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## Challenges and opportunities for drug discovery for neurodegenerative diseases

Neurodegenerative diseases have become the most common cause of dementia among the elderly. There were 36 million people living with dementia worldwide in 2010, increasing to 66 million by 2030 and 115 million by 2050. In 2010, the global cost of dementia was $604 billion. This is 1% of global GDP and it is likely that these costs will increase in proportion to the number of people with dementia. Gene therapy has been identified to possess a broad potential for the treatment of numerous neurological diseases, including Alzheimer's disease (AD). AD is a progressive neurodegenerative disease and the most common form of dementia caused by accumulation of toxic amyloid-β (Aβ) peptides in the brain, in which the development of effective therapies have been desired. However, the major challenge in the field of gene therapy is the design of safe vectors that can cross the blood brain barrier (BBB). It has been found that the transferrin receptors are present on the surface of brain endothelial cells. The liposomes, lipid based nanoparticles, can be surface modified with transferrin (Tf) protein for targeting the brain endothelial receptors and conjugated to cell penetrating peptide (CPP) for improving their internalization into brain by overcoming receptor saturation. In order to deliver gene/drug across the BBB, we conjugated the liposomes with two ligands (1) a receptor targeting protein (Tf) and (2) a CPP. Thus, we designed near-neutral, PEGylated liposomal nanoparticles encapsulating gene and drug and modifying the surface with Tf and CPP. Findings of in vitro characterization and in vivo bio-distribution will be discussed.

### Biography

Jagdish Singh is a Professor and Chair of the Department of Pharmaceutical Sciences at NDSU College of Pharmacy, North Dakota and a Fellow of American Association of Pharmaceutical Scientists (AAPS) and Fellow of Association of Biotechnology and Pharmacy. His efforts focus on the mechanistic studies for developing and testing novel delivery technologies to deliver biotechnologically derived molecules (e.g., peptide, protein, and gene). He has published over 150 peer-reviewed papers and 270 abstracts.

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