Intranasal and Pulmonary Delivery Devices

Health need

Intranasal and pulmonary delivery devices administer vaccines or medications directly to the nasal cavity or lungs, where they are rapidly absorbed by the appropriate tissues. Studies have demonstrated that vaccines against some pathogens are more efficacious when delivered by the intranasal or pulmonary route, particularly if these are the routes of infection.

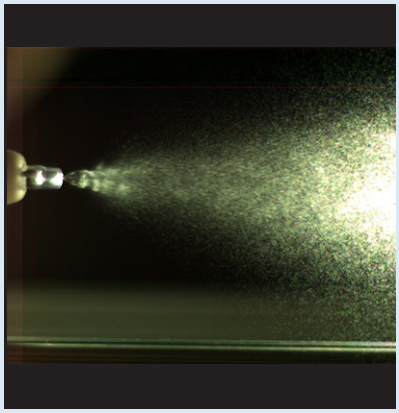
In high-income countries, these devices are used for influenza vaccines and in the treatment of noncommunicable pulmonary diseases such as asthma. The intranasal and pulmonary routes may also be suitable for addressing health needs in developing countries by helping to deliver measles and tuberculosis vaccines, viral vector vaccines, and drugs for respiratory infections such as tuberculosis or pneumonia. For these applications, this delivery approach has the potential to increase access, improve safety, and reduce treatment costs. However, existing intranasal and pulmonary delivery technologies are designed for high-income country markets, and do not necessarily address the programmatic needs of developing countries, including ease of use.

Technology solution

The development of intranasal or pulmonary delivery vaccines and drugs important to public health is ongoing. In addition to improved efficacy, wider use of these delivery routes could better enable administration by a broader range of health care workers. It could help significantly to reduce the use of sharps by decreasing the frequency with which the same vaccine or drug is delivered by injection. Identification of and access to delivery device designs that better meet developing-country public health requirements, in terms of cost and safety, would also facilitate the introduction of new therapies. Optimizing the design and manufacture of these delivery technologies to ensure the production of reliable, low-cost, and appropriate devices for future vaccine and drug applications would also help to expand access and use.

Current status and results

PATH recently conducted an analysis of intranasal delivery technologies for use with live attenuated influenza vaccine. A variety of intranasal delivery technologies were evaluated, including liquid drops and sprays, dry powders, prefilled and user-filled devices, single-use and multiuse devices, and separate and integrated reconstitution technologies. The results helped to inform low-cost influenza vaccine manufacturers of the device options currently available and the various considerations surrounding the selection or development of a delivery technology for use with their vaccines in developing countries. PATH continues to explore the broader landscape of aerosol and pulmonary delivery technologies as well as their potential applications for public health.



PATH/Gene Saxon

Evaluation of a nasal spray device.

"Inhalational administration of substances is necessary for treatment of asthma and chronic lung disease, and has been evaluated for delivery of other molecules. There is a need for development of affordable and standardized devices for administration..."

World Health Organization (WHO). *The Selection and Use of Essential Medicines. Report of the WHO Expert Committee, 2009.* Geneva: WHO; 2009. Available at: www.who.int/medicines/publications/TRS958_2010.pdf

Availability

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Donor support

Support for this project was provided through funding from the **Bill & Melinda Gates Foundation** and the **Open Society Foundation**.

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