

Teaser Memorandum

KOREA INSTITUTE OF SCIENCE AND TECHNOLOGY

Title(Name of Technology) :

CELL AGGREGATE-HYDROGEL-POLYMER SCAFFOLD COMPLEX FOR CARTILAGE REGENERATION, METHOD FOR THE PREPARATION THEREOF AND COMPOSITION COMPRISING THE SAME



Executive Summary	IP Owner Summary	
Dr. Soo-hyun, Kim, a senior research engineer of Korea Institute of Science and Technology, has developed novel methods and complexes for treating cartilage demage that are very interesting in terms of efficacy, safety and commercializing potential.	Korea Institute of Science and Technology Established in 1966 No. of Employees : 662 Business field : Funded research service	
Osteoarthritis is a debilitating joint disease caused by the degeneration of articular cartilage and anti-osteoarthritis agents or materials occupy huge market because of innumerable world wide patients		
KIST intends to enter into a technology transfer or licensing transaction with regard to tissue-engineered cartilage-like implant Terms of the transaction are not set, and interested parties may further discuss the details if they wish to enter into an agreement.		
Industry Sector: 1. Academic/Research: Animal health, 2. Animal health: Medical device: device, 3. Biotechnology: Human therapeutics, 7. Medical device:	Personal Description of Researcher	
Therapeutic device, 8. Non-profit org.: Government	Name: Soo-hyun, Kim, Ph.D	
Therapeutic Target: 11. Hospital and Surgery : Transplantation, Tissue grafting	Present Position:	
Development phase: middle stage	Senior research engineer, Biomaterials Research Center, Korea Institute of Science and Technology	
Type of business relationship sought (including licensing availability): development collaboration, or non-exclusive or exclusive licensing agreement		
Key Technology Highlights	 Research interest: Tissue Engineered Biomaterials 	
Complexes of cell aggregates-hydrogel-polymer scaffold shows remarkable activities of cartilage-regeneration which were verified in animal experiments. In addition, complexes are expected to have excellent mechanical strength providing shape-maintenance.	 Office address: 39-1 Hawolgok-dong, Seongbuk-Gu Korea Institute of Science and Technology, Seoul 136-791, Korea 	
In contrast to solid permanent artificial inserts, this technology is free from articular joint surface damage owing to employing biocompatible or biodegradable materials		
Strong IP Position This technology have been filed for a patent application in Korea and have been already patented in Korea. Other related pending patent applications(not yet published) are anticipated to be patented in the near future.		



Technology Overview

Technology Platform

The core technology of KIST is to provide novel methods for treating cartilage damage using tissue-engineered cartilage-like implant made of cartilage cell aggregates-hydrogel-polymer scaffold complex. It is considered as far advanced therapy in terms of activity-provided biocompatible materials

Background and unmet needs

Osteoarthritis is a debilitating joint disease characterized by the degeneration of articular cartilage, and affects over 20 million people nationwide. Several methods have been established in the last decades for the treatment of injured and degenerated cartilage. Osteochondroal transplatation, microfracturing, heat treatment for sealing the surface, shaving, autologous chondrocyte transplantation(ACT) or total joint replacement are among the common techniques applied in today's orthopedic surgery. Commonly, the replacement of cartilage tissue with solid permanent artificial inserts has been unsatisfactorily because the opposing articular joint surface is damaged by unevenness or by the hardness of the inserts. Therefore, the transplantation technology had to take a step forward in the research of alternative cartilage materials such as biocompatible materials and structures for cartilage replacement. In view of this situation, many clinical and research studies are currently striving to understand the disease progression of osteoarthritis and develop improved methods of treatment but have finally failed to effectively improve both mechanical strength and cartilage-genesis at the same time. Moreover, conventional osteoarthritis treating cell complexes have been composed of only hydrogel and single cell, or scaffold and single cell, which turned out to have much less effective in chondrocyte-differentiation.

Discovery and Achievements

Technology of KIST has been developed on the basis of findings that cell the aggregates-hydrogel-polymer scaffold complexes show excellent ability for remedy of osteoarthritis. The present inventors used i) cell aggregates for more efficient differentiation into cartilage than in single cell due to cell-cell interactions; ii) hydrogel for living body-similar environment; and iii) biocompatible polymer scaffold to provide mechanical strength similar to native cartilage using biodegradable elastic scaffold. These cartilage-like biomaterials comprising of i, ii and iii have outstanding ability in accelerating cartilage-differentiation and also in maintaining their shape. When transplanted with complexes of the present technology, the cartilage lesion gets remarkably improved.

Fig. 1. scheme of cell aggregates-hydrogel-polymer scaffold complexs



- a) differentiation induced cell-
- aggregates are mixed with hydrogel
- b) above mixture is injected into polymerscaffold
- c) above complexes are transplanted into cartilage lesion



Fig. 2. Regenerated cartilage tissue using the cell aggregates-hydrogel-polymer scaffold complexs



Present technology can be successfully applied to effective anti-osteoarthritis therapy based on strong cartilage-regenesis ability, and KIST is planning to make further research to establish optimal production conditions, clinical test, physical stability and automatic manufacturing process for mass production.

□ KIST is seeking for out-licensing partners who equipped with GMP.

Patents and Publications

KIST have patents issued or filed for application in Korea with regard to the present technology and one of them was Granted in 2007 which could be prior occupation of the field of the art.

Country	Patent, Publication or Appln. No.	Status	Description
Korea	10-2008-0110395	Pending	Cell AggreateHydrogel-Polymer Scaffold Complex for Cartilage Regeneration Method for the Preparation Thereof and Composition Comprising the Same
Korea	10-2008-0115647	Pending	High Resilient and Biodegradable Block Copolymer Scaffold with Shape Recovery Effect and Treatment of Articular Cartilage Damage Using the Same
Korea	10-0737167	Granted	Method for Preparing of a Porous Osteochondral Composite Scaffold

TABLE 1. List of Patents