

G. Skopp Reply

We appreciate the interest of Dr. Bogusz in our article previously published in this journal [1]. He pointed out what has been already demonstrated by the data of the case histories and in Table 1. A specific pattern of the analytes morphine, morphine-6- and morphine-3-glucuronide concerning regional dependence, survival time and postmortem interval until sampling of the particular body fluids could not be observed, because the results obtained were highly scattered. Contrary to our findings his report on 2 cases using API-LC-MS showed distinct tendencies which support the attempts to calculate the time interval between last morphine dose and death from toxicological investigations on body fluids taken at autopsy. There is no doubt that the highly advanced and sophisticated API-LC-MS technique and deuterated internal standardization will be the best tool for accurate and specific measurement of opiate glucuronides at present. The accuracy and specificity for routine case work of HPLC with native fluorescence detection, the method used in our study [1], have already been demonstrated [2]. Quality control sera containing known amounts of morphine, morphine-6-

and morphine-3-glucuronide had always been included. In 2 cases, morphine concentrations were determined by GC/MS (EI-mode/SIM using 2 qualifiers) and quantified by means of deuterated internal standard. Therefore, we do not believe our results to be mainly affected by the analytical system used, but to be strongly influenced by various factors prior to analysis. The determination is the last step in sample processing, and is less susceptible to faults compared to all steps preceding analysis. This is particularly true for postmortem body fluids, being subjected to numerous changes and severe alterations, including continuation of enzymatic activities during the postmortem interval, hypostasis, pH-changes, bacterial contamination, autolysis of vascular tissue, putrefaction and, in most cases, poor information on the circumstances surrounding death. So, we are pleased by the report of Dr. Bogusz adding 2 further cases to the limited knowledge on postmortem regional dependence of opiates and their glucuronides available at present.

References

1. Skopp G, Lutz R, Ganßmann B, Mattern R, Aderjan R (1996) Postmortem distribution pattern of morphine and morphine glucuronides in heroin overdose. *Int J Legal Med* 109: 118–124
2. Aderjan R, Hofmann S, Schmitt G, Skopp G (1995) Morphine and morphine glucuronides in serum of heroin consumers and in heroin-related deaths determined by HPLC with native fluorescence detection. *J Anal Toxicol* 19: 163–168

G. Skopp
Institut für Rechtsmedizin, Ruprecht-Karls-Universität,
Vossstrasse 2, D-69115 Heidelberg, Germany