G47 Study of the Diagnostic Value of Iron in Freshwater Drowning

Geoffroy Lorin de la Grandmaison, MD, M. Lettereux, PharmD, K. Lasseguette, MD, J.C. Alvarez, PharmD, Philippe de Mazancourt, MD, PhD, and Michel Durigon, MD, PhD, Department of Forensic Pathology, Raymond Poincare Hospital, Garches, 92 380, France*

After attending this presentation, attendees will be able to test the diagnostic value of iron (Ir) in freshwater drowning by investigating the postmortem levels of hemodilution in drowning cases compared to control cases.

This presentation will impact the forensic community and/or humanity by demonstrating the importance of postmortem biochemistry for the diagnosis of freshwater drowning.

Material and Methods: Twenty-six typical freshwater drowning cases were selected from all immersion cases autopsied in the Department of Forensic Pathology between 1998 and 2004 (n=128). The exclusion criteria were a long postmortem interval (more than one week) and causes of death other than drowning (acute intoxication or trauma). For all selected cases, the diagnosis of drowning was based on the presence of autopsy findings (including overinflated lungs, pulmonary edema, frothy contents in the airways) and positive diatom test. The diatom test was performed after treatment of the samples with Soluen-350. The test was considered positive when a significant number of diatoms were detected in lungs and other internal organs (liver, kidney, bone marrow) and when concordance of diatom types recovered from organs and the putative drowning medium were found. A control population of 12 cases was also selected. For each case, age, sex, manner of death, postmortem interval, and resuscitation attempts were reported from the postmortem records. For each drowning and control case, blood iron levels were measured in the left ventricle (LV) and right ventricle (RV) of the heart. The mean difference of iron concentration (RVIr-LVIr) between the drowning group and the control group was compared. Furthermore, iron measurements were performed in 19 drowning cases showing advanced putrefaction.

Results and Discussion: The mean age of the drowning cases was 43.2 years. The mean age of the control population was 36.2 years. In the majority of the drowning cases, manner of death was suicide (n=14). The mean difference of iron concentration was significantly higher in the drowning cases compared with age and sex-matched controls ($p<0.001$). All drowning cases showed hemodilution. Four control cases showed hemoconcentration. No overlap was found in the RVIr-LVIr levels between the two groups. In the control group, the maximal RVIr-LVIr level was equal to 11 micromol/l. In the drowning group, the difference levels ranged from 12 to 387 micromol/l. Resuscitation seemed to have no effect on the results. In cases of drowning showing advanced putrefaction, the iron test was not reliable because biochemical iron measurement was often prevented by inability to obtain postmortem blood.

Conclusion: According to the results, iron seems to be a good biochemical marker for freshwater drowning with a short postmortem interval.

Drowning, Iron, Postmortem Biochemistry

 ** Presenting Author*