http://dx.doi.org/10.5272/jimab.2015211.705

Journal of IMAB
ISSN: 1312-773X
http://www.journal-imab-bg.org

OPEN ACCESS

Journal of IMAB - *Annual Proceeding (Scientific Papers)* 2015, vol. 21, issue 1

BIOCOMPATIBILITY OF MEDICAL DEVICES – LEGAL REGULATIONS IN THE EUROPEAN UNION

Mariela Yaneva–Deliverska[1], Jordan Deliversky[2], Maya Lyapina[3]
1) Legal Department, Military Medical Academy, Sofia, Bulgaria
2) Department of National Security, State University of Library Studies and Information Technologies, Sofia, Bulgaria
3) Department of Hygiene, Medical Ecology and Nutrition, Medical University, Medical Faculty, Sofia, Bulgaria

ABSTRACT

A multiplicity of laws, standards, and recommendations regulate the marketing of medical devices. Therefore, legal regulations do not release the specialists in the fields of medicine and dentistry from the responsibility to gather as much information as possible about the products used or to request this information from the manufacturer. Safety data sheets for medical devices can be downloaded from the Internet. They are an important source of information about the biocompatibility of dental materials as they were investigated by the manufacturers. Appropriate safety labels on the wrappings should be considered. The manufacturer/importer is responsible for its products and is potentially liable for damages. The medical doctors and dentists should use only those medical devices for which appropriate information is available.

Key words: legal regulations, European Union, medical devices

Medical devices and dental materials and are subject to legal specific regulations in EU. All these regulations deal with biocompatibility and effectiveness of the medical materials and devices. Everyone in the working in the field of medicine should be informed about the regulations and their responsibilities imposed by them (including adverse effect reporting).

Definicions

According **ISO 13485**, medical device is "Any instrument, apparatus, implement, machine, appliance, implant, in vitro reagent or calibrator, software, material or other similar or related article, intended by the manufacturer to be used, alone or in combination, for human beings for one or more of the specific purpose(s) of diagnosis, prevention, monitoring, treatment or alleviation of disease, diagnosis, monitoring, treatment, alleviation of or compensation for an injury, investigation, replacement, modification, or support of the anatomy or of a physiological process, supporting or sustaining life, control of conception, disinfection of medical devices, providing information for medical purposes by means of in vitro examination of specimens derived from the human body and which does not achieve its primary intended action in or on the human body by pharmacological, immunological or metabolic means, but which may be assisted in its function by such means" [1].

According to **European Union Medical Devices Directive (MDD),** "medical device' means any instrument, apparatus, appliance, software, material or other article, whether used alone or in combination, together with any accessories, including the software intended by its manufacturer to be used specifically for diagnostic and/or therapeutic purposes and necessary for its proper application, intended by the manufacturer to be used for human beings for the purpose of:

· diagnosis, prevention, monitoring, treatment or alleviation of disease,

· diagnosis, monitoring, treatment, alleviation of or compensation for an injury or handicap,

· investigation, replacement or modification of the anatomy or of a physiological process,

· control of conception

and which does not achieve its principal intended action in or on the human body by pharmacological, immunological or metabolic means, but which may be assisted in its function by such means;' 'accessory' means an article which whilst not being a device is intended specifically by its manufacturer to be used together with a device to enable it to be used in accordance with the use of the device intended by the manufacturer of the device [2].

Because the intended main function of **dental materials** is generally to replace lost tissue, these materials fall by definition into the jurisdiction of the MDD.

