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Commentary

Applications and Design of Polymer Therapeutics

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DESCRIPTION

Polymeric materials have been used for decades in therapeutic applications such as drug delivery and tissue regeneration due to their biocompatibility and appropriate mechanical properties. In addition, selected polymer-drug conjugates are used as bioactive drugs due to their improved efficacy, solubility and target specificity of the drug compared to small molecule drugs. Improved synthetic control of polymer properties enables the manufacture of polymer assemblies for targeted and controlled drug delivery [1]. Polymer materials have been used for decades in biomedical applications such as drug delivery, implants, contact lenses, vascular grafts, dental materials, and selected artificial organs.

Their useful and adjustable mechanical properties have provided a wide range of usefulness in the structural support or replacement of tissues or in the controlled retention and release of drugs. Polymers, which have long been considered non-therapeutic and heterogeneous in terms of molecular weight, composition and structure. Many specific benefits that is essential in the treatment of human diseases. Bonding to the polymer prevents the breakdown of the drug and improves efficacy by prolonging the drug circulation time [2]. In addition to the environmental protection provided by polymers, the adjustable and responsive properties of many polymer backbones also improve the route of targeted drug delivery. Small molecule drugs can be physically encapsulated or covalently attached to macromolecular micelles and or core shell nanoparticles to form macromolecular aggregates. Improving the therapeutic effect of drugs, selective delivery of drugs to target cells, and reduced toxicity Side effects on other organs are major challenges and research areas in the development of these polymer assemblies.

Drug-polymer conjugates supra molecular drug delivery systems and polymer-protein conjugates are all examples of polymer therapies. By attaching enzymes or physiologically significant proteins to polyethylene glycol components created. The version of adenosine deaminizes is one of polymer-protein. This technique involves coupling low-molecular-weight anticancer drugsto high-molecular-weight polymers through a cleavable linker. Drug delivery methods based on clearly specified covalent bonding and dendritic polymers constitute another type of polymer therapies [3]. These include dendritic core-shell structures for drug encapsulation, polymeric compounds with DNA or RNA, and poly anionic polymers. Specific areas in which accurate polymer designs can benefit include gene delivery, drug delivery, antibacterial polymer therapeutics, and polymer-peptides, polymers-nucleic acids, polymer-drugs, and protein-polymer conjugates contains bioactive. Since polymer design is often a non-intuitive process, future development in these areas will be facilitated by high-throughput research and an advanced approach to data-driven design.

The areas of high-throughput research can be divided into combinatorial chemistry, High-Throughput Experiments (HTE), and High-Throughput Screening (HTS). In combinatorial chemistry related parameters (solvent, material composition, additives, etc.) are tested in parallel. HTE involves testing numerical variables such as temperature, pressure, time and volume while HTS is a parallel high-speed test [4]. HTS first expanded into the life sciences and pharmaceutical industry in the 1950s, conducting extensive screening of small molecule libraries. The main obstacle to establishing a more user-friendly polymerization technique is air intolerance due to oxygen or moisture [5]. Over the last decade, progress has been made by several groups demonstrating outdoor technologies for Ring-Opening Polymerization (ROP), RAFT polymerization, and atom transfer radical polymerization. ROP is a widely used technique for the synthesis of biodegradable polymers such as Poly Capro Lactone (PCL), Poly Lactic Acid (PLA), and Poly Lactic Acid-co-Glycolic Acid (PLGA).

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