Original article:

Histochemical study of foetal tracheal glands

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Abstract:
The submucosal glands in the trachea of 50 human foetuses of 24 weeks to 37 weeks were studied by histochemical methods. This study was carried out to study the mucin pattern of human tracheal glands and correlated it with functional significance. Serial coronal sections were stained with H & E, Alcian blue at pH 1.0 and pH 2.5, Periodic acid Schiff, combined Alcian blue and Periodic acid Schiff, Aldehyde Fuchsin –Alcian blue pH 2.5. The submucosal glands of foetal trachea contained neutral and sulfated acid mucosubstances.

Key words: mucin, submucosal glands, trachea, human foetus

Introduction:
Mucus secreting cells in the trachea are seen in the mucosa as goblet cells and in the submucosal glands. The histochemical nature of respiratory mucus shows considerable variation in different species. It has been studied in several manners. This study has been carried out in several animals, like mouse and rat [1], cat [2], mongoose [3] and also in man [4]. Recently it was described in the ferret [5].
The present work was undertaken to find out the types of mucins secreted by tracheal glands and to study their normal distribution. Although mucin changes in nasal polyp and chronic bronchitis have been described, little is known about the pathophysiology of mucins. Foetal mucins differ histochemically in many respects from their adult counter parts. It is difficult to interpret such differences because the biological role of even the best chemically defined adult glycoprotein is poorly understood [6]. The association of cells with different staining characteristics within the gland has laid to the suggestion that within one cell before secretion, mucin may mature from a simple to a more complex nature and with altered histochemical reaction [7].
The normal distribution at different gestational age group may help to understand the physiology of mucin secretion and changes in mucin pattern. Each cell produces one or more than one type of acidic mucosubstances.
Histochemically the mucins are divided into –
I) Neutral mucins
II) Acidic mucins
The acidic mucins are further classified into –
a) Sulfated mucins.
Histochemical knowledge of serous and mucus glands in foetus is limited and very little is known about changes in mucousubstances in tracheo-bronchial glands at varied foetal age. This study may help to understand the possible physiological role of mucin in children and possible changes from normal substances may help in early diagnosis of certain diseases.

**Material and Methods:**

50 normal human foetuses were obtained from Shri Chhatrapati Shivaji Maharaj Sarvopchar Rugnalaya, Solapur. These foetuses were of 24 weeks to 37 weeks of gestation period. They were obtained from Obstetrics and Gynaecology Department of the hospital. Trachea was obtained by dissection of fresh specimens. The tissue obtained were fixed in 2 % calcium in 10% formaline at room temperature for 4-5 days, embedded in parrafin wax and sectioned at 6 micron. The sections were stained with the following standard technique.

A. Haematoxyline and Eosin (H & E)
B. Alcian blue at pH 1.0 and pH 2.5 (AB)
C. Periodoc acid Schiff.(PAS)
D. Combined Alcian blue and Periodic acid Schiff (AB-PAS)
E. Aldehyde Fuchsin – Alcian blue pH 2.5 (AF-AB)

**Observations:**

The trachea of human foetus showed pseudostratified ciliated columnar epithelium with glands scattered in lamina propria by H.&E.staining (figure1). The glands & goblet cells were stained magenta with PAS technique indicating neutral mucosubstances (figure2). With AB pH 1 & pH 2.5 the glands and goblet cells were stained blue indicating presence of sulfated acid mucosubstances (figure3). With AB pH 2.5 PAS technique the glands and goblet cells showed mixture of magenta & blue colour indicating presence of neutral and sulfated acid mucosubstances (figure4). With AF-AB technique, the glands & goblet cells showed purple colour, indicating presence of sulfated acid mucosubstances (figure5).
Discussion:
A comparison of the mucosubstances elaborated and secreated by tracheo-bronchial glands in the foetus, the newborn and the child under four year age is different from that of adults [7]. The mucus glands of adult human trachea contains less neutral & correspondingly more carboxyl rich mucins [8]. It was found that in patients of cystic fibrosis, and bronchiectasis, there was a decrease in the proportion of mucus cells producing sialomucin & an increase in the proportion, producing sulfated mucins [9]. The mucus secretion has antibacterial activity along with antiviral property. The carboxylated mucins were not found in mucus cells of the tracheo-bronchial tree of human foetus & newborn but were predominantly seen in adults. The sialomucin according to literature data detemine the protective properties of the secretions against viruses [10]. This may be one of the reason why children below 4 years of age & newborn are more prone for viral infection than adult. In present study foetal trachea showed pseudostratified ciliated columnar epithelium. The submucosal glands showed presence of neutral and sulfated mucins. The carboxylated mucins were absent. From above observations, it was concluded that in the foetus the mucosubstances of the tracheal glands were neutral and sulfated.
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