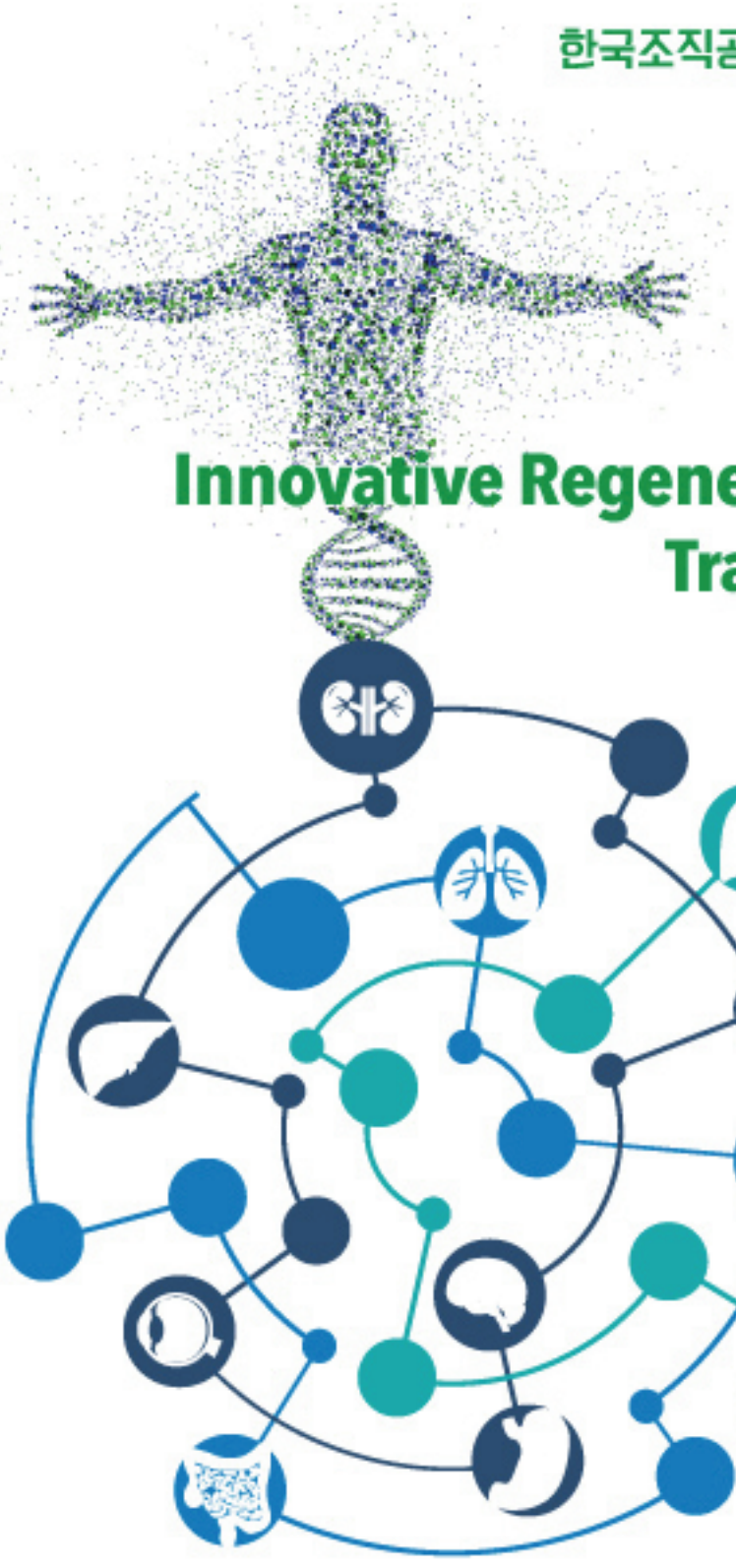
2023 KTERMS

한국조직공학 · 재생의학회 제23차 학술대회

2023. 05. 19(금) ~ 05. 20(토)

서울대학교병원 의학연구혁신센터, 어린이병원



Innovative Regenerative Medicine for Translation to Human

한국조직공학·재생의학회

Korean Tissue Engineering and Regenerative Medicine Society

Program at a glance

DAY 2 – 2023년 5월 20일 (토)

