

The Pressure Losses in the Model of Human Lungs

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Abstract : For the treatment of acute and chronic lung diseases it is preferred to deliver medicaments by inhalation. The drug is delivered directly to tracheobronchial tree. This way allows the given medicament to get directly into the place of action and it makes rapid onset of action and maximum efficiency. The transport of aerosol particles in the particular part of the lung is influenced by their size, anatomy of the lungs, breathing pattern and airway resistance. This article deals with calculation of airway resistance in the lung model of Horsfield. It solves the problem of determination of the pressure losses in bifurcation and thus defines the pressure drop at a given location in the bronchial tree. The obtained data will be used as boundary conditions for transport of aerosol particles in a central part of bronchial tree realized by Computational Fluid Dynamics (CFD) approach. The results obtained from CFD simulation will allow us to provide information on the required particle size and optimal inhalation technique for particle transport into particular part of the lung.

Keywords : human lungs, bronchial tree, pressure losses, airways resistance, flow, breathing

Conference Title : ICCFD 2015 : International Conference on Computational Fluid Dynamics

Conference Location : Barcelona, Spain

Conference Dates : February 26-27, 2015