SALIVARY NGF, BDNF AND CORTISOL LEVELS DURING PARABOLIC FLIGHT

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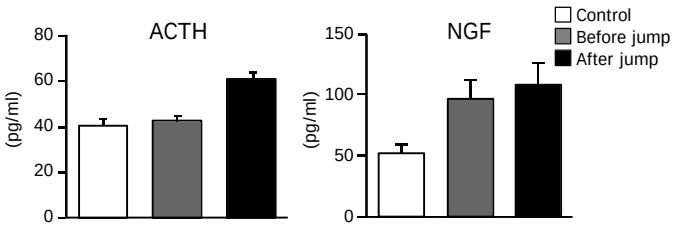
Nerve growth factor (NGF) is a well-studied polypeptide growth factor involved in the development and maintenance of specific peripheral and central populations of neuronal cells. In the central nervous system NGF acts as trophic factor for those neurons (mainly cholinergic and peptidergic) that are known to degenerate in disorders, such as Alzheimer's disease, which is becoming progressively more frequent due to the longer lifespan of the western population. More recently, NGF target cells have been identified in the nervous, immune, and endocrine systems, and an increasing body of evidence suggest that NGF, in addition to its role as a neurotrophic agent, may operate through multiple paths to ultimately regulate physiological homeostasis and behavioural coping.

In previous studies, we used a mouse model of social stress to demonstrate that NGF levels increase both in plasma and in the hypothalamus following intermale aggressive interactions and more recently, we found an increase in NGF levels both in plasma and in some brain areas, such as the frontal cortex, hippocampus and hypothalamus, of mice exposed to rotation-induced hypergravity (2g).

In humans, experiences such as the anticipation of the first jump with a parachute also result in increased NGF plasma levels and in changes in the distribution of NGF receptors on lymphocytes.

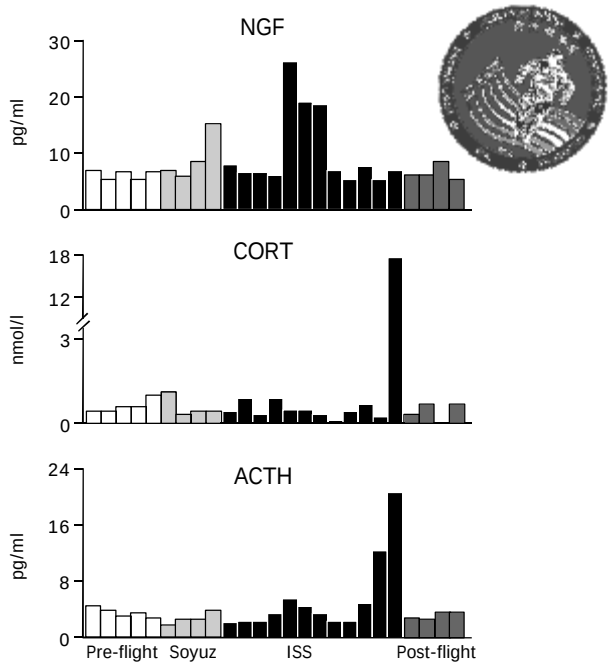
ACTH AND NGF LEVELS IN THE BLOOD OF PARACHUTISTS OF THE BRIGATA "FOLGORE" BEFORE AND AFTER JUMPING



Adapted from: *Aloe L. et al. (1994) Proc Natl Acad Sci USA*

Similarly, an astronaut experiencing stress related to a space mission shows an increase in the salivary levels of NGF preceding the hormonal response.

SALIVARY LEVELS OF NGF, CORT AND ACTH MEASURED IN THE ASTRONAUT DURING THE ENEIDE MISSION



In order to evaluate NGF levels and others neurochemical parameters, known to be involved in the responses to stress, saliva samples were collected before, during and after parabolic flight with Lunar-, Mars-, and Zero-gravity conditions.

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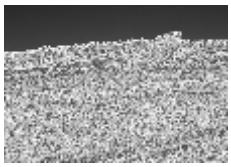
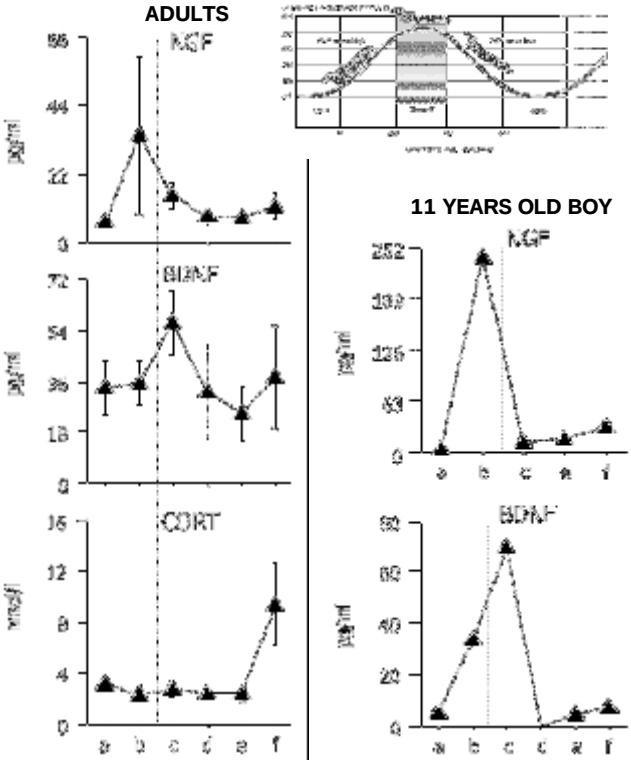
EXPERIMENTAL PROCEDURE



Saliva samples were self-collected by the experimental subjects (nine adults and a 11 years old boy) using Salivette kits (Sarstedt, Aktiengesellschaft & Co., D-51588 Nümbrecht, Germany) before, during and after the parabolic flight. Saliva was collected by chewing on a cotton rolls for 2-3 min and returned to transport vial. Samples were stored frozen at -70°C until assay.

Saliva was assayed for nerve growth factor (NGF), brain derived neurotrophic factor (BDNF) and cortisol (CORT) levels.

SALIVARY LEVELS OF NGF, BDNF AND CORT MEASURED DURING THE PARABOLIC FLIGHT



CONCLUSION

In agreement with previous studies on parachutists and on astronaut experiencing stress related to skydiving and space mission, experimental subjects showed an increase in salivary levels of NGF and BDNF only during specific phases of the flight. Moreover, individual as well as age-related differences have been observed. These data confirm the role of NGF and BDNF in the adaptative response to "extreme situations" involving psychological stress.

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