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Development Challenges and Opportunities in Aerosol Drug Delivery Systems in Non-Invasive Ventilation in Adults

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Abstract

Introduction: With the gain in popularity of non-invasive ventilation (NIV), particularly in patients requiring drug delivery by aerosol therapy, the feasibility of the combination between NIV and aerosol therapy has regularly been questioned.

Areas covered: This review covers the in vitro and in vivo studies which explored the effects of this combination on pulmonary drug delivery (imaging and pharmacological studies) and on physiological measurements

Expert opinion: Even if the feasibility of the combination is evident, the type of nebulizer influences the lung deposition with a greater delivery with vibrating mesh nebulizers. The influence of the interfaces of NIV devices should be further investigated even if vented masks may seem less efficient for nebulization. There is also a need to develop new devices and modalities, or specific components better designed for a more efficient delivery, to offer more optimal particles size to lung delivery. The use of spacer also seems promising to improve the lung delivery even if strong evidences are still missing. Finally, it would be interesting to explore the influence of all spontaneous modes which use different flow-time curves. Further investigations should focus on the synchronization of the delivery with the inspiratory part of the respiratory cycle in patients during NIV, particularly when delivering toxic or expensive drugs.

Keywords: Non-invasive ventilation; aerosol; drug delivery; nebulizer.