

# 사람 코점막과 배양된 코점막 상피세포에서 15-Lipoxygenase와 Cyclooxygenase-2의 발현

연세대학교 의과대학 이비인후과학교실,<sup>1</sup> 두뇌한국 21 의과학사업단<sup>2</sup>

김경수<sup>1,2</sup> · 윤주현<sup>1,2</sup> · 김창훈<sup>1</sup> · 김선구<sup>1</sup> · 장정현<sup>1</sup> · 김지훈<sup>1</sup>

## Expression of 15-Lipoxygenase and Cyclooxygenase-2 in Human Nasal Mucosa and Cultured Human Nasal Epithelial Cells

Kyung-Su Kim, MD<sup>1,2</sup>, Joo-Heon Yoon, MD<sup>1,2</sup>, Chang-Hoon Kim, MD<sup>1</sup>,  
Sun Goo Kim, MD<sup>1</sup>, Jung Hyun Chang, MD<sup>1</sup> and Ji Hoon Kim, MD<sup>1</sup>

<sup>1</sup>Department of Otorhinolaryngology, Yonsei University College of Medicine, Seoul; and

<sup>2</sup>Brain Korea 21 Project for Medical Science, Seoul, Korea

### ABSTRACT

**Background and Objectives** : The purpose of our study was to examine the expression of 15-lipoxygenase (15-LO) in human nasal mucosa and to investigate the change of expression of 15-LO and cyclooxygenase-2 (COX-2) as a function of mucociliary and squamous differentiation. **Materials and Method** : Human inferior turbinates were used and immunohistochemistry with 15-LO and COX-2 antibody was done. Passage-2 normal human nasal epithelial cell culture using air-liquid interface method was performed for 14 days and the cells were divided as retinoic acid (RA)-sufficient and RA-deficient group. Western blot analysis for 15-LO and COX-2 expression was performed on each group on 0, 7, and 14 days. **Results** : 15-LO expression of mucociliated epithelium was noted in ciliated cells and basal cells, but was not found in goblet cells and secretory acini. In squamous epithelium, the expression of 15-LO was weaker than that in the mucociliated epithelium, but the expression of COX-2 showed no difference between them. In Western blot analysis, 15-LO expression was significantly higher in RA-sufficient culture than in RA-deficient culture and this expression was time-dependent. COX-2 expression was almost same level in RA-deficient culture, but its expression was significantly higher in RA-sufficient culture on 7 and 14 days than on zero day. **Conclusion** : 15-LO and COX-2 may be related to differentiation and development of nasal epithelial cells. However, it is unclear whether this relationship is direct or indirect effect of 15-LO and COX-2. This question remains to be solved. (Korean J Otolaryngol 2003;46:649-53)

**KEY WORDS** : Nasal mucosa · 15-Lipoxygenase, arachidonate · Synthase, prostaglandin · Cell differentiation.

Prostaglandin  
genase(COX) isoform COX - 1, 2  
COX - 1  
COX - 2  
2

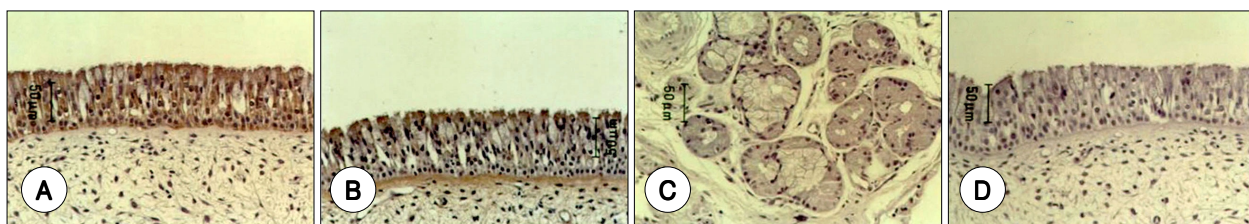
cyclooxy-  
가 가  
COX -  
(leukocyte trafficking),  
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: (02) 3497 - 3463 · : (02) 3463 - 4750  
E - mail : ydrhinol@yumc.yonsei.ac.kr

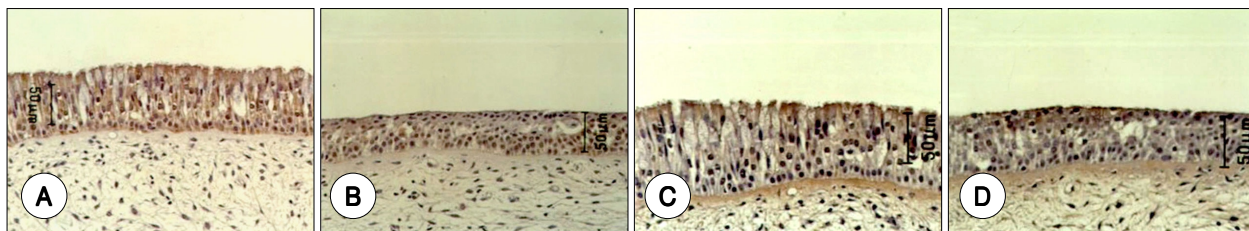
<sup>2)</sup>  
15 - lipoxygenase(15 - LO)  
hydroperoxy epoxy  
15(S) - hydroperoxyeicosatetraenoic acid  
(HpETE) 15(S) - hydroxyeicosa-  
tetraenoic acid(HETE)  
13(S) - hydroperoxyoctadecadienoic acid(Hp-  
ODE) 13(S) - hydroxyoctadecadienoic  
acid(HODE) . 15 - LO 1, 2 가



