Nanoparticles in Drug Delivery and Therapy of Alzeheimer's Disease

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Abstract : Alzheimer's disease (AD) is a progressive form of dementia, contributing to up to 70% of cases, mostly observed in elderly but is not restricted to old age. The pathophysiology of the disease is characterized by specific pathological changes in brain. The changes (i.e. accumulation of metal ions in brain, formation of extracellular β-amyloid (Aβ) peptide aggregates and tangle of hyper phosphorylated Tau protein inside neurons) damage the neuronal connections irreversibly. The current issues in improvement of life quality of Alzheimer's patient lies in the fact that the diagnosis is made at a late stage of the disease and the medications do not treat the basic causes of Alzheimer's. The targeted delivery of drug through the blood brain barrier (BBB) poses several limitations via traditional approaches for treatment. To overcome these drug delivery limitation, nanoparticles provide a promising solution. This review focuses on current strategies for efficient targeted drug delivery using nanoparticles and improving the quality of therapy provided to the patient. Nanoparticles can be used to encapsulate drug (which is generally hydrophobic) to ensure its passage to brain; they can be conjugated to metal ion chelators to reduce the metal load in neural tissue thus lowering the harmful effects of oxidative damage; can be conjugated with drug and monoclonal antibodies against BBB endogenous receptors. Finally this review covers how the nanoparticles can play a role in diagnosing the disease.

Keywords : Alzheimer's disease, β-amyloid plaques, blood brain barrier, metal chelators, nanoparticles