Joint Seminar

Date: Monday July 8, 2019
Location: Donnelly Centre
160 College Street, 2nd Floor, Red Seminar Room

Dr. Inbo Han, MD, PhD
Department of Neurosurgery, Spine Center
CHA University, School of Medicine, South Korea

"Matrilin-3 pretreatment improves the function of mesenchymal stem cells in the intervertebral disc repair"

Intervertebral disc (IVD) degeneration is a major cause of low back pain and disability and it is irreversible. Current therapeutic options are limited and treatment often remains unsatisfactory. In recent years, pre-clinical studies of stem cell therapy for IVD repair have demonstrated encouraging results. However, the translation of stem cell therapy into clinical practice faces substantial barriers due to minimal effect of stem cells. To improve the function of mesenchymal stem cells (MSCs), we used matrilin-3, an extracellular matrix protein (ECM) protein involved in cartilage development and potential osteoarthritis pathomechanisms. Here we will introduce our in vitro and pre-clinical study to investigate the effectiveness of matrilin-3 pretreatment of MSCs.

Biography

Dr. Inbo Han is currently working as a Professor in the Department of Neurosurgery, Spine center at CHA University. He received his Ph.D. from Yonsei University, South Korea. He is also working as Deputy Research Director, CHA University, prior to this he was a Research fellowship at Laboratory of Spinal Cord Injury & Stem Cell Biology and Brigham & Women's Hospital/Harvard Medical School, USA. He is a member of many Professional Societies and has many publications.

Dr. UnYong Choi, MD
Department of Neurosurgery, Spine Center
CHA University, School of Medicine, South Korea

"Disc regenerative therapy of intervertebral disc degeneration in stem cell with scaffold"

Due to the structural nature of the intervertebral disc, it is vulnerable to frequent minor trauma, easily degenerating and irritating neural compressive symptoms, which causes chronic back pain. Surgical treatments are generally effective in alleviating pain, but are invasive, risk of complications and chronic back pain may recur at long-term follow up. To Solve the problems of conventional therapy, we focused on different treatment strategy such as disc regeneration using stem cells. However, such approaches remain several limited which are difficult to cell grow environment due to hypoxia and inflammatory condition, and hard to transplant due to cell leakage. This study investigates disc regeneration by implanting wharton's jelly derived mesenchymal stem cell into a degenerated intervertebral disc using hyaluronan-methylcelluose (HAMC) developed with injectable scaffold. The spinal disc degenerative model will be made by spinal needle puncturing at the level of caudal intervertebral disc 5/6 and 6/7 according to surgical procedures in Sprague-Dawley rats. Two weeks after the spinal disc degenerative modeling, the caudal intervertebral discs will be exposed through the same surgical procedure as before and treated with PBS injection group, stem cell only group, HAMC only group and HAMC with stem cell group. 6 weeks after the injection of the treatment, we will study differences between the groups by radiologic and histologic analysis. This study will improve the possibility of disc regeneration treatment in degenerative intervertebral disc.

Biography

Dr. UnYong Choi is graduate of Wonkwang University, College of Medicine at 2009. Dr. Choi trained at the Yonsei University Gangnam and Shinchon Severance Hospital, department of neurosurgery during his residency. He had a mandatory military service at Brian Allgood U.S Army Community Hospital. Afterward, he completed a two-year spine fellowship at Yonsei University Gangnam Severance Hospital. During his fellowship, Dr. Choi focused on patient treatment and studies of sagittal imbalance treatment in adult spinal deformity patient. Dr. Choi currently serves as the assistant professor of Neurosurgery in CHA University, CHA Bundang Medical center. His research areas are bone fusion material and regenerative treatments of spinal diseases

Ji-hye Lee, Ph.D.
Medical & scientific affairs, CGBio, Co., Ltd., South Korea

"Introduction of CGBio"

Since CGbio was founded in 2006, we expanded our business area from biomaterial based product to growth factors and cell therapy to become the only one company in Korea which have all of the components for tissue engineering. We have five development pipelines including wound healing, bone regeneration, aesthetic and plastic surgery, intervention (kind of stents) and 3D printing. Here, we will introduce products related to bone regeneration focused on its key features and possible indications based on our field experiences. First, we have synthetic bone graft materials such as hydroxyapatite and beta-tricalcium phosphate. They are usually applied in dental surgery including sinus augmentation, ridge augmentation, and guided bone regeneration. Demineralized bone matrix is one of the most frequently used bone graft materials. It can be used in spinal surgery as well as other orthopedic surgeries. BGS-7 is our own unique bio-ceramic which have superior mechanical strength and the ability to direct binding with the surrounding bone. It was applied on the spinal interbody fusion and successfully achieved a high fusion rate similar to that of autologous bone graft group. Now, we are trying to use this material with using 3D printing technology for the regeneration of craniofacial defect. We also have growth factors to enhanced bone regeneration, named recombinant human bone morphogenetic protein-2 (rhBMP-2), Novosis. It can be produced easily from *e.coli* and many studies already proved its efficacy and safety on bone regeneration. As an ideal cell source for regenerative medicine, we chose adipose-derived stromal vascular fraction due to its easy availability and stem cell-like property. We developed the equipment named 'Cellunit™' for automatic SVF isolation from fat tissue and its therapeutic efficacy have been proved in various indications including soft tissue reconstruction and ischemic diabetic foot. From this introduction, we expect to have active discussion about the way to work together and to become the best partner for further investigations.

Biography

Ji-hye Lee is currently working as a part leader of scientific part in the Medical & scientific affairs at CGbio. She is in charge of providing academic information about CGbio's products to the customers as well as design new researches including *in vitro* study and clinical study. She received her Ph.D. from Hanyang University, South Korea and majored bone tissue engineering using various biomaterials and cells. She worked as a postdoctoral researcher in the department of orthopedic surgery at Seoul national university hospital.

Chanwoo Ryan Hong
Director, illuminaid inc., South Korea
R&D team3 manager, CGBio, Co., Ltd., South Korea

"Introduction of custom 3d printing system for bioprint"

The greatest advantage of 3D printing is the small number of customized products produced in any shape. Especially in the case of bio-printing, the final product is optimized for individual. As the human body is complex, there are many different biomaterials for bioprinting and with these different material properties require different bioprinting systems. 3d printing can only succeed if the material, system and software are combined all together. In this presentation, I will introduce 3D printing system for ceramic materials in both ways such as photopolymerization and material extrusion. Moreover, I will talk about essential of bioprinting system for general biopolymers.

Chanwoo Ryan Hong

Founder and former CEO of illuminaid inc., and now director of illuminaid 3d printer company. R&D team3 manager on duty in CGBio now. Coming with high professionalism in executing duties effectively in mechanical engineering for medical devices and 3d printing system.