Conference abstract PNM02

Influence of Carrier Particle Morphology on the Performance of Dry Powder inhalers

E. M. LITTRINGER [1], A. MESCHER [2], H. SCHRÖTTNER [3], P. WALZEL [2], N. A. URBANETZ [1]

[1] Research Center Pharmaceutical Engineering GmbH Graz, Austria
[2] Department of Biochemical and Chemical Engineeering, TU Dortmund, Düsseldorf, Germany
[3] Austrian Centre for Electron Microscopy and Nanoanalysis, TU Graz, Austria

E-mails: eva.littringer@tugraz.at (E. M. Littringer), axel.mescher@bci.tu-dortmund.de (A. Mescher), hartmuth.schroettner@felmi-zfe.at (H. Schröttner), p.walzel@bci.uni-dortmund.de (P. Walzel), nora.urbanetz@tugraz.at (N. A. Urbanetz)

Sci Pharm. 2010; 78: 672 doi:10.3797/scipharm.cespt.8.pnm02

In order to reach the deep lung API (active pharmaceutical ingredient) particles must have an aerodynamic diameter of 1 µm to 5 µm. Powders of this size are rather cohesive and exhibit poor flowing properties. Due to the fact that dosing is done volumetrically sufficient flowability is crucial. One solution to cope with cohesivity is to mix the API with coarser carrier particles of sufficient flowability. On the one hand interparticular forces of such interactive mixtures must be high enough to guarantee powder uniformity during mixing and powder handling and on the other hand low enough to allow API detachement form the carrier upon inhalation. Since interparticular forces depend on the contact area between API and carrier particles and consequently surface morphology the variation of the carrier surface may lead to optimized dry powder inhaler (DPI) formulations. Experiments of Maas [1] showed that spray drying aqueous mannitol samples at different outlet temperatures lead to varying morphologies. However these particles which had been prepared at a lab scale spray dryer were too small ($d_{50,3}$=12 µm) as to be used as carriers in DPIs.

The aim of this work was to prepare spray dried mannitol carrier particles of variable surface roughness. Intended particle size was between 50 µm and 100 µm. Interactive mixtures of carrier particles with salbutamol were prepared and the respirable fraction was determined according to the European Pharmacopoeia using the next generation impactor (NGI).

[1] Maas SG. Optimierung trägerbasierter Pulverinhalate durch Modifikation der Trägeroberfläche mittels Sprühtrocknung. PhD Thesis, Heinrich-Heine-University Duesseldorf. 2009