

Project 1

Development of functionalized human oral mucosa substitutes with enhanced capabilities for the treatment of complex pathologies of the oral cavity.

Synopsis/Abstract (max 800 words)

This project is focused on the generation of novel human oral mucosa substitutes with increased potential, that can be used to treat complex conditions affecting the oral cavity, such as oral cancer or orofacial clefts, among others. These conditions represent important clinical challenges, due to the limitations associated with the use of autologous grafts, which currently constitute the gold standard treatment in oral and maxillofacial surgery. To this end, the project aims to respond to several objectives: 1) Improve the current model of human artificial oral mucosa using advanced functionalization methods using blue bioactive biomaterials (of natural origin and sustainable nature), to generate more biomimetic oral mucosa substitutes; 2) Optimize the current oral mucosa model through functionalization with osteoactive particles to increase its biocompatibility in bone regions of the oral cavity; 3) Optimize the current oral mucosa model through functionalization with bioactive provasculogenic molecules to generate tissue substitutes with a higher biointegration rates; 4) Characterize the new improved models of human oral mucosa both ex vivo and in vivo; 5) Analyze the translational potential of the new models of human artificial oral mucosa as advanced therapy products, in accordance with the requirements of the Spanish Agency for Medicines and Health Products (AEMPS).

Objectives

1. Tissue engineering applied to oral mucosa regeneration: Development of functionalized three-dimensional models for the reconstruction of tissue defects in the oral cavity.
2. Biomaterials and bioactive scaffolds: Evaluation of new biomimetic structures that promote cell proliferation and differentiation for use in oral mucosa tissue engineering.
3. Histological and molecular characterization of in vitro generated tissues: Analysis of the viability, functionality, and compatibility of developed models for future application in patients.
4. Clinical applications of regenerative medicine in dentistry: Development of innovative therapeutic strategies based on tissue regeneration for the treatment of complex oral pathologies.
5. Preclinical models and in vivo validation: Implementation of trials in animal models to assess the efficacy and safety of generated tissues before their clinical translation.
6. Clinical translation: Manufacturing as a medicinal product in GMP-compliant facilities, clinical trials in advanced therapies, biosafety analysis, and clinical efficacy assessment.

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Proposed collaboration within ArchiFun network (not mandatory at this stage):

Proposed list of secondments (not mandatory, but recommended if known already):



Main ArchiFun theme involved

Host-pathogen interactions

Mechanisms of bacterial resistance and cancer onsets;

Neurodegenerative and autoimmune diseases;

- Translational research in prevalent diseases;

Physiology and ecology;

Neurosciences and cognition.

