

## **The Effect of High Intensity Interval Training on STAT-3 and Angiopoietin-1 Gene Expression, and tie-2 Protein in Mice with Breast Cancer**

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### **Abstract**

**Introduction:** Angiogenesis has a great role in physiological development of tissues and tumors. Considering the key role of STAT-3 and angiopoietin-1-tie-2 in angiogenesis, this study aimed to investigate the effect of 10 weeks of high intensity interval exercise (HIIT) on STAT-3 and angiopoietin-1 gene expression, and tie-2 protein in mice with breast cancer.

**Methods:** After inducing cancer (subcutaneous injection of MC4-L2 on the right side of mice), twelve Balb/c mice (6-8 weeks, weight  $19 \pm 1.05$ ) were randomly assigned to HIIT (n=6) and non-active groups (n=6). HIIT sessions were performed five days a week for 10 weeks. Twenty-four hours after the last session of HIIT, the animals were sacrificed and the tumor tissue was isolated for measuring the expression of STAT-3 and angiopoietin-1 gene by qreal time PCR and measuring tie-2 protein by western blot method. Tumor volume changes were also assessed using a digital caliper every week.

**Results:** The results of this study showed a significant decrease in expression of STAT-3 and angiopoietin-1, and changes in tumor volume and tie-2 in the training group compared to the control group ( $p = 0.001$ ).

**Conclusion:** It appears that high intensity interval exercise can reduce the rate of tumor progression through decreasing the expression of some angiogenesis promoters, and is an effective non-medical method for reducing tumor growth.

**Keywords:** Breast Cancer, High Intensity Interval Training, Angiogenesis, STAT-3, Angiopoietin-1 and tie-2