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Targeted drug delivery to the brain via intranasal nanoemulsion: Available proof of concept and existing challenges

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Abstract

Intranasal delivery has shown to circumvent blood-brain-barrier (BBB) and deliver the drugs into the CNS at a higher rate and extent than other conventional routes. The mechanism of drug transport from nose-to-brain is not fully understood yet, but several neuronal pathways are considered to be involved. Intranasal nanoemulsion for brain targeting is investigated extensively. Higher brain distribution of drug after administering intranasal nanoemulsion was established by many researchers. Issues with nasomucosal clearance are solved by formulating modified nanoemulsion; for instance, mucoadhesive nanoemulsion or in situ nanoemulgel. However, no intranasal nanoemulsion for brain targeted drug delivery has been able to cross the way from 'benches to bed-side' of patients. Possibilities of toxicity by repeated administration, irregular nasal absorption during the diseased condition, use of a high amount of surfactants are few of the persisting challenges that need to be overcome in coming days. Understanding the ways how current developments have solved some challenges is necessary. At the same time, the future direction of the research on intranasal nanoemulsion should be figured out based on existing challenges. This review is focused on the current developments of intranasal nanoemulsion with special emphasis on the existing challenges that would help to set future research direction.

Keywords

Author Keywords: Nanoemulsion; Nose to brain; Intranasal; In situ gel; Mucoadhesive nanoemulsion; Nanoemulgel

KeyWords Plus: IN-SITU GEL; DIHYDROERGOTAMINE NASAL SPRAY; EX-VIVO; DIRECT NOSE; FORMULATION DEVELOPMENT; SYSTEM; VITRO; MICROEMULSION; DESIGN; OPTIMIZATION

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