Nanoparticle-Organism Interactions: Cellular Uptake and Biodistribution

- Chapter
- First Online: 20 March 2024
- pp 79–101
- Cite this chapter

Environmental Nanotoxicology

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Abstract

Nanoparticles are extremely small particles that can enter and permeate several organs, including the skin, gut, and lungs. Nanoparticles' size and surface characteristics affect how deeply they can penetrate. Prior to doing *in vivo* experiments, *in vitro* tests on the toxicity of nanoparticles must be completed. Numerous investigations have revealed that certain nanoparticles exhibit toxicity in biological systems. Many nanoparticles can produce active oxygen, which in turn triggers oxidative stress and inflammation in the reticuloendothelial system (RES), according to some studies. Nanomaterials, plasma, and blood components can interact thanks to the translocation of nanoparticles into the bloodstream. A "protein corona," which is created when nanoparticles come into contact with plasma proteins, may change the biological and pharmacological characteristics of the metallic nanoparticles. Numerous molecular and physicochemical factors, such as particle size, shape, and crystallinity, affect how hazardous nanoparticles behave. Inhaled nanoparticles may have unintended side effects such as lung inflammation and heart problems. Before final application, freshly created nanoparticles are tested for potential toxicity *in vitro* to see whether they pose a risk to the health of both producers and consumers. Though the findings acquired do not clearly depict the impact of nano-carriers, the interaction of nanoparticles with skin, and particularly skin models, is an exciting subject.

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Cite this chapter

Yakubu, J.G., Isibor, P.O., Sunday, A.S., Iseghohi, F., Taiwo, O.S., Oyewole, O.A. (2024). Nanoparticle-Organism Interactions: Cellular Uptake and Biodistribution. In: Isibor, P.O., Devi, G., Enuneku, A.A. (eds) Environmental Nanotoxicology. Springer, Cham. https://doi.org/10.1007/978-3-031-54154-4_5

Download citation

- .RIS
- .ENW
- .BIB

- DOIhttps://doi.org/10.1007/978-3-031-54154-4_5
- Published20 March 2024
- Publisher NameSpringer, Cham
- Print ISBN978-3-031-54153-7
- Online ISBN978-3-031-54154-4
- eBook PackagesEarth and Environmental ScienceEarth and Environmental Science (R0)

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