

## Role of different endurance training program on cancer cachexia: pointing particular attention to the gender and age differences

Filippo Macaluso<sup>1</sup>, Rosario Barone<sup>1</sup>, Claudia Sangiorgi<sup>1</sup>, Daniela D'Amico<sup>1</sup>, Elisa Dino<sup>1</sup>, Dario Coletti<sup>2,3</sup>, Sergio Adamo<sup>3</sup>, Felicia Farina<sup>1</sup>, Valentina Di Felice<sup>1</sup> and Giovanni Zummo<sup>1</sup>

<sup>1</sup> Dipartimento di Biomedicina Sperimentale e Neuroscienze Cliniche, Università degli Studi di Palermo, Italy

<sup>2</sup> Laboratory of Genetics and Physio-pathology of Muscle Tissues, UR4 - Ageing, Stress, Inflammation, University Pierre et Marie Curie Paris 6, France

<sup>3</sup> Dipartimento di Scienze Anatomiche, Istologiche, Medico-legali e dell'Apparato Locomotore, SAPIENZA Università di Roma, Italy

Evidence from recent publications indicates that repeated exercise may enhance the quality of life of cancer patients (Maddocks et al., 2012). Regular physical activity may attenuate the adverse effects of cancer therapy, prevent or reverse cachexia and improve survival, although not all the patients are able or willing to undertake programs currently being offered. The aims of this study were to analyze: i) the effects of a progressive endurance exercise (progressive Training, pTR) on survival and cachexia in sedentary (SED) mice inoculated (I) with a fresh fragment of solid C26 tumor [SED-I-pTR; SED-I-SED]; ii) the effect of different protocols of endurance exercise (Trained for 30 min, TR30; Trained for 60 min, TR60; Trained for 120 min, TR120) on survival and cachexia in trained mice inoculated (I) with a fresh fragment of solid C26 tumor [pTR-I-TR30'; pTR-I-TR60'; pTR-I-TR120']. All the conditions were tested to evaluate the gender (male and female) and age differences (young, 7-weeks old; adult, 3-months old; old, 15-months old). Mice were trained on a rota-rod for 6 weeks (5 times per week). Male sedentary mice (SED-I-SED) showed a higher median survival than sedentary female mice (for each age group); moreover adult mice survive more than sedentary young and old mice (for both gender groups). The endurance training improved the survival of mice in which the tumor was more aggressive (young and old), especially in female mice. Moreover, in the female old mice the progressive training exercise conducted before the inoculation seems to prolong survival. The data suggest that the endurance exercise as adjuvant therapy in cachexia needs to be gender and age specific.

### References

- [1] Maddocks M, Murton AJ, Wilcock A (2012) Therapeutic exercise in cancer cachexia. *Crit Rev Oncog.* 17(3): 285-92.

### Key words

Cachexia, endurance exercise, survival, gender ,age, muscle wasting.