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Cocaine in Wayne County Medical Examiner's Cases

REFERENCE: Hood, I., Ryan, D., Monforte, J., and Valentour, J., "Cocaine in Wayne County Medical Examiner's Cases," *Journal of Forensic Sciences*, JFSCA, Vol. 35, No. 3, May 1990, pp. 591-600.

ABSTRACT: We determined the incidence of detection of cocaine or its metabolites in Wayne County (Michigan) Medical Examiner's cases from 1984 to 1987. Over this four-year period there was a significant ($P < 0.01$) increase each year in evidence of recent cocaine use in this population, reaching 38.3% of all tested cases in 1987. Much of this increase was accounted for by homicide victims, especially those in their third or fourth decade of life, of whom 58.6 and 56.3%, respectively, tested positive in 1987. There was a large increase in recent cocaine use in teenage homicide victims in 1987, having previously changed little from 1984 to 1986.

In victims of drug abuse, recent cocaine use also increased significantly ($P < 0.01$) each year, reaching 47.6% in 1987, generally in combination with heroin. Although deaths attributed solely to cocaine were not as common, they also increased significantly each year from 4 in 1984 to 25 in 1987.

Compared with the general population, those who use cocaine in Wayne County are more likely than those who do not to die prematurely, often as a result of violence.

KEYWORDS: criminalistics, cocaine, homicide, death, epidemiology

Cocaine is a drug with a checkered history of licit and illicit use. Popular in a variety of patent formulations at the turn of this century, cocaine was then more rigorously controlled by the Harrison Narcotic Act of 1914. Because cocaine was largely superseded by more effective local anesthetics in medicinal uses, its illicit use was mostly confined to a small population who could afford its high price and took the drug by nasal instillation ("snorting") [1]. In the early 1970s, the prevailing view was that little mortality, morbidity, or social cost related to cocaine [2]. Since then cocaine has become increasingly available in "freebase" formulations, notably "crack" cocaine, at low financial cost and smoked rather than snorted, with different pharmacology and an apparently greater potential for abuse [3,4]. The current "epidemic" of cocaine use has not gone unrecorded by the news media [5], and there has been a considerable increase in the proportion of the population who report having used cocaine [4,6-10]. Concurrently, emergency room admissions and deaths attributed to cocaine have increased [11,12]. The Medical Examiner's Office of Wayne County (WCMEO), Michigan, serves a population of about two million, including the City of Detroit, and has noted a steady increase in deaths attributed solely to cocaine,

Received for publication 8 May 1989; revised manuscript received 29 June 1989; accepted for publication 30 June 1989.

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but these numbers are small and constitute a minor fraction of all deaths due to drugs. However, the overall incidence of cocaine detected in cases investigated by the WCMEO increased markedly in the mid 1980s and may better represent this aspect of the burden of cocaine abuse. Therefore, this study was undertaken to characterize better the medical examiner's cases in which cocaine was detected and to determine their incidence.

Methods

All cases from 1984 to 1987 inclusive that had been tested for cocaine were abstracted from the files of the WCMEO. A case was regarded as positive only if it met the same standard used by the WCMEO in medicolegal reports, namely cocaine or metabolite detected in two or more body fluids by two or more different methods. Generally, this meant a positive urine EMIT® screen for cocaine and confirmation of cocaine in blood by gas chromatography (GC) or gas chromatography/mass spectrometry (GC/MS), but in some cases, tissue or some other body fluid was similarly tested. Free cocaine in blood has an elimination half-life estimated at up to 60 min [13], but we have detected its metabolite benzoylecgonine in urine and other tissues (for example, kidney) in cases hospitalized for two to three days before death. Generally, one or more of the analytical methods used in each case in this study was sensitive to this compound. A positive result was thus taken to indicate recent use, that is, within two to three days before death [14]. The age, race, gender, and manner of death were noted for each case along with any other drugs detected. The large number of cases whose manner of death is given as undetermined in Wayne County is composed predominantly (90 to 95%) of deaths due to drugs, mostly heroin. They are classified this way so as not to impede those judicial jurisdictions who elect to investigate such cases and prosecute any second party who administered the fatal dose. Cases from each year were compared according to their abstracted characteristics.

