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Does exercise have an effect on Breast Cancer Cell Growth?

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Background: One way to influence the tumor microenvironment (TME) by exercise through myokines is the cancer-muscle cross talk. The cytokine CXCL9 plays a central role in the regulation of tumor growth and cell proliferation, mediated via the CXC chemokine receptor 3 (CXCR3) signaling pathway. We analyzed whether exercise-conditioned serum has an influence on the CXCL9 concentration in breast cancer (BC) cells in vitro and on BC cell growth.
Methods: Twelve female participants underwent an acute endurance exercise intervention. Serum samples were collected before, immediately after, and two hours post-exercise. Triple-negative BC (MDA-MB-231) cells and estrogen-dependent BC (MCF-7) cells were incubated with the conditioned serum, and cell vitality (MTT assay) and proliferation (Immunohistochemistry with anti-Ki-67 antibody) were assessed.
Results: Endurance exercise-conditioned serum significantly reduced triple-negative BC cell vitality ($p= .046$) and cell proliferation ($p= .032$) post-intervention and after the resting period ($p<.001$). Protein arrays identified CXCL9 as a key cytokine. The corresponding CXCR3 pathway was inhibited and experiments were repeated. Inhibition of the CXCL9 receptor CXCR3 resulted in metabolic ($t (10)= 3.064$, $p=.012$) and proliferative inhibitory effects ($t (10)= -11.734$, $p<.01$) for the MDA-MB-231 cells. For the MCF-7 cells, the MTT analysis showed a significant decrease in cell vitality after CXCR3 inhibition (Effect size (ES) = 0.75, $p=.032$), while immunohistochemical analysis revealed increased Ki-67 expression under the inhibitor condition compared to the control condition (ES = 0.85, $p=.005$).
Discussion: Our results suggest that serum conditioned by an acute endurance exercise causes changes in BC cell growth, but the effects appear to be cell type-specific. This discrepancy suggests that the CXCR3 signaling pathway may be more relevant in metabolic than proliferative processes. Overall, this provides valuable insights into the complexity and possible mechanisms of action of the CXCR3 signaling pathway in the TME and provide important key points for future research.

Keywords

breast cancer, tumor microenvironment, exercise, myokines

Conflict of Interest & Ethical Approval

yes

Abstract submitters declaration

yes

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