DEATHS IN POLICE CONFRONTATION WHEN OLEORESIN CAPSICUM IS USED

(A Study of 63 Incidents)

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Oleoresin Capsicum (O.C.) in the form of a stream or spray is employed widely by law enforcement organizations as a less-than-lethal weapon to accomplish individual or crowd control. Early in the use of this agent, questions arose as to the safety in using O.C., both to the target person and to the officer who employs it.

This report deals only with the study of instances of individual confrontations between the law enforcement officer and a subject, where, after the officer has effected control of the subject, death has ensued.

Vital to such a study is the report and acquisition of information regarding cases where death of the subject took place. To collect cases for study has involved several organizations and many individuals.*

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NACLEET (National Law Enforcement and Corrections Technology Center)
IACP (International Association of Chief of Police)
LECTAC (Law Enforcement and Corrections Technology Advisory Council)

Harlan McEwen, former Chief of Police, Ithaca, NY Police Department
Colonel Carl R. Baker, Chief of Police, Chesterfield County, VA Police Department
Dennis E. Nowicki, Chief of Police, Charlotte-Mecklenburg, NC Police Department

Numerous other Chief of Police and Sheriffs and members of their organizations

Numerous Medical Examiners and Coroners
and, Edward T. McDonough, Deputy Chief Medical Examiner, State of Connecticut

There are several facets to such a study, which relies upon more than one discipline of investigative competence.

Every instance reported must involve reports from:

1. The law enforcement agency and individuals within the agency
2. The emergency medical technicians
3. The emergency room personnel
4. The medical examiner and/or the coroner and coroner's pathologist
5. The toxicologist in the medicolegal system

Without knowledge of each of the component inputs to an individual case, an understanding of cause of death will be impossible. Also, it must be noted that each police confrontation (forensic situation) is unique and cannot be reproduced. Also, there is no "time-line" that can be established, so that the duration of confrontation cannot be measured nor can the time elapsed from one point to another be established. To put this in blunt terms, this analysis is based, not entirely upon quantifiable data, but to an extent upon subjective analysis of information. Such is collected by diverse people with differing objectives and sometimes with personal stakes in the situation at hand. Thus, some of the information supplied may have been biased.

CASES REPORTED

The report of cases, where O.C. was applied during a confrontation between law enforcement officers and a subject, totaled 73:

73 cases reported

7 having insufficient details to include in this study
3 did not involve O.C. as shown by investigation
10 unacceptable

63 cases are included in this report.

In examining the 63 cases deemed "acceptable in detail," several subsets may be discerned. These cases have been selected on the basis of details of the law enforcement confrontation and modified by examination of the pathologic and toxicologic information. Thus, a non-quantifiable phase (the details of confrontation) is combined with more quantifiable findings at autopsy and finally with numerically precise figures from toxicologic data. These subsets are noted in tabular form in Table 1. Where the cause of death appears to be clear and well-founded, these cases are listed as Category I ("clear-cut"). In those instances

where the cause of death of a "hazy" nature, with two or more entities acting together or contributing to death, such are included in Category II ("Jumbled").

Of the 63 total cases subject to analysis (see Table 1), six of the cases defy categorization and are really outside of this study. These cases are noted in Table 2, and are not discussed in further detail.

The remaining two cases are termed "asthma" and are to be discussed below. These are cases O.C. 1 and 89 in Category IV. Case O.C. 89 upon autopsy was shown to have morphologic changes distinctly attributable to a well established asthma. The medical examiner who served as the medicolegal official certified the death as asthma precipitated by the O.C. used by the law enforcement officers. As of the time of writing, not all of the details of the confrontation are available, and in Table 3 this is noted.

The other Category IV case, O.C. 1, does not show morphologic changes of asthma as does O.C. 89. Examination of the lung reveals a marked follicular bronchiolitis. Such a condition could well make the subject apt to suffer from bronchospasm precipitated by inhaled O.C., but this is by no means certain. In addition, it must be noted that the subject stated only that "I can't breath"; air hunger (if it existed) was not described. It is of interest that multiple applications of O.C. were employed, more than recorded for any of the other cases studied. The O.C. was reported to be non-effective which involves an element of doubt as to the "accuracy" of the application. Also, the subject was large, obese, was cuffed behind his back, was in a face-down position and transported thus. Mechanical interference with breathing may well have been added to an already disease-compromised airway. So it is that O.C. 1 is not a clear-cut instance of "asthma", based upon autopsy findings or upon investigational information.

For each of these two cases, a disease involving the air passages to the lungs was found at autopsy. For each instance, the autopsy surgeon was convinced enough to list O.C. (and the disease) as causing death. In Case 1, it is possible that the confrontational situation contributed to or caused death. In Case 89, the details of the confrontation are not, at the time of writing, known to this writer.

THE SUBSETS

IA. DRUGS ALONE AS CAUSE OF DEATH

12 cases are included here.

Case No.	Drug(s)
6	Cocaine
7	Cocaine
10	Cocaine
27	Cocaine
28	Cocaine
62	Cocaine
70	Cocaine
84	Cocaine
75	Cocaine + Methamphetamine
24	Methamphetamine
20	Multiple drugs
77	Psilocin

Of these 12 cases, the information available would indicate that the drug was responsible for death. Trauma from the confrontation and/or the confrontational effort itself were not the cause of death.

IB. DRUGS + DISEASE AS CAUSE OF DEATH

4 cases are included in this group.

Case No.	Drug	Disease
58	Cocaine	Hypertensive heart disease
85	Cocaine	Cardiomegaly
61	PCP	Ischemic heart disease + myocardial bridge
90	Mixed drug	Hypertensive heart disease

As might be expected, the heart in each of the subjects was overweight. In each of these cases, the autopsy surgeon considered the heart disease to have contributed to the death by drugs.

It might be reasonable to combine these two subsets as both belonging to the same category. However, they are separated in this report.

IC. POSITIONAL ASPHYXIA

In the 7 cases so categorized, all of the subjects were, by various applications of

force, restraints and position before and during transport, subjected to limitation of their respiratory capacity.

Case No.	
5	No drugs or disease. Cause of death = anoxic encephalopathy
16	No drugs or disease (paranoid schizophrenic)
17	Small amounts of PCP and alcohol. No disease.
26	No drugs. Down's Syndrome*.
67	Small amount of amphetamine. Fatty liver*.
72	Cocaine present. No disease.
83	Small amounts of Codeine present. No disease*.

In those three cases marked by *, the autopsy surgeons termed the deaths due to positional asphyxia.

The term "positional asphyxia" as used here indicates that, by virtue of the position of the subject is such that he cannot use the normal and accessory muscles to adequately move air in-and-out of the lungs. This situation can be exaggerated by the pressure of a "big belly". When lying face down, hands cuffed behind, the subject lies on his abdomen, which forces the abdominal contents up against the diaphragm, inhibiting its use. Weights applied to the back, such as an arresting officer placing his weight in the shoulder blade area, or as in one of the reported cases (OC29), a sofa was placed on the subject to help control him, will add to the difficulty in breathing.

The 7 cases in this category (IC) all appear to be instances of positional asphyxia that without other contributing disease or drugs have effected death.

These Category I (A, B and C) cases comprise the "clear-cut" group where the cause of death appear to be due to definable entities.

CATEGORY II ("Jumbled") cases

All of these cases involve drugs, disease, drugs and disease combined with the confrontational situations to such a degree that in the writer's mind, they cannot be separated in any convincing manner. Thirty-two of the 63 cases (50%) are so categorized. They are subdivided as follows:

A.	**Confrontational situation + drugs**	**— 23 cases**
B.	**Confrontational situation + disease**	**— 5 cases**
C.	**Confrontational situation + drugs & disease**	**— 4 cases**

SUBSET IIA. Confrontational situation + drugs

Case No.	
2	52
9	54
11	55
12	59
13	60
14	63
19	68
21	74
22	78
23	79
41	80
	87

SUBSET IIB. Confrontational situation + disease

Case No.
4
25
50
71
81

SUBSET IIC. Confrontational situation + drugs + disease

Case No.
3
29
57
82

The effects of a confrontation (subject vs law enforcement officers) are many, and some are not often considered. Take (for example) a subject with arteriosclerotic heart disease:

> **The heart is a muscular pump, demanding oxygen for its use. Because of the disease of the coronary arteries, a limit is placed on the flow of oxygen rich blood needed by the heart muscle. When the limit is surpassed, the heart muscle will die and so will the whole subject die. The frequent actual mechanism is that as the heart muscle becomes more oxygen-starved, it becomes more and more irritable and more and more susceptible to the**

establishment of abnormal and ineffective heart rhythm (heartbeats) and the subject dies.

