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ΘΕΜΑ: **DEPOSITION OF AEROSOL PARTICLES IN THE HUMAN RESPIRATORY SYSTEM**

ΤΟΠΟΣ: Αίθουσα Σεμιναρίων ΕΙΧΗΜΥΘ-ΙΤΕ

ΗΜΕΡΟΜΗΝΙΑ: Τετάρτη, 11 Σεπτεμβρίου 2002

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ΠΕΡΙΛΗΨΗ

Knowledge of local deposition rates of aerosol particles in the respiratory system together with information on particle size, shape and mass and clearance rates at the deposition sites is required for a complete evaluation of dose from inhaled particles. The efficiency of deposition of particles along the respiratory tract depends significantly on the local gas flow structure and particle properties. An important parameter, which influences the deposition pattern, is the local geometry of the respiratory system. This geometry is complete, especially with regard to the tracheobronchial tree (TB). A single element of the generation of TB constitutes a bifurcation of the parent tube into two daughter tubes.

The k-ε model was used for description of airflow structure in the sequence of the two first bifurcation of the human respiratory system. Local and temporary distribution of the linear air velocity was calculated for a cyclic breathing pattern corresponding to the symmetrical hyperventilation with spontaneous deep breathing. For such a flow, deposition efficiency of particles with diameters 0.01, 0.1, 1 and 10 μm was calculated using particle trajectory concept supplied with random displacement of particles due to Brownian motion. The "hot spots" of deposition for each type of particles were identified. A specific temporary deposition pattern during breathing cycle was found. The enhancement of deposition was observed at the moment of transition between inspiratory and expiratory parts of breathing curve.

Gas flow structure and particle deposition rate in the pulmonary region of the respiratory system were computed using poroelastic model of the deformation of alveolar wall. Temporary deposition of particles during breathing cycle was determined.