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FROM ANTARCTICA TO ALZHEIMERS – EXERCISE HELPS TO PREVENT COGNITIVE DECLINE

Abstract

INTRODUCTION Within a sedentary society, a lack of physical exercise is well known to provoke vascular, metabolic, and metastatic diseases. Regular physical exercise has been successfully proven to counteract this deconditioning. More recently, human and animal studies have demonstrated that regular physical activity also targets brain function by increasing cognitive abilities and mood and therefore improving life-quality. Besides these functional, short-term changes, there is good reason to speculate that structural changes caused by exercise may prevent the genesis of neurodegeneration.

METHODS Study 1: Eight male volunteers were isolated and confined during the winter period at the Antarctic Concordia Station. Every six weeks electroencephalographic measurements were recorded under rest conditions, and cognitive tests and a mood questionnaire were executed. Based individual training logs, subjects were afterwards separated into an active (¿ 2500 arbitrary training units/interval) or inactive (¡ 2500 arbitrary training units/interval) group.

Study 2: Seventy-five previously sedentary patients with a clinical diagnosis of mild cognitive impairment (MCI) were randomized to one of three groups. One group received a standardized 1-year extensive aerobic exercise intervention (3 units of 45 min/week). The second group completed a stretching and toning (non-aerobic) exercise (3 units of 45 min/week) and the third group acted as the control group. The primary outcome, cognitive performance, was determined by a neuropsychological test battery (CogState battery, Trail Making Test and Verbal fluency). Secondary outcomes include Montreal Cognitive Assessment (MoCA) and cardiovascular fitness.

RESULTS Study 1: A long-term effect of exercise was observed for brain cortical activity and mood. Whereas brain activity showed a decline throughout the isolation period for both groups, regular active people were able to remain their mood state. Inactive people instead showed a deterioration of mood over time. Study 2: Participants who showed an increase in physical fitness over the one year intervention period, also showed a significant increase in cognitive performance and life-quality. In contrast, physical fitness and cognitive performance of the participants of the non-exercise control group decreased or remained unchanged.

DISCUSSION In both studies, we could show that a regular exercise program was able to improve mood, cognitive performance and life-quality of our participants. A transfer of results from space life science into everyday life, allows emphasizing the importance of regular physical activity for brain health and stressing its relevance for a healthy life-style. It is important to realize that findings of space life science research are beneficial also for the general population.