

powered by



GERMAN
CANCER RESEARCH CENTER
IN THE HELMHOLTZ ASSOCIATION

Contribution ID: 297

Type: 1 - Scientific Poster

Subtype-Specific Molecular Responses of Breast Cancer Cells to High-Intensity Interval Exercise-Conditioned Human Serum

Thursday 23 July 2026 12:40 (20 minutes)

Background: Exercise exerts antitumor effects through acute systemic responses that modulate tumor biology. In particular, high-intensity interval exercise (HIIE) induces transient changes in circulating factors that may influence cancer cell behavior. However, the underlying molecular mechanisms, subtype specificity, and temporal dependence remain incompletely understood.

Methods: Physically inactive women completed a single HIIE session. Blood lactate and circulating 17 β -estradiol were measured before and after exercise. Pre- and post-HIIE serum was used to culture MCF-7 and MDA-MB-231 breast cancer cells under two paradigms: continuous exposure and repeated short daily pulses (3 h). Cell viability, apoptosis, and necrosis were assessed by biochemical assays, Western blotting, and flow cytometry. Estrogen receptor α signaling, inflammatory pathways, and growth-related signaling were analyzed by Western blot. Transcriptomic profiling was performed by RNA sequencing followed by GSEA using Hallmark and MitoCarta 3.0 collections.

Results: HIIE increased blood lactate and reduced circulating 17 β -estradiol. In MCF-7 cells, continuous exposure to post-HIIE serum decreased ER α phosphorylation at Ser167 while increasing phosphorylation at Ser118. Continuous exposure did not affect viability or apoptosis, despite reduced 4E-BP1 phosphorylation in MDA-MB-231 cells and decreased MyD88 and p-NF- κ B levels in both subtypes. MCF-7 cells showed enrichment of estrogen response, oxidative phosphorylation, DNA repair, and mitochondrial pathways, accompanied by downregulation of inflammatory and apoptosis-related programs. In contrast, MDA-MB-231 cells exhibited enrichment of cell-cycle programs with negative enrichment of oxidative phosphorylation, mitochondrial, and interferon- α -related signaling. Repeated short daily pulses of post-HIIE serum reduced viability at 48 h and 72 h in both cell lines, more markedly in MCF-7 cells.

Conclusions: HIIE-conditioned human serum induces subtype- and time-dependent modulation of tumor cell signaling. Continuous exposure alters estrogen, inflammatory, and mitochondrial pathways without overt cell death, whereas transient repeated exposure elicits antiproliferative effects, underscoring the importance of temporal dynamics when modeling exercise-induced systemic influences.

Keywords

High-intensity interval exercise; Exercise-conditioned human serum; Breast cancer; Tumor cell signaling

Conflict of Interest & Ethical Approval

yes

Abstract submitters declaration

yes

Authors: Dr VALERO BRETON, Mayalen (Institute of Health and Sport Sciences, Faculty of Health Science, Universidad Francisco de Vitoria. Madrid, Spain); Mr LEDESMA RONCERO, Pablo (Faculty of Experimental Sciences, Universidad Francisco de Vitoria. Madrid, Spain)

Co-authors: Dr SANTOS TEJEDOR, Cruz (Faculty of Experimental Sciences, Universidad Francisco de Vitoria. Madrid, Spain); Dr GUTIÉRREZ HELLÍN, Jorge (Institute of Health and Sport Sciences, Faculty of Health Science, Universidad Francisco de Vitoria. Madrid, Spain); Dr IGLESIAS, Maite (Faculty of Experimental Sciences, Universidad Francisco de Vitoria. Madrid, Spain); Dr LÓPEZ MORENO, Miguel (Institute of Health and Sport Sciences, Faculty of Health Science, Universidad Francisco de Vitoria. Madrid, Spain); Dr MENDOZA LAIZ, Nuria (Institute of Health and Sport Sciences, Faculty of Health Science, Universidad Francisco de Vitoria. Madrid, Spain); Dr CUADRADO CASTAÑO, Sara (Department of Microbiology, Icahn School of Medicine at Mount Sinai. New York, USA); Ms BYKOV, Yonina (Department of Microbiology, Icahn School of Medicine at Mount Sinai. New York, USA); Mr MONAGO SÁNCHEZ, Álvaro (Faculty of Experimental Sciences, Universidad Francisco de Vitoria. Madrid, Spain)

Presenters: Dr VALERO BRETON, Mayalen (Institute of Health and Sport Sciences, Faculty of Health Science, Universidad Francisco de Vitoria. Madrid, Spain); Mr LEDESMA RONCERO, Pablo (Faculty of Experimental Sciences, Universidad Francisco de Vitoria. Madrid, Spain)

Session Classification: Poster Session