

COMPUTER SIMULATION OF THE LANG AIRWAY SYSTEM

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The lung airway is a system with a function to supply air to all parts in the lung. Since the lung is an organ in the 3D space, the airway system should be constructed so that it carries the fluid to any part in 3D space with equal flow rate. In addition to this requirement, the energy loss in the flow should be as small as possible, so that it is installed in a living body; Now, a technological problem arises how such duct system can be designed. At the same time we have a need from the medical field to construct an airway system numerically, with which basic studies of image analyses are made. In this work an algorithm composed of several rules is proposed to construct an airway system which is similar to the real lung in detail. The results show that this algorithm works well, so that medical doctors have accepted it.

As an application of this virtual airway system, simulation of pathological deformation of a local part of the lung was made. For example, the lung cancer is recognized by irregular orientations of airway branches in X-ray images or CT images. By giving a deformation, similar to that in an elastic body, the deflection of branch orientations were calculated, and an effective method is proposed to recognize cancers.

The posters showing a simulated lung airway and its pathological deformation are presented along with a real airway photograph.