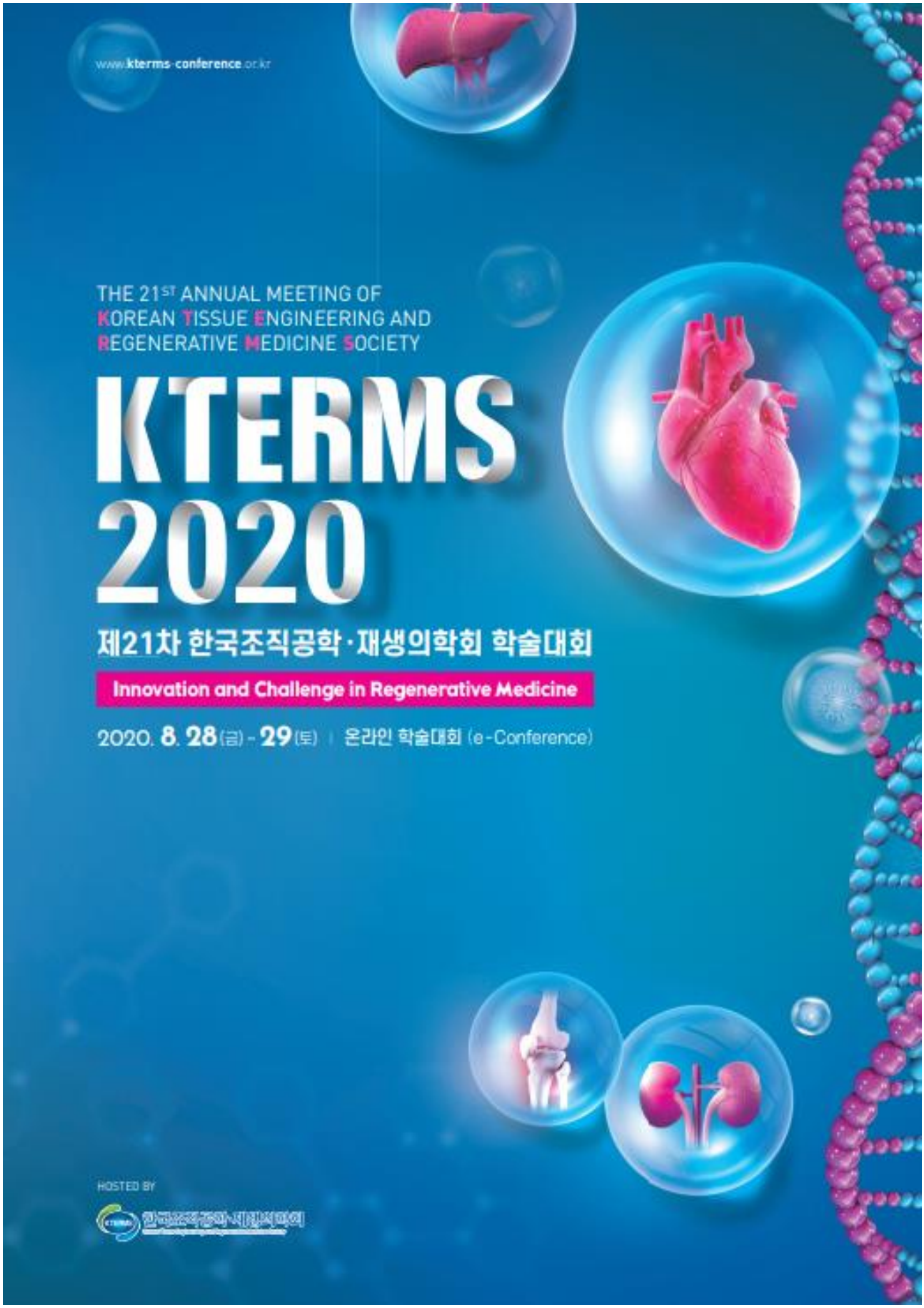
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KTERMS
2020
제21차 한국조직공학·재생의학회 학술대회
Innovation and Challenge in Regenerative Medicine
2020. 8. 28(금) - 29(토) | 온라인 학술대회 (e-Conference)
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KTERMS 2020 e-Poster List