As the confrontation escalates, there is more muscular activity and anxiety, both of which increase the load of blood the heart must pump. Now, add to this subject a drug (such as amphetamine) which excites the subject, causing him to be more active and causes a rise in body temperature, all of which results in a greater demand upon the heart, increasing once again the need of the heart muscle for oxygen.

Not mentioned, as yet, is the flow of catecholamines (adrenaline and others) that are released. The catecholamines in and of themselves make the heart muscle more irritable.

So it is that these different items are added to the potential of a fatal outcome. Add to the foregoing a small reduction in the healthy capacity by position of the subject who is restrained (see above) and positional asphyxia enters the picture.

Insofar as Category II cases are concerned, the effect of positional asphyxia are much less well defined as in Subset IC and the term is avoided. Instead, the phrase "confrontational situation" is applied.

Now add to the foregoing, the subject who has ingested drugs in place of having heart disease, or in addition to heart disease. Many drugs (cocaine, for example) render the heart muscle more irritable than normal, increasing the potential for abnormal rhythms and interfering with heart function. Part of this not totally understood triad of drugs, diseases, and interference with the mechanics of breath is discussed in a letter to the editor (Ref 1).

The foregoing is a bleak outlook and not often pushed to the extreme, with death resulting, but it can, and does, happen.

<u>Category III "Odd-balls" — 6 cases. See Table 2.</u>

These are cases that just don't fit into the other cases reported.

<u>Category IV "Asthma" — 2 cases.</u>

In the confrontation with the law enforcement officer, due to the movements of

both the subject and the officer, the point of application of the stream or spray of O.C. on the target is difficult, if not impossible, to determine.

External factors

Wind and rain can easily divert the O.C. carrier.

Autopsy and laboratory detection of the deposited O.C.

This can, and has been, undertaken so as to determine the area(s) of strike of the agent. But decontamination of the subject can dilute (if not entirely remove the traces of the agent).

Intervening materials

Eyeglasses, face masks, hands and collars of clothing can divert the agent from reaching the face.

All of these factors may well contribute to the law enforcement officer stating that the O.C. was ineffective in a given case. Of course, "effectivity" is, like beauty, in the eyes of the beholder. It would appear that many law enforcement officers regard O.C. as a device that will "drop" the subject upon application , and disable him for enough time to establish control. As noted above, the point of aim is of signal importance in the determination of effectivity.

In 60 cases where the effectivity was reported, 12 (20%) were noted by the law enforcement agency to be effective, 6 (10%) partially effective, including one case reported as subject "blinded but still violent." These results must be viewed while bearing in mind that death was the end-report of each confrontation. If the confrontation had been less violent, it is entirely possible that death would not have ensued. In other words, it is possible that those subjects who failed to react (the 70% in this study) were the very ones who set the degree of violence in the confrontation that ended in death. It must also be noted that the O.C. application(s) was only one of the components of force applied by the law enforcement officers.

If O.C. were to cause death, it would be expected that the effect of the substance would:

A. Be noted by difficulty in breathing due to the closing or narrowing of the bronchii. This would show in both the phase of inspiration and expiration — a struggle to breathe.

B. With the effect on respiration being noted shortly after the application of O.C.

In only five cases (O.C. 2, 21, 22, 24, 66) were comments regarding breathing

recorded (other than "ceased breathing"):

"Respiratory distress" — O.C. 2
(A long time elapsed between O.C. application and death)
"Abnormal pulse and respiration" — O.C. 21
(No further details given)
"Difficulty in breathing" — O.C. 22
(Labored and shallow)

"Difficulty in breathing" — O.C. 24
(No further details)
"Breathing funny" — O.C. 66
(Slow, breath every 30 seconds to 1 minute)

In the face of information that is devoid of a description of a struggle to breathe, and in no case a description of death following rapidly after the spray incident, the conclusion must be reached that O.C. did not solely and directly cause death in the five cases noted above. Breathing was not noted (other than "ceased breathing") in the other cases (excepting, of course, the two cases [O.C. 1 and 89] where the subject was a proven or possible asthmatic. It would appear that O.C. is simply another phase in the escalation of the confrontational situation. Noted in Table 3, several forms of force application were applied by the law enforcement officers including the use of batons, carotid and choke holds, Taser, 4-point restraint, etc.

In regard to the time elapsed between the application of O.C. and death, this is impossible to even estimate from the information supplied. As usual, in a melee, even the actors (as well as the non-involved witnesses) vary greatly in regard to the "facts" of the occasion. No "quantitative" time line is available.

EFFECTIVITY

The overall effectivity (as reported by the involved law enforcement officers) is approximately 20%. It should be noted that in the Category IC (positional asphyxia), no oleoresin capsicum (O.C.) Application was reported to be effective. These 7 cases comprise 17% of the total ineffective applications.

The conclusion might be drawn that these 7 subjects were more violent than most. Therefore, the confrontations escalated more rapidly to a higher degree, resulting in situations where the subjects were eventually subjected to force resulting in positional asphyxia. There is no proof of this, of course.* It remains an interesting observation.

With the effectivity of an O.C. application at 20% of the 60 cases reported here, it is interesting to compare this with the percent reported in the 1997 survey of O.C. spray use by law enforcement agencies (Ref. 2). These categories were used:

- **Somewhat effective**
- **Moderately effective**
- **Very effective**

The survey questioned three uses of O.C.:

Effectivity in —

- **Preventing assaults on officers**
- **Preventing injuries to officers**
- **Preventing injuries to suspects**

If "somewhat effective" is equated with "partially effective" as used in the current study, and "moderately and very effective" are equated to be effective in this report, then the effectivity is approximately 92% (Range 90 to 93.3%) in the 1997 survey report. This is much greater than the 20% effective rate found in th study of actual confrontational instances. These subjects have, perhaps, greater anger and tend not to submit to physical stress as much as in the 1997 study.

POSITIONAL ASPHYXIA

In the recent past, there have been developments which have caused some to become skeptical of the entity termed positional asphyxia. Some of this has resulted from a case heard in a courtroom. In this instance a forensic pathologist, in answering a direct question, replied that he could not prove, in the case in question, the death was due to positional asphyxia (Ref. 3). His answer was honest but he was not (in subsequent questioning) allowed to explain the full ramifications of his answers and opinions.

A report was issued by the International Association of Chiefs of Police (Ref. 4) where positional asphyxia was deemed to be the cause of death of several subjects. Following the publication of this report, some law enforcement agencies have incorporated into their training programs cautions as to how to avoid positional asphyxia. Training has been accomplished via lectures, written materials, and viodeotapes. That these have been effective can be seen in Table 3 (confrontational details). Here, in several instances, is recorded "rolled subject on side", and similar notes. This is obviously the result of law enforcement training to avoid, rather than to precipitate, positional asphyxia.

A second result of this increased recognition of positional asphyxia can be seen in the "cause of death" noted in several of the more recent instances where positional asphyxia has been listed by the autopsy surgeon as the cause of death.

Mention has been made above that it is impossible to replicate the forensic situation. There is no way to duplicate in the laboratory all of the elements entering into the cases reported in this report. There is no way that a computer model can be employed. It is this hazy area that has prompted the use of the "Jumbled" category of causes of death in this report. The confrontational situation is used to imply this inability to come to a precise explanation for death in many of the reported instances. An interesting view of this "haziness" is to be found in a letter to the editor of the American

Journal of Forensic Medicine and Pathology. (Ref. 1)

In assessing the cause of death (as discussed above), no precise parameters can be found in regard to the role of O.C. One recent attempt has been made to assess the effect of O.C. on the experimental human subject. This study was undertaken to investigate the effect of O.C. on the respiratory function in human volunteers (Ref. 5). Since the subjects, after exposure to O.C. were placed in either a sitting position or in prone maximal restraint position (with wrists cuffed behind the back). The study served also to evaluate the potential danger of positional asphyxia.

