

Evaluation of Bone Tissue Decalcification Methods for Use in Tissue Engineering Research

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Abstract

Developing tissue engineering implants to treat severe bone injuries requires studies using large animal model systems, such as swine, before human clinical trials can be considered. Use of large animals for bone tissue studies is complicated by the need to use harsh chemical agents to decalcify the bone. To take full advantage of modern, commonly used histological techniques for data generation, the bone must be decalcified in order to soften it enough so that it can be sectioned. However, prolonged or improper exposure to harsh chemical decalcification agents can destroy the tissue and make it useless for data gathering. The goal of this work is to determine which, decalcifying agent treatment gives the best combination of sectioning, histochemical staining, and immunostaining competence in swine radius bone specimens. The three decalcification agents we investigated were trifluoroacetic acid (TFA), CalciClear Rapid, and Nitric Acid (HNO_3). These findings will help us to develop better experiments using swine as a model for bone tissues engineering.