Nanoparticulate Mineralized Collagen Glycosaminoglycan Scaffold With An Anti-Resorption Factor

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SUMMARY

Researchers in the Division of Plastic and Reconstructive Surgery at the UCLA David Geffen School of Medicine and the Institute of Genomic Biology at the University of Illinois Urbana Champaign (UIUC) have developed novel methods to incorporate anti-resorption factor into nanoparticulate mineralized collagen glycosaminoglycan scaffold to maximize bone regeneration.

BACKGROUND

Skeletal regenerative medicine addresses the current limitations for treating large osseous defects secondary to congenital, traumatic, and post-oncologic conditions. The current state of the art for bone replacement is either autologous bone grafting, or bone tissue engineering. Autologous bone grafting is limited by the donor site morbidity and the limited availability of autologous bone, which have resulted in the development of various alloplastic implants and usage of recombinant growth factors. However, complicated wounds such as radiated tissues or composite tissue deficiencies are likely to experience alloplastic implant failure from extrusion, infection, and other complications caused by growth factors use. Thus, there is an urgent need for a universal solution to clinically minimize or eliminate the reliance on artificial implants and growth factors.

INNOVATION

Researchers at UCLA and UIUC have previously discovered a mineralized collagen glycosaminoglycan material that is able to induce robust osteogenesis without growth factor stimulation or addition of stem cells. A novel method is proposed to incorporate an anti-resorption factor to this scaffold in order to augment bone regeneration by a temporary blockade of osteoclast activation.

APPLICATIONS

Bone regeneration

ADVANTAGES

This novel method is based on a biomaterial and an inhibitory factor rather than a growth factor.

STATE OF DEVELOPMENT

Have completed proof of concept experiments.

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Published Application	20210052771	02/25/2021	2018-585

RELATED MATERIALS

- Ren, X., Bischoff, D., Weisgerber, D.W., Lewis, M.S., Tu, V., Yamaguchi, D.T., Miller, T.A., Harley, B.A. and Lee, J.C., Osteogenesis on nanoparticulate mineralized collagen scaffolds via autogenous activation of the canonical BMP receptor signaling pathway, Biomaterials, 2015.
- Maxhimer, J.B., Bradley, J.P. and Lee, J.C., Signaling pathways in osteogenesis and osteoclastogenesis: Lessons from cranial sutures and applications to regenerative medicine, Genes & diseases, 2015.

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OTHER INFORMATION

KEYWORDS

Bone regeneration, bone replacement, osteogenesis, bone tissue engineering, biomimetic material, nanoparticulate mineralization, reconstructive surgery, regenerative medicine

CATEGORIZED AS

- **Biotechnology**
  - Health
- **Materials & Chemicals**
  - Nanomaterials
- **Medical**
  - New Chemical Entities, Drug Leads
  - Other
- **Nanotechnology**
  - NanoBio

RELATED CASES

2018-585-0

▶ Lee, J.C., Pereira, C.T., Ren, X., Huang, W., Bischoff, D., Weisgerber, D.W., Yamaguchi, D.T., Harley, B.A. and Miller, T.A., Optimizing collagen scaffolds for bone engineering: effects of cross-linking and mineral content on structural contraction and osteogenesis, The Journal of craniofacial surgery, 2015.

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