Time	Room A 어린이병원 CJ홀	Room B 어린이병원 제일제당홀	Room C CMI 서성환연구홀	Room D 본원 김종기홀	e-Poster
09:00 - 10:20	**Stem Cells** 좌 장 김태형 (중앙대), 윤진호 (가톨릭대)	**Dentistry** 좌 장 박준범 (가톨릭대), 김선영 (서울대)	**Student Presentation II** 좌 장 방석호(성균관대), 이태진 (강원대)		S09 - Stem Cells PS10 - Dentistry
09:00-09:20	S13-1 Disease modeling using patient-specific induced pluripotent stem cells 이재철 (성균관대)	S14-1 Clinical application of BMP for periodontal tissue regeneration and alveolar bone regeneration 윤정호 (전북치대)	S15-1 Gut-specific biochemical and biophysical cues promote the enteroendocrine function of in vitro gut model 한호현 (POSTECH) 09:00-09:10		
			S15-2 Biomimetic marine sponge-derived inorganic particle-reinforced injectable hydrogels for promoting bone tissue reconstruction 최수미 (동아대) 09:10-09:20	**삼성미래기술육성사업 설명회**	
09:20-09:40	S13-2 Application of human PSC-derived cardiomyocytes for drug screening and heart failure treatment 문성환 (중앙대)	S14-2 Succinylated natural polymer-based hydrogels for alveolar bone tissue regeneration 권일근 (경희치대)	S15-3 Optimizing lipid anchor for NK cell surface modification to enhance cancer-killing efficacy 이채은 (동국대) 09:20-09:30	09:20-09:35 삼성미래기술육성사업 소개 및 현황 김현주 PD (삼성전자 미래기술육성센터 소재팀장)	
			S15-4 Three-dimensional culture of endometrium as an in vitro platform for implantation 박은주 (연세의대) 09:30-09:40		
09:40-10:00	S13-3 Dissecting human diseases with genetics and pluripotent stem cells 이기현 (이화여대)	S14-3 Cure & care of Xerostomia through retroductal approach 전상호 (고려의대)	S15-5 Thermally annealed large-scale gold nanostructure platform for long-term electrochemical monitoring of living cells 김창대 (중앙대) 09:40-09:50	09:35-09:50 심사기준 및 프로세스 안내 권성홍 PD (삼성전자 미래기술육성센터)	

2023년 5월 20일 (토)
Room C
의학연구혁신센터(CMI) – 서성환연구홀

09:00-10:20
Session 15

좌장 : 방석호 (성균관대), 이태진 (강원대)
Student Presentation II

09:00-09:10	[S15-1]	Gut-specific biochemical and biophysical cues promote the enteroendocrine function of in vitro gut model 한호현 (POSTECH)
09:10-09:20	[S15-2]	Biomimetic marine sponge-derived inorganic particle-reinforced injectable hydrogels for promoting bone tissue reconstruction 최수미 (동아대)
09:20-09:30	[S15-3]	Optimizing lipid anchor for NK cell surface modification to enhance cancer-killing efficacy 이채은 (동국대)
09:30-09:40	[S15-4]	Three-dimensional culture of endometrium as an in vitro platform for implantation 박은주 (연세의대)
09:40-09:50	[S15-5]	Thermally annealed large-scale gold nanostructure platform for long-term electrochemical monitoring of living cells 김창대 (중앙대)
09:50-10:00	[S15-6]	3D printing of alginate granular hydrogels for wearable strain sensors 김수민 (성균관대)
10:00-10:10	[S15-7]	O2 gradient chip to regulate skeletogenesis of hypoxic BMSCs as a site-specific skeletal model 김혜선 (연세대)
10:10-10:20	[S15-8]	Development of 3D pre-vascularized macro hepatic tissue modules via co-axial bioprinting and light-activated decellularized extracellular matrix-based bioinks 김대근 (POSTECH)

Gut-specific biochemical and biophysical cues promote the enteroendocrine function of *in vitro* gut model

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Enteroendocrine (EEC) cells, which constitute only about 1% of the intestinal epithelium, produce various cytokines, peptides, and hormones in response to luminal environmental changes such as microbial dysbiosis. Accumulating data suggests that EEC cells have critical roles in intestinal immune response and barrier function and alternations in the EEC cell population and hormone secretion are related to gastrointestinal diseases such as inflammatory bowel disease (IBD). The current standard tool to study the relationship between EEC dysfunction and underlying IBD mechanisms is animal models with chemically induced IBD. However, as is often the case, the inter-species difference between humans and animals makes it challenging to translate the data into clinics.

Representative *in vitro* alternatives to the animal models are using organoids or cell lines; however, they have distinct limitations respectively. One of the limitations of organoids is their low reproducibility. Intrinsically, all organoids suffer from batch-to-batch variability due to the difference of tissue donors or culture conditions which makes it difficult to control the cell population within organoids. This could be a critical issue especially for translational studies including drug screening because the uncontrolled variability of organoids can interfere with accurate analysis of the results. In addition, as the EEC cells are very rare, enrichment of special cell types or exaggeration of specific gene expression is needed to establish hormone-producing, functional EEC models. On the other hand, human-derived isolated EEC cell lines typically lack physiological relevance because of their limited cellular diversity. As the dynamic interactions between different EEC cell types are necessary to have side hormonal repertoire in the model, cell line models have restricted functionality as well. To overcome these limitations, engineering the culture environment of the cells, such as the extracellular matrix (ECM) which the cells interact with, is vigorously investigated.

In this regard, we have previously developed a gut-specific biomaterial, decellularized extracellular matrix (dECM) derived from porcine colon tissue, and established a bioprinting process to recapitulate the hollow tubular structure of the native gut. EEC cells showed significantly different expression levels of various intestinal lineage markers, implying transdifferentiation and dedifferentiation, when cultured on colon dECM, the tissue-specific biochemical cues. However, these transcriptional changes did not lead to a hormonal secretion change in the 2D environment. Augmenting to the 3D environment, especially tubular geometry, remarkably increased the expression of serotonin levels, demonstrating the synergetic effect of tissue-specific biochemical and biophysical cues on promoting EEC function *in vitro*.

Keywords : *In vitro* gut model, *In vitro* enteroendocrine model, Tissue-specific biomaterial, Decellularized extracellular matrix, Bioprinting