National Institute of Justice

Award Title: A Multi-Modal Method for Determining the Postmortem Interval in Juvenile Remains and Assessing Skeletal Health	
Award Description: The Department of Health and Human Services reports that in 2005 there were 1460 cases of child maltreatment fatalities in the US. Child maltreatment crimes are difficult to investigate and resolve because little scientifically based research has focused on this specific issue. Because of the relatively small size of the victim, concealment of child maltreatment crimes are common and the victims may not be found for months allowing sufficient time for soft tissue decay and skeletonization. The purpose of our study is to use immature pigs as an analog for human subadults to identify the specific changes in bone decomposition and weathering that could be used as key elements in estimating the post mortem interval (PMI). Seasonal data collection over two years will be conducted to document bone weathering and survivability of the different skeletal elements. Moreover, a major contribution of this project is the assessment of bone mineral density (BMD) loss during the decay process and the histological evaluation of diagenesis resulting from the postmortem environment. Although some normative data is available for infants and children, which have been developed by the instrumentation companies (e.g. Hologic, Lunar) and, to some degree, from population specific scientific research (.e.g. data for Turkish and Spanish children), data does not exist for the American juvenile population at large. Thus, in order to develop normative data for clinically healthy (e.g. well nourished) and ill or malnourished infants and children (0-4 years of age) that can be used to assess skeletal health in the medicolegal setting, bone mineral density (BMD) will be obtained via a Hologic DXA scanner from incoming cases at the North Carolina and New York City medical examiner offices. The proposed study will address many of the unknowns regarding juvenile decomposition (i.e., timing, patterns) and will develop baseline data on postmortem BMD loss, differential decomposition due to body disposition environment, and BMD data from human subadult forensic cases. Thus, the proposed goals of our study are to: 1. to develop a model to estimate the postmortem interval of skeletal decomposition and bone mineral density changes for juvenile remains; 2. evaluate microscopic agents that cause changes to bone in the postmortem environment (histotaphonomic changes) and their potential effect on bone mineral density; and 3. to develop bone mineral density baseline data for infants and children from a modern forensic population to help assess the skeletal health. The implications for criminal justice practice is the development of regionally specific bone weathering standards, which has tremendous implications for more accurate PMI estimates that could impact case solvability and produce a much more informative assessment of unidentified human remains, particularly for juvenile homicides. ca/ncf	
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