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Pharmaceutical Nanotechnology Application and Challenges

Samiksha Subhash Gawai[1], Dr. Shivshankar D Mhaske[2], Akash More[3]
Student, B Pharm Final Year, Satyajeet College of Pharmacy, Mehkar, India[1]
Principal, Satyajeet College of Pharmacy, Mehkar, India[2]
Professor, Satyajeet College of Pharmacy, Mehkar, India[3]
samikshgawai2021@gmail.com

Abstract: *Pharmaceutical nanotechnology is a rapidly evolving field that leverages the unique properties of nanomaterials, such as nanoparticles, nanostructured materials, and nanodevices, to improve drug delivery, diagnostics, and therapeutic efficacy.*

Nanotechnology in the pharmaceutical industry holds the potential to overcome the limitations of traditional drug delivery systems by enhancing bioavailability, enabling targeted therapy, and reducing side effects. Applications of nanotechnology include nanoparticle-based drug delivery systems, gene and RNA therapy, diagnostics, vaccine development, and tissue regeneration. Despite its significant promise, the field faces various challenges, such as concerns over safety and toxicity, regulatory hurdles, manufacturing difficulties, and scalability.

The lack of standardized regulatory guidelines and the complexity of evaluating the safety of nanomaterials in vivo add to the challenges. Nevertheless, pharmaceutical nanotechnology is poised to revolutionize the treatment of numerous diseases, offering new solutions to complex medical problems. Ongoing research, innovation, and careful evaluation are essential to unlock its full potential while addressing the associated challenges.

Keywords: Pharmaceutical nanotechnology