Because disease and drugs obviously play a large role in the cause of death, Table 4 (disease found at autopsy) and Table 5 (alcohol and drugs found at autopsy) are included here. The interrelationship of disease, and alcohol and drugs is indicated in Table 6 (cause of death).

This Table 6, as indicated in the legend, compares the cause of death as listed by the autopsy surgeon and that noted by the writer. The two do not always coincide in language and meaning. Note that, in many instances, the writer of this report had more and varied information sources available than did the certifying official. It is this availability of information that has made it possible to categorize and place in subsets the cases reviewed.

WEIGHT OF THE HEART

One further table has been made part of this report: Table 7. This table makes note of the subject's height and weight, and the weight of the heart compared to the expected normal heart weight. The work of Zeek (Ref. 6) has been used to establish the normal heart weight dependent upon the height of the subject. Even a brief examination of these data reveals that at least 50% of the subjects had markedly overweight hearts.

An increase in the weight of the heart is usually an indication of heart disease. Cardiomyopathy (large heart) is mentioned in the

cause of death Table 6. Of interest here is that repeated abuse of certain drugs lead to cardiomyopathy. (Ref. 7,8) Investigation into the drug abuse history of the subjects included in this report goes far beyond the limits of this study. That many of the study subjects were chronic drug abusers is suggested by the weight of the heart as found at the autopsy.

LESSONS AND OBSERVATIONS FROM THIS STUDY

1. **There is no evidence that O.C. as used by law enforcement officers in confrontational situations is a total or contributing cause of death, except when preexisting asthma (or disease-narrowed airways) is present.**

2. **As a tool for the law enforcement officer, O.C. ranks at the "low end" of the "escalation of force" scale and is relatively innocuous.**

3. **The effectivity of O.C. is approximately 1 in 5, but this study included "violent" subjects alone, so violent that death ensued, from the confrontation.**

4. **Positional asphyxia is a real entity and can, and does, cause death.**

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TABLE 1

THE CATEGORIES AND SUBSETS (of 63)

I	"CLEAR-CUT"		
	1.	12 Drugs alone	
	2.	4 Drugs & Disease	23 cases
	3.	7 Positional asphyxia alone	
II	"JUMBLED"		
	A.	23 Confrontational situation + drugs	
	B.	5 Confrontational situation + disease	32 cases
	C.	4 Confrontational situation + drugs + disease	
IV	"ASTHMA"		
		2	2 cases
III	OTHER — "ODD BALLS"		
		6	6 cases
			63 Total cases

CATEGORIES (SUBSETS) OF SUBJECTS

Theses categories or subsets represent the writer's attempt to bring some order out of the 63 cases reported here. The cause of death represents a synthesis of the autopsy surgeon's opinion and the writer's opinion. In some instances, more (or different) information was available to the writer than to the autopsy surgeon at the time the latter opined as to the cause of death.

TABLE 2

"ODD-BALL CASES"
See Table 3 for confrontational details

CASE

18. **4-month hospitalization. Arteriosclerotic heart disease with old myocardial infarction with a pneumonia due to prolonged hospitalization listed as cause of death.**

51. **Multiple gunshot wounds as the cause of death. Oleoresin capsicum use was non-contributory (deemed ineffective by law enforcement officers).**

56. **Cause of death was arteriosclerotic heart disease. He was alive and resisting law enforcement officers after transport to a holding cell. A "field test" for cocaine, which was negative, was the only toxicologic study undertaken.**

65. **Dies in hospital, apparently due to a blood coagulation disorder disseminated intravascular coagulopathy (DIC) resulting from injuries that antedated the confrontation.**

66. **Was in the hospital 13 hours after confrontation. Said to have been "choked down" by law enforcement officers.**

69. **Said to have died as a result of "manual neck compression," (possibly a carotid sinus activation).**

These cases just don't fit into the categories or subsets as noted in the body of the report, but are included as a separate group for completeness.

TABLE 3

Case No. / Subset or Cate-gory	Age	Color	Confrontational Details	Oleoresin Capsicum	
				Times Applied	Effect
1 IV	24	B	Subject was waiting in line at a restaurant. He exchanged words with an off-duty law enforcement officer employed by the restaurant. He was placed under arrest. He refused to be handcuffed. OC was used. He struggled and struck officer. Several officers took him to the ground and cuffed him behind his back (2 sets because of size). Subject said he could not breath. He stood up, then went limp. He was placed in the back seat of patrol car and taken to the police station. Officer was decontaminated first. When it was subject's turn for decontamination, he was no longer responsive. EMTs were called and he was taken to the ER. Pronounced DOA.	7-12 bursts; not all struck.	Ineffective
2 IIA	38	B	Police answered a breaking and entering call. Subject displayed irrational behavior, pointing to imaginary persons. A struggle ensued. Subject was placed face down and cuffed behind and cloth leg restraint was used. EMTs arrived. Subject was placed face down in a gurney and strapped there. He was biting officer's thumb. Officer put his foot in subject's back. OC was used. Subject was yelling in ER. It was decided to take him to the psychiatric unit at another hospital. En route to the psychiatric unit, subject went into respiratory distress. He was taken back to ER. Pronounced dead.	2	Effective
3 IIC	33	B	Fire department received report of a stove fire. Fire department was denied access. Law enforcement officers and fire department together were allowed in. All 3 burners of stove were on. Subject was incoherent and lighting $100 in bills from stove burner. He was combative. OC spray was used. He was handcuffed in back. Law enforcement put his knee in subject's back. He suddenly stopped moving. He was said to be diabetic and had heart problems.	2	Effective

Case No. / Subset or Cate-gory	Age	Color	Confrontational Details	Oleoresin Capsicum	
				Times Applied	Effect
4 IIB	31	W	Subject was schizophrenic and displayed wild behavior. There was a struggle. OC spray was used. His hands were handcuffed in front. He was restrained in standard stretcher straps, face down. EMTs took him to a hospital. He went into arrest and was pronounced DOA at the hospital.	1	
5 IC	38	H	Police received a peeping tom call. There was a struggle upon attempting custody. Subject threatened officers. There was a struggle. OC spray was used. He was finally handcuffed and held face down. He had shallow breathing. EMT took him to a hospital where he survived for 10 days.	2	Ineffective
6 IA	32	B	Law enforcement officers observed suspect smoking marijuana cigarettes. There was an attempted arrest and the suspect ran. There was a struggle. A lateral neck restraint was applied. Subject momentarily lost consciousness. OC spray was used. More lateral neck restraint was applied. He became unconscious. He then sat up and began speaking, continuing to struggle. He as placed in a police vehicle and transferred to I.D. section of the Justice Center. He was laid on the floor during comparison of fingerprints. He stopped breathing. Suspect was pronounced DOA at a hospital.	2	Ineffective
7 IA	41	W	Subject was a drunk male at a motel. He was glassy-eyed and not responsive to commands. There was a struggle. OC spray was used. There was further struggle. He was handcuffed and put on the ground in prone position. He was held down. EMTs were called because of a wound on the subject's head. He stopped breathing. Law enforcement officers used chest compression, to no avail.	1	Ineffective
9 IIA	34	B	Disturbance call was received from a motel. Subject kicked door shut. Law enforcement officers kicked door down and attempted to handcuff subject. There was a struggle. OC spray was used. Subject was handcuffed behind his back and leg cord-cuffs were used. Because of possible cocaine intoxication, EMTs were summoned. Subject stopped breathing before EMTs arrived.	2	Ineffective