접수번호	최종 발표번호	Topic	Title	e 포스터 발표일(심사일)	Presenter			Corresponding Author		
					Name	Affiliation	Country	Name	Affiliation	Country
P3-0259	P1-053	2. Tissue Regeneration	Cell Subtype-Dependent Formation of Breast Tumor Spheroids and Their Variable Responses to Chemotherapeutics within Microfluidics-Generated 3D Microgels with Tunable Mechanics	2020-08-28	Dongjin Lee	Ulsan National Institute of Science and Technology	Korea(Rep.of)	Chaenyung Cha	UNIST	Korea(Rep.of)
P3-0095	P1-054	2. Tissue Regeneration	Targeted Delivery of Mesenchymal Stem Cell-Derived Nanovesicles for Spinal Cord Injury Treatment	2020-08-28	Ju-Ro Lee	Seoul National University	Korea(Rep.of)	Byung-Soo Kim	Seoul National University	Korea(Rep.of)
P3-0302	P1-055	2. Tissue Regeneration	Novel 3D indirect co-culture system for accelerating osteogenesis of mesenchymal stem cells by paracrine effect	2020-08-28	Hyerim Kim	Seoul National University	Korea(Rep.of)	Kangwon Lee	Seoul National University	Korea(Rep.of)
P3-0162	P1-056	2. Tissue Regeneration	Extracellular vesicles containing tauroursodeoxycholic acid (TUDCA) promotes the osteogenic differentiation of mesenchymal stem cells	2020-08-28	Kyung Yup Cha	Department of biomedicaltechnology, Dongguk University	Korea(Rep.of)	Soo-Hong Lee	Department of biomedicaltechnology, Dongguk University	Korea(Rep.of)
P3-0170	P1-057	3. Stem Cell	ROS producible hMSC based regulator for Cancer Immunotherapy	2020-08-28	Minyoung Jin	Department of Biomedical-Chemical Engineering, The Catholic University of Korea	Korea(Rep.of)	Kun Na	Department of Biomedical-Chemical Engineering, The Catholic University of Korea	Korea(Rep.of)
P3-0221	P1-058	3. Stem Cell	Cell penetrating protein-based transdifferentiation of HUVECs into osteoblasts using OCT-4	2020-08-28	Seung Hyun Kim	Seoul National University	Korea(Rep.of)	Nathaniel Hwang	Seoul National University	Korea(Rep.of)
P3-0071	P1-059	3. Stem Cell	A new role of integrin α3 as a biomarker for selection of senescent tonsil-derived mesenchymal stem cell	2020-08-28	Da Hyeon Choi	Chungbuk National University	Korea(Rep.of)	Yoon Shin Park	Chungbuk National University	Korea(Rep.of)
P3-0075	P1-060	3. Stem Cell	Enhancing neuronal differentiation of neural stem cells using homogeneous nanohole pattern arrays	2020-08-28	Yeon-Woo Cho	Chung-Ang University	Korea(Rep.of)	Tae-Hyung Kim	Chung-Ang University	Korea(Rep.of)
P3-0188	P1-061	3. Stem Cell	Valproic Acid Significantly Improves CRISPR/Cas9-Mediated Gene Editing	2020-08-28	JONGPIL KIM	Dongguk University	Korea(Rep.of)	JONGPIL KIM	Dongguk University	Korea(Rep.of)
P3-0260	P1-062	3. Stem Cell	Meniscus Chondrocytes Show Superior Differentiation Potential Towards Fibrocartilage Compared with Synovial MSCs	2020-08-28	Seoyoung Jang	Department of Medical Engineering, Graduate School, Kyung Hee University, 26, Kyungheedae-ro, Dongdaemun-gu, Seoul, 02447, South Korea	Korea(Rep.of)	EunAh Lee	Impedance Imaging Research Center, Kyung Hee University, 26, Kyungheedae-ro, Dongdaemun-gu, Seoul, 02447, South Korea	Korea(Rep.of)
P3-0267	P1-063	3. Stem Cell	Mycophenolic Acid (MPA) Induces Osteogenic Differentiation of Tonsil-derived Mesenchymal Stem Cells (TMSCs) by Depleting Guanosine Pool	2020-08-28	Se Young Oh	Molecular Medicine, Ewha Womans University	Korea(Rep.of)	Inho Jo	Molecular Medicine, Ewha Womans University	Korea(Rep.of)
