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Using 3D Reconstitution of the Different Length of Exposed to Aluminum Oxide THP-1 Cells Responses Nanoparticles

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In this study, we compared cytotoxicity induced by different length of aluminum oxide (Al_2O_3) nanoparticles in THP-1 cells (human acute monocytic leukemia cell line); nano sized spheres, and nano sized short and long fiber. Average sizes of each aluminum oxide nanoparticles were N- Al_2O_3 (<30nm), S- Al_2O_3 (2-4nm x 100-1000nm), L- Al_2O_3 (2-4nm x 2800nm) according to the manufacturer. Aluminum oxide nanoparticle crystal form was measured using a scanning electron microscopy. Different length of aluminum oxide nanoparticles were tested for biological activity using THP-1 cells and uptake of exposed aluminum oxide nanoparticles into THP - 1 cell, using the 3D structures were observed by transmission electron microscopy. By each size of the THP - 1 cell Nanoparticles're located in the cytosol was confirmed again .Nanoparticles were located in the cytosol as aggregates compared to the untreated THP-1 cells. Cytotoxicity induced by different length of aluminum oxide nanoparticles was measured by WST-1 assay.

To analyze intracellular reactive oxygen species (ROS) level, the N-, S-, L- Al_2O_3 nanoparticles treated cells were loaded with 2',7'-difluorescencein diacetate. The fluorescence intensity of DCF florescence was immediately analyzed with FACS Calibur at an excitation/emission wavelength of 488/530 nm. The levels of IL-1beta in culture supernatants were then assessed by a commercial enzyme-linked immunosorbent assay (ELISA) kit according to the manufacturer's instructions. Consequently, we found that aluminum oxide have length dependent cytotoxicity such as formation of ROS and release of inflammatory cytokines.

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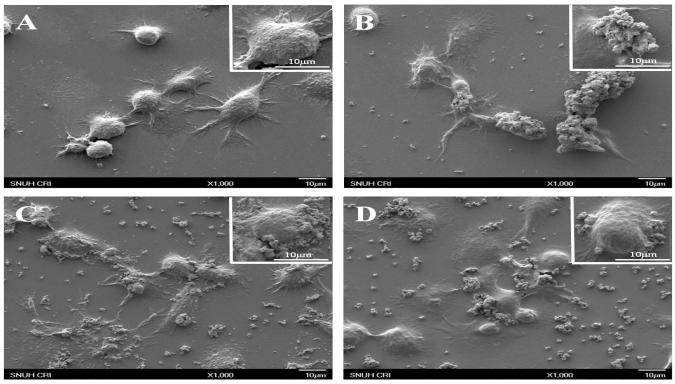

Fig. 1 Scanning electron microscopy of PMA-primed THP-1 cell morphology with or without presence of Al_2O_3 nanoparticles

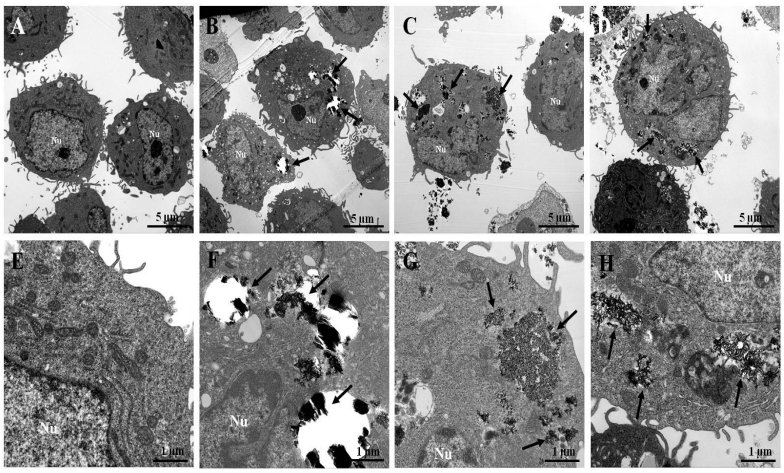

Fig. 2 Observation of particle phagocytosis by PMA-primed THP-1 cells

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