



### D37 Postmortem MR and CT in Fire Fatalities

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After attending this presentation, attendees will be able to identify the typical Postmortem Computed Tomography (PMCT) and Postmortem Magnetic Resonance (PMMR) imaging findings in fire fatalities, identify the burn related findings that are seen better on imaging than at autopsy, and describe the fire-related findings that are not well seen by imaging and those not seen by either imaging or autopsy. In sum, attendees will have a thorough understanding of forensic findings in fire fatalities across the spectrum of the major forensic tests that are currently available.

This presentation will impact the forensic science community by demonstrating that imaging methods provide excellent depiction of charred bodies and the majority of forensically important findings that can be identified in such cases. This presentation will provide the forensic investigator with additional tools and means to reach forensic conclusions as well as to display important findings to non-medical personnel such as family members, the police, members of the legal profession, and jurors.

This presentation will describe the evaluation of burn victims using advanced forensic imaging (including PMCT and PMMR), detail the typical imaging findings on both modalities, and finally compare the imaging results with results from traditional autopsy and other forms of forensic investigation to highlight the strengths and weaknesses of the various techniques in fire death investigation.

A retrospective review was performed of burn fatalities who were evaluated at our institution by both forensic imaging (either PMCT,

PMMR, or both) and traditional autopsy. The fire-related imaging findings were evaluated and the frequency of injury type and location where recorded. A description of the typical imaging findings is provided in addition to a detailed pictorial review. Finally, the autopsy related findings are compared to the results of imaging. These comparisons are discussed, as is a comparison with results of other published studies on forensic findings in fire related deaths.

Nearly all typical autopsy findings in charred bodies are visible in PMCT and PMMR, including: thermal tissue loss, large areas of skin splitting, heat epidurals, separation of the inner and out tables of the skull, contractures, fire related and non-fire related fractures, organ protrusion, and puppet organs. Imaging by PMCT better demonstrates internal gas collections. PMCT also better demonstrates global findings such as the distribution of debris that may be present and the distribution of fractures in the skeleton as a whole. PMMR best display the rarification of bone marrow that can occur in bones exposed directly to flame, a finding that is difficult to dissect and therefore not often seen at autopsy. Autopsy better demonstrates airway soot deposition, minute surface changes (for example crow's feet), coloration changes in the surface of burned bone, and the fine details of fracture margins. Neither autopsy nor imaging can identify carbon monoxide, although both can be used to collect toxicology samples.

In conclusion, forensic imaging by PMCT and PMMR is well suited for evaluation of fire fatalities. The combination of advanced imaging with the traditional external forensic examination can identify the majority of known and forensically important fire-related findings. PMCT and PMMR can be a useful adjunct or, in selected cases, possibly a replacement for traditional autopsy in the investigation of fire-related deaths.

**Radiology, Fire, Virtopsy**