P3-0123	P1-064	3. Stem Cell	The light-induced gene delivery and gene therapy utilizing hMSCs.	2020-08-28	Soyeon Bak	Department of Biomedical-Chemical Engineering, The Catholic University of Korea	Korea(Rep.of)	Kun Na	Department of Biomedical-Chemical Engineering, The Catholic University of Korea	Korea(Rep.of)
P3-0159	P1-065	3. Stem Cell	Establishment of Teratoma-derived Human Mesenchymal Stem Cells from Induced Pluripotent Stem Cells	2020-08-28	Dohyun Kim	Dongguk University	Korea(Rep.of)	Soo-Hong Lee	Dongguk University	Korea(Rep.of)
P3-0293	P1-066	3. Stem Cell	Enhanced cell survival and cartilage regeneration with adipose-derived stromal/stem cell spheroids versus single-cell suspension	2020-08-28	Gunil Im	Department of Regenerative medicine	Korea(Rep.of)	Gunil Im	Department of Regenerative medicine	Korea(Rep.of)
P3-0224	P1-067	3. Stem Cell	Comparison of different sources Human Mesenchymal Stem Cells from Tonsil and Turbinate Tissues	2020-08-28	Kyeong Eun Lee	Chungbuk National University	Korea(Rep.of)	Yoon Shin Park	Chungbuk National University	Korea(Rep.of)
P3-0022	P1-068	4. 3D Printing	Quantitative Analysis Of Bioprinting Of Hydroxyapatite-Gelatin Composite For Bone Tissue Engineering	2020-08-28	Hoyeol Lee	Pukyong National University	Korea(Rep.of)	Seung Yun Nam	Pukyong National University	Korea(Rep.of)
P3-0202	P1-069	4. 3D Printing	In-situ Crosslinkable Hyaluronic Acid/Collagen Hydrogel Bioink for Skin 3D Printing	2020-08-28	Moon Sung Kang	Pusan National University	Korea(Rep.of)	Dong-Wook Han	부산대학교	Korea(Rep.of)
P3-0250	P1-070	4. 3D Printing	Electrohydrodynamic 3D printing of Microfiber Bundle Structures for Tissue Engineering Applications	2020-08-28	DOHEE LEE	중재적 메카노 바이오 기술융합 연구센터	Korea(Rep.of)	ChanHee Park	중재적 메카노 바이오 기술융합 연구센터	Korea(Rep.of)
P3-0262	P1-071	4. 3D Printing	3D Bioprinting of Insulin-Producing Cell Aggregates-Derived from Human Pluripotent Stem Cells with Pancreatic Tissue-Derived Bioink	2020-08-28	Myungji Kim	POSTECH	Korea(Rep.of)	Jinah Jang	POSTECH	Korea(Rep.of)
P3-0285	P1-072	4. 3D Printing	Induction of Designed Micro-vascular Network with 3D Bioprinting	2020-08-28	Jeonghyun Son	Ulsan National Institute of Science and Technology	Korea(Rep.of)	Hyun-Wook Kang	Ulsan National Institute of Science and Technology	Korea(Rep.of)
P3-0289	P1-073	4. 3D Printing	Visible-Light Activated Tissue-Derived ECM Bioinks for Printing Biofunctional Tissue Equivalents in Centimeter-Scale	2020-08-28	Byeongmin Kang	Pohang University of Science and Technology	Korea(Rep.of)	Jinah Jang	Pohang University of Science and Technology	Korea(Rep.of)
P3-0100	P1-074	5. Cardiovascular/nerve tissue engineering	Inhibited Thrombosis and Augmented Re-endothelization of the Multifunctional Bioresorbable Stent by Catalytic Generation of Nitrogen Oxides	2020-08-28	Seung-Woon Baek	CHA University	Korea(Rep.of)	Dong Keun Han	CHA University	Korea(Rep.of)
P3-0031	P1-075	6. General bioengineering	Multi-Spheroid-Loaded Human Acellular Dermal Matrix Carrier Preserves Its Spheroid Shape and Improves In Vivo Adipose-Derived Stem Cell Delivery and Engraftment	2020-08-28	Jun Yong Lee	Dept. of Plastic and Reconstructive Surgery, College of Medicine, The Catholic University of Korea	Korea(Rep.of)	Jun Yong Lee	Dept. of Plastic and Reconstructive Surgery, College of Medicine, The Catholic University of Korea	Korea(Rep.of)

