Decreased levels of serum surfactant protein D is a potential biomarker for asthma patients with aspirin-exacerbated respiratory disease

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Abstract

Background: Surfactant protein D (SP-D) is a member of the collectin family that has an important role against lung infection and asthma. Moreover, SP-D dysfunction is related with several pulmonary diseases as it regulates inflammation. However, the function of SP-D in the pathogenesis of aspirin-exacrbated respiratory disease (AERD) is still unclear.
Objective: To identify systemic biomarkers of eosinophilic inflammation and airway limitation in patients with AERD.
Methods: SP-D concentrations were measured by human SP-D enzyme-linked immunosorbent assay (ELISA) in serum samples collected from patients with AERD (n=69), aspirin-toralent asthma (ATA, n=78) and healthy control subjects (HC, n=64).
Results: SP-D level in serum was significantly lower in patients with AERD compared to that of ATA (*P*=.007). Serum SP-D had no correlation with total eosinophil counts but inversely correlated with eosinophil cationic protein (ECP) concentrations (r=-0.178, *P*=.034)
Conclusion: Lowered SP-D in AERD may reflect altered eosinophil activation status, although the mechanistic studies are needed.

Introduction

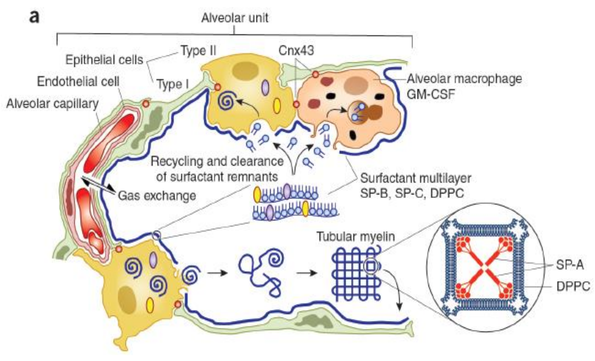
Alveolar epithelial cells

· Type I (95−97% total surface area)

: Exchange gas

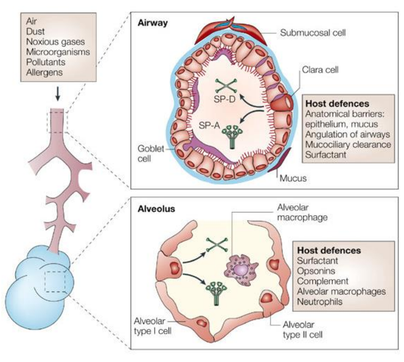
· Type II

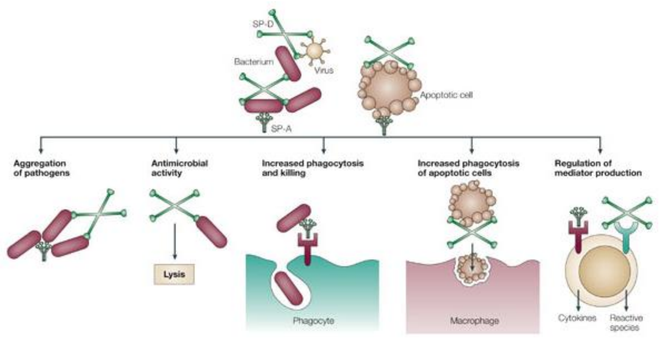
: Secrete surfactant proteins



Nature Immunology **16**, 27–35 (2015)

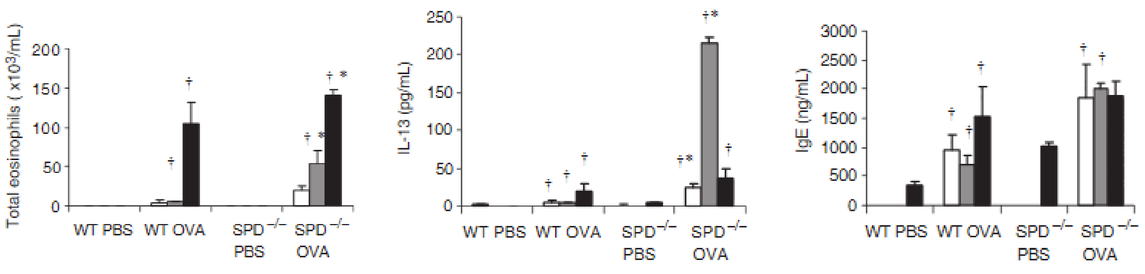
Immunoregulatory functions of surfactant proteins





Nature Reviews Immunology **5**, 58-68 (2005)

Surfactant protein D deficiency and allergic immune responses



Clin Exp Allergy **34**, 1819-26 (2004)

Methods

Human sample preparation: Serum was collected after removing clot by centrifuging.

