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The impact of nanotherapeutics in transforming the medicine

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Regardless of the administration routes, delivery of small molecule drugs to their target sites of action historically poses one of the biggest challenges due to their homogeneous tissue distribution, renal clearance and lack of target specificity. Nanotherapeutics have evolved as novel drug formulations at dimensions of roughly 1-100 nanometers by the integration of nanotechnology with medicine for treating and preventing critical human diseases effectively and precisely. The favorable pharmacokinetics with prolonged circulation time, selective endothelial permeability at several target tissues and high specificity for biological targets are the attractive attributes of nano-pharmaceuticals driving the pharmaceutical industries to conduct many pre-clinical and clinical trials, with enormous successes seen in the past in getting approval and commercialization of nanotechnology-based medical products. Diversified approaches based on synthetic, recombinant, hybridoma and phage display technologies have been undertaken to fabricate a variety of nanoparticulate and macromolecular carriers and drugs to overcome the multi-step extracellular and intracellular barriers and to facilitate development of novel strategies for therapeutic delivery and imaging.

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