Revised ANSI/ADA Standard No. 41
Approved by ANSI: December 23, 2015

Revised American National Standard/
American Dental Association

Standard No. 41

Evaluation of Biocompatibility of Medical Devices Used in Dentistry

Modified adoption of ISO 7405:2008 *Dentistry — Evaluation of biocompatibility of medical devices used in dentistry*

ADA American Dental Association®
Council on Scientific Affairs

2015

REVISED AMERICAN NATIONAL STANDARD/AMERICAN DENTAL ASSOCIATION STANDARD NO. 41 FOR EVALUATION OF BIOCOMPATIBILITY OF MEDICAL DEVICES USED IN DENTISTRY

The Council on Scientific Affairs of the American Dental Association has approved revised American Dental Association Standard No. 41 for Evaluation of Biocompatibility of Medical Devices Used in Dentistry. This and other standards for dental materials, instruments and equipment are being formulated by working groups of the ADA Standards Committee on Dental Products. The Committee has representation from all interests in the United States in the standardization of materials, instruments and equipment in dentistry. The Council has adopted the standards, showing professional recognition of their usefulness in dentistry, and has forwarded them to the American National Standards Institute with a recommendation that the standards be approved as American National Standards. The American National Standards Institute granted approval of revised ADA Standard No. 41 as an American National Standard on December 23, 2015.

The ADA Standards Committee on Dental Products thanks the members of the Joint Working Group on Biological Evaluation and the organizations with which they were affiliated at the time the standard was developed:

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FOREWORD

(This Foreword does not form a part of Revised ANSI/ADA Standard No. 41 for Biocompatibility of Medical Devices Used in Dentistry).

The objective of this Standard is to provide detailed guidelines and methodologies for evaluating the biocompatibility of dental materials following International Standard ISO 7405, Dentistry - biocompatibility of medical devices used in dentistry. ANSI/ADA Standard No. 41 is intended to be a modification of ISO 7405 for the benefit of United States dental professionals, scientists, and manufacturers. The intent of this Standard is to provide a framework through which regulatory approval can be obtained for dental products in the U. S. as well as in other countries that recognize ISO standards.

This edition of ANSI/ADA Standard No. 41 cancels and replaces ANSI/ADA Standard No. 41: 2005, Recommended Standard Practices for Biological Evaluation of Dental Materials. The SCDP Joint Working Group on Biological Evaluation examined ISO 7405:2008, Dentistry – Evaluation of biocompatibility of medical devices used in dentistry, and found it acceptable with modifications as revised ANSI/ADA Standard No. 41.

The Working Group made the following modifications to ISO 7405:2008 to prepare ANSI/ADA Standard 41:2015:

A. Scope: Provided additional information on the types of testing covered by Standard 41.

   Rationale: The Working Group decided that more details were needed.

B. Normative references were updated to include newer versions of ISO 10993

   Rationale: Additional ISO 10993 documents have been approved since ISO 7405 was last revised.

C. Terms and definitions, 3.4: A definition of implant device was added and definitions were renumbered.

   Rationale: The Working Group decided that more details were needed.

D. Categorization of medical devices, 4.1.3, Surface Contacting Devices Description modified.

   Rationale: The Working Group decided that more details were needed.

E. Biological evaluation process, 5.1 General added a statement that Good Laboratory Practice regulations should be followed when conducting studies under this Standard.

   Rationale: The US FDA Good Laboratory Practice regulation (21CFR Part 58) provides details on data recording and retention for nonclinical safety studies that are acceptable to the US FDA when studies are submitted to the agency for review.

F. Biological evaluation process, 5.4 Types of test added a statement that the US FDA should be consulted prior to conducting tests for submission to the agency.

Rationale: The Working Group decided that confirmation of the test strategy by the FDA would improve study design.

G. Biological evaluation process, 5.4 Types of test replaced the tooth slice model with a method described at the 2015 ISO TC106 meeting that is being considered for inclusion in the next revision of ISO 7405.

Rationale: The Working Group agreed that reference to the tooth slice model was unnecessary and if a new test is included in ISO 7405, it would improve harmonization with Standard 41.

H. Test procedures specific to dental materials, 6.4.1 Objective was revised to add additional detail.

Rationale: The Working Group decided that more details were needed.

I. Test procedures specific to dental materials, 6.4.3.2.1 was revised to change dentin thickness.

Rationale: The Working Group decided that dentin thickness for testing should be between 0.5 and 1 mm.

J. Test procedures specific to dental materials, 6.4.3.2.2 was added to provide additional details.

Rationale: The Working Group decided that more details were needed.