Legal regulations

In the European Union (EU), a number of regulations must be followed for materials and devices used in medical and dental practice. The most important regulations are the MDD [2] and the European Chemical Regulation for Registration, Evaluation, Authorization, and Restriction of Chemicals (REACH) [3]. Besides the EU directive for medical devices, other directives are also applicable, including the following:

• Cosmetics (Cosmetics Regulation (EC) No 1223/2009, 2013.), which comprises, among other things, oral hygiene products [4];

• Drugs the requirements and procedures for the marketing authorisation for medicinal products for human use, as well as the rules for the constant supervision of prod-

ucts after they have been authorised, are primarily laid down in Directive 2001/83/EC and in Regulation (EC) No 726/2004 [2]. The European Parliament adopted **amendments** to the proposal for a regulation of the European Parliament and of the Council on medical devices, and amending Directive 2001/83/EC, Regulation (EC) No 178/2002 and Regulation (EC) No 1223/2009;

• Active, implantable medical devices such as heart pacemakers *Directive 2007/47/EC* [5];

• In vitro diagnostics (98/79/EEC) [6].

There are also regulations concerning waste disposal, environmental protection, and occupational safety.

The directive 93/42/EEC on medical devices (MDD) was adopted on 14 June 1993 [2]. Directives of the EU are equivalent to laws and must be turned into national legislation within the given time limit by all member countries of the EU. Directives, like laws, are periodically amended. The MDD was amended in 2007 DIRECTIVE 2007/47/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL amending Council Directive 90/385/EEC on the approximation of the laws of the Member States relating to active implantable medical devices, Council Directive 93/42/EEC concerning medical devices and Directive 98/8/EC concerning the placing of biocidal products on the market, with "Revision of the medical device directives", 2013. Retrieved 15 June 2014 [6, 7].

Available standards (such as those of the International Organization for Standardization, or ISO) are used in most cases and presently are of high importance for fulfilling the essential requirements.

How Medical Devices are Segmented in Europe

The MDD applies to a great variety of more than 400,000 different medical devices. Therefore, a classification system is necessary. This classification into four classes is based on the intended application of the products and the risk potential associated with each individual product [8].

Essentially, all devices fall into four basic categories:

· Non-invasive devices

· Invasive medical devices

· Active medical devices

· Special Rules (including contraceptive, disinfectant, and radiological diagnostic medical devices)

Devices are further segmented into the classes noted below:

Class I – Provided non-sterile or do not have a measuring function (low risk).

Class I – Provided sterile and/or have a measuring function (low/medium risk)

Examples in dentistry include noninvasive products, such as adhesive bandages for small wounds; invasive products (for transient contact with the body, such as impression materials and materials for bite registration); reusable surgical instruments.

Class IIa (medium risk)

Examples in dentistry include surgically invasive products (for longer than transient contact with the body), such as pit and fissure sealants and filling materials and syringes and needles for dental anesthetic cartridges; active therapeutic products without potential risk, such as dental hand pieces; active diagnostic products, such as appliances for determining pulp vitality.

Class IIb (medium/high risk)

Examples in dentistry include dental implants;

Contraceptives; condoms; active therapeutic appliances with potential risk, such as electrosurgical devices; ionizing radiation.

Class III (high risk)

Examples include products for life-maintaining functions; products with druglike effect.

In general, class I is associated with low health risk, and class III devices carry the highest risk. The type of testing and the extent of individual requirements depend on the classification of the medical device. For instance, in contrast to class IIb devices, no clinical tests are mandatory for class IIa devices; clinical testing of class IIa devices is required only when clinical assessment cannot provide the necessary information [9].

Dental materials are usually classified under class IIa; exceptions include dental implants (class IIb) and root canal filling materials containing active pharmaceutical ingredients (class III). This category of materials must fulfill the relevant requirements of the drug directive.

According to the MDD, the responsibility for performance, safety, and quality of a medical device – that is, fulfillment of the essential requirements – always lies with the manufacturer. Importers may be responsible for products imported from countries outside the European Economic Area. In general, the manufacturers define the indications for use of their medical devices.

A medical device that is in compliance (conformity) with the essential requirements of the MDD receives the CE label and can be launched on the market within the area of MDD jurisdiction. The respective process is therefore called **conformity assessment**.

Various possibilities for such a conformity assessment are described in the MDD, depending on the class to which the individual medical device belongs.

- Conformity assessment for class I devices: This applies, for instance, to impression materials. Devices of class I can be assessed for conformity by the *manufacturers themselves*. The manufacturer, however, needs to have all information available for a clinical assessment of its devices.

