194f Novel Nanoparticles for Controlled Drug Delivery across the Blood-Brain Barrier

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Research shows that the cost of developing an average new therapeutic agent is approximately $150 million. However, the use of these therapeutic agents is frequently still hampered by the lack of an effective route and mode of delivery. The reasons for this reduced efficacy is because many of these therapeutic agents, especially therapeutic proteins and peptides, have very short half-lives, do not cross biological barriers and are metabolized at other tissue sites. Therefore, improving the effectiveness of therapeutic agents by optimizing their delivery and dosage and minimizing side effects may be a better investment and more beneficial to patients than creating entirely new pharmaceuticals.

The blood-brain barrier (BBB) is a dynamic and complex structure composed principally of specialized capillary endothelial cells held together by highly restrictive tight junctions. As the name implies, the BBB serves as a barrier that prevents the passage of cells and proteins, including therapeutic agents, present in the bloodstream from gaining access to the central nerve system (CNS). In this work, we develop nanoparticles including dendritic nanoparticles, cationic *f*"-cyclodextrin and polysaccharide-based nanogels for controlled drug delivery across the BBB. The permeability of the nanoparticles with/without model protein drugs, bovine serum albumin (BSA) and nerve growth factor (NGF), through a bovine retina endothelial cell (BREC) monolayer, an in vitro BBB model, is investigated. Completion of this project will have significant impact on the treatments of neurological disorders in the brain.