

**The effect of *Scutellaria baicalensis* George(SBG) extracts against airway inflammation and airway hyperresponsiveness induced by ovalbumin(OVA) and diesel exhaust particles(DEP) in mice**

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**Objectives**

Traditionally in Korea and China, SBG has been well-known and habitually used as a herbal medicine for effects such as antibiosis, drop of blood pressure, improvement of liver function, holdback of intestinal convulsions, sedation and diuresis action, removal of fever, and particularly control of edema and inflammation. While, the inhalation of DEP have been suggested to make symptoms of respiratory diseases worse such as asthma, chronic bronchitis, bronchial pneumonia. The aim of present study was to investigate the effect of crude SBG extracts in the asthmatic airway inflammation induced by OVA and DEP in mice.

**Materials and Methods**

o Intratracheal instillation of OVA & DEP, and treatment of SBG to mice.

After anesthetizing mice with 10% chloral hydrate, mice were treated the 100 ul of 1 mg/ml of DEP suspension once a week for 10 weeks by intratracheal instillation and mice were also nebulized the 1 % OVA PBS buffer solution(pH 7.4) for 30 mins once a week for 10 weeks by Buxco Aersol Dilivery System. We administered to mice with the concentration of SBG 200 mg/kg orally 5 times a week for 10 weeks.

o OVA sensitization and the measurement of airway hyperresponsiveness

OVA sensitization and inhallation to mice was performed by the method of Harmond et al.(2004) and airway hyperresponsiveness was measured according the procedure of Finotto et al(2001) by using Biosystem XA equipped with whole body plethysmographs.

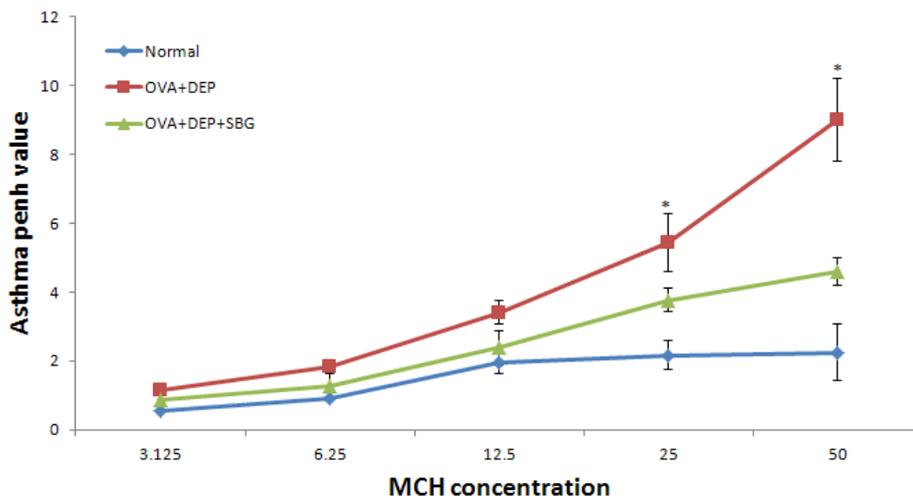
o Determination of cytokine and chemokine level

We measured the IL-4, IL-5, IL-13 and IFR- $\gamma$  level in the bronchoalveolar lavage fluid (BALF) of mice, the histamine and IgE level in blood with using ELISA kit.

**Results**

Oral SBG treatment to mice decreased the serum immunoglobulin (IgE) and histamine level increased by OVA and DEP, and declined the respiratory resistance. It also dropped an enhanced infiltration of eosinophils in the BALF of mice, and an increased T helper type 2 cell derived cytokine levels such as interleukin (IL)-4, IL-13 and IL-5, and an elevated T helper type 1 derived cytokine such as IFR- $\gamma$ . These results indicate that SBG may alleviate OVA+DEP allergen-related airway inflammation and airway hyperresponsiveness in mice and may play an important role in the modulation of asthmatic airway inflammation.

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**Fig. 1.** Effect of SBG on airway hyperresponsiveness by MCH in OVA & DEP treated mice. \* Significantly different from OVA+DEP group(p<0.01)

### Test scores

**Table 1.** Change of lung weights, the number of total cells and eosinophils in bronchoalveolar lavage fluid

	Normal	OVA+DEP	OVA+DEP+SBG
lung weights(g)	0.14 ± 0.03	0.18 ± 0.08	0.16 ± 0.06
Total Cells (x 10 <sup>5</sup> cells)	1.81 ± 0.23	8.59 ± 1.51 <sup>#</sup>	2.48 ± 0.38 <sup>#*</sup>
Eosinophils (x 400)	2.00 ± 0.20	356.0 ± 59.0 <sup>#</sup>	205.5 ± 16.0 <sup>#*</sup>

<sup>#</sup>:Significantly different from normal group(p<0.01)

\*:Significantly different from OVA+DEP group(p<0.01)

**Table 2.** Change of histamine and IgE levels in serum

	Normal	OVA+DEP	OVA+DEP+SBG
Histamine (ng/ml)	46.6 ± 3.6	178.8 ± 9.8 <sup>#</sup>	114.6 ± 5.8 <sup>#*</sup>
IgE (Ug/ml)	26.2 ± 2.0	161.0 ± 26 <sup>#</sup>	68.8 ± 6.5 <sup>#*</sup>

<sup>#</sup>:Significantly different from normal group(p<0.01)

\*:Significantly different from OVA+DEP group(p<0.01)

**Table 3.** Change of cytokine levels in bronchoalveolar lavage fluid.

Cytokine	Normal	OVA+DEP	OVA+DEP+SBG
IL-4 (pg/ml)	15.7 ± 1.2	183.1 ± 16.6 <sup>#</sup>	85.0 ± 9.6 <sup>#*</sup>
IL-5 (pg/ml)	48.3 ± 3.8	507.0 ± 67.4 <sup>#</sup>	243.2 ± 46.2 <sup>#*</sup>
IL-13 (pg/ml)	7.4 ± 3.2	100.3 ± 19.0 <sup>#</sup>	39.5 ± 6.2 <sup>#*</sup>
IFN-gamma (pg/ml)	12.5 ± 2.6	130.8 ± 14.7 <sup>#</sup>	37.3 ± 14.2 <sup>#*</sup>

<sup>#</sup>:Significantly different from normal group(p<0.01)

\*:Significantly different from OVA+DEP group(p<0.01)