H115 Human Cremains From a Controlled Car Fire

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After attending this presentation, attendees will have learned what happens to a human body when it has been subjected to fire.

This presentation will impact the forensic community by presenting controlled research experiments in an area where very little research is available.

Within the past two decades, a wealth of taphonomic research has emerged that focuses on isolating and identifying a variety of controlled environmental variables in order to establish patterns of postmortem changes. Vehicle fires are unique environments loaded with combustible materials of plastics, foam, upholstery, carpet, rubber, and petrol-based products, all housed within the small space of a metal frame.

The location and positioning of the victim's body within a vehicular fire was found to directly influence the extent and types of burn patterns. Ten human cadavers and ten pigs were placed in different sections of cars: front seat, back seat, and trunk to: (1) observe the differences in the extent and patterns of heat-related damage, and (2) the average length of time that the bodies continued to burn after the manufactured fuels (interior) had naturally extinguished. Of course, each vehicle is unique in the amount and types of synthetic materials, compartment size (truck cab vs. minivan), interior construction (bucket or bench seat), age of the car's materials (older or newer), and the amount of ventilation during the growth stage of the fire (windows open or closed). The salvage vehicles used in these burn experiments were manufactured before the year 2000. Newer models have different synthetic plastics and materials, which would produce accelerated results. On average, the vehicles burned for 45 minutes to an hour, while the bodies continued to burn for different lengths of time depending on their placement within the vehicle.

Front Seat: Bodies positioned in the front seats, typically bucket seats with upholstery over a wire frame seat, initially provided protection to the back and legs. As the fabrics and plastics burned away, the body remained supported on the wire frame seat frame, thus allowing ample circulation of heat and fire to all surfaces and more evenly distributed burn patterns of the body. Movement of the body was observed as supporting combustible materials burned away. For example, a body slumped over on the dashboard gradually lost this point of support and fell over into portions of the floor or driver's seat. In some cases, the seat fell back, thus positioning the body into a prone position and partially into the back seat. Since the body burned on a wire frame seat, it remained elevated in the fire environment and continued to burn for several hours (2+) after the car fire had self-extinguished. The small fire burning under the body was due to the supply of melted body fat under the body and around the areas of the torso which continued to render the body into charred tissues and bone.

Back Seat: Bodies positioned in the back seats had the least amount of heat-related damage when compared to those placed in the front seats and trunk of the same vehicle. The back seats consist of minimal upholstery over a broad, flat metal bench, which burns away early during the fire. Then the body remained in direct contact with the metal bench, thus preventing heat and circulation to points of contact, which resulted in partial burn patterns of only the areas exposed to the fire. Likewise, there was not enough fuel to sustain burning of the bodies, nor ample materials to sustain the wick effect from the body's melted fat.

Trunk: Bodies in the trunk, due to their protected environment, took longer for the fire to reach but burned intensely once the trunk was involved. This required that the back seat upholstery burned away and exposed the perforated metal structure, thus allowing ventilation and direct heat to reach the body. Some trunks housed a spare wheel, or at least a depressed wheel well. The presence or absence of a tire in the trunk was influential not only as a solid fuel source, but the metal rim elevated portions of the body and allowed the body's fat to pool there as a sustaining fuel source. The trunk space became a miniature crematorium environment as air and heat circulated through the back seat and the burned out openings of the taillights. Bodies in the trunk burned intensely for over 4 hours past the initial car fire and left most of the body as charred and calcined bone, with the exception of some adherent tissues of the bulky torso. Their condition and preservation was drastically different than bodies burned in the front and back seats of the same vehicle.

Results of these vehicular fires show that the location of the body within different areas of the vehicle directly influences the extent of heat- related damage and burn patterns to a human body. These variables should be considered when examining bodies from burned cars, and the death investigator must be aware of how the immediate environment can

be used to anticipate and explain unique burn patterns in fatal vehicle fires, or ones set to intentionally destroy evidence of a crime.

Human Cremains, Car Fire, Human Remains

 ** Presenting Author*