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Virtual Platform



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# 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

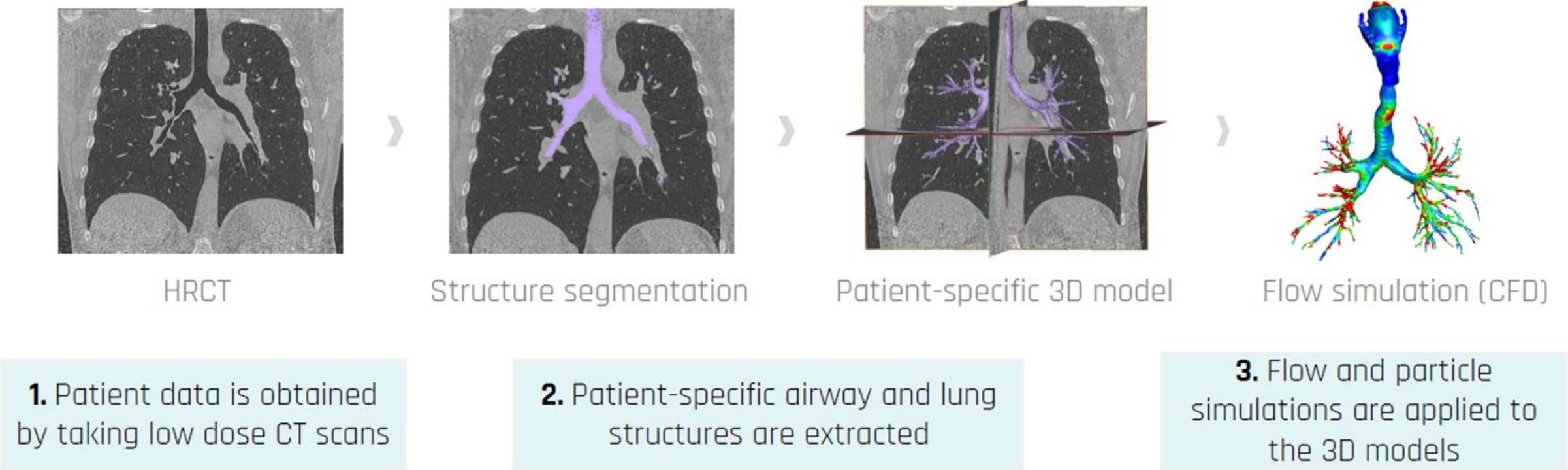
Methods

Results

Conclusion

# RATIONALE

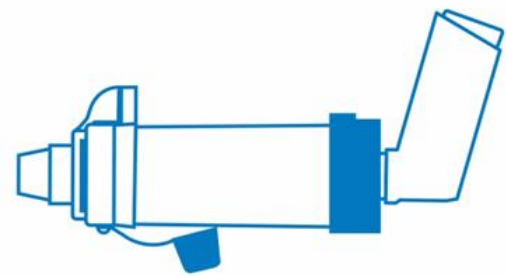
- Both MDIs and DPIs can be used to deliver drugs to manage Asthma.
- Valved Holding Chambers (VHC) can be used to help patients with inhalation coordination of their MDIs.
- Inspiratory flow rate is known to influence drug delivery. This FRI based study assessed the modelled airway drug delivery from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



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| Rationale | Methods | Results | Conclusion |
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# 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<sup>†</sup>  
EvoHalert pMDI (100 µg; GSK)



