

Nonatherosclerotic vascular changes may also mediate the effect of smoking on genital function. The vasoconstrictive effects of nicotine in cigarette smoke may impair the complicated vascular processes involved in erection (Benowitz 1988). This may be due in part to disturbances of prostaglandin production in the vascular endothelium or to an enhancement of platelet aggregation noted by several investigators (Nadler, Velasco, Horton 1983; Alster et al. 1986; Taylor et al. 1987; Lassila et al. 1988; Jeremy et al. 1986; FitzGerald, Oates, Nowak 1988; Chapter 6).

Finally, hormonal effects of cigarette smoking could alter sexual responsiveness and spermatogenesis. Alterations in the secretion of luteinizing hormone releasing hormone (Moss, Riskind, Dudley 1979) or catecholamines (Patra, Sanyal, Biswas 1979; Klaiber and Broverman 1988) are two such possibilities, but disturbances in sex hormones, particularly low testosterone or high estradiol, have been suggested more often. In general, men who smoke cigarettes have similar or higher testosterone levels than nonsmokers; thus, it is difficult to associate low testosterone with sexual dysfunction among men who smoke (Briggs 1973; Shaarawy and Mahmoud 1982; Andersen, Semczuk, Tabor 1984; Handelsman et al. 1984; Deslypere and Vermeulen 1984; Vermeulen and Deslypere 1985; Vogt, Heller, Borelli 1986; Barrett-Connor and Khaw 1987; Dai et al. 1988; Lichtenstein et al. 1987; Meikle et al. 1987; Klaiber and Broverman 1988). The adrenal androgens (i.e., androstenedione, dehydroepiandrosterone, and dehydroepiandrosterone sulfate) are elevated in male smokers (Barrett-Connor, Khaw, Yen 1986; Barrett-Connor and Khaw 1987; Dai et al. 1988). Aromatization of these hormones may explain the elevated levels of estradiol among males who currently smoke (Entrican, Mackie, Douglas 1978; Lindholm et al. 1982; Klaiber, Broverman, Dalen 1984; Barrett-Connor and Khaw 1987; Lichtenstein et al. 1987; Dai et al. 1988; Klaiber and Broverman 1988). Elevations in circulating estrogens may interfere with spermatogenesis and sexual behavior (Klaiber and Broverman 1988); such an explanation remains speculative.

Several studies have suggested that the estradiol and testosterone levels of former smokers are comparable with those of never smokers (Deslypere and Vermeulen 1984; Vogt, Heller, Borelli 1986; Barrett-Connor and Khaw 1987; Lichtenstein et al. 1987). This observation implies that smoking cessation is likely to reverse any effect mediated by disturbances of these hormones. Alternatively, former smokers may have had a lower total dose. Androstenedione and dehydroepiandrosterone sulfate levels may be modestly higher in former smokers compared with those of never smokers (Barrett-Connor, Khaw, Yen 1986; Barrett-Connor and Khaw 1987; Lichtenstein et al. 1987). However, the relevance of these findings to sexual capabilities is unlikely to be significant. These hormones appear to have little intrinsic potency, and are important because of their capacity for conversion to more active hormones such as testosterone and estradiol (Baxter and Tyrrell 1987).

Sexual Activity and Performance

Surveys of the relationship between smoking and frequency of sexual episodes (intercourse or masturbation) have generally found smokers to be as sexually active as nonsmokers. In two studies of elderly men, sexual activity in smokers was comparable

with that of nonsmokers (Tsitouras, Martin, Harman 1982; Diokno, Brown, Herzog 1990); in a cross-sectional study of younger men, no differences were indicated (Vogt, Heller, Borelli 1986). Adolescent smokers are more sexually active than nonsmokers (Russell 1971; Malcolm and Shephard 1978). In contrast, Cendron and Vallery-Masson (1971), in studying 70 men older than age 45, found that those who reported smoking between ages 25 to 40 also reported being less sexually active at those ages than those who denied smoking. Overall, it appears that the relation between current cigarette smoking and the level of male sexual activity is not very strong. Among younger males, personality differences between smokers and nonsmokers may dominate any adverse physiologic effects (Russell 1971).

If, as the aforementioned studies suggest, current smokers (or ever smokers) are similar in sexual habits to never smokers, then no differences would be expected for former smokers. Vogt, Heller, and Borelli (1986) evaluated 239 healthy male volunteers aged 19 to 40 without genital abnormalities or diseases and taking no medications. The study results indicated that the 36 former smokers among them were comparable with both never smokers and current smokers in sexual activity (Vogt, Heller, Borelli 1986).

Impotence, the inability to maintain an erection sufficient for intercourse, has been more extensively investigated in relation to smoking. Among treated hypertensives aged 40 to 64, cigarette smokers were more likely to report impotence, although the differences were modest and not statistically significant (Bühler et al. 1988). A statistically significant association was reported among men undergoing radiation therapy for prostatic cancer (Goldstein et al. 1984). However, in both studies, potentially important covariates, such as alcohol intake and age, were not considered. Two other studies of men undergoing impotence evaluation indicated a high prevalence of smoking and suggested an association between smoking with impotence (Virag, Bouilly, Frydman 1985; Condra et al. 1986). Unfortunately, neither study included a sexually functional control group, and both studies based their conclusions on questionable comparisons of the smoking rate in their clinic patients with that of the general population. Vogt, Heller, and Borelli (1986) studied a group of young volunteers without selecting for impotence. These investigators found that smokers reported more difficulties with decreased libido and erection than nonsmokers (Vogt, Heller, Borelli 1986). This analysis did not consider former smokers separately.

An acute effect of smoking on sexual performance is suggested by a study of smokers monitored while viewing erotic films (Gilbert, Hagen, D'Agostino 1986). The successive smoking of 2 cigarettes high in nicotine content significantly impaired the rate of penile diameter change compared with that observed after smoking 1 cigarette or eating candy. However, the clinical relevance of these observations is unknown because frank impotence was not studied.

An important clinical measurement in the evaluation of impotence is the PBI, which indicates the systolic blood pressure in the penis divided by systolic blood pressure in the arm. A low value is considered to be evidence of compromise of the penile blood supply, a factor which may interfere with erection. Several studies of men undergoing evaluation of impotence reported an association between smoking and low PBI (Jacobs et al. 1983; Condra et al. 1986; Bornman and Du Plessis 1986; DePalma et al. 1987).

Among impotent diabetics, evidence of nocturnal erections was found less in smokers compared with nonsmokers, thus suggesting an increased risk of vascular compromise in smokers (Takahashi and Hirata 1988). However, other studies of impotent men have not reported differences between smokers and nonsmokers in vascular measurements (Wabrek et al. 1983; Virag, Bouilly, Frydman 1985; Kaiser et al. 1988). Most of these investigations did not consider covariates such as alcohol use, although one study suggested that smoking in isolation had little effect and that an association of smoking with an abnormal PBI may be due to the association of smoking with other arterial risk factors (Virag, Bouilly, Frydman 1985).

In many of the studies relating smoking and impotence, the investigators did not distinguish nonsmokers as ex-smokers or never smokers. However, two investigations considered former smokers separately (Table 15). Wabrek and associates (1983) studied 120 men who were referred to a hospital-based erectile dysfunction program. The percentage of former smokers was approximately the same among men with impaired, borderline, and normal PBI. Condra and colleagues (1986) reported on 178 patients also referred for impotence. Former smokers were not separated for analysis, but this study suggests that the PBI for ex-smokers is more normal than in current smokers (Condra et al. 1986). However, neither study considered important covariates, such as age and alcohol use (Wabrek et al. 1983; Condra et al. 1986).

Two recent investigations considered the effect of smoking cessation on impotence. Forsberg and colleagues (1979) noted that two smoking men who were impotent improved their functioning after smoking cessation at the same time that measures of penile blood flow improved. However, it is not clear how these two men were selected for this study, and control subjects were lacking. Elist, Jarman, and Edson (1984) reported on the treatment of 60 impotent men. Twenty nonsmokers were treated with the vasodilator isoxsuprine, and 40 smokers were either advised to stop smoking or advised to stop smoking and also given isoxsuprine. There was no mention of randomization, and there was no untreated control group. Similar proportions improved whether given isoxsuprine, convinced to stop smoking, or both (Elist, Jarman, Edson 1984).

Animal data have not elucidated the relation between smoking and either sexual activity or impotence. Soulairac and Soulairac (1972) studied the sexual activity of male rats given either a 0.6 mg/kg or a 1.2 mg/kg dose of nicotine subcutaneously. The sexual activity of the rats after the nicotine administration was compared with that before treatment. Sexual activity was markedly increased with the 0.6 mg/kg dose, and at 1.2 mg/kg there was trembling and twitching and no sexual behavior for 2 to 3 hours. In contrast, exposure to smoke from 1 cigarette has been shown to interfere with the physiology of erection in male dogs (Juenemann et al. 1987).

In summary, the level of sexual activity does not appear to be affected by cigarette smoking. Cigarette smoking may be associated with impaired male sexual performance. Among impotent men, smokers are more likely to have an underlying vascular problem. These associations have been more commonly noted in groups already at high risk of impotence, such as hypertensives and diabetics. However, these associations have not been consistently observed, and the positive findings may be due to the association of smoking with other factors such as alcohol use. Moreover, because the

TABLE 15.—Sexual performance among male former smokers

Reference	Study population	Findings	Comments
Vogt, Heller, Obe (1984)	Volunteers	No differences in sexual activity between former, current, and never smokers	No consideration of covariates
Wabrek et al. (1983)	Impotent patients	Proportion of former smokers similar in men with abnormal, impaired, and normal PBI	No consideration of covariates
Condra et al. (1986)	Impotent patients	Indications that former smokers had more normal PBI than current smokers	No consideration of covariates
Forsberg et al. (1979)	Impotent patients	Two smokers improved sexual performance after smoking cessation	No controls
Elist, Jarman, Edson (1984)	Impotent patients	Smoking cessation improved sexual performance as well as vasodilator	No untreated and controls

NOTE: PBI=penile brachial index.

studies of PBI are generated entirely in referral populations, it is unclear if these findings can be generalized. Because of limited and uncontrolled data, no conclusions can be drawn regarding sexual performance or PBI among former smokers.

