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FLUIDDA

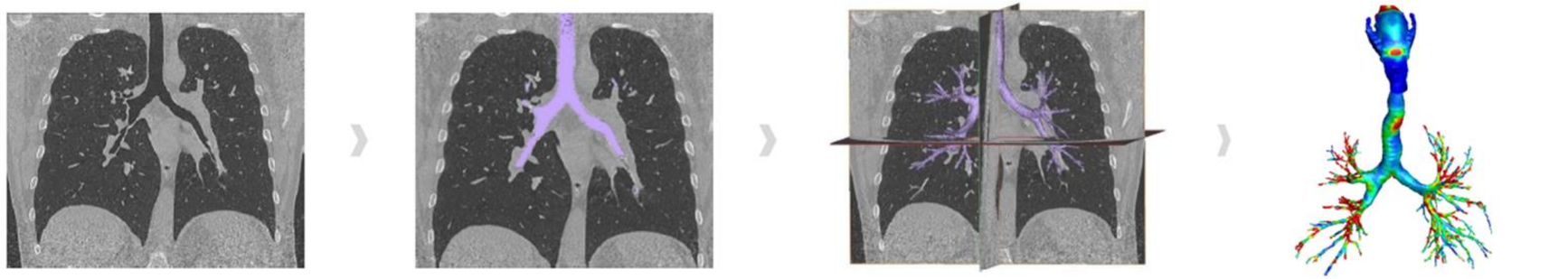
ATS Conference 2021
Virtual Platform

Metered Dose Inhaler (MDI) with Valved Holding Chamber (VHC) vs Dry Powder Inhalers (DPIs): Using Functional Respiratory Imaging (FRI) to Assess Modelled Lung Deposition in an Asthmatic patient.

Rationale	Methods	Results	Conclusion

RATIONALE

- Both MDIs and DPIs can be used to deliver drugs to manage Asthma.
- Valved Holding Chambers (VHC) can be used to help patients with inhalation coordination of their MDIs.
- Inspiratory flow rate is known to influence drug delivery. This FRI based study assessed the modelled airway drug delivery from an MDI/VHC system and two DPI systems at optimal and sub-optimal flow rates.



1. Patient data is obtained by taking low dose CT scans

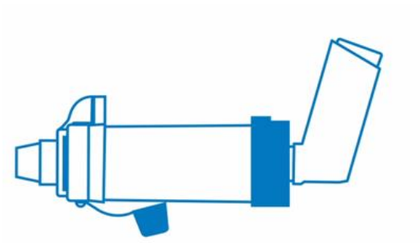
2. Patient-specific airway and lung structures are extracted

3. Flow and particle simulations are applied to the 3D models

Rationale	Methods	Results	Conclusion

METHODS

- Three dimensional geometries of airways and lobes were extracted from a CT scan of a 21 year old male Asthma (moderate) patient.
- Drug delivery and airway deposition was modelled using FRI with measured particle and plume characteristics via the following devices:



AeroChamber Plus* Flow-Vu* ((AC+) valved holding chamber (VHC), Trudell Medical International) delivering salbutamol from a Ventolin† EvoHaler† pMDI (100 µg; GSK)

Symbicort† Turbuhaler† (6 µg formoterol fumarate/200 µg budesonide; AstraZeneca)

Seretide† Diskus† (50 µg salmeterol xinafoate/250 µg fluticasone propionate; GSK)

- Inhalation flowrates of 30 L/min (optimum for MDI/VHC, sub-optimal for DPIs) and 60 L/min (optimum for DPIs, sub-optimal for MDI/VHC) were assessed.

