

Estrogen Effect on Extracellular Matrix Production of Vocal Fold in Rat

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Background

During lifetime the female voice affect under the varied influences of estrogens, progesterone, and testosterone. The ovariectomized rat is widely used animal model for study of aging women because ovariectomy closely mimics the postmenopausal state. However, the histological and molecular changes of vocal fold due to estrogen deficiency have not been studied. Therefore, the aim of this study was to determine estrogen effect on extracellular matrix production of vocal fold in order to clarify effects of estrogen deficiency on laryngeal tissue and to provide a supportive animal evidence for female voice changes due to sexual hormones.

Methods

Female SD rats aged ten weeks were randomly divided into four groups: group I, III (sham-operated rats as CON) and group II, IV (ovariectomized rats as OVX). Rats were sacrificed 4 weeks and 12 weeks after surgery. Endogenous serum estrogen levels were examined by rat-specific estradiol ELISA kit. Various staining methods and immunohistochemistry were used to examine extracellular matrix changes. Moreover, real-time PCR method was used for quantification of extracellular matrix-related mRNA ex-

pression using SYBR Green technology.

Results

The animal characteristics are presented by body weight and food intake. Overall weekly food intake and final body weight was greater on OVX group than CON group. The cellular density of lamina propria is similar, however distribution of elastin fiber and tropoelastin mRNA expressions were decreased in OVX group. Hyaluronic acid and hyaluronic acid synthase (HAS-1 and HAS-2) also down regulated on OVX rats. Meanwhile, mRNA expression of procollagen I and procollagen III was increased in OVX group compared with CON group.

Conclusion

Elastin fibers and Hyaluronic acid were reduced by estrogen deficiency. Further, collagens were accumulated by ovariectomized surgery. Our study shows that the vocal fold is an estrogen target organ and ovariectomy model may provide prevention and treatment of voice change in postmenopausal women.

Keywords

Estrogen, Extracellular matrix, Vocal fold