D15 Estimation of Postmortem Interval by Morphological and DNA Changes of Blood

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After attending this presentation, attendees will see the effect of time on the cellular morphological changes and DNA degradation which occurs in blood after death at variable time intervals.

This presentation will impact the forensic community by demonstrating how the estimation of the time of death is one of the most important problems in forensic medicine and law. Most experienced forensic pathologists agree that the ordinary postmortem changes are easily influenced by external factors. A variety of procedures are used for the purpose of postmortem interval estimation including the analysis of postmortem blood for various biochemical substances.

In the present study, postmortem blood samples were examined to demonstrate the effect of time on the cellular morphological changes and DNA degradation which occur in blood after death at variable time intervals. The study included 30 blood samples from autopsy and dead hospital cases, where light microscopic examination was used to study the morphological cellular changes of blood. Postmortem DNA changes were also studied using gel electrophoresis as well as flowcytometric analysis.

At six hours postmortem the neutrophils, oesinophils, and monocytes shared in showing pyknosis of the nucleus as a starting sign of white blood cell degenerative changes. At 18 hours postmortem, only the neutrophils and oesinophils started showing nuclear fragmentation, whereas, the monocytes didn't show this change until 24 hours after death. Disintegration of the neutrophils, oesinophils, and monocytes began to appear at 48 hours postmortem.

Gel electrophoresis was used in the present work to assay the integrity of DNA within the studied blood samples. Up to 18 hours after death, gel electrophoresis revealed that the majority of cellular DNA was intact. Starting from 24 hours postmortem until 72 hours, DNA fragmentation progressed where it began to smear in tracks indicating the presence of degraded, low molecular weight DNA as well as high molecular weight DNA. Upon reaching day three most of the DNA had been degraded to low molecular weight fragments.

Histograms obtained by flowcytometry revealed that autopsy and dead hospital samples showed similar patterns of DNA degradation after death with no significant difference observed. The values of degraded DNA increased gradually over different postmortem intervals, whereas the values of normal and double DNA content decreased gradually. A significant positive correlation was observed between time since death and the pattern of DNA degradation based upon the flowcytometric analysis of the studied samples. The resulting equations for estimation of postmortem interval from DNA content of cells measured by flowcytometry revealed an acceptable degree of accuracy in accomplishing this goal

Postmortem Interval, Blood Morphology, DNA

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