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VALORIZATION OF RABBIT SKIN FOR THE DEVELOPMENT OF DECELLULARIZED MATRICES FOR BURN WOUND REGENERATION

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Caught in the middle of the transition to a circular economy and emergent call for sustainable solutions, the agro-food industry is undoubtedly a sector that needs action. With a significant generation of by-products, the search for reuse methods to reduce its environmental impact while enhancing its economic value is necessary.

The utilization of animal tissue by-products, namely skin, emerges as a promising opportunity in the biomedical field, particularly for the development of decellularized dermal matrices (dDMs).

With burns affecting 11 million people globally annually, advanced solutions like dDMs are crucial. These have revolutionized burn wound care, offering plenty of advantages compared to traditional autologous and synthetic-based treatments.

This project represents a unique opportunity for valorizing rabbit skin for biomedical applications, being a valuable and abundant by-product of the world-leader felting company Cortadoria Nacional de Pêlo, S.A.

Rabbit skin by-products were processed at Cortadoria Nacional de Pêlo S.A., following a set of pioneer methodologies involving chemical, enzymatic, and mechanical processing. The obtained purified rabbit dermis was further processed through selected chemical decellularization agents (SDS and SDC) with varying exposure periods, to achieve a fast and complete decellularization process with a minimum impact on dermal matrices' microarchitecture, mechanical properties, and biochemical composition.

The impact of processing methods and decellularization agents on rabbit dermal matrix (dRDM) preservation was assessed via SEM, swelling properties, and tensile behavior. Histology and DNA quantification confirmed decellularization effectiveness, while *in vitro* tests with human dermal fibroblasts demonstrated cytocompatibility. The matrix showed pH-responsive properties, with distinct surface characteristics that vary depending on decellularization agents and time. Mechanical tests showed effects on collagen and elastin contribution to the ECM, but overall matrix integrity was mantained. This study marks the first successful use of clean chemical methods for rabbit dermis decellularization, producing high-quality matrices for skin regeneration.

Keywords: Decellularized rabbit dermis; Skin regeneration; Burn wounds

Short bio:
Marta Rosadas holds a BSc in Bioengineering and an MSc in Biomedical Engineering from the Escola Superior de Biotecnologia, Universidade Católica Portuguesa. Currently pursuing her PhD in Biotechnology at the same institution, her research focuses on developing innovative tissue engineering solutions, particularly in the field of skin regeneration. Marta is dedicated to valorizing by-products from the agro-food and textile industries, transforming them into high-value biomaterials for medical applications. With a strong foundation in both engineering and biotechnology, she aims to create sustainable, cutting-edge solutions that bridge environmental sustainability with biomedical advancements.