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High throughput screening method for nanoparticles toxicity using 3D cells

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With the increase of nano-consumer using nanomaterials, the potential exposure to nanomaterials have been raised. Therefore recently the human and environmental impacts of nanomaterials have emerged as an issue. However, there are no suitable methods to evaluate the cytotoxicity of nanoparticles based on high-throughput screening method. High-throughput approaches allow the bulk of the screening analysis for manufactured nanoparticles and high volume data generation for nanoparticle toxicity. To assess the potential toxicity of manufactured or engineered nanoparticles, traditional in vitro toxicity studies have been performed using normal 2D culture system. But several problems were encountered during assay validation, ranging from particle agglomeration in biological media and optical interference with assay system. To date, there are several ISO activities on the cytotoxic effects of nanoparticle using cell viability assay and detection of ROS level. This work item is different from the others in that new assay platform such as 3D cells on pillar insert was applied to evaluate the cytotoxicity to exclude the artifacts of traditional cell-based assay such as optical absorption and reactivity with assay reagent. 3D cells based on pillar insert provide more in vivo mimicking state and to allow us to easily change cell growth media or expose 3D cells to detecting reagents by immersing the tip of the pillar insert in different reaction plates. This method allows the high-throughput screening of nanoparticle cytotoxicity by excluding the optical absorption and reactivity with assay reagent.

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