Sperm Density and Quality

Measurements of sperm density, morphology, and motility are commonly used assessments of sperm quality (Rogers and Russell 1987). Over 20 studies have dealt with the relation of cigarette smoking to sperm density, motility, and morphology (Vicizian 1968a; Schirren and Gey 1969; Campbell and Harrison 1979; Vogel, Broverman, Klaiber 1979; Stekhun 1980; Nebe and Schirren 1980; Evans et al. 1981; Godfrey 1981; Rodriguez-Rigau, Smith, Steinberger 1982; Shaarawy and Mahmoud 1982; Buiatti et al. 1984; Andersen, Semczuk, Tabor 1984; Nordenson, Abramsson, Duchek 1984; Handelsman et al. 1984; Hoidas et al. 1985; Kulikauskas, Blaustein, Ablin 1985; Ablin 1986; Rantala and Koskimies 1987; Vogt, Heller, Borelli 1986; Klaiber et al. 1987; Dikshit, Buch, Mansuri 1987; Saaranen et al. 1987; Klaiber and Broverman 1988; Saaranen et al. 1989; Rui, Oldereid, Purvis 1989; Marshburn, Sloan, Hammond 1989; Oldereid et al. 1989). Table 16 summarizes the findings of those studies that reported mean values for smokers and nonsmokers. In most studies, men smoking cigarettes had lower sperm density, although many of these studies indicated differences that were not statistically significant. The smokers' average sperm density was at least 80 percent that of the nonsmokers. In several studies sperm morphology or motility was impaired

in smokers compared with nonsmokers, but this was a less consistent finding. Few studies have considered the spermatid chromosomal characteristics of smokers compared with nonsmokers. Nordenson, Abramsson, and Duchek (1984) found smokers to have more chromosome breaks than nonsmokers, but Oldereid and coworkers (1989) reported no differences in DNA condensation as assessed by flow cytometry.

Although differences in mean values of any of these measurements suggest an effect of smoking, the most relevant parameter may be the percentage of smokers and nonsmokers who exhibit deficiencies in sperm density, morphology, or motility. Several researchers have investigated the relative risk of azoospermia (no sperm in the ejaculate) or oligospermia (reduced number of sperm) in smokers versus nonsmokers or never smokers (Table 17). Although the range of relative risks is wide, there is a clear pattern of increased risk among smokers. However, the clinical significance of oligospermia is uncertain. Most studies have used one ejaculate per man, although the within-man coefficient of variation can be as much as 60 percent (Schenker et al. 1988).

The available information suggests that current smoking is related to low sperm density. However, these data are limited. Many studies investigated men visiting infertility clinics, limiting generalization. Moreover, if male smokers with poor sperm quality are most likely to attend these clinics, selection biases may distort the results. Also, many of these studies were relatively informal. Few of the studies accounted for potentially confounding factors such as alcohol use and age. Less than half of the studies documented that a period of sexual abstinence was required for subjects before giving the sperm sample, and few of the studies analyzed multiple semen specimens as some authorities recommend (Zaneveld and Jeyendran 1988). Most studies have a small number of subjects, and their statistical power is limited for this reason. In some of the studies, it is not clear whether former smokers were included in the smoker or nonsmoker group.

A few studies investigated ex-smokers (Table 18). One was a case-control study of male infertility in Italy (Buiatti et al. 1984). The cases were azoospermic or oligospermic men being treated for infertility at the University of Florence. Controls were University outpatients who had normal sperm counts. There were no significant differences between smoking categories in the percentage of men with low sperm counts. Vogt, Heller, and Borelli (1986) evaluated 239 male volunteers. Among former smokers (those who had smoked for at least 1 year and those who had stopped smoking for at least 1 year), percent normal spermatozoa, percent young forms, percent old forms, and percent degenerate forms were comparable with those of never smokers. Stekhun (1980) reported that 42 percent of former smokers had oligospermia compared with 18 percent of never smokers. Schirren and Gey (1969) reported that three men with low sperm density and motility showed substantial increases in these parameters 3 to 6 months after smoking cessation. However, there were no controls defined in this analysis. Because of the limitations of the four studies, no conclusions are possible regarding the effects of smoking cessation on sperm quality in humans.

Animal studies have not been particularly informative. In some studies, rodents that were heavily exposed to nicotine or cigarette smoke demonstrated testicular atrophy, but this has not been a general finding (Larson, Haag, Silvette 1961; Larson and Silvette 1968; Dontenwill et al. 1973b; Essenberg, Fagan, Malerstein 1951; Thienes 1960;

TABLE 16.—Sperm quality among smokers and nonsmokers

Reference	Study population (number of nonsmokers/number of smokers)	Ratio of measure among smokers to that among nonsmokers			Comments
		Sperm density	% Normal sperm	% Motile sperm	
Viczian (1968a)	Obstetrics clinic (smokers only) (50/120)	0.82	0.90	0.77	No decrease in sperm density with increasing amounts smoked; controls were fertile men
Vogel, Broverman, Klaiber (1979)	Unstated (39/17)	0.60 ^d	NS	0.87 ^d	
Nebe and Schirren (1980)	Andrology clinic (455/451)	1.01	—	—	
Evans et al. (1981)	Subfertility clinic (43/43)	—	0.92 ^d	—	Smokers and nonsmokers matched on sperm density
Godfrey (1981)	Infertility clinic (74/75)	—	0.94	—	Oligospermic ^b men omitted ($<1 \times 10^6$ /mL)
Spira et al. (1981)	Vasectomy candidates (173/122)	0.75 ^d	0.94	0.93 ^d	
	Infertility clinic (228/292)	0.86	0.91 ^a	0.97	
Rodriguez-Rigau, Smith, Steinberger (1982)	Infertility clinic (101/58)	0.95	1.00	1.00	
Shaarawy and Mahmoud (1982)	Volunteers (20/25)	0.93	0.69 ^d	0.67 ^d	All subjects were fertile
Andersen, Senczuk, Tabor (1984)	Infertility clinic (86/137)	0.99	1.07	1.08	10 azoospermic ^c smokers omitted from analysis
Handelsman et al. (1984)	Semen donors (71/23)	0.67	0.98	0.93 ^d	
Kulikauskas, Blaustein, Ablin (1985)	Fertility clinic (135/103)	0.43 ^d	1.00	0.78 ^d	
Rantala and Koskimies (1987)	Infertility clinic (50/60)	0.90	0.98	0.95	Oligospermic ^b men omitted ($<1 \times$ 10^6 /mL)
Vogt, Heller, Borelli (1986)	Volunteers (52/150)	0.81 ^d	1.01	0.99	

TABLE 16.—Continued

Reference	Study population (number of nonsmokers/number of smokers)	Ratio of measure among smokers to that among nonsmokers			Comments
		Sperm density	% Normal sperm	% Motile sperm	
Saaranen et al. (1987)	Infertility clinic (110/54)	0.81	1.00	0.97	Azoospermic ^c men omitted
Klaiber et al. (1987)	Paid volunteers (90/60)	0.77 ^d	0.98	0.89 ^d	
	Males from infertile couples (43/51)	0.52 ^d	0.94	0.80 ^d	
Dikshit, Buch, Mansuri (1987)	Infertility clinic (288/219)	0.96	0.99	1.01	
Klaiber and Broverman (1988)	Volunteers (21/22)	0.93	1.02	0.97	
Saaranen et al. (1989)	Semen donors and fertile men (32/28)	0.83	0.95	1.01	
Marshburn, Sloan, Hammond (1989)	Infertility clinic (294/152)	0.92	0.99	0.94	
Rui, Oldereid, Purvis (1989)	Infertility clinic (203/147)	1.17	1.05	0.96	Azoospermic ^c men omitted
Effendy and Krause (1987)	Infertility clinic (61/31)	1.13	1.06	1.12	

^dStatistically significant difference ($p < 0.05$) between smokers and nonsmokers.

^bOligospermia is a low sperm count.

^cAzoospermia is the absence of sperm.

Thompson et al. 1973; Patra, Sanyal, Biswas 1979; Biswas and Patra 1981). Some studies have noted a disturbance of spermatogenesis, a decrease in the interstitium, or a destruction of the seminiferous epithelium (Larson, Haag, Silvette 1961; Larson and Silvette 1968; Essenberg, Fagan, Malerstein 1951; Viczian 1968b; Wyrobeck and Bruce 1975; Biswas and Patra 1981; Alwachi et al. 1986; El-Sayad et al. 1987). The results may depend on the duration and dose of exposure, as well as on the ages at which exposure takes place. Moreover, the relevance to humans of the large doses given to the animals is uncertain. None of these investigations considered spermatogenesis after exposure ended; thus, few conclusions may be drawn regarding the effect of cessation of exposure even within the limitations of the animal studies.