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



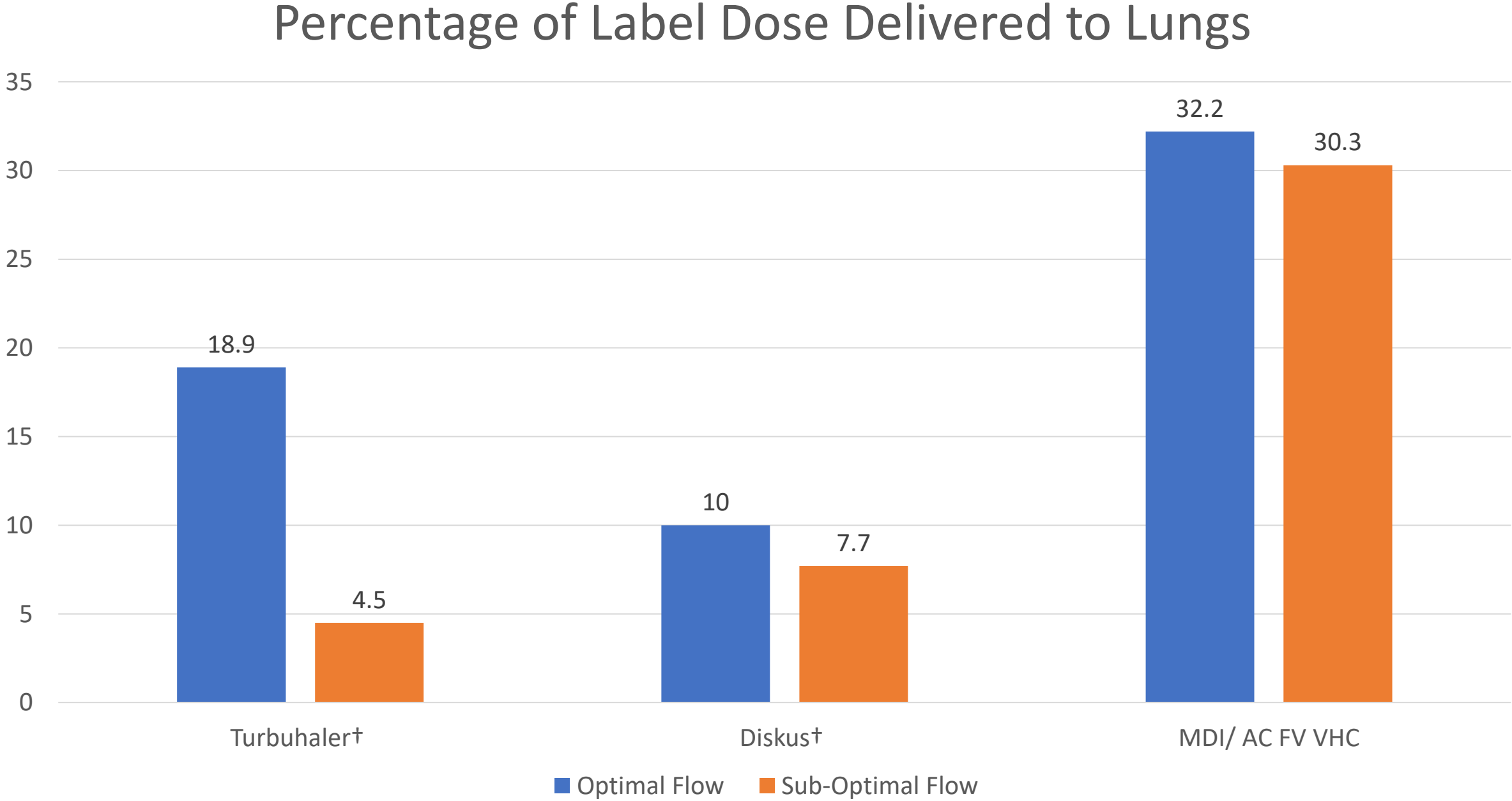
Seretide<sup>†</sup> Diskus<sup>†</sup> (50 µg salmeterol  
xinafoate/250 µg fluticasone  
propionate; GSK)

- 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.

