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PSYCHOLOGICAL AND PHYSIOLOGICAL STRESS OF PILOTS AND ASTRONAUTS – RECORDATION OF DATA OF BIOMETRICAL STRESS PARAMETERS VIA THE ACOUSTIC BIO SIGNAL 'VOICE'

Heinen, A., Heinen, A.*
*Theoretical Physics University of Constance, Constance, Germany
A. Heinen, Friedrichshafen, Germany

Most traffic accidents are not caused by technical failure, but by human failure. The machine operator's physiological, psychological, emotional and mental stress status and behaviour remain unexplainably and unpredictably. Especially for pilots and astronauts it is of high importance to know ones own personality and the way of acting in situations of highest requirements to awareness, concentration, well directed and perfect action. Up to now there are only few methods to measure human stress status and the individual regulation und function cycles. The few ones restrict themselves to the measurements of the autonomous nervous system. But there are several more parameters of importance, especially those, which indicate the psychological and emotional status. The more parameters are available, the more effective is the selection of most capable persons and crews to stand a long, hard training period and the stress situation of long distance flights, the more effective is monitoring and controlling of human reactions and developments during training and work.

A special method to do measurements of biometrical stress parameters via the acoustic bio signal voice gives information to the activities of the autonomous nervous system as well as to some additional stress parameters: a.o. redox-system, acid-base-balance, catabolic-anabolic endocrine hormones, status / energy of immune system, experience and orientation of space and time, capability of balance, the reference to important experiences in one's life history, which function unconsciously as long lasting stress factors, and the private personality, classified into basic type and stress type. This special information enables to optimize and individualize stress and health management.
As a result of about 2800 probands' measurements there is a sensitivity and specifity of 90 – 95 %.

The method is based on the knowledge of the sensible functionality of biological rhythm system BRS. The sound character of voice is influenced by each extern and intern stimulus. The voice graph gives insight into the sensible reacting BRS and the fluctuating rhythmic processes. The BRAC (Basic-Rest-Activity-Cycle), a dominant 2h lasting rhythm within the 24h night-day-rhythm, which is to regulate periods of activity and rest, is a significant indicator for the rhythmic and functional status of organism and its tendency to physiological and psychological stress reactions. Voice analysis enables control and evaluation of BRAC phases.

The method is quick, easy and safe to handle. It is appropriate for telecommunication. Current control is to handle during flight without disturbing work. The physician, the trainer, aboard or in earth laboratory does analyses and informs the pilot to rebalance by a special developed method of entrainment of adequate endogenous biological rhythms.

It is our special interest to demonstrate the results of 20 probands, who were stressed by machine's sound and vibration.

Contact:

MD Arno Heinen
Theoretical Physics University of Constance, Constance, Germany
Universitätsstrasse 10

D-78457 Konstanz
Germany

Tel: +49-7541-584971
Fax: +49-7541-584972
e-mail: Arno.Heinen@uni-konstanz.de

*Annegret Heinen
IFG Individuelle Förderung Gesundheit
Zuernstr. 5/1
D - 88048 Friedrichshafen
Germany

Tel: +49-7541-584971
Fax: +49-7541-584972
e-mail: aheinen@ah-ifg.de