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Lipid-based nanosystems for the nose-to-brain delivery of biological drug, Insulin

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Lipid-based nanosystems with the aim of direct nose-to-brain delivery of therapeutics are of great interest nowadays for both biomolecules and abiotic molecules. The hormone insulin, administered nasally, could be promising for Alzheimer's disease therapy, which only has fruitless treatments that interfere with its progression. Insulin may play this role by either being involved in the clearance of beta-amyloid from the brain or increasing memory performance. Since insulin is a macromolecule polypeptide with a delicate and hydrophilic nature, its delivery to the brain is limited by the lipophilic blood-brain barrier (BBB) not to mention the low stability issue. Encapsulation of insulin in solid lipid nanoparticles (SLNs) holds great potential in boosting insulin ability to reach the brain, owing to their nanosize, biocompatibility, and lipophilicity. Further coating of SLNs with a mucoadhesive polymer, chitosan, can improve the drug release profile, mucoadhesion to the olfactory region and permeation through the nasal mucosa, which are the three key steps for any nasally applied drug to be delivered to the brain.

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