TABLE 17.—Estimated relative risk of azoospermia or oligospermia among smokers versus nonsmokers or never smokers

Reference	Study population (number of nonsmokers/ number of smokers)	Contrast	Estimated relative risk in smokers	Comments
Schirren and Gey (1969)	Andrology clinic (580/1377)	Azoospermia; smokers vs. nonsmokers	1.2	
		Oligospermia; smokers vs. nonsmokers	1.2	Oligospermia not defined
Campbell and Harrison (1979)	Fertility clinic (119/134)	Oligospermia ($<40 \times 10^6$ /mL); smokers vs. nonsmokers	1.6 ^d	Azoospermic men omitted
Stekhun (1980)	Not stated (33/105)	Oligospermia; current smokers vs. never smokers	3.2 ^d	Oligospermia not defined
Rodriguez-Rigau, Smith, Steinberger (1982)	Fertility clinic (101/58)	Oligospermia; ($<20 \times 10^6$ /mL); current smokers vs. nonsmokers	0.9	
Buiatti et al. (1984)	Fertility clinic (80/135)	Oligospermia ($<20 \times 10^6$ /mL); smokers vs. nonsmokers	1.0	
Andersen, Semczuk, Tabor (1984)	Fertility clinic (86/147)	Azoospermia; current smokers vs. nonsmokers	∞^a	
Ablin (1986)	Not stated (135/238)	Oligospermia ($<40 \times 10^6$ /mL); smokers vs. nonsmokers	2.9 ^d	
Vogt, Heller, Borelli (1986)	Volunteers (52/150)	Oligospermia ($<1 \times$ 10^6 /mL); current smokers vs. never smokers	∞	
		Azoospermia; current smokers vs. never smokers	∞	
Klaiber et al. (1987)	Volunteers with varicocele (11/9)	Oligospermia ($<20 \times$ 10^6 /mL); current smokers vs. never smokers	∞	
	Volunteers without varicocele (79/61)	Oligospermia ($<20 \times$ 10^6 /mL); current smokers vs. never smokers	1.3	
	Fertility clinic with varicocele (8/21)	Oligospermia ($<20 \times$ 10^6 /mL); current smokers vs. never smokers	7.7	

TABLE 17.—Continued

Reference	Study population (number of nonsmokers/ number of smokers)	Contrast	Estimated relative risk in smokers	Comments
Klaiber et al. (1987) (continued)	Fertility clinic without varicocele (35/30)	Oligospermia (<20 × 10 ⁶ /mL); current smokers vs. never smokers	1.5	
Dikshit, Buch, Mansuri (1987)	Fertility clinic (219/288)	Oligospermia (<20 × 10 ⁶ /mL); current smokers vs. never smokers Azoospermia; current smokers vs. never smokers	1.2 1.1	

NOTE: Azoospermia is the absence of sperm; oligospermia is a low sperm count.

*Estimated relative risk statistically significantly (p<0.05) different from 1.0.

TABLE 18.—Sperm quality among former smokers

Reference	Study population	Findings	Comments
Schirren and Gey (1969)	Andrology patients	Smoking cessation improved sperm density and motility in 3 smokers	No control
Stekhun (1980)	Not stated	Former smokers had RR of 2.3 for oligospermia	Oligospermia not defined
Buiatti et al. (1984)	Male partners of infertile couples	No difference between current, former, and never smokers in prevalence of azoo-/oligospermia	
Vogt, Heller, Borelli (1986)	Healthy volunteers	No difference between current, former, and never smokers in sperm morphology	No consideration of covariates

NOTE: RR=relative risk.

CONCLUSIONS

1. Women who stop smoking before becoming pregnant have infants of the same birthweight as those born to never smokers.
2. Pregnant smokers who stop smoking at any time up to the 30th week of gestation have infants with higher birthweight than do women who smoke throughout pregnancy. Quitting in the first 3 to 4 months of pregnancy and abstaining throughout the remainder of pregnancy protect the fetus from the adverse effects of smoking on birthweight.
3. Evidence from two intervention trials suggests that reducing daily cigarette consumption without quitting has little or no benefit for birthweight.
4. Recent estimates of the prevalence of smoking during pregnancy, combined with an estimate of the relative risk of low birthweight outcome in smokers, suggest that 17 to 26 percent of low birthweight births could be prevented by eliminating smoking during pregnancy; in groups with a high prevalence of smoking (e.g., women with less than a high school education), 29 to 42 percent of low birthweight births might be prevented by elimination of cigarette smoking during pregnancy.
5. Approximately 30 percent of women who are cigarette smokers quit after recognition of pregnancy, with greater proportions quitting among married women and especially among women with higher levels of educational attainment.
6. Smoking causes women to have natural menopause 1 to 2 years early. Former smokers have an age at natural menopause similar to that of never smokers.

References

- ABLIN, R.J. Cigarette smoking and quality of sperm. (Letter.) *New York State Journal of Medicine* 86(2):108, February 1986.
- ADENA, M.A., GALLAGHER, H.G. Cigarette smoking and the age at menopause. *Annals of Human Biology* 9(2):121-130, 1982.
- ALBERMAN, E., CREASY, M., ELLIOTT, M., SPICER, C. Maternal factors associated with fetal chromosomal anomalies in spontaneous abortions. *British Journal of Obstetrics and Gynaecology* 83(3):621-627, August 1976.
- ALSTER, P., BRANDT, R., KOUL, B.L., NOWAK, J., SONNENFELD, T. Effect of nicotine on prostacyclin formation in human endocardium *in vitro*. *General Pharmacology* 17(4):441-444, 1986.
- ALWACHI, S.N., AL-KOBAISI, M.F., MAHMOUD, F.A., ZAHID, Z.R. Possible effect of nicotine on the spermatogenesis and testicular activity of the mature male albino mice. *Journal of Biological Science Research* 17(3):185-194, 1986.
- ANDERSEN, A.N., SEMCZUK, M., TABOR, A. Prolactin and pituitary-gonadal function in cigarette smoking infertile patients. *Andrologia* 16(5):391-396, 1984.
- ANDERSEN, F.S., TRANSBOL, I., CHRISTIANSEN, C. Is cigarette smoking a promoter of the menopause? *Acta Medica Scandinavica* 212:137-139, 1982.
- ANDERSON, G.D., BLIDNER, I.N., MCCLEMONT, S., SINCLAIR, J.C. Determinants of size at birth in a Canadian population. *American Journal of Obstetrics and Gynecology* 150(3):236-244, October 1, 1984.
- ANDERSSON, K., ENEROTH, P., FUXE, K., HÄRFSTRAND, A. Effects of acute intermittent exposure to cigarette smoke on hypothalamic and preoptic catecholamine nerve terminal systems and on neuroendocrine function in the diestrous rat. *Archives of Pharmacology* 337:131-139, 1988.
- ANDERSSON, K., FUXE, K., ENEROTH, P., AGNATI, L. Differential effects of mecamylamine on the nicotine induced changes in amine levels and turnover in hypothalamic dopamine and noradrenaline nerve terminal systems and in the secretion of adenohipophyseal hormones in the castrated female rat. Evidence for involvement of cholinergic nicotine-like receptors. *Acta Physiologica Scandinavica* 120:489-498, 1984.
- ANDERSSON, K., FUXE, K., ENEROTH, P., GUSTAFSSON, J.-A., AGNATI, L.F. Mecamylamine induced blockade of nicotine induced inhibition of gonadotrophin and TSH secretion and of nicotine induced increases of catecholamine turnover in the rat hypothalamus. *Acta Physiologica Scandinavica* 479(Supplement):27-29, 1980.
- ANDREWS, J., MCGARRY, J.M. A community study of smoking in pregnancy. *Journal of Obstetrics and Gynaecology of the British Commonwealth* 79(12):1057-1073, December 1972.
- ATHAYDE, E. Incidencia de abortos e mortalidade nas operarias da industria de fumo. (Inquirito realizada na regioo fumageira da Bahia). *Brasil-Med* 62:237-239, 1948.
- BAILEY, A., ROBINSON, D., VESSEY, M. Smoking and age of natural menopause. (Letter.) *Lancet* 2(8040):722, October 1, 1977.
- BAIRD, D.D., WILCOX, A.J. Cigarette smoking associated with delayed conception. *Journal of the American Medical Association* 253(20):2979-2983, May 24-31, 1985.
- BARBIERI, R.L., GOCHBERG, J., RYAN, K.J. Nicotine, cotinine, and anabasine inhibit aromatase in human trophoblast *in vitro*. *Journal of Clinical Investigation* 77:1727-1733, June 1986.
- BARBIERI, R.L., MCSHANE, P.M., RYAN, K.J. Constituents of cigarette smoke inhibit human granulosa cell aromatase. *Fertility and Sterility* 46(2):232-236, August 1986.