Results

More than 3300 cases were tested for cocaine in the four years of this study. As indicated in Fig. 1, the incidence of positive results has increased steadily ($P < 0.01$ for each year to year comparison) and cocaine or its metabolite were found in over 38% of all WCMEO cases in 1987. Figure 2 demonstrates that this increase occurred in both black and white subjects, although whites lagged behind blacks and the increase in white males was restricted mostly to 1986. The increase in white females was steady, surpassing white males in 1987, whereas black males exhibited the highest incidence of recent cocaine use and a significant increase over all other groups after 1986. Males of all races outnumbered females approximately four to one amongst the population of WCMEO cases, reflecting their greater propensity for sudden, violent, or unexpected death.

While the incidence of recent cocaine use remained relatively constant amongst teenage WCMEO cases from 1984 to 1986, it almost doubled in this age group in 1987 ($P < 0.01$) and increased steadily in cases in their third or fourth decade of life (Fig. 3). After 1986, there was a significant increase in recent cocaine use in cases aged 40 and over ($P < 0.01$), probably representing a cohort effect as most were within the first 2 or 3 years of this age group. Virtually all cases under the age of 40 are tested for cocaine and other illicit drugs at the WCMEO, but this is not true of the older age group, many of whom are unattended deaths of elderly individuals as a result of natural causes. It is generally the younger cases of this age group that are selected for drug testing, and the proportions of positive cases indicated for them in Fig. 3 are almost certainly higher than exist in the entire group (including untested cases) because of this selection bias. However, there

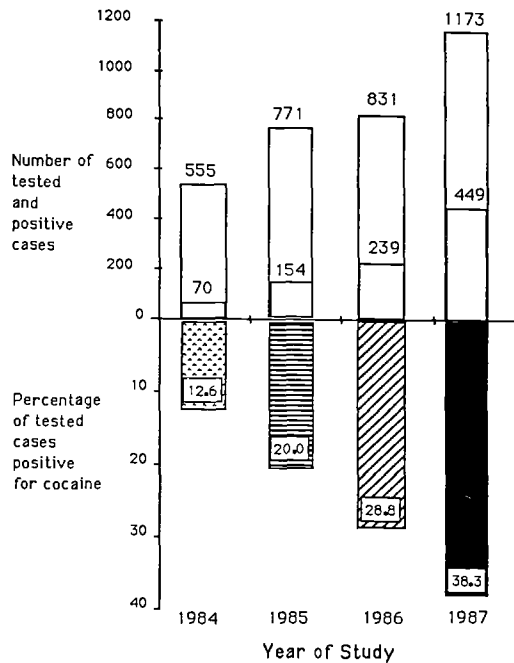


FIG. 1—Incidence of cocaine in WCMEO cases.

was no change in the criteria by which cases over the age of 40 were selected for drug testing during the course of this study, and any significant differences over time within this age group are unlikely to be artifactual.

When cases were considered according to their manner of death (Fig. 4), some of the greatest increases in recent cocaine use were apparent. As noted in the section on Methods, the Undetermined group was comprised mostly of deaths due to drugs amongst whom there was more than a fourfold increase in recent cocaine use ($P < 0.01$ for each year-to-year comparison) to include more than 46% of all such cases. There was a similar increase in deaths attributed solely to cocaine, but, as is seen in Table 1, these numbers were still relatively small and the majority of deaths due to drugs in which cocaine was detected had also used heroin. These two drugs are sometimes taken together in a mixture known in street terms as a "speedball." However, it was not cases of death as a result of drugs that had the greatest incidence of recent cocaine use, but rather victims of homicide in terms of both total numbers and proportion of cases. In 1984 almost a fifth of homicide victims had evidence of recent cocaine use, and this proportion more than doubled in the next three years ($P < 0.01$). When the Homicide and Undetermined groups, which contain the majority of cases in whom cocaine was detected, were classified by age (Figs. 5 and 6), the proportions of cases with evidence of recent cocaine use were even greater in certain age groups. There were very few deaths as a result of drug abuse in teenagers, but there was evidence of recent cocaine use in approximately 17% of homicide victims in this age group for the first 3 years of the study period and a marked increase to 27% in 1987. The great majority of cases in which there was evidence of recent cocaine use were aged 20 to 39 years and occurred within the Homicide and Undetermined groups, particularly the former. The incidence of recent cocaine use in these groups nearly tripled over the 4 years of this study.

