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Fluoxetine and violent death in Maryland

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Abstract

A retrospective Medical Examiner case review of all deaths in Maryland where either fluoxetine or tricyclic antidepressant (TCA) use was forensically detected was conducted for the time period January 1987–July 1991. Case records and toxicology reports from the Office of the Chief Medical Examiner were reviewed to determine cause and manner of death, circumstances of death, demographic information on the decedent, prior medical history of the decedent, and presence and level of either fluoxetine or TCA in various body fluids/tissues. Suicide was the manner of death most frequently associated with TCA and fluoxetine detection. Violent methods were more often associated with fluoxetine suicides than with TCA suicides (65% v. 23%, $P < 0.001$). Demographic characteristics of antidepressant-related deaths in Maryland were similar to those of the entire USA. Possible explanations for the results obtained include the inherent lower lethality of fluoxetine compared to the TCAs, necessitating the use of additional means to complete the act of suicide; that physicians may have switched more impulsive, high risk patients to this new agent as it became available, thus creating a selection bias for more violence-prone individuals in the fluoxetine group; or that fluoxetine may be associated with induction of violence and/or suicidal ideation. Further research examining the possible association of these agents with violent acts is warranted.

Key words: Fluoxetine; Tricyclic-antidepressants; Suicide; Death; Violence

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1. Methods

Fluoxetine (Prozac™) is a propylamine derivative antidepressant chemically unrelated to the tricyclic antidepressant (TCA) class of medication. The drug was approved for marketing in the USA in January, 1988. The currently approved indication for use is the treatment of depression. Fluoxetine has been promoted as possessing a wider margin of safety than the TCA class.

Recently, fluoxetine has been the center of considerable controversy regarding a possible induction of violence and/or suicidal ideation. Teicher et al. reported 6 patients who developed intense, violent suicidal preoccupation after 2–7 weeks of fluoxetine treatment [1]. Other investigators have reported similar cases in which suicidal ideation and fluoxetine therapy were strongly associated [2,3]. King et al. described self-injurious ideation or behavior appearing de novo or with greater intensity during fluoxetine treatment of obsessive-compulsive disorder in 6 adolescents and children [43]. Hamilton et al. have proposed that suicidal ideation is explained by fluoxetine induced akathisia and other dysphoric extrapyramidal reactions [5].

However, the association has not been consistently demonstrated. Fava and Rosenbaum conducted a survey of 27 psychiatrists treating 1017 depressed outpatients. Their results showed no statistically significant difference in the incidence of suicidal ideation between the group receiving fluoxetine and those receiving other antidepressant treatments [6]. Other series consisting of 100–300 fluoxetine-treated patients have failed to demonstrate an association between the drug and violent suicidal preoccupation [7,8].

Fluoxetine is the drug most frequently reported in the USA Food and Drug Administration's (FDA) Spontaneous Reporting System for all adult age groups [9]. This is due in part to the fact that this is a new agent and has received considerable publicity. The FDA was petitioned to have this product removed. In July, 1991 the FDA rejected this petition, stating that the data available did not indicate any association between fluoxetine use and suicide [10].

More recently, Bost and Kemp examined all deaths involving fluoxetine and TCAs [11] in Dallas County, Texas. When examining all manners of death in each group, they found a higher proportion of suicide deaths in the fluoxetine group than the proportion of suicide deaths in the TCA group.

The potential link of this drug with violent behavior is not easily dismissed. This, coupled with a paucity of published studies comparing the demographic characteristics of people whose death involved either a TCA or fluoxetine, was the impetus for this study to compare the incidence of TCA ingestion to the incidence of fluoxetine ingestion immediately prior to death in Maryland and to examine the characteristics of deaths involving the use of these pharmacologic agents.

