



H8 The Utility of Routine Histological Sampling in the Assessment of Cause and Manner of Death in Medicolegal Autopsies—Fire, Immersion, and Traffic-Related Deaths

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Learning Overview: The goal of this presentation is to reveal the value of routine histological sampling in deaths related to traffic, fire, and immersion.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by increasing ethical standards and effectiveness and lowering costs.

In 1999, the European (EU) Committee of Ministers recommended histological sampling of “major organs” in medicolegal autopsies.¹ Also because of local routines, histological examination is often routinely included in the autopsy, although the scientific evidence regarding its value is disputed. Previous studies using mixed populations have shown inconsistent results, some highly favorable and others dismissing its utility.²⁻⁷

In order to allow practical applicable conclusions regarding the necessity of routine histological sampling, it seems necessary to analyze specific Cause Of Death (COD) groups separately. This study focused on deaths related to traffic, fire, and immersion, with the intent of analyzing the value of histology to determine COD and/or Manner Of Death (MOD).

Autopsy protocols, including toxicologic and histopathologic analyses, were acquired from the national database of the Swedish National Board of Forensic Medicine. Study cases were selected based on information available *before* autopsy, suggesting traffic-related, fire-related, or immersion-related deaths. Fifty cases in each study group were selected from the years 2017 and 2018. Any information connected to the decedent, the forensic pathologist, the forensic medicine unit, original assessments regarding COD and MOD, and histological analyses, was masked out. The study was performed in two steps, and there were four reviewers, with two reviewers participating in each subgroup analysis.

Step 1: The de-identified autopsy protocols (excluding histological analyses) were sent to two independent, board-certified forensic pathologists who independently reviewed the macroscopic and toxicologic findings. The reviewers determined the COD and the MOD and graded the certainty of their assessments using an incremental scale.

Step 2: After reporting the results of Step 1, the reviewers were given access to the histologic analysis in each case, then reevaluated their previous assessments, including the degree of certainty. Any discrepancy between ante-histology and post-histology assessments regarding COD and MOD was analyzed.

Cases were classified on a 1–5 scale as to the extent of agreement ante- vs. post-histology, and the underlying COD was registered in all cases, both ante- and post-histology. Ordered-logistic and logistic Bayesian generalized linear models were used to model the effect of histology on underlying COD, MOD, and agreement.

Agreement: In all groups the inter-observer agreement was high both ante- and post-histology. There were minor shifts in agreement in the immersion and traffic-related deaths but none in the fire group. The effect of histopathology on agreement was credibly 0 (-0.4, 0.4 95% Highest Posterior Density Interval [HPDI]) in all groups.

Underlying COD: The probability of changing COD for an average observer was small in all groups; in fire cases 0.0038 (1.02×10^{-26} , 0.016 95% HPDI), in immersion 0.018 (9.02×10^{-12} , 0.068 95% HPDI), and in traffic cases 0.032 (1.38×10^{-13} , 0.13 95% HPDI).

MOD: The probability of changing MOD for an average observer was small in all groups; in fire cases 0.0038 (1.74×10^{-33} , 0.015 95% HPDI), in immersion 0.024 (4.08×10^{-16} , 0.079 95% HPDI), and in traffic cases 0.013 (2.65×10^{-11} , 0.043 95% HPDI).

Certainty of assessment: Regardless of change in COD and MOD, the change in certainty in COD was highly variable. In fire cases, the probability of change was 0.074 (4.25×10^{-7} , 0.25 95% HPDI), in immersion 0.74 (1.42×10^{-7} , 0.26 95% HPDI), and in traffic cases 0.11 (1.69×10^{-7} , 0.37 95% HPDI).

Conclusions: Based on the results, and when considering the economic, ethical, and legal aspects, it is concluded that routine histologic sampling is not mandatory in any of the three study group scenarios. Instead, histologic sampling should be left to the experienced forensic pathologist to decide on a case-by-case basis.

Reference(s):

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Histological Sampling, Medicolegal Autopsy, Cost-Benefit

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