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How ultrafine particles may interact with pulmonary cells

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There is evidence from in vitro (Rothen et al., 2001; 2002) and in vivo (Geiser et al, 2003b; Kapp et al., 2003) studies that particles deposited on the internal lung surface may be taken up by any cells and are translocated rapidly beyond the epithelial barrier into the lung tissue. It has been shown that this transport involves not only phagocytosis, a specific ligand-receptor mediated and actin based process, but is also guided by other mechanisms like non-specific adhesive interactions between particles and the cell membranes. Furthermore, we have evidence that these mechanisms for the uptake of particles by cells and, hence, the route of translocation of particles into the pulmonary tissue depends on particle size. First data of our studies on particle-cell interaction and the cellular interplay may help to understand this rapid particle translocation. Knowing the mechanisms of particle translocation and the interplay of the different cell types involved as well as the role of surfactant will enhance our ability to understand airway diseases and to design aerosolised drugs against them.

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