannot or will not enter residential treatment. These are modified TC models implemented as ambulatory or day treatment programs affiliated with community-based TCs or with urban hospitals (Galanter et al. 1992).

Staffing and Training

TCs are currently serving an influx of cocaine abusers with a wide range of social and psychological problems that appear to be even more severe than those of previous generations, The general modifications needed to address the needs of these clients require altering the TC staff composition to include more mental health, medical, and educational professionals to complement the nontraditional recovered professionals. Moreover, staff training efforts need to be considerably expanded to effectively integrate the theory and methods of the TC with mental health practices. The challenge of modification is to retain the self-help perspective and effective elements of the TC.

CONCLUSION

In the TC perspective, recovery refers to rehabilitation, returning individuals back to a drug-free, socially acceptable lifestyle that was rejected or lost. For many others, it refers to habilitation, developing a positive drug-free

lifestyle that has never been known or acquired (De Leon and Rosenthal 1989). The research reviewed on cocaine admissions confirms the common clinical observations in TCs that the clients during the 1980s displayed more psychological difficulties than in previous generations. In addition to alcohol and other drug abuse, problems arising from developmental gaps in intellectual functioning, marketable skills, and social learning emphasize the multidimensional needs of these clients. In this regard, the long-term residential TC remains the main treatment modality charged with habilitating increasing numbers of substance abusers, regardless of their primary drug.

NOTES

1. A report currently in preparation presents findings on the prevalence and patterns of multiple nondrug diagnoses (e.g., antisocial personality and depression). It also provides some discussion of comparisons with results from other modalities. For example, the prevalence of posttraumatic stress disorder in this large TC sample appears to be less than that reported in some non-TC studies.

2. The clinical indicator study was based on the treatment program's admission files, which differ from the research files. The former did not code separately for crack abuse. The latter did contain suicide-crack data, but not information on violent behavior.

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Community Outreach for Injection Drug Users and the Need for Cocaine Treatment

Clyde B. McCoy, James E. Rivers, and Dale D. Chitwood

INTRODUCTION

It is now widely recognized that substance abusers are not a homogeneous group; there are subpopulations that are akin to subcultures, with self-acknowledged membership. In addition, researchers and planners construct subcategories of substance abusers for analytic purposes. Among these is the often-discussed dichotomy that contrasts drug abusers "on the street" to those identified by institutional screens. This report examines two such samples: injection drug users (IDUs) in treatment in the Miami area and street IDUs enrolled in the Miami National AIDS Demonstration Research (NADR) Program. The data are analyzed with particular attention to the cocaine use of these IDUs and the implications of these data for treatment for cocaine abuse problems.

THE STUDY GROUPS

Treatment Study Sample

Between June 1987 and August 1988, 604 IDUs from treatment programs in Dade County, FL, were enrolled in a longitudinal study to determine human immunodeficiency virus-1 (HIV-1) serostatus and associated risk behaviors. The majority (n=366) of treatment study subjects were in methadone maintenance programs. All subjects had used a drug or drugs intravenously at some time in approximately the decade prior to the interview (i.e., since January 1, 1978). All subjects participated on a voluntary basis, gave informed consent, were tested for HIV-1 serostatus, and received pretest and post-test counseling. As part of a structured interview, all participants answered questions concerning present and past drug use.

Subjects were followed at 6-month intervals after the baseline interview. At each followup, subjects were questioned concerning drug use in the 6-month period since the last interview. This report examines the drug use,

particularly cocaine use, of 490 IDUs recruited from treatment facilities who completed both the 6-month and 12-month followups. (Of all original subjects, 102 had completed either none or only one of the followup questionnaires, and 12 of the original panel were deceased at the time of the 12-month followup.)

Outreach Study Sample

The National Institute on Drug Abuse, recognizing the critical need to address the high-risk population of IDUs not enrolled in a treatment program, initiated a major intervention effort targeting this group. The resulting NADR Program, inaugurated at 63 sites throughout the United States and in Puerto Rico, focuses on IDUs not in treatment and sex partners of IDUs. This coordinated network of research projects in high-prevalence areas is evaluating prevention and intervention programs designed to encourage and assist these individuals to change behaviors that place them at risk for HIV infection.

The Miami study site was among the first five locations in the United States to receive NADR funds, The University of Miami research team, with more than 15 years of experience in research involving street IDUs, commenced recruitment and interviewing of study subjects in March 1988.

IDUs who had injected drugs during the preceding 6 months and sex partners of IDUs were recruited from street settings by indigenous outreach workers. After an initial pretest counseling session during which informed consent was given, each individual received a blood test to determine baseline serostatus with regard to HIV antibodies. A standardized NADR questionnaire was then administered by trained interviewers to obtain information on drug use, needle sharing, needle cleaning, and sexual practices as well as demographic characteristics, health status, acquired immunodeficiency syndrome (AIDS) knowledge, and followup locator information.

Study subjects were randomly assigned to either a standard or an enhanced intervention (figure 1). The enhanced intervention provided both intensive individual and group counseling (three sessions) as well as training in condom use and needle-cleaning procedures as further instrumental skills that could prevent HIV infection. The standard intervention was a single counseling session. Study subjects were reinterviewed and seronegatives retested at 6-month intervals to assess the effectiveness of the interventions in modifying high-risk drug use, needle use, and unsafe sexual behavior.

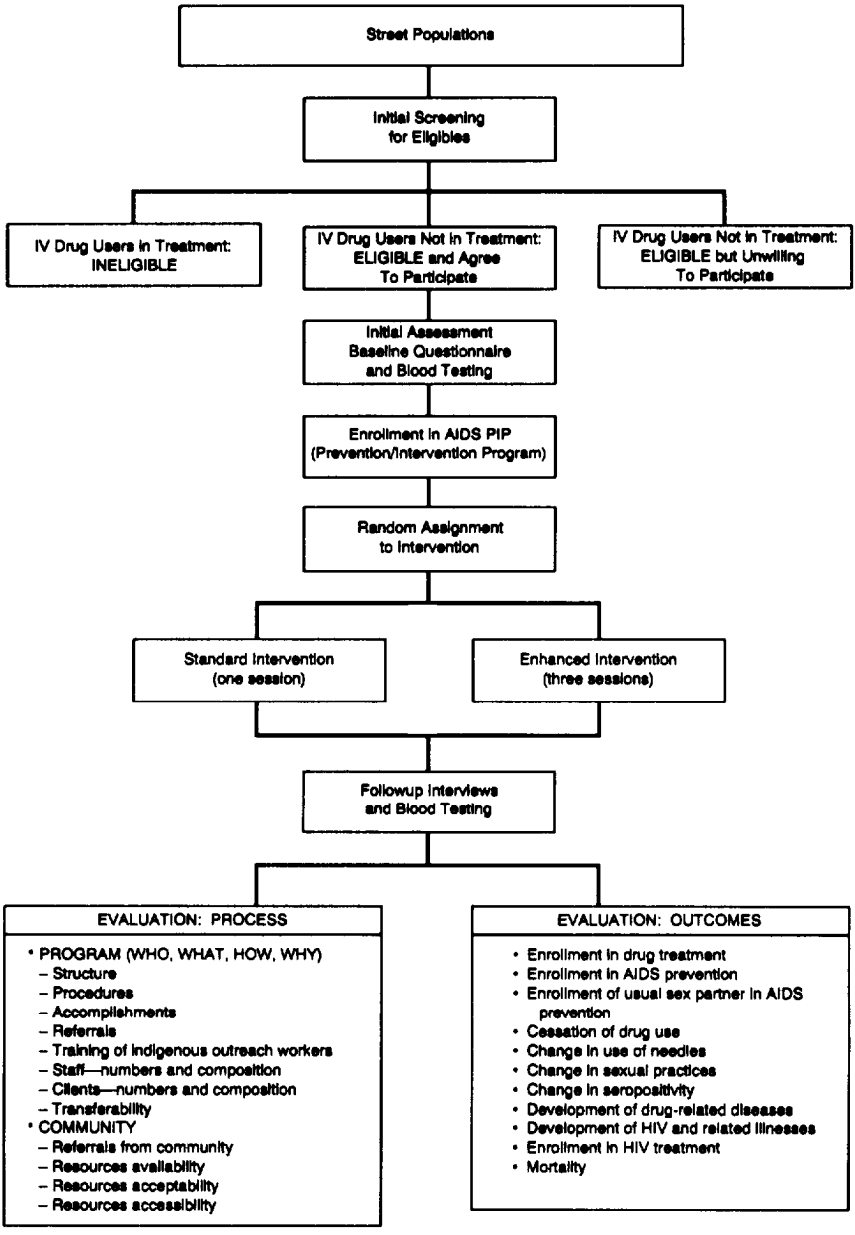

FIGURE 1. *Study design*

KEY: IV=intravenous
SOURCE: Chitwood and McCoy 1990

RESULTS

Demographic characteristics from the 6-month followup of the two study groups are presented in table 1. As shown, the sample of IDUs from treatment was less predominantly male and black (more likely to be white or Hispanic), more likely to consist of high school graduates or individuals having postsecondary educational experiences, and more likely to be employed than the sample of street IDUs. Although not shown in the tables, about 16.5 percent of the treatment IDUs were found to be HIV positive at the 6-month followup compared with nearly double that percentage for the street IDUs. There was fairly close correspondence in the employment status and age distribution between the two samples (although the street sample was somewhat more likely to be 35 or older). It is possible that the racial and ethnic differences between these two samples are a reflection of differential demand for treatment by IDUs, differential ability to afford treatment fees, and the particular locations and target populations of local methadone maintenance clinics, the major source of treatment IDUs in this sample.

TABLE 1. *A comparison of demographic characteristics of IDUs from treatment and outreach groups at 6-month followup (percent)**

Characteristic	Treatment Group (n=599)	Outreach Group (n=722)
Age 30 and older	79.5	76.5
Gender		
Male	65.4	78.3
Race/ethnicity		
Non-Hispanic black	21.2	75.6
Hispanic	13.5	6.8
Non-Hispanic white	63.6	16.8
Other	1.5	0.8
Education		
High school graduate or higher	77.6	51.9
Currently employed	63.4	51.8

*Differences between the treatment group and the street group are significant at p<.01 level for all variables except "Age."

SOURCE: Chitwood and McCoy 1990

The frequency and methods of cocaine and other drug use of the two samples prior to baseline are presented in table 2. Use by the treatment sample was collected for the year prior to baseline, and use by the outreach sample is for the d-month period preceding baseline interview. Table 2 shows that higher percentages of subjects in the street IDU sample than in the treatment IDU sample were cocaine users during their

TABLE 2. *Frequency of drug use by IDUs in treatment and on the street (percent)*

Drug/Frequency	Treatment Group (n=599)	Outreach Group (n=722)
Noninjected drugs		
Alcohol		
Never	20.9	9.1
Less than daily	51.8	42.2
Daily or more	27.4	48.6
Crack cocaine		
Never	56.6	23.5
Less than daily	23.2	39.2
Daily or more	20.2	37.3
Cocaine hydrochloride		
Never	70.3	39.9
Less than daily	25.7	40.4
Daily or more	4.0	19.7
Injected drugs		
Cocaine		
Never	59.8	10.0
Less than daily	29.5	56.4
Daily or more	10.7	33.7
Heroin		
Never	47.9	38.0
Less than daily	36.6	40.6
Daily or more	15.5	21.5
Cocaine and heroin (Speedball)		
Never	67.9	39.9
Less than daily	22.0	35.3
Daily or more	10.0	24.6

respective baseline periods and that street IDUs were more frequent users of noninjected drugs such as alcohol, crack, and cocaine hydrochloride. Cocaine injection was much more common among the street IDU sample than among the treatment IDU sample; within the street sample, cocaine injection was more prevalent than heroin injection. During the baseline period, 90 percent of the street sample had injected cocaine; 62 percent had injected heroin; and 60 percent had injected both in combination (i.e., speedball).

The demographic information on the cocaine-using subsamples from the IDU street outreach and treatment samples is presented in table 3. Similar to the data for the entire samples shown in table 1, the subsample of cocaine users in the IDU treatment sample shown in table 3 was less predominantly male,

TABLE 3. *Demographic information (percent) of cocaine users*

Characteristic	Treatment Sample (n=270)	Outreach Sample (n=237)
Gender		
Male	63.7	81.4
Female	36.3	18.6
Ethnicity		
White	50.5	12.7
Black	25.6	82.7
Hispanic	14.4	4.2
Other	1.5	0.4
Age		
24 or younger	7.4	5.9
25-29	16.7	19.4
30-34	35.9	26.2
35 or older	40.0	46.5
Education		
Less than high school	23.7	34.6
High school graduate	40.0	59.9
Higher than high school	36.3	5.5
Employment		
Employed	57.4	55.7
Unemployed	42.6	44.3

less predominantly black (more likely to be white or Hispanic), and more likely to have postsecondary educational experience than the sample of cocaine users in the IDU street sample. There was fairly close correspondence in the employment status and age distribution between the two samples (although the street sample was somewhat more likely to be 35 or older).

The frequency of cocaine use by route of ingestion prior to baseline interview is described in table 4 for each study subsample. The IDU outreach cocaine-using subsample showed a higher percentage using daily or multiple times per week for all forms of cocaine than did those IDU cocaine users in the treatment sample.

TABLE 4. *Frequency of cocaine use by route of ingestion: Baseline (percent)*

Drug/Frequency	Treatment Sample* (n=270)	Outreach Sample† (n=237)
Crack cocaine		
Had not used	50.4	26.6
Less than weekly	1.9	13.5
Less than daily, more than weekly	16.7	21.1
Daily or more	31.1	38.8
Snorted cocaine		
Had not used	78.5	43.0
Less than weekly	1.5	18.6
Less than daily, more than weekly	14.8	19.0
Daily or more	5.2	19.4
IV cocaine only		
Had not used	63.0	10.1
Less than weekly	4.1	24.5
Less than daily, more than weekly	17.0	31.6
Daily or more	15.9	33.8
Speedball		
Had not used	58.5	44.3
Less than weekly	14.4	19.0
Less than daily, more than weekly	10.7	18.1
Daily or more	16.3	18.6

*Year prior to baseline
†6 months prior to baseline
KEY: IV=intravenous

The use of cocaine by route of ingestion for the 6 months prior to baseline and the following 6 to 12 months for participants in the outreach study is described in table 5. Decreased use (i.e., fewer using daily or multiple times per week) of cocaine by each route is shown for each of the two followup periods.

The same information for the cocaine-using IDU treatment subsample is displayed in table 6, except the baseline measure describes use for the year prior to entry into the study. As with the outreach group, decreased frequency of use is seen in each followup period for each ingestion route, but the declines were greater among the treatment group.

TABLE 5. *Frequency of cocaine use by route of ingestion at baseline, 6 months, and 12 months: Outreach sample (percent) (n=237)*

Drug/Frequency	Baseline	6 Months	12 Months
Crack cocaine			
Had not used	26.6	32.9	40.5
Less than weekly	13.5	14.3	12.2
Less than daily, more than weekly	21.1	24.1	21.9
Daily or more	38.8	28.7	25.3
Snorted cocaine			
Had not used	43.0	55.7	67.1
Less than weekly	18.6	18.6	13.1
Less than daily, more than weekly	19.0	13.1	13.5
Daily or more	19.4	12.7	6.3
IV cocaine only			
Had not used	10.1	41.4	55.7
Less than weekly	24.5	23.2	16.5
Less than daily, more than weekly	31.6	19.8	16.9
Daily or more	33.8	15.6	10.9
Speedball			
Had not used	58.5	62.0	69.2
Less than weekly	14.4	14.8	10.5
Less than daily, more than weekly	10.7	9.3	11.8
Daily or more	16.3	13.9	8.4

TABLE 6. *Frequency of* cocaine *use by route of ingestion at baseline, 6 months, and 12 months: Treatment sample (percent) (n=270)*

Drug/Frequency	Baseline	6 Months	12 Months
Crack cocaine			
Had not used	50.4	54.8	63.7
Less than weekly	1.9	18.9	9.6
Less than daily, more than weekly	16.7	8.1	12.2
Daily or more	31.1	18.1	14.4
Snorted cocaine			
Had not used	78.5	82.2	80.0
Less than weekly	1.5	9.3	11.9
Less than daily, more than weekly	14.8	8.7	4.8
Daily or more	5.2	1.9	3.3
IV cocaine only			
Had not used	63.0	74.4	78.9
Less than weekly	4.1	15.2	11.1
Less than daily, more than weekly	17.0	4.4	5.6
Daily or more	15.9	5.9	4.4
Speedball			
Had not used	58.5	84.4	88.5
Less than weekly	14.4	3.0	1.5
Less than daily, more than weekly	10.7	8.1	5.9
Daily or more	16.3	4.4	4.1

The frequency of cocaine use for the year prior to baseline and 6 to 12 months following baseline for the 366 treatment subjects enrolled in methadone maintenance clinics at the time of entry into the study is described in table 7. A considerable number of methadone maintenance patients continued to use cocaine in one form or another. The largest decrease was in the use of speedball, the most common form; crack cocaine showed no reduction.

