

Wpływ aerodynamiki przepływu powietrza przez nos na fizjologię nosa

The influence of nasal flow aerodynamics on the nasal physiology

Stanisław Betlejewski, Andrzej Betlejewski

Summary

The ability of the human nose to warm and humidify the respiratory air is important to maintaining the internal environment of the lungs, since ambient air is conditioned to nearly alveolar conditions (body temperature and fully saturated with water vapour) upon reaching the nasopharynx. Because of very short time of the inspiratory phase duration, as well as expiratory phase, only the rich vascularization of the nasal mucosa and specific organization of the submucosal vessels are not able to assure such effective physiological activity. Therefore the type of airflow during the respiration is essential to understanding the functional possibilities of the nasal mucosa. Most studies have investigated the airflow only in steady-flow conditions, where the laminar flow was observed. Anatomically accurate physical models of real nasal cavities and particle image velocimetry allow evaluation of the entire flow field in the nasal cavity. In these investigations a partially turbulent flow was observed even at low air velocities in most part of the nasal cavity. From a physiological perspective, a turbulent flow would seem sensible, since it enhances contact between air and the mucosal layer. By doing so, the nasal physiological functions - humidification, cleaning and warming are optimized.