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# KTERMS 2019

20th Anniversary International Meeting of Korean Tissue Engineering and Regenerative Medicine Society

## 2019년 창립 20주년 한국조직공학·재생의학회 국제학술대회

*A Big Step and New Challenges in Regenerative Medicine for Patients*

**June 6(Thu) - 8(Sat), 2019, ICC JEJU**

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THE ASSOCIATION OF KOREAN WOMAN SCIENTISTS AND ENGINEERS

이 발표논문집은 정부재원(과학기술진흥기금 및 복권기금)으로 한국과학기술단체총연합회의 지원을 받아 발간되었음
This work was supported by the Korean Federation of Science and Technology Societies(KOFST) Grant funded by the Korean Government.

**SP-0074**
Development of a cell Spheroid System based on Cell/Microparticle for Cell Survival and Osteogenic Differentiation
Yeoungjo Jeoung (Hannam Univ.), Jinho Lee, Minji Kim (Dankook Univ.), Seheang Oh

**SP-0075**
Development and Characterization of Polycaprolactone-based 3D Printing Scaffold with Leaf-Stacked Structure
Hayeon Noh (Dankook Univ.), Minji Kim, Sua Park (KIMM), June-ho Byun (Gyeongsang National Univ.), Jin ho Lee (Hannam Univ.), Seheang Oh (Dankook Univ.)

**SP-0076**
Stem Cell/Growth Factor-Loaded Microparticle for Intervertebral Disc Regeneration in Beagle Dog Model
Minji Kim (Dankook Univ.), Jea-hoon Lee (Gyeongsang National Univ.), Jun-soo Kim, Jinho Lee (Hannam Univ.), Seheang Oh (Dankook Univ.)

**SP-0077**
Brown Adipocytes Cultured with Splenocytes Maintain Regulatory T cell Subset in Intermittent Hypobaric Condition
Myungchul Lee, Junghwa Park, Taeheung Kang (Konkuk Univ.)

**SP-0078**
A Bilayer Composite composed of Methyl Cellulose (MC) Hydrogel and Hydroxyapatite (HA)-incorporated Human Extracellular Matrix Scaffold for Periodontal Tissue Engineering
Hyoungbae Ji, Changhee Woo, Yongwoo Cho (Hanyang univ.)

**SP-0079**
A Polyphenol-based Dynamic and Multifunction Hydrogel via High-Affinity Enzyme Crosslinking for Wet Tissue Adhesion and Immune Modulation
Su-hwan Kim, Uk-jae Lee, Byung-gee Kim, Nathaniel S Hwang (Seoul National Univ.)

**SP-0080**
Determination of Residual Chemical Agents and Biological Agents in Decellularized Nerve Allograft
MyeongKyu Lee (Korea Public Tissue Bank), Sae-rom Lee, Sook-jin Kim (CHA Univ.), Hea-young Cho, Yang-guk Chung (The Catholic Univ. of Korea)

**SP-0081**
Comparison of Cytokine Expression and Ultrastructure Changes in Cryopreserved and Dehydrated Human Amniotic Membrane
Myeongkyu Lee (Korea Public Tissue Bank), Jung-won So, Yang-guk Chung (The Catholic Univ. of Korea), Taegi Kim (Kyung Hee Univ.), Jaheon Kang

**SP-0082**
IL-10 deficiency aggravates renal inflammation and fibrosis in high-fat dieted mice
Bomi Kim (Kyungpook National Univ.), Daehwan Kim (Yeungnam Univ.), Soyoung Chun (Kyungpook National Univ.), Eunhye Lee, Bohyun Yoon, Yun-sok Ha, Junnyung Lee, Bumsoo Kim, Taegyun Kwon, Byungik Jang (Yeungnam Univ.)

**SP-0083**
Characterization and Validation of Brain and Blood Vessel-derived Extracellular Matrix Bioinks for Recapitulating Human Blood-Brain Barrier in vitro
Sooyeon Lee, Jinah Jang (POSTECH)

**SP-0084**
Comparative Analysis of Human and Porcine derived Pancreatic Decellularized Extracellular Matrix Bioinks to Recapitulate Microenvironment of Human Pancreatic Tissue in vitro
Myungji Kim, Jinah Jang (POSTECH)

## Stem Cell

**SP-0056**
Co-transplantation of tonsil-derived mesenchymal stromal cells in bone marrow transplantation accelerate thymus regeneration after cytotoxic conditioning
Da-won Choi, Kyung-ah Cho, So-youn Woo (Ewha Womans Univ.)

**SP-0085**
TNF-α and IL-1β challenged fetal cartilage stem cell-derived conditioned media results in down-regulation of inflammatory markers in synoviocytes
Dongil Shin(Ajou Univ.), Insu Park, Byunghyune Choi(Inha Univ.), Doyoung Park (Ajou Univ.), Byounghyun Min (Ajou Univ.)

