

7<sup>th</sup> International Conference on

# PHARMACEUTICS & ADVANCED DRUG DELIVERY SYSTEMS

March 27-28, 2023 | London, UK

Received date: 31-10-2022 | Accepted date: 02-11-2022 | Published date: 03-04-2023

## Development of powder nasal forms for donepezil hydrochloride: Assessment of nasal discomfort by slug mucosal irritation assay

**Mirna Perkušić**

University of Zagreb, Croatia

**Introduction:** Nasal delivery of the anti-dementia drug donepezil hydrochloride (DH) presents an alternative route of administration directly to the brain. Nasal powders stand out as formulations with great potential for nose-to-brain delivery (1). However, due to close contact of powders and the mucosa, formulations can cause stinging, itching and/or burning (SIB) sensations. The slug mucosal irritation assay is quick and accurate screening method for early prediction of nasal discomfort caused by powders (2). **MATERIALS AND METHODS** DH-loaded chitosan, chitosan/mannitol and chitosan/lactose microspheres were prepared by spray-drying (Büchi Mini Spray Dryer B-290, equipped with ultrasonic nozzle). Furthermore, DH-loaded chitosan microspheres were blended (Turbula® shaker mixer) with sieved (45-63 µm) or spray-dried mannitol and lactose, reaching the same constituent weight ratios as in spray-dried hybrid microspheres. The particle size distribution and morphology were determined by laser diffraction method (Malvern Mastersizer 3000) and scanning electron microscopy (Tescan Vega 3), respectively. The slug mucosal irritation assay was performed to screen the powders regarding their potential to cause SIB sensations (2). **RESULTS** DH-loaded nasal powders were successfully prepared by spray-drying and/or powder blending. All spray-dried particles ( $Dv50$   $9.7\pm 0.0$ - $29.0\pm 1.2$  µm) were smaller than sieved lactose and mannitol. The tested nasal powders showed either no discomfort or mild discomfort. Statistically significant increase in irritability compared to negative control was observed only for DH-loaded chitosan microspheres and their mixture with sieved lactose. The obtained results indicate the superior sensory effects of hybrid microspheres compared to chitosan microspheres and reveal the possible combined impact of filler particle size and morphology on the powder blend irritability. **CONCLUSION** Slug mucosal irri-

ration assay proved to be a useful tool for evaluation of nasal discomfort early in the formulation development. Prepared DH powders generally showed low irritability, confirming the appropriate selection of excipients and suitability of the spray-drying process to adjust particle morphology.

**Acknowledgement:** This work has been supported in part by Croatian Science Foundation under the project UIP-2017-05-4592, European Social Fund under the Croatian Science Foundation project DOK-2020-01-2473 and Strengthening the scientific research and innovation capacities of the Faculty of Pharmacy and Biochemistry, University of Zagreb (FarmInova; project number KK.01.1.1.02.0021), financed from the European Regional Development Fund, Operational Program Competitiveness and Cohesion for the period 2014–2020.

### References

1. Perkušić M, et al. *Int. J. Pharm.* 2022. 624:122038.
2. Lenoir J, et al. *Toxicol. In Vitro.* 2013. 27:1954-61. *Recent Publications 1.* Perkušić M, et al. *Int. J. Pharm.* 2022. 624:122038. 2. Nižić Nodilo L, et al. *Eur. J. Pharm. Biopharm.* 2022. 175:27-42.
3. Nižić Nodilo L, et al. *Pharmaceutics.* 2021. 13:795.

### Biography

Mirna Perkušić works as a research assistant on a project funded in part by Croatian Science Foundation, at the Department of Pharmaceutical Technology, University of Zagreb Faculty of Pharmacy and Biochemistry. She obtained Master of Pharmacy degree at the same Faculty. Her research focuses on formulation and *in vitro* characterization of innovative therapeutic platforms for nasal drug delivery.

e: mperkusic@pharma.hr