

Air-Jet Nasal DPI & Interface

A system designed to enhance nasal drug delivery

Nasal deposition of pharmaceutical aerosols can be an effective delivery route to treat a variety of diseases and disorders. For locally acting medications such as corticosteroids, nasal delivery of pharmaceutical aerosols increases concentrations in the nose and reduces systemic exposure and side effects. Nasal delivery could also provide a method for needle-free administration of systemically acting medicines requiring rapid absorption or response without the risks and complexities of lung delivery. Thus giving it potential to be used for nose to brain delivery and respiratory system vaccines. However, nasal sprays use a single stream, which creates a dependence on the orientation of the spray and can cause variability of the effectiveness in patients.

The technology

Our group has developed a system that is able to provide more reliable nasal drug delivery, while maintaining a high efficiency. The system is comprised of a positive pressure gas and aerosol source, referred to as the air-jet dry powder inhaler (DPI), and a three-stream interface. The air-jet DPI is able to optimize the powder dispersion and release rate through the control of parameters such as the size and number of air-inlets. The air-jet DPI also includes a 3D rod array which diffuses the turbulent jet and improves aerosol deaggregation, with minimal aerosol loss. The implementation of a three-stream interface allows drug delivery to be achieved in a more controlled manner. The streams are able to remain largely separate in the anterior nose, thus minimizing depositional loss, and then combine in the posterior nose, which results in increased mixing and turbulence. This system also allows the flow rate of each stream to be adjusted independently so that different nasal regions can be targeted.

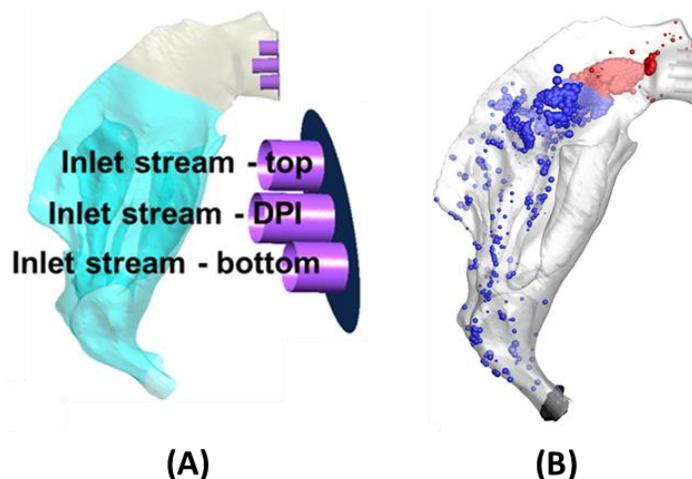


Figure 1. (A) Three-stream aerosol delivery interface; (B) Aerosol deposition locations

Benefits

- » High efficiency & targeted nasal deposition
- » Improved aerosol dispersion & nasal-surface coverage
- » Improved nasal retention of medication
- » Improved formulation stability

Applications

- » Delivery of medications to:
 - Treat nasal conditions
 - Treat respiratory viruses
 - Bypass the blood brain barrier
- » Vaccine delivery
- » Needle-free alternative for drugs requiring rapid absorption

Patent status:

Patent issued: [US 10,105,500 B2](#)

License status:

This technology is available for licensing to industry for further development and commercialization.

Category:

Biomedical

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Investigators:

Worth Longest, Ph.D.
Michael Hindle, Ph.D.
Dale Farkas, Ph.D.
Arun Varghese Kolanjiyil, Ph.D.
Sarah Strickler

Contact us about this technology

Michael Mancini, Ph.D.
Business development manager
mmancini@vcu.edu
(804) 828-1977