

European Respiratory Society Annual Congress 2013

Abstract Number: 3971

Publication Number: P1281

Abstract Group: 9.1. Respiratory Function Technologists/Scientists

Keyword 1: Physiology **Keyword 2:** Pharmacology **Keyword 3:** Experimental approaches

Title: Simulation of particle deposition in the human airways

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Body: Objective: To study the airway deposition of inhaled particles, using a numerical model of fluid dynamics. Methods: A 3D model of the airways has been developed, from mouth up to terminal bronchioles. A simulation code of Computational Fluid Dynamics (CFD) has been used, which simulates the air movement in the model, and the trajectory of inhaled particles, according to their velocity and size. Different airflows have been simulated: 10, 30 and 80 l/min, with 3 particle sizes: 5 nm, 0.5 µm and 20 µm. When a particle collides with the airway wall, it is trapped there. This code calculates the percentage of particles trapped in the different anatomical parts of the model. Results: In figure1, red color in the airways represents areas with a high concentration of trapped particles, whereas the blue color spots are areas without trapped particles. The number of trapped particles in the pharynx is higher as the bigger the particles are and the higher the airflow is. When the particles are small and the airflow is low, the particles tend to be trapped in more distal regions.

Conclusions: 1. It's possible to develop a realistic computer model to simulate the breath and the deposition of inhaled particles, employing CFD codes. 2. Pharynx is the area where the most part of the particles are going to be trapped. 3. It is possible to improve the deposition of inhaled particles in more distal areas breathing with a low airflow and using inhalers with a small particle size.