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Deposition studies on a systematically modified paediatric throat geometry

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Inhaling drugs seems to be an upcoming therapy option in many indications due to various advantages: less active pharmaceutical ingredient (API) is needed to achieve an effective dosage, a rapid onset of action and a therapy opportunity in case of inability to swallow.

Because of age- dependent differences in upper airway geometries and breathing patterns it is difficult to predict the pulmonal deposition of API's, especially in paediatric inhalation therapy. Assessing the pulmonal deposition is especially important in evaluating the efficacy of therapy and dosage finding.

A few geometry models, which should improve the knowledge about the particle deposition, were introduced in literature which try to reflect the tracheobronchial region of children. However, none depicts the age-specific differences.

Therefore, a known paediatric throat geometry was modified in different dimensions and realized via 3D-printing. Constrictions were built in systematically to investigate the particle deposition in the upper airways and to determine the amount of API which is able to reach the lungs. Aerodynamic assessment was performed with the Next Generation Impactor (NGI) according to the Ph. EUR 2.9.18 using the example of "Cyclocaps[®] Salbutamol sulphate 200µg" and the modified throat geometries instead of the sample induction port (SIP).

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