2. Methods

Case records of the Office of the Chief Medical Examiner (OCME), State of Maryland, were examined for the period January, 1987 through July, 1991. Toxicology reports for all deaths in which either fluoxetine or a TCA was involved were reviewed. Approximately 85% of the deaths examined by the OCME are screened

for TCAs and fluoxetine, as well as drugs of abuse, other CNS drugs and cardiovascular drugs. All suicides and homicides are screened for these drugs. All deaths are screened for the presence and level of alcohol. Cases in which a drug was qualitatively found in urine, blood, liver, bile, vitreous humor, brain tissue or other body tissue were included. Case records were utilized to obtain cause and manner of death, circumstances of death, demographic information on the decedent (age, gender, race, residence) and prior medical history of the decedent.

The methodology for testing for TCAs in body fluids utilizes a liquid-liquid extraction process with capillary gas chromatography-nitrogen phosphorus detection. Detection limit with this screen is 0.1 mg/l.

Although fluoxetine was licensed domestically in January 1988, the OCME did not begin toxicologic testing for the product until March, 1989. The presence of fluoxetine is tested with the same screening process used for detection of TCAs. The detection limit is 0.1 mg/l.

Data for TCA-related deaths were collected from January 1987 through July 1991; data for fluoxetine-related deaths were collected from March 1989 through July 1991.

The population-based incidence rates of cases in both the 'any TCA' category and the fluoxetine group were calculated utilizing 1990 Census figures [12] for the following regions of Maryland: the City of Baltimore, the Baltimore metropolitan area, the DC metropolitan area, Western Maryland, Southern Maryland, Upper Eastern Shore and Lower Eastern Shore.

To determine the population at risk, numerous sources were contacted to obtain the number of prescriptions and/or doses written for these agents over an annual period. This information was extremely difficult to obtain. Several groups refused to release data to the authors. We were able to obtain information only from the state of Maryland's Medicaid Program, which represents approximately 15% of the total prescription volume in this state.

The authors categorized the fluoxetine blood concentrations in the following manner: therapeutic = 0.1–0.3 mg/l, subtoxic = 0.4–1.0 mg/l and toxic > 1.0 mg/l. Each case record was examined in a blinded fashion by one of the authors (WRL). Fluoxetine blood concentration categorization was assigned without knowledge of the manner or circumstances of death.

Violence in the suicide category was defined by the authors before data analysis to include gunshot or shotgun wounds, suffocation, stabbing, strangulation, drowning, falls and jumping in front of a moving vehicle. This categorization was performed on each suicide in a blinded fashion, without knowledge of which medication(s) were involved.

Statistical analysis was performed using procedures described by Fleiss [13].

3. Results

TCA- and fluoxetine-related deaths were compared for the period March 1, 1989 through July 31, 1991. 'Any TCA' (one or more per death) was detected in 190/232 (82%) of antidepressant medication cases and fluoxetine was detected in 42/232 (18%) of antidepressant medication cases.

Suicide was by far the most frequent manner of death for both the TCAs (48%)

Table 1
Manner of death by gender for any TCA and fluoxetine (Maryland — March 1989 through July 1991)

Drug detected	Suicide	Homicide	Accident	Natural	Undetermined	Total deaths	% of total death
Any TCA[a]							
Female	47	4	1	29	15	96	50.5
Male	44	5	7	21	17	94	49.5
Total	91	9	8	50	32	190	100
Fluoxetine							
Female	11	0	0	4	6	21	50
Male	12	1	1	6	1	21	50
Total	23	1	1	10	7	42	100

[a]'Any TCA' includes cases where either a single TCA or a combination of TCAs was present.

and fluoxetine (55%) (Table 1). The distribution of suicides and total deaths did not vary significantly by gender for either TCAs or fluoxetine.

Table 2 lists the frequency of detection of various antidepressant medications in OCME cases. Population-based incidence rates were similar for males and females for both the fluoxetine and the TCA category.

