Limitations of high dose carrier based formulations

Stewart Yeung, Daniela Traini, Alan Tweedie, David Lewis, Tanya Church, Paul M. Young

PII: S0378-5173(18)30229-1
DOI: https://doi.org/10.1016/j.ijpharm.2018.04.012
Reference: IJP 17419

To appear in: *International Journal of Pharmaceutics*

Received Date: 23 January 2018
Revised Date: 5 April 2018
Accepted Date: 9 April 2018

Please cite this article as: S. Yeung, D. Traini, A. Tweedie, D. Lewis, T. Church, P.M. Young, Limitations of high dose carrier based formulations, *International Journal of Pharmaceutics* (2018), doi: https://doi.org/10.1016/j.ijpharm.2018.04.012

Limitations of high dose carrier based formulations

Stewart Yeung[1], Daniela Traini[1], Alan Tweedie[2], David Lewis[2] Tanya Church[2] and Paul M. Young[1]

[1]Respiratory Technology, The Woolcock Institute for Medical Research and Discipline of Pharmacology, Sydney Medical School, University of Sydney, NSW 2006, Australia

[2]Chiesi Limited, Chippenham, Wiltshire, United Kingdom

Correspondence: Prof. Paul M. Young, Email: paul.young@sydney.edu.au. Postal: 431 Glebe Point Road, Glebe, NSW, 2037. Tel: +61 2 91140350

Abstract

Purpose: This study was performed to investigate how increasing the active pharmaceutical ingredient (API) content within a formulation affects the dispersion of particles and the aerosol performance efficiency of a carrier based dry powder inhalable (DPI) formulation, using a custom dry powder inhaler (DPI) development rig.

Methods: Five formulations with varying concentrations of API beclomethasone dipropionate (BDP) between 1% and 30% (w/w) were formulated as a multi-component carrier system containing coarse lactose and fine lactose with magnesium stearate. The morphology of the formulation and each component were investigated using scanning electron micrographs while the particle size was measured by laser diffraction. The aerosol performance, in terms of aerodynamic diameter, was assessed using the British pharmacopeia Apparatus E cascade impactor (Next generation impactor). Chemical analysis of the API was observed by high performance liquid chromatography (HPLC).

Results: Increasing the concentration of BDP in the blend resulted in increasing numbers and size of individual agglomerates and densely packed BDP multi-layers on the surface of the lactose carrier. BDP present within the multi-layer did not disperse as individual primary particles but as dense agglomerates, which led to a decrease in aerosol performance and