

A third investigated process is the transmucosal delivery of insulin into blood stream. There are a number of mucosal surfaces possible for transport: nasal, buccal, pulmonary, oral, vaginal, and rectal. The nasal, pulmonary and oral routes are leading candidates for transmucosal delivery.

Nasal administration has attracted a lot of interest as a highly efficient route for the systemic delivery of insulin. The large surface area available for absorption through nose cause a wide range for insulin reaches the systemic circulation, thereby avoiding the loss of insulin from first-pass hepatic metabolism (Shah et al., 2010). Some barriers limit the intranasal absorption of insulin, low permeability of nasal mucosa to large molecules and the low bioavailability of insulin act as barriers to intranasal absorption. To overcome the various barriers by the nasal route, researchers have studied many extensive ranges of enhancers such as bile salts and derivatives, sodium lauryl sulfate, phospholipids, cyclodextrins, chitosan and enzyme inhibitors. At first chitosan-nanoparticles is seemed to be the safest and most effective as a carrier for the nasal delivery of insulin. It protected insulin from degradation in the nasal cavity and increased intranasal absorption of insulin with its positive charge (Fernández-Urrusuno et al., 1999). However, recent studies showed that insulin-chitosan solution formulation was more effective than the intranasal nanoparticles complex (Dyer et al., 2002).

Pulmonary insulin delivery requires the addition of absorption enhancers to achieve good insulin delivery (Hussain et al., 2003). Recently, Experimental studies investigated that insulin could be efficiently encapsulated in. Liposome mediated pulmonary drug causes enhancement in drug retention time in the lungs and decreases side effects which results increased therapeutic effects. When aerolized insulin