**PM40**

# Development of Dry Powder Formulations Containing Antibacterial Compounds

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In recent years, lung diseases have been a major cause of mortality in the world. In 2013, lower respiratory infection, like influenza and pneumonia, chronic pulmonary diseases (asthma, chronic obstructive pulmonary disease -COPD- and sarcoidosis) and trachea, bronchus and lung cancer represented, approximately, 8.7 million of deaths [1]. Fusidic acid is a well-known antimicrobial agent with a bacteriostatic action in bacterial conjunctivitis, colitis, cystic fibrosis and respiratory infections [2]. However, when administrated by oral route, this compound is subject to enzymatic degradation and rapid clearance in the gastrointestinal tract or the first-pass of metabolism [3], limiting the effectiveness of the treatment. Thus, in order to overcome these limitations, dry powder formulations containing fusidic acid, as active pharmaceutical ingredient, and two different polymers as stabilizer agent were performed. Dry powder formulations are promising issues in the pharmaceutical landscape due to increased storage stability, minimize infection risk enabling an easier availability and higher patient compliance. However, the pharmacokinetic profile for inhaled bioactive molecules may vary due to poor aqueous solubility or specific physico-chemical properties of the formulations, posing delivery challenges. Therefore, to achieve the requirements for an effective drug delivery in lungs, in this work, dry powder formulations of trehalose containing pegylated- and polyoxylated-fusidic acid were prepared by supercritical $CO_2$-assisted spray-drying (SASD). Since the supercritical carbon dioxide ($scCO_2$) is a non-toxic, non-inflammable and low cost solvent, the SASD represents an alternative and sustainable process. The conjugation of fusidic acid with poly(ethylene glycol) and poly(2-ethyl-2-oxazoline) was performed in one pot reaction, preventing reaction wastes and reducing the reaction and purification steps. Finally, the physical and chemical characteristics of formulations were studied by diverse techniques as NMR, Karl-Fisher, FTIR-ATR, Andersen Cascade Impactor and Morphologi G3.

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