- Conformity assessment for class II and class III devices:

Medical devices of classes II and III must be assessed *together with an external authority* ("notified body"). Class II and class III devices are assessed for conformity by different processes. The manufacturer always uses the CE label at its own responsibility when all essential requirements are met and the stipulated conformity assessments have been successfully performed.

In the case of class IIa products, either the manufacturer or one of its products can be certified by the notified body. If a manufacturer has been certified (complete quality assurance system), then the manufacturer can place the CE label on the devices it manufactures with no further involvement of a notified body. This policy is preferred by

most manufacturers of dental materials of class II (e.g., restorative materials and alloys).

For medical devices that contain pharmaceutically active agents (class III), a statement by the legal authority responsible for drugs is necessary during the conformity assessment.

The execution of *clinical studies* is regulated in a specific paragraph of the MDD. Each clinical study has to be registered with the appropriate agency, and a number of requirements (such as approval by an ethics committee) have to be met before such a study can be initiated. These regulations are meant to protect patients who participate in these studies.

The legal regulations of the MDD do not release dentists from their responsibility to inform patients independent of the manufacturer's interest and to define the indications for each individual case within the scope of the specifications set by the manufacturer.

Furthermore, a patient will most likely contact the dentist first if he or she has a problem with a material. In addition, it has been found in the past that various filling materials were labeled with CE (without clinical examination) but subsequently caused problems in patients (pain, tooth fractures). Therefore, if any doubt exists, one should not just rely on the CE label but should critically question the statements associated with the material's label.

If a medical device is not applied by the dentist according to the manufacturer's specifications (for example, use of an expired product or application of a product outside the range of indications), then this qualifies as malpractice. In this case, the injured person can claim compensation.

Since June 2007, the new European regulation on registration, evaluation, and authorization of chemicals (REACH) has been in force [10, 11, 12]. Its main purpose is a high level of protection of human health for consumers, workers, and the environment. It is directed at chemical elements and their compounds, preparations (mixtures or solutions composed of two or more substances), and articles (objects of special design) that mainly determines their functions. The responsibility for safe use lies with the manufacturer of the substances.

Manufacturers and importers of chemicals have until 2018 to use a stepwise approach to register with the European Chemicals Agency (ECHA) in Helsinki all new and currently available (presently, approximately 30,000 marketed substances) chemicals that have a production volume of >1 ton (1,000 kg) per year. Particularly dangerous substances must pass an authorization procedure.

Related legislation (such as that regarding product safety, construction products, and the health and safety of workers who handle chemicals) and other legislation that regulates chemicals (such as in cosmetics and detergents) are not replaced by REACH and will continue to apply. REACH has been designed not to overlap or conflict with other chemical legislation [3, 11].

Medical doctors, dentists and dental laboratories belong mainly to the group of "downstream users" as long as they do not synthesize chemicals themselves. For them, it is important that scenarios of chemical exposure in dentistry be addressed in the basic documents for the substances. Therefore, the manufacturers of such substances must declare that, for these substances, the exposure scenarios in dentistry have been taken into account. Information for the downstream user is provided by information such as the **safety data sheet**.

Safety data sheet are required also for dental materials (material safety data sheets - MSDS), and they can be requested from the manufacturer or obtained from the Internet (refer to the manufacturer's Web site). These data sheets are an important source of information concerning the components of a material and its biocompatibility. However, because this is a shortcut standard information format, other information sources, such as the scientific literature, are still necessary.

Labeling of a substance, preparation, or medical device (including dental materials) serves as a tool for risk communication from the manufacturer to the user. Within the EU, a labeling system for chemicals is laid down in directives 67/548/EEC (substances) [10] and 1999/45/EC (preparations) [12]. The latter regulation is obligatory in some EU countries (e.g., in Scandinavia) to be used for dental materials; in others, it is used by certain manufacturers. A central aspect of these regulations is the use of specific symbols to visualize risks. These symbols are placed on the device together with "R-phrases" to further specify the risk. "S-phrases" describe safety advices for the material. The formulations of these sentences are standardized and have to be selected by the manufacturer according to the directive's defined procedure.