Case No.	Age	Color	Confrontational Details	Oleoresin Capsicum	
Subset or Cate-gory				Times Applied	Effect
10 IA	26	B	Police attempted to arrest subject on burglary charges. There was a struggle. OC spray was used. Batons were used and also a choke hold. He was cuffed and walked to patrol car. He was taken to ER because of a cut in his hand. He was unresponsive upon arrival.	?	Ineffective
11 IIA	38	W	Subject was running berserk at a street intersection. There was an attempt to cuff the subject. OC spray was used. He was wrestled to the ground and handcuffed. He was held on the ground. He then stopped breathing. CPR was not effective.	1	Ineffective
12 IIA	27	W	Subject was combative. There was a struggle and batons were used. OC spray was sprayed. He was hogtied and placed on his side in the patrol car. Transport was begun to ER but driver was informed that they were busy. Course was changed to the police station for decontamination. Upon removal from car, subject was not breathing.	2	Ineffective
13 IIA	42	W	Altercation occurred with subject. He jumped from 2nd story building to avoid arrest. He was found lying on ground, snoring. He was aroused easily. Subject was combative in ambulance. He was in ER 4 hours, was abusive and fought restraints. He was discharged but said he couldn't walk. He jumped up; it took 6 persons to restrain him. OC spray was used. He was hogtied. He was then found not breathing.	2	Ineffective
14 IIA	41	W	Law enforcement officers went to motel to locate subject who had warrants on file. He resisted arrest and there was a struggle. OC spray was used. He then was hogtied, handcuffed and flexcuffs were used on his legs. He was placed in the back seat of patrol vehicle. In a few minutes, he appeared not to be breathing. Officers began CPR. EMTs took over and transported him to a hospital. He survived 28 hours in the hospital.	1	Ineffective

Case No. / Subset or Cate-gory	Age	Color	Confrontational Details	Oleoresin Capsicum	
				Times Applied	Effect
16 IC	43	B	Law enforcement officers responded to a call because of a suspicious, irrational person. Subject was sprayed with OC several times with no reaction. He was cuffed behind his back. One officer had his weight on the subject and placed on his stomach. Officers washed off his face with hose. Subject was then unresponsive, with no pulse. EMTs were called who took him to the ER. Subject was not responsive. (ER report stated he had not taken his medication for 3 months.)	3-4	Ineffective
17 IC	24	B	Law enforcement officers were called to a mall. Report concerned breaking and entering a store. Subject was destroying objects, was angry and violent. He grabbed a shard of glass, threatening law enforcement officers. Subject was sprayed with OC. He resisted handcuffing. He was cuffed and struck with a blackjack. Subject was laid prone with leg shackles. He was placed on a gurney. He stopped breathing en route to hospital.	3 (1 miss, 2 hits)	
18 III	53	B	Subject was sitting in a car, which was not his. He refused to get out. He was extracted by law enforcement officers and became combative. OC spray was used. He was cuffed, decontaminated and taken to jail. 45 minutes later, he was unsteady on his feet. He was taken to a hospital in a patrol car. He stopped breathing en route and did not regain consciousness. He died after 4 months of hospitalization.	2	Effective
19 IIA	34	B	Law enforcement officers were called to remove subject from a truck terminal. He resisted arrest. OC spray was used. There was a struggle. He was cuffed and hogtied. When he was being loaded in transport van, he stopped moving.	3	Effective
20 IA	32	W	Domestic disturbance call was received. Subject was eating dirt. He resisted arrest and was handcuffed. Law enforcement officers tried to load him into police unit, which he resisted. He was sprayed with OC and then batons were used on his legs. Subject was unresponsive and paramedics were called. He was DOA at the hospital.	1-2	Ineffective

Case No. / Subset or Cate-gory	Age	Color	Confrontational Details	Oleoresin Capsicum	
				Times Applied	Effect
21 IIA	28	W	Naked man was acting unusual while at a friend's house. Law enforcement officers were called. There was a struggle. OC spray was used. Subject was handcuffed and soft restraints were applied to legs. Subject broke these, so duct tape was used. Five officers were involved. EMTs were called. Subject had abnormal pulse and respiration.	2	Ineffective
22 IIA	44	W	There was a struggle between the subject and officer. The officer was injured. Subject was sprayed with OC and thrown to the ground. He was handcuffed and hobbled. Then he was placed in a police vehicle. He had difficulty breathing. No longer breathing upon removal from car.	1	Ineffective
23 IIA	40	W	Subject was showing irrational behavior. He resisted arrest and was sprayed with OC. He then was forced to the ground and hogtied in left lateral position. He had shortness of breath. CPR was applied and paramedics were called. He was taken to a hospital but ACLS ineffective.	1	Ineffective
24 IA	35	H	Subject was awaiting transportation to a psychiatric ward. On attempted transfer, he was wild and bizarre. OC spray was used. He was restrained by hobbling and carried to the radio car. He had difficulty breathing and was placed on his side. EMTs were called and he was taken to the hospital. He expired 9 hours later.		
25 IIB	32	B	Subject was in state prison. There was an altercation in chow hall and a stabbing occurred. OC spray was applied. He was restrained on his stomach and transferred to a strip cell. Further details are unknown.	?	

Case No. / Subset or Cate-gory	Age	Color	Confrontational Details	Oleoresin Capsicum	
				Times Applied	Effect
26 IC	32	W	Disorderly subject was a mental patient with Hepatitis B at a summer camp for the mentally retarded. He threatened to bite law enforcement officers. They attempted to talk with subject. OC spray was used. There was a struggle. OC spray was used again. Further struggle occurred and subject was handcuffed in prone position. He was spitting. He was handcuffed to a stretcher. A towel was put over his head because of the spitting. He was uncuffed and recuffed behind on the stretcher. He stopped struggling.	2+	
27 IA	26	H?	Subject was "doing drugs". He resisted cuffing. OC spray was used. Attempt was made to handcuff him in back. Subject attempted to grab for officer's gun. OC spray was used again. Several officers finally cuffed him in front and hobbled him but hands were not connected to the leg cuffs. Taser was used without effect. EMS arrived. Subject had stopped breathing. He was pronounced DOA at hospital.	2	Ineffective
28 IA	37	H	According to police report, subject was striking cars with a board. He was handcuffed. He was also sprayed with OC "several times" with no effect. He was transported by ambulance to a hospital. He arrived unresponsive, without respiration. Blood pressure 120/70, pulse 80, temperature 105. He had a seizure. Nothing was documented about anything occurring during ride in ambulance.		Ineffective
29 IIC	67	B	According to police report, subject was naked and violent. He had destroyed an apartment. He was sprayed with OC and subdued. A large sofa was placed on him to hold him down. He was handcuffed and put on a stretcher, face down. Subject went limp upon arrival at ER.	2	Ineffective
41 IIA	34	B	Subject was a hit and run suspect. Altercation occurred. OC spray was used. He was cuffed, shackled and laid face down. He was transported in van. While sitting in van, he was still reacting. Upon arrival at headquarters, he was not breathing. Taken to ER where he was pronounced DOA.	1	Ineffective

Case No. / Subset or Cate-gory	Age	Color	Confrontational Details	Oleoresin Capsicum	
				Times Applied	Effect
50 IIB	32	W	Subject was acting crazy in residence. He was combative when approached. He attempted to strike officers with a stick. He was sprayed with OC + Taser was used. He was handcuffed and hogtied. He had cardiac arrest.	1	Ineffective
51 III	33	B	Officers appeared to serve a warrant. Subject was in a bedroom and refused to come out of a garment bag. A burst of OC was used. Subject exited the bag and grabbed a butcher knife. He was shot 3 times.	1	Ineffective
52 IIA	28	W	Subject attempted suicide by OD "crank". He told officers he wanted an ambulance. He climbed onto the gurney. Was transported to hospital. He exited ambulance and attempted to strike officers with a stick. Multiple OC sprays were applied. There was a struggle. Officers applied a carotid hold and he was handcuffed and hogtied. Subject expired. No response to CPR.	1 +	Ineffective
54 IIA	35	W	Subject displayed bizarre behavior. He was sprayed with OC, forced to the ground and handcuffed. Officers put their weight on his hips and shoulders, then hogtied. He was left in face-down position. He became unresponsive. EMTs applied CPR and took him to the hospital. He did not regain consciousness. He died 1½ days later.	1	Ineffective
55 IIA	30	B	Police received a domestic disturbance call. Subject was paranoid, screaming, kicking and biting. He was handcuffed. Subject continued to go limp. He was put into a squad car. He was biting and attempted to exit car. Leg restraints were applied. He was sprayed with OC. In the squad car, his head was hanging out the door. He stopped breathing after several minutes.	1	Ineffective

