Effects of Physical Training on Brain Neurochemical Factors in Rats with Parkinson's Disease

Paganini, C.S.\(^1\), Tuon, T.\(^1\), Pozzi, B.G.\(^1\), Tromm, B.T.\(^1\), Souza, P.S.\(^1\), Pedroso, G.S.\(^1\), Pinho, R.A.\(^1\).

\(^1\)Laboratory of Exercise Biochemistry and Physiology (PPGCS/UNESC, Criciúma, Brazil).

Introduction: Effects of exercise on Parkinson's disease (PD) has been extensively investigated; however, the underlying mechanisms responsible for these effects are poorly understood. The aim of this study was to evaluate the effect of training physical on the neurochemical markers in the striatum of rats with PD disease.

Material and Methods: Twenty-four 2-month-old male Wistar rats were divided into untrained+sham-operated (USO), untrained+PD (UPD), trained+sham-operated (TSO), trained+PD (TPD), \(n=6\). The animals were submitted to training on the treadmill (8-weeks, 4 days/week on every second days, 50 min/day, 13-17 m/min). Twenty-four hours after training, PD was induced by unilateral lesion on the left hemisphere with an injection of 6-OHDA (8 µg in 1 µl in 0.2% ascorbic acid). Seven days after the lesion the animals underwent rotational test (rotameter) and euthanasia by decapitation. The striatum was homogenized in specific buffer and immunoblotting with anti-tyrosine hydroxylase (TH), anti-brain-derived neurotrophic factor (BDNF), anti-sarcoplasmic reticulum Ca\(^{2+}\)-ATPase (SERCAII) and anti-alpha-synuclein.

Results and Discussion: The UPD (910%) and TPD (516%) groups showed increase numbers of rotation, when compared to USO group. However, exercise training was effective to reduce the numbers of rotation in PD disease (TPD group) in 43%, when compared to UPD group. Since the TPD group showed less asymmetry in relation to the UPD group. The exercise training in PD disease rats (TPD group) lead significant increase in TH (46%), BDNF (50%) protein levels and reduced (32%) alpha synuclein protein levels with compared to UPD group. The SERCA II protein levels increased (52%) in TDP group compared to UDP.

Conclusions: Our results suggest that the exercise training modulates expressions of TH, BDNF, SERCAII and anti-alpha-synuclein in the striatum of rats by improving our understanding of the pathogenesis in PD significantly. This knowledge can help create new treatment strategies, involving the exercise in PD.

Key Words: Parkinson’s Disease., TH., BNDF., alpha synuclein., SERCA II., physical exercise.

Supported by: FAPESC, CNPq and CAPES.