# Osteomodulatory Hydrogels for Bone Induction

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## Technology description

University of Missouri Office of Technology Management & Industry Relations Non-Confidential Abstract of Invention UM Disclosure No. 17UMC039
Osteomodulatory Hydrogels for Bone InductionBRIEF DESCRIPTION:This invention is a composition of matter and method for hydrogels that induce stem cell differentiation towards an osteoblast bone cell lineage. This invention also inhibits osteoclast bone resorption. This invention uses common osteomodulatory molecules in a new, injectable hydrogel that can be delivered percutaneously or as an adjunct to other devices. This hydrogel can also be used in load-bearing applications. The formulation can change depending on the desired effect. These injectable hydrogels will treat osteoporosis, facilitate bone fusion, and heal induced fractures.
CLINICAL NEED:Vertebral compression fracture (VCF) is the most common consequence of osteoporosis and one of the leading causes of disabilities in elderly. Approximately 1.5 million vertebral compression fractures occur annually in the United States. Vertebroplasty and kyphoplasty are minimally invasive treatments for VCF which involve the injection of the bone cement poly (methyl methacrylate) (PMMA) into the vertebral body. While PMMA provides benefits, it does not have the capability to deliver medication having osteomodulatory properties. A need exists for a hydrogel with osteomodulatory properties that achieves the requisite strength upon setting.
PROPRIETARY SOLUTION:To overcome the issues of current treatments for VCF, researchers at the University of Missouri have developed a new injectable hydrogel capable of treating osteoporosis, facilitating bone fusion, and inducing fracture healing. Long term success can be achieved by use of a chistosan-based hydrogel with osteomodulatory molecules. Chitosan has the benefits of natural polymers, without inducing a negative immune response. However, previous treatments with chitosan have lacked strong mechanical properties. This new hydrogel has the option to incorporate a ground-breaking method of covalent crosslinking using a natural crosslinker, to gain the mechanical strength necessary without sacrificing stability or adding toxicity. This novel hydrogel has already been evaluated and tested, with promising results for clinical use.
SPECIFICATIONS:
250 kPa compressive strength—load bearing
Osteomodulatory properties enhances natural bone connections
Injectable as a hydrogel

## Application area

Surgical Repair
Bone Treatments
Osteoporosis

## Advantages

Innovative Concept
Injectable
Potentially Load-Bearing

## Institution

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