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Measurement of ciliary flow generated on the surface of tracheal lumen KOKI KIYOTA, HIRONORI UENO, TAKUJI ISHIKAWA, KEIKO NUMAYAMA-TSURUTA, YOHSUKE IMAI, TOSHIHIRO OMORI, TAKAMI YAMAGUCHI, Tohoku University — Although we consistently take air with virus and bacteria, these harmful substances are trapped on the surface of tracheal lumen and transported toward larynx from the trachea and bronchi by effective ciliary motion and swallowed it (clearance function). However, the 3-dimensional flow field generated by inhomogeneously distributed ciliary cells are largely unknown. In this study, we first succeeded to measure the ciliated cells' density by staining actin of the epithelial cells and tubulin of the cilia, respectively. Second, we analyzed the ciliary motion by labeling the tip of cilia with fluorescent particles, and tracking their movements to understand the mechanism of the flow generation. Last, in order to clarify the flow field induced by the ciliary motion, we measured the motion of tracer particles on the surface of tracheal epithelial cells by a confocal micro-PTV system. The results show that the mean velocity and the velocity disturbance decayed rapidly as the height from the epithelial cells were increased.

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