Gum Arabic Modified Chitosan Nanocomposites (GAMCNs) Variable Resorption

TreMonti

Method of producing nanocomposite bioresorbable materials that have applications in orthopedics and tissue engineering.

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Field
Tissue Engineering

Technology
Biomedical Engineering

Stage of Development
Based on the patent disclosure, the inventor has demonstrated that these nanocomposites do have differing degrees of resorbability. The inventor next wants to develop a bioactivity metric that would be predictive of the performance of GAMCNs *in vivo.*

Status
Seeking development & licensing partner.

TECHNOLOGY OVERVIEW

This invention developed at the Catholic University of America (CUA), describes a method of producing nanocomposite bioresorbable materials that have applications in orthopedics and tissue engineering. The use of the gum Arabic-chitosan composite with hydroxyapatite provides the ability to control the rate of resorption while still having a material that can function as a bone graft substitute. These nanocomposites should exhibit good osteoconductive properties and may in fact possess material properties closer to natural bone than pure calcium phosphate or silica-calcium phosphate bone graft substitutes, which are in general relatively brittle materials with reasonable uniaxial compressive strength but poor fracture toughness and low ductility. This invention may also show some osteoinductive capability, due to the ability of the GAMCNs to potentially bind proteins and peptides. This would also bode well for the use of GAMCNs for more advanced tissue engineering applications.

POTENTIAL FIELDS OF USE

GAMCNs should compliment or replace current bone graft substitute products such as calcium phosphate, calcium sulfate, silica-calcium phosphate, or hydroxyapatite ($CaPO_4$ or HA). The need for bone graft substitute products is expected to increase dramatically as the population ages and fracture incidence rises. A product with variable resorption should help to differentiate a company's product line in a crowded market.

BENEFIT ANALYSIS

GAMCNs can be manufactured with different resorption rates, creating bone filler material specific to the need. For instance they can be manufactured with short resorption rates for distal radial fractures and long resorption rates for spinal fusion applications. The ductility of GAMCNs should more closely mimic the physical properties of natural bone material than $CaPO_4$ and HA materials currently on the market. GAMC's also facilitate nucleation of HA and protein binding, and may have bioactivity superior to current bone graft substitutes.

STAGE OF DEVELOPMENT

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FUTURE DEVELOPMENT

There is a need to fully characterize the mechanical properties of the GAMCNs

LICENSING OPPORTUNITIES

The patent application for this technology has been filed. CUA is seeking a development and licensing partner.

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INVENTOR

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Ph.D., Ceramic Science and Engineering, Rutgers University, 1995
M.Sc.., Ceramic Science and Engineering, Rutgers University, 1991
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Biography in Brief:
Prior to joining the faculty at CUA, Otto Wilson was an assistant professor in the Department of Materials Science and Nuclear Engineering at the University of Maryland and brings a strong background in research and teaching. Wilson's research is in the areas of biomaterials, hard tissue engineering, biomimetics, nanocomposites, interfacial chemistry of hyroxyapatite, and microwave processing of ceramic materials.