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Ellagic acid prevents submandibular gland inflammation in a rat model of hypertension with nitric oxide deficiency

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Introduction: It has well established that administration of N^{ω}-nitro-L-arginine methyl ester (L-NAME) results in systemic hypertension[1] and vascular inflammation[2]. Recently, biological differences of submandibular gland between control and hypertensive rats which induced by L-NAME have been reported[3]. Ellagic acid (EA) is a natural polyphenolic compound (Fig. 1) present in fruits, such as strawberries, grapes, pomegranates, and nuts[4], and possesses anti-inflammatory activities[5]. The aim of this study was to investigate whether EA can prevent submandibular gland inflammation in hypertensive condition.

Method: Hypertension was induced in male Sprague-Dawley rats by administration of L-NAME (40 mg/kg) in drinking water and simultaneously treated with EA (15 mg/kg/day, p.o.) for three weeks (n= 6/each group). Systolic blood pressure (SBP) was measured once a week using a tail cuff method. Submandibular glands weight was recorded and histomorphology was investigated by Hematoxylin and Eosin (H&E) staining. The Western blot analysis was used to determine an iNOS protein expression. Data were expressed as mean±S.E.M. Statistical analysis was tested by one-way analysis of variance (ANOVA) and followed by Student Newman-Keul's test.

Results: L-NAME treated rats has higher SBP than the values in control and L-NAME + EA group ($p<0.05$, Fig. 2). Submandibular gland weight in L-NAME rats was higher than that in control (0.43 g ± 0.01 vs 0.34 g ± 0.01, n=6, $p<0.05$) and this was prevented by EA (0.36 g ± 0.01, n=6, $p<0.05$). Although histomorphology by H&E did not show the difference among groups, the expression of iNOS protein in submandibular glands from L-NAME rats was significantly upregulated when compared to the control ($p<0.05$). Preventive treatment of EA significantly alleviated iNOS protein overexpression ($p<0.05$, Fig. 3).

Conclusion: These results indicate that EA can effectively prevent submandibular inflammation of rats with hypertensive condition.

References:

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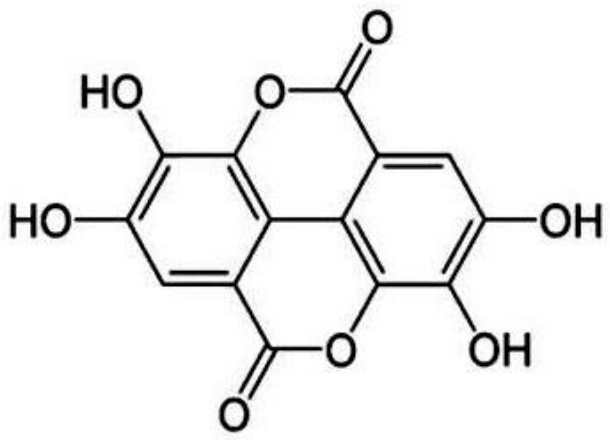

Fig. 1 Chemical structure of ellagic acid

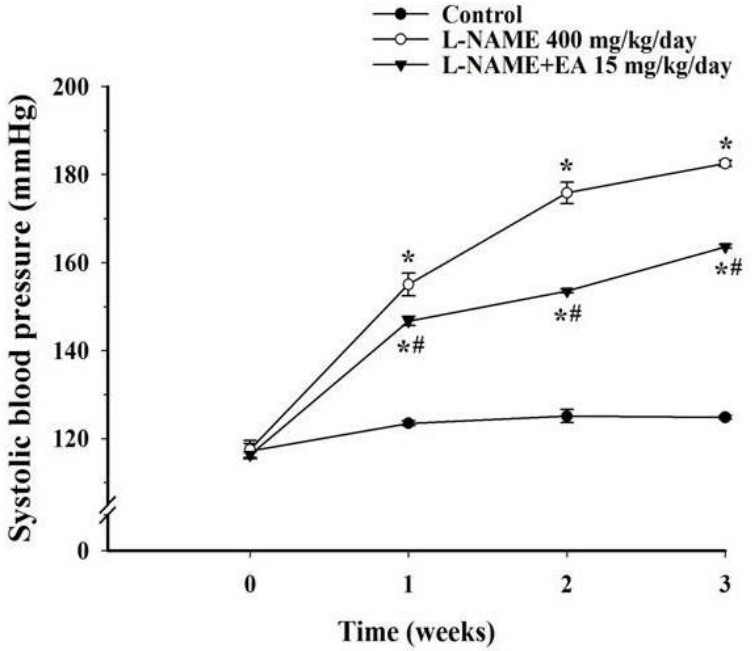

Fig. 2 Effect of EA on systolic blood pressure

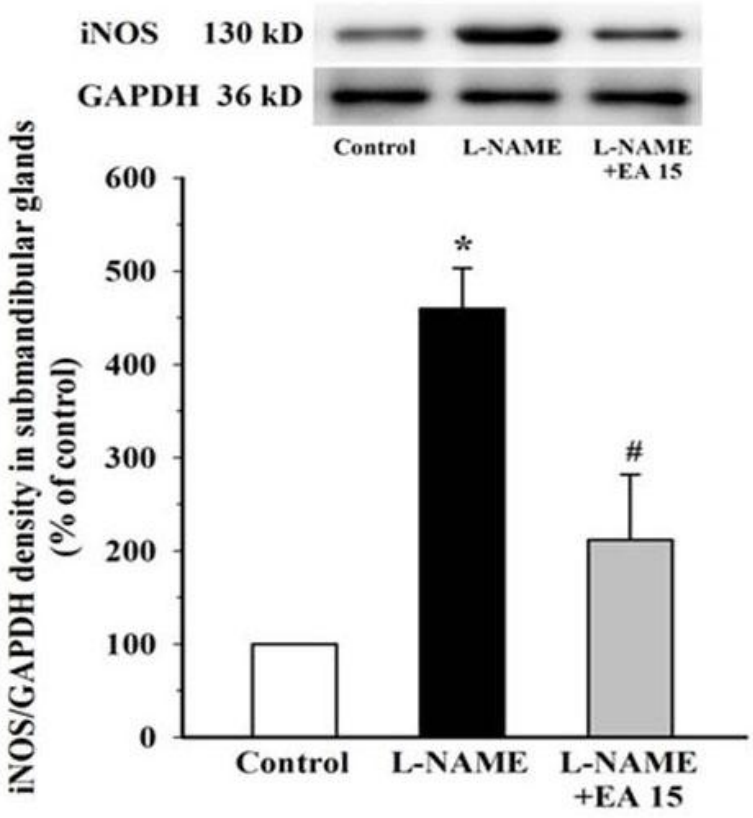

Fig. 3 Effect of EA on iNOS expression