Case No. / Subset or Category	Age	Color	Confrontational Details	Oleoresin Capsicum	
				Times Applied	Effect
56 III	41	W	Subject's automobile was observed to stop on ramp. Law enforcement officers spoke with subject driver who was driving with a suspended license. Handcuffing was attempted. Subject exited from the police vehicle. OC spray was used. Subject eventually thrown into police vehicle and taken to the police station. He was put into a holding cell, still kicking. Subject was cuffed in front, legs were shackled and both were secured together. He stopped breathing.	1	Partially effective
57 IIC	35	B	Subject was burglarizing the garage of a residence. He resisted arrest and was put on the ground. OC spray was attempted, but may have missed. He was cuffed. Subject stopped breathing. CPR was not effective.	1	Ineffective
58 IB	30	B	Police were called because of attempted suicide. EMTs had responded. Subject was mumbling and chanting. Restraining was attempted. He was sprayed with OC. He was then handcuffed and placed on a stretcher. He stopped breathing.	2	Effective
59 IIA	33	H	Subject appeared dazed and was wet from head to toe. He was mumbling broken English. He was ordered by 2 sheriffs to stop. He started yelling and ran into a traffic lane. He entered a car that had stopped. He was sprayed with OC. He got out of the car and OC spraying was attempted again but wind kept spray from reaching him. He was handcuffed on left wrist and taken to the ground. OC was sprayed into his face, with no reaction. He was placed face down and cuffed on right wrist. Subject was kicking and an officer kneeled on his legs. He was hogtied. After one minute, he turned purple and CPR was applied. He was taken to the hospital.	3	Ineffective
60 IIA	26	H	Subject was attempting breaking and entering. He was mumbling and incoherent. He violently resisted handcuffing. He was sprayed with OC, then cuffed in back. He was placed in prone position in back of patrol car. He was unresponsive upon arrival at ER.	2	Ineffective

Case No. / Subset or Cate-gory	Age	Color	Confrontational Details	Oleoresin Capsicum	
				Times Applied	Effect
61 IB	38	B	Subject was a possible mental case on floor of a department store. He was violent, screaming and chanting. He was placed in hogtied position on his side. He was transported to a padded cell in jail. OC spray was used twice. He remained violent. He was sprayed again. He was restrained hand and foot and placed in a 4 point restraint cell. He stopped breathing 30 minutes after last OC spray. He was taken to the hospital where he expired 2 days later.	3	Ineffective
62 IA	38	W	Police received a domestic dispute call. Subject was violent. He was sprayed with OC. There was a struggle and he was finally cuffed. He was placed face down. He stopped breathing. He was not hogtied. CPR was not effective.	2	Ineffective
63 IIA			Subject was violent and fighting. A struggle with police ensued. He was sprayed twice with OC. He was handcuffed and leg restraints were applied. He was not hogtied. He was placed on his stomach. He stopped breathing and was rolled onto his side. Restraints were removed. CPR was not effective.	2	Ineffective
65 III	24	B	Subject was disorderly inside K-mart store. No resistance to arrest. He was handcuffed and placed in back of police car. He became agitated and kicked out window. OC was applied. It was effective. Within 20 minutes, he showed signs of illness. He appeared to be passing out. His breathing and heart rate were okay. He was taken to the hospital. He survived 10 hours, dying of blunt force to abdomen that had occurred before confrontation.	1	Effective
66 III	30	B	Police received a call regarding a domestic dispute which was occurring on a porch. Subject displayed paranoid actions ("They are going to kill me"). The door had been kicked in. Because of his large size, they decided to use OC spray prior to handcuffing the subject. There was a struggle when police tried to place cuffed subject in police car. EMTs arrived. He was strapped on a backboard while he was still cuffed with his hands in back. He started breathing "funny" (breaths every 30 seconds to 1 minute). He stopped breathing before transport.	1	Partially effective

Case No. / Subset or Cate-gory	Age	Color	Confrontational Details	Oleoresin Capsicum	
				Times Applied	Effect
67 IC	29	W	Subject was paranoid and "suspicious". He refused to be cuffed after being taken to the ground. He was sprayed with OC. He was put in prone position, with officer's knee on his back. Subject went limp. He was DOA at the hospital.	1-2 short bursts (?)	Ineffective
68 IIA	29	W	Subject was running in front of vehicles and jumping on them. Officers wrestled with him and tried to cuff him. He was violent and OC was sprayed. Subject was finally cuffed in back and legs restrained. He was rolled onto his side and put into sitting position. He apparently was holding his breath. He was uncuffed and placed in back of police vehicle. EMTs took the subject to the hospital where he was DOA.		Effective
69 III	25	B	Police stopped subject at a traffic signal. Subject displayed high stress and was verbal. There was a struggle and OC spray was used. He was handcuffed. There was another protracted struggle. Carotid neck restraint was used. He was taken to the hospital by EMTs. He was DOA at the hospital.	1	Partially effective
70 IA	27	B	Subject was exited and irrational in a 7-Eleven store. He was handcuffed in back but subject was able to get his hands in front. He continued to be violent and irrational. He fell against the police car. OC spray was used. Leg restraints were applied above the knees. He appeared dazed and unconscious. He then stopped breathing.	2	Ineffective
71 IIB	34	W	Police report stated that subject was paranoid schizophrenic and displayed bizarre behavior. He was stopped while speeding. He kicked the patrol car and hit an officer in the face. OC was sprayed in subject's face. At this point, a police dog assisted the officers. OC was again sprayed in his face. No effect. He was then hogtied. Subject continued struggling and an officer "sat on his back". Subject vomited and then stopped breathing.	2	Ineffective

Case No. / Subset or Cate-gory	Age	Color	Confrontational Details	Oleoresin Capsicum	
				Times Applied	Effect
72 IC	40	B	Coroner's office report stated that subject became disoriented and had fallen down. He became aggressive. OC spray was used. He was handcuffed. One officer was on subject's back attempting to restrain his feet. Subject was not moving. EMTs took him to ER in full arrest.		
74 IIA	37	W	Law enforcement officers summoned to a motel by silent alarm because of a robbery. Subject ignored orders, jumped from 2nd floor balcony and landed on a parked motor vehicle. He was sprayed with OC without effect. He was sprayed with OC a second time. Carotid hold was applied. He resisted cuffing. Finally, he was cuffed with 2 pair of handcuffs. A knee was on his shoulder, his shoulder was sat upon by law enforcement officers.	2	Ineffective
75 IA	35	B	Subject was driving vehicle erratically and was stopped by a deputy. Driver did not comply with officer. He was sprayed with OC and cuffed in back. He fought the restraints. His legs were cuffed. He was then decontaminated and taken from the scene by EMTs. When he was placed in the ambulance, he suffered a cardiac arrest.	1	Effective
77 IA	24	W	Subject was assaulting a woman and child. There was a chase by police and a struggle. He was sprayed twice with OC. He was cuffed in the back. There was a struggle to flexcuff his feet. He was placed face down in cruiser. He was possibly unconscious. He was dragged into his cell and placed face down. Within a few minutes, he was not breathing.	2	No effect
78 IIA	40	W	Police report stated that subject was abusing cocaine and running nearly naked through the neighborhood. One officer sat on his legs. OC spray was used with no effect. After cuffing, he was not breathing. One officer was on his leg and one was applying a "head lock" with right forearm on chin. Subject was rolled over and he was not breathing.	1 burst	No effect

Case No. / Subset or Cate-gory	Age	Color	Confrontational Details	Oleoresin Capsicum	
				Times Applied	Effect
79 IIA	20	H	EMTs stated "man gone crazy". They were unable to control. Law enforcement officers were summoned. There was a struggle. OC spray was applied. Officer kneeled on subject and finally used handcuffs and flexcuffs. Subject was placed face down on stretcher and strapped there. He stopped breathing en route to ambulance.	1	No effect
80 IIA	36	W	Multiple 911 hang-up calls were received. Law enforcement offices found the agitated subject in the shower of the trailer. Subject was extremely strong. There was a struggle and OC spray was used. He was cuffed and choke hold administered. Subject was placed on his side and legs cuffed, then hogtied. EMTs arrived and he was placed on backboard face down. He was DOA at hospital.	1	Ineffective
81 IIB	48	W	Police report stated domestic battery occurred. Subject was a schizophrenic and showed increased rage. He was sprayed with OC, then cuffed and hobbled. He was rolled over by EMTs. Subject was dead.	Not known	Ineffective
82 IIC	31	W	Police were called to a family disturbance at a motel. Subject was irrational and jumped through the motel window. He then jumped on police car. OC spray was used. He was placed face down and cuffed in back. He was held down and EMTs called because OC was used and there was suspected drug intoxication. Subject stopped breathing.	2	Ineffective
83 IC	29	W	Police received a disturbance call. An ambulance was requested. There was an RN in the police vehicle. Subject had seizures and displayed aggressive behavior. OC spray was used. He reacted to it and then was more aggressive. He was placed face down and cuffed. He was sat on (with a knee between his shoulder blades.) He was prepared for transport. He stopped breathing.		Partially effective

