D14 Decomposition Patterns Associated With Cadavers of Contrasting Mass

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After attending this presentation, attendees will understand the fundamental patterns of cadaver mass loss during decomposition on the soil surface and a methodology used to analyze cadaver breakdown.

This presentation will impact the forensic community and/or humanity by demonstrating that neonate cadavers follow a pattern of mass loss different to adult cadavers.

The rate of decomposition has been estimated to be the same throughout different sizes of bodies. Ideally, every cadaver would have the same equation for determining the time of death, however, different body types and masses might offer different rates and patterns for decomposition. It was hypothesized that cadavers of contrasting mass will decompose at different rates and, thus, be associated with contrasting patterns of decomposition.

The experimental site was located at the University of Nebraska Agricultural Research Development Center located approximately 48 km north of Lincoln, Nebraska, USA. The site is a pasture that is intermittently grazed by cattle and horses. The climate is temperate mid-continental characterized by hot summers, cold winters, and moderately strong surface winds. Average annual precipitation is 695 mm. Approximately 75 percent of the precipitation occurs between April and September. Mean annual temperature is 9.8 °C with mean minimum and maximum temperatures ranging from 0 C (January) to 31°C (July). The vegetation at site is dominated by non-native grass (smooth brougham) and forb (white clover) with some native vegetation, including daisy fleabane, yellowwood sorrel nut sedge, and pasture rose. Coyote (*Canis latrans*) and turkey vulture (*Cathartes aura*) are the primary scavengers in the area.

Swine (*Sus scrofa*) carcasses of four contrasting masses approximating sizes from neonate to adult (~1 kg, ~20 kg, ~40 kg, and ~50 kg) were used. Swine were killed with blunt force trauma to the cranium, weighed, and placed on their right side within a PVC frame on the soil surface facing west. PVC frames with polypropylene mesh were constructed for mass loss measurements. The use of PVC frame construction allowed free movement of decomposition fluids into the gravesoil. For two weeks, each cadaver was weighed every day. After two weeks the weight measurements were taken less frequently due to the stabilization of cadaver mass.

The smaller pigs lost their weight much faster than the larger pigs, but also showed a difference in pattern of mass loss. Generally, remaining mass of all pigs followed a sigmoidal curve with an extended tail (reflecting the remains stage of decomposition). However, smaller pigs (1kg and 20kg) had both steeper slopes of maximum decomposition rate and different patterns of weight stabilization than did larger (40kg and 50kg) pigs. Thus, the hypothesis that decomposition rates and patterns of decomposition of the smaller and larger pigs were significantly ($P < 0.05$) different was accepted.

With this information, it is suggested that human cadavers of contrasting mass might also follow different rates and patterns of decomposition. In particular, babies and small children likely follow different rates and patterns of decomposition relative to adults. This phenomenon needs to be explicitly considered, particularly when the physical characteristics of a cadaver are used as the basis for estimating postmortem interval.

Forensic Taphonomy, Mass Loss, Postmortem Interval

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