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BIOCHEMICAL EVIDENCES ON YOUNGSTERS BEING BEST ASTRONAUT CANDIDATES

Abstract

The data acquired on board SpaceLand microgravity research flights taken off from the NASA Space Shuttle L.F. in Cape Canaveral not only confirm the role of NGF and BDNF in the adaptative response to "extreme situations" involving psychological stress but also show that brain hormones production in youngsters is five to ten times higher than in adults, most likely to support a faster and quantitatively more intense production of new synapsis in kids' brain to quicklier and better adapt to weightlessness with respect to grown-up adults. As a matter of facts, NGF is involved in the development and maintenance of specific peripheral and central populations of neuronal cells and, in the central nervous system, it acts as trophic factor for those neurons known to degenerate disorders, such as Alzheimer's disease. In humans, studies conducted prior to the parabolic flights of the SpaceLand program have shown that the anticipation of, for instance, the first parachute jump results in increased NGF plasma levels and in changes in the distribution of NGF receptors on lymphocytes. Commissioned by a Nobel-Prize-winner led group including European Brain Research Institute and Italy's CNR, ISS and the University of Milan, the SpaceLand neurobiological experiments in weightlessness similarly prove that an astronaut facing stress related to a space mission experiences an increase in the salivary levels of NGF preceding the hormonal response. During microgravity flight campaigns in Lunar-gravity, Mars-gravity and in so-called Zero-gravity flight conditions, saliva samples were self-collected by the experimental subjects of the SpaceLand flight crew, namely nine adults and the world's youngest kid to fly in weightlessness for research purposes, namely a 11 year-old boy authorized by NASA to be brought on board by the author of this paper in his role as father and research mission head. Saliva samples were then collected, stowed in payload-freezer at the Kennedy Space Center after the flight and then brought to Italy, where they were assayed for nerve growth factor (NGF), brain derived neurotrophic factor (BDNF) and cortisol (CORT) levels. Experimental subjects showed an increase in salivary levels of NGF and BDNF only during specific phases of the flight; besides, the 11-year-old kid has shown an impressive output of BDNF and cortisol levels during his flight where video data show his extremely faster adaptation to weightlessness with respect to surrounding adults. Research data and considerations on the potential of such discoveries are presented in this paper.