Letters to the Editor

Discussion of "An Evaluation of Fused Silica Capillary Columns for the Screening of Basic Drugs in Postmortem Blood: Qualitative and Quantitative Analysis"

Sir:

We have read with interest the paper of Koves and Wells: "An Evaluation of Fused Silica Capillary Columns for the Screening of Basic Drugs in Postmortem Blood: Qualitative and Quantitative Analysis" Vol. 30, No. 3, July 1985, pp. 692–707. This article, however, contains some points which may need further clarification or comment.

- From the pictures presented in the paper (Figs. 3, 5, and 7), it is obvious that the elution time for all compounds was longer on the DB-1 column than on the DB-1701 column. This observation is rather discrepant with what one would expect: the DB-1 phase (corresponding to OV-1), as a phase of lower polarity, should be "faster" than the DB-1701 phase (corresponding to OV-1701). Moreover, the film thickness of the DB-1 column used was 0.10 μm, whereas that of the DB-1701 column was 0.15 μm. It is known that in the case of two columns with the same diameter but different film thickness (that is, different phase ratio) the capacity ratio and, related to this, retention time, is smaller for the column with the thinner film. Therefore, we have two factors that should lead to longer retention times for the DB-1701 column. There may be two possible explanations for the phenomena observed by Koves and Wells: Either the polarity of the DB-1 and DB-1701 phases is not comparable with OV-1 and OV-1701, or the conditions of analysis (carrier gas flow, temperature program, and so forth) were different for both columns.
- From Figs. 3 and 5, showing the chromatograms of extracts of blood which were spiked with various drugs to the same concentration of 1 and 0.5 μg/mL, respectively, it can be seen that the peak of caffeine is strikingly small. This may indicate very poor recovery of this drug, as well as other weak bases. The response of the NP detector to caffeine is among the largest, and this drug is frequently used as a sensitivity check for such detectors. Moreover, the comparison of peak heights of the drugs analyzed on the DB-1 column and presented in Figs. 3 and 5 shows that the peak height ratios caffeine/codeine and caffeine/diazepam calculated from Fig. 3 were 1.5 and 1.1, respectively, whereas the ratios for these drugs calculated from Fig. 5 were 0.5 and 0.3, respectively. These observations are probably a result of variable recoveries which does not seem to support the authors' statements on the reproducibility of their results. Another point that needs further explanation is the apparent differences in peak heights of the same drugs but chromatographed on the two columns. See for example Peaks 8, 9, and 10 in Fig. 3.
- It is a pity that the authors have chosen to use relative retention times (RRT) as the basis for identification. Though this may assure adequate reliability for intralaboratory use, it is well known that RRT values are very difficult to handle on an interlaboratory basis. The elaborate listings of retention data produced by the authors would have been more useful for other colleagues, if expressed in retention index (RI) units.

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Authors' Response

Dear Sir:

In response to the letter of Drs. Bogusz and de Zeeuw, we would like to make the following comments. They are right in questioning the long retention times on the DB-1 column as compared to the DB-1701 column. The phase thickness of the DB-1 column could have been different than was stated in the paper. Recent results have led us to question the characteristics of the DB-1 column we initially worked with.

The original column was purchased as a DB-1 column in September 1982, and was used with excellent results until July 1984, when it was replaced with a DB-5 column. In December 1985, this DB-5 column was replaced with a new DB-1 (now called DB-1+). We saw significant differences between this DB-1+ and our original DB-1 column, not only in retention behavior (the peaks eluted faster on the DB-1+; phase thickness either 0.1 or 0.25 μm), but also in the elution order of some of the drugs. This lack of consistency puzzled us since the test chromatograms for the old DB-1 and the new DB-1+ columns were similar and we had not significantly changed the operating parameters of the instruments. The recent purchase of another DB-1+ column (phase thickness: 1.0 μm) has, however, enabled us to reproduce the data illustrated in our paper. It appears that there was a mix-up and the original DB-1 column probably had a 1.0-μm phase thickness.

The question of caffeine ratios is misleading as we failed to clearly point out in the text that the bloods used in both Fig. 3 and Fig. 5 were not spiked with caffeine; the trace quantities of caffeine present were endogenous to the bloods in question; a fact we thought would have been obvious from the chromatograms.

The lack of equality of the peak heights of Peaks 8, 9, and 10 in Fig. 3 is not surprising since the samples were run on different columns and on different, although similar, instruments. Differences in response factors for the two columns were noted in the text. The purpose of Fig. 3 was to illustrate the sensitivity and resolution of the system, as well as the detectability of certain drugs after one year, and was not intended for quantitative comparisons.

The question of relative retention times (RRT) versus relative index (RI) units is a moot point. Employing N/P detectors, it is more convenient to use RRT. Relative retention time is used only as a guide for the identification or exclusion of a particular drug(s) in extracts from postmortem blood. GC/MS is always used for confirmation.

