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Albuterol Delivery Through An Adult Ventilator Circuit To A Patient-Specific Tracheobronchial Airway Model RAHUL RAJENDRAN, ARINDAM BANERJEE, Lehigh Univ, ARIEL BERLINSKI, Univ of Arkansas for Medical Sciences — An integrated *in vitro in silico* approach was employed to investigate albuterol administration to a patient-specific adult lung airway. The particle size distribution (PSD) of aerosolized albuterol generated by a jet nebulizer and a vibrating mesh nebulizer was evaluated by placing them at three different positions in an adult ventilator model – dry side of the humidifier, before the Y-piece, and tested alone without the circuit. The circuit was connected to a Next Generation Impactor equipped with a standard USP induction port, through a 7-mm inner diameter ETT that is operated at a constant flow rate of 14L/min. The experimentally determined PSD served as the input to the *in silico* model, which involved Reynolds-Averaged Navier Stokes simulations with Lagrangian particle tracking. Particle deposition was predicted in two patient-specific upper airway models - intubated model A (ETT-G0-G7), and a truncated model B (G0-G7). The deposition in the mouth-throat region and the effect of the laryngeal jet on the flow for model B was appropriately accounted for by comparing the deposition characteristics in the USP throat and an anatomical mouth-throat geometry. The vibrating mesh nebulizer delivered a higher dose of albuterol compared to the jet nebulizer, and the nebulizers were most efficient when placed on the dry side of the humidifier. The effect of type and location of nebulizer on deposition efficiency, regional deposition, and the fraction of drug available to the different lung lobes will be presented.

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