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- Visible-Light Activated Tissue-Derived ECM Bioinks for Printing Biofunctional Tissue Equivalents in Centimeter-Scale -

(August 28, 2020 – August 29)

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Abstract

In the field of tissue engineering, decellularized extracellular matrix (dECM) has emerged as a highly biomimetic material, comprising of a complex of tissue-specific proteins and growth factors. Recent studies have presented that tissue or organ-derived dECM can be utilized as a bioink for 3D cell printing to reproduce complex tissue structures as well as biophysical and biochemical cues for tissue-specific function and maturation. Yet, dECM bioinks have been challenged with respect to their printability, shape fidelity and physical properties, resulting in limited scalability. Here, we report dECM-based bioinks that can be mechanically reinforced by the secondary crosslinking with visible-light irradiation (400–450 nm). The mechanism of crosslinking is mainly related to tyrosine radicals, generated by the visible light, coupled with nearby radicals inherent to the dECM to rapidly produce dityrosine, of which synthesis was monitored by autofluorescence measurement. This rapid reaction did not affect bioink viscosity profile but enhanced the compressive and complex moduli of the new bioinks by 4.3 and 10.8 times, respectively, compared with those of original dECM bioinks. Photopolymerized dECM bioinks enabled successful fabrication of cylindrical constructs to 86% of the pre-designed height, 5.5 mm, whilst non-photocrosslinked constructs could only be fabricated to approximately 23% of original height. In addition, geometrically complex and large constructs (e.g., the human ear and a hollow pyramid) could also be fabricated without any additional supports. Biocompatibility and tissue-specific functionality of the new bioinks were then confirmed based on the cornea and the heart. Encapsulated keratocytes in cornea-derived dECM (Co-dECM) bioinks with crosslinker showed similar level of functions to the cells in the original Co-dECM bioink, upregulated mRNA levels of cornea-specific genes (KERA and ALDH), and downregulated the level of the myofibroblast marker, ACTA2. The residual crosslinkers were washed by immersion of the printed constructs into the basal medium for 30 min, indicating the preservation of transparency and light transmittance of the 3D-printed cornea. In addition, iPSC-derived cardiomyocytes encapsulated in the heart-derived dECM (hdECM) bioinks with crosslinker maintained their viability higher than 80% at day 2, with the similar level of cardiac-specific marker gene expression such as cTnT, MYH6, CACNA1A, and ATP2A2 to that of the control group. Taken together, the visible-light activated dECM bioinks enable bioprinting of tissue constructs with complex and scalable geometry and biofunctional capacity emulating native tissues, which may serve as a platform for a wider biofabrication window in the field of tissue engineering.

Conclusion

- The visible-light activated dECM bioinks successfully improved physical properties, printability of original dECM bioinks.
- Various dECM-based structures could be printed without any supporting or sacrificial material by using the developed bioinks.
- Biocompatibility and biofunctionality of the new bioinks were then confirmed based on the cornea and the heart.
- Therefore, our new dECM-based bionks may serve as a platform for a wider biofabrication window in the field of tissue engineering.

Acknowledgement

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