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A 3D HUMAN LUNG-ON-A-CHIP MICRODEVICE FOR NANOTOXICITY TESTING

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The expansion of nanoparticles (NPs) and nanomaterials application has drawn increasing concerns about their impact on environment and human health. Lung is the major target organ during NP exposure. Establishing an *in vitro* lung model could promote nanotoxicity studies on pulmonary system and paratheatrical development. We proposed a new 3D human lung-on-a-chip that recapitulates the organ-level structure and functions of *in vivo* lung to investigate nanotoxicity during pulmonary NP exposure. The microdevice mimicked the alveoli niche including cellular components, 3D extra cellular matrix, and flow cue to reconstitute the alveolar capillary barrier, allowing tissue/organ level analysis of nanotoxicity during NP exposure (ZnO and TiO_2). The results exhibit decreased tight junction protein expression, increased permeability, dose dependent cytotoxicity under the treatment of NPs, and revealed their varied ability to drive ROS and apoptosis on lung epithelium. This *in vitro* 3D ACB model demonstrated great potential in the study of human pulmonary health, as well as safety assessment for nanoparticles, environment, food and drugs.

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