Recording of individual identification information on dental prostheses using fluorescent material and ultraviolet light

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Abstract: The placement of individual identification on a prosthesis is very important for forensic dentistry and traceability. This article describes the unique naming/labeling of dentures with information for individual identification using a method in which information is invisible under natural light but visible under ultraviolet light-emitting diode/black light exposure. The use of laser beam machining with this method will enable the recording of a large amount of information.

MeSH: Acrylic Resins -- chemistry; Composite Resins -- chemistry; Dental Materials -- chemistry; Denture Bases; Denture Design; Denture Identification Marking -- methods (major); Fluorescent Dyes -- chemistry (major); Forensic Dentistry; Humans; Image Processing, Computer-Assisted -- methods; Lasers; Surface Properties; Ultraviolet Rays (major)

Journal classification: Dental Journals

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Comparative analysis of aspartic acid racemization methods using whole-tooth and dentin samples

Author: Sakuma, Ayaka; Ohtani, Susumu; Saitoh, Hisako; Iwase, Hirotaro


Abstract: One way to estimate biological age is to use the aspartic acid (Asp) racemization method. Although this method has been performed mostly using enamel and dentin, we investigated whether an entire tooth can be used for age estimation. This study used 12 pairs of canines extracted from both sides of the mandible of 12 individuals of known age. From each pair, one tooth was used as a dentin sample and the other as a whole-tooth sample. Amino acids were extracted from each sample, and the integrated peak areas of D-Asp and L-Asp were determined using a gas chromatograph/mass spectrometer. Statistical analysis was performed using the D/L-Asp ratio. Furthermore, teeth from two unidentified bodies, later identified as Japanese and Brazilian, were examined in the same manner. Results showed that the D/L ratios of whole-tooth samples were higher overall than those of dentin samples. The correlation coefficient between the D/L ratios of dentin samples and their age was r=0.98, and that of the whole-tooth samples was r=0.93. The difference between estimated age and actual chronological age was -0.116 and -6.86 years in the Japanese and Brazilian cases, respectively. The use of whole teeth makes the racemization technique easier and can standardize the sampling site. Additionally, using only a few tooth samples per analysis made it possible to reanalyze known-age samples. Although the difficulty in obtaining a proper control sample has prevented racemization from being widely used, the method described here not only ensures the availability of a control tooth, but also enables the teeth to be used for other purposes such as DNA analysis. The use of a whole tooth will increase the application of the racemization technique for age determination.

MeSH: Adult; Age Determination by Teeth -- methods (major); Aspartic Acid -- chemistry (major); Cuspid -- chemistry (major); Dentin -- chemistry (major); Female; Forensic Dentistry; Gas Chromatography-Mass Spectrometry; Humans; Male; Middle Aged; Regression Analysis; Stereoisomerism

Journal classification: Index Medicus

Substance: Substance: Aspartic Acid; CAS: 56-84-8
Bitemarks: distortion and covariation of the maxillary and mandibular dentition as impressed in human skin

Author: Sheets, H David; Bush, Peter J; Bush, Mary A


Abstract: In bitemark analysis the extent of distortion of both maxillary and mandibular arches and how one affects the other has not been studied. A single dentition was used to create 49 bites on unembalmed cadavers. Landmarks were placed on digital images of the bitemarks and scanned images of the biting dentition. A sample of 297 randomly acquired dental models was used for comparison purposes. Geometric morphometric techniques were utilized to statistically describe size and shape change, as well as the correlation between the two arches. Results indicate that the predominant distortion seen was in arch width, at 7-28 times as large as measurement error in the biting dentition and roughly 50% of the variation seen in the random population of dentitions. The correlation of arch width distortion between arches was very low (~0.03). However, the principal patterns of all shape variation did co-vary in the bitemarks produced by the maxillary and mandibular dentition, an effect indicating independence of size and shape distortion. In conclusion, bitemark analysis should be approached with caution when the principal difference between suspects is arch width.

MeSH: Bites, Human -- pathology (major); Cadaver; Dentition (major); Forensic Dentistry; Humans; Image Processing, Computer-Assisted; Mandible; Maxilla; Photography, Dental

Journal classification: Index Medicus

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Dental age estimation in Spanish children

Author: Feijóo, Gonzalo; Barbería, Elena; De Nova, Joaquín; Prieto, Jose Luis


Abstract: The objective of this study was to apply the method for calculating dental age proposed by Demirjian et al. to a sample of Spanish children, followed by a comparison between their dental and chronological ages. This study also set out to create tables to convert specific dental age using the maturity data from our sample. This study was performed on a sample of 1010 orthopantograms taken of Spanish children (485 boys and 525 girls) aged 2-16. We found that the mean estimated dental age exceeded the mean chronological age in both boys and girls, with the mean difference being 0.87 and 0.55 years respectively. We adapted Demirjian’s method to our study sample to obtain specific conversion tables and curves.