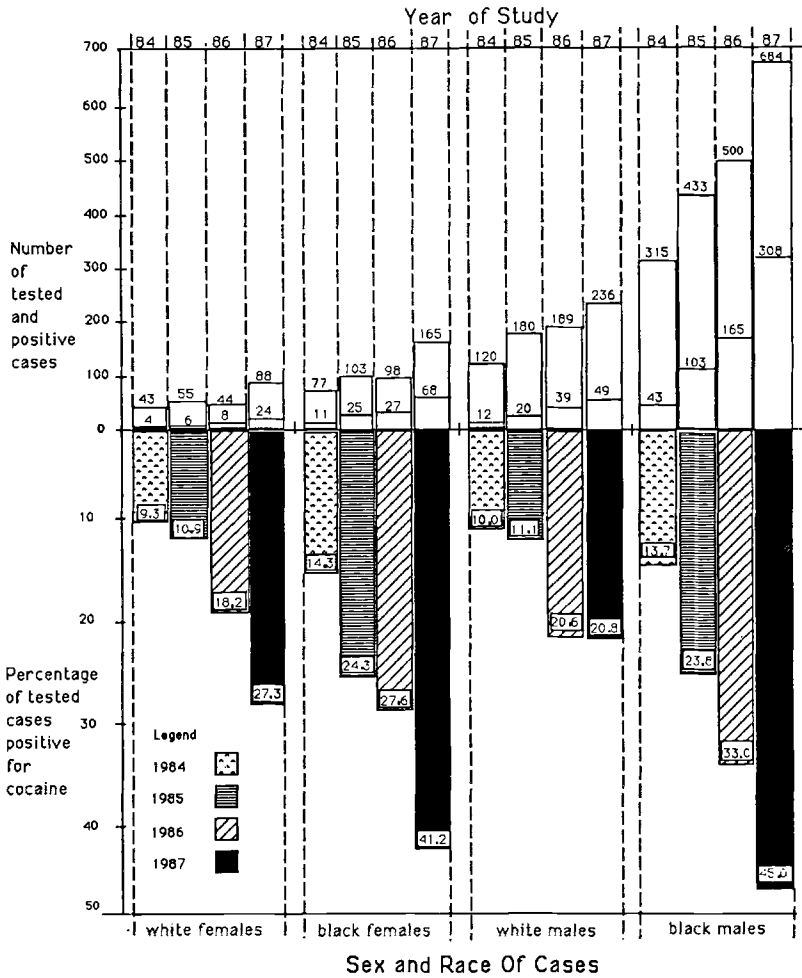


FIG. 2—Incidence of cocaine in WCMEO cases classified by race and gender.

Discussion

Not all deaths are referred to a medical examiner whose cases are therefore not representative of the population as a whole. The National Institute of Drug Abuse (NIDA) monitors drug abuse in the population with such instruments as the triennial Household Survey of Drug Abuse [7,10,15] and medical examiner's cases and emergency room admissions through the Drug Abuse Warning Network (DAWN) [11,12]. These documented an increase in cocaine use in the general population, but the proportion of WCMEO cases who had used cocaine two to three days before their deaths (38.3% in 1987) was much greater than those who had used cocaine in the preceding month in the NIDA surveys (about 3% in 1985) [7]. While some of this difference may reflect differences between the population of Wayne County and the general population surveyed by NIDA, it is improbable that more than a third of Wayne County residents used cocaine every two to three days [16], and we must conclude that from 1984 to 1987, individuals