TABLE 7. *Frequency of cocaine use by route of ingestion: Clients of methadone maintenance programs: Treatment sample (percent) (n=366)*

Drug/Frequency	Baseline	6 Months	12 Months
Crack cocaine			
Had not used	77.3	67.8	70.2
Less than weekly	4.4	14.5	11.5
Less than daily, more than weekly	8.2	7.4	9.0
Daily or more	10.1	10.4	9.3
Snorted cocaine			
Had not used	83.6	82.0	83.1
Less than weekly	6.6	10.9	10.4
Less than daily, more than weekly	7.4	4.9	4.1
Daily or more	2.5	2.2	2.5
IV cocaine only			
Had not used	71.3	79.2	83.6
Less than weekly	9.6	12.3	8.2
Less than daily, more than weekly	10.1	3.8	3.0
Daily or more	9.0	4.6	5.2
Speedball			
Had not used	69.9	88.5	90.4
Less than weekly	14.5	2.2	1.6
Less than daily, more than weekly	6.5	6.0	5.2
Daily or more	9.1	3.3	2.7

The percentages of subjects who were in drug treatment during the 6 months after baseline and the following 6 to 12 months are shown in table 8. Eighty-nine percent of the outreach sample were not in treatment during the first 6 months of followup, and 89.4 percent had no treatment in the following 6 months. The treatment sample, as would be expected, had considerably more subjects in treatment during both followup periods. However, by the end of 1 year, 47.4 percent had received no treatment in the last 6 months of that year.

TABLE 8. *Months in drug treatment (percent)*

Time in Treatment	Baseline to 6 Months	6 Months to 12 Months
Outreach sample		
No treatment	89.0	89.4
1 month	6.8	6.4
2 months	1.3	1.7
3 months	0.8	1.3
4 months	1.3	0.9
5 months	0.0	0.0
6 months	0.8	0.4
Treatment sample		
No treatment	6.3	47.4
1 month	25.9	5.6
2 months	4.8	5.9
3 months	6.7	2.6
4 months	3.3	4.1
5 months	20.4	10.4
6 months	32.6	24.1

The numbers of cocaine users from each study who had increased and decreased cocaine use during the two followup periods are shown in table 9. More individuals decreased cocaine use in each ingestion category than increased use during each followup period.

DISCUSSION

IV drug use has been identified as a major risk factor in the transmission of HIV through sharing of needles. During the past 2 years, more than 1,300 IDUs (including the sample of 722 reported in this chapter) have been recruited from the street population into the AIDS risk reduction outreach program conducted by the University of Miami. Sixty percent of these participants reported having received *no* drug abuse treatment services at any point during the 5-year period preceding the enrollment interview.

Significant proportions of this street outreach IDU sample have given positive signals that they are candidates for drug abuse treatment: 40 percent had previously enrolled in treatment; all agreed to enter the University of Miami risk reduction program; and significant percentages

TABLE 9. Changes *in cocaine use: Numbers of cocaine users*

	Baseline to 6 Months		6 Months to 12 Months	
Sample Drug Use	Decreased	Increased	Decreased	Increased
Outreach sample (n=237)				
Crack cocaine	73	47	61	41
Snorted cocaine	54	34	65	36
Injected cocaine	124	19	73	38
Speedball	76	26	58	25
Treatment sample (n=270)				
Crack cocaine	93	50	56	41
Snorted cocaine	52	26	28	41
Injected cocaine	81	30	40	29
Speedball	48	15	26	18

of the sample either had unsuccessfully sought or actually gained admission to treatment programs. At the 6-month followup reinterview, approximately 14 percent of these outreach clients indicated that they had unsuccessfully sought treatment admission since this initial interview. Another 11 percent were successful in gaining admission to treatment in the 6-month period following enrollment in the program, including 18 individuals admitted from waiting lists.

It is reasonable to expect that the percentages of participants enrolled in these community outreach efforts who seek, enter, and complete substance abuse treatment can be increased by adding more placement staff members (and perhaps relapse prevention personnel). Anecdotal support for this thesis comes from those participants in the Miami program who have entered and stayed in treatment and who report that they are there because “someone cared.”

As shown above, a documented pool of IDUs are eligible for treatment and willing to enter. However, as is often the case, many have limited financial resources to pay for treatment services. The Federal Government recognized IDUs as a priority treatment target population until recently, setting aside a percentage of block grant funds for their treatment. Nevertheless, a sizable number of participants in the Miami community outreach project who sought treatment either were placed on a waiting list or report that they were refused treatment admission.

Historically, IDUs have been associated mainly with heroin use, and the treatment for heroin-using IDUs has most often been methadone maintenance. These programs have admission criteria based on documented length of use, current use, etc. But the treatment IDUs in the Miami study shoot cocaine as their primary drug. In addition, there are some *former* IDUs who continue to use non-IV drugs, primarily cocaine. They are still addicted and tend to engage in unsafe sexual practices, thus maintaining the risk of contracting or transmitting the AIDS virus.

Ideally, a protocol should be developed, implemented, and evaluated that would include a thorough client services needs assessment; a "readiness for treatment" assessment; and referral and active assistance with enrollment, case management, treatment retention support, and followup interviews and measures. Minimally, funding for treatment services dedicated to HIV high-risk drug abusers of the type recruited into the Miami AIDS risk reduction programs is needed.

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Relapse to Cocaine Use: Conceptual Issues

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INTRODUCTION

Relapse to alcohol and other drug use is of paramount theoretical and practical importance. Assembled research findings and clinical experience indicate that many users who cease drug use eventually relapse, frequently after only limited periods of abstinence. To date, experience with cocaine users is no different; however, in contrast to the accumulation of data about recurrence of use in alcoholics, cigarette smokers, and opiate users, information on cocaine users is minimal. For this reason the authors have not attempted to present a comprehensive review of extant cocaine relapse studies. Such a review would be premature and yield few conclusions. However, it is timely to undertake a conceptual examination of relapse to cocaine use, with the hope that this effort will assist in establishing parameters for future empirical and theoretical work. Thus, this chapter examines definitional issues in relapse to cocaine use, background factors that have been linked to cocaine relapse, and promising theoretical variables.

WHAT IS RELAPSE?

Generally, relapse denotes a resumption of drug use after a period of abstinence. Defining relapse in cocaine users is complex because many compulsive users of cocaine engage in binge use and other styles of periodic consumption. Short intervals of abstinence are the rule for these intermittent users. How, then, is relapse to be distinguished from a pattern of periodic use? Several clinical investigators have tried to tackle this problem. Rawson and colleagues (1990) assert that the term should be restricted to a resumption of cocaine use that occurs after an extended period of abstinence, usually a month or more. Washton and Stone-Washton (1990) suggest an even longer period of 3 months. Although these definitions may be useful clinically, they are problematic in research because occasions of cocaine use frequently occur well before several months of abstinence have been achieved. For example, in a relapse study we conducted with 104 cocaine patients who completed

treatment, 31 percent lapsed during the first month following discharge (Hall et al. 1991*a;* Havassy et al. 1991*a*). Independent of how these lapses are labeled or clinically interpreted, they merit serious study.

A related question is the duration and extent of resumed cocaine use that is necessary before the use is considered a relapse. A relapse criterion based on a specified number of consecutive days of use is appropriate for most other abused drugs because these drugs typically are used daily (e.g., Ossip-Klein et al. 1986). Because many cocaine users do not have a pattern of daily use, this approach to defining relapse is not meaningful. Only 21 percent of subjects in the authors' cocaine relapse study typically used cocaine on a daily basis (Hall et al. 1991*a*; Havassy et al. *1991a).*

To accommodate the variety of cocaine use patterns in our research, the first occasion of resumed use (or first lapse) was chosen as the primary outcome variable, regardless of the amount used on that occasion or whether there were subsequent occasions of use (Hall et al. 1991 a; Havassy et al. 1991 a). This criterion was appealing for several reasons. First, lapses frequently lead to continued use, possibly caused by priming effects (Jaffe 1989). Second, unlike relapse, the first lapse is conceptually unambiguous. Third, a lapse can be reliably and validly measured with frequent biochemical verification of self-reported abstinence.

These reasons notwithstanding, the first lapse is not an ideal outcome criterion. It provides only limited information, particularly if it is the only outcome variable assessed. Furthermore, it is not yet known whether a lapse inevitably predicts continued use: it is not even clear that a lapse is an unequivocally negative outcome. Some clinicians suggest that a lapse, if thoughtfully examined, can facilitate long-term abstinence by helping the person identify the circumstances and situations that led to cocaine use.

For research purposes, it would be advantageous to achieve a consensus about what constitutes relapse in cocaine users. This definition should address (1) the duration, or range of durations, of periods of abstinence that are necessary before relapse can be said to occur and (2) the extent of resumed use that constitutes a clinically significant outcome. Using the first lapse as the dependent variable has generated heuristic findings in our work (Hall et al. 1991*a;* Havassy et al. 1991*a).* If this approach continues to be productive, and if it is demonstrated that first lapses frequently result in continued use, we would recommend that the first lapse be included among the outcome variables to be studied.

BACKGROUND FACTORS ASSOCIATED WITH RELAPSE

Several patient background factors appear to affect treatment outcomes and, therefore, may influence relapse.

Route of Cocaine Administration

In our cocaine relapse study (Hall et al. 1991*a;* Havassy et al. 1991*a),* intranasal users (snorters) had significantly higher rates of continuous abstinence for two periods than a group primarily composed of freebase/crack smokers and intravenous users-during the first 12 weeks after treatment completion (83 vs. 29 percent) and at 8 months following treatment (57 vs. 19 percent). Washton and Stone-Washton (1990) cite similar findings: Intranasal users had higher abstinence rates than cocaine smokers. Miller and colleagues (1989, p. 390) have speculated that cocaine smoking may have the highest addiction potential because of "the faster and higher peak blood levels" attained.

Ethnicity

Data from our cocaine relapse study showed that African-American and Caucasian patients differed in route of administration and in treatment outcome. Sixty-three percent of Caucasian subjects used cocaine primarily intranasally, but only 2 percent of African-Americans did so. African-Americans tended to smoke crack (82 percent), whereas only a minority of Caucasians (17 percent) were primarily crack users. Furthermore, Caucasian subjects were at lower risk for relapse during the first 12 weeks and were more likely to be continuously abstinent at 8 months. The confounding of ethnicity with route of administration unfortunately prevents the disentangling of potential ethnicity effects from route effects in this sample. However, the data analysis suggested that only route of administration contributed unique variance to the prediction of treatment outcomes.

Gender

Data from Griffin and coworkers (1989) and our work suggest that, on average, one woman presents for cocaine treatment for, at minimum, every two to three men. Gender differences also are found in cocaine use patterns. For example, in the cocaine relapse study, route of administration differed by gender, with females more likely than males to use cocaine intranasally. Also, female patients in treatment had slightly higher abstinence rates than men, even when route of administration was statistically controlled.

Polysubstance Use

Abuse of other substances is common in cocaine treatment patients. "Almost invariably, cocaine abusers use other drugs to enhance the euphoriant properties of cocaine or to alleviate some of its dysphoric psychoactive effects" (Millman 1988, p. 27). The abused drug is usually alcohol. In an ongoing study of the efficiency of inpatient and outpatient treatment for cocaine dependence led by Havassy, psychoactive substance use disorders (as defined in the "Diagnostic and Statistical Manual of Mental Disorders, Third Edition, Revised" [DSM-III-R] [American Psychiatric Association 1987]) are assessed using the Diagnostic Interview Schedule (DIS-III-R) (Robins et al. 1981). Polysubstance dependence has been prevalent. Of the first 80 subjects meeting criteria for cocaine dependence, 59 percent met criteria for lifetime alcohol dependence and 58 percent for lifetime cannabis dependence. Thirty-eight percent were diagnosed as both alcohol- and cannabis-dependent; 41 percent were dependent on one but not the other. Miller and colleagues (1990) assessed three samples of cocaine-dependent patients and found slightly lower rates of cannabis dependence (42 to 51 percent) but higher rates of alcohol dependence (88 to 92 percent). Although the use of any abusable drug is believed to increase the risk of cocaine relapse, supporting data are lacking. If future data indicate that the use of other drugs precipitates relapse to cocaine, several processes may be responsible, including priming, disinhibition, and conditioned craving (Jaffe 1989; Pollack et al. 1989).

PSYCHOSOCIAL INFLUENCES ON ABSTINENCE AND RELAPSE

Distinct from the stable background factors just described, several psychosocial variables have emerged as potentially important in cocaine relapse. These variables may be responsive to intervention and often are the focus of treatment. Variables that currently offer the most promise for further investigation are having something to lose, commitment to absolute abstinence, social support, coping with drug-related cues, psychopathology, and positive moods/well-being.

Having Something To Lose

Relapse is believed to be less likely if something of great value could be lost if drug use is resumed. Potential losses include family and friends, jobs, health, reputation, and freedom. In support of this proposition, negative contingencies for resumption of cocaine use have been applied successfully in therapeutic settings. All cocaine users are not equally vulnerable to contingent losses, however. For those who have few resources or have "hit bottom," powerful negative contingencies may be difficult to identify (Kleber 1989; Rawson 1990).

The power of adverse contingencies to prevent relapse in cocaine patients was first addressed in research by Anker and Crowley (1982). In this study, patients were asked to enter into contracts stipulating severe consequences (e.g., notification of one's employer) in the event of relapse. Eighty-one percent of 32 patients agreeing to the contracts stayed in treatment and remained abstinent for 3 months or more. Despite several limitations, including a self-selection bias and possible lack of generalizability because of the mostly affluent, Caucasian sample, this study showed that contracts can be extremely effective with consenting patients. However, to succeed, contingencies must be selected that are "sufficiently potent to counteract the reinforcing properties of drugs or the conditioned reinforcing properties of drug-related stimuli" (Stitzer et al. 1983, p, 116).

Aversive-contingency contracting has been criticized for several reasons. Contracts are seen by some as unnecessarily coercive or punitive, particularly when used with voluntary patients. Furthermore, to be effective, contingencies must continue to be applied: Behavior change often decays when contingencies are no longer in force. Finally, some clinicians view lapses as expected events in early abstinence, possibly instructive to the patient, and, therefore, undeserving of punishment or withdrawal of reinforcers (Rawson 1990).

Positive contingencies for abstinence from cocaine use have received less attention than negative contingencies. Higgins and coworkers (1991) recently adapted the community reinforcement approach (CRA) (Azrin 1976; Azrin et al. 1982; Hunt and Azrin 1973), a technique initially developed for alcoholics, for use with cocaine users. The hallmark of CRA is the creation of an environment rich with positive and negative contingencies. Numerous reinforcers are provided by spouses, employers, and friends to reward abstinence. When drug use occurs, a time-out from this high-density reinforcement is instituted. Early results from Higgins and colleagues (1991) are encouraging, although future studies will need to clarify which of the many components of this approach account for the positive outcomes,

The possibility of using CRA with cocaine-using individuals who have few economic or social resources is intriguing. If part of the difficulty of motivating these patients is the scarcity of meaningful contingencies, then providing them with new reinforcers at the beginning of treatment might give clinicians added leverage in influencing their drug use. Developing new reinforcers entails helping the patient to acquire "positive gains interpersonally, vocationally, and economically" (Kleber 1989, p. 82).

Modest positive contingencies seem ineffective with cocaine users. For example, Magura and colleagues (1988) found that methadone "take-home" privileges contingent on decreased use of cocaine failed to alter methadone-

maintenance patients' use of the stimulant. This outcome was surprising because similar interventions have been successful in modifying other illicit drug use in this population (e.g., Stitzer et al. 1980). Perhaps methadone dose increases were not effective reinforcers for decreased use of cocaine. In addition, as suggested by Magura and colleagues (1988) a multiple-reinforcer approach might prove more powerful. Multiple reinforcers increase the general level of reinforcement (Cautela 1984) and also minimize the effects of "reward erosion," which is a decrease in how rewarding a stimulus is with repeated administrations over time.

Operant techniques such as contingency contracting and CRA are thought to be more useful in assisting the initiation of abstinence than in helping to maintain abstinence over time (Stitzer et al. 1983). if this is so, it may be because such approaches are extrinsically rather than intrinsically motivating. Extrinsic and intrinsic motivation refer to the origins of the desire or intent to engage in or to cease a particular behavior (Curry et al. 1990). Extrinsic motivators include external reinforcement and punishment. Common intrinsic motivators are good health, self-determination, and psychological congruence. in a recently published study of cigarette smokers, stronger intrinsic, relative to extrinsic, motivation was found to predict abstinence at 3 and 6 months after quitting (Curry et al. 1990). According to Curry and colleagues, extrinsic motivation "can be detrimental to sustained performance" (Curry et al. 1990, p. 315). Gawin and Ellinwood noted the superiority of intrinsic motivation in long-term abstinence from cocaine, and they recommended gradual reduction of "the external controls that were placed on the abuser during the initiation of abstinence, with the goal of facilitating the development of the abuser's internal controls . . ." (Gawin and Eliinwood 1988, p. 1177). If intrinsic motivators indeed are more important in later abstinence, then it would seem advisable to begin to identify these early in treatment.

The role of urine monitoring in contingency-management procedures with cocaine users is critical. The effectiveness of contingency strategies depends on the valid detection of cocaine use when it occurs. Failure to detect use results in the inappropriate application of contingencies and, thus, renders interventions ineffective. Because urine testing provides a valid indicator of drug use, it is strongly recommended as an adjunct to these methods.

