

Morphological and Histochemical Study of Human Submucosal Laryngeal Glands

LUIS M. PASTOR, ANTONIO FERRAN, ALFONSO CALVO, CARLOS SPREKELSEN,
RAMON HORN, AND JUAN A. MARIN

Department of Cell Biology, Section of Histology and General Embryology (L.M.P., A.C., R.H., J.A.M.), and Department of Otorhinolaryngology (A.F., C.S.), Medical School, University of Murcia, Murcia, Spain

ABSTRACT *Background:* The respiratory submucosal glands are a major source of secretions in the airway. Human submucosal laryngeal glands have been scarcely studied, with no works existing about their ultrastructure and histochemistry.

Methods: Samples of epiglottis, ventricle, false vocal folds and true vocal folds were fixed in 10% buffered formalin for histochemical study with conventional and carbohydrate lectin histochemistry. Other samples were fixed in 2.5% glutaraldehyde and conventionally processed for transmission electron microscopy.

Results: The human submucosal laryngeal glands are composed of serous tubules; mucous tubules; collector duct; and final portion of this duct. The serous cells showed sialosulphomucins and affinity for WGA and Con-A lectins. With a previous treatment with neuraminidase, they also labelled with PNA. The mucous cells contained sialosulphomucins and showed affinity for WGA and DBA lectins in the samples proceeding from blood group A, and for WGA, UEA-I and LTA with those from blood group O. Ultrastructurally, the serous cells presented a wide variety of granules, cells in which seromucous granules predominated. The mucous cells presented larger-sized granules which were very electron-lucent. The collector duct was composed of mitochondria-rich cells and basal cells. A cell which we have termed "intermediate" was identified in the transition zone between the mucous tubules and the collector duct, and in the final portion of the collector duct. It had morphological characteristics as if it were a transition between a goblet cell and collector duct cell. Some nerve endings with cholinergic and peptidergic vesicles were found among the myoepithelial cells.

Conclusions: These glands presented some histological differences from the bronchial glands, the mucous secretion was related to the blood group antigens, and the serous cells showed a wide variability in their secretory granules, many of them being of a seromucous type.

© 1994 Wiley-Liss, Inc.

Key words: Electron microscopy, Glycoconjugates, Lectins, Light microscopy, Serous and mucous cells, Submucosal laryngeal glands

Submucosal glands are found in the normal human laryngeal, tracheal and bronchial mucosa (Nielsen, 1983; Jeffery, 1983). These glands are a major source of mucus secretion in the airway (Kaliner et al., 1986). Mucus plays an important role in the defense of the respiratory tract and protects the underlying epithelium from dehydration and injury (Breeze and Bealson, 1977). Moreover, the adherence of inhaled microorganisms to airway mucus is a mechanism for prevention of respiratory infections (Green, 1968).

The submucosal tracheal and bronchial glands have been widely studied with conventional light and electron microscopy (Meyrick et al., 1969; Spicer et al.,

1971; Meyrick and Reid, 1970; Plotkowski et al., 1990). Moreover, these glands have been studied with carbohydrate histochemical techniques for the characterization of mucosubstances (Lamb and Reid, 1970; Mazzuca et al., 1982; Spicer et al., 1983; Plotkowski et al., 1990; Castells et al., 1992).

Received May 3, 1993; accepted February 15, 1994.

Address reprint requests to Prof. Dr. L.M. Pastor, Departamento de Biología Celular, Histología y Embriología General, Facultad de Medicina, Universidad de Murcia, 30071, Murcia, Spain.