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Discussion of "A Study of .22 Caliber Rimfire Exploding Bullets: Effects in Ordnance Gelatin"

Dear Sir:

In the paper on rimfire exploding bullets by Josselson et al. in Vol. 30, No. 3, July 1985, pp. 760-772, the presentation of results in the form of calculated Relative Incapacitation Indices (RII), rather than as a simple table (including weapon and bullet type, velocity, penetration, temporary cavity, and bullet deformation), not only omits important data but also produces misleading conclusions.

The authors tell us that when the "Devastator" bullet explodes "wounding effects would

probably be much greater [than when it does not explode]," and that when it explodes the RII is up to 8.09 compared to 1.66 when it does not explode. I submit that, quite contrary to the conclusions drawn by the authors, the very limited penetration depths of the exploding bullets (2.5 to 4.8 cm—all under 2 in.) would probably cause *less* incapacitating wounds than those that do not explode. The latter penetrate three times as far (14 to 15.2 cm) and would be much more likely to put a hole in a vital structure.

One needs only to look at the mechanisms of tissue disruption caused by a penetrating bullet to recognize the serious deficiencies inherent in the "relative stopping power" evaluation methodology [*1*]. The tissue that is struck by the penetrating projectile and crushed is completely ignored in this method; only the stretch of the tissue surrounding the bullet tract (temporary cavity) is considered. One might expect temporary cavity stretch to disrupt tissue that is inelastic (liver) much more than elastic tissues (bowel wall, muscle). We have shown this to be the case in living animal tissue [*2*]. Large blood vessels are also quite elastic; according to the RII theory if the aorta is displaced transiently by the temporary cavity of a bullet that passes nearby, the same incapacitation results as if it were hit directly by the bullet. The whole "relative stopping power" study is based on the unproved assumption that incapacitation of the human target is proportional to temporary tissue stretch.

Is not the whole point of the Devastator bullet the extra energy delivered to the target from the exploding lead azide? On p. 765, the kinetic energy produced by this bullet is calculated from the projectile weight and striking velocity as would be done for any other bullet. Is it not necessary to add the energy derived from the chemical transformation of the lead azide to the value the authors have given? Is there any information on how much extra energy might be expected from this source? Could the authors recalculate the conversion of 37 to 128 ft-lb to joules? I believe the figures should be 50 to 174 joules rather than the 1.6 to 5.4 given.

It is surprising to see a hollow-point bullet rated below a round-nosed bullet of the same caliber (p. 768, Items 6 and 7). The maximum temporary cavity diameter (on which the RII is based) for the hollow-point .22 Long Rifle bullet in our studies [*3*] was larger than that for the round-nosed bullet. Our studies were done at rifle velocity. I could not find the velocity of the hollow-point bullet listed but suspect that from the 1¾-in. (4.4-cm) barrel it was too low to cause expansion of the hollow-point bullet. Was this the case? It is important to point this out so that readers are not left with the misconception that hollow-point bullets are, in general, less destructive than round-nosed ones.

A centimetre scale on the photographs and radiographs would clarify relationships, and help others to compare information from Josselson et al. with their own findings.

References

[*1*] Bruchey, W. J. Jr., "Ammunition for Law Enforcement: Part I, Methodology for Evaluating Relative Stopping Power and Results," ARBRL Technical Report TR-02199, Aberdeen Proving Ground, MD, 1979.

[*2*] Fackler, M. L., Surinchak, J. S., Malinowski, J. A., and Bowen, R. E., "Wounding Potential of the Russian AK-74 Assault Rifle," *Journal of Trauma*, Vol. 24, 1984, pp. 263-266.

[*3*] Fackler, M. L. and Malinowski, J. A., "The Wound Profile: A Visual Method for Quantifying Gunshot Wound Components," *Journal of Trauma*, Vol. 25, 1985, pp. 522-529.

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Discussion of "Secreted Blood Group Substances: Distributions in Semen and Stabilities in Dried Semen Stains"

Dear Sir:

I have read with interest the paper by Dr. F. Samuel Baechtel "Secreted Blood Group Substances: Distributions in Semen and Stabilities in Dried Semen Stains," Vol. 30, No. 4, Oct. 1985, pp. 1119-1129.