If a dental material includes a danger label, the dentist should consult the safety data sheet for further information, especially concerning safety advice.

After about 10 years of effort, a new regulatory body was developed by the United Nations and adopted in 2003: the Globally Harmonized System of Classification and Labeling of Chemicals (GHS). The GHS will enter in the EU into force in 2008. It includes criteria for classifying health, physical, and environmental hazards, and it furthermore specifies which information should be included on labels of hazardous chemicals and on safety data sheets.

REFERENCES:

1. International Standard Organisation. ISO 13485:2003 - http://www.iso.org/iso/home/store/catalogue_tc/catalogue_detail.htm?csnumber=36786

2. Council Directive 93/42/ EEC of 14 June 1993 concerning medical devices. *Official Journal of the European Communities.* L 169, vol. 36:1–43 (12 July 1993); Directive 2001/83/EC, Regulation (EC) No 726/2004 - http://ec.europa.eu/health/human-use/legal-framework/index_en.htm

3. Commission Regulation (EU) No 895/2014 of 14 August 2014 amending Annex XIV to Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH).

4. Regulation (EC) No 1223/2009 of the European Parliament and of the Council of 30 November 2009 on cosmetic products (Text with EEA relevance). *Official Journal of the European Union.* L 342/59 (22 Dec 2009).

5. Directive 2007/47/EC of the European Parliament and of the Council of 5 September 2007 amending Council Directive 90/385/EEC on the approximation of the laws of the Member States relating to active implantable medical devices, Council Directive 93/42/EEC concerning medical devices and Directive 98/8/EC concerning the placing of biocidal products on the market. *Official Journal of the European Communities*. L 247, vol. 50 (21 Sep 2007)

6. Directive 98/79/EC of the European Parliament and of the Council of 27 October 1998 on in vitro diagnostic medical devices. *Official Journal of the European Communities*. L 331, vol. 41:1-37. (07 Dec 1998).

7. Revision of the medical device directives, 2013, Retrieved 15 June 2014, http://ec.europa.eu/health/medical-devices/documents/revision/index_en.htm

8. Schmalz G. Biological Evaluation of Medical Devices: A Review of EU Regulations, with Emphasis on In Vitro Screening for Biocompatibility. *ATLA*. 1995; 23:469-473.

9. Wachenhausen H. [Legal requirements for clinical testing.] [in German] *Medizinprodukte Journal*. 9, 80 (2002).

10. Council Directive 67/548 EEC on the approximation of laws, regulations and administrative provisions relating to the classification, packaging and labelling of dangerous substances. *Official Journal of the European Communities.* P 196, 1–98 (1967).

11. Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals Agency, amending Directive 1999/45/EC and repealing Council Regulation (EEC) No 793/93 and Commission Regulation (EC) No 1488/94 as well as Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC. *Official Journal of the European Union.* L 396, vol. 49/1 (30 Dec 2006).

12. Directive 1999/45/EC of the European Parliament and of the Council of 31 May 1999 concerning the approximation of the laws, regulations and administrative provisions of the Member States relating to the classification, packaging and labelling of dangerous preparations. http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:31999L0045

Please cite this article as: Yaneva-Deliverska M, Deliversky J, Lyapina M. BIOCOMPATIBILITY OF MEDICAL DEVICES – LEGAL REGULATIONS IN THE EUROPEAN UNION. *J of IMAB.* 2015 Jan-Mar;21(1):705-708.
DOI: http://dx.doi.org/10.5272/jimab.2015211.705

Received: 05/12/2014; Published online: 13/02/2015

Address for correspondence:
Mariela Yaneva-Deliverska
Legal Department, Military Medical Academy, Sofia,
3, St Georgy Sofiiski blvd., 1606 Sofia, Bulgaria
e-mail: yanevamariela@yahoo.com