- BARNDT, R. JR., BLANKENHORN, D.H., CRAWFORD, D.W., BROOKS, S.H. Regression and progression of early femoral atherosclerosis in treated hyperlipoproteinemic patients. *Annals of Internal Medicine* 86:139-146, 1977.
- BARON, J.A. Cigarette smoking and age at natural menopause. In: Wald, N., Baron, J.A. (eds.) *Smoking and Hormone-Related Disorders*. Oxford: Oxford University Press, 1990, pp. 57-63.
- BARON, J.A., LA VECCHIA, C., LEVI, F. The anti-estrogenic effect of cigarette smoking in women. *American Journal of Obstetrics and Gynecology* 162(2):502-514, February 1990.
- BARRETT-CONNOR, E., KHAW, K.-T. Cigarette smoking and increased endogenous estrogen levels in men. *American Journal of Epidemiology* 126(2):187-192, 1987.
- BARRETT-CONNOR, E., KHAW, K.-T., YEN, S.S.C. A prospective study of dehydroepiandrosterone sulfate, mortality, and cardiovascular disease. *New England Journal of Medicine* 315(24):1519-1524, 1986.
- BAXTER, J.D., TYRRELL, J.B. The adrenal cortex. In: Felig, P., Baxter, J.D., Broadus, A.E., Frohman, L.A. (eds.) *Endocrinology and Metabolism*. Second Edition. New York: McGraw-Hill, 1987, pp. 511-573.
- BENOWITZ, N.L. Pharmacologic aspects of cigarette smoking and nicotine addiction. *New England Journal of Medicine* 319(20):1318-1330, November 17, 1988.
- BERKOWITZ, G.S., HOLFORD, T.R., BERKOWITZ, R.L. Effects of cigarette smoking, alcohol, coffee and tea consumption on preterm delivery. *Early Human Development* 7(3):239-250, 1982.
- BERNHARD, P. Sichere schaden des Zigarettenrauchens bei der Frau. [Certain injurious effects of cigarette smoking on women.] *Medizinische Monatsschrift* 3:58-60, 1949.
- BISWAS, N.M., PATRA, P.B. Role of testosterone propionate on spermatogenesis following chronic nicotine administration in immature rats. *Indian Journal of Experimental Biology* 19:604-606, July 1981.
- BLAKE, C.A. Parallelism and divergence in luteinizing hormone and follicle-stimulating hormone release in nicotine-treated rats. *Proceedings of the Society for Experimental Biology and Medicine* 145:716-720, 1974.
- BLAKE, C.A., NORMAN, R.L., SAWYER, C.H. Localization of the inhibitory actions of estrogen and nicotine on release of luteinizing hormone in rats. *Neuroendocrinology* 16:22-35, 1974.
- BLAKE, C.A., SCARAMUZZI, R.J., NORMAN, R.L., KANEMATSU, S., SAWYER, C.H. Effect of nicotine on the proestrous ovulatory surge of LH in the rat. *Endocrinology* 91(5):1253-1258, November 1972a.
- BLAKE, C.A., SCARAMUZZI, R.J., NORMAN, R.L., KANEMATSU, S., SAWYER, C.H. Nicotine delays the ovulatory surge of luteinizing hormone in the rat. *Proceedings of the Society for Experimental Biology and Medicine* 141(3):1014-1016, December 1972b.
- BORNMAN, M.S., DU PLESSIS, D.J. Smoking and vascular impotence. *South African Medical Journal* 70(6):329-330, September 13, 1986.
- BRAMBILLA, D.J., MCKINLAY, S.M. A prospective study of factors affecting age at menopause. *Journal of Clinical Epidemiology* 42(11):1031-1039, 1989.
- BRIGGS, M.H. Cigarette smoking and infertility in men. *Medical Journal of Australia* 1(12):616-617, March 24, 1973.
- BROWN, S., VESSEY, M., STRATTON, I. The influence of method of contraception and cigarette smoking on menstrual patterns. *British Journal of Obstetrics and Gynaecology* 95:905-910, September 1988.
- BUCK, G.M., COOKFAIR, D.L., MICHALEK, A.M., NASCA, P.C., STANDFAST, S.J., SEVER, L.E., KRAMER, A.A. Intrauterine growth retardation and risk of sudden infant death syndrome (SIDS). *American Journal of Epidemiology* 129(5):874-884, May 1989.

- BÜHLER, F.R., VESANEN, K., WATTERS, J.T., BOLLI, P. Impact of smoking on heart attacks, strokes, blood pressure control, drug dose, and quality of life aspects in the International Prospective Primary Prevention Study in Hypertension. *American Heart Journal* 115 (1):282–288, January 1988.
- BUIATTI, E., BARCHIELLI, A., GEDDES, M., NASTASI, L., KRIEBEL, D., FRANCHINI, M., SCARSELLI, G. Risk factors in male infertility: A case-control study. *Archives of Environmental Health* 39(4):266–270, July–August 1984.
- BUTLER, N.R., GOLDSTEIN, H., ROSS, E.M. Cigarette smoking in pregnancy: Its influence on birth weight and perinatal mortality. *British Medical Journal* 2:127–130, April 15, 1972.
- CAMPBELL, J.M., HARRISON, K.L. Smoking and infertility. (Letter.) *Medical Journal of Australia* 1:342–343, April 21, 1979.
- CAMPBELL, O.M., GRAY, R.H. Smoking and ectopic pregnancy: A multinational case-control study. In: Rosenberg, M.J. (ed.) *Smoking and Reproductive Health*. Littleton, Massachusetts: PSG Publishing, 1987, pp. 70–75.
- CENDRON, N., VALLERY-MASSON, J. Tabac et comportement sexuel chez l'homme. *Vie Médicale* 25:3027–3030, July 1971.
- CHOW, W.-H., DALING, J.R., WEISS, N.S., VOIGT, L.F. Maternal cigarette smoking and tubal pregnancy. *Obstetrics and Gynecology* 71(2):167–170, February 1988.
- COMMITTEE TO STUDY THE PREVENTION OF LOW BIRTHWEIGHT. *Preventing Low Birthweight*. Washington, D.C.: National Academy Press, 1985.
- COMSTOCK, G.W., LUNDIN, F.E. JR. Parental smoking and perinatal mortality. *American Journal of Obstetrics and Gynecology* 98(5):708–718, July 1, 1967.
- CONDRA, M., MORALES, A., OWEN, J.A., SURRIDGE, D.H., FENEMORE, J. Prevalence and significance of tobacco smoking in impotence. *Urology* 27(6):495–498, June 1986.
- COOPER, L. An Epidemiologic Assessment of Low Birth Weight and Smoking Behavior in a Black Urban Population. Doctoral Dissertation. University of Maryland, 1989.
- COPE, I., LANCASTER, P., STEVENS, L. Smoking in pregnancy. *Medical Journal of Australia* 1:673–677, April 7, 1973.
- COUNSILMAN, J.J., MACKAY, E.V. Cigarette smoking by pregnant women with particular reference to their past and subsequent breast feeding behaviour. *Australian and New Zealand Journal of Obstetrics and Gynaecology* 25(2):101–106, May 1985.
- DAI, W.S., GUTAI, J.P., KULLER, L.H., CAULEY, J.A. Cigarette smoking and serum sex hormones in men. *American Journal of Epidemiology* 128(4):796–805, 1988.
- DALING, J., WEISS, N., SPADONI, L., MOORE, D.E., VOIGT, L. Cigarette smoking and primary tubal infertility. In: Rosenberg, M.J. (ed.) *Smoking and Reproductive Health*. Littleton, Massachusetts: PSG Publishing, 1987, pp. 40–46.
- DALING, J.R., WEISS, N.S., VOIGT, L., SPADONI, L.R., SODERSTROM, R., MOORE, D.E., STADEL, B.V. Tubal infertility in relation to prior induced abortion. *Fertility and Sterility* 43(3):389–394, March 1985.
- DANIELL, H.W. Smoking, obesity, and the menopause. (Letter.) *Lancet* 2(8085):373, August 12, 1978.
- DAVIES, D.P., ABERNETHY, M. Cigarette smoking in pregnancy: Associations with maternal weight gain and fetal growth. *Lancet* 1(7956):385–387, February 21, 1976.
- DAVIES, J.M., LATTO, I.P., JONES, J.G., VEALE, A., WARDROP, C.A.J. Effects of stopping smoking for 48 hours on oxygen availability from the blood: A study on pregnant women. *British Medical Journal* 2:355–356, August 11, 1979.
- DEMARINI, D.M. Genotoxicity of tobacco smoke and tobacco smoke condensate. *Mutation Research* 114:59–89, 1983.
- DEPALMA, R.G., EMSELLEM, H.A., EDWARDS, C.M., DRUY, E.M., SHULTZ, S.W., MILLER, H.C., BERGSRUD, D. A screening sequence for vasculogenic impotence. *Journal of Vascular Surgery* 5(2):228–236, February 1987.

- DESLYPERE, J.P., VERMEULEN, A. Leydig cell function in normal men: Effect of age, life-style, residence, diet, and activity. *Journal of Clinical Endocrinology and Metabolism* 59(5):955-962, 1984.
- DIKSHIT, R.K., BUCH, J.G., MANSURI, S.M. Effect of tobacco consumption on semen quality of a population of hypofertile males. *Fertility and Sterility* 48(2):334-336, August 1987.
- DIOKNO, A.C., BROWN, M.B., HERZOG, A.R. Sexual function in the elderly. *Archives of Internal Medicine* 150(1):197-200, January 1990.
- DONOVAN, J.W. Randomised controlled trial of anti-smoking advice in pregnancy. *British Journal of Preventive and Social Medicine* 31:6-12, 1977.
- DONTENWILL, W., CHEVALIER, H.-J., HARKE, H.-P., LAFRENZ, U., RECKZEH, G., SCHNEIDER, B. Investigations on the effects of chronic cigarette-smoke inhalation in Syrian golden hamsters. *Journal of the National Cancer Institute* 51(6):1781-1807, December 1973a.
- DONTENWILL, W., CHEVALIER, H.-J., HARKE, H.-P., LAFRENZ, U., RECKZEH, G., SCHNEIDER, B. Experimental investigations of the effect of cigarette smoke exposure on testicular function of Syrian golden hamsters. *Toxicology* 1:309-320, 1973b.
- EFFENDY, I., KRAUSE, W. Environmental risk factors in the history of male patients of an infertility clinic. *Andrologia* 19 (Special number):262-265, June 1987.
- EL-SAYAD, H.I., GHANIM, A.E., GAMAL EL DIN, A., SWEDAN, N., EL-SHERIF, F.A. Testicular damage in rats after subcutaneous administration of cigarette smoking residues. *Journal of the Egyptian Society of Parasitology* 17(1):179-188, 1987.
- ELIST, J., JARMAN, W.D., EDSON, M. Evaluating medical treatment of impotence. *Urology* 23(4):374-375, April 1984.
- ELLENBERG, J.H., NELSON, K.B. Birth weight and gestational age in children with cerebral palsy or seizure disorders. *American Journal of Diseases of Children* 133(10):1044-1048, October 1979.
- ENEROTH, P., FUXE, K., GUSTAFSSON, J.-Å., HÖKFELT, T., LÖFSTRÖM, A., SKETT, P., AGNATI, L. The effect of nicotine on central catecholamine neurons and gonadotropin secretion. II. Inhibitory influence of nicotine on LH, FSH and prolactin secretion in the ovariectomized female rat and its relation to regional changes in dopamine and noradrenaline levels and turnover. *Medical Biology* 55:158-166, 1977a.
- ENEROTH, P., FUXE, K., GUSTAFSSON, J.-Å., HÖKFELT, T., LÖFSTRÖM, A., SKETT, P., AGNATI, L. The effect of nicotine on central catecholamine neurons and gonadotropin secretion. III. Studies on prepubertal female rats treated with pregnant mare serum gonadotropin. *Medical Biology* 55:167-176, 1977b.
- ENTRICAN, J., MACKIE, M., DOUGLAS, A.S. Oestrogens, myocardial infarction, and smoking. (Letter.) *Lancet* 2(8098):1048, November 11, 1978.
- ERSHOFF, D.H., AARONSON, N.K., DANAHER, B.G., WASSERMAN, F.W. Behavioral, health, and cost outcomes of an HMO-based prenatal health education program. *Public Health Reports* 98(6):536-547, November-December 1983.
- ERSHOFF, D.H., MULLEN, P.D., QUINN, V.P. A randomized trial of a serialized self-help smoking cessation program for pregnant women in an HMO. *American Journal of Public Health* 79(2):182-187, February 1989.
- ESSENBERG, J.M., FAGAN, L., MALERSTEIN, A.J. Chronic poisoning of the ovaries and testes of albino rats and mice by nicotine and cigarette smoke. *Western Journal of Surgical Obstetrics and Gynecology* 59:27-32, 1951.
- EVANS, H.J., FLETCHER, J., TORRANCE, M., HARGREAVE, T.B. Sperm abnormalities and cigarette smoking. *Lancet* 1(8221):627-629, March 21, 1981.

