Current Drug Delivery
Volume 17 | Issue 3 | 2020 | ISSN: 1567-2018

Dextran Microparticulate Inhalable Dry Powder for the Treatment of Cystic Fibrosis and Mucopolysaccharidosis

Neel R. Solanki, Deepa H. Patel, Dipali R. Talele

Department of Pharmaceutics, Faculty of Pharmacy, Parul Institute of Pharmacy and Research, Parul University, P.O. Limda, Ta: Waghodia, Dist. Vadodara-391760, Gujarat, India

Abstract:

Background: Cystic Fibrosis (CF) is a genetic disease which affects the patient's lungs, pancreas, liver, kidney and intestine and lacks sulfatase enzyme, leading to mucopolysaccharidosis. Colistin sulfate acts by interacting with phospholipids of bacterial cell membranes. Sulfatase enzyme reduces the high levels of sulfated glycosaminoglycans and glycolipids by the hydrolysis of sulfate esters in lysosome.

Objective: The aim of the present investigation was to prepare and evaluate dextran microparticulate inhalable dry powder for the efficient targeting of colistin sulfate at affected area of lung without causing the side effects in the treatment of CF and mucopolysaccharidosis.

Methods: Microparticulate dry powder was prepared by the lyophilization method and evaluated for particle size, % yield, % drug content, solid state characterization, in-vitro lung deposition study, and in-vitro drug release study.

Results: Particle size, % yield and % drug content were found to be 4.03 ± 0.196 µm, 94.02 % and 99.45 ± 0.015% respectively. Bulk density, tapped density, hausner's ratio, carr's index and angle of repose of optimized batch were found to be 0.216 ± 0.025 g/cm3, 0.236 ± 0.035 g/cm3, 1.09 ± 0.026, 8.47 ± 0.025 % and 26.10 ± 0.029° respectively. A fine particle fraction, fine particle dose, mass median aerodynamic diameter, geometric standard deviation and emitted dose were found to be 66.78%, 16.45 mg, 4.89 µm, 1.32 and 246.33 mg respectively. The % CDR of optimized batch was found to be 96.12 ± 0.049 % at 24 h.

Conclusion: Based on the obtained results, we conclude that dextran microparticulate inhalable dry powder might be suitable carrier for the delivery of colistin sulfate and sulfatase in combination via pulmonary route for the treatment of cystic fibrosis and mucopolysaccharidosis.

Keywords:

Cystic Fibrosis (CF), mucopolysaccharidosis, colistin sulfate, sulfatase, dry powder inhaler, pulmonary.

Link: https://www.eurekaselect.com/node/178522/article/dextran-microparticulate-inhalable-dry-powder-for-the-treatment-of-cystic-fibrosis-and-mucopolysaccharidosis