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분야 Ⅲ : Tissue Engineering and Regenerative Medicine

PO-81 **Spheroid culture system using gelatin microparticles for cellular stemness maintenance of human adipose stem cells**

Nopphadol Udomluck[1], Naeun Ryu[1] and Hansoo Park[1,*]

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PO-82 **Tissue Engineered Nano-Constructs for Tendon Regeneration**

Yonghyun Gwon[1,2], Woochan Kim[1,2], Sunho Park[1,2], Yang-Kyung Kim[3], Hyoseong Kim[1], Sung-Eun Jeong[3], Myung-Sun Kim[3,*], and Jangho Kim[1,2,*]

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PO-83 **Micro-Grooved NGC Filled with Electrospun Align Fiber for Peripheral Nerve Regeneration**

Jin Jeon[1] and Hee Seok Yang[1,*]

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PO-84 **Bioinspired Surface-Engineering of Stem Cell Spheroids with Dexamethasone-Eluting Depots Promotes Bone Regeneration in Murine Calvarial Defect Model**

Tiep Tien Nguyen[1], Manju Shrestha[1], Junhyeung Park[1], Chul Soon Yong[1], Jong Oh Kim[1], Simmyung Yook[1], Jun-Beom Park[1], Jee-Heon Jeong[1,*]

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PO-85 **Understanding the roles of cell-matrix interaction in loss of chondrocyte phenotypes during *in vitro* expansion**

Yunhye Kim[1,2], Sung Sik Hur[1,2] and Yongsung Hwang[1,2,*]

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PO-86 **Ameliorating Fibrotic Phenotypes of Keloid Dermal Fibroblasts Through an Epidermal Growth Factor-Mediated Extracellular Matrix Remodeling**

Laurensia Danis Anggradita[1,2], Hyunbum Kim[1,3], Sung Sik Hur[1], Nathaniel Suk-Yeon Hwang[3], Seung Min Nam[4,*], and Yongsung Hwang[1,2,*]

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PO-87 **Heparin-Mimicking Polymer-Based In Vitro Platform Recapitulates In Vivo Muscle Atrophy Phenotypes**

Ji Hoon Jeong[1,2], Hyunbum Kim[1,3], Hyo-Shin Lee[1,2], Sung Sik Hur[1], Jeong Kyo Yoon[1,2,*], and Yongsung Hwang[1,2,*]

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PO-88 **IMMunomodulation by combination therapy of PEGylation of islets and delivery system for long term delivery of tolerance enhancing drug lead to long term islet graft functionality**

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PO-89 **Fabrication of 3D Skeletal Muscle Tissue with Integrated Vasculature by In-Bath Cell Printing Method**

Seungyeun Cho[1], Myungji Kim[2], Uijung Yong[1], Donghwan Kim[2], Dong Gyu Hwang[2] and Jinah Jang[1,2,3,*]

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PO-89

Fabrication of 3D Skeletal Muscle Tissue with Integrated Vasculature by In-Bath Cell Printing Method

Seungyeun Cho[1], Myungji Kim[2], Uijung Yong[1], Donghwan Kim[2], Dong Gyu Hwang[2] and Jinah Jang[1,2,3,*]

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Engineering of a biomimetic and implantable skeletal muscle tissue has been emerged as an alternative for regenerative therapy of volumetric muscle loss (VML), where excessive injuries are beyond endogenous self-repair capacity. Pre-vascularization of muscle tissue could overcome the diffusion limit of 200 μm and enable larger tissue fabrication, matching the size of injury. Establishing channel structure followed by lumen endothelialization have failed to build capillary-scale vasculature due to limited resolution. As an alternative method, spontaneous vascular network has been induced by applying chemical or mechanical gradients. In this research, we suggest a 3D bioprinting-based direct endothelial cell patterning method such to engineer vasculatures with scales of both few hundreds and tens of micrometers. High-density endothelial cells, encapsulated in skeletal muscle decellularized extracellular matrix (mdECM), were stably printed in a line pattern into a supporting bath. Mixture of myogenic cells and mdECM bioink was deposited as bath bioink. Increased angiogenesis-related gene expression level showed that spatial patterning promoted vascular network formation compared to random organization. In addition, effect of physiomimetic microvascular unit (MVU)-mimicking structure on myogenic maturation and reduced tissue necrosis was characterized by immunofluorescence staining assays. We anticipate that our method might be applied to large-volume muscle tissue fabrication.