- EVERSON, R.B., SANDLER, D.P., WILCOX, A.J., SCHREINEMACHERS, D., SHORE, D.L., WEINBERG, C. Effect of passive exposure to smoking on age at natural menopause. *British Medical Journal* 293:792, September 27, 1986.
- FABIA, J. Cigarettes pendant la grossesse, poids de naissance et mortalité perinatale. *Canadian Medical Association Journal* 109(11):1104–1107, December 1, 1973.
- FANCOURT, R., CAMPBELL, S., HARVEY, D., NORMAN, A.P. Follow-up study of small-for-dates babies. *British Medical Journal* 1:1435–1437, June 12, 1976.
- FINGERHUT, L.A., KLEINMAN, J.C., KENDRICK, J.S. Smoking before, during, and after pregnancy. *American Journal of Public Health* 80(5):541–544, May 1990.
- FITZGERALD, G.A., OATES, J.A., NOWAK, J. Cigarette smoking and hemostatic function. *American Heart Journal* 115(1, Part II):267–271, 1988.
- FITZHARDINGE, P.M., STEVEN, E.M. The small-for-date infant. I. Later growth patterns. *Pediatrics* 49(5):671–681, May 1972.
- FORSBERG, L., GUSTAVII, B., HÖJERBACK, T., OLSSON, A.M. Impotence, smoking, and β -blocking drugs. *Fertility and Sterility* 31(5):589–591, May 1979.
- FRAZIER, T.M., DAVIS, G.H., GOLDSTEIN, H., GOLDBERG, I.D. Cigarette smoking and prematurity: A prospective study. *American Journal of Obstetrics and Gynecology* 81(5):988–996, May 1961.
- GILBERT, D.G., HAGEN, R.L., D'AGOSTINO, J.A. The effects of cigarette smoking on human sexual potency. *Addictive Behaviors* 11:431–434, 1986.
- GODFREY, B. Sperm morphology in smokers. (Letter.) *Lancet* 1(8226):948, April 25, 1981.
- GOLDSTEIN, I., FELDMAN, M.I., DECKERS, P.J., BABAYAN, R.K., KRANE, R.J. Radiation-associated impotence. *Journal of the American Medical Association* 251(7):903–910, February 17, 1984.
- GULYAS, B.J., MATTISON, D.R. Degeneration of mouse oocytes in response to polycyclic aromatic hydrocarbons. *Anatomical Record* 193:863–882, 1979.
- HAAG, H.B., LARSON, P.S., WEATHERBY, J.H. The effect on rats of chronic exposure to cigarette smoke. *Annals of the New York Academy of Science* 90:227–238, 1960.
- HAMMOND, E.C. Smoking in relation to physical complaints. *Archives of Environmental Health* 3:28–46, August 1961.
- HANDELSMAN, D.J., CONWAY, A.J., BOYLAN, L.M., TURTLE, J.R. Testicular function in potential sperm donors: Normal ranges and the effects of smoking and varicocele. *International Journal of Andrology* 7:369–382, 1984.
- HARTZ, A.J., KELBER, S., BORKOWF, H., WILD, R., GILLIS, B.L., RIMM, A.A. The association of smoking with clinical indicators of altered sex steroids—A study of 50,145 women. *Public Health Reports* 102(3):254–259, May–June 1987.
- HARVEY, D., PRINCE, J., BUNTON, J., PARKINSON, C., CAMPBELL, S. Abilities of children who were small-for-gestational-age babies. *Pediatrics* 69(3):296–300, March 1982.
- HEBEL, J.R., FOX, N.L., SEXTON, M. Dose–response of birth weight to various measures of maternal smoking during pregnancy. *Journal of Clinical Epidemiology* 41(5):483–489, 1988.
- HERSEY, P., PRENDERGAST, D., EDWARDS, A. Effects of cigarette smoking on the immune system. Follow-up studies in normal subjects after cessation of smoking. *Medical Journal of Australia* 2:425–429, October 29, 1983.
- HIATT, R.A., FIREMAN, B.H. Smoking, menopause, and breast cancer. *Journal of the National Cancer Institute* 76(5):833–838, May 1986.
- HILL, R.M., VERNIAUD, W.M., DETER, R.L., TENNYSON, L.M., RETTIG, G.M., ZION, T.E., VORDERMAN, A.L., HELMS, P.G., MCCULLEY, L.B., HILL, L.L. The effects of intrauterine malnutrition on the term infant: A 14-year progressive study. *Acta Paediatrica Scandinavica* 73:482–487, 1984.

- HOIDAS, S., WILLIAMS, A.E., TOCHER, J.L., HARGREAVE, T.B. Scoring sperm morphology from fertile and infertile cigarette smokers using the scanning electron microscope and image analysis. *Fertility and Sterility* 43(4):595–598, April 1985.
- HOOK, E.B. Changes in tobacco smoking and ingestion of alcohol and caffeinated beverages during early pregnancy: Are these consequences, in part, of fetoprotective mechanisms diminishing maternal exposure to embryotoxins? In: Kelly, S., Hook, E.B., Janerich, D.P., Porter, I.H. (eds.) *Birth Defects: Risks and Consequences*. New York: Academic Press, 1976, pp. 173–183.
- HOWE, G., WESTHOFF, C., VESSEY, M., YEATES, D. Effects of age, cigarette smoking, and other factors on fertility: Findings in a large prospective study. *British Medical Journal* 290:1697–1700, June 8, 1985.
- JACOBS, J.A., FISHKIN, R., COHEN, S., GOLDMAN, A., MULHOLLAND, S.G. A multidisciplinary approach to the evaluation and management of male sexual dysfunction. *Journal of Urology* 129:35–37, January 1983.
- JEREMY, J.Y., MIKHAILIDIS, D.P., THOMPSON, C.S., DANDONA, P. The effect of cigarette smoke and diabetes mellitus on muscarinic stimulation of prostacyclin synthesis by the rat penis. *Diabetes Research* 3:467–469, 1986.
- JICK, H., PORTER, J., MORRISON, A.S. Relation between smoking and age of natural menopause. *Lancet* 1(8026):1354–1355, June 25, 1977.
- JUENEMANN, K.-P., LUE, T.F., LUO, J.-A., BENOWITZ, N.L., ABOZEID, M., TANAGHO, E.A. The effect of cigarette smoking on penile erection. *Journal of Urology* 138:438–441, August 1987.
- KAISER, F.E., VIOSCA, S.P., MORLEY, J.E., MOORADIAN, A.D., DAVIS, S.S., KORENMAN, S.G. Impotence and aging: Clinical and hormonal factors. *Journal of the American Geriatric Society* 36:511–519, 1988.
- KANEMATSU, S., SAWYER, C.H. Inhibition of the progesterone-advanced LH surge at proestrus by nicotine. *Proceedings of the Society for Experimental Biology and Medicine* 143:1183–1186, 1973.
- KAUFMAN, D.W., SLONE, D., ROSENBERG, L., MIETTINEN, O.S., SHAPIRO, S. Cigarette smoking and age at natural menopause. *American Journal of Public Health* 70(4):420–422, April 1980.
- KLAIBER, E.L., BROVERMAN, D.M. Dynamics of estradiol and testosterone and seminal fluid indexes in smokers and nonsmokers. *Fertility and Sterility* 50(4):630–634, October 1988.
- KLAIBER, E.L., BROVERMAN, D.M., DALEN, J.E. Serum estradiol levels in male cigarette smokers. *American Journal of Medicine* 77:858–862, November 1984.
- KLAIBER, E.L., BROVERMAN, D.M., POKOLY, T.B., ALBERT, A.J., HOWARD, P.J., JR., SHERER, J.F., JR. Interrelationships of cigarette smoking, testicular varicoceles, and seminal fluid indexes. *Fertility and Sterility* 47(3):481–486, March 1987.
- KLEINMAN, J.C., KOPSTEIN, A. Smoking during pregnancy, 1967–80. *American Journal of Public Health* 77(7):823–825, July 1987.
- KLEINMAN, J.C., MADANS, J.H. The effects of maternal smoking, physical stature, and educational attainment on the incidence of low birth weight. *American Journal of Epidemiology* 121(6):843–855, June 1985.
- KLEINMAN, J.C., PIERRE, M.B., JR., MADANS, J.H., LAND, G.H., SCHRAMM, W.F. The effects of maternal smoking on fetal and infant mortality. *American Journal of Epidemiology* 127(2):274–281, 1988.
- KLINE, J. Environmental exposures and spontaneous abortion. In: Gold, E. (ed.) *The Changing Risk of Disease in Women: An Epidemiologic Approach*. Lexington, Massachusetts: D.C. Heath and Company, 1984, pp. 127–138.

