



Combined intermittent hypoxia and surface muscle electrostimulation as a method to increase peripheral blood progenitor cell concentration

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Abstract

Background

Our goal was to determine whether short-term intermittent hypoxia exposure, at a level well tolerated by healthy humans and previously shown by our group to increase EPO and erythropoiesis, could mobilize hematopoietic stem cells (HSC) and increase their presence in peripheral circulation.

Methods

Four healthy male subjects were subjected to three different protocols: one with only a hypoxic stimulus (OH), another with a hypoxic stimulus plus muscle electrostimulation (HME) and the third with only muscle electrostimulation (OME). Intermittent hypobaric hypoxia exposure consisted of only three sessions of three hours at barometric pressure 540 hPa (equivalent to an altitude of 5000 m) for three consecutive days, whereas muscular electrostimulation was performed in two separate periods of 25 min in each session. Blood samples were obtained from an antecubital vein on three consecutive days immediately before the experiment and 24 h, 48 h, 4 days and 7 days after the last day of hypoxic exposure.

Results

There was a clear increase in the number of circulating CD34⁺ cells after combined hypobaric hypoxia and muscular electrostimulation. This response was not observed after the isolated application of the same stimuli.

Conclusion

Our results open a new application field for hypobaric systems as a way to increase efficiency in peripheral HSC collection.

Journal of Translational Medicine 2009, **7**:91 doi:10.1186/1479-5876-7-91

Received: 11 May 2009

Accepted: 29 October 2009

Published: 29 October 2009