Commitment to Absolute Abstinence

The rigorousness of abstinence goals chosen by drug patients at the end of treatment is correlated with later abstinence. Our work has shown that patients who report that they are committed to absolute (i.e., total and permanent) abstinence from their problem drug are more likely to remain abstinent than those who subscribe to a less stringent goal such as periods of abstinence with

occasional slips. Hall and coworkers (1990), in a study of relapse in alcoholics, cigarette smokers, and opiate users who had completed treatment, found that patients with a commitment to absolute abstinence were at lower risk for a lapse during the first 12 weeks posttreatment. Data from the authors' study of treated cocaine users (Hall et al. 1991*a)* indicated the same association. Because subjects from both studies were drawn from programs endorsing the 12-step model and strict abstinence, the results may not be generalizable to persons completing other types of treatment, especially programs that provide instruction in dealing with lapses.

Social Support

By "social support" we mean resources provided by other persons (Cohen and Syme 1985), a concept more inclusive than the administration of contingencies by social-network members. In considering drug use, social support may be either specific to abstinence or more general (i.e., not limited to drug use or to abstinence). Greater perceived emotional support, a type of general support in which subjects report being valued and accepted by one's intimates, predicted abstinence in the cocaine relapse study (Havassy et al. 1991*b).* In a study of relapse in alcoholics, cigarette smokers, and opiate users, we found that greater social integration (i.e., being socially involved with more people) at the end of treatment predicted a lower risk of relapse (Havassy et al. 1991*b).* in the cocaine relapse study, this finding was replicated for Caucasian subjects but not for African-Americans (Havassy et al. 1991*a).* The interaction of social integration with ethnicity suggests that the protective elements of social integration may differ for Caucasian and African-American cocaine users. Further work is required to develop hypotheses about the mechanisms by which social support influences maintenance of abstinence.

Clinical experience indicates that social support may be enhanced by family therapy, social-network therapy, and such self-help programs as Alcoholics Anonymous. Skills-training interventions (e.g., assertiveness training) that teach patients ways of eliciting additional support also may be useful. Focused interventions that teach a significant other to provide more support (e.g., spouse training) have not been promising when used with other populations such as cigarette smokers (Lichtenstein et al. 1986). The results of these focused interventions are disappointing, as studies have demonstrated consistently that abstinence and support covary. Support-enhancing interventions may need to target a wider universe of helpful behaviors as well as involve multiple network members. Interventions also might be enhanced by targeting cognitive processes that affect how enacted support is perceived (Lakey and Cassady 1990).

Coping With Drug-Related Cues

External and internal cocaine-related cues frequently are cited as relapse precipitants (e.g., O'Brien et al. 1988). External cues include the drug, drug paraphernalia, known cocaine users, places where cocaine has been used, and ready cash. Internal cues include moods or feeling states, such as boredom, performance anxiety, elation, and depression, as well as sexual arousal. Training in coping with these cues, whether by escape/avoidance, assertion, self-talk, or other means, is now incorporated into many treatment programs.

Clinicians have dealt with the problem of cues in a variety of ways. One has been to reduce or eliminate cue exposure temporarily through hospitalization or a stay in another restrictive setting. The long-term value of complete isolation from drug cues is uncertain because most patients ultimately must return to cue-laden environments. Alternatively, patients can be helped to respond more adaptively to drug cues. A major strategy for changing patients' responses is cue exposure treatment, which combines cue exposure with extinction and has been studied extensively by researchers at the University of Pennsylvania and the Philadelphia Veterans Affairs Medical Center (O'Brien et al. 1988, 1990). These investigators have demonstrated that conditioned responses to cocaine stimuli can be extinguished through repeated exposure in a safe laboratory environment. Preliminary data showed that extinction trials increased treatment retention and the number of in-treatment drug-free weeks (O'Brien et al. 1990).

Nevertheless, the value of cue exposure in preventing posttreatment relapse in cocaine users appears limited, at least when the technique is used alone. Findings have not been encouraging-nor has cue exposure been shown to be effective with other drug populations. An article by Drummond and colleagues (1990) concluded that cue exposure has not been shown to reduce drinking in alcoholics and, furthermore, that no demonstrated link has been found between conditioned responses to alcohol-related cues and relapse. According to Drummond and coworkers (1990), if cue exposure eventually is shown to be effective, it may be caused by the critical mediators such as enhanced self-efficacy and diminished positive outcome expectancies for drug effects rather than true extinction or habituation. Marlatt (1990) also points to the likely importance of these latter factors in cue-exposure treatment.

To enhance the value of cue exposure, researchers have recommended several strategies, which include using more realistic stimuli (e.g., actual cocaine), phasing out "safety signals" (i.e., the therapist and other reassuring cues that may be present in artificial laboratory situations), embedding exposure trials in the context of high-risk situations in the natural environment (in vivo), and combining cue exposure with coping skill training (Drummond et al. 1990; Marlatt 1990; O'Brien et al. 1990).

Psychopathology

Several studies have documented a high prevalence of mental disorders, particularly depression and various personality disorders, among cocaine users in treatment (e.g., Kleinman et al. 1990). Measures of psychopathology have included both psychiatric diagnosis and dimensional symptom scales. In the first author's current multisite cocaine treatment-efficacy study, the prevalence of DSM-III-R (American Psychiatric Association 1987) antisocial personality disorder in the first 80 subjects recruited was 49 percent. Posttraumatic stress disorder was also common (lifetime prevalence=27.5 percent), although there were pronounced site differences in prevalence. In contrast, in the cocaine relapse study, psychological symptom levels as measured by the SCL-90-R (Derogatis 1983) were fairly low. Mean scores on the nine primary symptom dimensions and the Global Severity Index were higher than those for the nonpatient normative cohort for the SCL-90-R but were lower than the scores for the psychiatric inpatient and outpatient normative groups. SCL-90-R data from another study of cocaine patients were comparable (Kleinman et al. 1990).

It is as yet unclear whether psychopathology (1) is present before cocaine initiation, (2) precipitates cocaine abuse, or (3) attenuates cocaine treatment effects. With respect to the third issue, preliminary analyses from the cocaine relapse study indicated no relationship between psychological symptoms and relapse. However, diagnoses were not obtained. Recent evidence in the area of smoking cessation (e.g., Glassman et al. 1990; Hall et al. 1991*b)* suggests that persons with a diagnosis of major depression are less successful in their efforts to stop smoking. Parallel findings have been reported for alcoholics and users of other abused substances (e.g., Hatsukami and Pickens 1982). If these data can be generalized, then untreated depression and other psychiatric disorders could limit treatment effectiveness and facilitate relapse in cocaine users as well.

Posltlve Moods/Well-Being

Research from several different perspectives points to the importance of variables labeled as subjective well-being (Diener 1984). These variables include positive moods, optimism, and life satisfaction, Note that well-being is not simply the "flip side" of general dysphoria, depression, or perceived stress; rather, positive and negative states are at least partially independent (Diener and Emmons 1986). Peele (1988) and Longabaugh and Lewis (1988) have emphasized the importance of well-being in abstaining from problem drinking: "Personal well-being is important because people are likely to hope that they will feel better about themselves and their lives after treatment; if this does not occur, a patient is more likely to be at risk for relapse" (Longabaugh and Lewis 1988, p. 172). Strack and colleagues (1987) showed that dispositional optimism in alcoholics predicted completion of a halfway house program.

Hail and coworkers (1990) found that higher posttreatment positive mood levels were marginally ($p<.06$) related to decreased relapse risk in a sample of alcoholics, cigarette smokers, and opiate users.

Subjective well-being may be especially important in cocaine users. One phase of the cocaine abstinence syndrome, which Rawson and associates (1990) have called "the wall," is characterized by anhedonia and anergia. This stage, specific to stimulant abuse (Gawin and Ellinwood 1988), is widely believed to heighten vulnerability to relapse. Data from the cocaine relapse study suggest that this hypothesis is correct. The absence of positive moods predicted relapse more reliably in cocaine users than in users of other drugs (Hall et al. 1991*a).*

There has been little work done pertaining to the enhancement of subjective well-being in drug users and specifically in cocaine users. if subjective well-being aids in prolonging abstinence, then ways of developing it in cocaine treatment patients should be explored. It may be possible to help patients develop a repertoire of behaviors and reinforcing activities that do not involve drug use and that can compete successfully with drug use behavior. "The two major positive reinforcers for many people that are effective over time involve developing close relations with significant others and having a rewarding vocational and/or educational position" (Kleber 1989, p. 91).

CONCLUSIONS: TREATMENT IMPLICATIONS FOR RELAPSE PREVENTION

With some exceptions, much of the extant research on cocaine relapse may have limited generalizability because of design limitations and because middle and upper-middle socioeconomic status (SES) Caucasians were overrepresented in the samples (Means et al. 1989). These SES groups were the first to encounter difficulties with cocaine in this most recent cocaine "epidemic." However, with the advent of crack, addicts are increasingly lower SES persons. Because of these limitations, and the resulting necessity of extrapolating from research with other drug groups, the following recommendations for cocaine relapse prevention are offered with caution.

1. Identification and provision of positive and negative reinforcers and penalties that can compete with the reinforcing effects of cocaine appear to be central. Early in treatment, reinforcers should be under the control of treatment personnel and designated significant others as much as possible, with urine monitoring used to confirm abstinence. The use of reinforcers and urine monitoring should be coupled with the removal or amelioration of conditions that make cocaine use attractive and with the provision of coping skills for circumstances that are more intractable. Lower SES patients will need initial assistance in training for, finding, and keeping meaningful jobs; arranging child care; and accessing affordable medical care. Similarly,

Goldstein and Kalant (1990, p. 1518) state that members of groups with exceptionally severe drug problems who are also socially and economically disadvantaged need "opportunities for economic advancement within a licit social framework and for enhanced self-respect through reinforcement of traditional social and cultural values." As longer periods of abstinence are achieved, intrinsic motivators should be identified and emphasized. Reinforcers for middle and upper class persons usually can be less oriented to survival needs and more toward psychological comfort and growth.

2. Patients should be encouraged to adopt a goal of absolute abstinence from cocaine. This goal may be difficult for patients to accept at the beginning of treatment. Over time, however, patients appear more amenable to adopting stringent goals,

3. Multiple potential sources of familial and nonfamilial social support should be identified, and the patient's perceptions of the availability and usefulness of that support should be enhanced. The most effective sources of support may differ by racial and ethnic groups and by gender.

4. Skills for coping with drug-related cues should be taught in meaningful contexts that contain external cues or evoke strong internal cues for drug use. The natural environment should be used frequently for training.

5. Thorough evaluation for psychiatric disorders may be advisable. Currently depressed patients, those who have been depressed in the past, and those with other psychiatric disorders may be at higher risk for relapse. Concomitant treatment for cocaine dependence and mental disorders may increase the likelihood of continued abstinence.

6. Ways of enhancing a sense of well-being should be identified for each patient. Improved well-being may be targeted directly through activities like exercise and also may follow as a byproduct of previously discussed interventions such as increasing social support. Subjective well-being achieved without the aid of cocaine or other drugs may be thought of as a kind of "final common pathway" through which successful interventions exert their positive effects.

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Pretreatment Natural History of Cocaine Addiction: Preliminary 1 -Year Followup Results

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INTRODUCTION

Treatment for cocaine dependence has increased dramatically in the past decade throughout the United States for individuals of all characteristics and backgrounds. The effectiveness of different cocaine treatment efforts is under study, but only minimal results are available as yet. Generally, information on the effectiveness of cocaine treatment has come primarily from clinical experience and from surveys of higher socioeconomic populations. The University of California, Los Angeles, Cocaine Treatment Evaluation study was designed to evaluate the effectiveness of three common treatment approaches for cocaine addiction and to study the natural history of cocaine dependence (i.e., the characteristics of users and their patterns and progression of use). It was also the authors' purpose to develop prognostic indicators based on the demographic, personality, and diagnostic characteristics of users.

Although a randomized treatment assignment was planned for the experimental design, two-thirds of patients rejected such assignment, Thus, a mixed design evolved in which patients accepting random assignment were placed in an inpatient ward or outpatient services or were referred to community self-help organizations (e.g., Cocaine Anonymous). In addition, other subjects were randomly selected from patients with an expressed preference for either inpatient or outpatient treatment. Baseline assessments were performed on all subjects at acceptance into the research protocol. Outcome data collection was completed at 1 -year followup in December 1990, and a 2-year followup began in October 1990 and was completed in December 1991,

A natural history approach was used to examine the psychological, environmental, and sociocultural variables that support the maintenance of addiction over time (Winick 1962). In addition to conventional

sociodemographic, personality, and other background data, a complete drug history with emphasis on cocaine use was obtained for each subject following a strategy developed by one of the authors and his associates (McGlothlin et al. 1977; Anglin and McGlothlin 1984).

The natural history interview, adapted in part from a schedule developed by Nurco and colleagues (1975) has been described in detail elsewhere (Anglin and McGlothlin 1984). Briefly, a schematic time chart is prepared before the interview showing all known arrests and intervals of incarceration, legal supervision, and treatment. With subject cooperation, the interviewer then establishes the date of first cocaine use (FCU) on the time chart and proceeds chronologically from 12 months before FCU to the time of the interview. Data are then collected on the use of cocaine, alcohol, and other drugs: employment: criminal behavior; and other variables for that period. Subsequent periods are demarcated by significant life changes, such as changes in level of cocaine use or changes in the respondent's legal or treatment status. The interviewer proceeds to each successive homogeneous period, repeating the systematic process of data collection for each period until reaching the interview date.

In this initial report, natural history results are reported for the period between FCU and treatment entry (TE) for 285 cocaine-dependent males. In addition, 1 -year followup results are reported for the 98 subjects whose first-year followup interviews have been completed and data entered.

CHARACTERISTICS OF THE SAMPLE

Data were collected from cocaine-dependent male veterans who applied for treatment at the West Los Angeles Medical Center between April 1988 and September 1989. All requested treatment voluntarily. Patients with a history of psychiatric treatment were selected out by the hospital's triage system. For the majority of selected subjects (approximately 95 percent), this was a first experience seeking help from a treatment agency for their cocaine problem.

The mean age at the time of interview for these male veterans was 36.7 years; 32 percent were 40 years of age or older, and 11 percent were younger than 30. Sixty-six percent of the subjects were black: 26 percent, white: and 7 percent, Hispanic. The patients as a group had an educational background higher than the level observed in the general male population of veterans: 44 percent had postsecondary schooling, 42 percent had completed high school, and only 14 percent reported less than a 12th grade education. Because of disruptive circumstances associated with treatment application, a high proportion of subjects were unemployed at the time of the intake interview (43 percent), and 13 percent

reported being homeless. Sixty-seven percent had been married at least once, and 65 percent had fathered children. Eighty-six percent reported being arrested at least once in their lives. The mean age of first arrest was 20 years, but most first arrests (41 percent) occurred before age 18.

Drug use history was extensive for this group: 98 percent had used marijuana or hashish (82 percent regularly); 69 percent, amphetamines (32 percent regularly): 67 percent, hallucinogenics (21 percent regularly); 65 percent, phencyclidine (PCP) (17 percent regularly): 58 percent, downers (21 percent regularly); 53 percent, crystal methamphetamine (18 percent regularly); 40 percent, heroin (16 percent regularly): 36 percent, tranquilizers 8 percent regularly): and 26 percent, glue (7 percent regularly). Mean age of first drug use was younger than 18 for marijuana and glue; between 18 and 20 for hallucinogenics, amphetamines, and downers; and between 21 and 25 for crystal methamphetamine, heroin, tranquilizers, and PCP.

A high lifetime rate of criminal behaviors was reported, including early deviant behaviors (e.g., 58 percent had been expelled from school). The proportion of subjects reporting stealing and/or shoplifting was high (66 percent), and involvement with the illegal economy (buying or fencing stolen goods) was high as well (48 percent). There was a small increase in the proportion of subjects involved with stolen goods after initiating cocaine use. Involvement with force and weapons was common (49 percent), whereas involvement with threatened violence against persons was less frequent (29 percent). Most of those activities occurred before the individuals had used cocaine.

A high degree of involvement in the drug subculture was also reported: 65 percent of the sample had sold illicit drugs, and 47 percent carried drugs for others. Although these activities often occurred before the use of cocaine, there was an increase in these activities after the use of cocaine (of those who sold or carried drugs, 46 and 41 percent, respectively, did so only after using cocaine).

HISTORY OF COCAINE USE

The mean age of FCU was 24. For 76 percent of the sample, FCU was influenced by a friend or acquaintance; for 8 percent, by a parent or other relative (excluding siblings); for 4 percent, by a girlfriend or wife: for 4 percent, by a sibling: and for 8 percent, by either a dealer or prostitute or other. In 40 percent of the cases, the person influencing the subject's first cocaine use was cocaine dependent. The reasons reported for FCU were curiosity, 36 percent: social reasons (at parties, for fun and celebration), 34 percent: psychological reasons (depression, loneliness anxiety), 15 percent: wanting to get high, 7 percent; reasons related to sex (sexual partner using, to have

better sex, and to get sexual partners), 3 percent; and easy availability of street cocaine, 6 percent. The route of first administration utilized was intranasal (IN) for 77 percent, smoking crack for 11 percent, intravenous (IV) for 4 percent, freebasing for 3 percent, and other for 5 percent ("primo," smoking cocaine combined with marijuana; "rails," smoking cocaine with tobacco; or oral). In 84 percent of the cases, the cocaine consumed was given to the subjects, and 15 percent of the sample bought it themselves.