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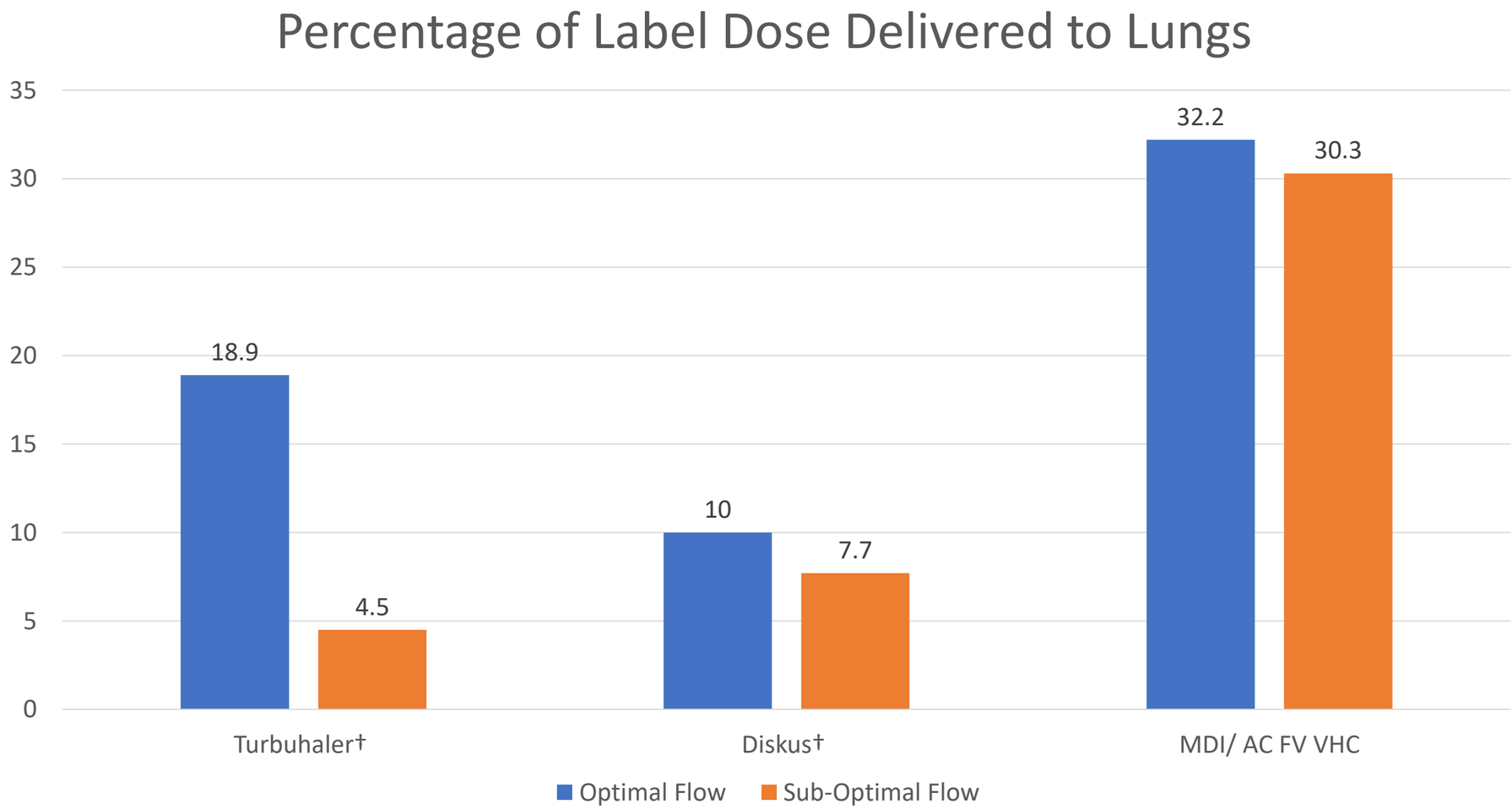
RESULTS

- The modelled lung deposition results are shown in the chart below, expressed as a percentage of label dose, using both optimal and sub-optimal inhalation flow rates.