Table 3 presents distribution by race. Hispanic, Asian and 'Other' represented so few cases (5 total) that these were excluded from the data tabulations. Differences between whites and blacks were noted for population-based incidence rates for doxepin (rate for blacks is three times the rate for whites) and for fluoxetine (rate for whites is 16.7 times the rate for blacks).

There was a steady increase with age in the number of cases for both TCAs and fluoxetine until a peak was reached in the 30–39 year-old age group, with a gradual decrease in the older age groups (Fig. 1). The range for the TCA group was 14–84 years (mean 41.3 years); the range for the fluoxetine group was 14–83 years (mean 44.6 years).

Table 2
Frequency of antidepressant medication detection by gender (Maryland — March 1989 through July 1991)

	Male		Female	
	Cases detected	Population incidence (Rate/100 000/year)	Cases detected	Population incidence (Rate/100 000/year)
Amitriptyline	42	0.75	40	0.68
Nortriptyline	52	0.93	55	0.93
Desipramine	27	0.48	21	0.35
Imipramine	15	0.27	10	0.17
Doxepin	16	0.28	17	0.29
Any TCA	94	1.69	96	1.62
Fluoxetine	21	0.38	21	0.35

Table 3
Frequency of antidepressant medication detection by race (Maryland — March 1989 through July 1991)

Drug	White		Black	
	# mentions	Population incidence (rate/100 000/year)	# mentions	Population incidence (rate/100 000/year)
Amitriptyline	59	0.72	22	0.77
Nortriptyline	81	0.99	25	0.88
Desipramine	37	0.45	10	0.35
Imipramine	20	0.25	4	0.14
Doxepin	16	0.20	17	0.60
Any TCA	133	1.63	55	1.92
Fluoxetine	41	0.50	1	0.03

Examining the Maryland data by region revealed an annual incidence rate for the TCA-related deaths in the City of Baltimore of 4.4 per 100 000, with an annual incidence rate of 1.1 per 100 000 for the remainder of the state (Fig. 2). This pattern was also evident in the fluoxetine-related deaths. The City of Baltimore experienced a rate of 0.6 per 100 000 compared to the rate for the remainder of the state of 0.3 per 100 000. Neither difference was statistically significant at the $P < 0.05$ level.

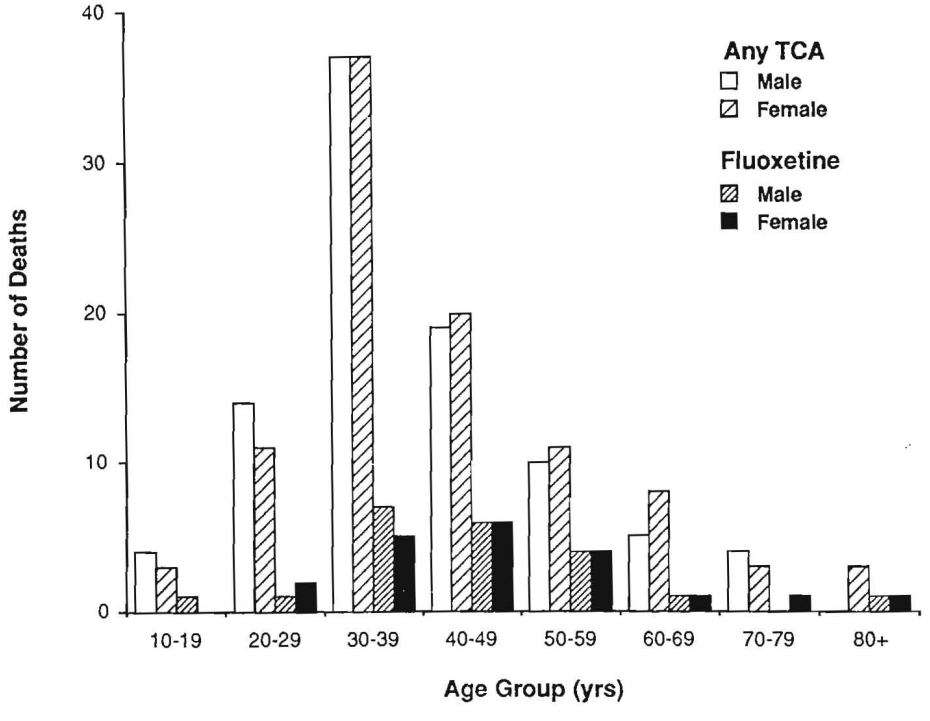

Fig. 1. Distribution by age group and gender of antidepressant medication deaths (Maryland — March 1989 through July 1991).

