



F5 Comparative Analysis of the Effects of Heat on the PCR-Amplification of Various Sized DNA Fragments Extracted From *Sus Scrofa* Molars

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After attending this presentation, attendees will learn that DNA from *sus scrofa* teeth embedded in jawbone and from whole fleshed heads can be amplified at high temperatures.

This presentation will impact the forensic community by demonstrating an increased rate of success in DNA amplification compared to previous research conducted on isolated human teeth and exemplifying the *sus scrofa* dentition as a viable alternative to humans in such experimentation.

This study investigates the degree of protection afforded to the pulp chamber of *sus scrofa* dentition by the dental enamel, alveolar process and soft tissue mass of the head during incineration. Further, it examines the temperature above which DNA can no longer be amplified using PCR- based analysis. Segments of defleshed *sus scrofa* maxilla and mandible encasing the first molar (n=60) were subjected to a range of incineration temperatures (302, 437, 572, 707, 842, 977°F) for a fifteen minute duration. Dental pulp was retrieved and subsequent amplification of PCR products using a three primer (101, 200, 283 bp) and four-primer (101, 200, 283 and 450 bp) multiplex showed no degradation of the largest fragment analyzed following exposure to 842°F. Amplification of the largest fragment analyzed in the three-primer multiplex (283 bp) was successful following exposure to 977 °F but only in maxillary samples. Observations made during this study have revealed the enamel density of maxillary first molars to be greater than mandibular molars in *sus scrofa*. Pulp temperature data demonstrated that the mandibular pulp chambers experienced higher temperatures compared to maxillary pulp chambers.

Following incineration of whole, fleshed *sus scrofa* heads in the field for fifteen minutes (n=10) and for one hour (n=4) at an average temperature of 1157°F, amplification of the largest fragment analyzed (450 bp) was successful from the dental pulp of both maxillary and mandibular first molars. The amplification success experienced in this study exceeds that obtained from previous research conducted on isolated human teeth and emphasizes the significance of the alveolar process and soft tissue mass of the head in terms of the protection afforded to the pulp chamber during incineration.

Observations made during this experiment indicate that trends observed in human teeth exposed to increasing temperatures are consistent with teeth from *sus scrofa*. This combined with close similarities between species in soft tissue thickness promotes the experimental use of whole *sus scrofa* heads as a sample dentition representative to that of humans.

DNA Analysis, Buried Human Remains, Dentition