F10 The Dental Forensic Value and Usefulness of ToothPrints®

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After attending this presentation, attendees will appreciate the usefulness of ToothPrints® in the dental identification of children.

This presentation will impact the forensic community and/or humanity by demonstrating this study indicates that a properly fabricated ToothPrints® can be useful in completing a dental identification of a child.

ToothPrints® is a product that has been made available to dentists by the Kerr Unit of Sybron Dental Specialties, Inc. ToothPrints® is a patented, arch-shaped thermoplastic wafer. The wafer is softened in hot water. A child bites into the softened wafer to record their individual tooth characteristics, tooth position within the arch and the upper to lower jaw relationship. The ToothPrints® is stored in a zippered plastic bag provided and kept in a safe place by the child's family. ToothPrints® have been marketed as a source of dental information and as a convenient way to store a child's DNA. Identifications by both dental means and by DNA are routinely used in missing person cases.

The manufacturer recommends that three ToothPrints® impressions be taken at various times in a child development. The initial impression is taken at age three when all the primary teeth have erupted. The second is taken in the mixed dentition stage at about age seven when the permanent incisors and first molars have erupted into function. The last impression is taken after all the primary teeth have been shed and the second molars have erupted, at about age 12.

This study was undertaken to determine the ability of a ToothPrints® impression to provide useful forensic dental evidence. A ToothPrints® examination and comparison protocol has been proposed. The protocol was tested. The protocols ability to correctly discriminate an individual from among a group of similar dentitions was studied.

Fifteen ToothPrints® were available for study. Each ToothPrints® has a maxillary impression on one side and a mandibular impression on the other. The collection of ToothPrints® used in this study were from individuals from three to 12 years of age.

Each side of every ToothPrints® was both digitally photographed and scanned. The resultant images were brought to Adobe Photoshop as JPG files. Each JPG was manipulated to produce a positive image of the dental structures of interest.

The cusp tips of various teeth were marked. For the ToothPrints® from three year olds, the cusp tips of each primary second molar were marked. For the ToothPrints® from seven year olds, the cusp tips of each permanent first molar were marked. For the ToothPrints® from 12-year- olds the cusp tips of each of the permanent second molar were marked.

The cusp tip markings were connected with straight lines to produce a circle–like figure for each tooth. For every tooth studied, the lengths of the connecting lines were calculated. The angles described by adjacent lines were also calculated.

Each ToothPrints® yielded four groups of numbers, one for each of the studied teeth. Each group contained line lengths, and angle measure- ments. The lower permanent molars usually had five cusp tips while the rest of the studied teeth had four cusp tips.

The groups of numbers from each ToothPrints® were compared to the groups of numbers from the other ToothPrints®. The correct tooth print could be identified in every case.

As a child matures the teeth are worn. This will affect the placement of the cusp tip marking. Future studies to determine for how long a period of time that a ToothPrints®' information is valid and useful in dental iden- tifications will be undertaken. The variability introduced by having ToothPrints® produced by dentists, by dental hygienists and by dental assistants need to be studied. As will the reliability of producing ToothPrints® for very young patients.

This study has shown that ToothPrints® is a reliable method to record dental information that is of forensic value. This study presents preliminary findings and verifies the need for a larger and more controlled study. A larger study will produce a larger database that may prove useful in assisting the identification of missing children. The ability of ToothPrints® to record and store forensically significant DNA has been left for future study.

Forensic Dentistry, Dental Identification, ToothPrints®

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