

## #2004 - How can nanotechnology be applied to diagnosis and therapy of kidney diseases?

Authors and Affiliations

Narges Elahi  
Nanobiotechnology Research Center, Baqiyatallah  
University of Medical Sciences, Tehran, Iran

Corresponding Author and email

\* Corresponding author. Narges Elahi stu.elahi.n@bmsu.ac.ir

Body

**Introduction:** Substantial improvement has been made in nanomedicine, initially in the form of nanoparticles (NPs), for theranostic applications to various diseases. Explicit physical and chemical attributes make nanoparticles prodigious scaffolds in medicine that they may diminish undesirable systemic side effects and dominate several physical and physiological barriers that systemic drug administration typically encounters. The interactions of nanoparticles with different kidney compartments can be accurately adjusted by modulating their size, shape and surface chemistry. In this study, the biomedical applications of nanoparticles, as a considerable candidate tool in nanotechnology, in particular in kidney disease have been investigated.

**Results and discussion:** In addition to the organs of the RES, the kidneys are the second major organ for blood filtration and waste elimination and so play a main role in the transport and clearance of nanoparticles in vivo. A large number of nanoparticles including organic and inorganic NPs (polymeric nanoparticles, dendrimer-based nanoparticles, liposomal nanoparticles, gold nanoparticles, quantum dot-based nanoparticles, carbon nanoparticles, magnetic iron oxide nanoparticles) have been exploited for the diagnosis and treatment of kidney diseases. By understanding the anatomy and normal physiology of the kidneys and its unique set of barriers to successful delivery, the design NPs delivery systems can be achieved properly for renal applications.

**Conclusion:** Recently, the conventional biomedical methods have been successfully substituted with modern nanotechnology methods for significant accuracy, much sensitivity, efficiency and high-speed measurement. These advances in nanotechnology are because of the improvement of engineered nanoparticles. The current

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flourished development and application of nanoparticles for diagnosing and treating nephropathologies are the vivid evidences.

**Keywords:** Kidney diseases, nanotechnology, nanoparticles, medical application

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