Biostable porous material comprising composite biopolymers

Biomaterials like collagen can be designed for use as scaffolds for connective tissue reconstruction. It is known that proteins conjugated with PEGs exhibit a decrease in their biodegradation rate and their immunogenicity. Different concentrations and molecular weights of PEGs (PEG-750 and PEG-5000) were conjugated by chemical or irradiation means to collagen materials (films or sponges) which were then investigated by physicochemical assays, collagenase assay, fibroblast cell culture and subcutaneous implantation.

PEG-conjugation delayed the degradation by collagenase and preserved a normal fibroblasts morphology and confluency in culture. In vivo, the porous structure of non-modified sponges was collapsed by day 15 with few observable fibroblasts between the collagen fibers. In PEG-modified collagen sponges, the porous structure remained stable for at least 30 days. Cell infiltration was particularly enhanced in PEG-750-conjugated collagen sponges.

In conclusion, PEGs conjugated onto collagen sponges stabilize the porous structure without deactivating the biological properties of collagen. These porous composite materials could advantageously function as a scaffold to organize tissue ingrowth. Therefore, the present invention relates to a porous biomaterial whose porosity is stabilized by conjugation to PEG-derivatives. Biopolymers other than collagen may be used in the making of such composite materials.