

Name of research institute or organization:

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**Institute of Physiology, University of Zürich**

Title of project:

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Human adaptation to high altitude

Project leader and team:

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Project description:

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The study aim was to find answers to the following questions:

- A. Is four weeks of altitude exposure sufficient to increase red cell blood volume?
- B. Is the reduction in stroke volume at rest and during exercise related to a reduced plasma volume?
- C. Does chronic hypoxic exposure cause substantial sensitisation of the chemoreflex, which at least partially explains the sympathoexcitation of high altitude?
- D. Does mitochondrial function change with hypoxic exposure?
- E. Do changes in sympathetic activity alter cerebral auto regulation?
- F. Do 4 weeks of altitude exposure cause continuous increase in ventilatory sensitivity to CO<sub>2</sub> during NREM sleep and are 4 weeks of altitude exposure associated with increasing instability of ventilatory control during sleep?
- G. Is exposure to hypobaric hypoxia at 3450 m associated with impairment of cognitive and psychomotor function and if so is there an improvement of these skills over the course of the 4 weeks acclimatization period?
- H. Does sleep quality have an influence on red cell mass (question A) and measures of autonomic cardiovascular control (question C and E)?
- I. How do high altitude related changes of the autonomous nervous system activity influence pulmonary hemodynamics?

The data have thus far only been analyzed in its complete for aim D. Here we show that the human mitochondrion adapts to high altitude exposure by optimizing its pathways. This finding has been published.

Key words:

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Human physiology

Collaborating partners/networks:

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University Hospital Zürich

University Hospital Copenhagen

Scientific publications and public outreach 2012:

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**Refereed journal articles and their internet access**

Jacobs R.A., C. Siebenmann, M. Hug, A.K. Meinild, C. Lundby, 28 days at 3,454 m diminishes respiratory capacity but enhances efficiency in human skeletal muscle mitochondria, *FASEB J.*, **26**, 12, 5192-5200, doi: 10.1096/fj.12-218206, 2012.

<http://www.fasebj.org/content/26/12/5192.abstract>

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