

# Orphan Medicine / Cancer Treatment: Respiratory Drug Delivery



Avicenna Alliance  
Association for Data Driven Medicine

## Medical Challenge

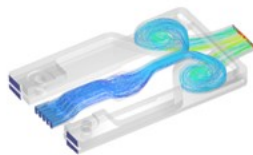
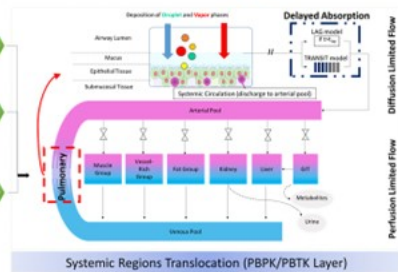
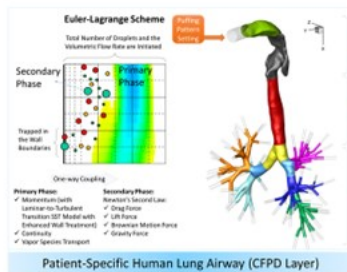
- Optimizing device design for pressure drop and particle size distribution
- Powder dosing/capsule emptying
- Particle de-agglomeration, droplet coalescence
- Device delivery efficiency (particle/droplets deposition)

## In Silico Solution

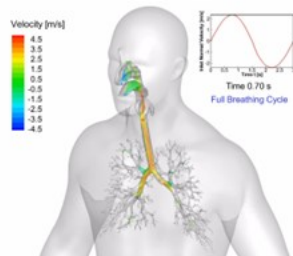
- **Accuracy:** Multiphase flow, steady and transient flow, particle-flow interaction models, particle-particle, and particle-wall interactions

## 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