powered by

dkfz.
GERMAN
CANCER RESEARCH CENTER
IN THE HELMHOLTZ ASSOCIATION

Contribution ID: **258** Type: **3 - Talk**

Exercise during chemotherapy for breast cancer: Not just improving patients' functional ability

Thursday 23 July 2026 11:00 (15 minutes)

Background: Exercise during chemotherapy for breast cancer (BCa) offers significant health benefits and could influence disease progression. Evidence suggests that exercise-induced circulating factors mediate such anticarcinogenic effects, although the implicated cellular processes remain uncharacterized.

Method: Twenty-nine BCa patients (40.0±0.9 yrs, 25.0±0.8 kg/m2) were randomized with a 2:1 ratio either to exercise (EX) or usual care (UC) group. The EX participated in a 12-week exercise program during chemotherapy, consisting of both aerobic (25min; 40-59% Heart Rate Reserve) and resistance training (30min; elastic bands), 3 times per week, with monthly assessments of their functional ability. On the 12th week, human serum was collected from the EX immediately before (PRE-EX) and after (POST-EX) an exercise session and used to treat BCa cells (MCF-7) in vitro, to examine the effect of the exercise-conditioned serum on their metabolic activity, cytotoxicity, DNA damage and levels of apoptosis.

Results: Compared to baseline, in EX the cardiorespiratory endurance (Rockport 1-mile walk test) was improved by 10.78±4.59% ($p<0.05$) after the 12th week, as were also the handgrip strength on the mastectomy side (-21.00±4.79%) and the "Sit to Stand-60sec"(10.78±4.59%) and "Sit Ups-60sec"performances ($p<0.001$). In UC, the cardiorespiratory endurance exhibited a decreasing trend (-12.63±7.0%) and the handgrip strength on the mastectomy side deteriorated (-19.43±7.10%; $p<0.001$), along with the "Sit to Stand-60sec"(-8.80±3.44%; $p<0.01$) and "Sit Ups-60sec"(-21.90±9.98%; $p<0.05$) performances. Furthermore, the treatment of BCa cells with the POST-EX serum decreased their metabolic activity (32±6.4%; $p<0.001$), while induced cytotoxicity (1.5±0.04 fold-change; $p<0.001$) and DNA damage (1.8±0.2 fold-change; $p<0.05$), when compared to the PRE-EX condition. Also, the number of apoptotic cells raised to 14.6±0.4% ($p<0.05$) in the POST-EX serum-treated cells.

Conclusion: Exercise during chemotherapy not only counterbalanced functional ability deteriorations that were experienced by UC but also appeared to enrich patients'blood with anticarcinogenic exerkines, which could act additively to chemotherapy.

Keywords

breast cancer, in vitro, exerkines, apoptosis

Conflict of Interest & Ethical Approval

yes

Abstract submitters declaration

yes

Authors: Dr PAPADOPETRAKI, Argyro (Physiology Laboratory, Medical School, National and Kapodistrian University of Athens); Ms GIASKEVITS, Tatiana (Physiology Laboratory, Medical School, National and Kapodistrian University of Athens); Dr DROUFAKOU, Stavroula (Medical Oncology Department, Iaso General Clinic); Prof. KOUTSILIERIS, Michael (Physiology Laboratory, Medical School, National and Kapodistrian University of Athens); Prof. ZAGOURI, Flora (Alexandra General Hospital, Medical School, National and Kapodistrian University of Athens); Prof. MARIDAKI, Maria (Faculty of Physical Education and Sports Science, National and Kapodistrian University of Athens, Greece); Prof. PHILIPPOU, Anastassios (Physiology Laboratory, Medical School, National and Kapodistrian University of Athens)

Co-author: Dr GIANNOPOULOS, Antonios (Department of Community Medicine and Rehabilitation, Sports Medicine, Umea University, Sweden)

Presenter: Dr PAPADOPETRAKI, Argyro (Physiology Laboratory, Medical School, National and Kapodistrian University of Athens)

Session Classification: Oral Session