- KLINE, J., STEIN, Z., HUTZLER, M. Cigarettes, alcohol and marijuana: Varying associations with birthweight. *International Journal of Epidemiology* 16:44–51, 1987.
- KLINE, J., STEIN, Z.A., SUSSER, M., WARBURTON, D. Smoking: A risk factor for spontaneous abortion. *New England Journal of Medicine* 297(15):793–796, October 13, 1977.
- KOOPS, B.L., MORGAN, L.J., BATTAGLIA, F.C. Neonatal mortality risk in relation to birth weight and gestational age: Update. *Journal of Pediatrics* 101(6):969–977, December 1982.
- KRAILO, M.D., PIKE, M.C. Estimation of the distribution of age at natural menopause from prevalence data. *American Journal of Epidemiology* 117(3):356–361, 1983.
- KRAMER, M.S. Determinants of low birth weight: Methodological assessment and meta-analysis. *Bulletin of the World Health Organization* 65(5):663–737, 1987.
- KRAMSCH, D.M., ASPEN, A.J., ABRAMOWITZ, B.M., KREIMENDAHL, T., HOOD, W.B. JR. Reduction of coronary atherosclerosis by moderate conditioning exercise in monkeys on an atherogenic diet. *New England Journal of Medicine* 305(25):1483–1489, December 17, 1981.
- KULIKAUSKAS, V., BLAUSTEIN, D., ABLIN, R.J. Cigarette smoking and its possible effects on sperm. *Fertility and Sterility* 44(4):526–528, October 1985.
- KUZMA, J.W., KISSINGER, D.G. Patterns of alcohol and cigarette use in pregnancy. *Neurobehavioral Toxicology and Teratology* 3:211–221, 1981.
- LANDESMAN-DWYER, S., EMANUEL, I. Smoking during pregnancy. *Teratology* 19(1):119–125, 1979.
- LARSON, P.S., HAAG, H.B., SILVETTE, H. *Tobacco: Experimental and Clinical Studies*. Baltimore: Williams and Wilkins Company, 1961.
- LARSON, P.S., SILVETTE, H. *Tobacco: Experimental and Clinical Studies, Supplement I*. Baltimore: Williams and Wilkins Company, 1968.
- LASSILA, R., SEYBERTH, H.W., HAAPANEN, A., SCHWEER, H., KOSKENVUO, M., LAUSTIOLA, K.E. Vasoactive and atherogenic effects of cigarette smoking: A study of monozygotic twins discordant for smoking. *British Medical Journal* 297:955–957, October 15, 1988.
- LEHTOVIRTA, P., FORSS, M. The acute effect of smoking on intervillous blood flow of the placenta. *British Journal of Obstetrics and Gynaecology* 85:729–731, October 1978.
- LICHTENSTEIN, M.J., YARNELL, J.W.G., ELWOOD, P.C., BESWICK, A.D., SWEETNAM, P.M., MARKS, V., TEALE, D., RIAD-FAHMY, D. Sex hormones, insulin, lipids, and prevalent ischemic heart disease. *American Journal of Epidemiology* 126(4):647–657, 1987.
- LINDHOLM, J., WINKEL, P., BRODTHAGEN, U., GYNTELBERG, F. Coronary risk factors and plasma sex hormones. *American Journal of Medicine* 73(5):648–651, November 1982.
- LINDQUIST, O., BENGTSSON, C. Menopausal age in relation to smoking. *Acta Medica Scandinavica* 205:73–77, 1979.
- LONGO, L.D. The biological effects of carbon monoxide on the pregnant woman, fetus, and newborn infant. *American Journal of Obstetrics and Gynecology* 129(1):69–103, September 1, 1977.
- LONGO, L.D. Some health consequences of maternal smoking: Issues without answers. In: Nyhan, W.L. and Jones, K.L. (eds.) *Prenatal Diagnosis and Mechanisms of Teratogenesis* Birth Defects: Original article series, volume 18(3A). New York: Alan R. Liss, Inc., 1982, pp. 13–31.
- LOWE, C.R. Effect of mothers' smoking habits on birth weight of their children. *British Medical Journal* 2(1):673–676, October 10, 1959.
- LUBCHENCO, L.O., SEARLS, D.T., BRAZIE, J.V. Neonatal mortality rate: Relationship to birth weight and gestational age. *Journal of Pediatrics* 81(4):814–822, October 1972.

- MACARTHUR, C., KNOX, E.G. Smoking and pregnancy: Effects of stopping at different stages. *British Journal of Obstetrics and Gynaecology* 95(6):551-555, June 1988.
- MACARTHUR, C., NEWTON, J.R., KNOX, E.G. Effect of anti-smoking health education on infant size at birth: A randomized controlled trial. *British Journal of Obstetrics and Gynaecology* 94:295-300, April 1987.
- MACMAHON, B., ALPERT, M., SALBER, E.J. Infant weight and parental smoking habits. *American Journal of Epidemiology* 82(3):247-261, November 1966.
- MALCOLM, S., SHEPHARD, R.J. Personality and sexual behavior of the adolescent smoker. *American Journal of Drug and Alcohol Abuse* 5(1):87-96, 1978.
- MALLOY, M.H., KLEINMAN, J.C., LAND, G.H., SCHRAMM, W.F. The association of maternal smoking with age and cause of infant death. *American Journal of Epidemiology* 128(1):46-55, July 1988.
- MANLEY, R.S., BOLAND, F.J. Side-effects and weight gain following a smoking cessation program. *Addictive Behaviors* 8:375-380, 1983.
- MARCOUX, S., BRISSON, J., FABIA, J. The effect of cigarette smoking on the risk of preeclampsia and gestational hypertension. *American Journal of Epidemiology* 130(5):950-957, 1989.
- MARSHBURN, P.B., SLOAN, C.S., HAMMOND, M.G. Semen quality and association with coffee drinking, cigarette smoking, and ethanol consumption. *Fertility and Sterility* 52(1):162-165, July 1989.
- MARTIN, T.R., BRACKEN, M.B. Association of low birth weight with passive smoke exposure in pregnancy. *American Journal of Epidemiology* 124(4):633-642, 1986.
- MATSUNAGA, E., SHIOTA, K. Ectopic pregnancy and myoma uteri: Teratogenic effects and maternal characteristics. *Teratology* 21:61-69, 1980.
- MATTISON, D.R. Morphology of oocyte and follicle destruction by polycyclic aromatic hydrocarbons in mice. *Toxicology and Applied Pharmacology* 53:249-259, 1980.
- MATTISON, D.R. The effects of smoking on fertility from gametogenesis to implantation. *Environmental Research* 28(2):410-433, August 1982.
- MATTISON, D.R., THORGEIRSSON, S.S. Smoking and industrial pollution, and their effects on menopause and ovarian cancer. *Lancet* 1(8057):187-188, July 28, 1978.
- MATTISON, D.R., THORGEIRSSON, S.S. Ovarian aryl hydrocarbon hydroxylase activity and primordial oocyte toxicity of polycyclic aromatic hydrocarbons in mice. *Cancer Research* 39:3471-3475, September 1979.
- MCCORMICK, M. The contribution of low birth weight to infant mortality and childhood morbidity. *New England Journal of Medicine* 312(2):82-90, January 10, 1985.
- MCGARRY, J.M., ANDREWS, J. Smoking in pregnancy and vitamin B₁₂ metabolism. *British Medical Journal* 2(5805):74-77, April 8, 1972.
- MCINTOSH, I.D. Smoking and pregnancy: Attributable risks and public health implications. *Canadian Journal of Public Health* 75:141-148, March-April 1984.
- MCLEAN, B.K., RUBEL, A., NIKITOVITCH-WINER, M.B. The differential effects of exposure to tobacco smoke on the secretion of luteinizing hormone and prolactin in the proestrous rat. *Endocrinology* 100(6):1566-1570, June 1977.
- MCNAMARA, P.M., HJORTLAND, M.C., GORDON, T., KANNEL, W.B. Natural history of menopause: The Framingham Study. *Journal of Continuing Education in Obstetrics and Gynecology* 20:27-35, 1978.
- MEIKLE, A.W., BISHOP, D.T., STRINGHAM, J.D., FORD, M.H., WEST, D.W. Cigarette smoking alters plasma sex-steroid levels. *Clinical Research* 35(1):183A, 1987.
- MEYER, M.B. How does maternal smoking affect birth weight and maternal weight gain? *American Journal of Obstetrics and Gynecology* 131(8):888-893, August 15, 1978.
- MEYER, M.B., JONAS, B.S., TONASCIA, J.A. Perinatal events associated with maternal smoking during pregnancy. *American Journal of Epidemiology* 103(5):464-476, 1976.

