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GENERAL INFORMATION

Skin and tissue bank: Operational model for the recovery and preservation of tissues and skin allografts☆

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Abstract Tissue storage is a medical process that is in the regulation and homogenisation phase in the scientific world.

The international standards require the need to ensure safety and efficacy of human allografts such as skin and other tissues. The activities of skin and tissues banks currently involve their recovery, processing, storage and distribution, which are positively correlated with technological and scientific advances present in current biomedical sciences.

A description is presented of the operational model of Skin and Tissue Bank at Instituto Nacional de Rehabilitación as successful case for procurement, recovery and preservation of skin and tissues for therapeutic uses, with high safety and biological quality. The essential and standard guidelines are presented as keystones for a tissue recovery programme based on scientific evidence, and within an ethical and legal framework, as well as to propose a model for complete overview of the donation of tissues and organ programmes in Mexico. Finally, it concludes with essential proposals for improving the efficacy of transplantation of organs and tissue programmes.

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PALABRAS CLAVE
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Banco de piel y tejidos: un modelo operativo para la recuperación y preservación de aloinjertos de piel y tejidos

Resumen El almacenamiento de tejido es un proceso médico en fase de regulación y homogenización científica en el mundo. Los estándares internacionales exigen garantizar la seguridad y la eficacia de los aloinjertos humanos como piel y otros tejidos. En la actualidad las actividades de los bancos de piel y tejidos involucran la recuperación, procesamiento, almacenamiento y distribución como proceso de desarrollo, que se correlaciona positivamente con los avances tecnológicos y científicos presentes en las ciencias biomédicas actuales.

Se describe el modelo instaurado por el Banco de Piel y de Tejidos del Instituto Nacional de Rehabilitación como un caso exitoso para la procuración, recuperación y preservación de piel con fines terapéuticos, alta seguridad sanitaria y elevada calidad biológica. Se discuten los fundamentos y estándares empleados en el programa actual de recuperación de tejidos con base en la evidencia científica disponible, el contexto ético y el marco jurídico vigente de la donación de tejidos en México. Se concluye con algunas propuestas para mejorar la eficacia de los programas de trasplantes.

Background

Although several primitive attempts to carry out transplants were rudimentarily described almost 2500 years ago, in the so-called ''Sutrasthanam manuscripts'',[1] where they appeared as an incipient surgical procedure against the damage caused to the bodies of soldiers, it was not until the beginning of the 20th century that the first documented processes were reported regarding the use of tissues preserved at low temperatures over several days and subsequently replanted into the same donor.[2]

The Luyet[3] and Webster[4] studies documented freezing as an effective method for the temporary preservation of tissues. In accordance with Wright et al.[5] Falt and Marragonni reported the first storage procedures of skin from dead bodies using solutions supplemented with 10% serum as a preserving agent.[5,6] All these steps led to the creation of a new type of establishment from the end of the 1980s, equipped to store skin and other tissues. These installations were latterly known by their generic name as ''skin banks''.

The use of human allografts is closely related to the development of different methods for the preservation of tissues (Table 1). These strategies are designed to integrate tissue recovery procedures which seek: (1) cellular viability maintenance[7]; (2) the preservation of proteins[8]; (3) the presence of growth factors such as: the epidermal growth factors, the vascular endothelial growth factor, the transforming growth factor beta and pro-inflammatory cytokines (Il-2, Il-6, Il-10 TNF-α alfa); and (4) the complete integrity of tissues. All these factors focus on generating biological products of high quality, with top health safety and of extreme therapeutic value.[9]

The procurement and preservation of tissues is a rapidly and increasingly developed activity which is positively correlated with technological and scientific advances present in biomedical sciences during the 20th century. Furthermore, demand for allografts for therapeutic reasons is projected to increase considerably as a result of the increase in life expectancy and its concomitant increase in chronic degenerative diseases. The design of successful institutional strategies capable of promoting donation activities and tissue retrieval[10–12] has therefore become imperative.

The aim of our study consisted of describing the current panorama of tissue retrieval and storage with the design of a prototype institutional model authorised by the Banco de Piel y de Tejidos del Instituto Nacional de Rehabilitación (INR) for retrieval and storage of high therapeutic value,

Table 1 Methods for tissue preservation for transplant uses.

Tissue type	Preservation method
Bone	Gamma radiation, lyophilisation, BR/C, chemical disinfection
Cartilage	Gamma radiation, BR/C
Tendon	Gamma radiation, BR/C, chemical disinfection
Cardiovascular tissue (arteries, veins and cardiac valves)	Chemical disinfection, BR/C
Eye tissue (cornea, sclera)	BR/chemical disinfection
Skin and dermis	Gamma radiation, lyophilisation, BR/C, decellularisation and chemical disinfection
Foetal tissues, amnions	Gamma radiation, lyophilisation, BR/C
Bone marrow	Cryopreservation
Blood and blood products	Chemical inactivation and controlled refrigeration
Germ cells	Cryopreservation

BR/C, biological recovery and cryopreservation.