PRETREATMENT NATURAL HISTORY

Table 1 summarizes the pretreatment history of all 285 subjects and postdischarge results for 98 subjects. This data overview is presented as column 1, for the 1 year before FCU (baseline behaviors): column 2, the full period from FCU to TE; column 3, from first severe use (FSU) to the halfway mark (midpoint) before TE; and column 4, from midpoint to TE. Column 5 summarizes behavior for the full followup year after treatment discharge (TD); column 6 shows the 3-month period before followup interview: column 7, the initial month after TD; and column 8, the initial 3-month period after TD.

The average total time in the pretreatment career, from FCU to TE, was 11.5 years (standard deviation [SD]=5.9 years). As table 1 shows, at some point during their pretreatment career, 278 subjects (98 percent) used cocaine at a severe level, and the mean percent nonincarcerated time using at this level was 45 percent. A high proportion of the subjects (86 percent) were abstinent at some point in this period, and the mean percent time abstinent was 32 percent, whereas some subjects were never abstinent from FCU to TE. In other words, on the average, in the 11.5 years of the cocaine addiction career prior to treatment, subjects used cocaine, in the aggregate, at a severe level for approximately 4.5 years, at a mild level for a year and 8 months, and at a moderate level for more than 7 months and were abstinent for almost 5 years.

The average length of the period from FSU to TE was 83 months, and the average longest continuous period of severe use was 37 months. In table 1, this period has been subdivided (columns 3 and 4) into one period from FSU to the midway point before treatment and another period from midway to TE. As opposed to the full pretreatment period (FCU to TE), during the overall period from FSU to TE, the mean percent time using at a severe level across the full FSU to TE period increased to 70 percent, whereas the mean percent time of abstinence decreased to 18 percent.

TABLE 1. *Overview of pretreatment histoty and postdischarge results*

	Behavioral Patterns From FCU to TE (n=285)								Behavioral Patterns at 1-Year Followup (n=96)							
	1		2		3		4		5		6		7		8	
	1 Year Prior FCU		FCU to TE		FSU to Midpoint*		Midpoint to TE		TD to 1 Year After TD		3 Months Before 1-Year Followup		1 Month After TD		TD to 3 Months After TD	
	12 Months†		128 Months		42 Months		41 Months		11.6 Months		2.7 Months		1 Month		2.5 Months	
Behaviors	PP	MPT	PP	MPT	PP	MPT	PP	MPT	PP	MPT	PP	MPT	PP	MPT	PP	MPT
Cocaine use																
None			86	32	45	17	80	20	95	60	67	61	73	73	80	70
Mild			74	15	17	5	28	7	45	12	18	12	6	6	14	8
Moderate			47	8	13	4	23	6	22	7	14	10	2	2	6	4
Severe			98	45	100	73	96	67	42	22	20	17	19	19	28	18
Cocaine: route of administration																
IN			74	24	48	26	28	12	4	1	3	2	0	0	1	0
Crack			72	25	42	30	70	44	60	30	35	29	21	21	35	25
Freebase			38	10	25	14	29	14	7	3	3	2	4	4	3	3
Primo			11	3	8	4	4	2	1	0	0	0	0	0	0	0
IV			16	4	9	5	11	4	5	3	4	4	2	2	2	2
Other			14	2	8	3	8	3	2	1	1	1	0	0	0	0
Marijuana use																
Daily	40	38	60	25	42	26	30	15	2	1	2	2	1	1	1	1
Less than daily	36	33	70	28	42	25	43	19	25	9	6	6	5	4	19	13
Excessive alcohol drinking	54	53	76	51	65	52	60	43	42	21	14	14	20	16	27	23
Any narcotic use	5	4	19	4	12	5	10	4	7	3	2	2	3	2	6	4
Any amphetamine use	10	7	23	5	12	5	9	3	2	<1	0	0	0	0	1	1
No drug use (excluding cocaine)	22	21	85	38	55	39	80	57	95	84	90	90	93	91	82	79
Dealing	20	14	61	19	44	24	44	19	11	6	6	6	6	5	5	4
Criminal activities	6	3	35	5	16	6	23	8	6	2	0	0	1	1	1	1
Working	91	81	99	79	96	79	94	75	88	65	58	50	74	62	75	65
Relationships	40	36	82	43	65	43	64	41	38	28	30	27	25	25	32	29

KEY: PP=percent people; MPT=mean percent time

* The period from FSU to TE was divided into two periods because of its long length of 83 months and to track behavior changes as severe use progressed.

† Mean months in each period.

For the overall pretreatment career (FCU to TE), most of the subjects used more than one route of administration, the most popular being IN (74 percent) and smoking crack (72 percent). Freebasing was less prevalent (38 percent), and IV use (16 percent) was less common.

During the FSU to TE period, there was a shift in mode of administration from IN to crack. Whereas 42 percent used crack in the 3.5 years after FSU, 70 percent did so during the 3.5 (nonoverlapping) years before TE (midpoint to TE period). The mean percent time uslng crack increased as well, from 30 to 44 percent. Other routes of administration remained stable, with the exception of IN and primo, which decreased to one-half the earlier levels.

From FCU to TE, alcohol was heavily used: 76 percent of the sample drank alcohol excessively (at least 4 ounces per day) for 51 mean percent time during their pretreatment career. Marijuana was used for a mean percent time of 25 percent at a daily level and 28 percent at a less-than-daily level. Narcotics and amphetamines were used by about one-fourth of the sample but at a lower mean percent time than marijuana or alcohol (4 percent for narcotics and 5 percent for amphetamines). The mean percent time using marijuana both daily and less than daily, drinking alcohol excessively, and using narcotics and amphetamines progressively decreased during the period from FSU to TE, particularly during the 3.5 years before TE (midpoint to TE, column 4).

Although 61 percent reported dealing drugs at some point during FCU to TE, the mean percent time doing so was low (19 percent). The proportion of the sample reporting dealing decreased to 44 percent during the 3.5 years before TE (midpoint to TE, column 4), but the mean percent time dealing remained stable at 19 percent, suggesting that those dealing were doing so for longer periods. Income-generating illegal activities (property crimes) were reported by 35 percent from FCU to TE, but at a relatively low mean percent time of involvement (5 percent). For the full period, almost twice as many subjects (61 percent) reported dealing than those reporting property crime activities.

The proportion of subjects employed was high (99 percent) at 79 mean percent time during the entire pretreatment career and decreased only slightly in the period before TE (midpoint to TE, column 4) to 94 percent of the sample at 75 mean percent time as subjects engaged in more severe cocaine use in the 3.5 years before TE. However, although not shown in table 1, the period just prior to TE was one of disruption, and 43 percent were unemployed at admission, Eighty-two percent had been involved in marriage and/or common law relationships during FCU to TE at 43 mean percent time. As subjects approached TE, the proportion of

those so involved decreased to 64 percent, but the mean percent time involved did not change significantly.

Overall, this sample represented a highly functional population, able to maintain employment and relationships durlng most of their pretreatment cocaine-using career.

POSTTREATMENT PERIOD

Although followup data are still being processed, columns 4 and 5 in table 1 enable a comparison of behavioral patterns, using 98 completed followup interviews, during the midpoint-to-TE period and during the 12 months after TD period, 1 month after the beginning of the index treatment. The percentage of the sample using cocaine at a severe level after treatment decreased to 42 percent. The mean percent time period of abstinence for cocaine increased from 20 to 60 percent, whereas the mean percent time of severe use decreased from 87 to 22 percent. Route of administration, which was multiple in the period before TE, shifted to mainly crack after TE (i.e., most of those who used cocaine after TD used crack). Marijuana use (both daily and less than daily) decreased precipitously after treatment, as did amphetamine use, whereas narcotic use decreased but not so dramatically.

The percentage of the sample drinking alcohol excessively dropped from 60 to 42 percent for the full 1 -year followup period, and the mean percent time drinking excessively was reduced by half. Deviant behaviors such as dealing drugs and committing criminal activities were reduced considerably after treatment, both in the percentage of people involved in such activities and in the mean percent time.

Working and involvement in relationships also seem reduced after treatment. However, it should be kept in mind that the midpoint-to-TE period, used as a comparative baseline, is 3.5 years long. More specifically, during the month before treatment, 43 percent of the sample reported being unemployed for that month; by 1 month after treatment discharge, only 26 percent did not have a job, indicating that marked improvement in the pretreatment to posttreatment period did occur. The overall performance of the sample (not shown in table 1) can be expressed as 26 percent remained abstinent from cocaine use for the entire 1-year followup period; 4 percent used at a severe level throughout: and 70 percent relapsed to at least one episode of use.

COCAINE USE PATTERNS

The overview presented in table 1 does not reveal different types of use patterns for sample subgroups. To explore different patterns of use, the authors divided the sample according to the sequence of the initial pattern of cocaine use. Figure 1 shows four patterns of progression found for the pretreatment cocaine career: One pattern began with mild, occasional use, increasing to moderate, but not out-of-control use, and progressing to severe use (mild-moderate-severe, group 1); a second pattern was found as a mild-to-severe progression, without an intervening period of moderate use (group 2); a third pattern demonstrated a moderate-to-severe progression (group 3); and the last pattern was one of instantly severe use (group 4). The definitions used for mild, moderate, and severe levels of cocaine use were based on the frequency and amount of cocaine used and on the length of the abstinence between cocaine use episodes. For example, a severe level of use would be daily use (any amount) for at least a month, weekly binges of at least 3 days for at least 1 month, or very heavy (at least 10 g of cocaine) biweekly binges

Patterns of Progression	N	%
(FCU) Mild - - - Moderate - - - - - Severe - - - - - TE (Group 1) MA=24 MA=28 MA=30 MA=35 <52 months> <36 months> <54 months> SD=50 SD=29 SD=50	47	17
(FCU)Mild- - - - - - - - - - - - - - - - - Severe- - - - - TE(Group2) MA=24 MA=29 MA=35 <64 months> <78 months> SD=53 SD=59	125	44
- - - - - - - - - - (FCU) Moderate - Severe - - - - - TE (Group 3) MA=26 MA=29 MA=35 <39 months> <70 months> SD=45 SD=58	28	10
---------- (FCU) Severe----- TE(Group4) MA=27 MA=36 <111 months> SD=81	84	30

KEY: MA=mean age; SD=standard deviation

FIGURE 1. *Initial sequencing patterns*

(also known as the paycheck “blow-off”). The most prevalent pattern (44 percent of the sample) consisted of starting cocaine use at a mild level and subsequently escalating abruptly to a severe use level.

Overall, the mean time from FCU to TE was 141 months for groups 1 (mild-moderate-severe) and 2 (mild-severe) and 109 and 111 for groups 3 (moderate-severe) and 4 (instantly severe), respectively. For subjects who started using cocaine at a mild level, the average overall time to TE was 2 years longer than for those subjects who started at a higher (moderate or severe) level. As flgure 1 shows, the shortest average length of time at any one stage corresponded to the group 1 progression from a moderate-to-severe level, and the longest was the group 4 progression from FSU to TE. The results indicate that the majority of subjects were generally able to maintain mild use for a considerable length of time, but once they reached a moderate level of use, escalation to severe use occurred comparatively rapidly.

Table 2 shows levels of cocaine use, routes of administration, other drug use, and different behaviors for the progressive stages represented by the four different groups. Although the initial sequencing patterns of cocaine use were markedly different for the four groups, the progression-related shifts in cocaine use, other drug use, and the behavioral domains did not differ significantly. All groups were similar in terms of the types of shifts and distribution of levels among the cocaine routes of administration. That is, all showed increasing cocaine involvement over time in smoking routes and less involvement in other drug use. The differences among groups typically occurred in the baseline levels of drug use and behavior.

In terms of the demographic characteristics, the four groups were very similar. Statistical differences were not found with the exceptions of the number of arrests and convictions (groups 3 and 4 included a higher proportion of subjects who had been arrested more than five times).

When the four groups are compared in terms of their characteristics during the year prior to FCU, some differences emerge. Group 1 is characterized by the highest level of less-than-daily marijuana use, the lowest level of excessive alcohol drinking and narcotic use, the highest level of criminal activity, and the lowest involvement in relationships. Group 2 is characterized by the highest level of daily marijuana and amphetamine use, the lowest level of criminal activities, and the highest level of working. Group 3 is characterized by a high level of less-than-daily marijuana use (similar to group 1), the highest level of narcotic use, a high level of amphetamine use (similar to group 2), and the lowest level of dealing and working. Group 4 is characterized by the lowest level of marijuana and amphetamine use and the highest level of dealing, working, and involvement in relationships.

TABLE 2 *Pretreatment history postdischarge results by groups according to the initial sequencing patterns of cocaine use*

	Group 1: Mild-Moderate-Severe (n=47)										Group 2: Mild-Severe (n=125)							
	1 Year Prior FCU		Mild to Moderate		Moderate to Severe		Severe to Midpoint		Midpoint to TE		1 Year Prior FCU		Mild to Severe		Severe to Midpoint		Midpoint to TE	
	12 Months*		52 Months		36 Months		27 Months		27 Months		12 Months		64 Months		39 Months		39 Months	
Behaviors	PP†	MPT	PP	MPT	PP	MPT	PP	MPT	PP	MPT	PP	MPT	PP	MPT	PP	MPT	PP	MPT
Cocaine use																		
None			79	54	57	28	22	7	49	15			72	53	45	18	61	21
Mild			100	46	36	15	17	11	27	8			100	47	18	4	31	8
Moderate			0	0	100	23	12	4	24	8			0	0	15	4	23	6
Severe			0	0	0	0	100	78	93	69			0	0	100	74	98	66
Cocaine: route of administration																		
IN			79	40	57	28	39	23	24	9			76	33	46	24	29	12
Crack			11	3	36	20	46	38	73	51			17	7	44	28	69	41
Freebase			6	0	24	14	27	16	27	16			7	2	29	17	35	17
Primo			9	1	5	3	5	1	0	0			6	3	11	6	7	3
IV			2	0	7	6	12	8	15	4			9	2	7	3	8	3
Other			4	1	2	1	15	7	7	4			2	<1	7	2	10	3
Marijuana use																		
Daily	36	34	53	32	52	42	42	31	27	13	48	46	58	42	46	29	36	17
Less than daily	40	36	55	38	43	24	37	25	46	22	33	31	50	32	41	24	45	19
Excessive alcohol drinking	40	39	67	56	64	51	59	52	59	40	55	54	68	55	63	48	58	39
Any narcotic use	0	0	9	1	5	2	5	2	2	1	6	4	12	2	7	3	7	3
Any amphetamine use	6	6	13	4	10	4	7	3	10	4	14	9	17	6	12	5	6	3
No drug use (excluding cocaine)	19	19	38	28	38	28	49	39	85	62	18	18	34	22	55	40	82	56
Dealing	21	13	32	10	19	8	22	7	37	11	18	12	40	19	47	28	45	21
Criminal activities	11	5	11	1	12	1	15	5	20	6	7	3	14	2	17	7	23	7
Working	89	78	94	82	95	82	98	84	93	75	93	83	98	84	94	76	93	72
Relationships	34	30	55	37	48	43	46	43	56	40	38	32	65	44	68	43	66	42

KEY: PP=percent people; MPT=mean percent time

* Mean months in each period.

† PP will add to >100 percent because many have periods involving several different routes.

TABEL 2. *(continued)*

	Group 3: Moderate-Severe (n=28)								Group 4: Instantly Severe (n=84)					
	1 Year Prior FCU		Moderate to Severe		Severe to Midpoint		Midpoint to TE		1 Year Prior FCU		Severe to Midpoint		Midpoint to TE	
	12 Months*		39 Months		35 Months		35 Months		12 Months		56 Months		56 Months	
Behaviors	PP†	MPT	PP	MPT	PP	MPT	PP	MPT	PP	MPT	PP	MPT	PP	MPT
Cocaine use														
None			50	33	39	10	57	14			58	24	64	23
Mild			18	5	11	2	11	3			19	6	29	7
Moderate			100	62	18	7	29	8			10	3	21	6
Severe			0	0	100	81	96	75			100	67	94	64
Cocaine: route of administration														
IN			68	39	39	23	21	9			57	29	31	16
Crack			18	16	54	48	82	62			34	25	66	39
Freebase			7	5	18	13	18	9			19	8	25	11
Primo			4	4	4	0	4	1			6	3	4	2
IV			0	0	4	2	7	4			12	7	14	6
Other			7	4	4	4	7	1			8	3	6	3
Marijuana use														
Daily	36	36	50	35	29	15	21	18	32	29	43	22	26	13
Less than daily	39	36	46	35	36	27	25	16	37	33	49	27	46	20
Excessive alcohol drinking	64	63	71	69	71	56	64	47	57	56	66	54	64	47
Any narcotic use	11	9	11	7	14	6	11	6	5	4	21	8	17	6
Any amphetamine use	11	7	14	8	7	6	7	6	5	4	17	6	13	3
No drug use (excluding cocaine)	21	21	36	24	68	49	68	56	29	26	55	35	77	55
Dealing	14	9	39	23	39	24	46	24	24	18	51	26	44	18
Criminal activities	7	5	14	9	11	6	25	9	8	3	17	5	24	10
Working	86	74	100	81	93	80	93	73	89	83	98	79	95	78
Relationships	43	43	54	41	64	40	61	40	45	41	69	42	68	39

KEY: PP=percent people; MPT=mean percent time

* Mean months in each period

† PP will add to >100 percent because many have periods involving several different routes.

