Revised ANSI/ADA Standard No. 41
Approved by ANSI: May 7, 2020

Revised American National Standard/
American Dental Association

Standard No. 41

Evaluation of Biocompatibility of Medical Devices Used in Dentistry

Modified adoption of ISO 7405:2018, *Dentistry — Evaluation of biocompatibility of medical devices used in dentistry*.

ADA American Dental Association®

Standards Committee on Dental Products

2020

REVISED AMERICAN NATIONAL STANDARD/AMERICAN DENTAL ASSOCIATION STANDARD NO. 4 FOR EVALUATION OF BIOCOMPATIBILITY OF MEDICAL DEVICES USED IN DENTISTRY

The ADA Standards Committee on Dental Products (SCDP) has approved revised ANSI/ADA Standard No. 41for 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 SCDP. The Committee has representation from all interests in the United States in the standardization of materials, instruments and equipment in dentistry. The Committee 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 May 7, 2020.

The ADA Standards Committee on Dental Products thanks the members of Joint Working Group 1 on Biological Evaluation, and the organizations with which they were affiliated at the time the standard was developed:

Milton Marshall (chairman), Marshall & Associates, Houston, TX;

Satish Alapati, University of Illinois at Chicago;

Sherrill Lathrop Blitzer, Food and Drug Administration, Silver Spring, MD;

Clifton Carey, University of Colorado, Aurora;

Claudia Cotca, Washington Institute for Dentistry & Laser Surgery, Chevy Chase, MD;

Riddhi Gangoli, Glidewell Dental Laboratories, Irvine, CA;

Lawrence Gettleman, University of Louisville, KY;

Prerna Gopal, American Dental Association, Chicago, IL;

Yiming Li, Loma Linda University, CA;

Nancy Lin, National Institute of Standards and Technology, Gaithersburg, MD;

William Mclees, National Association of Dental Laboratories, Kent, WA;

Cornelis Pameijer, University of Connecticut, Farmington; and

Scott Trapp, Department of Veteran Affairs, Alexandria, VA.

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

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

FOREWORD

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

This edition of ANSI/ADA Standard No. 41 cancels and replaces ANSI/ADA Standard No. 41:2015, Evaluation of Biocompatibility of Medical Devices Used in Dentistry. The SCDP Joint Working Group on Biological Evaluation examined ISO 7405:2018, Dentistry – Evaluation of biocompatibility of medical devices used in dentistry, and found it acceptable with modifications as revised ANSI/ADA Standard No. 41.

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.

The main changes in ISO 7405:2018 compared to the previous edition (ISO 7405:2008) are as follows:

- as crucial first step in the biological evaluation a material characterization is required before biological tests are conducted (see 5.4.2);
- modifications of contents of ‘pulp and dentine usage test’ and ‘endodontic test’;
- deletion of Annex C (Acute toxicity testing);
- addition of Endosseous dental implant usage test as new Annex C.

The modifications made to ISO 7405:2018 for this modified adoption are as follows:

References to the standard as a document were changed to standard.

- Addition of ISO/DIS 10993-23, Biological evaluation of medical devices -- Part 23: Tests for irritation as a normative reference;
- Under 5.1 Note 2, the US FDA Good Laboratory Practice citation, Title 21 of the Code of Federal Regulations Part 58, was added;
- Under 6.4.2, reference to US animal welfare regulations replaced those cited in ISO 7405;
- Under 6.4.2, the note, “There is a possibility that national regulatory requirements for laboratory animals exist,” was removed because of the preceding statement of US animal welfare regulations;
- Under 6.4.2, animal housing according to ISO 10993-2 was replaced by a document used in the US, specifically, The Guide for Care and Use of Laboratory Animals (ILAR publication, 1996, National Academy Press);
- Under 6.4.4.2, addition of non-parametric statistical to describe the type of non-parametric test to be used;
- Under 6.5.2.3.5, calcium hydroxide was removed as a reference control in Note 1, and consistency of MTA was described as a firm (paste) rather than putty;

- Under Annex A, Table A1, a note was added that risk assessments in the test matrix in the table might not be acceptable to the US FDA;

- Addition of ISO/TR 10993-22:2017, Biological evaluation of medical devices -- Part 22: Guidance on nanomaterials as a reference document.

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

Introduction

This standard describes 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 number and exposure of test 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 dentine 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.

Annex B is 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. Annex C is based on and replaces ISO/TS 22911.

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

1 Scope

This standard specifies test methods for the evaluation of biological effects of medical devices used in dentistry. It includes testing of pharmacological agents that are an integral part of the device under test.

This document 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 documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 10993-18, *Biological evaluation of medical devices — Part 18: Chemical characterization of materials*

ISO/TS 10993-19, *Biological evaluation of medical devices — Part 19: Physico-chemical, morphological and topographical characterization of materials*

ISO/TR 10993-22:2017, *Biological evaluation of medical devices -- Part 22: Guidance on nanomaterials*

ISO/DIS 10993-23, *Biological evaluation of medical devices -- Part 23: Tests for irritation*

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

ISO 16443, *Dentistry — Vocabulary for dental implants systems and related procedure*