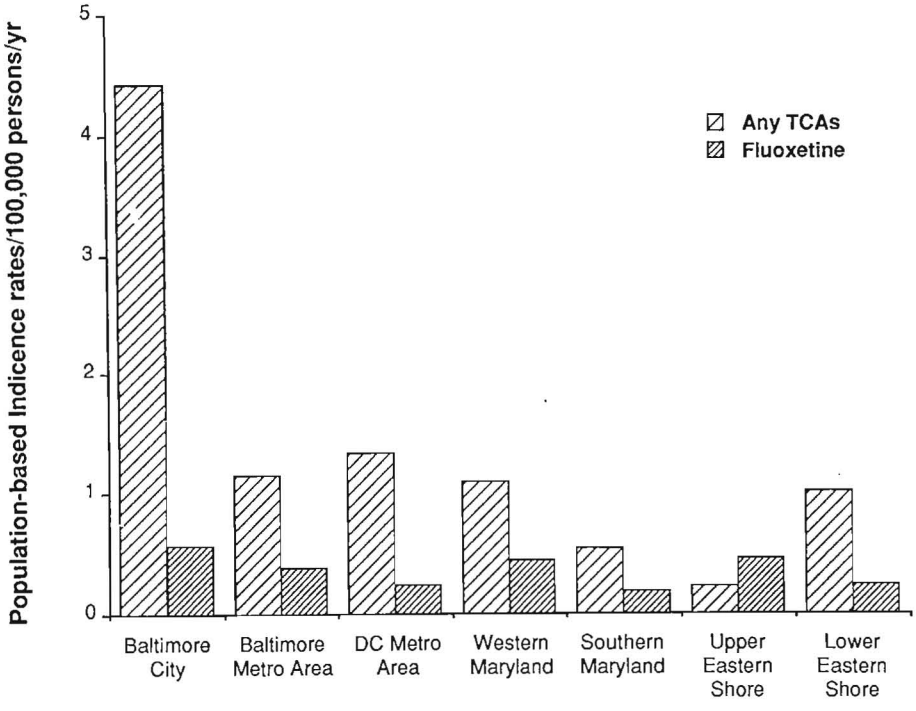

Fig. 2. Antidepressant medication death rates by region (Maryland — March 1989 through July 1991).

Table 4 depicts the number of deaths with involvement of either TCAs or fluoxetine for the different years examined. A decrease in the number of deaths with TCA involvement was noted in 1989. There was also an increase in the number of deaths with fluoxetine involvement that year, but not of the magnitude of the decrease in the TCA-related deaths.

Table 4
Time trend of detection of antidepressant medications in OCME cases in Maryland

Year	Any TCA[a]		Fluoxetine[b]	
	#	# of cases/month	#	# of cases/month
1987	71	5.9	—	—
1988	80	6.7	—	—
1989	88	7.3	9	0.9
1990	67	5.6	19	1.6
1991[c]	51	7.3	14	2.0
Total	357		42	

[a]Methodology to detect presence of TCAs in body samples changed — 1988.
[b]Fluoxetine presence not tested for until March 1989.
[c]Through July 1991 only.

Since testing for fluoxetine began in March, 1989, there has been an increase in the rate of fluoxetine-related deaths in Maryland. The years 1989, 1990 and 1991 experienced a rate of fluoxetine-related deaths of 0.9/month, 1.6/month and 2.0/month, respectively.

