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On the Possibility of Finding Volatile Halocarbons in Animal Blood Samples

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Many investigations recently have shown that volatile halocarbons can be analysed in blood samples (Pfaffenberger et al. 1980, Kroneld & Reunanen 1983).

Volatile halocarbons occur in drinking water in the form of chlorination products (Eklund et al. 1978, Kroneld et al. 1981, Reunanen & Kroneld 1982). The concentrations in the Turku area show seasonal variations with concentrations ranging between 25 and 130 µg/l (Kroneld et al. 1981).

Pfaffenberger et al. (1982) in U.S.A. showed a correlation between the concentrations in drinking water and in samples of human serum. Such a correlation could, however, only be found for patients receiving haemodialysis therapy in Turku (Kroneld & Reunanen 1985). No such correlation, however, was found for healthy individuals consuming chlorinated drinking water. This paper, however, deals with the possibility of finding volatile halocarbons in blood samples from animals. The controls were animals from the countryside, receiving only well water free of volatile halocarbons.

MATERIALS AND METHODS

Ten samples of blood from cows, pigs and sheep were collected both from the suburban area of Turku and the countryside. The animals from the suburban area were served by chlorinated drinking water. The animals from the countryside were served by well water, free of volatile halocarbons.

Volatile halocarbons were extracted through elution with n-pentane (Reunanen & Kroneld 1982). Calibration by means of spiking experiments was used to standardize the system. The samples (5 ml) were extracted with n-pentane (0.5 ml) containing a known amount of 1-chlorohexane as an internal standard. The detection

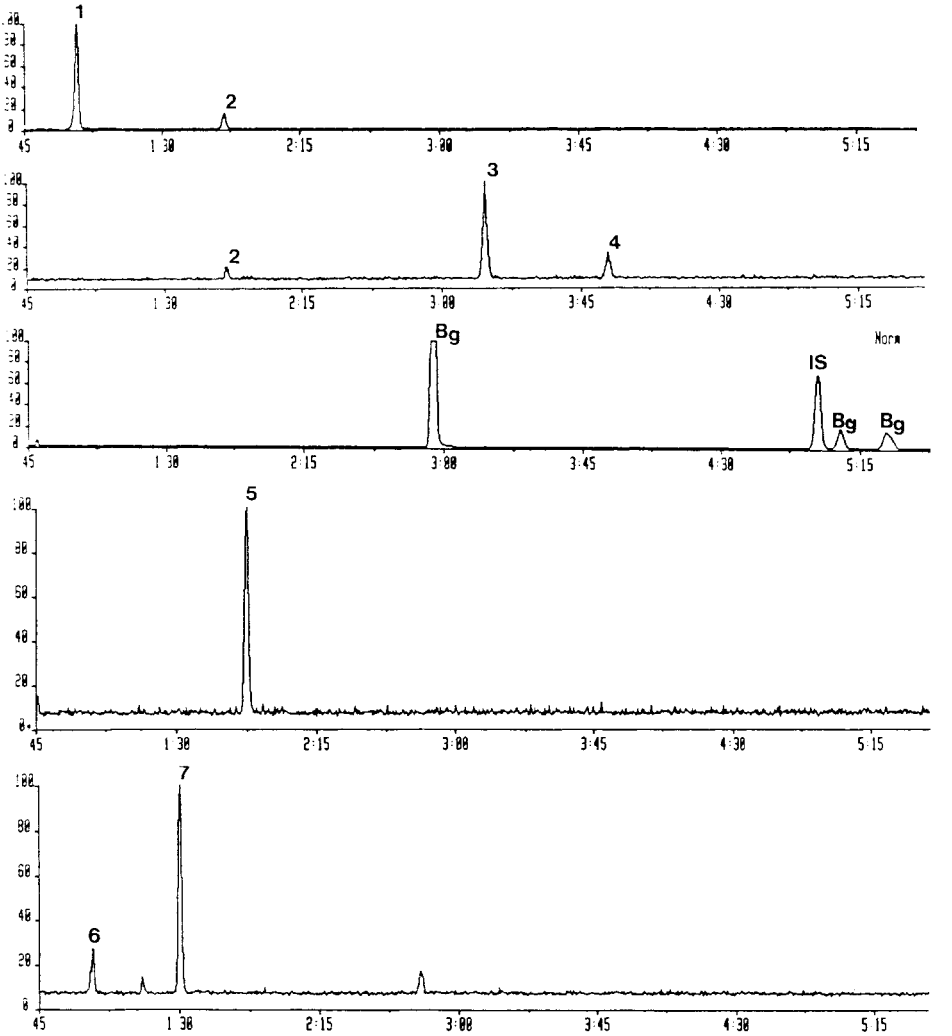

Figure 1. SIM-chromatograms from spiked blood sample. The spiking level is indicated in the pharenteses. 1=$CHCl_3$ (10 µg/l), 2=$CHBrCl_2$ (2 µg/l), 3=$CHBr_2Cl$ (2 µg/l), 4=$Cl_2C{=}CCl_2$ (0.4 µg/l), 5=$CHCl{=}CCl_2$ (0.2 µg/l), 6=CH_3CCl_3 (0.25 µg/l), 7=CCl_4 (0.2 µg/l), IS=internal standard, Bg=solvent impurities.

limit for volatile pollutants was approximatively 0.1 µg/l. After centrifugation, the pentane phase was analysed by GC-MS in SIM-mode.

