Abstract  Since its inception the IAEA program in radiation and tissue banking supported the establishment of twenty five tissue banks in different countries. Now more than 103 tissue banks are now operating in these countries. The production of sterilized tissues has grown in an exponential mode within the IAEA program. From 1988 until the end of 2000 the production of sterilized tissues was 224,706 grafts, with an estimated value of at least $51,768,553 million dollars at the mean current charge rate in non-commercial banks in Europe and USA. During the period 1997–2002 several countries from Asia and the Pacific region produced more than 155,000 grafts, with an estimated value of about $36.7 million dollars. Training was considered to be one of the most important tasks to be supported. A total of 192 students were registered in the training program and 146 students graduated with a University Diploma. For many developing countries an additional benefit is not having to import expensive sterilized tissues from developed countries, but the exposure of orthopedic and plastic surgeons working, to new methods of using allografts in specific surgical treatments.

Introduction

An appropriate and on time transplant of tissues for persons suffering serious burns and subject to medical treatment, or who require certain orthopedic or plastic surgery, or are suffering other serious diseases, could not only in certain cases save their own lives but might have an important impact in the quality of their future existence. The benefits of these transplants of tissues can reach millions of persons in many countries of the world, if appropriate facilities for the processing and sterilized human and/or animal tissues are available in these countries.

Initially, to carry out such transplantation of tissues in developed countries, the patient’s own tissues (autografts) were used. However, now, most of the countries are also using tissues of human or animal origin (allograft). This new type of transplant has been developed in recent years and now a significant number of facilities in many countries are preparing this type of tissues with high quality to be used in certain specialized medical treatments, in accordance with their national norms and regulations. This type of facility, commonly called “tissue banks”, are
medical facilities that acquire, process, store and distribute different types of human and/or animal tissues, with the purpose to use it in certain medical treatments, including orthopedic and plastic surgeries. These tissue banks are now available in many countries in Asia and the Pacific, in Latin America, in Europe and in North America.

Each country should specify the appropriate method to be used to recover and to donate human and/or animal tissues, how these tissues should be processed in its tissue banks and under which conditions the processed tissues can be used in public or private medical facilities. Before the processed tissues can be used in patients, the tissue bank should ensure that the donor’s clinical histories have been rigorously revised and the necessary serological as well as any other medical tests required by the corresponding national health authorities have been carried out. The purpose of these tasks is to guarantee that the tissues do not carry any type of infection that can be transmitted to the recipient. In other words the tissue should be free of viral and bacterial contamination.

The IAEA, within the framework of its program on tissue banking, has elaborated a document titled “IAEA International Standards for Tissue Banking”, in which the minimum requirements and the appropriate procedures that should be applied in the operation of the tissue banks are clearly defined. The purpose of these Standards is to ensure the correct sterilization of the tissues obtained from different donors. The IAEA Standards has been elaborated keeping in mind the best international practices in this field, as already applied in many countries. A brief description of the content of the IAEA Standards has been included in this document.

Before applying the IAEA Standards in a tissue bank the following questions should be properly answered: (a) How to ensure the correct sterilization of tissues for their use in specific medical treatments in certain patient? (b) Which are the tissue sterilization methods most commonly used in different countries, to ensure that the tissues transplanted to the patient are free of viral contamination? In the IAEA Standards at least eight different types of tissue sterilization methods used in different tissue banks now operating in many countries are described. However, in the framework of the IAEA program, the radiation sterilization method is considered to be the most appropriate and secure tissue sterilization technique when used under specific conditions which must be observed in all situations.

To ensure the appropriate and safe use of the radiation sterilization technique for the sterilization of tissues the IAEA, within the framework of its program on tissue banking, drew up the document entitled “IAEA Code of Practice for the Radiation Sterilization of Tissues Allografts: Requirements for Validation and Routine Control”. In this Code of Practice all the important elements which should be observed by tissue banks operators to ensure the safe use of the radiation sterilization technique are included. A brief description of the content of the IAEA Code of Practice is included in this document.

Due to quality and cost reasons the ionizing radiation technique is now used increasingly in a growing number of tissue banks in many countries in all geographical regions, with the purpose to sterilize human and/or animals tissues for their safe use in specific medical treatments. Thanks to the IAEA Technical Cooperation Program, this organization has been able to provide important assistance to national atomic energy agencies and to national health authorities in many of its developing Member States, with regard to the safe and effective use of the ionizing radiations technique for the sterilization of tissues.

Bearing in mind the initial methods under which some tissues were sterilized and the uses in specific medical treatment a simple question become evident. Which are the reasons for the explosion in the establishment and development of tissue banks in many countries in so short period of time? The answer in general depends on the type of country which is used as reference. In the case of developed countries, as well as in some developing countries, the establishment and development of tissue banks has been a consequence of the promotion and evolution of important health programs supported by the respective governments and the private sector, with the purpose to improve the medical attention...