Case No. / Subset or Category	Age	Color	Confrontational Details	Oleoresin Capsicum	
				Times Applied	Effect
84 IA	28	B	Law enforcement officers were summoned on a suspicious person complaint. Subject entered the patrol unit vehicle, but got in front seat. OC spray was used to help get him out of the front seat and into the back seat. Subject was wrestled into back seat of the patrol unit, then taken to the police station. He was decontaminated in police department while in cuffs. After some interval, unsuccessful attempts to question the subject, he just babbled. He stopped breathing in his cell. He could not be resuscitated. He was pronounced dead at the hospital.	2	No effect
85 IB	36	B	Subject was stopping traffic. He became exited and started wrestling with officers. OC spray was used. He was cuffed in front with a waist belt. Leg cuffs were used. He was transported to the hospital, sitting up in the car. He was in asystole at the hospital.	2	Not effective
87 IIA	36	B	Subject was mentally disturbed. He was running in a roadway and was nearly struck by automobiles. OC spray was used. He was handcuffed in back. He had been held down while handcuffed. Subject started coughing and had trouble breathing. He was turned on his side. Ankle cuffs were linked to handcuffs by cuffs. He was placed face down in patrol car. His breathing slowed. He was pronounced DOA at the hospital.	2	Ineffective
89 IV	29	B	At the time of writing, the investigational details were not available. The medical examiner reports a history of asthma, and autopsy findings of asthma and no significant other disease or injury was found at the autopsy.	?	Effective
90 IB	39	W	Subject resisted arrest. He was sprayed with OC. He was handcuffed in back and rolled onto his side. He stopped breathing. The EMTs arrived. The subject was deceased.	1	Unknown effectiveness

CONFRONTATIONAL DETAILS

Case number. These are consecutive numbers. Age and color are as stated. All subjects are

male. The details of the confrontation are condensed. Accuracy of times OC were applied can be questioned. The effect of the application is that given by the law enforcement officers and may vary, depending on judgement and experience of the observer.

TABLE 4

DISEASE ENTITIES FOUND AT AUTOPSY

Only those considered by the autopsy surgeon to be important, or listed by him as part of the cause of death, are noted. In a few instances, diseases noted by the writer to have been included in the autopsy report have been added.

CASE	DISEASES
1	Follicular bronchiolitis; Cardiomegaly
2	Mild ASCVD; Moderate COPD
3	Cardiomegaly; Occlusive coronary artery disease
4	Not reported
5	Broncho pneumonia due to anoxic encephalopathy (10 day survival in hospital)
6	None
7	None
9	None
10	None
11	None
12	None
13	ASCVD, moderate
14	None
16	None
17	None
18	Granular atrophy of cortex, cerebellum, brainstem, Staph aureus pneumonia; ASCVD — remote myocardial infarction (month survival in hospital)
19	None
20	Generalized psoriasis
21	None
22	Single coronary ostium (dominant right)
23	None

CASE	DISEASES
24	None
25	ASCVD
26	Down's syndrome
27	None
28	Pneumonia; Cirrhosis (7 day survival in hospital)
29	HCVD
41	None
50	Fatty liver; Obesity; Cardiomegaly
51	None
52	Cardiomegaly; 75% Stenosis LAD; Hepatomegaly + fatty liver
54	None (1½ day survival in hospital)
55	HHD; Hepatomegaly
56	Focal coronary (LAD arteriosclerosis 80% occluded)
57	ASCVD; AS LAD 80% narrowing; Hepatomegaly + fatty liver
58	HHD
59	Hepatic steatosis, mild
60	None
61	Ischemic heart disease; LAD midsegmental myocardial bridge (2 day survival in hospital)
62	None
63	Fatty liver; Dilated cardiomyopathy
65	Probable blunt force injury (ABD); DIC (clinical) (10 hour survival in hospital)
66	DIC (clinical)
67	Fatty liver (2100 gm)
68	Cardiomegaly
69	None
70	None
71	Moderate coronary artery disease

CASE	DISEASES
72	None
74	None
75	None
77	None
78	Cardiomegaly - AS coronary artery; COPD
79	None
80	None
81	Hypoplastic right coronary artery
82	Coronary artery and atherosclerosis
83	None
84	Cardiomegaly; Bronchitis
85	Cardiomegaly
87	No autopsy done
89	Asthma; Early hypoxia; Obesity
90	Hypertension

Table 5

ALCOHOL AND DRUGS FOUND AT AUTOPSY

CASE	ALCOHOL (%		DRUGS (mgm/L)		
	Blood	Other	Blood		Other
1	0.14				
2			Cocaine Cocaethylene Benzoylecgonine	0.17 0 3.5	20.98 V 1.08 V 32.0 V
3	0.15	0.17 V 0.17 U	Cocaine Cocaethylene Benzoylecgonine THC Carboxy	1.04 0.44 3.41	70.9 V 18 V 116.3 V 0.082 U
4	0				
5	0		Benzoylecgonine Amphetamine Methamphetamine Phencyclidine Tricyclics	 0 0 0	0 U 0 U
6	0	0 V	Cocaine Benzoylecgonine Ecgonine methyl ester THC hydroxy THC carboxy	0.47 0.62 0.26 0.002 0.007	
7	<0.01	0.01 V	Cocaine Cocaethylene Amphetamine Methamphetamine Narcotics AN screen Benzolyeonine	0.50 0.22 0 0 0 	 0 V + V
9	0		Cocaine Benzoylecgonine	17.7 17.3	
10	0.04		Cocaine Benzoylecgonine	0.141 0.599	0.738 G 0.292 G
11	0		Amphetamine Methamphetamine Acetone Isopropanol	0.16 9.18 152 7.7	4.61 U 54.2 U

CASE	ALCOHOL (%		DRUGS (mgm/L)		
	Blood	Other	Blood		Other
12	0		Amphetamine Methamphetamine	0.143 1.845	
13	0.15	0.22 V	Drug scan	All neg	
14	0.268				
16	0		Cocaine Amphetamine Methamphetamine Phencyclidine Opiates Haldol	0 0 0 0 0 0	
17	(Hosp. autopsy 0.02) 0		Cocaine Benzolylecgonine Amphetamine Methamphetamine Phencyclidine Heroin	0 0 0 0 0.10 0	
18	0		Volatiles	0	
19	0		Cocaine Benzoylecgonine Cannabis	0.1197	0.324 + +
20	0.11		Methamphetamine Phencyclidine	0.153 0.548	1.259 U 1.121 U
21	0		Benzoylecgonine Methamphetamine Phencyclidine Morphine	0 4.4 0 0	
22	0		Cocaine Amphetamine Methamphetamine Diazepam	0 2.60 1.985 1.587	
23	0		Amphetamine Methamphetamine Ephedrine Diphenaydramine	0.04 15 0.45 Detected	Detected U Detected U Detected U Detected U
24	0		Amphetamine Methamphetamine	0.09 0.31	0.18 B 1.24 B

CASE	ALCOHOL (%		DRUGS (mgm/L)		
	Blood	Other	Blood		Other
25	0		Cocaine Benzoylecgonine Acid-base Salicylate Opiates Benzodiazepines	0 0 0 0 0 0	
26	0		Drug screen	0	0 U
27	0		Cocaine Benzoylecgonine Phencyclidine Cannabinoids Opiates Benzodiazepines Benzamines Barbiturate Methaqualene Propexyphen Methodone	0.295 1,121 0 0 0 0 0 0	120.8 U 31.59 G 182.7 U 1.04 G 0 U + U 0 U 0 U 0 U 0 U 0 U 0 U
28			Cocaine antemortem Opiates antemortem Benzos antemortem Cannabis antemortem	0.72	+ U + U + U 0
29	0		Cocaine Cocaethylene Diazepam	0.28 0.07 0.03	
41			Phencyclidine	0.422	
50			Cocaine Cocaethylene Benzoylecgonine Methamphetamine		ND Kidney ND Kidney ND Kidney ND Kidney
51			Cocaine Amphetamine Morphine (RIA) Free morphine Quinine	Neg 100 0.025 Neg	+ + + +

