

## Promotion of the Use of a Thermoplastic Material to Aid in the Identification of Unidentified Human Remains

American Board of Forensic Odontology

### introduction

As a pediatric dentist and forensic dental consultant, I am asked by dentists my opinion of "Toothprints: The Dental ID for Safeguarding Children," a procedure that has been advertised in dental journals. The company marketing Toothprints states that "your young patient's unique tooth characteristics, tooth position ..." will be recorded on a thermoplastic wafer and then may be used "to assist authorities in tracking a missing child or making a positive identification." The advertisement further states that it "will give their parents peace of mind." Our impression is that it may give parents a false "peace of mind."

A missing/abducted young child is one of the most tragic incidents in our society. In 1999, statistics showed that 115 children were victims of "stereotypical kidnappings" (the most serious, long-term abductions) that year. (Source: National Center for Missing and Exploited Children.) When such a child is found, hopefully alive, it should not take a Toothprint to identify the child. Tragically,

a small percentage of these abducted children are killed. When decomposed remains of a child are found, identification will be first attempted by forensic dentistry. If there are no dental X-rays for the missing child, then DNA will come into play. California has an excellent DNA facility (Department of Justice DNA/Missing Persons Laboratory) and the potential identification of a missing child would become a priority case for the lab.

In our opinion, there are many reasons why these bite impressions would be of limited value for the identification of children. It is recommended that rather than introducing bite impressions into their practices, that our colleagues expend efforts to obtain and retain good dental records for their young patients. Following is the position paper recently completed by the American Board of Forensic Odontology covering bite impressions.

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## Abstract

There has been a recent effort to promote the use of a thermoplastic bite impression material for the identification of children. The American Board of Forensic Odontology is a certification board for forensic dentists in the United States and Canada. It is the position of the ABFO that this technique is of limited value when used for the dental identification of children.

A presentation was made to the Odontology Section of the American Academy of Forensic Sciences in Dallas, Texas, in February 2004. The presentation promoted the use of a thermoplastic material to record the morphology of the human dentition for use by qualified personnel to identify missing persons. Currently, the target population for the recording of this information is children. In addition to recording the morphology of the dentition, the presenter claimed that the material, properly stored after impressing the teeth, could also be used as a source of DNA for identification purposes, as well as a source of the individual's scent to be used by tracking dogs. The weeks and months following

this presentation generated significant comments and concerns regarding the information presented amongst members of the ABFO and members of the Odontology Section of AAFS. It was suggested that the ABFO look into this tooth impression method and comment on its validity and usefulness in the identification process. The following comments regarding this method have been formulated following significant input from diplomates of the ABFO.

The ABFO is a certifying organization for dentists who wish to become board certified in the field of forensic odontology, and as such, requires its diplomates to maintain significant experience in the use of the human dentition for identification purposes. The ABFO also has a mission to promote and enhance the science of forensic odontology. As the ABFO primarily deals with the dentition, the comments in this paper will be confined to the use of the thermoplastic material as it relates to the dental identification process. Experts in DNA analysis and tracking should address the issues of DNA and scent.

**This method should not be considered a substitute for obtaining and keeping accurate conventional dental records.**

## Position Paper

The concept of using an inert material to record the morphology of the teeth is not new, although its use in the identification of children may be somewhat novel. Historians have recorded the use of tooth impressions centuries ago, in wax, to identify documents as being authentic and from a certain author. Wax bite impressions as exemplars in the analysis of bite mark evidence have been used for several decades. The concept of using tooth impressions in a thermoplastic material for identification purposes was actually pursued in the late 1980s by a Dr. Dennis Welch. His concept was to use the same thermoplastic material that was presented at the 2004 AAFS meeting to record the

anatomy of the dentition, and then using the scanning software developed for the cruise missile system, develop a database of mapped dentitions for comparison to unknown mapped dentitions of human remains recovered but not identified. Dr. Welch eventually abandoned this project due to failure to obtain the necessary venture capital to establish the database that would be usable to produce a list of possible identification candidates. Dr. John Wagner was also involved in this project as the developer of the thermoplastic material.

The technique proposed at the 2004 AAFS meeting in Dallas, which uses Dr. Wagner's material to record the morphology of the dentition, is

one that has merit in aiding in the identification process of human remains. However, without a database of mapped dentitions, the product as now marketed, has limited value. It may be of some use in cases where no other antemortem (before death) dental information is available for comparison. The imprint of teeth in the thermoplastic material might be of use to help identify an individual by comparing unique morphological features of the teeth. The inability to develop a list of possible candidates that could be compared to an unidentified dentition reduces the usefulness of this procedure. Until a method of digitally mapping the impressions of teeth for comparison is attained, the

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utilization of thermoplastic tooth impressions for identification should be considered limited. There are current systems in place (e.g., dental radiography) which provide information on the human dentition and related structures in a more accurate and expedient manner.

It has been stated that a trend toward less restorative dental treatment with children would increase the value of thermoplastic dental impressions. Although this trend may exist, there are other systems in place, and others being developed, that are taking the lower incidence of dental restorations into account.

Companies marketing, or considering marketing, thermoplastic material for bite impressions for forensic use should be cautioned to neither mislead the dental profession nor the general public (especially parents) into thinking that this form of recording personal identification information is the best method for identification purposes. This method should not be considered a substitute for obtaining and keeping accurate, conventional dental records. Dental records should include detailed treatment records and radiographs of the dentition and surrounding structures. Dental models and intraoral/

extraoral photographs are also sometimes used for identification purposes. Systems are currently in place to efficiently compare dental treatment, or the lack of it, in large populations. At this point in time, these systems are the best way to link dental information of missing persons with those of unidentified remains. Future technology may provide a better means to compare between known and unknown databases.

As stated above, the recording of the dentition in a thermoplastic material may have merit in aiding in the identification process of human remains, especially in cases of permanent dentitions and in cases where no dental records are available. In such cases one would need to be certain that the bite impression was not only accurate but was taken within a reasonable time preceding its use in comparison with the human remains.

The presenter at the AAFS meeting stated that current efforts with thermoplastic bite impressions are aimed at children. It must be understood that children present unique and potentially limiting circumstances when using this technique. These include, but are not limited to:

1. Accurately taking the impression on a young child.

2. The ongoing growth and development of a child's mouth produce changes in the teeth and oral structures, as does also early orthodontic treatment.

3. Decomposed remains of children can present special dental identification challenges such as single rooted primary teeth, teeth with resorbing roots, and developing permanent teeth which are often missing, leaving few teeth for comparison. In such cases, dental radiographs would be preferable to a thermoplastic bite impression for identification purposes.

In conclusion, the use of a thermoplastic material to record the anatomy and morphology of the dentition should not be completely discouraged but the treatment provider and the consumer should understand the limitations of its use for forensic dental identification. The ABFO understands and certainly appreciates the humanitarian gestures that organizations are making in attempting to apply this procedure to the identification of children. It is not the ABFO's intention to dampen their enthusiasm, but it is imperative these organizations understand the current limitations of this procedure and encourage the use of other more conventional forms of dental information recordkeeping. CDA