PO-90

Dual Temperature and pH-responsive injectable chitosan hydrogel loaded with bone graft for bone regeneration

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There are many cases of bone defects that occur from disease or trauma. Since they are cost effective and readily available, bone graft materials (BGMs) have been used to fill defected area for reconstruction of diseased bone tissues. However, BGMs have several drawbacks including their tendency to migrate around the tissue area. This prevents them from being continuously located in the defect area after transplantation. In this study, we synthesized succinylated chitosan (SCS) based hydrogel with high decomposition rate and excellent biocompatibility. We confirmed that BGMs were well distributed inside the SCS hydrogel. SCS-B hydrogel showed an increase in mechanical properties, such as compressive strength and young's modulus, as the succinylation rate decreased. SCS-B hydrogels exhibited high cell growth rate and bone differentiation rate. Moreover, in vivo results showed that the SCS hydrogel decomposed into the surrounding tissues while maintaining the BGMs in the transplantation area for up to 6 weeks. These data support the idea that SCS hydrogel can be useful as a tissue engineering structure in a broad range of biomedical applications.

PO-91

Therapeutic effect of the epiphyseal growth plate cells for bone formation via endochondral ossification

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Epiphyseal Growth Plate Cells (GPCs) regulate bone growth and homeostasis by differentiating into bone like-cells. bone growth occurs at the growth plate of the secondary ossification center, however, the function of the GPCs is not well understood. Our study suggests that GPCs have important contributions to bone formation via endochondral ossification. GPCs, expressing the CD200 marker, are mostly present in the resting region of the growth plate and are known as skeletal stem cells (SSCs). Recently, SSCs have demonstrated their ability to self-renew and to specialize in bone/cartilage regeneration. Also, accumulating evidence supports the idea that SSCs play an important role in bone formation and repair. Here, we investigated the multi-potential capacity for bone repair by GPCs compared with Mesenchymal Stem Cells (MSCs). The characterization of GPCs was confirmed by the expression of osteogenic and chondrogenic markers via Real-Time polymerase chain reaction (qPCR), and Western Blotting (WB). Interestingly, GPCs demonstrated high expression of osteogenic and chondrogenic markers compared with MSCs. Also, GPCs showed significantly higher bone regeneration. In particular, the regeneration of the spongy bone was outstanding. Our results indicate that GPCs are a better cell source for spontaneous bone formation and can promote a better, and high-quality bone regeneration.

PO-92

Vitamin D-incorporated Injectable Hyaluronic Acid-based Hydrogel to Treat Tendinopathy

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Tendinopathy, also called tendonitis, is one of the most common overuse injuries that includes painful condition, swelling, and impaired function. Recent studies demonstrated that inflammation plays a crucial role in early tendon injuries. Most current treatments of tendinopathy provide only symptomatic relief such as rest and steroid injection, without altering the disease course. Vitamin D (Vit D) is known as there are important roles not only in the regulation of bone metabolism and homeostasis but also in immune regulation. Previously, we clarified the mechanism of the effects of Vit D on tenocyte. And, we identified that Vit D can improve the proliferation of tenocyte and tendon restoration in the achilles tendon injury model. In this study, we suggest the efficient Vit D delivery system with hyaluronic acid (HA) which is one of the chief components of the extracellular matrix and has ability of the inflammatory response and wound healing. The new Vit D delivery system with HA hydrogel would have prominent regeneration property for tendinopathy treatment. It is revealed that injectable HA hydrogel incorporated with Vit D has outstanding performance for damaged tenocyte proliferation with TNF-α. Accordingly, this Vit D delivery system would be a great treatment for tendinopathy.