- MEYER, M.B., TONASCIA, J.A. Maternal smoking, pregnancy complications, and perinatal mortality. *American Journal of Obstetrics and Gynecology* 128:494–502, 1977.
- MICHNOVICZ, J.J., HERSHCOPF, R.J., NAGANUMA, H., BRADLOW, H.L., FISHMAN, J. Increased 2-hydroxylation of estradiol as a possible mechanism for the anti-estrogenic effect of cigarette smoking. *New England Journal of Medicine* 315(21):1305–1309, November 20, 1986.
- MOSS, R.L., RISKIND, P., DUDLEY, C.A. Effects of LH-RH on sexual activities in animal and man. In: Colla et al. (eds.) *Central Nervous System Effects of Hypothalamic Hormones and Other Peptides*. New York: Raven Press, 1979.
- NADLER, J.L., VELASCO, J.S., HORTON, R. Cigarette smoking inhibits prostacyclin formation. *Lancet* 1(8336):1248–1250, June 4, 1983.
- NAEYE, R.L. Effects of maternal cigarette smoking on the fetus and placenta. *British Journal of Obstetrics and Gynaecology* 85(10):732–737, October 1978.
- NAEYE, R.L. Abruptio placentae and placenta previa: Frequency, perinatal mortality, and cigarette smoking. *Obstetrics and Gynecology* 55(6):701–704, June 1980.
- NAEYE, R.L., TAFARI, N. *Risk Factors in Pregnancy and Diseases of the Fetus and Newborn*. Baltimore, Maryland: Williams and Wilkins, 1983.
- NATIONAL CENTER FOR HEALTH STATISTICS. Advance report of final natality statistics, 1980. *Monthly Vital Statistics Report* 31(Supplement 8):1–8, November 30, 1982.
- NATIONAL CENTER FOR HEALTH STATISTICS. Health promotion and disease prevention: United States, 1985. *Vital and Health Statistics*, Series 10, No. 163. Public Health Service. DHHS Publication No. (PHS) 88-1591, February 1988.
- NEBE, K.H., SCHIRREN, C. Statistische untersuchungen bei andrologischen patienten. III. Nikotin und ejakulatparameter. *Andrologia* 12(6):493–502, November–December 1980.
- NIKKILÄ, E.A. Is human atherosclerosis reversible? In: Miller, N.E., Lewis, B. (eds.) *Lipoproteins, Atherosclerosis and Coronary Heart Disease*. Amsterdam: Elsevier/North-Holland Biomedical Press, 1980, pp. 155–164.
- NISWANDER, K.R., GORDON, M. Demographic characteristics. Cigarette smoking. In: *The Women and Their Pregnancies*. The Collaborative Perinatal Study of the National Institute of Neurological Diseases and Stroke. U.S. Department of Health, Education, and Welfare, Public Health Service, National Institutes of Health. Philadelphia: W.B. Saunders Co., 1972, pp. 72–80.
- NORDENSON, I., ABRAMSSON, L., DUCHEK, M. Somatic chromosomal aberrations and male infertility. *Human Heredity* 34:240–245, 1984.
- OBE, G., HERHA, J. Chromosomal aberrations in heavy smokers. *Human Genetics* 41:259–263, 1978.
- OCHSNER, A. The health menace of tobacco. *Medical Aspects of Human Sexuality* 59:246–252, November 1971a.
- OCHSNER, A. Influence of smoking on sexuality and pregnancy. *Medical Aspects of Human Sexuality* 5(11):82–92, November 1971b.
- OLDEREID, N.B., RUI, H., CLAUSEN, O.P.F., PURVIS, K. Cigarette smoking and human sperm quality assessed by laser-Doppler spectroscopy and DNA flow cytometry. *Journal of Reproduction and Fertility* 86:731–736, 1989.
- OUNSTED, M., MOAR, V.A., SCOTT, A. Risk factors associated with small-for-dates and large-for-dates infants. *British Journal of Obstetrics and Gynaecology* 92:226–232, March 1985.
- OUNSTED, M., TAYLOR, M.E. The postnatal growth of children who were small-for-dates or large-for-dates at birth. *Developmental Medicine and Child Neurology* 13:421–434, 1971.
- OUNSTED, M.K., MOAR, V.A., SCOTT, A. Children of deviant birth weight at the age of seven years: Health, handicap, size and developmental status. *Early Human Development* 9:323–340, 1984.

- PAPOZ, L., ESCHWEGE, E., PEQUIGNOT, G., BARRAT, J., SCHWARTZ, D. Maternal smoking and birth weight in relation to dietary habits. *American Journal of Obstetrics and Gynecology* 142(7):870–876, April 1, 1982.
- PATRA, P.B., SANYAL, S., BISWAS, N.M. Possible alpha-adrenergic involvement in nicotine induced alteration of spermatogenesis in rat. *Andrologia* 11(4):273–278, 1979.
- PETITTI, D.B., COLEMAN, C. Cigarette smoking and the risk of low birth weight: A comparison in black and white women. *Epidemiology*, in press.
- PETTERSSON, F., FRIES, H., NILLIUS, S.J. Epidemiology of secondary amenorrhea. I. Incidence and prevalence rates. *American Journal of Obstetrics and Gynecology* 117(1):80–86, September 1, 1973.
- PRAGER, K., MALIN, H., SPIEGLER, D., VAN NATTA, P., PLACEK, P.J. Smoking and drinking behavior before and during pregnancy of married mothers of live-born infants and stillborn infants. *Public Health Reports* 99(2):117–127, March–April 1984.
- PULKKINEN, P. Smoking and pregnancy: The influence of maternal and gestational factors on the outcome of pregnancy and the newborn. *Annales Chirurgiae et Gynaecologiae* 74(Supplement 197):55–59, 1985.
- RABKIN, S. Relationship between weight change and the reduction or cessation of cigarette smoking. *International Journal of Obesity* 8:665–673, 1984.
- RANTAKALLIO, P. Relationship of maternal smoking to morbidity and mortality of the child up to the age of five. *Acta Paediatrica Scandinavica* 67(5):621–631, September 1978.
- RANTALA, M.-L., KOSKIMIES, A.I. Semen quality of infertile couples—Comparison between smokers and non-smokers. *Andrologia* 19(1):42–46, January–February 1987.
- REUBEN, D. Warning: Smoking endangers your sex life. *Reader's Digest*, April 1988, pp. 98–100.
- RODRIGUEZ-RIGAU, L.J., SMITH, K.D., STEINBERGER, E. Cigarette smoking and semen quality. *Fertility and Sterility* 38(1):115–116, July 1982.
- ROGERS, B.J., RUSSELL, L.D. Semen analysis, sperm functional abnormalities, and enhancement of semen parameters. In: Gondos, B., Riddick, D.H. (eds.) *Pathology of Infertility*. New York: Thieme Medical Publishers, 1987, pp. 335–352.
- RUI, H., OLDEREID, N.B., PURVIS, K. Royking og spermiekvalitet hos menn under fertilitetstredning. *Tidsskr Nor Lægeforen* 109(5):573–575, 1989.
- RUSH, D. Examination of the relationship between birthweight, cigarette smoking during pregnancy and maternal weight gain. *Journal of Obstetrics and Gynaecology of the British Commonwealth* 81:746–752, October 1974.
- RUSH, D., CASSANO, P. Relationship of cigarette smoking and social class to birth weight and perinatal mortality among all births in Britain, 5–11 April 1970. *Journal of Epidemiology and Community Health* 37(4):249–255, December 1983.
- RUSH, D., KASS, E.H. Maternal smoking: A reassessment of the association with perinatal mortality. *American Journal of Epidemiology* 96(3):183–196, September 1972.
- RUSSELL, M.A.H. Cigarette smoking: Natural history of a dependence disorder. *British Journal of Medical Psychology* 44(1):1–16, May 1971.
- SAARANEN, M., KANTOLA, M., SAARIKOSKI, S., VANHA-PERTTULA, T. Human seminal plasma cadmium: Comparison with fertility and smoking habits. *Andrologia* 21(2):140–145, 1989.
- SAARANEN, M., SUONIO, S., KAUKANEN, O., SAARIKOSKI, S. Cigarette smoking and semen quality in men of reproductive age. *Andrologia* 19(6):670–676, 1987.
- SCHENKER, M.B., SAMUELS, S.J., PERKINS, C., LEWIS, E.L., KATZ, D.F., OVERSTREET, J.W. Prospective surveillance of sperm quality in the workplace. *Journal of Occupational Medicine* 30(4):336–344, April 1988.
- SCHIRREN, C., GEY, G. Der einfluss des rauchens auf die fortpflanzungsfähigkeit bei mann und frau. *Zeitschrift für Haut- und Geschlechtskrankheiten* 44(5):175–182, 1969.