Patterns in behavior after FCU showed few major differences (see table 2). Groups 2, 3, and 4, constituting 83 percent of the sample, began their cocaine careers with generally higher use levels of alcohol, amphetamine, and narcotics than did group 1. (Only the "instantly severe" group 4 had lower levels of marijuana use.) As they progressed in their cocaine involvement, subjects in group 1 used fewer narcotics and amphetamines than subjects in other groups: they also used slightly less alcohol and marijuana. Furthermore, group 1 subjects were less involved in antisocial behaviors such as criminal activities and dealing and were more involved in socially desirable activities such as working. Although fewer group 1 subjects had a marriage/common law relationship, those who did were involved for longer periods.

After their FCU, group 2 subjects were characterized by a slightly higher level of freebasing, a low level of narcotic use, and a slightly lower level of excessive alcohol drinking. Group 3 subjects used cocaine severely and for longer periods, and fewer used mildly or were ever abstinent. For this group, the preferred cocaine form was crack and fewer used marijuana and alcohol.

Subjects in group 4 were characterized by a higher level of abstinence and lower levels of moderate use. This group was distinctive in that the IN and IV routes of administration were more prevalent than in any other group and the proportions of crack and freebase users were lower. More subjects in this group used narcotics and amphetamines than those in the other groups.

In summary, these results show that the pretreatment cocaine career lasted an average of 11.5 years and subjects were able to maintain a severe level of cocaine use for an average of 8.5 years. Four different sequences of escalation to severe cocaine use were described. As subjects approached TE, the mean percent time of severe use increased, and a shift occurred to crack use from other routes of administration. Despite this progression, antisocial behaviors (dealing and property crime) did not increase, socially desirable activities (working and relationships) did not decrease significantly (except in the period of the month immediately prior to treatment entry), and excessive alcohol and other drug use decreased. Generally, subjects' pretreatment functional levels were high.

The 1-year followup (post-TD) data for these four groups are based on numbers of 13, 35, 37, and 13, respectively. Because of the low numbers in groups 1 and 4, the following results should be interpreted cautiously. The proportions of subjects using at a severe level at some point during the followup year were 31, 43, 46, and 39 percent for the four groups,

respectively. The percentages of subjects who were abstinent for some period were 100, 89, 97, and 100 percent for the four groups, respectively. In all groups, the predominant route of administration after treatment was crack (mean percent time from 31 to 36 percent); the daily use of marijuana decreased dramatically after treatment (mean percent time from 0 to 3 percent); however, marijuana use less than daily was still prevalent (from 7 to 14 mean percent time). The excessive use of alcohol decreased after TE for the four groups (from 14 to 29 mean percent time) as did amphetamine use (from 0 to 1 mean percent time). Narcotic use decreased for groups 3 and 4 (to 0 and 3 mean percent time, respectively) but increased for groups 1 and 2 (to 3 and 4 mean percent time for 8 and 11 percent of subjects, respectively) after treatment compared with the level of narcotic use before TE. Both the proportion of subjects dealing and the time they spent doing so decreased after TE for the four groups (from 0 to 2 mean percent time for groups 1, 2, and 3 and to 12 mean percent time for group 4).

Crime also was reduced for the four groups (to 1 or less mean percent time for groups 1, 3, and 4 and 5 mean percent time for group 2). Working and involvement in relationships increased across the four groups after TE (87 to 100 percent of the subjects reported working after TE and 26 to 52 percent reported relationships).

Overall, results show that 1 month after TE the use of cocaine and other drugs decreased considerably (with the exception of narcotics), deviant behaviors decreased, and socially desirable behaviors (e.g., working) increased to an adequate level of functioning.

GROUPS ACCORDING TO LENGTH OF COCAINE CAREER

Further analyses were made grouping the sample according to the pretreatment length of the cocaine career (LCC): 18 percent of the sample had used cocaine for 5 years or less before TE, 29 percent for more than 5 years to 10 years, 27 percent for more than 10 years to 15 years, and 26 percent for more than 15 years.

In terms of the demographic characteristics of these four LCC groups, statistically significant differences were found for three variables:

- Age: Group 1 included higher proportions of the youngest subjects and subjects older than 50 years, whereas group 4 included higher proportions of subjects between 40 and 49 years of age.

- Race: Group 1 included higher proportions of blacks, and group 3 included higher proportions of whites.

- Education: Group 4 included the highest proportion of subjects with more than 12 years of education.

Data on the pretreatment career (table 3) show that a greater proportion of the two longer term LCC groups used cocaine at a severe level during the midpoint-to-TE period. They were also much more likely to use cocaine intravenously than the less-than-lo-year LCC groups. The long-term groups had higher levels of marijuana use, amphetamine use, excessive alcohol drinking, narcotic use, dealing, and being involved in a relationship. The four LCC groups were similar in terms of property crime and working.

Results for the 1 -year followup period (1 year post-TD, table 3) showed that the degree of improvement was relatively equivalent across LCC groups: Their levels of drug use and of deviant and socially desirable behaviors were different at pretreatment, and the levels after treatment were proportional to what they were at pretreatment.

Severe cocaine use decreased for all the groups (more for group 4). The route of administration was predominantly crack, although groups 2, 3, and 4 still had some IV use at followup. Daily marijuana use decreased for all groups, less-than-daily marijuana use did not decrease significantly for group 1, and the largest decrease occurred for group 4. Narcotic use decreased for group 1 but increased for groups 2, 3, and 4. Amphetamine use decreased for all groups, and dealing decreased for all groups, especially for group 4.

GROUPS ACCORDING TO AGE AT FIRST COCAINE USE

The sample was also divided according to age at FCU. Group 1 included subjects 20 years of age or younger (34 percent); group 2, subjects 21 to 28 years old (42 percent); and group 3, subjects 29 years old and older (24 percent). No significant differences were found for demographic characteristics among the three groups.

Data on the pretreatment cocaine career (table 4) show that the groups ranked from group 3 to group 1, from higher to lower, in terms of the mean percent time using cocaine at a severe level during the midpoint-to-TE period, in terms of the mean percent time subjects used crack as the main route of administration, and in terms of the mean percent time subjects were involved in a relationship. On the other hand, the groups ranked from group 1 to group 3, from higher to lower, in terms of using cocaine intranasally, marijuana use, amphetamine use, excessive alcohol drinking, dealing, crime, and work.

TABLE 3. *Pretreatment and followup periods for groups according to LCC*

	0 to 60 Months				61 to 120 Months				121 to 180 Months				More Than 181 Months			
	Midpoint to TE		TD to (TD+12)		Midpoint to TE		TD to (TD+12)		Midpoint to TE		TD to (TD+12)		Midpoint to TE		TD to (TD+12)	
	TT=14±7 n=52		TT=11.6 Months n=19		TT=33±14 n=81		TT=11.6 Months n=26		TT=41±25 n=73		TT=11.6 Months n=26		TT=75±43 n=72		TT=11.6 Months n=27	
Behaviors	PP	MPT	PP	MPT	PP	MPT	PP	MPT	PP	MPT	PP	MPT	PP	MPT	PP	MPT
Cocaine use																
None	37	10	95	57	59	19	92	64	66	23	96	66	71	24	96	52
Mild	14	6	47	17	28	7	42	10	31	10	31	7	34	5	59	15
Moderate	17	8	11	1	22	6	23	7	25	5	23	4	28	7	30	14
Severe	94	76	47	27	93	68	39	20	96	62	46	22	100	64	37	19
Cocaine: route of administration																
IN	14	9	0	0	24	10	9	2	31	14	0	0	41	15	7	3
Crack	71	61	63	35	69	46	65	30	75	42	58	27	65	31	56	32
Freebase	14	11	21	6	33	17	0	0	29	11	8	5	37	17	4	2
Primo	2	2	0	0	5	2	4	<1	5	2	0	0	4	2	0	0
IV	6	5	0	0	3	2	4	4	12	5	4	2	24	6	11	7
Other	2	1	5	2	8	3	0	0	7	2	0	0	15	5	4	3
Marijuana use																
Daily	8	7	5	<1	27	13	0	0	36	15	0	0	44	26	4	4
Less than daily	23	11	21	4	42	23	23	8	52	23	42	17	50	17	11	6
Excessive alcohol drinking	40	35	46	24	59	45	35	17	64	44	29	22	74	43	48	23
Any narcotic use	6	3	0	0	3	<1	4	1	8	3	12	5	24	10	11	6
Any amphetamine use	2	1	0	0	10	5	0	0	9	2	4	1	13	3	4	1
No drug use (excluding cocaine)	85	76	100	95	77	58	96	85	78	51	92	75	81	46	93	85
Dealing	27	18	11	3	42	17	8	6	49	20	19	6	52	20	7	6
Criminal activities	21	9	5	1	25	6	0	0	23	8	19	8	22	9	0	0
Working	87	72	79	61	96	75	89	67	94	79	89	60	96	72	93	69
Relationships	50	36	32	17	56	33	42	36	68	45	35	27	82	48	41	23

KEY: TT=total time; PP=percent people; MPT=mean percent time

TABLE 4. *Pretreatment and followup periods for groups according to age at FCU*

	≤20 Years				21 to 28 Years				≥29 Years			
	Midpoint to TE		TD to (TD+12)		Midpoint to TE		TD to (TD+12)		Midpoint to TE		TD to (TD+12)	
	49±36 Months n=92		11.6 Months n=29		33±14 Months n=117		11.6 Months n=42		41±25 Months n=68		11.6 Months n=27	
Behaviors	PP	MPT	PP	MPT	PP	MPT	PP	MPT	PP	MPT	PP	MPT
Cocaine use												
None	74	25	97	63	55	19	95	63	49	14	93	51
Mild	36	9	45	8	21	4	41	9	29	9	52	19
Moderate	32	7	21	10	22	7	21	5	14	5	26	6
Severe	96	60	35	19	97	69	45	23	94	72	44	24
Cocaine: route of administration												
IN	42	15	10	4	25	13	2	1	14	7	0	0
Crack	67	36	52	27	70	42	60	28	74	59	70	39
Freebase	37	17	3	2	30	15	2	1	15	9	19	8
Primo	6	2	3	<1	3	2	0	0	3	3	0	0
IV	12	2	3	2	13	6	10	7	6	5	0	0
Other	10	2	3	3	10	4	0	0	3	1	4	2
Marijuana use												
Daily	39	23	3	3	33	15	2	<1	14	5	0	0
Less than daily	52	21	31	12	43	20	17	8	32	16	30	6
Excessive alcohol drinking	72	49	52	25	60	42	29	13	46	33	52	30
Any narcotic use	11	4	10	5	10	5	10	4	8	2	0	0
Any amphetamine use	12	5	3	1	9	2	0	0	6	2	4	1
No drug use (excluding cocaine)	77	45	97	79	80	57	91	85	83	72	100	89
Dealing	53	20	7	2	41	18	19	11	35	18	4	1
Criminal activities	25	9	17	7	23	7	2	1	20	8	0	0
Working	95	78	90	67	94	74	93	67	91	70	78	59
Relationships	63	35	45	29	66	42	38	28	64	47	30	21

KEY: PP=percent people; MPT=mean percent time

Results for the posttreatment period (table 4) showed that the rate of improvement was equivalent across groups: Their levels of drug use and of deviant and socially desirable behaviors were proportional to what they were at pretreatment.

In the posttreatment period, severe cocaine use decreased for all groups, and the route of administration was predominantly crack. Daily marijuana use decreased for all, with substantial decreases in the proportions of subjects involved in less-than-daily use occurring in groups 1 and 2, but not for group 3. Narcotic use decreased for group 3 but stayed at the same level for groups 1 and 2. Amphetamine use decreased for all groups, and dealing decreased, especially for group 3. Working was relatively stable for groups 1 and 2 but decreased somewhat for group 3.

CONCLUSIONS

The cocaine career of the subjects investigated from onset of use to treatment entry averaged 11.5 years. Severe use of cocaine was maintained for an average of 6.5 years. Four different sequences of escalation to severe cocaine use were identified.

Cocaine use at severe level increased and became more prolonged in the period just prior to entry into treatment, and a shift to more efficient methods of drug delivery, such as crack smoking, increased. Surprisingly, in spite of this progression in cocaine use, antisocial behavior (dealing and property crimes) increased only marginally, and constructive social activities (work and close interpersonal relationships) did not decrease significantly until just before TE. Excessive alcohol and other drug use declined as the dependence on cocaine progressed. Overall, treatment could be considered effective in that the use of cocaine at a severe level decreased and both the proportion of abstinent subjects and the mean percent time of abstinence increased; other drug use decreased after treatment, and dealing and criminal behaviors decreased as well.

Most relapses, 51 percent, occurred within the first month after TD. In the 3 months just prior to the followup interview, 16 percent were using cocaine daily, 25 percent reported other than daily use, and 61 percent reported no use.

In general, the pretreatment level of social functioning of the subjects investigated was high. These patients had a significant potential for rehabilitation, although they displayed relatively high levels of deviant behavior during the pre-FCU period, including aggressive behavior.

Data derived from our study indicated no prominent variation among the various groups defined for more specific analysis. Such homogeneity in progression of use must be considered as we select relevant outcome variables to investigate. More extensive multivariate analyses must be performed to determine variables that predict specific outcomes.

NOTE

1. Mean percent time is the number of months involved in a behavior or in a specified status divided by the number of nonincarcerated months between the critical dates of interest, times 100 (for example, for a subject engaging in a specific behavior 5 months out of a 10-month period, the mean percent time would be 50 percent).

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Combinations of Treatment Modalities and Therapeutic Outcome for Cocaine Dependence

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INTRODUCTION

Although the theoretical and practical importance of longitudinal "natural history," "life cycle," or "addict career" approaches to the understanding of the process of drug dependence has been repeatedly emphasized, this methodology has been applied primarily to the study of alcoholism or heroin addiction (Anglin et al. 1986, 1987; Anglin and Speckart 1986; Brecht et al. 1987; Hser et al. 1990; Kandel et al. 1985; Simpson et al. 1986; Valliant 1970). Long-term followup studies of dependent cocaine users employing this approach are lacking. Such studies are important not only to understand the etiology and clinical course of cocaine dependence but also to understand the role played by therapeutic interventions in recovery.

The importance of determining effective treatment for cocaine users became urgently apparent with the dramatic increases in cocaine use, peaking at an estimated 5 million regular users in 1985 (Abelson and Miller 1985). Although recent estimates show a decline in cocaine use by the general population (National Institute on Drug Abuse 1991) high prevalence rates among groups such as arrestees have persisted (O'Neil 1992). The escalation in the observed numbers of people seeking cocaine treatment may be attributable to increased use at severe levels among current users (Johanson and Fischman 1989).

Evaluation studies of treatment protocols specifically designed for cocaine users have been undertaken only recently. Intensive outpatient treatment has been shown to be the most effective treatment for cocaine dependence in several studies. Evaluated outpatient programs differed in terms of their elements or treatment components. In one study, the highest success rates corresponded to subjects who attended group therapy five times per week, combined with individual psychotherapy and family therapy sessions (Hoffman et al. 1993). Washton and Stone-Washton (1990) also found

intensive outpatient treatment effective for a highly structured program with behavioral counseling, cocaine-specific education, supervised urine testing, and encouragement to utilize self-help groups. Rawson and coworkers (1990) found that outpatient treatment was better than inpatient treatment or no treatment. The outpatient program studied by Rawson and colleagues followed the neurobehavloral model of cocaine dependence treatment, which includes strategies to address four dlfferent areas of functioning by using relapse prevention techniques, individual and family therapy, 12-step involvement, and urine testing. In contrast, one study of cocaine treatment found that once-a-week psychotherapy, family therapy, or group therapy was ineffective and that there was no association between number of outpatient treatment sessions and improved outcome (Kang et al. 1991). However, these cited studies differ in the length of the followup periods and in the criteria used to define effectiveness. Therefore, results should be interpreted cautiously because of methodological issues.

Other authors have studied treatment process and outcome more generally, without an exclusive focus on cocaine dependence. Guydish and colleagues (1993) found that day treatment for drug users in general, although less intense than residential or inpatient but more intense than traditional outpatient treatment, was a more accessible and less expensive form of drug rehabilitation. Nevertheless, they found traditional outpatient treatment to have higher attrition rates than residential treatment (Guydish et al. 1993). Wallace (1990) focused on a multidimensional approach that recognized biopsychosocial variables underlying the development and maintenance of drug dependence. She found that an approach combining pharmacological adjuncts, psychoeducation on the multideterminants of relapse, and psychotherapy produced the best outcomes,

Based on their individual studies, different authors (Kleinman et al. 1992; Miller and Pechacek 1987) have recommended various strategies to improve treatment effectiveness. Kleinman and coworkers (1992) have encouraged greater focus on therapist and program variables (vs. client characteristics) as more likely to improve treatment outcome. Miller and Pechacek (1987) have recommended assessing and addressing psychological dependence patterns to increase treatment effectiveness.

