Summary

The general topic of this work is to reveal the potential relationship between tiredness cause by hypokinetic monotonous loading and breathing. The aim was to determine if there are suitable respiratory parameters that would indicate this tirednes and, if so, then verify their validity for predicting the tiredness phenomena accompanying huge range of everyday human activities.

The performed experiment was attended by five volunteers who absolved measurements of electrical activity of brain, of breathing and of chest volume changes. The course of the experiment and the behaviour of probands were recorded by a camera. In the first part of each maesuremnt, a specified monotonous task (Task Tracking) was performed. The probands have had to follow the target moving with pseudocasual direction and speed by the cursor on the monitor. This task currently reflected the level of reliability and quality of the performed aktivity. In the second part of measurement, the probands had just to relax and watch a movie. Both parts were measured in two conditions – alert and tired (after 24 hours of sleep deprivation) proband. The data were compared with each other and evaluated.

The measurements and the results showed that the rate of the tiredness can be fairly reliably assessed by monitoring of the volume respiratory nonstationarities that occur in an otherwise steady breathing of the measured subjects. It must be noted that this phenomenon is loaded with high interindividual variability and therefore it it always necessary to apply an individual approach to the evaluation of the measured data of each subject.

The main outcome of this work is to design a parameter usable to estimate the onset of induced sensorimotoric tiredness under defined monotonous hypokinetic loading conditions several units or tens of minutes in advance. The validity of this parameter was also successfully verified by the performed experiment.

Keywords

breathing, respiration, nonstationarity, tiredness, hypokinetic load, EEG, tracking task, spirometry