

SQUAMOUS METAPLASIA IN THE RESPIRATORY TRACT

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<https://doi.org/10.5281/zenodo.12514279>

Abstract: This thesis discusses squamous cell metaplasia as a preneoplastic change in bronchial epithelium that occurs in response to toxic exposures, especially from cigarette smoke. The process of epithelial change from multi-row ciliated columnar to multilayered squamous epithelium and the associated consequences, such as chronic bronchitis and risk of lung cancer, especially in smokers, are described. The text also emphasizes the importance of preventing and addressing factors contributing to these changes to prevent possible malignant transformation of the epithelium.

Keywords: respiratory mucosa, columnar-to-squamous metaplasia, squamous metaplasia, bronchiectasis, squamous cell carcinoma.

In human respiratory mucosa, ciliated pseudostratified columnar epithelium may change to stratified squamous epithelium. This change from columnar to squamous epithelium is referred as columnar-to-squamous metaplasia or simply the squamous metaplasia. Epithelial alterations of this kind are reversible and are characterized by change from one type of fully differentiated adult cell to a different type of adult cell. A given mature cell does not change to another type of mature cell; rather, basal cell proliferation gives rise to the new differentiated cell type. These cellular changes are considered to be controlled and adaptive.

Squamous metaplasia is a normal occurrence on the rounded, more exposed portions of the turbinates, on the vocal folds, and in certain other regions.

Changes in the character of the respiratory epithelium may, however, occur in other ciliated epithelial sites when the pattern of airflow is altered or when forceful airflow occurs, as in chronic coughing. Typically, in chronic bronchitis and bronchiectasis, the respiratory epithelium changes in certain regions to a stratified squamous form. The altered epithelium is more resistant to physical stress and insult, but it is less effective functionally. In smokers, a similar epithelial change occurs. Initially, the cilia on ciliated cells lose their synchronous beating pattern as a result of noxious elements in smoke. As a



result, removal of mucus is impaired. To compensate, the individual begins to cough, thereby facilitating the expulsion of accumulated mucus in the airway, particularly in the trachea. With time, the number of ciliated cells decreases because of chronic coughing. This reduction in ciliated cells further impairs the normal epithelium and results in its replacement with stratified squamous epithelium at affected sites in the airway. If factors (i.e., tobacco smoking) that predispose to squamous metaplasia are not eliminated, the metaplastic epithelium may undergo malignant transformation. Therefore, one of the two most common forms of cancer in the respiratory tract, the squamous cell carcinoma, has its origin from the squamous metaplastic cells.

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