Violence in the suicide category was defined by the authors before data analysis to include gunshot or shotgun wounds, suffocation, stabbing, strangulation, drowning, falls, and jumping in front of a moving vehicle. Twenty-three percent (21/91) of the suicides involving 'any TCA' were considered to be violent, as compared to 65% (15/23) of the suicides involving fluoxetine ($X^2 = 15.09(1)$, $P < 0.001$) (Fig. 3). This difference was also statistically significant when testing males only ($X^2 = 8.69(1)$, $P < 0.01$) and when testing females only ($X^2 = 7.09(1)$, $P < 0.01$).

We categorized the circumstances of death for all suicides in both the 'any TCA' group and the fluoxetine group (Table 5). Multiple drug ingestion, defined as the ingestion of one or more products other than antidepressant medication, was present in 60% of the TCA-related suicides (43% of the violent suicides, 66% of the poisoning suicides). Multiple drug ingestion was present in 74% of the fluoxetine-related suicides (60% of the violent suicides and 100% of the poisoning suicides).

Toxic blood concentrations of TCA, defined to be >1.0 mg/l, were detected in 10% of the violent TCA-related suicides and in 93% of the poisoning TCA-related suicides. The relationship between plasma fluoxetine concentrations and therapeutic or toxic effects has not been clearly established [14]. Categorization of fluoxetine blood concentrations and presence or absence of coingestants for both violent and poisoning suicides are listed in Table 6.

Six of the 15 violent suicides involved fluoxetine alone. Three of these single drug ingestions were in the therapeutic range, 1 in the subtoxic range and 2 in the toxic range. There was no information concerning the prescribed dose of fluoxetine nor information on the length of fluoxetine therapy.

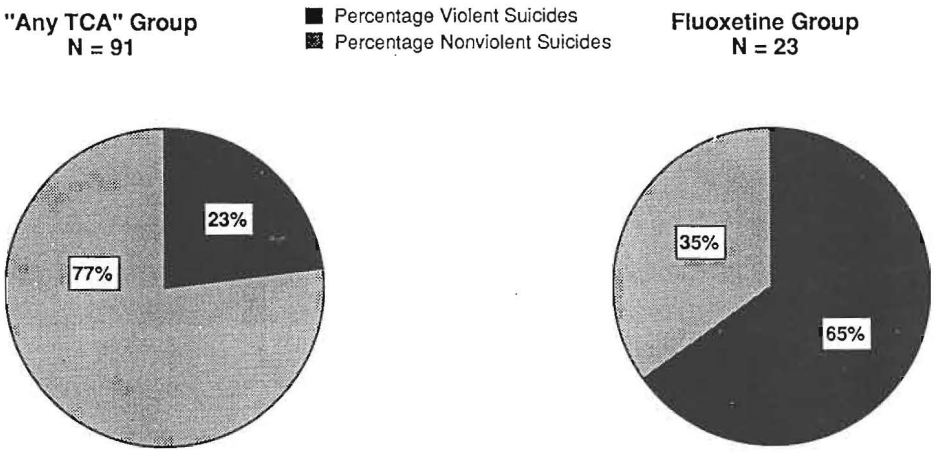

Fig. 3. Percent of violent acts in suicides (Maryland – March 1989 through July 1991). (Violent acts included the following: gunshot, shotgun wounds, suffocation, stabbing, strangulation, drowning, falls, jumping in front of a moving vehicle.)

