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PO-194 **'Find-me' signaling microparticle boosts antitumor immune response for cancer immunotherapy**

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PO-195 **Hyaluronic acid-bilirubin nanomedicine-based combination chemoimmunotherapy**

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분야 VI : Biofabrication & 3D Printing

PO-196 **Chitosan-based borate hydrogels for tissue regeneration**

Weiqiang Hao[1] and Kyueui Lee[1,*]

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PO-197 **Advancements in 3D bioprinting technology-derived biofabrications for establishing high-quality *in vitro* tissue/disease model**

Jungbin Yoon[1,4], Narendra K. Singh[2], Yoo-mi Choi[3,4], Dong-Woo Cho[1] and Jinah Jang[1,3,4,*]

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PO-198 **3D printing of tissue-stimulator integrated biohybrid platform to increase efficacy of pancreatic islets through electrical stimulation**

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PO-199 **3D co-axial bioprinting of visible light-activated decellularized extracellular matrix-based bioinks to build liver-like tissue modules**

Daekeun Kim[1], Donghwan Kim[2], Yoo-mi Choi[1], Dayoon-Kang[3,4], Jaewook Kim[4] and Jinah Jang[1,2,3,4,*]

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PO-200 **Development of magnetic polarity patterning for 4D-printed structure mimicking myocardial fiber orientation**

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PO-201 **3D printed electroconductive and stretchable composite hydrogel patches for accelerated wound healing**

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PO-202 **3D printable and stretchable hyaluronic acid methacrylate hydrogels for enhanced wound healing**

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PO-203 **Effect of oxygen ratio in atmosphere on post-curing of dental 3D printing materials**

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PO-204 **Development of electrospun nanofibrous hydrogels injectable with precise volume control**

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PO-205 **Multi-channel microfluidic system to analyze the effects of interleukin 6 on lymphatic breast cancer metastasis**

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PO-206 **Biofabrication of 3D tumor models surrounded by capillaries and arteries**

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PO-207 **Villi differentiation of intestinal epithelial cells grown in the tubular structure generated by 3D bioprinting**

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PO-196

Chitosan-based borate hydrogels for tissue regeneration

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Finding an ideal hydrogel system has been a major challenge in tissue engineering. Here, we developed an injectable hydrogel loaded with DPCA by dynamic borate crosslinking of chitosan-boronic acid (CS-BA) hydrogels with polyphenols, making it a promising candidate for tissue regeneration applications. The chitosan backbone imparts antimicrobial and antioxidant properties, while the catechol moiety is able to rapidly gel with the boronic acid group under alkaline conditions. This hydrogel loads and releases DPCA, which enables stable expression of HIF-1α protein and induces tissue regeneration. Key properties of the hydrogel include shear-thinning ability, antimicrobial and antioxidant capacity, good biocompatibility, and 3D printing potential. In addition, the hydrogel's ability to control drug release enhances its potential for therapeutic applications. This hydrogel shows great promise in the field of cell-loaded matrices for tissue engineering applications. Further studies are underway to explore its full potential.

PO-197

Advancements in 3D bioprinting technology-derived biofabrications for establishing high-quality *in vitro* tissue/disease model

Jungbin Yoon[1,4], Narendra K. Singh[2], Yoo-mi Choi[3,4], Dong-Woo Cho[1] and Jinah Jang[1,3,4,*]

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The evolution of 3D bioprinting technology has transformed tissue engineering and disease modeling, allowing the precise creation of intricate *in vitro* tissues. Recent progress in 3D bioprinting technology has led to high-quality *in vitro* tissue and disease models. Bioinks based on sterilized corneal-derived extracellular matrix (Co-dECM) and incorporating living cells (human keratocytes and corneal epithelial/ conjunctival cells) have enabled the accurate construction of complex human corneal tissues. More physiologically relevant disease models have been achieved by combining biocompatible bioinks and 3D bioprinting technology. Specifically, we studied and analyzed organ interactions, like the kidney-gut axis, using microfluidic systems and 3D bioprinting technology. These biofabrication techniques shed light on multiorgan-related disease conditions such as secondary hyperoxaluria in a single *in vitro* model. Such evolution of biofabrication techniques, including lung-derived dECM bioinks and patient-derived lung cancer organoids (LCOs), has also led to vascularized lung cancer models. These *in vitro* models, with lung cancer organoids, fibroblasts, and vessels, serve as promising tools for testing drug resistance and simulating cancer environments. In essence, evolving 3D bioprinting technology marks a new era for *in vitro* tissue and disease modeling, accelerating drug discovery, disease comprehension, and personalized medicine, ultimately bridging the gap between laboratory research and clinical applications.

PO-198

3D printing of tissue-stimulator integrated biohybrid platform to increase efficacy of pancreatic islets through electrical stimulation

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Type 1 diabetes arises from the progressive loss of beta cells, impairing blood glucose regulation. Islet transplantation is a potential remedy, yet challenges remain in the low efficacy of the isolation process and overcoming donor scarcity. To address these, we propose enhancing beta cell performance via controlled membrane depolarization using external electrical stimulation (E-stim) to enhance islet equivalents (IEQ) functionality. Our approach involves a biohybrid platform for E-stim and 3D bioprinting technology for precise pancreatic tissue construction. The platform seamlessly integrates tailored electrodes, 3D-printed using biocompatible polymer (PEVA) with conductive carbon nanomaterials (carbon black). Characterized through rheology and electrochemical impedance analysis, they exhibit high conductivity and charge storage capacity. MIN6m9 cells, rat pancreatic beta cells, were bioprinted into islet configurations, demonstrating synchronized intracellular calcium elevation upon E-stim. Transitioning to primary rat islets, our platform significantly enhanced insulin secretion through E-stim, validated by elevated markers related to insulin secretion. Combining the biohybrid platform and E-stim offers a promising avenue to improve isolated IEQ functionality, potentially mitigating donor scarcity challenges in type 1 diabetes therapy through further implanting the platform. Moreover, the strategy paves the way for innovative approaches in enhancing functional outcomes in other cell-based regenerative treatments.

PO-199

3D co-axial bioprinting of visible light-activated decellularized extracellular matrix-based bioinks to build liver-like tissue modules

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Addressing the shortage of donor livers for transplantation is a critical focus in liver tissue engineering. However, it's challenging to engineer liver grafts meeting at least 30% of the recipients' liver mass using current biofabrication methods. The paradigm of tissue assembly offers an efficient and flexible approach to fashioning volumetric tissue constructs. Moreover, integrating bioprinting technologies into tissue assembly systems has expanded the size of fabricable tissue modules. For generating large-scale tissue modules, bioink selection, a pivotal determinant in bioprinting, necessitates careful consideration. In this study, we formulated biocompatible dERS bioinks capable of photo-crosslinked under visible light irradiation within several seconds to minutes, utilizing a decellularized extracellular matrix (dECM) to emulate an *in vivo* microenvironment. Additionally, we established a multi-material bioprinting system using dERS bioink and sacrificial material to fabricate centimeter-sized porous living tissue constructs. Furthermore, combining co-axial nozzles with the developed bioprinting system, we fabricated a pre-vascularized liver-like tissue module using cell-specific dERS bioinks to recapitulate liver-specific microstructures. Remarkably, liver-like tissue modules with patterned vascular structures enhanced vascular development and liver-specific function. The developed pre-vascularized liver-like tissue modules are expected to open a new chapter to building clinically relevant-sized liver constructs for liver implants.