CASE	ALCOHOL (%		DRUGS (mgm/L)		
	Blood	Other	Blood		Other
52	0		Benzoylecgonine Methamphetamine Phencyclidine Heroin Benzodiazepine Barbiturate	0 1.8 0 0 0 0	
54	0		Cocaine Cocaethylene Benzoylecgonine Amphetamine Methamphetamine Phencyclidine Heroin Basic/gc Epheprine	ND ND ND ND* ND 0.02* 0.03 ND ND ND ND* ND	 2.56 U 0.09 L 860 U* 0.12 L ND U ND L
55	0		Cocaine Benzoylecgonine Nicotine Caffeine	0.505 2.1 + +	
56	0		Cocaine	0 (Field test)	No further exam
57	0.0553	0.0953 V	Cocaine Benzoylecgonine	2.671 0.03305	+ U + B + Nasal swab
58	0.038		Cocaine Cocaethylene Benzoylecgonine Methylecgonine	516 112 1769 707	
59			Benzoylecgonine Amphetamine Methamphetamine	0 0.16 0.78	0.40 U 10.2 U 39.9 U
60	0		Cocaine Cocaethylene Benzoylecgonine Carboxy THC	0.33 ND 0.68	12.76 U ND U 42.49 U 0.032 U

CASE	ALCOHOL (%		DRUGS (mgm/L)		
	Blood	Other	Blood		Other
61	ND	ND V ND CSF	Cocaine Benzoylecgonine Phencyclidine Heroin THC carboxylic acid	ND ND 0.62 ND 0.01	 0.6 U 0.77 CSF
62	ND		Cocaine Benzoylecgonine	0.50	+ B + B
63	0.038		Cocaine Cocaethylene Benzoylecgonine Propoxyphene N/NOR Propxyphene Acetaminophen	0.61 3.13 0.24 4.95	 + U + U + U + U
65	0*		Cocaine Benzoylecgonine Amphetamine Methamphetamine Phencyclidine	0.080* 0.007* 0* 0* 0*	
66	0.116		Cocaine Cocaethylene Benzoylecgonine Methcafinone Ephedrine	0.092 0 1.418 0 0	
67			Codeine Amphetamine Methamphetamine	 0.74	0.30 U 15.4 U 111.4 U
68	0.02		Cocaine Cocaethylene Benzoylecgonine Amphetamine Methamphetamine Phencyclidine Heroin	0.56 0 0.57 0 0 0 0	

CASE	ALCOHOL (%		DRUGS (mgm/L)		
	Blood	Other	Blood		Other
69	0.02		Cocaine Cocaethylene Benzoylecgonine Amphetamine Methamphetamine Phencyclidine Heroin	0 0 0 0 0 0 0	
70	0.07	0.09 V	Cocaine Cocaethylene Benzoylecgonine Cannabinoids LSD	1.1 0.37 3.2	 0 U 0 U
71	0		Cocaine Cocaethylene Benzoylecgonine Amphetamine Methamphetamine Phencyclidine Heroin	0 0 0 0 0 0 0	
72	0		Cocaine Benzoylecgonine Amphetamine Methamphetamine Phencyclidine Heroin	5.4 1.3 0 0 0 0	+ U + U
74	0		Cocaine Cocaethylene Amphetamine Methamphetamine Barbiturate	0.49 0 0 0.037 0	1.6 Brain 0 Brain
75	No results available		Cocaine Benzoylecgonine Heroin	2.5 2.8 1.2	
77	0		Cocaine Amphetamine Methamphetamine LSD Psilocin	0 0 0 0 +	 + U + L

CASE	ALCOHOL (%		DRUGS (mgm/L)		
	Blood	Other	Blood		Other
78	0		Cocaine Cocaethylene Benzoylecgonine Amphetamine Methamphetamine Phencyclidine Heroin Opiates	3.22 0 0 0 0 0 0 0	
79	0		Cocaine Cocaethylene Benzoylecgonine Amphetamine Methamphetamine Phencyclidine Heroin	0.877 0 0 0 0 0 0	+ U
80	0		Ritalin	0.13	
81	Neg		Cocaine Amphetamine Phencyclidine Heroin	Neg Neg Neg Neg	
82	0		Cocaine Benzoylecgonine Ecgonine CH3 ester Cannabinoid	0.56 3.9 0.62 0	
83			Cocaine Amphetamine Phencyclidine LSD Benzodiazapines Codeine Free Codeine Total	0 0 0 0 0 0.18 0.40	 0 U 0 U
84	0.01 Heart 0.01 Peripheral	0.01 V 0.01 U 0 B 0.07 G 0.01 Pericardial fluid	Cocaine	0.49 Heart 0.41 Peripheral	+ U

CASE	ALCOHOL (%		DRUGS (mgm/L)		
	Blood	Other	Blood		Other
85	0		Cocaine Cocaethylene Benzoylecgonine Ecgonine methyl ester	0.34 0 3.7 1.7	42 U 0.18 L 1.1 U 440 U 5.4 L 210 U 1.5 L
87	0		Cocaine ("Lethal level")	No autopsy	No toxicology
89			Cocaine Cocaethylene Benzoylecgonine Amphetamine Methamphetamine Phencyclidine Atropine	0 0 0 0 0 0.4	0 G 0 G 0.066 U 0 G 0 U 0 U 0 G
90	0.0018		Amphetamine Methamphetamine Δ-9 THC Δ-9 Carboxy THC Bromphenramine	0.12 0.27 3.3 19 0.06	

LEGEND:

V = Vitreous
U = Urine
B = Bile
G = Gastric
L = Liver

ND = Not Detected
* = Antemortem

In all instances, the units in which the alcohol/drug concentrations have been reported have been reduced to percent (%) for alcohol, and milligrams/Liter or milligrams/Kg (solid tissues) for drugs.

TABLE 6

CAUSE OF DEATH

CASE	LISTED IN RECORDS RECEIVED	DERIVED FROM THIS STUDY CATEGORY	SUBSET
1	Asphyxia due to broncho spasm precipitated by O.C.	Probable positional asphyxia Asthma + O.C.	IV
2	Acute cocaine intoxication	Confrontational situation Cocaine intoxication	IIA
3	Cocaine Disease Restraint	Confrontational situation ASCVD Diabetes mellitus	IIC
4	Not reported	Confrontational situation Cardiomyopathy	IIB
5	Broncho pneumonia due to anoxic encephalopathy	Positional asphyxia (10 day survival in hospital)	IC
6	Toxic effects of cocaine	Toxic effects of cocaine	IA
7	Toxic effects of cocaine	Toxic effects of cocaine	IA
9	Acute cocaine intoxication	Acute cocaine intoxication Possible confrontational situation	IIA
10	Cardiac dysrhythmia due to cocaine intoxication	Cocaine intoxication	IA
11	Acute methamphetamine intoxication Police restraining procedure	Methamphetamine intoxication Probable confrontational situation	IIA
12	Acute methamphetamine intoxication	Methamphetamine intoxication Possible confrontational situation	IIA
13	Probable ventriculus arrhythmia Acute exhaustive mania Alcohol induced paranoia	Confrontational situation Acute alcohol intoxication	IIA
14	Cardiac arrhythmia following struggle Acute alcohol intoxication contributing	Confrontational situation Acute alcohol intoxication	IIA
16	Excited delirium due to paranoid schizophrenia natural	Probable positional asphyxia	IC

