

Nanoparticle-Based Imaging Techniques- A Comparative Analysis [†]

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Abstract: Nanotechnology is applied for innovative imaging in the field of medical technology. The imaging at the nanoscale can give a more detailed picture at the cellular level. Nano-based methods are emerging in bioimaging because of their improved potential at a much smaller scale and their ability to serve as contrast agents for tracking experiments. Several imaging nanoparticles have been tried at different stages, such as detection, diagnosis, and image-guided treatment of various diseases. Inorganic nanoparticles (iron oxide, gold, silica, calcium phosphate), carbon-based nanoparticles (carbon nanotubes, perfluorocarbon nanoparticles, graphene nanoparticles), and Biological nanoparticles (liposomes, polymers, dendrimers, polyelectrolyte complexes) are being used for imaging purposes. Specialized nanostructures like quantum dots, molecular dots, and nanowires have also been effectively applied for bioimaging. This review attempts to analyze the role of different nanoparticles in biological imaging and their future potential. It also attempts to analyze the impact of different nanoparticles in bioimaging and the advantages and disadvantages associated with various nanoparticles. Since nanoparticles can be modified for their size, composition, shape, and other characteristics, they could be tuned effectively to take them to the clinic are also analyzed. Toxicity of the nanoparticles plays a major role in hindering the progression of a nanoparticle to the clinic, and hence the potential nanoparticle that can make it to market-based on toxicity is also analyzed.

Keywords: nanoparticles; bioimaging; inorganic nanoparticles; carbon based nanoparticles; biological nanoparticles; quantum dots.

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Conflicts of Interest

The authors declare no conflict of interest.