H83 Interpretation of Postmortem Vitreous Concentrations of Sodium and Chloride

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After attending this presentation, attendees will be more confident in how to interpret postmortem vitreous samples regarding sodium and chloride in cases of dehydration, salt intoxication, water intoxication, or drowning. Analysis should be routinely considered at autopsy.

This presentation will impact the forensic science community by convincing attendees that vitreous sodium and chloride concentrations correlate well with antemortem serum concentrations when interpreted together with postmortem vitreous potassium levels or the Postmortem Interval (PMI), and that they can be used to diagnose certain causes of death that otherwise would not have been detected.

Vitreous fluid can be used to analyze sodium and chloride levels in deceased persons, but it remains unclear to what extent such results can be used to diagnose antemortem sodium or chloride imbalances. Further, there are no reference ranges for postmortem vitreous sodium or chloride concentrations. In this study vitreous sodium and chloride levels from more than 3,000 cases are presented. It is shown that vitreous sodium and chloride levels both decrease with approximately 2.2mmol/L per day after death. Since potassium is a well-established marker for the PMI and can easily be analyzed along with sodium and chloride, sodium and chloride levels have been correlated with the potassium levels and postmortem reference ranges relative to the potassium levels that have been presented. Virtually all cases outside the reference range exhibited signs of antemortem hypo- or hypernatremia. Vitreous sodium or chloride levels can be the only means to diagnose cases of water or salt intoxication, beer potomania, or dehydration. Forensic cases are presented in which the analysis of vitreous sodium concentration was the only means to establish the cause and manner of death.

The results of this study also illustrate that postmortem vitreous sodium and chloride levels correlate strongly and can in practice be used interchangeably if analysis of one of the ions fails.

It has been previously suggested that vitreous sodium and chloride levels can be used to diagnose drowning or to distinguish saltwater from freshwater drowning. In this study, vitreous sodium concentrations have been compared in cases of drowning in fresh water, drowning in brackish water, and non-drowning. The results reveal that in cases of fresh water drowning, vitreous sodium levels are in fact decreased, but that this mainly is an effect of postmortem diffusion between the eye and surrounding water rather than due to the drowning process itself, since the decrease in sodium levels correlates with immersion time.

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