



V. Symposium of Young Researchers on Pharmaceutical Technology, Biotechnology and Regulatory Science

January 18-20 2023 - Szeged, Hungary

OP-09

DOI: [10.14232/syrptbrs.2023.31](https://doi.org/10.14232/syrptbrs.2023.31)

Preparation and characterization of binary systems with semisynthetic derivatives of β -cyclodextrin for dimethyl fumarate nasal delivery

Eleonora Sofia Cama, Milena Sorrenti, Laura Catenacci, Sara Perteghella, Maria Cristina Bonferoni

Department of Drug Sciences, University of Pavia, Pavia, Italy



Relapsing-remitting multiple sclerosis is a chronic inflammatory disease of the central nervous system. Solid dosage forms in capsules of dimethyl fumarate (DMF) are currently used as first line treatment [1], [2]. However, the gastrointestinal side effects, the limited solubility and the low stability, limit its therapeutic efficacy. To overcome this issues, binary systems of DMF and semisynthetic derivatives of β -cyclodextrin (β -CD), in particular hydroxypropyl (HP β CD) and randomly methylated β -CD (RAMEB) were prepared with the aim to improve its bioavailability and allow its administration by the nasal route [3].

Complexes by kneading method, at 1:1 and 1:2 molar ratios, were prepared and characterized by means of differential scanning calorimetry (DSC) supported by FT-IR analyses in order to point out the solid-state interaction between the two components. Phase solubility studies were performed according to Higuchi and Connors method, with a concentration of CD ranging from 0 to 200 mM.

Stability studies have been performed in order to verify how much the presence of CD can influence the degradation process of the drug; the results within 14 days showed that the binary systems slowed down the DMF degradation process.

Solutions of DMF and the kneading products were freeze-dried, according to a design of experiment plan, to evaluate the effect of complexation on relevant stability aspects and quantify the presence of degradation products monomethyl fumarate and fumaric acid. RAMEB:DMF at 2:1 molar ratio seemed the most suitable system for DMF stabilization.

The present work highlights how CDs can be a valid tool to increase the water solubility and stability of the drug, with interesting perspectives in relation to a possible nasal application.

References:

1. Valencia-Sanchez C. Expert Opinion on Pharmacotherapy, 21(12), 1399-1405 (2020).
2. Papadopoulou A. Expert opinion on investigational drugs, 19(12), 1603-1612 (2010).
3. Rassa G. Pharmaceutics, 13, 1180 (2021).