B96 Rapid Collection of Dental Pulp Tissue for DNA Analysis

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At the conclusion of the presentation the participants will be familiar with a technique for the collection of pulp tissue from inside a tooth for DNA analysis; be familiar with the instruments needed for cleaving tooth structure; and be familiar with pulp canal morphology to help understand the best teeth for producing DNA.

The presentation will impact the forensic science community by allowing for the rapid, effective removal of pulp tissue using common dental instruments that do not require the training and skill of a dentist to perform. It will also suggest ways that forensic odontologists and DNA Analysts can collaborate to produce the best chance of obtaining useable DNA.

Tooth enamel is the hardest structure in the human body. The durability of the dentition is well documented and has historically allowed Forensic Odontologists to play an important role in the post mortem identification of victims of a mass fatality event. In cases where advanced decomposition, fire or severe trauma has made identification by other means difficult or impossible, often the dentition remains remarkably intact. In the past, dental identification has been accomplished by comparing post mortem dental radiographs of an unidentified victim with antemortem radiographs of a known patient. This method of identification works very well provided an antemortem dental record can be obtained for comparison. In the absence of antemortem dental records, dental identification had little to offer other than to assist anthropologists in age determination. Even then, using the dentition for the determination of age is only accurate within certain age ranges during which there is active tooth development.

In recent years, the use of DNA has proven to be an extremely valuable tool in post mortem identifications. In the course of developing the science and technology for DNA analysis, it was discovered that an excellent source of DNA was dental pulp tissue. The dental pulp, found in a small canal within the tooth, is commonly referred to as “the nerve”. Although it does contain unmyelinated nerve fibers, it is actually connective tissue made up of many other components. In addition to the nerve fibers, the dental pulp also contains highly specialized tooth- forming cells, undifferentiated cells that can become whatever cell type is needed, defense cells, blood vessels and ground substance. The durability of the tooth structure encasing the dental pulp provides protection so that its DNA survives in cases where it may be destroyed in other areas of the body. Thus recovery of dental pulp tissue can be very useful in recovering DNA from an unidentified victim. However, removal of the tissue from the tooth can be difficult, in some cases even for trained dentists, requiring significant time, instrumentation and skill.

The literature often describes recovering pulp tissue for DNA analysis by grinding away tooth structure until the pulp is encountered. This presentation discusses a fast, inexpensive, and efficient alternative technique that involves splitting the tooth to access the pulp. Using readily available, inexpensive dental tools, the presentation will describe the technique and the instruments required for accessing the pulp space that does not require the training and clinical skill of a dentist. It is designed for those who perform DNA analysis and who would like to learn a fast, efficient technique for accessing the pulp in any setting.

At the conclusion of the presentation, the participants will have a basic knowledge of pulp canal morphology for single and multi-rooted teeth, the instruments recommended for cleaving the tooth structure, the best areas on the tooth to accomplish splitting of the tooth and the role forensic odontologists can play in collaboration with DNA Analysts in the recovery of useable DNA.

The presentation will have an impact by suggesting a fast, efficient technique for collecting DNA from the dental pulp by DNA Analysts. It will also suggest ways that DNA Analysts and dentists can work together to maximize the chance of obtaining useable DNA from the pulp.

Dental Pulp, DNA, Collection

 ** Presenting Author*