8% SDS - polyacrylamide gel (Fig. 1A).  
 nitrocellulose membrane  
 10% milk in TBST 4 (Fig. 1C).  
 15 - LO COX - 2 4 COX - 2  
 TBST horseradish peroxidase  
 (Amersham Pharmacia Biotech, Buckinghamshire, UK) 1 enhanced chemiluminescence(ECL kit, Amersham Pharmacia Biotech) (Fig. 1B), (Fig. 1C).  
 autoradiography 15 - LO COX - 2 Scion Image(Scion Co., Frederick, MD, USA) 2 (Fig. 1D).  
 membrane  
 deprobing actin (Santa Cruz Biotechnology Inc., Santa Cruz, CA, USA)(1 : 500 ) Western blot analysis actin . 15 - LO COX - 2 actin 15 - LO COX - 2 (15 - LO COX - 2/actin) COX - 2 15 - LO COX - 2  
 (Fig. 2A and B).  
 COX - 2 (Fig. 2C and D).  
 15 - LO COX - 2  
 15 - LO COX - 2  
 15 - LO COX - 2

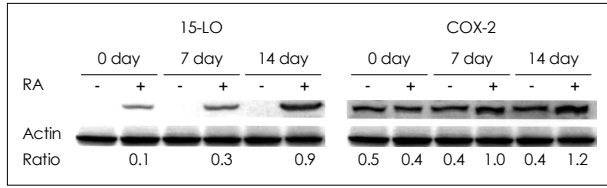


**Fig. 1.** Expression of 15-lipoxygenase and cyclooxygenase-2 in human nasal mucosa. A : 15-lipoxygenase expresses in the upper portion of cytoplasm of ciliated cells and basal cells, but not in goblet cells. B : Cyclooxygenase-2 expresses mostly in upper portion of ciliated cells and partly in basal cells, but not in goblet cells. C : In submucous glands, positive reactions to cyclooxygenase-2 and 15-lipoxygenase are not found. D : Negative control in which the primary antibody was omitted.



**Fig. 2.** Expression of 15-lipoxygenase and cyclooxygenase-2 in mucociliary and squamous epithelium. Expression of 15-lipoxygenase is more intense in mucociliated epithelium (A) than in squamous epithelium (B), but expression of cyclooxygenase is almost same level between mucociliated (C) and squamous (D) epithelium.

사람 코점막에서 15-LO와 COX-2의 발현



**Fig. 3.** Expression of 15-lipoxygenase (15-LO) and cyclooxygenase-2 (COX-2) according to culture duration in the presence or absence of retinoic acid (RA). In Western blot analysis using normal human nasal epithelial cells grown in RA-sufficient (RA+) or RA-deficient (RA-) culture media, the values of 15-LO and COX-2 expression were marked as ratio using their corresponding actin level after the estimation of intensity of hybridization bands by densitometer. 15-LO expression is significantly higher in RA+ culture than in RA- culture and the expression of 15-LO increases with culture duration in RA+ culture. COX-2 expression is almost same level in RA- culture throughout culture duration. However, in RA+ culture, COX-2 expression increases on 7 and 14 days after confluence compared with that on the day of confluence, but there is no significant difference between 7 and 14 days.

가  
가  
air - liquid interface  
0, 7, 14  
15 - LO COX - 2 Western blot analy-  
sis  
15 - LO 가 ,  
가  
LO air - liquid  
가 14 가 가  
(Fig. 3).  
COX - 2  
가 COX - 2  
가 7  
가 7 14  
(Fig. 3).  
15 - LO 가  
(high performance liquid chromatography)  
15 - HETE  
7)  
5)13)  
15 - LO

5)  
15 - LO  
15 - LO가  
13)  
가  
COX - 2  
가 9)  
10)  
9)10)  
(squamous meta-  
15 - LO  
15 - LO  
15 - LO가 가  
COX  
14)  
COX - 2  
COX  
10)  
COX 가  
15 - LO  
COX  
가  
가  
가

11)

COX - 2가 가 가 15 - LO 가

15 - LO 가 가

15 - LO가 가 가 COX

가

가

가

7

가

12)

(normal human tracheo - bronchial epithelial cells)

15 - LO COX - 2

15 - LO

COX - 2 가

COX - 2 가 가

15 - LO

가 14 가

COX - 2 15 - LO

가

15 - LO가 가 가

가

15 - LO가 15 - LO COX가

가

2002  
(2002 - 04)

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