ABSTRACT:

Relationships between Laboratory Measurements, Particle Deposition, Imaging, Pharmacokinetics, and Pharmacodynamics

Prof. Myrna B. Dolovich P.Eng.
Dr. Jolyon P. Mitchell Ph.D., FRSC (UK), C.Chem., C.Sci.

Measurements of inhaler performance in the laboratory are only a small part of the overall picture when it comes to the assessment whether or not an orally inhaled and nasal drug product (OINDP) is approved for sale to patients. This presentation begins by examining the inhaler lifecycle and the reasons for undertaking laboratory and clinical assessments. The relationship between *in vitro* testing, pharmacokinetic (PK) and pharmacodynamic (PD) clinical studies, and patient use assessments can be thought of as a bridge, with imaging methods to establish the fate of deposited particles in the body, in particular the lungs, as being a key and often missing link in submissions to the regulatory agencies. The information that is potentially available from each of these different ways of assessing inhaler performance is briefly considered before addressing the question: How can lung imaging help clarify the overall understanding of the inhaled drug product in patients? There are significant differences in the way that regulatory agencies in Europe, Canada and the USA currently review OINDPs and these are highlighted in terms of the assessment modalities that have been introduced. The focus moves on to look at the patient-inhaler interaction, often missed in clinical trials. The presentation highlights key areas for research that were identified in a symposium held in 2013 on the topic: '*In Vitro*/*in Vivo* Assessment of Inhaled Drugs: Science and Regulatory Issues for Consideration' that was sponsored by the International Society for Aerosols in Medicine (ISAM). It concludes by examining why an *in vitro*/*in vivo* correlation (IVIVC) for OINDPs is a desirable goal, indicating how recent improvements to laboratory methods is offering the prospect that it might eventually be achieved for at least some drug product classes used with inhalers.

May 2017