Table 5
Circumstances of death for antidepressant medication-related suicides (Maryland — March 1989 through July 1991)

Circumstance	Any TCA		Fluoxetine	
	#	%	#	%
Gunshot/shotgun wounds	12	13.0	8	35
Strangulation	4	4.5	1	4
Stabbing	2	2.2	2	9
Suffocation	1	1.1	2	9
Drowning	1	1.1	1	4
Jumping in front of moving vehicle	1	1.1	0	—
Falls	0	0.0	1	4
Poisoning alone	70	77.0	8	35
Total	91	100	23	100

Table 6
Fluoxetine blood concentration classification and coingestant status for fluoxetine-related suicides (Maryland — March 1989 through July 1991)

Race	Sex	Age	Fluoxetine blood concentration classification	Presence of coingestant	Cause of death
Violent Suicides					
W	M	64	Toxic	Hydroxyzine	Drowning
W	F	53	Toxic	None	Stabbing
W	F	34	Toxic	Cocaine	Gunshot wound
W	F	65	Toxic	None	Gunshot wound
W	F	37	Toxic	Alcohol	Gunshot wound
W	M	49	Subtoxic	Desipramine, imipramine, codeine, oxycodone	Suffocation
W	M	14	Subtoxic	Diphenhydramine, phenytoin	Strangulation
W	F	55	Subtoxic	Alcohol	Fall
W	M	80	Subtoxic	None	Gunshot Wound
W	M	41	Therapeutic	None	Shotgun wound
W	M	53	Therapeutic	Alcohol, metoprohol	Stabbing
W	M	58	Therapeutic	Doxylamine	Gunshot wound
W	M	33	Therapeutic	None	Gunshot wound
W	M	30	Therapeutic	None	Suffocation
W	M	51	Uncertain	Alcohol	Gunshot wound
Poisoning suicides					
W	M	33	Toxic	Salicylate, amoxapine	
W	F	46	Toxic	Alcohol, diltiazem, nordiazepam	
W	F	41	Subtoxic	Alcohol, maprotiline	
W	F	42	Subtoxic	Amitriptyline, nortriptyline, butalbital, codeine, salicylate	
W	F	38	Subtoxic	Alcohol, bupropion, flurazepam	
W	F	40	Therapeutic	Alcohol, vecuronium	
W	M	48	Therapeutic	Alprazolam, doxepin	
W	F	27	Therapeutic	Carbamazapine, chlorpheniramine, phenylpropanolamine, alcohol, acetaminophen, codeine	

Of the 21 'any TCA'-related violent suicides (not shown), TCA alone was detected in 12 cases, whereas 9 cases demonstrated multiple drug ingestion, including alcohol in 3 cases, cocaine in 2 cases and a benzodiazepine in 2 cases.

Comparison of the proportions of violent suicides in the 'any TCA' group and the fluoxetine group when the drug was ingested alone, 13% and 26%, respectively ($X^2 = 2.30(1)$, NS), continues to show an increased tendency for violence in the fluoxetine group.

For both the TCA- and fluoxetine-related violent suicides, rates were highest for white males, with approximately 62% of TCA-related violent suicides and 67% of fluoxetine-related violent suicides occurring in this group.

Examination of Medicaid data for the state of Maryland revealed that for FY90, TCAs were prescribed 48% more often than fluoxetine (97 552 prescriptions v. 65 720).

4. Comment

In 1988, the most current year for which complete records are available, suicide was the eighth leading cause of death in the USA, with more than 30 000 suicide deaths [15]. In 1986, over 6000 suicides (20% of total suicides) were a result of poisoning [16]. Antidepressants are the most commonly used agents in suicide by poisoning [16–17]. The risk of suicide is strongly associated with psychiatric illness and depression [18–20]. Worsening of depression and development of suicidal ideation have been associated with therapeutic doses of a TCA [21].

Both the TCAs and fluoxetine are prescribed to a patient population prone to suicidal thoughts and actions. This is a confounding issue in a study examining the relationship of an antidepressant to an adverse outcome such as suicide. It may not be possible to separate the effect of the disease from the effect of the treatment on this adverse outcome.

Males and females were almost equally represented in both TCA-related deaths and fluoxetine-related deaths. When comparing national mortality data [22] with the Maryland data, differences were noted in the percentages by gender for desipramine, imipramine and fluoxetine. USA percentages were higher for females and lower for males than the Maryland percentages for these drugs.

