Mineralization Scaffolds for Hard Tissue Regeneration (BGN)

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There are various conditions in which enhanced bone formation is required to prevent continuing deterioration and damage. The most apparent are bone fractures or bone deficiency, where it would be desirable to stimulate bone growth and to accelerate and complete bone repair. In spite of the enormous efforts to develop an effective, low cost, easy to use and safe bone substitutes, current treatments are dissatisfying regarding success rates, high morbidity and high rehabilitation expenses. Osteoporosis, which affects 20 million people in the US only, is also characterized by deterioration of bone tissue, leading to increased bone fragility and a consequently to increased fracture risk.

The Technology

We have developed novel 3D multifunctional peptide template matrices (PTM) in the form of hydrogels which act as bio-mimetic scaffolds for hydroxylapetite formation and bone tissue regeneration. These matrices accelerate bone formation by actively promoting hydroxylapetite formation in a manner which is cell independent as well as boost osteogenic cell binding and proliferation. Our de-novo bone repair PTM were developed using an interdisciplinary approach that combines rational peptide designing with profound understanding of the hydroxylapetite bio-mineralization and bone formation mechanisms.

Applications

Revolutionary local treatment for osteoporosis
Injectable bone regenerating scaffold and local drug delivery system
Upgrade of commercially available bone substitutes.

Advantages

Accelerate bone formation
Can be easily combined with various state of the art complementary products
Injectable, safe, easy to produce synthetic compounds, which mimic natural regenerative mechanisms.

Development Stage

Methodology for hydrogel formation at physiologically relevant conditions was developed.
Cell free hydroxylapetite nucleation was induced on peptide assemblies in 3D hydrogels
Hydrogels were shown to support adhesion and proliferation of osteogenic cells.
Hydrogels were shown to be safe in acute toxicity tests.
In vivo experiment in small animal models are in progress.

Patent Status

Patent Pending

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