## Orphan Medicine / Cancer Treatment:

# **Respiratory Drug Delivery**



## Medical Challenge

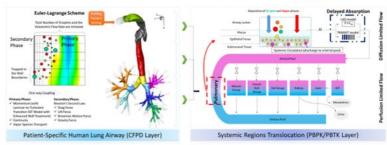
- Optimizing device design for pressure drop and particle size distribution
- Powder dosing/capsule emptying
- · Particle de-agglomeration, droplet coalescence
- Device delivery efficiency (particle/droplets deposition)

#### In Silico Solution

 Accuracy: Multiphase flow, steady and transient flow, particle—flow interaction models, particle—particle, and particle—wall interactions

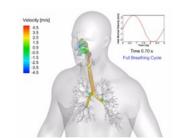
### Policy Relevance

- Understand impact of inhaler design on performance for patient
- · Predict powder de-agglomeration efficiency
- · Reduced time to market
- · Improved reliability





Particles flow through the drug blister of the TWINCER inhaler Courtesy of University of Groningen



"By increasing the accuracy of delivering chemotherapeutic drug to a lung tumor to 90 percent, versus 20 percent by conventional aerosol methods, they have potentially improved the prognosis for many cancer patients."

> Yu Feng, Assistant Professor Oklahoma State University Stillwater, USA

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