

세미나 초록

성명	방석호
소속	성균관대학교 화학공학/고분자공학부
발표 주제	Subaqueous 3D stem cell spheroid levitation culture and its application using novel bioreactor based on sound wave superposition
발표 내용	<p>Conventional 3D cell culture methods require a comprehensive complement in labor-intensive and time-consuming processes along with in vivo circumstantial mimicking. In this presentation, we describe a subaqueous free-standing 3D cell culture (FS) device that can induce the omnidirectional environment and generate ultrafast human adipose-derived stem cells (hADSCs) that efficiently aggregate with compaction using acoustic pressure. The cell culture conditions were optimized using the FS device and identified the underlying molecular mechanisms. Unique phenomena in cell aggregation have led to extraordinary cellular behavior that can upregulate cell compaction, mechanosensitive immune control, and therapeutic angiogenesis. Therefore, we designated the resulting cell aggregates as “pressuroid.” Notably, external acoustic stimulation produced by the FS device affected the pressuroids. Furthermore, the pressuroids exhibited upregulation in mechanosensitive genes and proteins, PIEZO1/2. CyclinD1 and PCNA, which are strongly associated with cell adhesion and proliferation, were elevated by PIEZO1/2. In addition, we found that pressuroids significantly increase angiogenic paracrine factor secretion, promote cell adhesion molecule expression, and enhance M2 immune modulation of Thp1 cells. Altogether, we have concluded that our pressuroid would suggest a more effective therapy method for future cell therapy than the conventional one.</p>