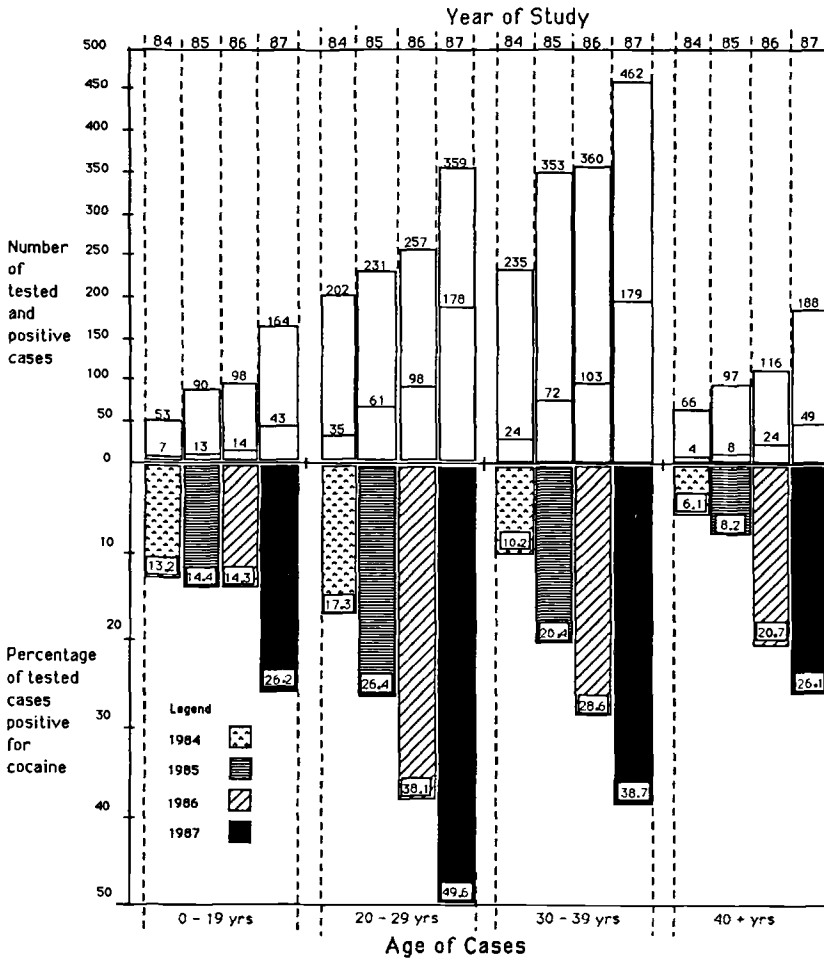


FIG. 3—Incidence of cocaine in WCMEO cases classified by age.

who used cocaine in Wayne County were more likely to become Medical Examiner's cases than those who did not.

The results for race and gender indicate that cocaine's relatively low price and ready availability have now made it an equal opportunity drug used by both blacks and whites of either sex. The slower and smaller increase in evidence of recent cocaine use by whites in our cases may reflect an actual delay in dissemination of cocaine abuse among the white population or a delay in their entering the population of cases examined by the WCMEO, perhaps for socioeconomic reasons. This latter explanation may account for some of the preponderance of recent cocaine abuse in young black male WCMEO cases, since this group suffers more sudden and violent deaths and hence overrepresentation in medical examiner's cases. However, even when consideration is restricted to homicides, the proportion of cases in which cocaine was detected was greater in blacks than in whites.

