Interleukin-5 mRNA in Mucosal Bronchial Biopsies from Asthmatic Subjects

Q.		Hamid ^a
M.	May	Azzawi ^a
S.	Sun	Ying ^a
R.		Moqbel ^a
A.J.		Wardlaw ^a
C.J.		Corrigan ^a
B.		Bradley ^a
S.R.		Durham ^a
J.V.		Collins ^b
P.K.		Jeffery ^c
D.J.	Diana J.	Quint ^d
A.B.		Kay ^a

^aDepartment of Allergy and Clinical Immunology, and ^bDepartment of Lung Pathology, National Heart and Lung Institute, ^bRoyal Brompton Hospital, London; ^cBiochemistry Department, Glaxo Group Research Ltd., Greenford, UK

Abstract

Using in situ hybridization, we have investigated the expression of interleukin-5 (IL-5) mRNA in bronchial biopsies from asthmatics (n = 10) and controls (n = 9). The number of IL-5-mRNA-positive cells were compared with the number of CD25⁺ and EG2⁺ cells and total eosinophil counts. Specific hybridization signals for IL-5 mRNA were demonstrated in 6 out of the 10 asthmatic subjects but in none of the controls. The 6 IL-5-mRNA-positive asthmatics tended to have more severe disease and showed a significant increase in the degree of infiltration of the bronchial mucosa by activated T lymphocytes and eosinophils.

Correspondence to: Prof. A.B. Kay, Department of Allergy and Clinical Immunology, National Heart and Lung Institute, Dovehouse Street, London SW3 6LY (UK)

Eosinophils are recognized as potentially important pro-inflammatory cells in bronchial asthma [1]. In vitro, the lymphokine interleukin-5 (IL-5) plays a critical role in terminal differentiation of the committed eosinophil precursor cell, as well as in priming and activation of the mature cell [2, 3]. It has been shown that activated T lymphocytes are the main source of IL-5 [4]. We have recently demonstrated an increase in numbers of activated T cells (CD25⁺) in asthma and suggested that this may be related to an increase in the number and activation of eosinophils [5]. Identification of IL-5 mRNA in asthma may provide evidence for IL-5 generation and emphasize the possible link between T lymphocytes and eosinophils in this disease.

Using the technique of in situ hybridization we have investigated the expression of IL-5 mRNA in endobronchial mucosal biopsies from asthmatics and controls. We have also attempted to relate the expression of IL-5 mRNA to the severity of the disease and the degree of infiltration of the airway mucosa by eosinophils and activated T lymphocytes.

Fig. 1. Autoradiograph of bronchial mucosa from a patient with symptomatic asthma. In situ hybridization was performed with a [32P]-labelled cRNA probe encoding for IL-5 mRNA. Arrows indicate the positive IL-5 mRNA cells. $\times 400$.

Bronchial biopsies were obtained, by fibre-optic bronchoscopy, from 10 asthmatics and 9 non-atopical normal controls. A radiola-belled cRNA probe was prepared from an IL-5 cDNA [6] and hybridized to permeabilized sections. These were washed extensively before processing for autoradiography [7]. An IL-5-producing T cell clone derived from a patient with the hyper-IgE syndrome was used as a positive control [8]. As a negative control, sections were also treated with a 'sense' IL-5 probe.

Specific hybridization signals for IL-5 mRNA were demonstrated within the bronchial mucosa in 6 out of the 10 asthmatic subjects (fig. 1). Cells exhibiting hybridization signals were located beneath the epithelial basement membrane. In contrast, there was no hybridization in the control group. No hybridization was observed with the sense probe.

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The 6 IL-5-mRNA-positive asthmatics tended to have more severe disease than the negative asthmatics, as assessed by symptoms and lung function, and showed a significant increase in the degree of infiltration of the bronchial mucosa by secreting (EG2+) eo-sinophils and activated (CD25+) T lymphocytes. Within the subjects who were positive for IL-5 mRNA, there was a correlation between IL-5 mRNA expression and the number of CD25+ and EG2+ cells and total eosinophil count.

This study provides evidence for the cellular localization of IL-5 mRNA in the bronchial mucosa of asthmatics and supports the concept that this cytokine regulates eosinophil function in bronchial asthma.

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