CHARACTERIZATION OF NANOCRYSTALLINE CALCIUM PHOSPHATE PRODUCED BY TWO METHODS TO BE USED IN AN OSTEO-ODONTO-KERATO PROSTHESIS.

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Nanocrystalline calcium phosphate (Ncp) is currently used in the process of fabrication of Osteo-odonto-Keratoprosthesis. These nanoparticles have to present high crystallinity, bioactivity, biocompatibility, tissue osteoconductivity and direct binding to the tissue, qualities that are similar to those properties in root tooth. In this work, we present the physical and chemical parameters for manufacturing Ncp by two synthesis methods, precipitation and hydrothermal.

The precipitation method has the following variables: pH, temperature, stirring time, settles time and thermal treatment. Polyethylene glycol (PEG) is used as solvent and cetyl trimethyl ammonium bromide (CTAB) as a cationic screen in order to control and standardize the nucleation and crystal growth which are considered to have an effect in the synthesis and crystallinity of the Ncp.

The hydrothermal method has the following variables: pH, temperature, heat treatment and injection speed. The whole process was conducted in a continuous flow tubular reactor.

Ncp characterization was developed using X-Ray Diffraction (XRD), Energy Dispersive Spectroscopy (EDS), Fourier Transform Infrared Spectroscopy (FTIR), Transmission Electron Microscopy (TEM) and Scanning Electron Microscopy (SEM). The hydrothermal method was used as a synthesis route for Npc and offered better results, since these particles are similar to human tooth root. In this method the Fcn have rod shape with length between 50 and 70 nm and Ca/P ratio between 1.5 and 1.61 which are in the range of the tooth root. However the Ncp obtained by precipitation showed nanoparticles and nanofibers with a diameter between 20-25 nm and length nanofibers between 250 nm and 1 µm and 5 nm to 10 nm diameter with a Ca/P ratio between 1.65 and 1.67.

Keywords: Nanocrystalline calcium phosphate (Ncp), root-tooth, odonto-keratoprosthesis

References:

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