With respect to age, the NIDA data have demonstrated that most of the increase in cocaine abuse in the general population has occurred in subjects in their third and fourth decade of life and the WCMEO cases mirror this distribution [7,10]. This is in keeping with other studies that indicate new users in this age group are responsible for much of

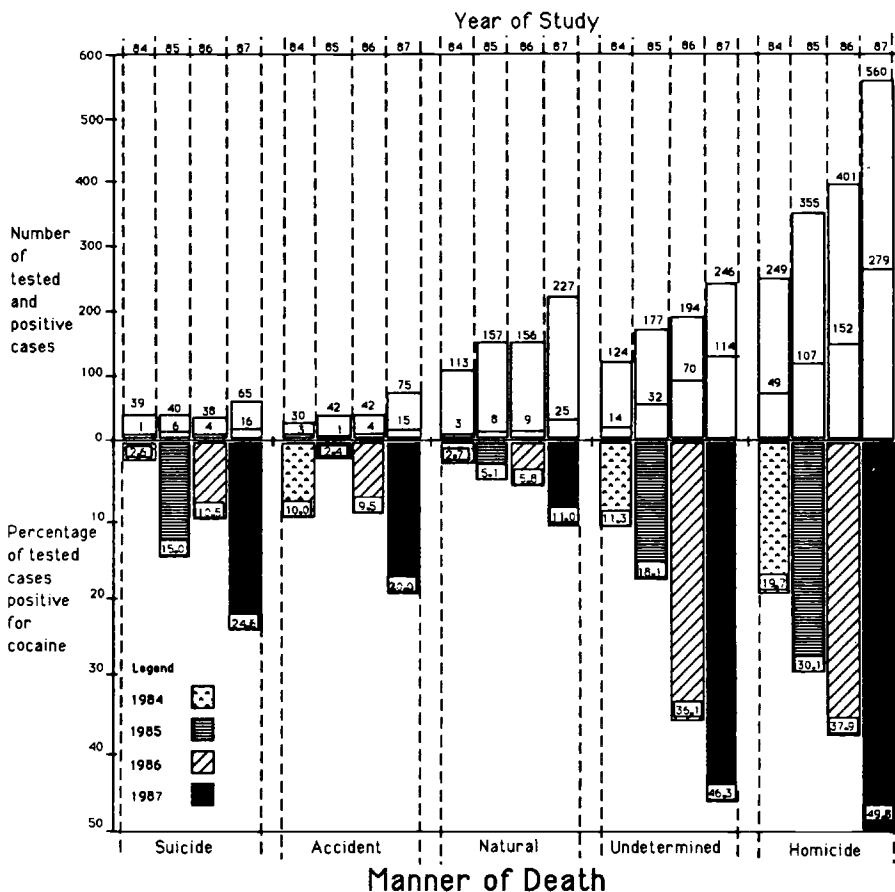


FIG. 4—Incidence of cocaine in WCMEO cases classified by manner of death.

the increase in cocaine abuse [8,17]. Much propaganda aimed at discouraging cocaine abuse has been directed at the high school and early college population rather than this older age group, although some effort has been made toward this end [18]. The proportion of the general college-age population that reported using cocaine at least once in the year before sampling remained stable up to 1985 at 16 to 17% [19]. In 1985, 7.6% of 18-

TABLE 1—Cocaine in deaths as a result of drugs.

	1984	1985	1986	1987
Total drug deaths	14/124 (11.3%)	32/174 (18.4%)	69/186 (37.1%)	110/231 (47.6%)
Heroin	10/101 (9.9%)	24/145 (16.6%)	56/151 (37.1%)	81/184 (44.0%)
Other drugs	0/19	1/21	2/22	4/22
Cocaine as sole cause	3	5	10	25
Probable cocaine alone ^a	1	3	3	0

^aCocaine used at time of death and was the only drug detected in urine and tissues but not in blood (as free cocaine) because of decomposition or metabolism in agonal period of survival.