Population-based rates for whites and blacks were similar for amitiptyline, imipramine, fluoxetine (all rates much higher for whites) and for doxepin (rates for blacks much higher than for whites). Maryland trends generally followed USA trends [22], with the exception of doxepin.

The difference in the population-based incidence rates for whites and blacks in the fluoxetine-related deaths (white rate is 16.7 times the black rate) is difficult to interpret. One explanation may be that the white population is prescribed fluoxetine significantly more frequently than is the black population. Another possibility is that fluoxetine is much more expensive than the older TCAs, thus may be prescribed more frequently to only a certain subset of the population, i.e. to privately insured patients where cost is a minimal factor. Information on the demographics of the prescribing patterns of the TCAs and fluoxetine in Maryland was not available.

USA data show age distributions similar to Maryland's, with the proportion of TCA- and fluoxetine-related deaths peaking in the 30–49-year age group [22].

The pattern of increased rates of both TCA- and fluoxetine-related deaths in the

City of Baltimore as compared to the remainder of the state is similar to that detected throughout the USA [15].

Information on current marital status was not available for enough cases to allow any conclusions about the effect of this potential confounder. The same is true for prior medical history. Several persons had documented prior suicide attempt(s), depression and/or other psychiatric history, yet documentation available in the record was not consistent or complete enough to allow for any conclusions.

The number of TCA-related deaths remained relatively constant over the study period. Data from 1991 show a 40% increase over the previous year in the number of fluoxetine-related deaths. This may be explained by an increase in the number of prescriptions written for fluoxetine over this time period. The trend for a greater number of fluoxetine-related deaths in Maryland each successive year parallels the national trend. In 1989, there were 39 fluoxetine mentions in Medical Examiner cases in the USA; in 1990, there were 103 mentions [22].

In attempting to determine the magnitude of the population at risk in Maryland, we were able to obtain only a limited amount of information regarding the number of doses dispensed or prescriptions written for these agents in the state. The Medicaid data obtained, representing only 15% of the prescriptions written in the state, may not be truly representative of the whole population at risk. Due to the high cost of fluoxetine, it is likely that it is prescribed less often for Medicaid patients. If this is so, extrapolating this data to an estimate of all prescriptions written for fluoxetine in Maryland would lead to a bias underestimating exposure and overestimating the rates of adverse outcomes.

The higher proportion of violence in the fluoxetine suicides deserves further attention. It may be explained by the lower lethality of this agent as compared to the TCAs, necessitating the use of additional means to accomplish this act. Due to its inherent lower lethality, it could be argued that fluoxetine may actually be safer than the TCAs if one monitored the level of suicide risk in patients more closely. Kapur et al. raise this as a possibility, attributing the higher risk of suicide with TCAs v. newer non-TCAs (e.g. fluoxetine) to the greater cardiotoxicity of the TCAs [23]. Another explanation may be that physicians switched their more impulsive, high-risk patients to this new agent which was touted as being safer, creating a selection bias for more violence-prone individuals receiving fluoxetine as compared to those receiving TCAs. Physicians may have placed their treatment failures on fluoxetine, again leading to selection bias.

The state of Maryland experiences approximately 50 antidepressant medication-related suicides each year. Prevention strategies to reduce this number should be examined. Several strategies to prevent adolescent self-poisoning have been described [24], some of which would apply to older persons as well.

More research in this area is needed in order to more fully understand whether or not these pharmacologic agents are associated with violent acts. While this study has provided much information regarding the demographics associated with these agents consumed immediately prior to death, the lack of reliable denominator data describing the population at risk and the lack of medical histories, including diagnoses and length of therapy, seriously limit the conclusions which may be drawn.