The purpose of this study is to provide further information about the effectiveness of different combinations of treatment modalities for cocaine dependence. The present study on cocaine treatment evaluation (CTE) examines a sample of cocaine-dependent males admitted to treatment through the West Los Angeles Department of Veterans Affairs (VA) Hospital. The authors' findings are reported in two phases: First, the behavioral changes seen within the group as a whole are presented; second, we compare the course followed by patients grouped according

to the combinations of treatments in which they participated within the 1-year followup period. This second phase allows us to determine which combinations of treatment are associated with more favorable outcomes.

METHODS

Subjects

Subjects were veterans who requested treatment for cocaine dependence at the West Los Angeles VA Hospital. Given that the population served by this hospital includes only a small proportion of women, all subjects were male. Sixty-three of the patients in the intake group who were asked to participate in the study refused. The main reasons given were lack of interest, skepticism about assurances of confidentiality, unwillingness or apprehension to disclose past drug use and/or criminal history, and lack of time to devote to the research interview. All 325 participants met *Diagnostic and Statistical Manual of Mental Disorders (Third Edition, Revised)* (DSM-III-R) (American Psychiatric Association 1987) criteria for cocaine dependence and signed a consent form approved by the Human Subjects Protection Subcommittee from the VA medical center.

The majority of the subjects were more educated and older than samples typically derived from urban cocaine users (Siegel 1985; Washton et al. 1984). However, subjects reported diverse characteristics in many respects: In addition to cocaine use, most patients reported extensive experimentation with other substances, including alcohol. Regarding their sociodemographic profile, 28 percent were single, 30 percent married, 17 percent separated and 24 percent divorced. Eighty-eight percent had completed at least grade 12 in school. Only 5 percent had completed fewer than 10 years in school, and 22 percent had completed 14 or more years of education. Forty-four percent had not worked during the 4 weeks before treatment entry; 21 percent had worked full time, and the remaining 35 percent had worked less than full time. Eighty-six percent reported a history of arrest, and 31 percent had been incarcerated 30 days or more. Thirteen percent of the patients were on probation at the time of the intake interview. A large proportion of these patients reported socially deviant behavior during adolescent and adult periods. Other characteristics of the sample have been presented in detail elsewhere (Khalsa et al. 1992).

Research Design

The original research design required random assignment to one of three treatment options: 21-day inpatient care, immediate outpatient care, or referral to community self-help groups. However, by the time patients applied for treatment, most had developed a preference for inpatient care. Fewer than 30 percent of the patients were willing to accept a random assignment.

Excluding patients who rejected the random assignment procedure introduced a bias that would have made the sample considerably less representative of the population of patients seeking admission. For instance, patients who were employed, married, and had less severe symptoms of dependence were more likely to accept the random assignment. Furthermore, because the number of patients who rejected this experimental condition was large, only a few would be available for meaningful statistical analysis. Therefore, a mixed design was introduced. In addition to the randomly assigned sample (n=75), a group of patients who voluntarily chose inpatient treatment was added (n=225). Results by randomly assigned groups will be reported elsewhere.

The VA inpatient treatment program was 21 days in length and included activities such as individual counseling, group therapy, and drug education. The VA-based outpatient treatment consisted of one to four initial visits with a physician, plus individual counseling sessions on an as-needed basis and weekly group sessions using methods espoused by Alcoholics Anonymous (AA). Both modalities emphasized the 12-step treatment philosophy. Self-help consisted of attendance at community-based AA and/or Cocaine Anonymous meetings. The variables that were investigated included use of cocaine and other drugs, alcohol use, measures of social performance such as work tenure and maintenance of interpersonal relationships, and deviancy such as property crime and drug dealing. Data were collected at the time of admission to the project and at two followup points, 1 and 2 years after treatment entry. Ninety percent of the subjects who participated in this research were located and interviewed at 1-year followup. Two-year followup data are in the process of being analyzed and will be reported later. The initial VA treatment episode (index treatment) was followed in most instances (78 percent) by involvement in other modalities of treatment selected by patients based on their own personal criteria as well as treatment availability and accessibility. Using data collected at the 1-year followup, the sample was grouped according to the combination of treatments in which the patients had participated. Although the 1-year followup timeframe is a relatively brief period in which to properly assess therapeutic outcome, the information generated by this study provides an indication of the changes that may be expected following conventional treatments.

Patients were grouped as receiving one of the following six combinations of treatment: (a) only one 21-day episode of inpatient care, (b) multiple episodes of residential care (admissions to therapeutic communities or inpatient treatments lasting more than a month), (c) an episode of inpatient care of at least a 21 -day duration with high-intensity outpatient care and with participation in self-help meetings (high intensity is defined as participation in either an outpatient or self-help session at least once a week for at least 6 months), (d) no inpatient care but high-intensity outpatient and/or high-intensity self-help participation, (e) one episode of inpatient care and low-

intensity outpatient and/or self-help (participation less than once a week for less than 6 months), and (f) low-intensity outpatient and/or self-help. Some subjects in the sample were not included in the six groups because they belonged to treatment combinations with a number of subjects too small to be amenable to statistical analysis or for other idiosyncratic reasons. Those subjects who spent most of the followup year incarcerated or admitted to psychiatric hospitals for any psychiatric illness (e.g., schizophrenia, major mood disorder) also were excluded. Therefore, data on these men (n=50) were excluded from statistical analyses.

Data Collection Instrument and Measures

At intake (treatment entry), specially designed interview schedules were used to collect sociodemographic data, developmental history, and assessment of social function and history of treatment. The Natural History Interview was the main source of detailed information, obtained in chronological order, concerning the cocaine use career. This assessment instrument is an adaptation of a schedule developed by Nurco and colleagues (1975) and has been described in detail elsewhere (Anglin and McGlothlin 1984). Briefly, with the assistance of the patient, a schematic time chart is prepared before the interview showing all known important events In the patient's life, such as treatment episodes, arrests, and periods of incarceration and legal supervision. These events are used as time-anchoring points to facilitate review of significant aspects of the patient's drug and social history. In addition, the interviewer establishes the date of the first cocaine use, recording it on the time chart, and proceeds chronologically from 12 months before the first use to the time of the interview. Data are collected on the use of cocaine, alcohol, and other drugs; health status; drug treatment experience; employment: family adjustment; criminal behavior; and other social adjustment variables for the initial period. Subsequent periods are demarcated by changes in levels of cocaine use and significant life events such as a change in the respondent's drug treatment or legal status. The interviewer proceeds to review each successive homogeneous period, repeating the systematic process of data collection on each time segment until the interview date is reached. The collected data can be plotted in time series graphs covering the periods of interest such as the development and course of dependence and posttreatment followup. The first-year followup interview consisted of an update of the Natural History Interview and completion of a treatment evaluation form. At this point, a urine specimen was collected to analyze for cocaine metabolites and assess the validity of recent self-reported drug use.

RESULTS

The first phase of our analyses examined overall response to treatment for the entire sample.

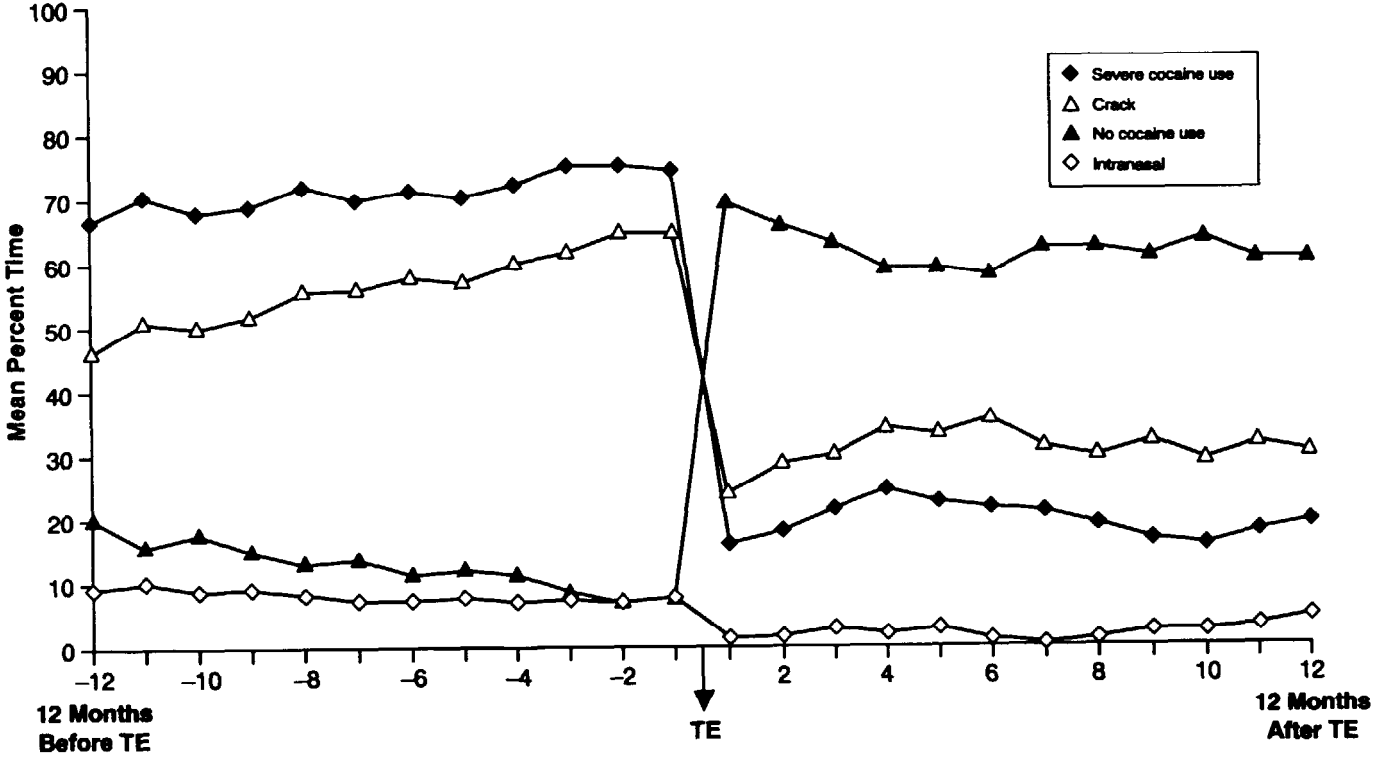
Total Sample Response to Treatment

The longer term pretreatment history describing the development and course of the dependence career is reported elsewhere (Khalsa et al., in press). Results reported here focus on the cocaine use behavior of the total sample in the 12 months before entry to the index treatment episode compared with behavior reported during the 12-month followup period. The mean percent time in each month of cocaine use provides an indicator of cocaine consumption. According to this measure, severe use throughout a month would be rated 100 percent involvement at this level of use. Fewer days of severe use during the month were computed proportionally; for example, if cocaine was used 15 days during the month, the mean percent time using at a severe level was 50 percent.

Figure 1 shows the monthly mean percent time for severe cocaine use in any form, and for no cocaine use, for the 12-month periods before and after treatment. By the time of treatment entry, intranasal use of cocaine was not common in this group, and the level of use by this route remained low after treatment (mean use level for the full 12-month periods was approximately 10 percent before and 5 percent after treatment). Before treatment entry, approximately 45 to 65 percent of each month for the full 12-month period was spent by the group smoking crack, whereas at followup, only 22 to 37 percent mean time was spent in this activity. Analysis of variance (ANOVA) revealed a statistically significant change ($P \leq 0.05$). Regarding severe use of cocaine, an overall 65 to 75 percent mean time level was reported in the period before treatment and 17 to 22 percent during the followup periods, whereas the mean percent time not using cocaine increased from 5 to 20 percent before treatment to 58 to 69 percent during followup.

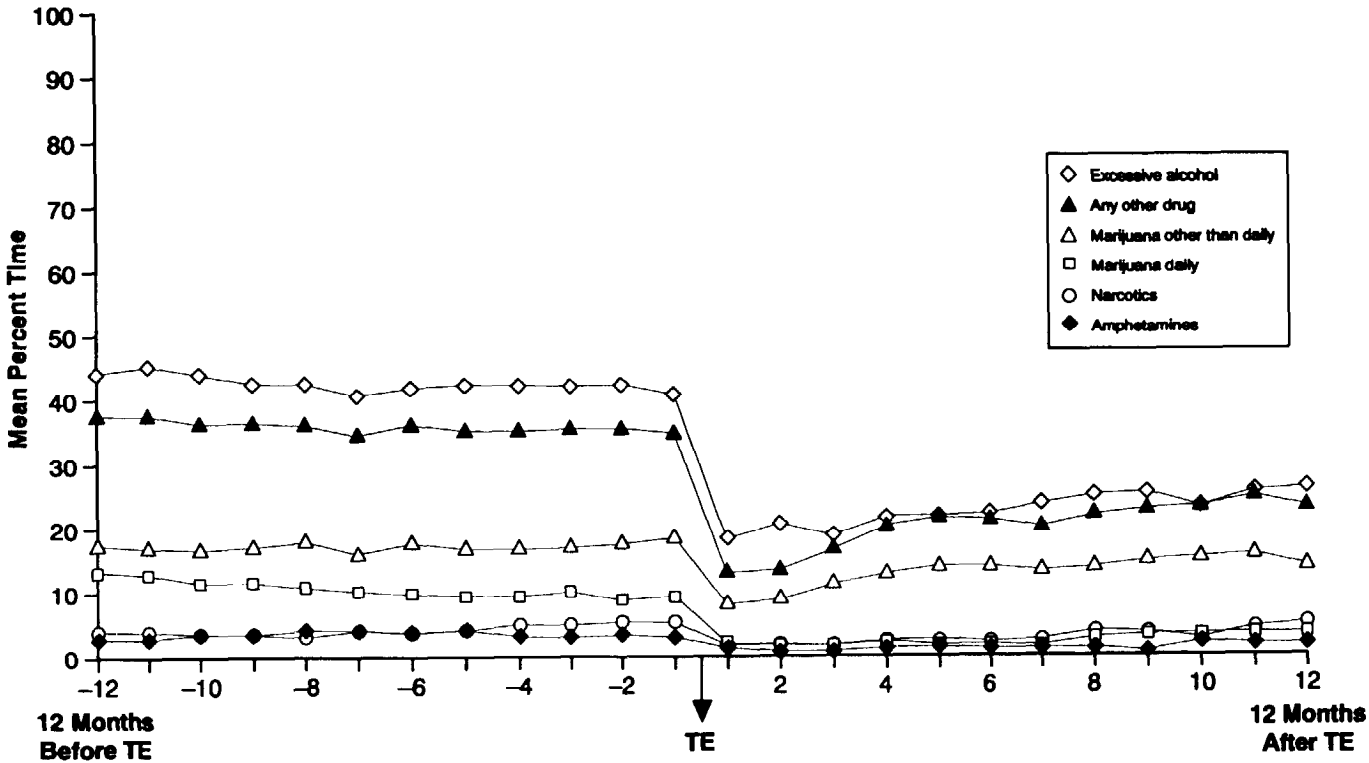
ANOVA also showed statistically significant changes observed in the use of other drugs ($P \leq 0.05$). The mean percent time using marijuana and excessive alcohol declined, as figure 2 illustrates, with a statistically significant decrease after treatment. Changes in narcotics and amphetamine use, although less striking and not statistically significant, were also observed.

As figure 3 shows, social behavior in most cases changed relatively little along the dimensions assessed in the study. Comparing before and after treatment, the mean percent time spent working, engaged in stable relationships, and in criminal activities did not change significantly. On the other hand, ANOVA revealed a significant change in the percent of



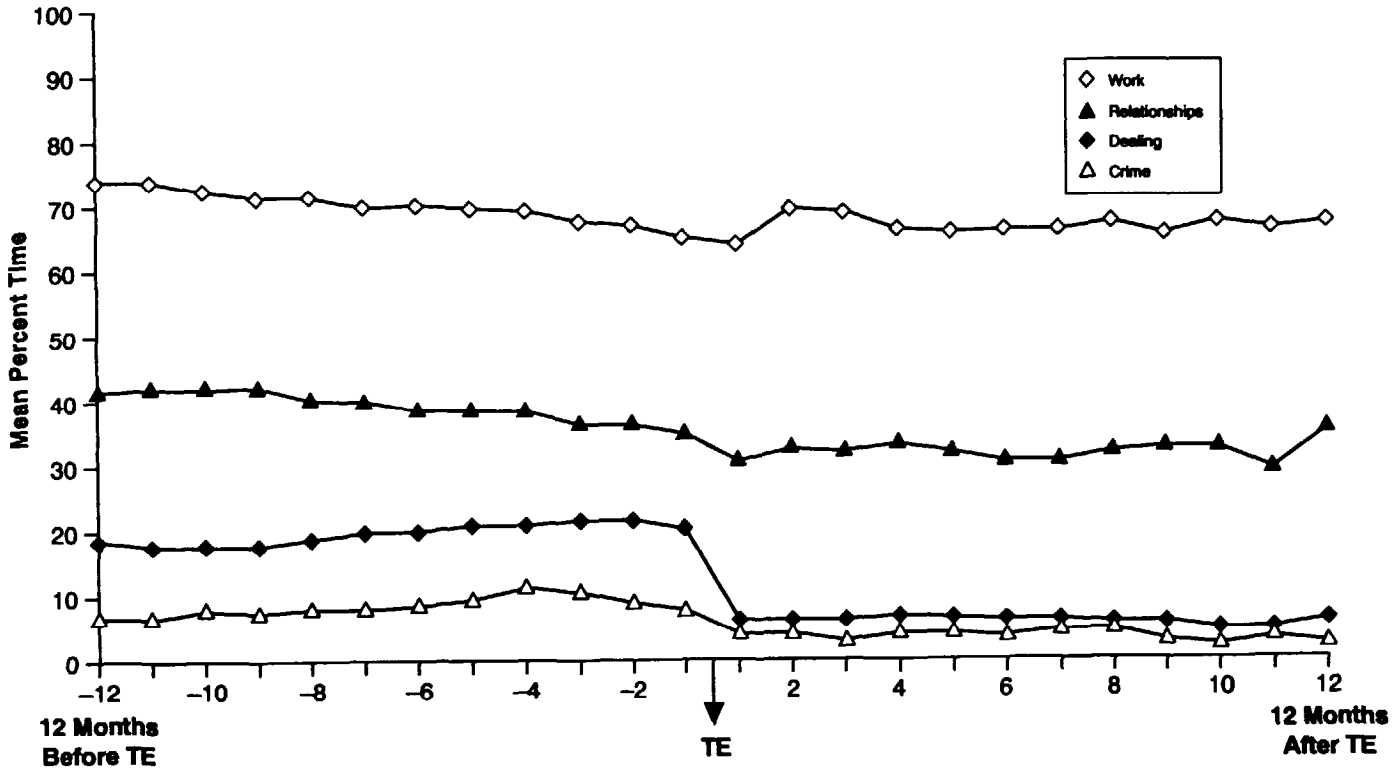
KEY: TE=treatment entry

FIGURE 1. *CTE total sample: months before and after index treatment—cocaine*



KEY: TE=treatment entry

FIGURE 2. *CTE total sample: months before and after index treatment—alcohol and other drugs*



KEY:TE=treamententry

FIGURE 3. *CTE total sample: months before and after index treatment—social behavior*

time involved in drug dealing, which decreased from 18 to 22 percent of the time before treatment to 6 percent or less after treatment ($p \leq 0.05$).

