



## Exercise Biochemistry Review

---

Proceedings of IBEC 2018, Beijing, China, October 23-25  
PO-087

### 4-weeks hypoxia (HHL) training improves rowers' cutaneous microcirculation

Zhijun Meng, Binghong Gao  
Shanghai University of Sport

**Objective** Sport scientists always pay attention to cardiorespiratory and hematologic system on benefit of hypoxic training, but peripheral circulation may be one of these benefit, which is one cause of improving performance. So, in order to know whether or not hypoxic training affect athletes' cutaneous microcirculation, we test rowers' microcirculation for 4 weeks' High Live-High Train-Low exercise(HHL).

**Methods** The subject is 21 male rowers of Shanghai rowing team.12 of them take part in 4 weeks HHL (train and live at 2500m, exercise at 100m), while 9 of them train in normoxia. Forearm and leg cutaneous blood flow(CBF) was measured using a laser doppler flowmeter (PeriFlux600, Perimed, Sweden) at room temperature (22°C) with subject lying position and after testing in that position for at least 10min. We tested the forearm and leg blood flow, and also the blood flow when localized heating to 44°C for 3 mins. Microvascular reactivity(MVR) was evaluated form the maximal post occlusive reactive hyperemia(PORH) following 3-min forearm ischemia produced by cuff inflation (200mm Hg). Similar procedures have been used by other investigators. Blood pressure was measured by brachial auscultation. SPO<sub>2</sub> and heart rate was measured by a hand hold pulse oximeter (NONIN, 9500, USA) .The blood flow was measured 4 times, baseline, 1<sup>st</sup>week, 3<sup>rd</sup>week and post.

**Results** Blood flow and CMBC of forearm of HHL increased significantly at 1<sup>st</sup>week(8.9,13.0;112.0,151.0,P<0.05), but thigh and NOM group did not increase. The lowest and highest blood flow of PORH both increase at 1<sup>st</sup>week(2.9,3.2;46.0,53.0;0.05<P<0.1). At 3<sup>rd</sup>week, HHL group's resting blood flow and CMBC of forearm is lower than 1<sup>st</sup>week(9.3,13.0;124.5,151.0), but higher than pretraining, but velocity of blood flow decreased(8.2,9.2).

These results suggest at early stage of HHL, vasoconstriction may be dominant. But when rowers suffer more and more hypoxia, vasodilation and angiogenesis may play a key role in their skin blood flow. At 3<sup>rd</sup>week after training, the blood flow and CMBC are similar with baseline.

**Conclusions** 4 weeks HHL training of rowers increase forearm blood flow, but no thigh. This is because thigh is main working muscle of rowers, which may be affected by training status and fatigue. And also, PORH reserve capacity is an indicator of endothelial function. In this study, we find HHL rowers increase their PORH reserve capacity, which means endothelial function is improved by hypoxia training. So, besides the traditional research of Hematologic System on hypoxia training, we find 4 weeks HHL training increase forearm blood flow and improve endothelial function. This may be one mechanism of improving performance, which need more studies to confirm.