5. References

1 M.H. Teicher, C. Glod and J.O. Cole, Emergence of intense suicidal preoccupation during fluoxetine treatment. *Am. J. Psychiatry*, 147 (1990) 207–210.
2 K. Dasgupta, Additional cases of suicidal ideation associated with fluoxetine. *Am. J. Psychiatry*, 147 (1991) 1570.
3 P. Masand, S. Gupta and M. Dewan, Suicidal ideation related to fluoxetine treatment. *N. Engl. J. Med.*, 324 (1991) 420.
4 R.A. King, M.A. Riddle, P.B. Chappel, et al., Emergence of self-destructive phenomena in children and adolescents during fluoxetine treatment. *J. Am. Acad. Child. Adolesc. Psychiatry.*, 30 (1991) 179–185.
5 M.S. Hamilton and L.A. Opler, Akathisia, Suicidality, and Fluoxetine. *J. Clin. Psychiatry*, 53,11 (1992) 401–406.
6 M. Fava and J.F. Rosenbaum, Suicidality and fluoxetine: is there a relationship? *J. Clin. Psychiatry*, 52 (1991) 108–111.
7 R.A. Miller, Discussion of fluoxetine and suicidal tendencies. *Am. J. Psychiatry*, 147 (1990) 1572.
8 R.B. Berkley, Discussion of fluoxetine and suicidal tendencies. *Am. J. Psychiatry*, 147 (1990) 1572.
9 L.B. Burke, H.M. Jolson, R.A. Goetsch and J.C. Ahronheim, Spontaneous adverse drug event reporting in the elderly, ASHP Mid-Year Clinical Meeting, Orlando, FL, Dec., 1992.
10 T.M. Burton, Scientologists fail to persuade FDA on Prozac. *Wall Street J.*, Aug. 2, 1991.
11 R.O. Bost and P.M. Kemp, A possible association between fluoxetine use and suicide. *J. Anal. Tox.*, 16 (1992) 142–145.
12 U.S. Department of Commerce, Economics and Statistics Administration, Bureau of the Census, *1990 Census of Population and Housing. Summary Population and Housing Characteristics, Maryland*, (Tables 2 and 4).
13 J.L. Fleiss, *Statistical Methods for Rates and Proportions*, Second Edn., John Wiley and Sons, New York, 1981.
14 AHFS Drug Information 91, American Hospital Formulary Service, Bethesda, MD 1252.
15 S.P. Baker, B. O'Neill, M.J. Ginsburg, et al. *The Injury Fact Book*, Second Edn., New York, Oxford University Press, 1992.
16 *Statistical Abstract of the United States: 1989.* 109th Edn., US Bureau of the Census, Washington, DC, 1989.
17 T.L. Litovitz, K.M. Bailey, B.F. Schmitz, et al., 1990 Annual Report of the American Association of Poison Control Centers National Data Collection System. *Am. J. Emerg. Med.*, 9 (1991) 461–509.
18 S.B. Guze and E. Robins, Suicide and primary affective disorders. *Br. J. Psychiatry*, 117 (1970) 437–8.
19 M. Monk, Epidemiology of Suicide. *Epidemiol. Rev.*, 9 (1987) 51–69.
20 B. Barraclough, J. Bunch, B. Nelson and P. Sainsbury, A hundred cases of suicide: clinical aspects. *Br. J. Psychiatry*, 125 (1974) 355–73.
21 N.F. Damluji and J.M. Ferguson, Paradoxical worsening of depressive symptomatology caused by antidepressants. *J. Clin. Psychopharmacol.*, 8 (1988) 347–9.
22 National Institute on Drug Abuse, Statistical Series, *Annual Medical Examiner Data*, Series 1, 1990, No. 10-B.
23 S. Kapur, M.A. Mieczkowski and J.J. Mann, Antidepressant medications and the relative risk of suicide attempt and suicide. *JAMA*, 268 (1992) 3441–3445.
24 A.M. Trinkoff and S.P. Baker, Poisoning hospitalizations and deaths from solids and liquids among children and teenagers. *Am. J. Pub. Health*, 76 (1986) 657–660.