Title Page

Title: "Development and Characterization of Novel β-TCP Reinforced Nanocomposite Scaffold from Human Placental Chorionic Membrane for Guided Tissue and Bone Regeneration."

Presenting Author:

1. **Dr. K. Rachel Sarah Vinodhini** [a]
   [a] Department of Dental Materials, Manipal College of Dental Sciences, Mangalore, Affiliated to Manipal Academy of Higher Education, Manipal, Karnataka, India.
   Email: rachel.vinodhini@learner.manipal.edu

Co-authors:

2. **Dr. Prashanthi S Madhyastha** [a]
   [a] Department of Dental Materials, Manipal College of Dental Sciences, Mangalore, Affiliated to Manipal Academy of Higher Education, Manipal, Karnataka, India.
   Email: prashanthi.madhyast@manipal.edu
3. **Dr. Bhisham Narayan Singh**[b]
   [b]Department of Ageing Research, Manipal School of Life Sciences, Affiliated to Manipal Academy of Higher Education, Manipal, Karnataka, India.
   Email: bhisham.singh@manipal.edu
4. **Dr. Rajalakshmanan Eswaramoorthy**[c]
   [c] Department of Biomaterials, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai, India
   Email: rajalakshmanan.e@gmail.com
5. **Dr. Manjunath Pattabhi**[d]
   [d] Dean, Faculty of Science & Technology
   Mangalore University, Mangalagangothri- 574199.
   Karnataka India.
   Email: manjupattabi@yahoo.com
6. **Dr. Suprajna Shetty**[e]
   [e]Department of Obstetrics and Gynaecology, Kasturba Medical College, Mangalore, Karnataka, India.
   Email: suprajna.shetty@manipal.edu
7. **Ms. Ankitha Suresh**[b]
   [b]Department of Ageing Research, Manipal School of Life Sciences, Affiliated to Manipal Academy of Higher Education, Manipal, Karnataka, India.
   Email: ankitha1998s@gmail.com

"DEVELOPMENT AND CHARACTERIZATION OF NOVEL B-TCP REINFORCED NANOCOMPOSITE SCAFFOLD FROM HUMAN PLACENTAL CHORIONIC MEMBRANE FOR GUIDED TISSUE AND BONE REGENERATION."

Abstract

Introduction:

Human placental membranes have high bioavailability and offer excellent regenerative properties. They have been widely used in various fields of medicine from treating corneal ulcerations to wound closures and even periodontal Guided Tissue Regeneration (GTR) and Guided Bone Regeneration (GBR). Despite their bioactivity and regenerative capacity, these biomaterials have the limitations of having low mechanical properties which can be modified by reinforcing them with fillers including nanoparticles because of their size-dependent properties. Beta–Tricalcium Phosphate (β-TCP) is a bioceramic known for its bioactivity in terms of osteoconductivity and higher resorbability enabling a faster turnaround time in the regeneration process. The present work involves the development of a novel nanocomposite membrane with enhanced properties from the chorionic membrane of the human placenta as the organic phase and the β-TCP nanoparticles (β-TCP NP) as the inorganic phase.

Aims and Objectives:

The present study aims to develop and characterize a novel nanocomposite barrier membrane scaffold with superior properties from human placental chorionic membrane reinforced with β-TCP NP.

Methodology:

Human placental membranes were collected from pre-screened consented donors who were posted for elective caesarean. The chorionic membrane was separated from the amniotic membrane and was processed separately. The membranes were subjected to the process of decellularization using 0.5% and 0.1% Sodium Dodecyl Sulphate (SDS), 1.5% Triton X 100 and DNase I enzyme. Following decellularization the membranes were subjected to lyophilization, pulverization and solubilization. Scaffolds were fabricated with the solubilized matrices through casting and lyophilization at 10mg/ml, 20mg/ml, 30mg/ml and 40mg/ml concentrations and cross-linked. Characterization of the scaffolds was done (morphological, physicochemical and mechanical) and the best concentration was selected as the control chorion (CC) for the incorporation of β-TCP nanoparticles at concentrations of 1 wt%, 2.5 wt% and 5 wt%. The newly fabricated nanocomposite scaffolds were then subjected to SEM, EDS, XRD, FTIR and Tensile testing.

Results and Conclusions:

The study is ongoing, and results are awaited. The discussion will be included in the full-length paper.

Keywords: Placental membranes, Periodontal, Regeneration, Guided Tissue Regeneration, Guided Bone Regeneration, Nanoparticles, β-TCP