

Impact of Nanotechnology in Tissue Engineering Applications and in Regenerative Medicine

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ABSTRACT

The influence of nanotechnology on the healthcare industry is substantial, particularly in the areas of diagnosis and treatment. Recent investigations in nanotechnology for drug delivery and tissue engineering have delivered high-impact contributions in translational research. The scope of biomaterials has undergone a notable expansion with the advent of electrospinning and the processing of natural or semi-synthetic macromolecular structures. The focus of biomaterial synthesis is targeted towards the development of implants based on interfacial reactions, biomechanics, and fracture mechanics. Further it is extended for drug delivery systems, drug/polymer interactions, and use of reabsorbable bioactive particulates or porous networks to activate mechanisms of tissue regeneration *in vivo*. The surface modification of biomaterials includes the creation of biomimetic materials to imitate natural processes and structures, and the design of sophisticated 3D architectures to produce well-defined patterns for diagnostics. Therefore, biomaterials consist of both simple devices and highly complex functional materials to control biological interactions. Our investigation focuses on the versatile application of transplantation technology with the use of biomaterials synthesized through electrospinning and electrospraying methods. This includes approaches like the restoration of infarcted heart, periodontal regeneration, wound dressing, surgical sutures, neuronal regeneration, blood vessels, coated stents etc.