Abstract Submitted
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Respiratory flows during early childhood: Computational models to examine therapeutic aerosols in the developing airways.[1] JANNA TENENBAUM-KATAN, PHILIPP HOFEMEIER, JOSU SZNITMAN, Technion, Israel institute of technology, JANNA TENENBAUM-KATAN TEAM — Inhalation therapy is the cornerstone of early-childhood respiratory treatments, as well as a rising potential for systemic drug delivery and pulmonary vaccination. As such, indispensable understanding of respiratory flow phenomena, coupled with particle transport at the deep regions of children's lungs is necessary to attain efficient targeting of aerosol therapy. However, fundamental research of pulmonary transport is overwhelmingly focused on adults. In our study, we have developed an anatomically-inspired computational model of representing pulmonary acinar regions at several age points during a child's development. Our numerical simulations examine respiratory flows and particle deposition maps within the acinar model, accounting for varying age dependant anatomical considerations and ventilation patterns. Resulting deposition maps of aerosols alter with age, such findings might suggest that medication protocols of inhalation therapy in young children should be considered to be accordingly amended with the child's development. Additionally to understanding basic scientific concepts of age effects on aerosol deposition, our research can potentially contribute practical guidelines to therapy protocols, and its' necessary modifications with age.

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Janna Tenenbaum-Katan
Technion, Israel institute of technology

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