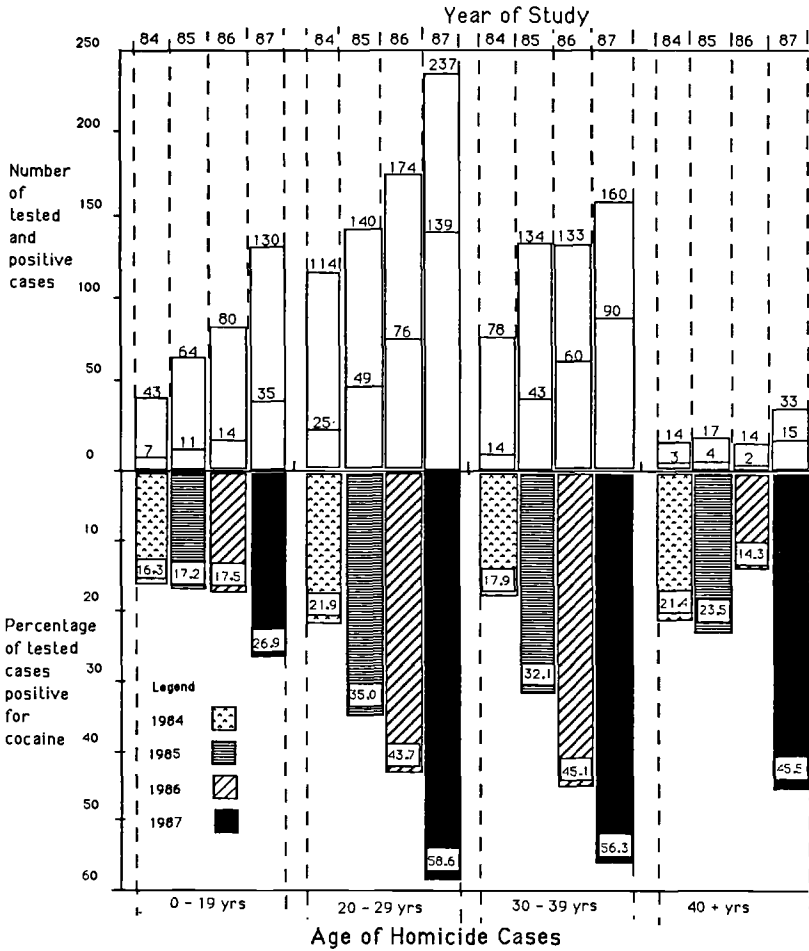


FIG. 5—Incidence of cocaine in WCMEO homicide cases classified by age.

to 25-year-olds and 1.7% of under 18-year-olds were estimated to have used cocaine in the preceding month, while 0.4% reported recent daily use, and similarly low figures might be predicted for those using cocaine in the previous 2 to 3 days [19–21]. Yet, in WCMEO cases aged under 20, the incidence of recent cocaine use (that is, in the preceding 2 to 3 days) was greater than 14% for the first 3 years of this study and increased to 26.2% in 1987. This latter increase occurred at a time when recent surveys of high-school seniors indicated a drop in cocaine use [22,23].

In 1987, 49.4% of WCMEO cases aged 20 to 29 had used cocaine in the preceding 2 to 3 days, 6 times the 7.7% of 18- to 25-year-olds who reported using cocaine in the 1 month before a NIDA survey of 1985 [7]. This figure of 7.7% for the latter group (which was the highest of all age groups in that survey) has fallen slightly since a peak of 9.3% in 1979 [15], yet the incidence of recent cocaine use actually increased substantially over the course of this study in WCMEO cases aged 20 to 39.

Although not a newly described entity [24], there have been increasing numbers of reports of sudden death associated with cocaine use, usually ascribed to cardiac causes [25–29]. However, as seen in Table 1, these deaths were not frequent in Wayne County, although they did increase steadily over the period of this study and numbered 25 in

