ABSTRACT

ANALYSIS OF HIGH-TEMPERATURE EXPOSED BONE AND DENTAL DNA OF LOCI STR CODIS, Y-CHROMOSOME STRs AND mtDNA

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High-temperature exposure is one of factors for DNA degradation. Bone and dental tissues are among materials most resistant to this DNA degradation. Bone and teeth are the most solid of human body due to its containing hydroxyapatite and extracellular matrices that provides protection for DNA (nuclear DNA and mtDNA). To date, DNA degradation due to the effect of high-temperature exposure on samples of bone and dental DNA in forensic identification has been extensively unknown.

The purpose of the present research was to analyze and elucidate DNA loci detectable subsequent to high-temperature exposure to samples of bone and dental DNA on the basis of loci STR CODIS, Y-STRs, and mtDNA.

Laboratory experimental in order to analyze DNA degradation of bone and dental materials due to effect of high-temperature exposures (500 ·C, 750°C, 1000°C, and 1250°C for 20, 30, and 40 minutes) on the basis of the loci STR and *mini*-STR CODIS (CSF1PO, D18S51, D21S11, FGA, D8S1179, D5S820, D7S820, D13S317, D16S539), Y-STRs (DYS19, DYS389, DYS390) and 143-bp and 126-bp mtDNA. Samples consisted of 24 ribs and 24 molars from 7 cadavers.

Teeth were more resistant than bones in protecting DNA from high-temperature exposure. This could be seen in the number of presentation positively detected from loci STR, Y-STRs and mtDNA. Loci of STR CODIS of bone materials detected by standard primer were D3S1358, D16S539 (1250°C-20') and CSF1PO (500°C-40'); those of dental materials were D7S820, D8S1179 (1250°C-40'), D3S1358 (1250 ·C-20'), D13S317 (1000°C-40'), D16S539 (750°C-40'), CSF1PO (750 ·C-20'). Loci of STR CODIS of bone materials detected by mini primer were D16S539 (750 ·C-40'), CSF1PO, *D12S137* (500°C-40'), and *D3S358* (500 ·C-30'); those of dental materials were CSF1PO (1250 ·C-40'), D16S539 (1000 ·C-20'), D13S317 (750 ·C-40'), D3S1358 (750 ·C-20'), D5S818, D7S820, D8S1179, D18S51 (500 ·C-40'). The detected locus of Y-STRs of bone materials was DYS389I (1250 ·C-20'); that of dental materials was DYS389I (1250 ·C-40'). mtDNA was detected at 143 bp (750 ·C-40' for bone materials and 1250 ·C-30' for dental materials) and at 126 bp (750 ·C-40' for bone materials and 1000 ·C-30' for dental material).

Undetected mini primer on DNA amplification of high-temperature exposed bones and teeth might be due to complete degradation resulting in DNA fragments to lose their annealing sites of primer. Successful

detection of those loci at the maximum exposure of the research was supported by differences in amplicon products, GC content. In publication, The ratio of GC content for CSF1PO was 42.6%, D8S1179 was 30.9% and D7S820 was 28.6%, and had power discriminant of different. In conclusion, dental materials that remained capable of detection were loci D7S820 and D8S1179 with standard primer, CSF1PO with mini primer and DYS389I at the maximum temperature exposure (1250 ·C for 40 minutes) of the research.

Keywords: High-temperature exposure, STR-mini STR CODIS, Y-STRs, mtDNA, bone and dental DNA.