G85 Estimation of Postmortem Interval Using Bioelectrical Impedance of the Human Body

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After attending this presentation, attendees will understand the principles of a new tool for the estimation of postmortem interval, bioelectrical impedance of the human body, in addition to the traditional methods currently used.

The method of measurements using cutaneous bioelectrical impedance may impact the forensic community and/or humanity by becoming a valuable analytic tool for the estimation of the time of death in forensic medicine.

In medicolegal practice, being able to estimate the time of the death is of paramount importance. Particularly in cases of homicides (to accuse or exculpate an alleged criminal), the cases of postmortem manipulation of the remains (occurring especially in the cases of overdose), as well as in civil matters (for example succession rights). The interest to perform a technique to specify more precisely the time of the death in the first part of the postmortem interval lead to the development of a new method, based on the bioelectrical impedance of the human body.

Human body can be compared to an electrical complex circuit, containing water, electrolytes, and cellular membranes. A direct, or alternating low frequency (<5 KHz) current, applied to the body, was used to measure electrical resistance. The alternating current will reflect both the extracellular compartment (electric resistance) and the intracellular compartment (capacitive resistance).

Initially, measurements were made on 34 fresh bodies, with a known time of the death, less than five hours postmortem. Electrodes (patches) were applied on the skin with a distance between patches of 10 cm, on the chest, abdomen, arms and thighs. Bodies were placed in a room at constant ambient temperature (approximately 18 - 20 °C). Measurements were performed using an impedance meter that automatically recorded the values of resistance (R), impedance phase angle (theta), as well as the body temperature (rectal probe) and the ambient temperature. Measurements were recorded every ten minutes during the first 24 hours, then every 15 minutes. The available time for the measurements was dependent on the interval between death and the time of the postmortem examination.

The reactance (Xc) and the impedance (Z) were calculated using the recorded data. These results were compared with the postmortem interval. A variation was observed with the absolute values between the different bodies. On the other hand, with the relative values, a statistically significant arithmetic correlation, was noted between the values of reactance and impedance compared to the postmortem interval.

The method of measurements using cutaneous bioelectrical impedance may become a valuable analytic tool for the estimation of the time of death in forensic medicine.

Forensic Medicine, Postmortem Interval, Bioelectrical Impedance

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