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Editorial

Potent Behaviour of Nanomaterial's and its use in the field of Nano medicine

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INTRODUCTION

The advent of nanotechnology, as well as its evolution, has improved a number of scientific fields greatly. This is especially true when creating novel medication compounds and goods. Nanotechnology has gradually become a part of our everyday lives in recent years. An integrated approach has allowed this ground-breaking technology to be used in a variety of fields. There are an increasing number of applications and goods available that use nanoparticles or at least claim to be Nano-based. Pharmaceutical research is no exception. Nanotechnology is now being used in the development of novel medications, and it has been designated as a Key Enabling Technology by the European Union (EU), capable of bringing new and creative medical solutions to address unmet medical needs. Nano medicine is the use of nanoparticles for illness diagnosis, monitoring, control, prevention, and therapy. In Nano medicine, nanomaterial's can be used for diagnosis (Nano diagnosis), controlled medication delivery (Nano therapy), and regenerative medicine [1]. Theranostic, a promising technique that holds both the diagnosis/imaging agent and the treatment in the same system, is a novel field that combines diagnostics and therapy. Nano medicine is bringing about positive changes in clinical practice by introducing novel medicines for both diagnosis and treatment, allowing us to address unmet medical needs by I integrating effective molecules that would otherwise be unavailable due to their high toxicity (e.g., Me pact), (ii) utilizing multiple mechanisms of action (e.g., Nano mag, multifunctional gels), (iii) maximizing efficacy (e.g., by increasing bioavailability) and reducing dose. This is due to nanoparticles' inherent characteristics, which have resulted in numerous benefits in pharmaceutical research. Nano materials have a large specific surface area compared to their volume due to their microscopic size. As a result, the surface energy of the particles increases, making nanomaterial's more reactive. When in contact with biological fluids, nanomaterials have a proclivity for adsorbing biomolecules such as proteins and lipids, among others [2]. The plasma/serum biomolecule adsorption layer, also known as "corona," arises on the surface of colloidal nanoparticles and is one of the most essential interactions with living matter. Its makeup is determined by the nanoparticles' point of entry into the body and the fluid they come into contact with (e.g., blood, lung fluid, gastro-intestinal fluid, etc.). As the nanoparticle moves from one biological compartment to another, further dynamic changes may have an impact on the "corona" composition. In addition, electron confinement in nanomaterials allows for changes in optical, electrical, and magnetic properties that can be tunable. Nano materials can also be created to have a variety of sizes, shapes, chemical compositions, and surfaces, allowing them to interact with a variety of biological targets. Only by employing precise particle design can a successful biological consequence be achieved. As a result, for two key reasons, a thorough understanding of how nanomaterial interacts with biological systems is necessary [3]. The first is concerned with the disease's physio pathological nature. Diseases are caused by biological processes that take place at the Nano scale, such as altered genes, misfolded proteins, virus or bacterial infection, and so on. A greater knowledge of molecular processes will allow for logical design of engineered nanomaterial's that will target the intended site of action in the body. The interaction of nanomaterial surface and surroundings in biological fluids is another source of concern. The characterization of biomolecules corona is critical in this context for understanding how the reciprocal interaction of nanoparticles and cells influences biological responses. This interface includes dynamic mechanisms for exchanging information between nanomaterial surfaces and biological component surfaces (proteins, membranes, phospholipids, vesicles, and organelles). The nanomaterial's and suspending media's compositions cause this interaction. Some of the material features that determine the respective surface attributes include size, shape, surface area, surface charge and chemistry, energy, roughness, porosity, valence and conductance states, the presence of ligands, or the hydrophobic/ hydrophilic character [4]. Water molecules, acids and bases, salts and multivalent ions, and surfactants are some of the medium-related components that influence contact. All of these factors will influence the properties of the nanomaterial-biological interface and, as a result, encourage diverse cellular fates. A better understanding of how the bio interface's physicochemical qualities influence the cellular signalling cascade, kinetics, and transport will give crucial design rules for nanomaterial's.

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Pharmaceutical Development Obstacles: Bringing nanotechnology from the lab to the market has faced a number of difficulties. Physicochemical characterization, biocompatibility, and Nano toxicology evaluation, pharmacokinetics and pharmacodynamics assessment, process control, and scale-reproducibility evaluation are some of the general challenges to consider during the creation of Nano medicine products [5].

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