ANALYSIS OF FLUORIDE IN POST-MORTEM TISSUES USING AN ION-SELECTIVE ELECTRODE

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Hydrofluoric acid (HF) with pKa=3.8 is commonly used in household cleaning products such as wheel cleaners and rust removers. Its industrial uses include the etching of glass and metal processing. Fluoride salts are used in dental-care products (sodium fluoride, sodium fluorosilicate) and at one time were used in household settings as rodenticides and insecticides in the form of sodium fluoride or sodium fluoroacetate. More recently ammonium fluoride and ammonium bifluoride have appeared in wheel cleaners where contact with body fluids results with the production of hydrofluoric acid and fluoride ion.

We report a fatal case of hydrofluoric acid ingestion with suicidal intent. Urine, vitreous humor, liver, kidney, muscle, bile, and nasogastric tube contents were measured for fluoride ion using an ion-selective electrode. This is the only case we are aware of where fluoride in muscle has been quantitated in a fatality. In addition to fresh specimens, fluoride ion was measured in the following fixed tissue: brain, pancreas, liver, kidney, stomach, and heart. Fluoride concentration in fresh tissue was consistent with toxicity although the urine fluoride concentration was in the range observed for asymptomatic workers exposed to fluoride in air. Fixed tissue preparations revealed fluoride concentrations consistent with non-exposure while examination of the formalin fixative showed fluoride concentrations only slightly higher than negative control formalin. We conclude that fixed tissue is an inappropriate sample for fluoride determination. The organ distribution and mechanisms of fluoride toxicity will be discussed and our results compared with those reported in other exposure cases.