CASE	LISTED IN RECORDS RECEIVED	DERIVED FROM THIS STUDY CATEGORY SUBSET
17	Cardiac arrhythmia	Positional asphyxia IC
18	Ischemic-hypoxic encephalopathy due to ASHD	Ischemic (hypoxic) encephalopathy due to ASHD (4 month survival in hospital) III
19	Cocaine abuse Excited delirium	Probable confrontational situation Cocaine abuse IIA
20	Cardiorespiratory arrest due to multiple drug toxicity	Multiple drug toxicity Methamphetamine + Phencyclidine IA
21	Collapse during restraint Acute methamphetamine toxicity	Acute amphetamine toxicity Probable confrontational situation IIA
22	Physical struggle + positional restraints Multiple drug abuse	Confrontational situation Methamphetamine toxicity IIA
23	Cardiac arrest following law enforcement restraint due to acute amphetamine intoxication	Acute methamphetamine intoxication Possible confrontational situation IIA
24	Acute methamphetamine intoxication Malignant (?) hyperkalemia	Acute methamphetamine intoxication IA
25	Not stated	Probable confrontational situation Cardiomegaly ASHD IIB
26	Physical exertion Restraint in prone position	Positional asphyxia IC
27	Acute cocaine toxicity	Acute cocaine toxicity +struggle Not positional asphyxia IA
28	Complications of cocaine toxicity	Complications of cocaine toxicity (7 days in hospital) IA
29	Acute cocaine intoxication	Confrontational situation with HCVD and cocaine intoxication IIC
41	PCP toxicity	Phencyclidine toxicity Possible confrontational situation IIA

CASE	LISTED IN RECORDS RECEIVED	DERIVED FROM THIS STUDY CATEGORY SUBSET
50	Positional asphyxia Diabetes mellitus (clinical)	Confrontational situation Obesity - big belly No drugs Diabetes mellilitus IIB
51	Multiple gunshot wounds	Cause of death = gunshot wounds O.C. spray noncontributory III
52	Acute methamphetamine toxicity	Confrontational situation Carotid hold Methamphetamine toxicity IIA
54	Hypoxic encephalopathy Restrictive asphyxia with cardiopulmonary arrest Maximum restraint in prone position by law enforcement officers Methamphetamine abuse (accidental)	Confrontational situation Methamphetamine toxicity IIA
55	Cocaine intoxication HHD Hepatomegaly	Probable asphyxia: position of head (hanging out of door of police vehicle) Cocaine intoxication IIA
56	Cardiac arrest due to ASCVD (LAD 80%)	Agree with autopsy diagnosis of cause of death Probably not positional asphyxia III
57	Acute cocaine toxicity ASCVD	Acuate cocaine intoxication ASCVD Probable confrontational situation IIC
58	Sudden death associated with cocaine- induced excited delirium and restraint HHD	Cocaine intoxication HHD (large) heart IB
59	Sequelae of methamphetamine Intoxicated with excited delirium	Confrontational situation Methamphetamine intoxication IIA
60	Cocaine intoxication	Cocaine intoxication Confrontational situation IIA
61	Phencyclidine poisoning Ischemic heart disease	Phencyclidine intoxication Ischemic heart disease (myocardial bridge) IB
62	Cocaine intoxication	Cocaine intoxication IA

CASE	LISTED IN RECORDS RECEIVED	DERIVED FROM THIS STUDY CATEGORY SUBSET
63	Cocaine intoxication	Cocaine intoxication Possible confrontational situation IIA
65	Disseminated intravascular coagulopathy due to blunt force	Blunt force injury to abdomen Cocaine intoxication III
66	Cocaine + alcohol toxicity	Probable positional asphyxia "Choked down" ?? III
67	Positional asphyxia Methamphetamine intoxication	Positional asphyxia IC
68	Cocaine intoxication Cardiomegaly	Cocaine intoxication (hyper pyrexia) Possible confrontational situation IIA
69	Sudden cardiac arrest due to manual compression of neck	Manual neck compression III
70	Cocaine intoxication	Cocaine intoxication IA
71	Cardiorespiratory arrest due to moderate coronary artery disease, fractured rib, hogtie position, exhaustion, and possible effects of pepper spray and excited delirium	Confrontational situation IIB
72	Cocaine toxicity	Positional asphyxia IC
74	Acute cocaine + methamphetamine intoxication (not stated on autopsy report)	Cocaine + methamphetamine intoxication Choke hold Confrontational situation IIA
75	Cocaine + heroin toxicity	Cocaine + heroin toxicity IA
77	Psilocin toxicity	Psilocin toxicity IA
78	Cocaine toxicity	Cocaine intoxication Probable confrontational situation IIA
79	Cocaine toxicity	Cocaine toxicity ? Confrontational situation IIA
80	Acute psychosis following IV of Ritalin Contributing: chronic methamphetamine abuse	Methylphenidate toxicity Probable confrontational situation IIA
81	Hypoplasia of right coronary artery	Hypoplastic right coronary artery Probable confrontational situation IIB

CASE	LISTED IN RECORDS RECEIVED	DERIVED FROM THIS STUDY CATEGORY SUBSET
82	Toxic effects of cocaine	Cocaine intoxication + ASCVD Possible confrontational situation IIC
83	Positional asphyxia + drugs	Positional asphyxia IC
84	Sudden CV collapses due to cocaine intoxication following struggle during restraint procedures Bronchitis, cardiomegaly	Cocaine intoxication IA
85	Cocaine intoxication	Acute cocaine poisoning Cardiomegaly Not positional asphyxia IB
87	Cocaine overdose	Cocaine intoxication Confrontational situation IIA
89	Asthma due to O.C.	Asthma + O.C. IV
90	Mixed drug intoxication HTN	Mixed drug intoxication HTN IB

CAUSE OF DEATH

A comparison of the cause of death as listed by the autopsy surgeon or medicolegal officer and that cause of death derived by the writer from all the information available to him. Note that two do not coincide in all instances. This is not unexpected since the information available to each party may be spotty, incomplete, or unavailable. In addition, the medical terminology employed, although meaning the same, may appear to represent different medical conditions.

TABLE 7

CASE NO.	HEIGHT (Inches)	WEIGHT (Pounds)	HEART WEIGHT (Grams)	"NORMAL" HEART WEIGHT
1	73	308	460	349 ± 40
2	68.5	168	382	329± 40
3	72	300	670	346± 40
4	73.5	260	543	352± 40
5	68	145	380	327± 40
6	61.5	118	440	294± 40
7	69.5	201	455	333± 40
9	67	178	390	321± 40
10	76	181	"Normal"	365± 40
11	73.5	212	520	352± 40
12	71	165	322	340± 40
13	69	280	390	330± 40
14	70	205	393	336± 40
16	74	192	340	355± 40
17	74	220	450	355± 40
18	69	134	430	330± 40
19	72	225	440	346± 40
20	68	202	460	327± 40
21	62.5	132	300	300± 40
22	65.5	137	320	314± 40
23	72	194	370	346± 40
24	70	156	350	336± 40
25	73	273	580	349± 40
26	60	190	340	287± 40
27	68	186	370	327± 40
28	71.5	216	410	343± 40
29	67	225	600	321± 40

CASE NO.	HEIGHT (Inches)	WEIGHT (Pounds)	HEART WEIGHT (Grams)	"NORMAL" HEART WEIGHT
41	73	214	425	349± 40
50	75	275	470	361± 40
51	71	160	320	340± 40
52	60	230	420	287± 40
54	75.5	245	390	363± 40
55	73.5	225	430	352± 40
56	69	165 est.	350	330± 40
57	73	228 est.	440	349± 40
58	68	204	500	327± 40
59	66	250+	385	317± 40
60	69	174	390	330± 40
61	71.5	212	450	342± 40
62	73	213	510	349± 40
63	63.5	300 est.	550	305± 40
65	73	255	500	349± 40
66	68.5	195 est.	440	329± 40
67	68	200	325	327± 40
68	73	242	500	349± 40
69	67	273	410	321± 40
70	67	172	390	321± 40
71	70	176	375	340± 40
72	72	308	430	346± 40
74	77	247	490	370± 40
75	73	210	500	349± 40
77	67	167	400	321± 40
78	66	172	460	317± 40
79	71	174	420	340± 40
80	68	198	420	327± 40
81	73	237	370	340± 40

CASE NO.	HEIGHT (Inches)	WEIGHT (Pounds)	HEART WEIGHT (Grams)	"NORMAL" HEART WEIGHT
82	67	180	400	321± 40
83	72	290	430	346± 40
84	68	221	415	327 ± 40
85	65.5	256	510	314± 40
87	67	170	?	321± 40
89	69	376	440	330± 40
90	65	131.5	530	311± 40

SUBJECT SIZE AND HEART WEIGHT

Height in inches, weight in pounds, heart weight in grams, normal heart weight for height of subject in grams. Normal heart weight adapted from Zeek.

It should be noted that most of the hearts are overweight, according to the tables taken from Zeek.