**SP-0086**
Generation of oligodendrocytes from X-linked adrenoleukodystrophy patients
Byeongmin Jeon, Dae-sung Kim (Korea Univ.)

**SP-0087**
Efficient generation of astrocytes from X-linked adrenoleukodystrophy patients
Gyu-bum Yeon, Dae-sung Kim (Korea Univ.)

**SP-0088**
Long lasting therapeutic effects of human placenta stem cells on an Alzheimer's disease model
Yuri Choi, Jisook Moon (CHA Univ.)

**SP-0089**
A Descriptive Study of the Characteristics of Human Mesenchymal Stem Cells from Tonsil and Turbinate Tissues
Kyeongeun Lee(Chungbuk National Univ.), Dahyeon Choi, Sunhwa Park (The Catholic Univ. of Korea), Sungwon Kim, Yoonshin Park (Chungbuk National Univ.)

**SP-0090**
A New Senescence Biomarker Protein-SP for Controlling Tonsil-derived Mesenchymal Stem Cell Senescence
Youngseo Jo(Chungbuk National Univ.), Dahyeon Choi, Kyeongeun Lee, Jukwang Choi, Inho Jo (Ewha Womans Univ.), Yoonshin Park(Chungbuk National Univ.)

**SP-0091**
The Effect of Tauroursodeoxycholic Acid (TUDCA) on the Differentiation of Human Embryonic Stem Cells
Dohyun Kim, Kyungyup Cha, Soo-hong Lee (Dongguk Univ.)

**SP-0092**
Development of a synthetic peptide for enhanced stemness and mesenchymal-to-epithelial transition during generation of induced pluripotent stem cells
Kwang-sook Park(Seoul National Univ.), Dongwoo Lee(NIBEC), Yoonshin Park(Chungbuk National Univ.), Jueyeon Lee(NIBEC), Chong Pyong Chung, YoonJeong Park (Seoul National Univ.)

**SP-0093**
Sustained WNT protein release boosts the stem cell properties
Jae-yol Lim, Won-gun Koh, Yeojun Yoon, Hyejin Hong (Yonsei Univ.)

**SP-0094**
Identification of WNT16 as a Predictable Biomarker for Osteogenic Differentiation of Tonsil-derived Mesenchymal Stem Cells
Yu-hee Kim, Hyun-ji Lee, Kyung-ah Cho, Minhwa Park, Hansu Kim, So-youn Woo, Kyung-ha Ryu(Ewha Womans Univ.)

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# - Comparative Analysis of Human and Porcine derived Pancreatic Decellularized Extracellular Matrix Bioinks to Recapitulate Microenvironment of Human Pancreatic Tissue *in vitro* -

**(June 6, 2019 – June 8)**

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## Abstract

To recapitulate the microenvironment of the target tissue in the 3D printed tissue construct, the selection of bioink is critical. In previous study, we suggested decellularized extracellular matrix (dECM) bioink as an appropriate material for mimicking the native microenvironment. However, since the source of dECM is generally derived from porcine, it is questionable whether porcine tissue-derived dECM bioink can completely mimic the function of human tissue. In this study, we investigated the differences between human and porcine-derived dECM through a variety of methods to validate that porcine derived dECM provide a suitable microenvironmental cue as for cellular activities, particularly for pancreatic tissue. To evaluate the composition of ECM, we quantified major ECM components before and after decellularization using various biochemical assays. In human and porcine dECM bioinks, the quantity of major components such as collagen and GAGs were observed in similar level. In addition, we conducted comparative analysis of representative components of human and porcine tissue-derived pancreatic dECM using liquid chromatography-mass spectrometry and immunofluorescence staining. The same types of collagen occupied the largest portion of both ECM in common, and other components also appeared in a similar ratio. In addition, we examined the differences of cell-matrix interactions by culturing human-induced pluripotent stem cells (hiPSCs)-derived insulin-producing cells (IPCs) in human and porcine pancreatic dECM (pdECM) bioinks. To assess the effects of the pdECM on cellular function, insulin secretion and gene expression level of IPCs encapsulated in both pdECM bioinks were conducted. These data confirmed that porcine-derived material can also provide beneficial effect under optimized microenvironment condition similar to human tissue. The developed pdECM bioink will be able to broaden the application of in vitro disease models of diabetes and pancreatic cancer and transplantable constructs for in vivo study.

## Conclusion

- The validity of porcine derived dECM bioink as an applicable material for 3D bioprinted tissue was verified by analyzing the the human and porcine pancreas.
- The ratios of constituents that organize the pancreatic tissue were explained in detail and the tissue similarity between the human and the porcine was verified using hiPSC-derived IPCs.
- The developed porcine-derived pdECM could potentiate tissue-specific microenvironment of human tissues for the application of in vitro disease models of diabetes and pancreatic cancer and transplantable constructs for in vivo study.

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