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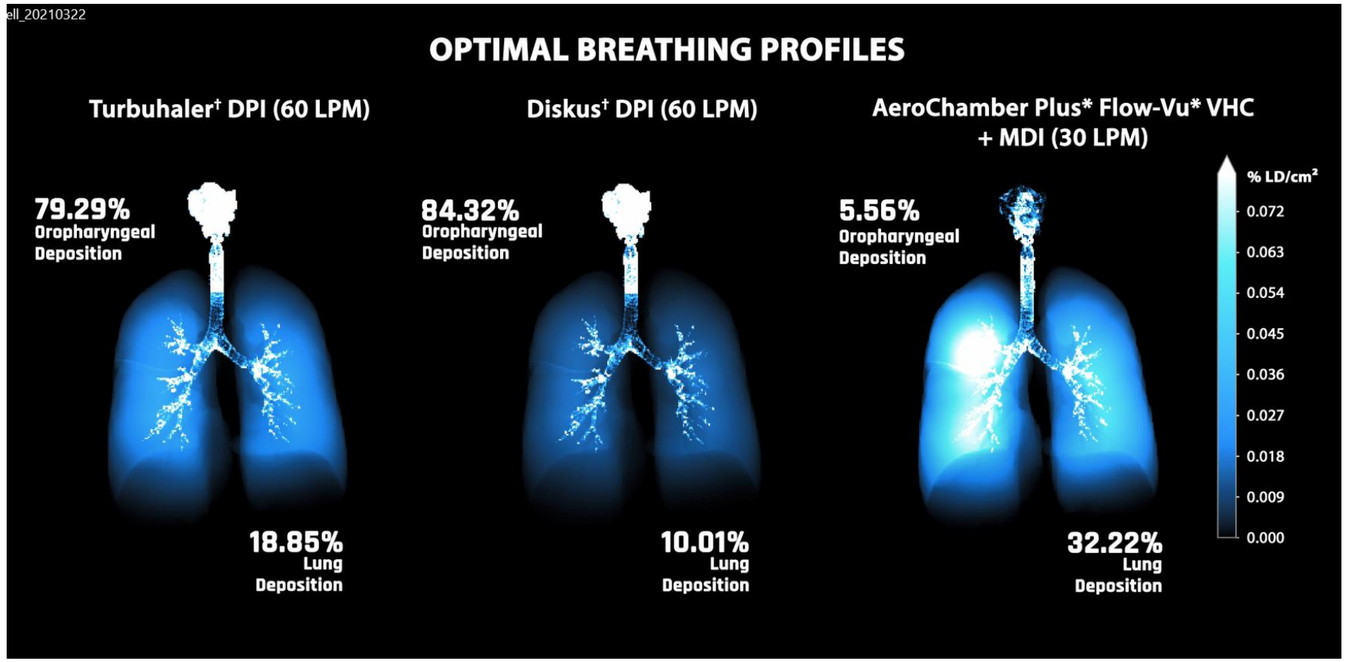
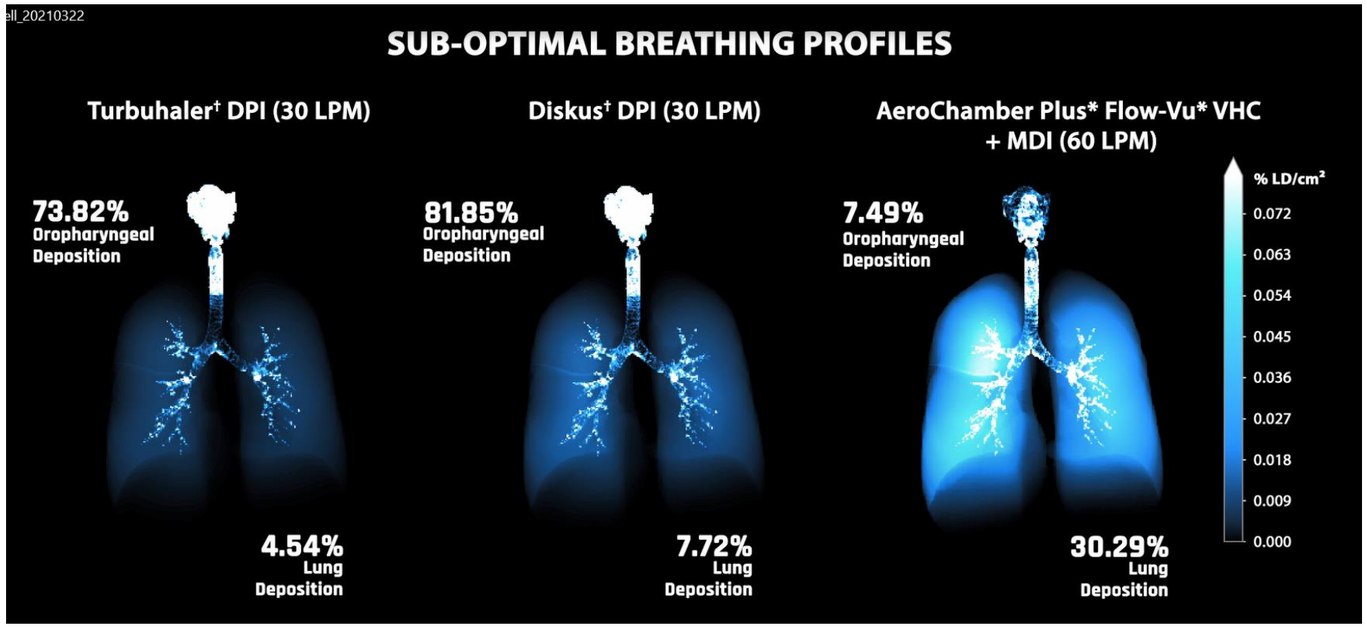
CONCLUSIONS

- The FRI deposition profiles highlight that the MDI/***AeroChamber Plus* Flow-Vu**** VHC system delivered an appreciably greater percentage of drug to the lung region than either of the two DPIs.

- The influence of inhalation flow profile was less with the MDI/VHC system and differed between the two DPIs.





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