



K15 Death by Potassium Chloride Intravenous Injection and Analytical Detection

Elisabetta Bertol, Lucia Politi, and Maria Grazia Di Milia, Viale Morgagni 85, Florence, ITALY,; and Francesco Mari, Istituto di Medicina Legale, D, Policlinico Careggi, Viale Mor, Firenze, ITALY*

After attending this presentation, attendees will understand the results of the determination of blood potassium in a case of suicide by potassium poisoning. The meaning of the blood potassium concentration is questioned and discussed.

This presentation will impact the forensic science community by demonstrating how potassium concentration resulted to be significantly higher in heart blood in a case of suicide by potassium chloride intravenous injection and, therefore, the general issue of considering potassium poisoning hardly demonstrable by the toxicology needs to be questioned and thoroughly studied in the future.

Potassium chloride intravenous injection is reported as a means in suicide attempts and also in lethal procedures for state-sanctioned capital punishment. Owing to its relatively high concentrations in hemolyzed blood (25-80 mmol/l) as compared to serum (about 4 mmol/l), potassium poisoning has often been considered hardly detectable in postmortem blood specimens.

In considerations of the results of the determination of blood potassium in a case of suicide by potassium poisoning, the meaning of blood potassium concentration is questioned and discussed.

A 41-year-old man, working as a nurse at the local intensive care unit, was found dead at his workplace. A recent injection site was observed on his left foot and a syringe retrieved close to the corpse. At the autopsy no particular signs were noted.

Biological specimens (blood, bile, and urine) were submitted to the screening procedures for drugs and poisons in use in the laboratory, consisting of general unknown screening by solid phase extraction and gas chromatography mass spectrometry for blood and bile, head-space gas chromatography for blood and immunoenzymatic screening for urine. The syringe content was submitted to Feigl spot tests for inorganic ions and, in particular, for potassium. Finally, blood potassium concentration was determined by ion selective electrode measurement (linear over the range 3.0-150 mmol/l).

According to the routine screening procedure, blood was found positive for diazepam at therapeutic level (0.21 mg/l) and urine resulted positive only for benzodiazepines. No other substances were identified in blood and urine and all other samples tested negative. Potassium concentration was found at 160.0 mmol/l in cardiac blood and 87.3 mmol/l in femoral blood (mean of three determinations in both cases). On the other hand, hemolyzed blood samples obtained from autopsies with no relevant toxicological findings had much lower potassium concentration, i.e., between 32.2 and 43.0 mmol/l (median: 38.6 mmol/l, n=6).

Death by potassium intravenous injection is often considered undetectable by toxicological analyses when only hemolyzed blood is available, and, consequently, literature is relatively scant. These results show that potassium concentrations were significantly higher in heart blood in a case of suicide by potassium chloride intravenous injection and, therefore, the general issue of considering potassium poisoning hardly demonstrable by the toxicology testing needs to be questioned and thoroughly studied in the future.

Potassium Chloride, Intravenous Injection, Suicide