

세미나 초록

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발표 주제	Engineered vascular endothelium model
발표 내용	<p>The maintenance of human physiology relies heavily on the proper function of blood vessels. Here, we propose an engineered endothelium model (EEM) as a valuable tool for vascular research and disease modeling. An artificial basement membrane, where porous polyvinyl alcohol (PVA) hydrogel was securely integrated with human fibroblast-derived, decellularized extracellular matrix (hFDM) on both sides was fabricated first and followed by endothelial cells (ECs) and pericytes (PCs) adhesion, respectively. Our EEM successfully formed robust cell-cell adherens junctions, vascular endothelial cadherin (VE-cad) and developed a functional barrier as assessed by permeability tests. The functionality of EEM was proved by nitric oxide (NO) secretion with time. We found the hemoglobin alpha 1 (Hb-α1) in our EEM, only when ECs and PCs interacted each other. Hb-α1 not only regulated NO but had a strong connection with VE-cad. Under inflammatory milieu (TNF-α), the responsiveness of EEM was also confirmed by significantly disrupted VE-cad and elevated inflammation-related markers in ECs. Interestingly, we noticed a resilient property of our EEM, where the inflammatory endothelium was returned to normal state with time. Furthermore, our EEM was successful in recapitulating foam cells formation, an early hallmark of atherosclerotic development, where a series of sequential events included human monocytes (THP-1) adhesion, transendothelial migration, differentiation into macrophages and oxidized low-density lipoprotein (Ox-LDL) uptake. In summary, our EEM proved to be an excellent vascular model and holds great a promise in advancing our understanding of vascular biology and diseases, and also toward the practical benefits like drug screening.</p>