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Intracellular Fate of Non-Biodegradable Nanoparticles

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Nanoparticles (NPs) are puzzling scientists since their discovery due to their interesting size-depending properties. The biomedical field in particular tries to apply these unique features into useful tools to improve existing drugs and methods or even create new ones. Active and passive targeting, stimuli-responsive drug release, hyperthermia treatments or increased blood circulation times are only few benefits the nano-world has offered to improve our medical possibilities. Understanding and knowing the fate of such NPs in the human body is pivotal to develop save and efficient nano-based drugs.
To improve the understanding of the fate of non-biodegradable NPs two different materials were investigated: Gold and Silica.
The fate of such Gold or Silica NPs in immune cells (macrophages) was assessed using flow cytometry, laser scanning microscopy and inductively coupled plasma optical emission spectroscopy.
While dividing immune cells were able to reduce their uptaken NP-load over time *via* dilution due to mitosis, the non-proliferating cells retained their uptaken NPs within intracellular vesicles.
The retention and with it the possible accumulation of NPs in cells could potentially have negative effects on the cell's biological function and therefore be detrimental for the human health. The effects of particle accumulation within cells are therefore required to be investigated.
The study covers only a small spectrum of the complex biological situation and therefore more studies in this direction are required. However, these insights highlight the importance of such studies in order to produce safe-by-design nanomedicines.

Jury:
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