Effects of Treatment Combination

For the second phase of analysis, patients were categorized according to the combination of treatments in which they participated within the followup year. As indicated earlier, six different treatment combinations were identified. The sociodemographic characteristics of the patients included in each of these categories are presented in table 1. No statistically significant demographic differences among the groups were detected.

The treatment combinations selected by the largest number of patients (n=79) are shown in column C (one episode of inpatient followed by high-intensity outpatient care and/or self-help) and column E (inpatient and low-intensity outpatient and/or self-help) (n=71). Combination (column) A (one episode of inpatient care) was chosen by 61 patients, and (column) B (multiple residential care programs) was chosen by 41 patients. The least preferred combinations are shown in columns F (low-intensity outpatient and/or self-help) and D (high-intensity outpatient and/or self-help), with 15 and 8 patients, respectively.

Table 2 presents data as levels of use of cocaine, alcohol, and other drugs; involvement in antisocial behaviors such as drug dealing and criminal activities; and constructive behaviors such as involvement in work and interpersonal relationships before treatment (B column) and after treatment (A column). These variables are expressed in terms of the mean percent time engaged in each behavior. Column D expresses the difference between A and B, indicating an increase (positive values) or decrease (negative values) for each variable.

Following treatment, the mean percent time spent by patients abstinent from cocaine increased in all groups, but this increase was significantly greater in groups C (inpatient and high-intensity outpatient and/or self-help) and D (high-intensity outpatient and/or self-help) than in any of the other groups. Multiple analysis of variance showed a statistically significant difference ($p \leq 0.05$) for these two groups. The proportion of time reporting severe use was also significantly reduced in group C. The proportion of time spent smoking crack decreased in all groups regardless of the treatment combination selected. Comparisons between the different treatment combinations did not show statistically significant differences in terms of this variable. Decreases, but without statistically significant differences between treatment combinations, were also observed with regard to daily use of marijuana. Use of narcotics, marijuana (less than daily), and amphetamines decreased for some groups, remained stable for others,

TABLE 1. *CTE sample by treatment combinations (n=275) and demographic characteristics (Percent*)*

Characteristic	A One IP Admission (n=61)	B Multiple Residential Treatment (n=41)	C IP and OP/SH High Intensity (n=79)	D OP/SH High Intensity (n=8)	E IP and OP/SH Low Intensity (n=71)	F OP/SH Low Intensity (n=15)
Age at interview (year)						
21-29	17	29	17	13	18	14
30-39	53	42	59	63	58	64
≥40	30	29	25	25	24	21
Race†						
Black	67	78	65	63	66	71
Hispanic	7	3	8	0	9	7
Anglo	27	20	25	38	24	21
Maritalstatus						
Single	35	33	31	25	21	21
Married/common law	27	20	26	38	35	50
Separated	17	23	17	13	16	7
Divorced/widowed	21	25	26	25	28	21
Occupation						
Unskilled	12	3	4	13	3	7
Semiskilled	40	33	36	38	51	64
Skilled	25	40	35	38	28	21
Sales/service/second level executive/other	25	26	25	13	18	7
Never incarcerated	72	74	74	75	69	79

*Figures may not add to 100 percent because of rounding.
†Other races were 2 percent for group *C* and 1 percent for group E.

KEY: IP=inpatient; OP/SH=outpatient and/or self-help

TABLE 1. *(continued)*

Characteristic	A One IP Admission (n=81)	B Mutiple Residential Treatment (n=41)	C IP and OP/SH High Intensity (n=79)	D OP/SH High Intensity (n=8)	E IP and OP/SH Low Intensity (n=71)	F OP/SH Low intensity (n=15)
Number of incarcerations						
0	20	10	20	13	20	7
1	17	31	24	13	30	21
2-4	38	38	31	83	24	43
≥5	25	23	28	13	27	28
Number of convictions						
0	38	38	32	75	30	38
1	22	31	22	0	25	14
2 4	27	13	30	25	28	29
≥5	15	25	18	0	17	21
Years of education						
<12	18	3	13	0	14	7
12	43	45	38	38	47	43
>12	38	53	49	83	39	50
Homeless at admission	17	20	12	0	7	14

*Figuree may not add to 100 percent because of rounding.

KEY: IP=inpatient; OP/SH=outpatient and/or setf-help

TABLE 2. *CTE sample by treatment groups: difference between 12 months before and after treatment entry (mean percent time*)*

	A One IP Admission (n=61)			B Multiple Residential Treatment (n=41)			C IP and OP/SH High Intensity (n=79)			D OP/SH High Intensity (n=8)			E IP and OP/SH Low Intensity (n=71)			F OP/SH Low Intensity (n=15)		
	B	A	D	B	A	D	B	A	D	B	A	D	B	A	D	B	A	D
Cocaine use																		
None	15	47	32	13	59	46	13	77	64	12	78	66	13	54	41	8	59	51
Mild	6	13	7	4	7	3	7	16	9	4	22	18	9	12	3	18	9	-9
Moderate	9	9	0	9	9	0	9	3	-6	21	0	-21	5	12	7	14	8	-6
Severe	70	32	-38	74	25	-49	70	5	-65	62	0	-62	73	22	-51	60	24	-36
Cocaine—route of administration																		
Intranasal	2	1	-1	1	3	2	10	1	-9	24	4	-20	16	5	-11	0	1	1
Crack	59	45	-14	67	31	-36	49	18	-31	53	17	-36	52	36	-16	58	23	-35
Freebase	10	3	-7	11	4	-7	16	3	-13	0	0	0	13	2	-11	15	5	-10
Primo	3	1	-2	2	0	-2	1	0	1	0	0	0	2	<1	-2	0	1	1
Intravenous	6	3	-3	6	2	-4	7	1	-6	10	0	-10	3	1	-2	10	8	-2
Other	5	<1	-5	<1	2	1	4	1	-3	0	0	0	<1	2	1	10	4	-6
Marijuana use																		
Daily	10	0	-10	13	1	-12	11	1	-10	33	13	-20	6	1	-5	11	2	-9
Other than daily	17	17	0	6	12	6	22	7	-15	28	13	-15	15	13	-2	25	24	-1
Excessive alcohol drinking	26	16	-10	26	11	-15	15	4	-11	36	0	-36	25	10	-15	15	11	-4
Any narcotic use	7	3	-4	3	3	0	5	1	-4	0	0	0	2	2	0	2	6	4
Any amphetamine use	<1	0	0	2	0	-2	6	1	-5	9	0	-9	8	3	-5	0	1	1
No drug use (excluding cocaine)	65	76	11	76	82	6	58	90	32	39	75	36	66	82	16	57	61	4
Dealing	16	11	-5	15	8	-7	20	1	-19	25	3	-22	24	6	-18	18	2	-16
Criminal activities	16	12	-4	8	5	-3	6	<1	6	2	0	-2	7	3	-4	7	0	-7
Working	64	58	-6	66	44	-22	71	74	3	84	88	4	75	73	-2	79	75	-4
Relationships	36	31	-5	29	14	-15	40	30	-10	28	68	40	45	36	-9	46	53	7

*Figures may not add to 100 percent because of rounding.

KEY: IP=inpatient; OP/SH=outpatient and/or self-help; B=before treatment; A=after treatment; D=difference between A and B

and increased slightly for others. Drug dealing and criminal activities changed in a favorable direction for all treatment combinations, with group C showing greater overall benefit than the others. Changes In work stability and relationship patterns across the two periods were minor for most of the groups, with two exceptions. The multiple residential patients (B) were less likely to maintain involvement in both those activities, primarily because their choice of treatment modality precluded such involvement. The high-intensity outpatient and/or self-help group (D), although representing only a few patients, showed a marked increase in relationship involvement. This result also can be attributed to life circumstances that motivated their choice of treatment environment.

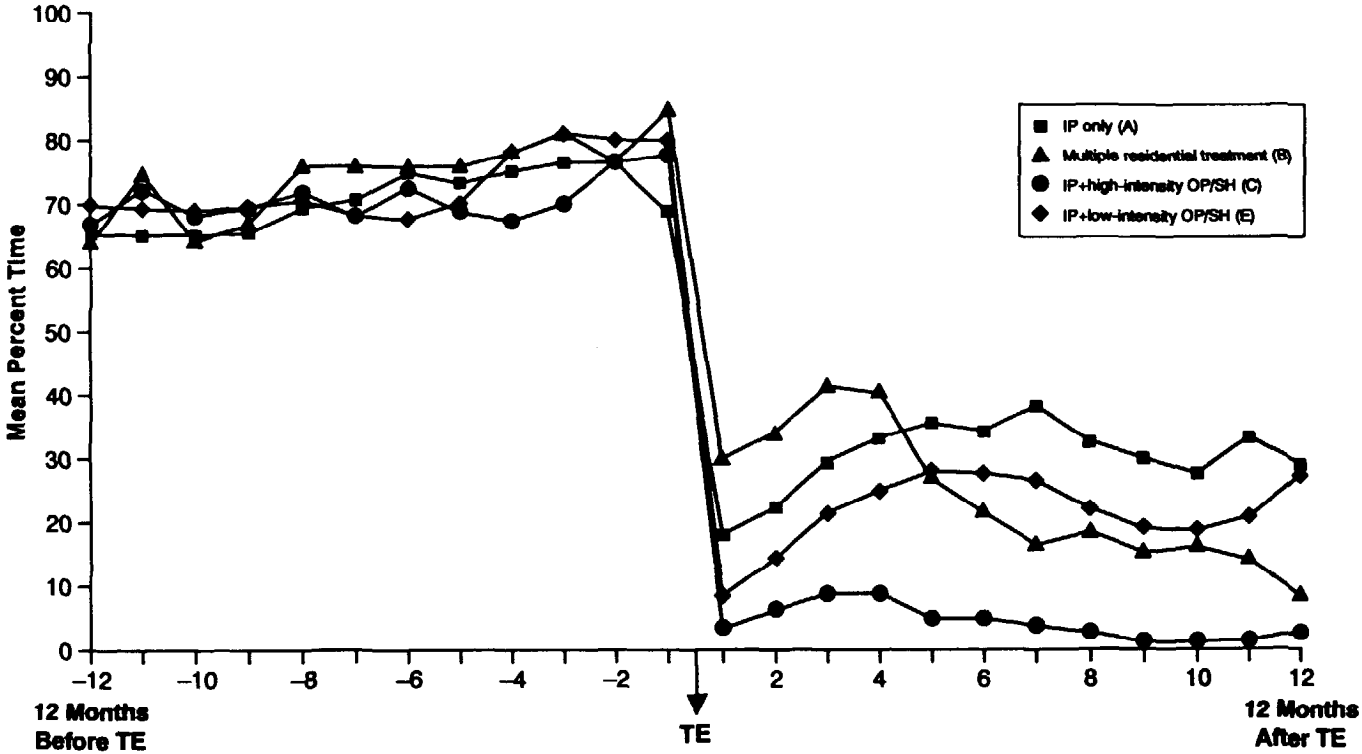
Comparisons of selected treatment combinations (those with a large enough size) along individual variables clearly support the more favorable outcomes for the C group. For example, figure 4 shows that the mean percent time using cocaine at a severe level before treatment was similar for the four selected groups.

After admission to the index treatment, severe use was lower in the C group (inpatient and high-intensity outpatient and/or self-help) than in the inpatient only, multiple residential treatment, or inpatient and low-intensity outpatient and/or self-help groups (A, B, and E). Figure 5 compares the mean percent time of cocaine abstinence between treatment combinations A, B, C, and E. The performance of group C is the best following initial treatment. However, combination B also improves through time, reaching the same level as group C by the end of the first year after treatment.

In terms of excessive alcohol drinking, all four groups decreased similarly after treatment (figure 6). Similar findings were observed regarding other drug use and involvement in criminal activities and drug dealing. Although differences were not significant, group C consistently showed more favorable changes.

Table 3 presents before- and after-treatment outcome data on the variables just discussed, measured in terms of the percentage of patients from each treatment combination group rather than mean percent time. The most striking changes are again apparent in group C. For example, the proportion of patients using cocaine severely decreased from 89 to 18 (net change -71). The changes observed in the other treatment groups were less dramatic, although all followed the same trend toward improvement.

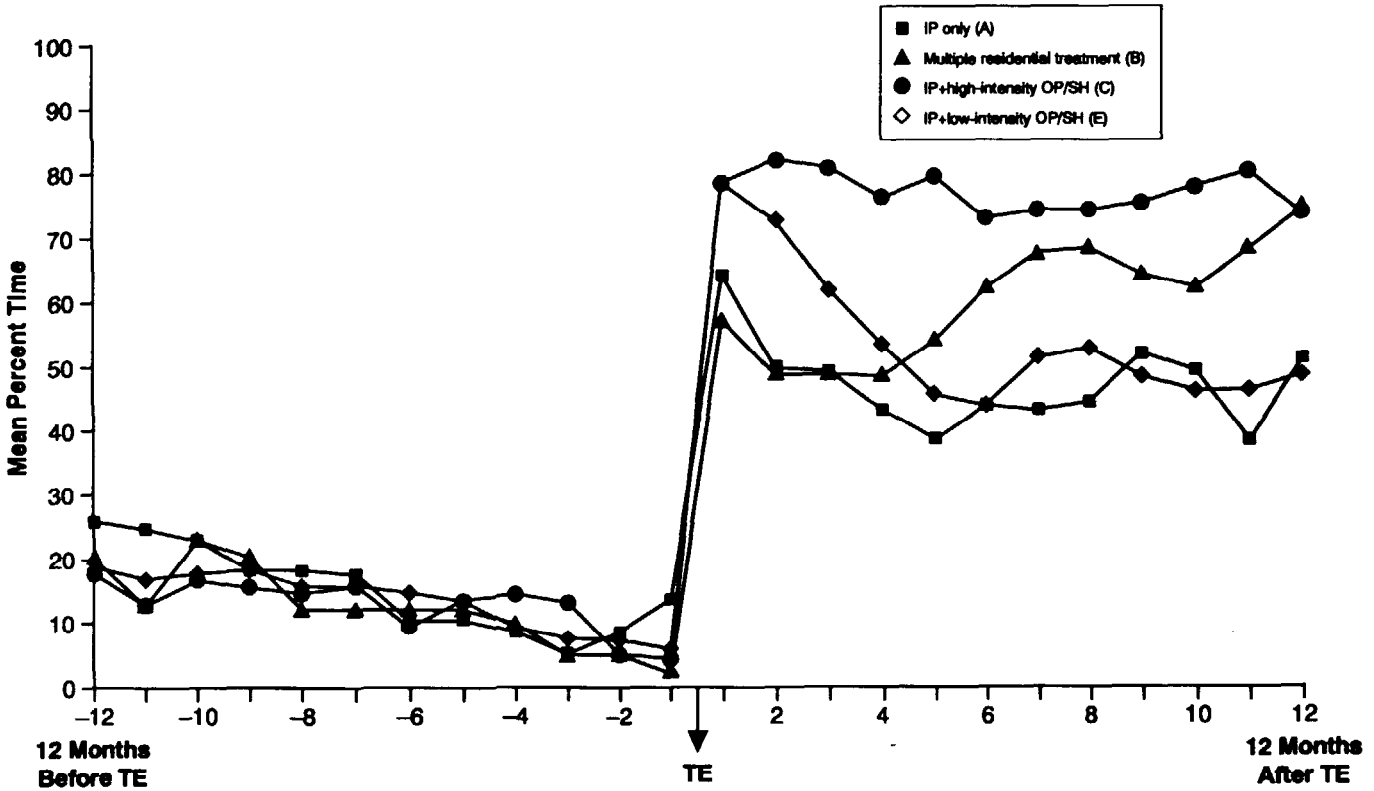
Use of marijuana and alcohol reflected minor changes compared with other variables (behaviors). The proportion of patients involved in criminal activities and drug dealing also decreased in group C in comparison with the other treatment groups, but there were only minor differences among groups regarding work tenure and involvement in interpersonal relationships. None of these differences were statistically significant.