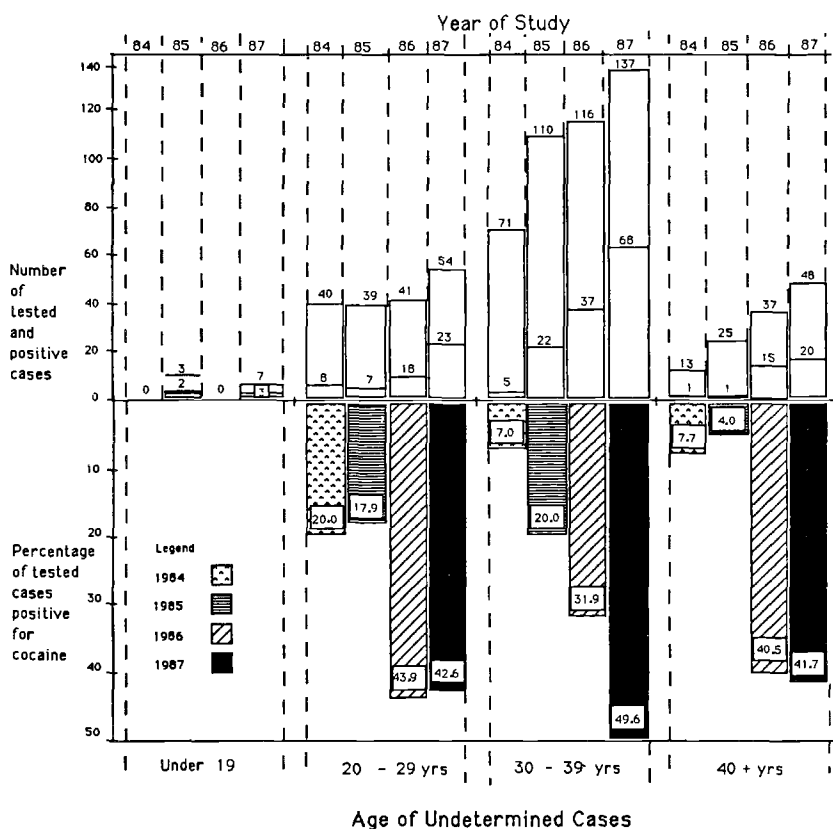


FIG. 6—Incidence of cocaine in WCMEO undetermined cases classified by age.

1987. This constituted less than 11% of all deaths as a result of drugs in this year, almost 80% of which were ascribed to heroin, alone or in combination. As indicated in Table 1, of all groups considered, cocaine use increased most rapidly in concomitant heroin users (a more than fourfold rise from 9.9 to 44%). Previous studies have also indicated the high frequency of use of other drugs in cocaine users [30].

It was in homicide victims that evidence of recent cocaine use was most prevalent in WCMEO cases, which marked increases in those aged 20 to 40 years. At almost 50%, the incidence of cocaine detection in all homicide victims in Wayne County in 1987 greatly exceeded the 20% figure found in San Diego homicide victims in the same year [31]. Among teenage homicide victims, cocaine was detected in a substantial proportion that did not increase significantly from 1984 to 1986 but did so markedly in 1987. In comparison, there were very few deaths as a result of drugs in this age group. The phenomenon of teenage homicide has not gone unnoticed in Wayne County [32] nor has the epidemic of "crack" cocaine [33,34] and these statistics for 1987 support the widely held view of a relation between the two phenomena [35].

The highest proportion of recent cocaine use in WCMEO cases was documented in homicide victims aged 20 to 39 and approached 6 times the highest incidence of cocaine use in the previous month reported in the general population (in the 18 to 25 age group) [7]. It could be argued that cocaine use is most common in those victims destined to become victims of homicide anyway, regardless of their use of this drug. In this regard, however, it may not be coincidental that the annual number of homicides increased

steadily from 618 to 815 in Wayne County in the period covered by this study, while the population of the county decreased slightly. A civic campaign against cocaine distribution in Wayne County was begun in 1987 [36,37], and it remains to be seen what effect this will have on WCMEO statistics.

The present study could address only associations between death and recent cocaine use, not cocaine use before the two to three days before death or associations of death with aspects of cocaine other than use by the victim. The latter would include dealing in cocaine or simply being an innocent bystander when cocaine-related violence occurred. Nor could we assess morbidity rather than mortality. In respect of recent cocaine use, however, it would seem that, when compared with the general population, those who use cocaine in Wayne County are more likely to become medical examiner's cases, that is, dead, usually by violent means.

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