- SCHRAMM, W. Smoking and pregnancy outcome. *Missouri Medicine* 77(10):619–626, October 1980.
- SCHWARTZ, D., GOUJARD, J., KAMINSKI, M., RUMEAU-ROUQUETTE, C. Smoking and pregnancy. Results of a prospective study of 6,989 women. *Revue Européenne d'Études Cliniques et Biologiques* 17:867–879, 1972.
- SEXTON, M., HEBEL, J.R. A clinical trial of change in maternal smoking and its effect on birth weight. *Journal of the American Medical Association* 251(7):911–915, February 17, 1984.
- SHAARAWY, M., MAHMOUD, K.Z. Endocrine profile and semen characteristics in male smokers. *Fertility and Sterility* 38(2):255–257, August 1982.
- SHIONO, P.H., KLEBANOFF, M.A., RHOADS, G.G. Smoking and drinking during pregnancy. *Journal of the American Medical Association* 255(1):82–86, January 3, 1986.
- SIMPSON, W.J. A preliminary report on cigarette smoking and the incidence of prematurity. *American Journal of Obstetrics and Gynecology* 73(4):808–815, April 1957.
- SOULAIRAC, M.-L., SOULAIRAC, A. Action de la nicotine sur le comportement sexuel du rat mâle. *Comptes Rendus Société de Biologie* 166:798–802, June 20, 1972.
- SPIRA, A., DUCOT, B., JOUANNET, P., SOUMAH, A., FENEUX, D., ALBERT, M. Consommation de tabac, d'alcool, et fertilité masculine. *INSERM* 103:363–378, 1981.
- STANFORD, J.L., HARTGE, P., BRINTON, L.A., HOOVER, R.N., BROOKMEYER, R. Factors influencing the age at natural menopause. *Journal of Chronic Diseases* 40(11):995–1002, 1987.
- STEKHUN, F.I. [Effect of tobacco smoking on spermatogenesis indices.] *Vrach Delo* 7:93–94, July 1980.
- STERLING, T.D., KOBAYASHI, D. A critical review of reports on the effect of smoking on sex and fertility. *Journal of Sex Research* 11(2):201–217, August 1975.
- SUBBARAO, V.V. Effects of smoking on female reproductive functions and the onset of menopause. In: Aoki, M., Hisamichi, S., Tominaga, S. (eds.) *Smoking and Health 1987*. Amsterdam: Elsevier Science Publishers, 1988, pp. 537–539.
- TAKAHASHI, Y., HIRATA, Y. Nocturnal penile tumescence monitoring with stamps in impotent diabetics. *Diabetes Research and Clinical Practice* 4:197–201, 1988.
- TAYLOR, R.R., STURM, M., VANDONGEN, R., STROPHAIR, J., BEILIN, L.J. Whole blood platelet aggregation is not affected by cigarette smoking but is sex-related. *Clinical and Experimental Pharmacology and Physiology* 14:665–671, 1987.
- THIENES, C.H. Chronic nicotine poisoning. *Annals of the New York Academy of Sciences* 90:239–248, 1960.
- THOMPSON, J.H., IRWIN, F.D., KANEMATSU, S., SERAYDARIAN, K., SUH, M. Effects of chronic nicotine administration and age in male Fischer-344 rats. *Toxicology and Applied Pharmacology* 26:606–620, 1973.
- TSITOURAS, P.D., MARTIN, C.E., HARMAN, S.M. Relationship of serum testosterone to sexual activity in healthy elderly men. *Journal of Gerontology* 37(3):288–293, 1982.
- UNDERWOOD, P.B., KESLER, K.F., O'LANE, J.M., CALLAGAN, D.A. Parental smoking empirically related to pregnancy outcome. *Journal of Obstetrics and Gynecology* 29(1):1–8, January 1967.
- U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES. *The Health Consequences of Smoking for Women. A Report of the Surgeon General*. U.S. Department of Health and Human Services, Public Health Service, Office of the Assistant Secretary for Health, Office on Smoking and Health, 1980.
- U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES. *Report of the Secretary's Task Force on Black and Minority Health. Vol. 6: Infant Mortality and Low Birthweight*. U.S. Department of Health and Human Services, January 1986.

- U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES. *The Health Consequences of Smoking: Nicotine Addiction. A Report of the Surgeon General, 1988*. U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control, Center for Health Promotion and Education, Office on Smoking and Health. DHHS Publication No. (CDC) 88-8406, 1988.
- U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES. *Reducing the Health Consequences of Smoking: 25 Years of Progress. A Report of the Surgeon General*. U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control, Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health. DHHS Publication No. (CDC) 89-8411, 1989.
- U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE. *The Health Consequences of Smoking. A Report of the Surgeon General: 1971*. U.S. Department of Health, Education, and Welfare, Public Health Service, Health Services and Mental Health Administration. DHEW Publication No. (HSM) 71-7513, 1971.
- U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE. *The Health Consequences of Smoking*. U.S. Department of Health, Education, and Welfare, Public Health Service, Health Services and Mental Health Administration. DHEW Publication No. (HSM) 73-8704, 1973.
- U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE. *The Health Consequences of Smoking, 1977-1978*. U.S. Department of Health, Education, and Welfare, Public Health Service, Office of the Assistant Secretary for Health, Office on Smoking and Health. DHEW Publication No. (PHS) 79-50065, 1978.
- U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE. *Smoking and Health. A Report of the Surgeon General*. U.S. Department of Health, Education, and Welfare, Public Health Service, Office of the Assistant Secretary for Health, Office on Smoking and Health. DHEW Publication No. (PHS) 79-50066, 1979.
- VAN DEN BERG, B.J. Epidemiologic observations of prematurity: Effects of tobacco, coffee and alcohol. In: Reed, D.M., Stanley, F.J. (eds.) *Epidemiology of Prematurity*. Baltimore, Maryland: Urban and Schwarzenberg, 1977, pp. 157-176.
- VAN DEN BERG, B.J., OECHSLI, F.W. Prematurity in perinatal epidemiology. In: Bracken, M.B. (ed.), Oxford University Press, New York, 1984, pp. 69-85.
- VERMEULEN, A., DESLYPERE, J.P. Testicular endocrine function in the ageing male. *Maturitas* 7:273-279, 1985.
- VICZIAN, M. Dohányosokon vegzett ondo-vizsgalatok tapasztalatai. [Experiences with the sperm examination of smokers.] *Orvosi Hetilap* 109:1077-1079, May 19, 1968a.
- VICZIAN, M. The effect of cigarette smoke inhalation on spermatogenesis in rats. *Experientia* 24:511-513, 1968b.
- VIRAG, R., BOUILLY, P., FRYDMAN, D. Is impotence an arterial disorder? *Lancet* 1(8422): 181-184, January 26, 1985.
- VIŠNJEVAC, V., MIKOV, M. Smoking and carboxyhaemoglobin concentrations in mothers and their newborn infants. *Human Toxicology* 5:175-177, 1986.
- VOGEL, W., BROVERMAN, D.M., KLAIBER, E.L. Gonadal, behavioral and electroencephalographic correlates of smoking. In: Remond, A., Izard, C. (eds.) *Electrophysiological Effects of Nicotine*. Amsterdam: Elsevier/North-Holland Biomedical Press, 1979, pp. 201-214.
- VOGT, H.-J., HELLER, W.-D., BORELLI, S. Sperm quality of healthy smokers, ex-smokers, and never-smokers. *Fertility and Sterility* 45(1):106-110, January 1986.
- VOGT, H.-J., HELLER, W.-D., OBE, G. Spermatogenesis in smokers and non-smokers: An andrological and genetic study. In: Obe, G. (ed.) *Mutations in Man*. Berlin: Springer-Verlag, 1984, pp. 247-291.

- WABREK, A.J., SHELLEY, M.M., HOROWITZ, L.M., BASTARACHE, M.M., GIUCA, J.E. Noninvasive penile arterial evaluation in 120 males with erectile dysfunction. *Urology* 22(3): 230–234, September 1983.
- WAINRIGHT, R.L. Change in observed birth weight associated with change in maternal cigarette smoking. *American Journal of Epidemiology* 117(6):668–675, June 1983.
- WERLER, M.M., POBER, B.R., HOLMES, L.B. Smoking and pregnancy. *Teratology* 32(3): 473–481, December 1985.
- WESTWOOD, M., KRAMER, M.S., MUNZ, D., LOVETT, J.M., WATTERS, G.V. Growth and development of full-term nonasphyxiated small-for-gestational-age newborns: Follow-up through adolescence. *Pediatrics* 71(3):376–382, March 1983.
- WILCOX, A.J. Intrauterine growth retardation: Beyond birthweight criteria. (Editorial.) *Early Human Development* 8:189–193, October 1983.
- WILCOX, A.J., RUSSELL, I.T. Birthweight and perinatal mortality. I. On the frequency distribution of birthweight. *International Journal of Epidemiology* 12(3):314–318, September 1983a.
- WILCOX, A.J., RUSSELL, I.T. Birthweight and perinatal mortality. II. On weight-specific mortality. *International Journal of Epidemiology* 12(3):319–325, 1983b.
- WILLETT, W., STAMPFER, M.J., BAIN, C., LIPNICK, R., SPEIZER, F.E., ROSNER, B., CRAMER, D., HENNEKENS, C.H. Cigarette smoking, relative weight, and menopause. *American Journal of Epidemiology* 117(6):651–658, 1983.
- WILLIAMS, R.L., CHEN, P.M. *California Perinatal Statistics, 1978–1980*. Prepared by University of California, Santa Barbara Community and Organization Research Institute, Department of Health Services, State of California, Maternal and Child Health Services. June 1982, p. 11.
- WILLIAMSON, D.F., SERDULA, M.K., KENDRICK, J.S., BINKIN, N.J. Comparing the prevalence of smoking in pregnant and nonpregnant women, 1985 to 1986. *Journal of the American Medical Association* 261(1):70–74, January 6, 1989.
- WINDSOR, R.A., CUTTER, G., MORRIS, J., REESE, Y., MANZELLA, B., BARTLETT, E.E., SAMUELSON, C., SPANOS, D. The effectiveness of smoking cessation methods for smokers in public health maternity clinics: A randomized trial. *American Journal of Public Health* 75(12):1389–1392, December 1985.
- WOOD, C. The association of psycho-social factors and gynaecological symptoms. *Australian Family Physician* 7:471–478, April 1978.
- WYROBEK, A.J., BRUCE, W.R. Chemical induction of sperm abnormalities in mice. *Proceedings of the National Academy of Science* 72:4425–4429, 1975.
- YERUSHALMY, J. Mother's cigarette smoking and survival of infant. *American Journal of Obstetrics and Gynecology* 88(4):505–518, February 15, 1964.
- YERUSHALMY, J. The relationship of parents' cigarette smoking to outcome of pregnancy—Implications as to the problem of inferring causation from observed associations. *American Journal of Epidemiology* 93(6):443–456, 1971.
- ZABRISKIE, J.R. Effect of cigarette smoking during pregnancy: Study of 2000 cases. *Obstetrics and Gynecology* 21(4):405–411, April 1963.
- ZANEVELD, L.J.D., JEYENDRAN, R.S. Modern assessment of semen for diagnostic purposes. *Seminars in Reproductive Endocrinology* 6(4):323–336, 1988.

CHAPTER 9
SMOKING, SMOKING CESSATION, AND
OTHER NONMALIGNANT DISEASES