

A nasal vesicular carrier for delivery of drugs to brain



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The nasal route for drug administration can be considered a safe, convenient and noninvasive alternative to the conventional oral and parenteral routes. However, by using classic carriers, the delivery to brain of hydrophilic molecules, peptides and proteins is poor. We have designed and investigated a new nasal carrier for enhanced drug delivery to brain; we call it as a Phospholipid Magnesome. The system contains soft phospholipid vesicles, composed of phospholipid, water, propylene glycol and magnesium salt. In addition, the carrier contains the mucoadhesive polymer, alginate. Electron microscopy, calorimetry and dynamic light scattering measurements show that the system is composed of soft multilamellar nanosized vesicles. The ability of the carrier's vesicles to entrap both lipophilic and hydrophilic molecules is evidenced by CLSM and ultracentrifugation studies. The mucoadhesive test results of the Phospholipid Magnesome carrier following in vitro application on porcine nasal mucosa indicate a prolonged contact time of the drug with the nasal membrane as compared to control. Effective delivery of various molecules to brain, Rhodamine 6G (R6G), insulin and epidermal growth factor (EGF) was demonstrated by two methods, Multiphoton Microscopy and Near Infrared (NIR) imaging. Moreover, results of a pharmacodynamic study measuring the antinociceptive effect of Oxytocin administrated nasally to an animal model indicate the efficiency of the Phospholipid Magnesome as compared to three control compositions. In an additional study in animals, nasal administration of insulin resulted in a strong

and prolonged hypoglycemic effect for the drug incorporated in the new carrier but not for control systems. Histopathological analysis of nasal mucosa following sub-chronic administration indicates the local safety of the system. In conclusion, the results of this investigation suggest that Phospholipid Magnesome nasal carrier is able to improve drug effect, probably by a combined mechanism, absorption enhancement and prolongation of mucosal contact.

Biography

Hiba Natsheh is pursuing her PhD under the Supervision of Prof. Elka Touitou at the Institute for Drug Research, School of Pharmacy, Faculty of Medicine, Hebrew University of Jerusalem.

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