RESULTS AND DISCUSSION

Chromatograms from the analyses are shown in Figure 1.

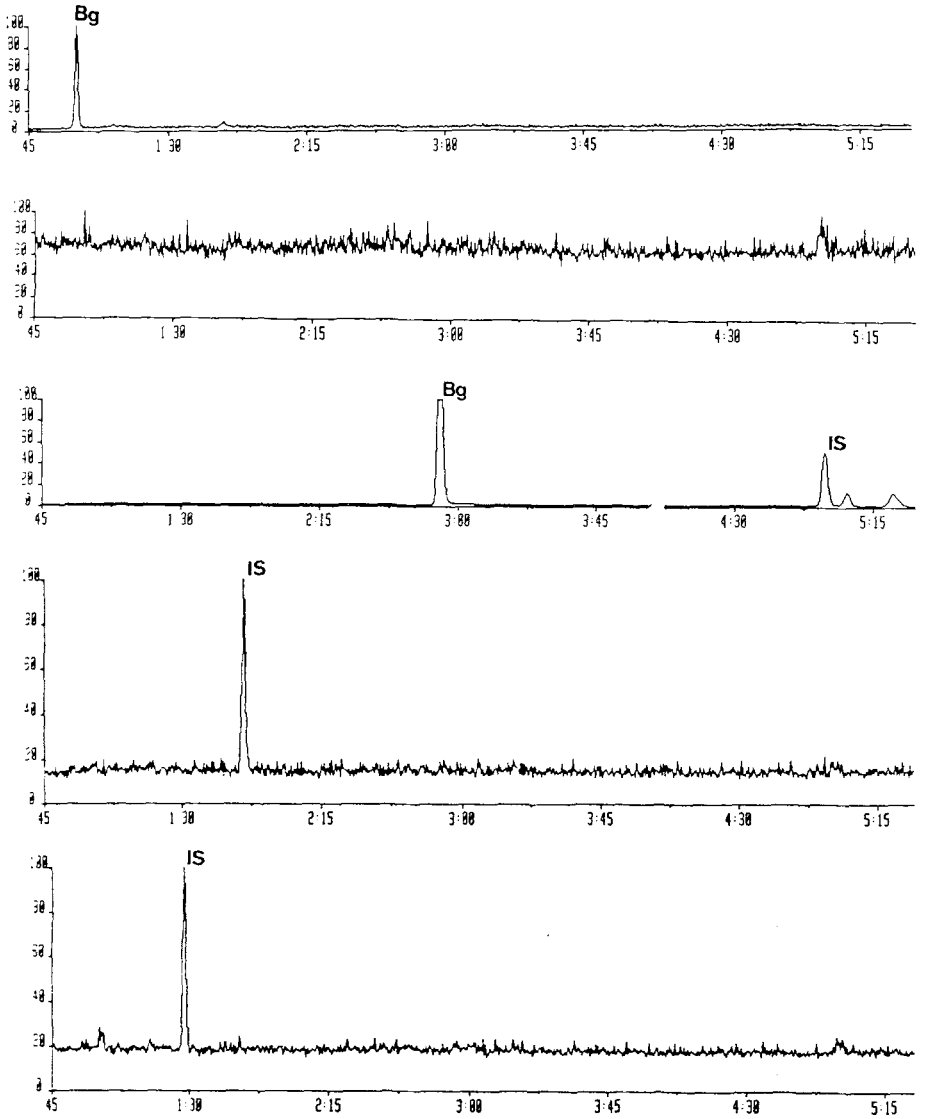

Figure 2. Results of blood sample analyses from cows, pigs and sheep. Bg, solvent impurities, IS, internal standard.

The analyses of blood samples were made with great accuracy and reliability. The results from the method adapted for blood samples from different animals are shown in Figure 2. No differences could, however, be found between the samples from the suburban area of Turku or the countryside.

Several papers have shown correlations between volatile halocarbons in drinking water and blood samples (Pfaffenberger et al. 1982, Combs et al. 1982, Kroneld & Reunanen 1983). The concentrations of volatile halocarbons in blood samples from healthy drinking water consumers in Turku were, however, so low that no epidemiological conclusions could be drawn from the material. The hypothesis of this work was that, by analysing animal blood samples, this would be possible. No volatile halocarbons could, however, be found in the animal blood samples analysed. Although animals consume more water daily than humans, the exposure level, ranging fron 25 to 130 µg/l, obviously is too low to permit an epidemiological study in the Turku area. The method used, could however, certainly be adapted in other regions of the world where the exposure level is higher.

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