

A Case of Drowning Whilst Swimming After Thinner-Sniffing^{*3)}

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ABSTRACT

A 25-year-old male, a thinner abuser, swam in a pond just after thinner-sniffing and he drowned. Death from drowning was confirmed by diatoms in the lung and kidney. The drowning would seem to be induced by the effect of considerable high concentrations of toluene, absorbed into the body from thinner-sniffing, in tissues of the cadaver.

INTRODUCTION

Most of thinners used for sniffing contain toluene^{4,9)}, and acute systemic thinner intoxication by sniffing is characterized by symptoms of central nervous system depression, which is caused by toluene^{3,6,7)}. In a case of drowning whilst swimming in a pond after thinner-sniffing, the drowning seems to be induced by the effect of toluene.

This report was written to warn of the danger of swimming after thinner-sniffing.

CASE REPORT

A 25-year-old male, a thinner-sniffer, went swimming in a pond accompanied by two other people.

At about 5 p. m. they began to swim just after they had been sniffing vapors of a thinner containing 60-80% of toluene and 10-20% of methanol for one hour.

At approximately 6:30 p. m. he drowned and sank to the bottom.

At 7:55 p. m. he was found dead at the bottom at a distance of 5 m from the shore and 5 m in depth.

AUTOPSY AND LABORATORY FINDINGS

An autopsy was performed 20 hours after

drowning. Nasal and oral cavities were dilled with light-reddish discolored foam. There were 80 ml and 150 ml of light-reddish fluids in left and right thoracic cavities respectively. Weights of the left and right lungs were 600 g and 690 g respectively. Petechial hemorrhages were found in the left lower conjunctiva, pericardium, pleurae of lungs and mucous membranes of renal pelvises. Blood in the heart and large vessels did not contain any clots.

In order to confirm that death was caused by drowning, the presence of diatom in lung and kidney was investigated. In one gram of lung there were many diatoms consisting of *Cyclotellas*, *Cymbellas*, *Naviculas* and so on; in addition two complete diatoms, *Cyclotella* and *Cymbella*, and one fragment of a diatom were found in 24 g of kidney.

Toluene distribution was determined by our gas chromatographic method^{4,8)}. Toluene levels in body fluids and organs were analyzed by the method for toluene in urine⁴⁾ and by the method for toluene in tissue⁸⁾, respectively. Toluene in mesenteric fat, however, was analyzed by the method for toluene in urine after toluene was extracted with ethanol. The concentrations ($\mu\text{g/g}$) were 13.3 in blood, 57.6 in brain, 70.4 in liver, 740 in mesenteric fat and 2.99 ($\mu\text{g/ml}$) in urine. Gas chromatograms are shown in Fig. 1.

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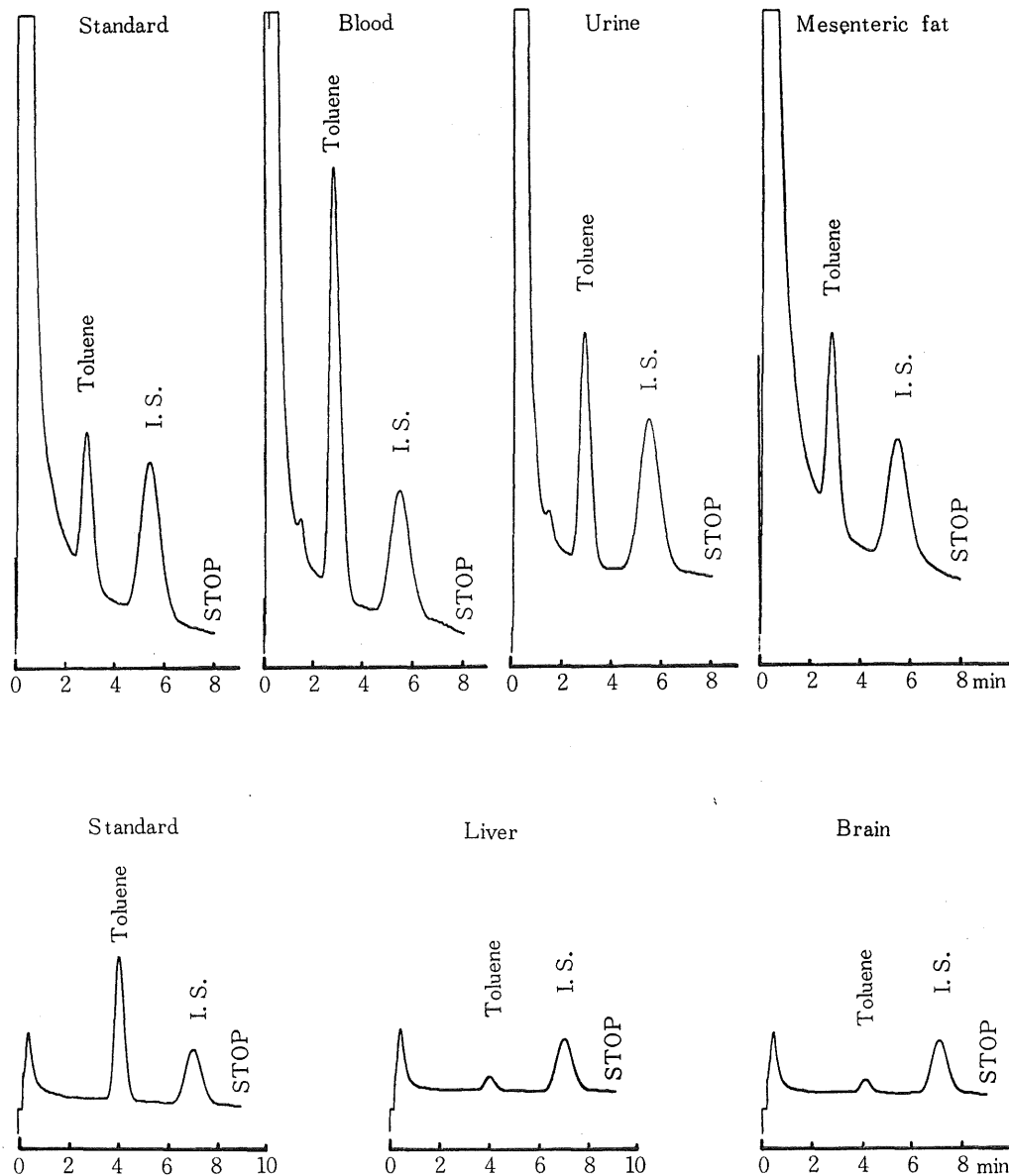


