Approximating Organs Small Talk

일정 : 2019 년 8 월 29 일 ~ 30 일

장소 : 국제협력관(L8) 컨벤션홀

본 Small Talk 는 이 분야에서 연구하는 실험실의 학생들이 직접 발표하는 작은 심포지엄으로,
올해는 KIST 에서 장소와 모든 제반 사항을 지원합니다.
발표는 10~12 분으로 준비해 주세요.

DAY 1 2019 년 8 월 29 일

Session 1-1. Blood Vessels

9:30 - 10:45 Chair : KIST 김홍남

9:30	서울대학교 이소민	3D brain angiogenesis model to reconstitute functional human blood-brain barrier in vitro	Somin Lee+, Minhwan Chung, Seung-Ryeol Lee and Noo Li Jeon*
9:45	KIST 서수영	Micro-physiological system for mimicking human blood-brain barrier and its application for drug screening	서수영+, 임혜원, 최낙원, 이강원, 김홍남*
10:00	연세대학교 김진	Development of Blood-brain barrier Chip and Fungal Pathogenic Modeling	김진+, 이종승, 신지수, 최보방, 조승우*
10:15	KAIST 조민경	A perfusable multichannel in vitro co-culture model of vascular smooth muscle cells and endothelial cells to mimic human artery	Minkyung Cho+, Je-Kyun Park*
10:30	연세대학교 이정복	Perfusable 3D microvascularized hydrogel	이정복+, 성학준*

Session 1-2. Multi-organs

11:00 - 11:30 Chair : 홍익대학교 성종환

11:00	DGIST 진채원	Body-on-a Chip; in vitro multi-microorgan network	진채원+, 김진영*, 최홍수*
11:15	홍익대학교 김성희	Multi-organ-on-a-chip for disease models of hepatic steatosis	김성희+, 변현재, 성종환*

Lunch

11:30 - 13:00

장소: L3 연구동 대식당 (아래 그림 참조)

	김명지	using hiPSC-derived IPC and LC-MS/MS	kyoung Shim, Song Cheol Kim, Jinah Jang*
10:15	KAIST 용인성	Cell-derived extracellular matrix based- in vitro aging model	Insung Yong+, Pilnam Kim*

Session 2-2. Various Organs : Others

10:45 - 11:30 Chair : 미정

10:45	연세대학교 신지수	Surface acoustic wave based-3D cell patterning for vascular tissue engineering	신지수+, 강병준, 이형석, 조승우*
11:00	DGIST 신현영	A novel aging tissue model mimicking human skeletal muscle phenotypes	Hyun Young Shin+, Yeong- Jin Choi, Sung Chun Cho, Jeong-Sik Kong, So Hye Yang, Dong-Woo Cho, Minseok S. Kim*
11:15	고려대학교 조영규	Construction of a 3D mammary duct based on spatial localization of the extracellular matrix	Youngkyu Cho+, Woo Kyung Moon, Hoe Suk Kim, Kyuhwan Na, Ji Hun Yang, Su Hyun Lee, Seok Chung*

Lunch

11:30 - 13:00

장소: L3 연구동 대식당 (아래 그림 참조)

Session 2-3. Integration with Organoids, 3D printers & Nanotechnologies 1

13:00 - 14:15 Chair : 인하대학교 전태준

13:00	고려대학교 최동희	3D in vitro high throughput screening model for analysis of colorectal cancer organoid by radio- and chemotherapy for precision medicine	Dong-Hee Choi+, Yong Hun Jung, Seung-Chul Shin, Ji Hun Yang*, Seok Chung*
13:15	연세대학교 조안나	Brain-mimicking microfluidic platform for brain organoids	조안나+, 진윤희, 김진, 최이선, 조승우*
13:30	서강대학교 최지욱	Droplet-based microfluidic feed-back control system for synthesis of core-shell Fe3O4@Au nanoparticles	최지욱+, Christian D. Ahrberg, 정봉근*
13:45	성균관대학교 Seokgyu Han	3D bioprinting of vascularized tumor	Seokgyu Han+, Sein Kim and Sungsu Park*
14:00	포항공과대학교 용의중	In vivo evaluation using fluorescence imaging after transplanting tissue constructs fabricated by 3D bioprinting technology	Uijung Yong+, G. Kate Park, Min Suk Lee, Hee Seok Yang, Hak Soo Choi, Jinah Jang*

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- *In vivo* Evaluation Using Fluorescence Imaging after Transplantation Tissue Constructs Fabricated by 3D Bioprinting Technology -

(Aug. 29, 2019 – Aug. 30)

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Abstract

Stem cell therapy has been actively studied as a treatment for ischemic heart disease. Particularly, a patch-type carrier can improve the therapeutic effect by enhancing homing and engraftment of stem cells into damaged myocardial tissues. Meanwhile, longitudinal monitoring of living cells provides an insight in understanding the mechanism of cellular migration from the transplanted graft and its integration with that of host tissues. Different kinds of imaging modalities using nontoxic and stable contrast agents have been explored to quantify the presence of cellular migrations from the graft to the host tissues. However, longitudinal monitoring of cells is currently limited by the lack of a stable probe in the near-infrared (NIR) window. In addition, difficulties related to the use of multimodal channels limit its application in real-time tracking of multiple cells in vivo, thereby demanding for an alternate approach to combat the existing challenges. The present work demonstrated long-term simultaneous tracking of multiple cells in vivo using 3 Charge-coupled device (3CCD) optical fluorescence imaging technique and different types of stable, nontoxic and target-specific fluorescent dyes in the NIR window. In this study, we are aiming to monitor the efficacy of cardiac stem cell-laden patch in ischemic myocardial tissue by using optical fluorescence imaging based on the NIR probes. First, we used three sets of spectral filter and CCD sensor. Second, contrast agents were selected to observe ischemic tissue, mitochondria, and lipoprotein. Using 3D bioprinting technology, we fabricated a pre-vascularized tissue construct with bioink composed of decellularized extracellular matrix and stem cells. Finally, we observed the interaction between the delivered construct and the ischemic myocardial tissue after transplanting it into the heart of the rats.

Conclusion

- Optical fluorescence imaging system was developed in order to monitor the regeneration of myocardial tissue after transplanting tissue construct.
- Myocardial infarction (M.I.) rat model was developed to observe the regeneration process *in vivo* environment.
- Tissue-specific near-infrared agents for assessing the efficacy of cardiac patch were developed and selected.
- Patch transplantation to the M.I. rat model for observing cell migration was performed.

Reference

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2. David E. Lee, Akshay Bareja, David B. Bartlett, and James P. White, **Autophagy as a therapeutic target to enhance aged muscle regeneration,** Cells 2019, 8(2), 183
3. Jang, J.; Park, H.J.; Kim, S.W.; Kim, H.; Park, J.Y.; Na, S.J.; Kim, H.J.; Park, M.N.; Choi, S.H.; Park, S.H.; et al. **3D printed complex tissue construct using stem cell-laden decellularized extracellular matrix bioinks for cardiac repair**. Biomaterials 2017, 112, 264–274.
4. Frangioni JV, **In vivo near-infrared fluorescence imaging,** Curr. Opin. Chem. Biol., 2003, 7(5), 626-634
5. Eric A. Owens, Hoon Hyun, Joseph G. Tawney, Hak Soo Choi, and Maged Henary, **Correlating molecular character of NIR imaging agents with tissue-specific uptake,** J. Med. Chem,, 2015, 58(10), 4348-4356

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