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HLA Awareness in tissue decellularization: A paradigm shift for enhanced biocompatibility, studied on the model of the human fascia lata graft

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Abstract
Last twenties, tissue engineering has rapidly advanced to address the shortage of organ donors. Decellularization techniques have been developed to mitigate immune rejection and alloresponse in transplantation. However, a clear definition of effective decellularization remains elusive. This study compares various decellularization protocols using the human fascia lata model. Morphological, structural and cytotoxicity/viability analyses indicated that all the five tested protocols were equivalent and met Crapo's criteria for successful decellularization. Interestingly, only the in vivo immunization test on rats revealed differences. Only one protocol exhibited Human Leucocyte Antigen (HLA) content below 1% residual threshold, the only criterion preventing rat immunization with an absence of rat anti-human IgG switch after one month (N=4 donors for each of the 7 groups, added by negative and positive controls, n=28). By respecting a refined set of criteria, i.e. lack of visible nuclear material, <50ng DNA/mg dry weight of extracellular matrix, and <1% residual HLA content, the potential for adverse host reactions can be drastically reduced. In conclusion, this study emphasizes the importance of considering not only nuclear components but also major histocompatibility complex in decellularization protocols and proposes new guidelines to promote safer clinical development and use of bioengineered scaffolds. © 2024 Elsevier Ltd

Author Keywords
Criteria of decellularization; Decellularization; Human Leucocyte antigen; Immunization; Major histocompatibility complex; Rejection

Index Keywords
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