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UNIVERSITAT POLITÈCNICA DE CATALUNYA

Biopolymer-containing calcium phosphate foam for bone regeneration

A new calcium phosphate foam with open pore macroporosity useful for bone regeneration and drug release has been patented and developed. Partners to further develop the technology and/or to establish commercial agreements along with technical cooperation are sought.

The Challenge

Hidroxyapatyte is a natural mineral found in teeth and bones. It is commonly used as a filler to regenerate bone or as a coating to promote bone growth. The application of calcium phosphate cements, which can form hydoxyapatite, in the treatment of bone defects, begun more than two decades ago and many formulations have been developed so far.

The ideal bone replacing cement should be osteoconductive and osteoinductive, to stimulate bone regeneration. Moreover, it should be resorbable and gradually replaced by newly formed bone. Although most of the developed calcium phosphate cements are more resorbable than sintered hydroxypatite ceramics, they still show relatively slow resorption kinetics and in many cases the cement remains stable in the implanted site during years. The absence of interconnected macropores is indeed a limiting factor to achieve resorption. If the designed material has macropores, cells can colonize it and the access of osteoclasts is facilitated increasing the rate of healing of the bone defect.

The Technology

The present invention allows to obtain a composite calcium phosphate foam by combining solutions of biopolymers with foaming properties with calcium phosphate powders. An excellent open pore macroporosity is achieved upon and following implantation by injection. The final mixture has the ability to set through a cementitious reaction in the biological environment of the body. Gelatine, sodium alginate and/or soybean derived polymers can be used as foaming agents and/or foam stabilisers and as injectability promoters for a calcium phosphate cement.

Innovative advantages

- Can be easily injected
- Very stable
- Can be prepared quickly and efficiently under conditions which neither require special environment.
- Able to set in a physiological environment.
- Highly interconnected macroporous network, together with micro and nanopores.
- Improved degradation rate in vivo due to the elevated porosity
- Superior bone regeneration potential
- Bioactivity and excellent osteoconducivity

Current stage of development

The material has been characterised in terms of chemical, mechanical and biological properties, both in vitro and in vivo.

Applications and Target Market

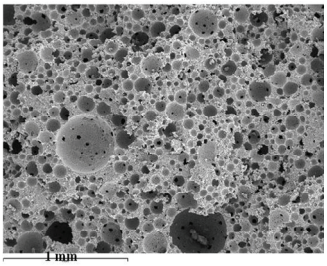
This technology allows to obtain a new material useful for bone regeneration and as scaffold for bone tissue engineering. It could also be used

- for sustaining the controlled release of active agents such as soy isoflavones in bony tissues to prevent bone loss in menopause.
- It could be of interest for biomaterials Research and Development companies.

Reference number

MKT2011/0028_H

New macroporous and easily injectable biomaterial with better rates of bone healing.



This new method allows to obtain a cement providing high interconnected macroporous network.

Soy-containing cement can release soy isoflavones locally and help preventing bone loss in menopause.

Business Opportunity

Technology available for licensing with technical cooperation

Patent Status

European patent priority application

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