Serum protein measuring: SP-D, DPP4 and sP-selectin were measured by using enzyme-linked immunosorbent assay (ELISA).

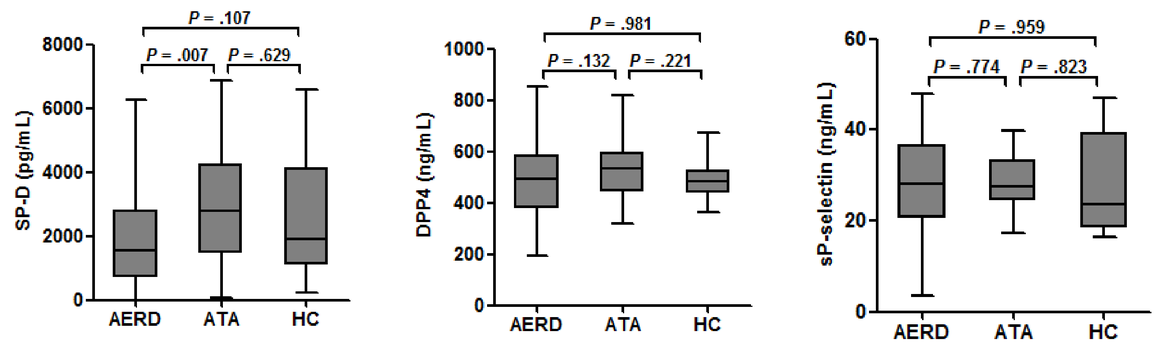
Results

1. Demograhic data

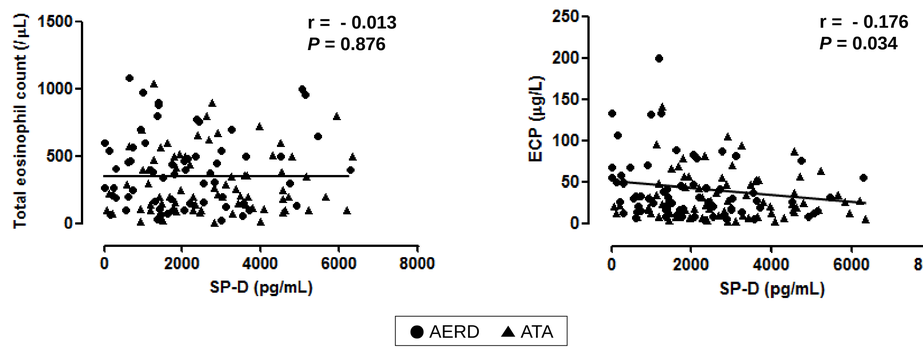
	Patients with AERD (n = 69)	Patients with ATA (n = 78)	Healthy control subjects (n = 64)
Age (y)	44 ± 14	45 ± 15	26 ± 3‡
Male sex (%)	22	36	75‡
Smoking history (%)			
Never	54	25†	89‡
Past	2	8	3
Current	44	67	8
Atopy (%)	46	42	50
Comorbidity (%)			
Atopic dermatitis	19	26	16
Allergic rhinitis	78	96†	25‡
Allergic conjunctivitis	33	26	6‡
Chronic urticaria	4	7	9
Severe asthma (%)	22	10	NA
FEV_1 (%)	88 ± 21	94 ± 19	ND
PC_{20} methacholine (mg/mL)	7 ± 11	12 ± 11*	ND
Total eosinophil count (/μL)	400 ± 274	309 ± 236*	ND
ECP (μg/L)	41 ± 38	32 ± 28	ND
Serum total IgE (kU/L)	393 ± 707	339 ± 454	ND

Data are presented as meams ± SDs.
AERD, aspirin-exacerbated respiratory disease; *ATA*, aspirin tolerant asthma; FEV_1, forced expiratory volume in 1 s; *ECP*, eosinophil cationic protein; *NA*, not applicable; *ND*, no data.
*$P < .05$.
†$P < .01$
‡$P < .001$ compared with patients with AERD

2. Comparison of serum levels of SP-D, DPP4 and sP-selectin



3. Correlation of serum SP-D levels with total eosinophil count and ECP concentrations



Conclusions

√ Only SP-D level in serum was significantly lower in patients with AERD compared to that of ATA

√ SP-D had no correlation with total eosinophil counts but inversely correlated with ECP concentrations

References

[1]Wang et al. *AJRCCM* 158, 510-8 (1998). [2]Mackay et al. *Chest* 15, 00177-4 (2016).