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Paravertebral deep back muscles of girls with idiopathic scoliosis reveal expression of receptors for estrogens

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Introduction

Estrogens can influence skeletal muscles activity by stimulating angio- and muscle-genesis. These hormones act through specific alpha and beta estrogen receptors (ER). Muscular tissue may be a target for estrogens, however there is no data on ER expression in paravertebral muscles in patients with idiopathic scoliosis (IS). During early adolescence the increase of estrogen serum level coincidences with the period of rapid scoliosis progression. The aim of the study was to investigate ER alpha expression in the paravertebral muscles of patients with IS.

Material and methods

The study was conducted on seven girls aged 11 to 16 years, having single right thoracic IS. The Cobb angle was from 55 to 80 degrees; the apical vertebra was Th8 or Th9 or Th10. During posterior scoliosis surgery muscle tissue samples were excised from deep paravertebral muscles (longissimus). The samples were taken from both sides at the apical level, as well as from one superficial back muscle (trapezius). Informed consent and ethical approval were assured.

Total RNA was extracted from muscle samples and reverse transcription was performed to obtain coding DNA. The expression of ER alpha was assessed by quantitative Real Time PCR. Sequence specific primers were designed to allow amplification of all spliced variants of ER alpha gene. The level of gene expression in healthy endometrial tissue was taken as a control.

Results

The presence of active gene encoding ER alpha was demonstrated in all muscle samples. Relative level of the ER gene expression was significantly higher in deep paravertebral muscles comparing to superficial back muscles. In both analyzed muscles the gene expression was lower than in endometrium. However, in deep muscles of individual patients the activity of the ER gene expression was as high as in endometrial tissue.

Discussion

This preliminary study for the first time demonstrates the expression of ER alpha in deep paravertebral muscles in girls suffering from IS. The expression level of ER alpha in individual patients was as high as in the endometrium which is known to be estrogen-dependent tissue. Physiological significance of our findings is not certain but it could be related to scoliosis progression during adolescence.

Conclusion

Deep paravertebral back muscles of girls with IS demonstrated the expression of estrogen receptor alpha.

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