Dr. Baechtel reports on p. 1124 that semen specimens from seven individuals of Lewis phenotype Le (a+b−) were examined for soluble ABO blood group substances, but none were detectable under the conditions of the assay even when the samples were used undiluted. The microtiter plate hemagglutination-inhibition method described appears to be very sensitive, and in view of this, perhaps one might have expected it to have been capable of detecting the small amounts of ABO blood group substances present in at least some nonsecretor individuals. Be this as it may, it appears from the author's comments on p. 1128 that he does not accept that ABO blood group substances are found in the body fluids of individuals of the Le (a+b−) phenotype since he refers to "anecdotal reports" of such substances. To suggest that there is any such doubt about the existence of small amounts of ABO blood group substances in some nonsecretors is incorrect. Apart from our own experience and that of our colleagues at the Metropolitan Police Forensic Science Laboratory here in London, there is evidence in the literature. As early as 1941, Grethe Hartmann in a monograph "on the content of group antigen in human saliva" not only produced evidence of such substances in nonsecretors, but investigated possible overlap between secretors and nonsecretors when considering the levels of substances detectable.

Moreover, Race and Sanger on p. 315 of the 6th edition of *Blood Groups in Man* when describing inhibition as a secretor test comment, "A more sensitive method, which shows that nonsecretors have a little of their blood group substance in their saliva, is to titrate the antiserum and add to each tube a constant amount of saliva."

It may well be that in spite of the high degree of sensitivity of Dr. Baechtel's test system, he is unable to detect the small amounts of substances in question or has not been fortunate enough to test such an individual, but it seems to me that there is nothing anecdotal about the existence of these substances in some nonsecretor individuals.

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Peer Review in the Courtroom

Dear Sir:

I strongly concur with the Plenary Session remarks of Dr. Larry B. Howard (Vol. 31, No. 1, Jan. 1986). Definitely there is need for peer review in the courtroom. The problem is to determine the ground rules for initiation and conduction of courtroom peer review and to provide a mechanism for review. One potential resource is to utilize the licensing agencies of the state.

The Florida Medical Association Board of Governors has recently approved the following principle to be incorporated into the list of prohibitions of the practice of medicine:

Creation of a new subsection of section 458.331, Florida Statutes, which would provide for appropriate discipline for any physician who gives false or substandard or unprofessional expert witness testimony, either by affidavit, deposition or courtroom testimony.

The Department of Professional Regulation of the State of Florida already has the staff and procedures to carry out investigations of illegal acts by licensed physicians. Therefore, a state licensing agency already exists as a potential review agency for courtroom misconduct of a licensee.

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Discussion of "Evaluation of Medicolegal Investigators' Suspicions and Positive Toxicology Findings in 100 Drug Deaths"

Sir:

Our experiences in Suffolk County, New York regarding the effectiveness of trained forensic investigators in uncovering vital information in drug deaths closely parallel those of Ernst et al. in the *Journal* (Vol. 27, No. 1, Jan. 1982, pp. 61-65).

We have completed a retrospective study of 55 consecutive drug deaths similar to that conducted in St. Louis. Our evaluation reveals that the forensic investigators correctly identified the offending substance(s) in 48 cases (87%). Of the remaining 7 deaths, 5 were classified by the forensic investigators as probable drug overdoses because of evidence discovered at the scene and/or other information acquired in the course of the investigation. These 5 cases are in Table 1.

In the two instances where drug overdose was not suspected, the bodies had been removed to the hospital and thus, an undisturbed scene was not available for examination. Also, family members persistently denied any knowledge of drug use or misuse by the decedents.

Suffolk County, New York is the easternmost county on Long Island. It comprises approximately 900 mi^2 (2330 $m^2 \times 10^6$) and has a permanent population of around 1.3 million

TABLE 1—*Five cases classified by the forensic investigators as probable drug overdoses.*

Case	Suspect Drug(s)	Evidence	Toxicological Findings
1	unknown	unmarked white tablet	talbutal
2	unknown	drug paraphernalia	morphine (heroin)
3	benztropine/ trifluperazine	empty prescription vials	amitriptyline/ chlordiazepoxide
4	unknown	drug paraphernalia	cocaine
5	unknown	drug paraphernalia	cocaine

people. This number swells considerably during the summer months. Between 4000 and 4500 deaths are referred to the Medical Examiner's Office annually. Of these, approximately 1000 are autopsied and around 400 examined externally and toxicologically. For several years, we have employed Registered Physician Assistants (RPA) to perform the field investigations of these deaths. They have done so with outstanding success. The duties of the RPA, as Forensic Investigators (FI), are varied. They include, but are not limited to, scene and follow-up investigation, pronouncement of death, and clearance for cremation. Additionally, the RPA/FI obtains blood for analysis in instances of driving while under the influence of alcohol and or other drugs. The forensic pathology staff relies on the RPA/FI for scene reports and follow-up of cases, using this information for the certification of manner of death and for verification of the circumstances surrounding death.

Physician Assistants are professionals whose education and training arè largely in clinical medicine. Many have experience in trauma by virtue of their work in emergency rooms. The forensic science skills of our RPA/FI are acquired via in-house training, daily case conferences, and frequent seminars. In our jurisdiction, the RPA/FI have achieved a high level of competence in all phases of death investigation. The current report highlights merely one aspect of their success.

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