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In vitro degradation of a poly(propylene fumarate)-based composite material

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We investigated the *in vitro* degradation of a novel degradable polymeric composite material being developed to function as a temporary replacement for trabecular bone. This material is based on a mixture of poly(propylene fumarate) cross-linked by *N*-vinyl pyrrolidone and includes sodium chloride and β -tricalcium phosphate. Using an *in vitro* test in simulated body fluids, the compressive strengths and compressive moduli of two composite materials increased with degradation time and remained above the minimum values acceptable for trabecular bone substitutes. A compressive strength of 21.3 ($\hat{\pm}$ 0.4) MPa and a compressive modulus of 696 ($\hat{\pm}$ 53) MPa were measured after twelve weeks for a composite material with initial strength of 18.0 ($\hat{\pm}$ 4.6) MPa and initial modulus of 113 ($\hat{\pm}$ 40) MPa. This unexpected phenomenon may prove to be useful for orthopaedic applications.



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Keywords

Poly(propylene fumarate); degradable polymers; composite materials; bone substitutes; β -tricalcium phosphate

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