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GAUGING THE DETERIORATION OF DEOXYRIBONUCLEIC ACIDS DURING THERMAL ALTERATION

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Abstract

Each year approximately 3,800 individuals die from fire/burn related injuries in the United States (Centers for Disease Control and Prevention, National Center for Injury Prevention and Control 2005). In the event tissue damage is so severe that morphological identification is no longer possible, radiology, forensic odontology, and DNA analysis are commonly used to identify these victims (Meyer 2003). By employing contemporary molecular amplification and quantification techniques for nuclear deoxyribonucleic acids (DNA), extracted from surviving skeletal remains of cadavers burned at a known range of temperatures, I hope to gauge the deterioration that occurs during the thermal alteration process.

I do not hope to retrieve any data of statistical significance. My sole aim is to observe and assess the deterioration of DNA undergoing thermal exposure and resulting alteration, gauged via extraction yields. By comparing quantification results among samples taken from each individual at different temperature intervals and comparing results between individual specimens, I hope to better understand the thermal alteration process on DNA in varying types of human hard tissue. Extraction and amplification for quantitation will be attempted in collaboration with Sheila Estacio Dennis of the New York City Office of Chief Medical Examiner, Forensic Biology Department; presence or absence of DNA from each sample will be used to gauge the viability of each for potential future amplification with a multiplex profiling system, or similar technology, currently used to identify victims of mass disasters or war crimes (Budlowe et al. 2003, Wilson et al. 1995, Kashyal et al. 2004).

Three individuals, donated to the State University of New York, Downstate Medical Center (SUNY-Downstate) for scientific research, will be sampled; one of which was not embalmed prior to the thermal event. With the assistance of Dr. Samuel Marquez of SUNY Downstate, samples with also be evaluated to determine the feasibility of genetic research/analysis of formalin-fixed human hard tissues and the potential effect of formalin on the thermal alteration process.