
Physical and chemical characterization of bone regeneration materials based on TCP

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Clin. Oral Impl. Res. Vol. 16, 4, 2005

The purpose of this study was to determine basic physical and chemical properties including phase purity of bone regeneration materials based on b-tri calcium phosphate.

Three commercially available materials were investigated: BioResorb (B) (Oraltronic, Germany), Cerasorb (C) (Curasan, Germany) and Poresorb-TCP (P) (Lasak, Czech Republic). X-ray diffraction was used to determine the phase composition. The chemical composition was analyzed by X-ray fluorescence analysis. The microstructure was observed by scanning electron microscope. Specific surface area and porosity was determined by krypton adsorption (BET) and mercury porosimetry. Changes of pH values during exposure in a static physiological solution at $37\pm 0.5^\circ\text{C}$ were evaluated.

X-rays diffraction detected β -tri calcium phosphate as a single crystalline phase in samples C and P. Two phases – a and b-tri calcium phosphate were detected in the sample B. Based on the chemical composition analysis the theoretical

phase purity was calculated to 99.4% and 99.0% in the C and P sample. Specific surface area of samples B, P and C was 0.78, 0.18 and 0.17 [$\text{m}^2\cdot\text{g}^{-1}$] respectively. Total porosity was 60% (B), 35% (P) and 30% (C). The change in pH value during the interaction with solution was 1.4 and 1.2 in case of P and C samples respectively and significantly higher pH increase (2.9) was detected in sample B.

Single crystalline phase was detected in two of three samples evaluated. The presence of more reactive α -TCP phase in the third sample could cause the higher pH increase after the exposure in solution.

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