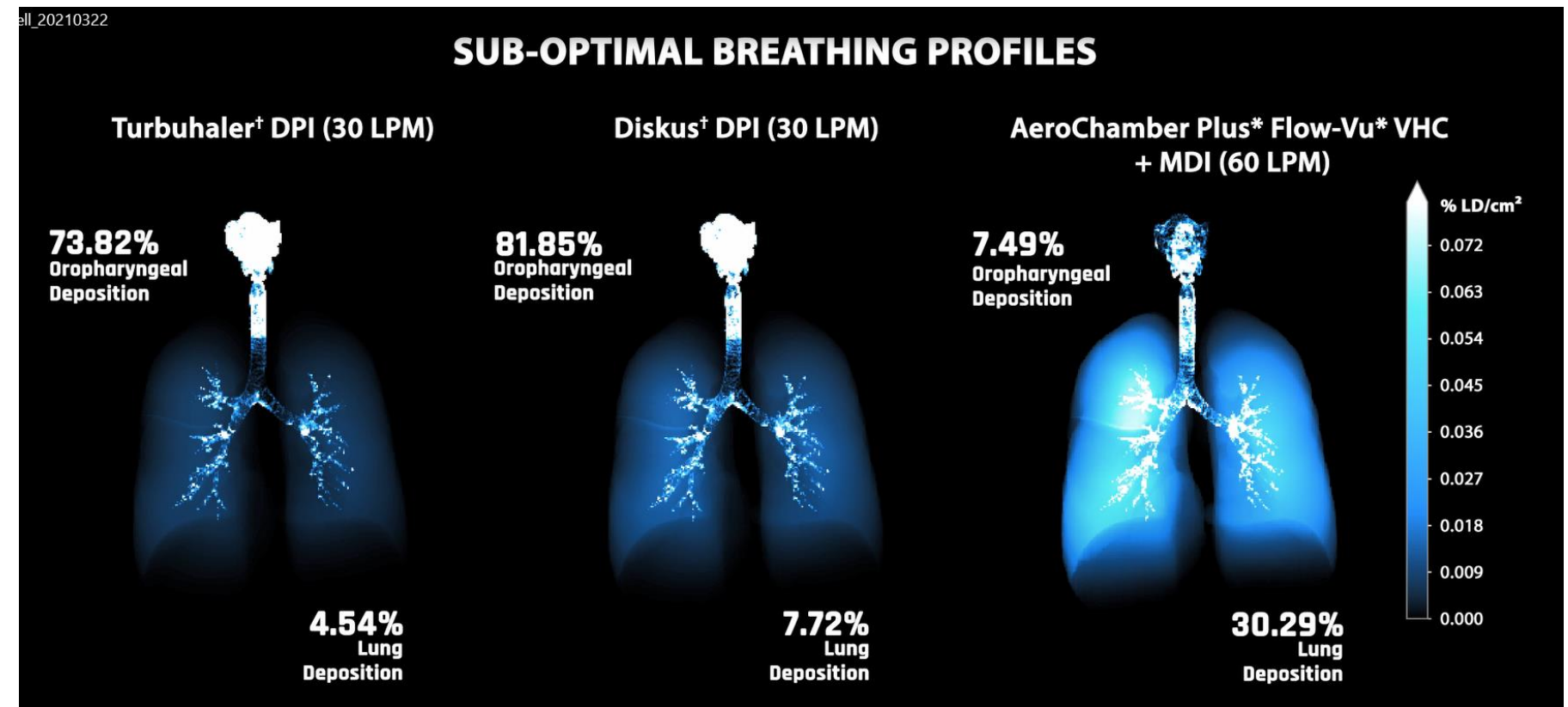
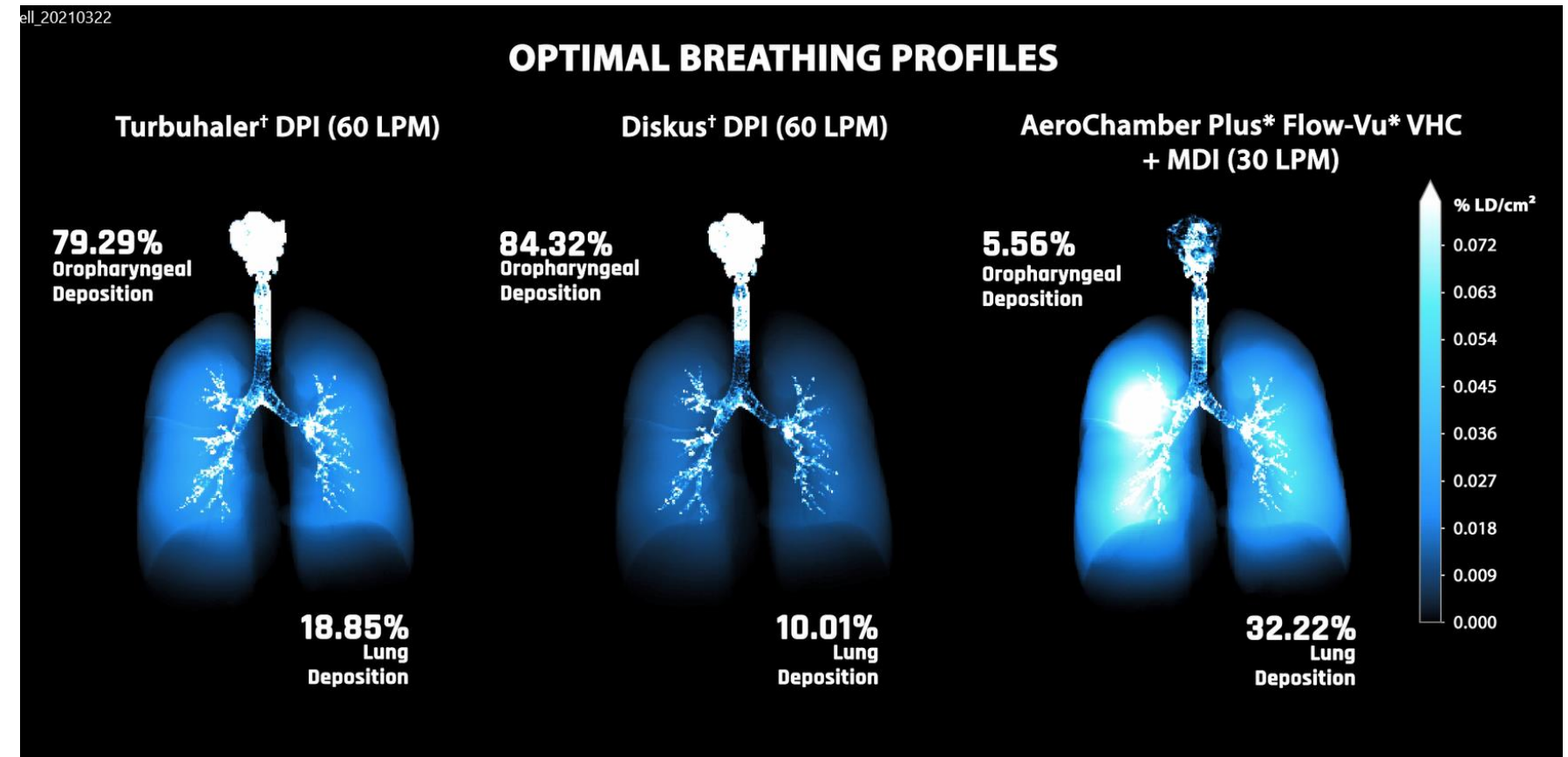


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# CONCLUSIONS

- 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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