

A135 A Paired Comparison of the Rate and Pattern of Decomposition in Small- and Large-Bodied Human Cadavers

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Learning Overview: After attending this presentation, attendees will have learned that differences in body mass of human cadavers can affect the gross morphoscopic observations of the decomposition process.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by providing the first closely paired body weight study using human cadavers to examine the difference in the rate and pattern of decomposition between small- and large-bodied individuals.

Several previous studies have examined the effect of body mass on the rate and pattern of decomposition using both human cadavers and animal proxy samples.¹⁻⁹ The results have proven to be inconsistent and categorically diverse. Summarily, inter-cadaver decomposition rate studies categorically suggest: (1) larger individuals decompose faster; (2) there is no difference in the rate or pattern of decomposition between individuals of different sizes; (3) the inter-individual progression of decomposition varies depending on the stage of decomposition observed; or (4) some smaller individuals decompose faster than larger individuals.¹⁻¹² Studies that empirically test body mass as an important variable in human decomposition have largely been conducted using human analogs. Only two of these studies have used human cadavers and considered the longitudinal postmortem intervals that characterize forensic anthropology casework.^{1,7} However, these studies diverge in their conclusions. Mann and colleagues suggest larger individuals decompose faster than smaller individuals as a result of the rapid liquefaction of body fats, while Roberts and colleagues demonstrated no correlation of body mass to Kelvin Accumulated Degree Days (ADD) at any observation threshold representing early, middle, and late stage decomposition, although minor differences in the pattern of decomposition were noted.^{1,7} In both of these previous studies, individuals were observed independently of the larger project, and data were collated retrospectively.

This study focuses on the paired observation of two individuals at the Complex for Forensic Anthropology Research (CFAR) at Southern Illinois University in Carbondale, IL. The two individuals observed died on the same day (May 17, 2019), were close in age at death (67/68 years old), and were refrigerated in funeral home coolers for the same length of time (seven days) at the same temperature (37°F). They were placed at CFAR on the same day, within 15 minutes of one another. The larger individual is an adult male, 188cm (6'2") in height, weighing 125kg (275lbs), with an estimated Body Mass Index (BMI) of 35.5 at the time of death. The smaller individual is an adult female, 150cm (4'11") in height, weighing 44kg (97lbs), with an estimated BMI of 19.6. Both weights were confirmed by the funeral home contracted to deliver the cadaver. Decomposition was categorically scored using the Megyesi et al. Total Body Score (TBS) system; macroscopic observations not represented in the TBS model were also described.¹³ Digital photographs were collected every third day, unless inclement weather interfered with camera use. The decomposition of the two individuals rapidly diverged, with the larger individual advancing more rapidly through the initial stages of decomposition, including color change, bloat, and soft tissue loss throughout the first 23 days post-deposition, suggesting gross decomposition was more rapid. After 23 days of exposure (more than 517 ADD), the advancement of TBS slowed and the two individuals scored nearly identically (≤ 1 TBS point difference) for the next 44 days (until July 29, 2019). Further data will be collected over the course of the next six months. However, in sum, this paired-individual study suggests that larger individuals initially decompose faster than smaller individuals, but as decomposition advances, the differences are marginal. This study also demonstrates the differences in the pattern of decomposition between larger and smaller individuals, which is consistent with previously reported results from varying sources.

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Forensic Taphonomy, Forensic Anthropology, Total Body Score

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