MeSH: Adolescent; Age Determination by Teeth -- methods (major); Child; Child, Preschool; Female; Forensic Dentistry; Humans; Male; Radiography, Panoramic; Sex Characteristics; Spain; Tooth -- growth & development (major); Tooth -- radiography

Journal classification: Index Medicus

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Language: English

Language of abstract: English

Document type: Journal Article
Morphologic patterns of lip prints in a Portuguese population: a preliminary analysis

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Abstract: Lip prints are thought to have the ability to distinguish individuals and, hence, have a potential use in human identification purposes. However, questions remain regarding their utility for sex determination. This study aimed to classify lip prints for different individuals in a Portuguese population and to determine whether sex differences exist. Lip prints of 25 females and 25 males
were obtained using dark-colored lipstick and cellophane tape. Lip prints were analyzed using a magnifying lens and classified according to the Suzuki and Tsuchihashi classification. A Type II pattern was found to be most common. A comparison of lip-print patterns between males and females showed results with a statistically significant difference: Type III pattern was most common in males, and a Type II pattern in females. This study corroborates the hypothesis that lip prints are able to distinguish individuals and may be useful in sex determination.

MeSH: Adult; Cosmetics; Female; Forensic Dentistry; Humans; Lip -- anatomy & histology (major); Male; Portugal; Sex Characteristics; Young Adult

Journal classification: Index Medicus

Substance: Substance: Cosmetics; CAS: 0

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The third molar as an age marker in adolescents: new approach to age evaluation

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Abstract: Adolescence is a relatively short period between childhood and adulthood. It is very difficult to determine adulthood based on biological indicators. The third molar may be considered a potential age marker for the period between the ages of 16-21. Our study evaluated a set of 1700 panoramic radiographs of individuals aged between 5 and 21 years. Results confirmed the statistically significant difference in the course of third molars development. The mean deviation for individuals with one third molar agenesis is -0.98 years, for individuals with two third molars agenesis -1.89 years, and with three molars agenesis -3.28 years. Thus, the extent of the deviation is directly proportional to the number of unformed third molars. The calculation of age according to the mean of stages of all third molars could lead to the underestimation of age. No intergender differences were found. Age determination using third molars could be used for forensic purposes.

MeSH: Adolescent; Adult; Age Determination by Teeth -- methods (major); Child; Child, Preschool; Czech Republic; Female; Forensic Dentistry; Humans; Male; Molar, Third -- growth & development (major); Molar, Third -- radiography; Radiography, Panoramic; Sex Characteristics; Young Adult

Journal classification: Index Medicus

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Personal identification of cold case remains through combined contribution from anthropological, mtDNA, and bomb-pulse dating analyses

Author: Speller, Camilla F; Spalding, Kirsty L; Buchholz, Bruce A; Hildebrand, Dean; Moore, Jason; Mathewes, Rolf; Skinner, Mark F; Yang, Dongya Y

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Abstract: In 1968, a child's cranium was recovered from the banks of a northern Canadian river and held in a trust until the "cold case" was reopened in 2005. The cranium underwent reanalysis at the Centre for Forensic Research, Simon Fraser University, using recently developed anthropological analysis, "bomb-pulse" radiocarbon analysis, and forensic DNA techniques. Craniometrics, skeletal ossification, and dental formation indicated an age-at-death of 4.4 ± 1 year. Radiocarbon analysis of enamel from two teeth indicated a year of birth between 1958 and 1962. Forensic DNA analysis indicated the child was a male, and the obtained mitochondrial profile matched a living maternal relative to the presumed missing child. These multidisciplinary analyses resulted in a legal identification 41 years after the discovery of the remains, highlighting the enormous potential of combining radiocarbon analysis with anthropological and mtDNA analyses in producing confident personal identifications for forensic cold cases dating to within the last 60 years.

MeSH: Age Determination by Skeleton -- methods (major); Age Determination by Teeth -- methods (major); Amelogenin -- genetics; Canada; Cephalometry; Child, Preschool; DNA Fingerprinting; DNA, Mitochondrial -- genetics (major); Dental Enamel -- chemistry; Dentition, Permanent; Forensic