

Letters to the Editor

A Discussion of Opiate Concentrations in Hair (Kintz, P. and Mangin, P., "Opiate Concentrations in Human Head, Axillary, and Pubic Hair," *Journal of Forensic Sciences*, Vol. 38, No. 3, May 1993, pp. 675-662.)

Dear Sir:

One of the main concerns in testing hair for drugs of abuse is their incorporation from environmental exposure. It is well known that other substances such as metals enter hair from the environment and affect the ability to ascribe a specific cause for their presence [1,2]. Likewise, reports have shown that environmental exposure is a consideration in testing hair for drugs [3-6]. For example, Cone has shown that external contamination does occur with cocaine [7]. Some authors have proposed increasingly more elaborate, sequential decontamination procedures which they hoped would eliminate this problem [8-11]. In their May 1993 *Journal of Forensic Sciences* article Kintz and Mangin mention, without fully considering, external contamination.

First, they postulate that dichloromethane removes all external contamination from hair. However, they present no results demonstrating that negative hair contaminated with opiates will test negative after their decontamination procedure. The only supporting reference to decontamination (their reference 20, [12]) is contrary to what others have observed, that external contamination is difficult to remove [4,5,7]. Also, the decontamination procedure Kintz and Mangin cite is significantly different from what they employ.

Second, they acknowledge that drugs in sweat, perspiration, or urine can be incorporated in hair. Yet, in the same article they describe forensic applications where their hair testing has determined chronic drug use. If drug (or metabolite) associated with sweat, perspiration, or urine can irreversibly contaminate hair, it remains to be shown how acute drug exposure would be distinguished from chronic use.

Finally, the authors report no sectional analysis of hair. By testing hair *in toto*, one cannot determine which section of the hair was growing when drugs were ingested. Their suggestion that such an historical record can be obtained from their results may be further misleading if hair contaminated from a single exposure can be confused with long term use. Until more is known about external contamination of hair, extreme caution is necessary to avoid misinterpretation of hair test results.

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Authors' Response

Dear Sir:

Since the first paper of Baumgartner et al. [1], more than 100 reports have been published dealing with hair analysis. Various procedures for decontamination, preparation (chemical or enzymatic hydrolysis) and analysis were mentioned. Recently, two meetings were organized to discuss results and methodological approaches [2,3]. The Society of Forensic Toxicologists has twice presented some points of view on the use of hair analysis. In summary of all this information, it appears that caution is necessary to interpret hair test results until some mechanisms are explained: (1) what are the mechanisms by which drugs are incorporated into hair? (2) to what extent is externally applied drug (sweat, glandular secretions or environmental exposure) retained in hair? These points are exactly the same as those presented here by Drs. Smith and Kidwell, based on the content of our article.

The aim of our work was to evaluate the opiate concentrations in hair of the head and to compare them in pubic and axillae hair. If the decontamination procedure is still a critical step to avoid environmental exposure one cannot always focus one's attention on theoretical impressions. In a drug addict (demonstrated by blood, urine and liver data) nobody is able to present the true ratio between environmental exposure and drug incorporation. Kinetics of wash data, and various domains of hair, proposed by Baumgartner [4] were also discussed without a consensus. Therefore, we think that dichloromethane decontamination is sufficient in most forensic cases.

According to Harkey and Henderson [5,6], drugs may be incorporated into the hair shaft from the blood and, from sebaceous or apocrine glands.

The influence of sweat was largely discussed by Kidwell and Blank [7]. Thus, the measured concentration in hair is the sum of various mechanisms. It is therefore accurate to postulate that in a part of the body where sweat is present in great amount (axillae) the incorporation is modified in consequence.

The sentence that hair of the head provides a historical record must be understood in

the general properties of hair analysis, that are indication of chronic and/or past drug exposure.

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A Discussion of “Concerning the Solubility of Sugar in Gasoline”

Dear Sir:

I read with great interest the letter by Inman, et al., [1] regarding the solubility of sugar in gasoline. The authors state that the investigation of cases of motor fouling caused by the suspected addition of sugar to gasoline must include a sampling of solid residues in the fuel tank. While this is not a bad idea, it is certainly not necessary.

The solubility experiments conducted indicate that a 100 mL sample of gasoline would contain only 150 μg of sucrose. If the sample is extracted with water, almost all of the sucrose would be extracted into the aqueous phase. Evaporating the solution to 1 mL would yield a concentration of 150 mg/L.

This concentration of sucrose in water is easily detectable using the sulfuric acid/anthrone reagent. In fact, concentrations as low as 10 mg/L in aqueous solution can be found.

While there is no doubt that a sample of dried crystalline solid taken from the bottom of a gas tank would make a powerful and convincing exhibit, vandalism cases infrequently go to trial, and the effort required to remove the fuel tank really may not be the

most effective allocation of resources, especially when simple evaporation of an aqueous extract can readily yield a solution wherein the sugar is quite detectable.

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Reference

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A Discussion of a Suicide by Self-Decapitation

Dear Sir:

Prichard has reported a fascinating case of self-inflicted decapitation in a motor vehicle [1] and the author stated that he was unable to find any similar type of suicide in the files of the Grays Harbor County Coroner's Office in Washington.

We wish to inform the author that there are at least two other published cases related to this bizarre form of suicide [2,3]. In these cases, the victims sustained circumferential ligature trauma to the front and middle compartments of the neck leading to death by asphyxiation. The forces were not severe enough to cause full-thickness injuries to the neck and cervical spine associated with decapitation [4]. Dr. Prichard's case represents the most extreme type of ligature strangulation in which a constricting rope about the neck acts as a sharp, cutting instrument similar to a guillotine.

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