Fig. 1. Gas chromatograms (I. S. : Ethylbenzene)

DISCUSSION

In a study of 110 cases of sudden sniffing deaths without plastic bag suffocation, Bass¹⁾ reported that the deaths were due to the direct effect of the solvent itself. In this case, however, the cause of death was drowning since the autopsy findings showed typical death from drowning plus the presence of diatoms in the lung and kidney.

With regard to the interpretation of toluene

concentrations, the level of brain toluene was about one fifth of the lowest level ($312 \mu\text{g/g}$) in three cadavers who died from acute toluene intoxication, as reported by Fukui et al.²⁾ Kashima et al.⁵⁾ described that three painters suffering from acute toluene poisoning whilst painting the inside of a tank fell and drowned in the water in the tank, and that the blood levels of toluene were $16\text{--}18 \mu\text{g/g}$. This value approximates to that of this case. Okamoto⁹⁾ reported that incoordination in walking was

observed at the above toluene level in urine of this case. The drowning in this case, therefore, seems to be induced by the effect of toluene.

REFERENCES

1. **Bass, M.** 1970. Sudden sniffing death. *J. A. M. A.* 212 : 2075-2079.
2. **Fukui, M., Kumaoka, H., Ito, H., Taniguchi, H. and Okada, K.** 1972. *Saiban Kagaku*, 2nd ed, p. 91. Hirokawa, Tokyo (in Japanese).
3. **Gerarde, H. W.** 1960. Toxicology and biochemistry of aromatic hydrocarbons, p. 141-150. In E. Browning(ed.), Elsevier Monographs. Elsevier, Amsterdam.
4. **Hosoma, K. and Kojima, T.** Submitted. Gas chromatographic analyses of toluene and hippuric acid in urine of thinner-sniffers, *Jap. J. Legal Med* (in Japanese).
5. **Kashima, T., Fukui, M., Mikake, N. and Waka-sugi, C.** 1968. A case report of toluene poisoning, *Saigai-igaku* 11 : 1422-1426 (in Japanese).
6. **Kojima, T. and Kobayashi, H.** 1973. Toxicological study on toluene poisoning by inhalation—Death due to toluene poisoning and the toluene tissue level. *Jap. J. Legal Med.* 27 : 258-262 (in Japanese).
7. **Kojima, T. and Kobayashi, H.** 1973. Toxicological study on toluene poisoning by inhalation—Correlation of toluene concentration for exposure with mortality and toluene tissue level. *Jap. J. Legal Med.* 27 : 282-286 (in Japanese).
8. **Kojima, T., Takeoka, T., Yashiki, M. and Kobayashi, H.** 1977. Toxicological study on toluene poisoning by inhalation—Effect of inhalation of toluene and ethyl acetate mixed vapor on death. *Jap. J. Legal Med.* 31 : 280-290 (in Japanese).
9. **Okamoto, K.** 1981. Medico-legal studies on intoxication of organic solvent. Detection of toluene in urine from gluesniffers and its relationship of their clinical signs. *Act. Crim. Japon* 47 : 60-74 (in Japanese).