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American Dental Association
Technical Report No. 110

Standard Procedures for the Assessment of Laser-induced Effects on Oral Hard and Soft Tissue

*A Technical Report prepared by the American Dental Association
and registered with ANSI.*

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AMERICAN DENTAL ASSOCIATION TECHNICAL REPORT NO. 110 FOR STANDARD PROCEDURES FOR THE ASSESSMENT OF LASER-INDUCED EFFECTS ON ORAL HARD AND SOFT TISSUE

The Council on Scientific Affairs of the American Dental Association has approved American Dental Association Technical Report No. 110 for Standard Procedures for the Assessment of Laser-induced Effects on Oral Hard and Soft Tissue. This and other technical reports and specifications for dental materials, instruments and equipment are being formulated by working groups of the ADA Standards Committee on Dental Products (formerly Accredited Standards Committee MD156 for Dental Materials, Instruments and Equipment). The Committee has representation from all interests in the United States in the standardization of materials, instruments and equipment in dentistry. The ADA Standards Committee on Dental Products confirmed approval of ADA Technical Report No. 110 on May 29, 2008.

Publication of this technical report that has been registered with ANSI has been approved by the American Dental Association, 211 East Chicago Avenue, Chicago, IL 60611. This document is registered as a technical report according to the *Procedures for the Registration of Technical Reports with ANSI*. This document is not an American National Standard and the material contained herein is not normative in nature. Comments on the content of this document should be sent to the American Dental Association, 211 East Chicago Avenue, Chicago, IL 60611.

The Council thanks Douglas Dederich, Louisiana State University, New Orleans, LA for his efforts in developing this technical report.

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ASSESSMENT OF LASER-INDUCED EFFECTS ON ORAL HARD AND SOFT TISSUE

FOREWORD

(This Foreword is not part of ANSI/ADA Technical Report No. 110 for Standard Procedures for the Assessment of Laser-induced Effects on Oral Hard and Soft Tissue).

The objective of this technical report is to provide detailed guidelines and methodologies for evaluating the interactions of dental lasers with oral hard and soft tissues. These guidelines and methodologies would provide data of enough quality and quantity to reconstruct the actual damage and healing dynamics at all clinically significant locations within the laser-affected area of soft tissue.

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1 INTRODUCTION

The use of lasers on hard or soft tissue can result in a variety of hard and soft tissue effects. Some of these effects are desired for their potential to clinically benefit the patient, and some are negative effects that should be minimized to the extent possible, or the presence of which may justify abandoning the application. Also, some effects may be unknown. A correct understanding of the salient issues related to laser interaction with hard and soft tissue is needed to assess the clinical validity and appropriateness of any hard or soft tissue laser application. The purpose of this document is to provide a listing of these issues. Specifically, clinical endpoints are listed along with specific dependent variables that should be assessed. Some suggestions for technologies that may be appropriate for the measurement of the dependent variables are also given.

2 SCOPE

This technical report covers standard practices for the assessment of laser interactions with oral hard and soft tissue.

3 NORMATIVE REFERENCES

The following referenced document is indispensable for the application of this document. The latest edition of the referenced document (including any amendments) applies.

ISO 1942 Dentistry-Vocabulary

(Available from the American Dental Association, Department of Standards, 211 E. Chicago Ave., Chicago, IL 60611, or from www.adacatalog.org).

4 DEFINITIONS

For the purposes of this Technical Report, the terms and definitions given in ISO 1942 and the following apply.

4.1 **Ablation** – a process where incident thermal energy is expended by loss of material.

5 REQUIREMENTS

Any statement regarding clinical efficacy or effectiveness of laser treatment shall be based on the results of the histological analysis of hard tissue (6.2.1) and soft tissue (7.2.1) effects; and the results from a minimum of 2 independent clinical studies supporting the statement (6.2.2) and/or (7.2.2).

6 ASSESSMENT OF LASER EFFECTS ON HARD TISSUE

6.1 Effects to be evaluated

6.1.1 Enamel

A Surface modification

i. Caries prevention

(a) Structural changes (possibly electron microscopy, light microscopy, infrared spectroscopy, x-ray analysis, and chemical analysis);

(b) Thermal effects.

ii. Enamel etching

(a) Structural modifications (possibly electron microscopy, light microscopy, infrared spectroscopy, x-ray analysis, and chemical analysis);

(b) Bond strength;

(c) Thermal effects.