Adsorption and release of strontium from hydroxyapatite crystals developed in Simulated Body Fluid (SBF) on poly (2-hydroxyethyl) methacrylate substrates

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Résumé en anglais	Poly (2-hydroxy ethyl) methacrylate (PHEMA) is a polymer that can be carboxymethylated to induce calcification at on its surface. This mimics the calcification of bone matrix since the polymer surface induces the deposit of large hydroxyapatite calcospherites. We investigated the effect of Sr2+ on hydroxyapatite crystals developed on PHEMA pellets. Pellets were incubated for 1 week in a synthetic body fluid (SBF) to induce mineralization, then 2 weeks in SBF containing 0, 130, 260 or 390 µM of Sr2+ allowing growth and maturation of calcospherites. Calcospherites were dissolved in HCl and Ca2+, PO43- and Sr2+ content was measured. Sr2+ release was assessed by transferring other pellets in saline which was collected at regular intervals to measure Sr2+ release. Hydroxyapatite was characterized by SEM, X-ray diffraction, FTIR and Raman microspectroscopy. After the maturation period, Sr2+ was incorporated into hydroxyapatite crystals as a function of its concentration in SBF. However, size of the calcospherites decreased as a function of the strontium concentration. During the release phase, the slope of Sr2+ elution was progressive and similar independently of the initial concentration; ~30% Sr2+ was released after 61 days. XRD showed that incorporation of Sr2+ produced no significant change in crystal lattice parameters or cristallinity. A progressive release of Sr2+occurred from the crystals. Strontium can adsorb rapidly on hydroxyapatite crystals and can be released easily. Carboxymethylated PHEMA can be used to study the effect of chemical compounds on the growth of hydroxyapatite nodules and their release in a second time.
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