PHYSIOLOGIC CHANGES RELATED TO DIFFERENT STAGES OF NORMOBARIC HYPOXIA

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Heart-rate, heart-rate variability, respiration rate, oxygen saturation and the EEG are changing with higher altitudes. In this study important parameters are analyzed with a linear discriminant analysis (LDA) to automatically classify the physiological parameters at different altitudes.

Three subjects participated in the study and were equipped with physiological sensors. Then the altitude was simulated with a normobaric hypoxic chamber (3000, 4000 and 5000 m) and compared to 383 m. Subjects performed 4 different tasks at each elevation: (i) rest, (ii) concentration and performance test, (iii) sleep, (iv) bending the knees. At each altitude and for each task heart-rate, heart-rate variability, respiration rate and SpO2 were calculated and classified with the LDA. The LDA was able to classify the 4 altitudes with an accuracy between 88 % and 97 %. The best classification accuracies were achieved for the concentration /performance and sleep test conditions and the worst one for the sport condition.

Measurements inside the hypobaric chamber in front of the computer screen with the instructions to follow

The advantage of the concentration/performance test and sleep condition is that subjects are under very well controlled mental and physical task. The bending knees condition was the most difficult one because the activity was self-paced and therefore difficult to control.

The method will be extended in future to predict the acclimatization effect based on the physiological parameters.

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