## H109 Validating an Equation to Estimate Postmortem Interval on Oahu, Hawaii

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After attending this presentation, attendees will understand a proposed universal formula for estimating Postmortem Interval (PMI), how the formula was used at actual human death scenes on Oahu, HI, and how the formula was inconsistent in providing accurate estimates of PMI.

This presentation will impact the forensic science community by providing key data from actual death scenes in a tropical climate in the pursuit of an accurate universal formula to estimate PMI.

In medicolegal death investigation, PMI can be one of the key elements of an investigation. Establishing PMI may help to identify a deceased person and corroborate witness statements. There are currently several methods to estimate PMI, including livor mortis, potassium concentration in the vitreous humor, and forensic entomology, but none of these methods both accurately calculate PMI and are universally and conveniently applied. To improve the ability to estimate PMI, a recently developed equation was implemented at ten indoor death scenes on Oahu, HI, under the jurisdiction of the City & County of Honolulu Department of the Medical Examiner.[1] The hypothesis that this equation will not be accurate in a tropical climate on Oahu because it was developed in a temperate climate on the United States mainland was tested.

In the current experiment, temperature and relative humidity data were collected at each death scene and these values, along with an estimate of soft tissue mass loss, were used to generate an estimate of PMI (days). These estimates were compared to available information about the dates that the decedents were last known alive, in order to determine the accuracy of the formula. Mean values of temperature, relative humidity, and soft tissue mass loss were compared using a *t*-test.

For five of the ten cases (50%), the estimated PMI was consistent with the known PMI. All of these cases had a known PMI of five days or less and an estimated soft tissue mass loss of 15% or less. In contrast, all of the cases in which the estimated PMI was inaccurate had known intervals ranging from four to 16 days. In four of these five cases, the estimated soft tissue mass loss was 20% or greater. Mean temperature ($P=0.82$) and relative humidity ($P=0.44$) were not significantly different between the two groups of cases (accurate vs. inaccurate); however, death scenes with accurate PMI estimates were associated with significantly ($P<0.05$) less soft tissue mass loss than death scenes with inaccurate estimates.

The current data reveal that this equation can be accurate in cases with relatively little decomposition. Like many other methods to estimate PMI, the accuracy of this equation decreased as PMI increased. The reason for this is possibly related to climate; the equation was developed in a temperate climate while the current experiment was conducted in a tropical climate. It is probable that bodies follow a different decomposition pattern in these two climates, particularly during the cooler months of the year. Although the measurements of temperature and relative humidity were instrumentally objective using a datalogger, estimates of soft tissue mass loss were more difficult due to their subjective nature. Although this equation was accurate in only 50% of these cases, it is believed that PMI estimates can be improved through the development of a standardized system to estimate soft tissue mass loss as well as an increased number of data points.

**References:**

1. Vass AA. The elusive universal post-mortem interval formula. *Forensic Sci Int* 2011:204:34-40.

**Decomposition, Medicolegal Death Inquiry, Forensic Taphonomy**