KEY: TE=treatment entry; IP=inpatent; OP/SH=outpatient and/or self-help

NOTE: The letters A, B, C, and E within the box relate to column headings in table 2.

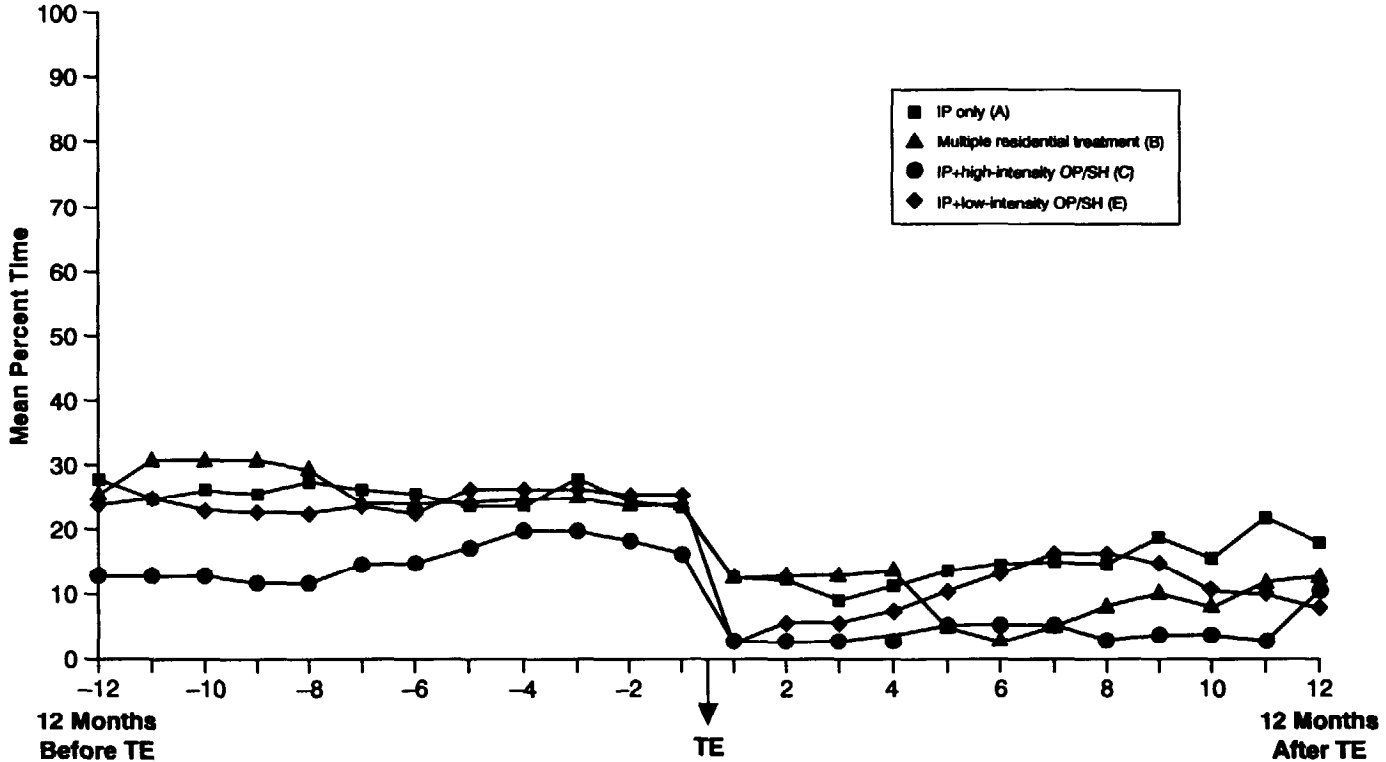
FIGURE 4. *Severe cocaine use*



KEY: TE=treatmententry; IP=inpatient; OP/SH=outpatient and/or self-help

NOTE: The letters A, B, C, and within the box relate to column headings in table 2.

FIGURE 5. *No cocaine use*



KEY: TE=treatment entry; IP=inpatient; OP/SH=outpatient and/or self-help

NOTE: The letters A, B, C, and E within the box relate to column headings in table 2.

FIGURE 6. *Excessive alcohol use*

TABLE 3. *CTE sample by treatment groups: 12 months before and after treatment entry (percent people*)*

	A One IP Admission (n=61)	B Multiple Residential Treatment (n=41)	C IP and OP/SH High Intensity (n=79)	D OP/SH High Intensity (n=8)	E IP and OP/SH Low Intensity (n=71)	F OP/SH Low Intensity (n=15)
Cocaine use						
None	40	56	33	50	58	50
Mild	31	22	31	37	37	14
Moderate	1	10	-6	-50	19	-15
Severe	-39	-32	-71	-75	-51	-28
Cocaine—route of administration						
Intranasal	-5	5	-14	0	-4	7
Crack	3	-10	-18	-25	-2	-7
Freebase	-10	-5	-12	0	-12	-22
Primo	-3	-5	-1	0	-5	7
Intravenous	-3	-5	-5	-13	-5	0
Other	-5	0	-5	0	-2	0
Marijuana use						
Daily	-15	-10	-16	-25	-11	-7
Other than daily	2	15	-15	-37	7	7
Excessive alcohol drinking	-9	-2	-10	-38	-17	-7
Any narcotic use	-2	0	-6	0	1	14
Any amphetamine use	-2	-2	-5	-13	-3	14
No drug use (excluding cocaine)	10	2	32	25	18	22
Dealing	-6	-12	-31	-12	-19	-7
Criminal activities	-7	-5	-11	-25	-10	-7
Working	5	0	2	0	-8	-7
Relationships	-2	-13	-14	25	-8	7

*Figures may not add to 100 percent because of rounding.

KEY: IP=inpatient; OP/SH=outpatient and/or self-help

SUMMARY AND DISCUSSION

This study investigated the clinical course of a cohort of patients who requested treatment for cocaine dependence at the West Los Angeles VA Hospital. Their behaviors were carefully assessed in two broad fields: use of cocaine and other substances and social performance and deviance.

A significant decrease in intranasal cocaine use for the sample as a whole was not apparent 1 year after entering index treatment. However, it should be noted that although 68 percent reported Intranasal use as the preferred route of administration at the time of initiation to cocaine, by 12 years later (the average period from initiation to treatment entry), most patients had shifted to crack smoking. At the time of entry into index treatment, only 32 percent were using by the intranasal route.

Crack use, the most common form of use during the year before entry into treatment, decreased for the sample as a whole after treatment entry to followup. Severe use of cocaine by any route also decreased substantially. Use of other drugs also declined, although not uniformly: Marijuana and excessive alcohol use decreased significantly, whereas the relatively low rates of use of narcotics and amphetamines changed little.

Work activities, engagement in stable relationships, and criminal activities did not show differences when comparing the year prior to treatment with the year after treatment Only one specifically drug-related behavior, dealing, did improve, and this change was statistically significant.

Most patients participated in other treatment modalities in addition to the index treatment within the period of followup. The demographic characteristics of the patients did not seem to influence the selection process, as suggested by the fact that there were no statistically significant differences in sociodemographic profile, regardless of the combination of treatment selected.

When these patients were grouped according to the treatment experiences reported within the followup year, interesting differences emerged. The combination of inpatient and outpatient with self-help groups was the most commonly selected and the one associated with more improvement. Therefore, clinical outcome appeared to be more related to the treatment combination chosen than to patient characteristics. Patients who selected inpatient care followed by intense involvement in outpatient care with self-help groups reported the longest periods of abstinence from cocaine and the lowest levels of cocaine use. This group was also significantly less involved in criminal activities and drug dealing. On the other hand, this group, with seemingly more favorable outcomes, did not show larger changes than other

groups in use of other drugs or alcohol, work stability, or maintenance of stable interpersonal relationships. In these respects, patients who participated in multiple residential programs did not display better outcomes for these behaviors. Their drug use decreased substantially over time, but most dimensions of social behavior showed less striking changes.

Overall, the results indicate a favorable response to the initiation of any treatment process, with more favorable outcomes for patients able to be engaged in frequent, longer term treatment participation. Further research needs to be done on the issue of treatment self-selection and intensity of self-selected treatment as influenced by motivational factors and other variables as they may be related to the emotional state of the individuals. Further research also needs to study the initial aspects or components of the treatment experience that prompted continued treatment involvement, either through increased retention or through a return to treatment if relapse occurred.

ACKNOWLEDGMENT

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Treatment of Cocaine Abuse and Dependence: Directions and Recommendations

Carl G. Leukefeld and Frank M. Tims

INTRODUCTION

Although some degree of progress in understanding pharmacological and psychosocial treatments that are generally effective has been made, much more work remains to be done. Recommendations reported in this monograph focus on understanding the client populations involved, existing treatments and treatments under development, and research requirements. Clearly, the number of problems addressed in a conference such as this is limited and cannot address the complexity of integrating work at many different levels. Nonetheless, an attempt was made to cover a broad range of material. The recommendations are presented under several headings, including consensus statements on research and practice needs.

RESEARCH ON CLIENT POPULATIONS

- Research should address clients diagnosed as cocaine dependent, using cocaine either alone or in combination with other drugs (including alcohol). The foci of such studies should include social and demographic characteristics, psychopathology, natural history, and treatment-seeking behavior.

- Studies should seek to increase understanding of client need and availability for treatment as well as diagnostic subtypes that may indicate differential response to available treatment.

- The diversity of client populations should be a services research focus for cocaine treatment. Given the differential access to treatment for these populations, special attention should be given to the treatment needs of pregnant women, mentally impaired chemical abusers, clients who are human immunodeficiency virus (HIV) seropositive, and cultural minorities.

- Attention should be given to clients with differing sets of natural contingencies, such as employed clients and those with different kinds of social networks that may be useful in understanding treatment effectiveness.

- Natural history studies are important to understand the context and dynamics of cocaine treatment. Little is known about how individuals recover from cocaine dependence over time and how key stages in recovery lead to treatment seeking and cessation of use. Thus, long-term studies of outcomes are important, both for treated and untreated cocaine abusers.

TREATMENT MODALITIES AND THERAPY RESEARCH

- Despite the enormous resources that became available for cocaine treatment research in the 1980s research related to cocaine treatment interventions has produced only limited results. However, the many studies under way should result in significant improvements in available treatments.

- Treatment studies should continue the present emphases on (1) identifying and systematically testing pharmacological agents that may be useful in achieving abstinence from cocaine and reducing the likelihood of relapse; (2) characterizing and understanding the processes and outcomes of existing treatments by using field studies with outcomes studied over a 1-year posttreatment period and longer; and (3) testing the efficacy of specific psychosocial interventions such as psychotherapies, behavioral treatments, and relapse prevention strategies.

- The need for theory-based treatment approaches should be recognized.

- Promising pharmacotherapies also should be field tested in clinical programs to understand issues related to compliance with medication regimens.

- The question of whether inpatient treatment has an inherent advantage over outpatient treatment must be addressed. Although dropout rates from outpatient programs are relatively high, it is not known whether inpatient programs are more effective.

- Studies should be designed and carried out to (1) improve retention in treatment for outpatient programs and (2) rigorously test inpatient vs. outpatient treatment for well-defined subgroups of clients.

- Treatment approaches regarded as experimental or nontraditional should be systematically investigated. For example, acupuncture is widely used in detoxification, yet its status as a somatic treatment for cocaine withdrawal remains to be scientifically established. Work by such practitioners as Michael Smith, M.D., at New York City's Lincoln Hospital has been widely recognized, and his data are encouraging; however, rigorous clinical trials of such interventions are difficult and have been frustrated by methodological and operational problems. Research in this area should continue to be encouraged.

- Other widely used approaches that should be examined include 1 P-step approaches, both as self-help programing and formal treatment.

- To improve existing treatment, there should be a systematic effort to integrate research and treatment. Studies should be undertaken to increase understanding of the factors and mechanisms related to client entry, engagement, retention, and compliance with treatment expectations. Such knowledge is essential to the ability to design effective treatments and improve existing treatments for cocaine-dependent clients.

- Research should develop and test criteria for client-treatment matching so that the most cost-effective treatments can be provided for cocaine-dependent clients.

- Additional research should focus on better understanding motivation as a factor for increasing the retention of cocaine users in treatment. This focus would include use of motivational incentives to enter and remain in treatment.

- There is a need to better understand the role of self-help in treating cocaine users.

- The association between compulsive sexual behaviors and compulsive use of cocaine needs to be better understood to strengthen relapse prevention efforts.

- The initial and high dropout rates from treatment during the first 60 days by cocaine users should receive specific attention when future studies are planned.

- Treatment programs should not be content to reach only those who present for treatment but also should seek to increase treatment entry through outreach and to contact those reluctant to enter treatment to

provide information and services to them that will reduce the degree of risk for HIV infection.

RESEARCH DESIGN ISSUES

A variety of study types and designs are necessary to understand cocaine dependence and response to treatment and to develop more effective treatments. Tightly controlled studies using randomized designs are necessary if the relationship of targeted cocaine treatment and treatment outcome is to be better understood. In such studies, inclusion and exclusion criteria must be specified that take previous study findings into consideration; treatments should be specified and be manual driven for replication; treatment doses and levels should be specified and dropout rates determined.

- In treatment outcome studies, the training and experience of treatment providers should be specified and documented.
- Outcome measures should include both behavioral and intrapsychic measures.
- Outcome analyses should include survival rates.
- Differences among study findings need to be better reconciled.

IMPLICATIONS FOR PRACTICE

Given that knowledge in the area of cocaine treatment is very preliminary, recommendations for practice in this area must also include cautions. Researchers are starting down a long road, because no specific protocols for cocaine treatment have been empirically validated. Still, existing treatment research findings and the experience of skilled practitioners make possible a series of generalizations for practice.

Treatment

- Although relatively little is known about what works for treatment of cocaine users, cocaine treatment can have negative aspects.
- Starting “where the client is” (e.g., history, comorbidity, legal status, what the client has to lose) is important for cocaine treatment, given the high dropout rates and low motivation.

- Program flexibility, open attitudes, and attention to boundaries are important to increase the retention of cocaine users, given their low motivation, impulsivity, and low acceptance of self-help as well as high staff burnout rates.

- Treatment contracts and contingencies should be clearly stated and agreed on at the outset of cocaine treatment.

- It is important to remember that cocaine addicts are not just alcoholics who have selected a different drug.

- Initial data and anecdotal information indicate that programs are most effective that include structure, intense and planned interventions, frequent attendance, flexibility, definition of treatment stages, urine testing, and targeted counseling.

- Interventions to increase client motivation have been reported anecdotally to be effective for some cocaine addicts when incorporated with frequent group meetings, urine testing, educational lectures, and individual counseling.

- Cognitive behavioral approaches for cocaine treatment are seen as appropriate, given that treatment for this group needs to be structured and specific.

- Pharmacotherapies for cocaine addicts are still undergoing testing, and recommendations are limited to approved uses, such as treatment of comorbidities. Practitioners are cautioned that some early trials of medications thought to be promising have had disappointing results.

- To the extent that efficacious medications become available, programs should pay particular attention to medications dosage and compliance issues.

- Cocaine addicts are difficult to treat, which necessitates a balanced approach for matching clients to treatment.

- Practitioners should be open to participating in research and keeping current with research findings.

Diagnosis

- The provision of treatment service must take into consideration the multiple problems associated with cocaine use, which include route of

administration (crack smoking, needle use), alcohol use, and compulsive sexual behavior,

- Psychiatric comorbidities are often present in cocaine users, including Axis I (especially depression and anxiety disorders) and Axis II diagnoses (American Psychiatric Association 1987). Although transient depression and some psychotic states associated with stimulant use may abate with entry into treatment, careful clinical evaluation of comorbidities on a continuing basis is needed.

- The implications of Axis II diagnoses, particularly antisocial personality disorder, for treatment planning must be considered.

Drug Testing

- Frequent and ongoing drug testing must be an integral part of treatment protocols for cocaine users.

Legal Issues

- Legal issues and legal involvement are important considerations when cocaine users receive treatment.

HIV/AIDS

- HIV/acquired immunodeficiency syndrome is a major risk associated with compulsive cocaine use, particularly for intravenous drug users and for women.

- The issue of HIV risk reduction is an important aspect of cocaine treatment.

Relapse

- Relapse is an essential characteristic of cocaine addiction.

- Cocaine addicts have high relapse rates as well as multiple relapses.

Tralnlng Issues

- Cocaine treatment training modules are needed.

- Counselors should be motivated to seek out research findings related to cocaine treatment as a means to increase their effectiveness and improve their practice.

- Counselors and outreach workers should receive training related to the specific characteristics of cocaine users and the implications for treatment.

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