K. Test procedures specific to dental materials, 6.4.3.2.4 Notes 2 and 3 were revised to provide additional details if ZOE is contraindicated and to describe an acceptable replacement for silicate cement due to the lack of availability of silicate cement.

Rationale: The Working Group decided that more details were needed.

L. Test procedures specific to dental materials, 6.4.3.2.5 described a procedure for randomization of treatment.

Rationale: The Working Group decided that more details were needed for randomization.

M. Test procedures specific to dental materials, 6.4.3.3 referenced a procedure for humane euthanasia.

Rationale: The Working Group decided that more details were needed for humane euthanasia and recommendations were available to provide such information.

N. Test procedures specific to dental materials, 6.4.3.4 Preservation of the Dental Pulp included additional details.

Rationale: The Working Group decided that more details were needed.

O. Test procedures specific to dental materials, 6.4.3.5.1 Preservation of Slides revised time points for tooth extraction.

Rationale: The Working Group decided that earlier time points would provide additional information.

P. Test procedures specific to dental materials, 6.4.4.1 Statistical analysis details were added.

Rationale: The Working Group decided that statistical analysis of data should be described.

Q. Test procedures specific to dental materials, 6.5.3.2.3 Note 1 was revised and Note 2 deleted.

Rationale: The Working Group decided that MTA provides a more appropriate control material.

R. Test procedures specific to dental materials, 6.6.3.2.1 Use of a rubber dam was added.

Rationale: The Working Group decided that a description of the isolation method was needed.

S. Table A.1 was revised to reflect current FDA requirements for biocompatibility testing.

Rationale: The Working Group decided that US FDA requirements were needed for submissions to US regulatory agencies.

T. Annex B Dentine barrier cytotoxicity test Objective was rewritten to provide additional details.

Rationale: The Working Group decided that additional details were needed.

U. Bibliography: Added a new reference for a positive control material that was incorporated into an amendment of ISO 7405:2008.

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INTRODUCTION

This standard concerns the evaluation of the biocompatibility of medical devices used in dentistry. It is to be used in conjunction with the ISO 10993 series of standards. This standard contains special tests, for which ample experience exists in dentistry and which acknowledge the special needs of dentistry.

Only test methods for which the members of the committee considered there was sufficient published data have been included. In recommending test methods, the need to minimize the use of animals was given a high priority. It is essential that the decision to undertake tests involving animals be reached only after a full and careful review of the evidence indicating that a similar outcome cannot be achieved by other types of test. In order to keep the number of animals required for tests to an absolute minimum, consistent with achieving the objective indicated, it can be appropriate to conduct more than one type of test on the same animal at the same time, e.g. pulp and dentin usage test and pulp capping test. However, in accordance with ISO 10993-2 these tests are performed both in an efficient and humane way. On all occasions when animal testing is undertaken, such tests are conducted empathetically and according to standardized procedures as described for each test.

This standard does not explicitly describe test methods for occupationally related risks.

Annexes B and C are included to encourage the development of *in vitro* and *ex vivo* test methods which will further reduce the use of animals in the evaluation of the biocompatibility of medical devices used in dentistry.

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1 Scope

This standard covers standard practices for the biological evaluation of the safety of medical devices used in dentistry. In addition, this document covers biological evaluation of the device component of combination products, including those with a pharmacological agent or biologic component as an integral part of the device.

This standard does not cover testing of materials and devices that do not come into direct or indirect contact with the patient's body.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 1942, *Dentistry — Vocabulary*

ISO 6344-1, *Coated abrasives — Grain size analysis — Part 1: Grain size distribution test*

ISO 10993-1, *Biological evaluation of medical devices — Part 1: Evaluation and testing within a risk management process*

ISO 10993-2, *Biological evaluation of medical devices — Part 2: Animal welfare requirements*

ISO 10993-3, *Biological evaluation of medical devices — Part 3: Tests for genotoxicity, carcinogenicity and reproductive toxicity*

ISO 10993-5, *Biological evaluation of medical devices — Part 5: Tests for in vitro cytotoxicity*

ISO 10993-6, *Biological evaluation of medical devices — Part 6: Tests for local effects after implantation*

ISO 10993-10, *Biological evaluation of medical devices — Part 10: Tests for irritation and skin sensitization*

ISO 10993-11, *Biological evaluation of medical devices — Part 11: Tests for systemic toxicity*

ISO 10993-12, *Biological evaluation of medical devices — Part 12: Sample preparation and reference materials*

ISO 10993-17, *Biological evaluation of medical devices—Part 17: Establishment of allowable limits for leachable substances*

ISO 10993-18, *Biological evaluation of medical devices— Part 18: Chemical characterization of materials*

ISO 14971, *Medical devices — Application of risk management to medical devices*