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Some metrological aspects of measurements of quantitative characteristics during a hypoxic training of elite rowers

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Abstract

The experimental research on the effects of the training model “living high, training high” would demand metrological support for the equipment and procedures required to measure three groups of indicators: training intensity, changes in the biological indicators, and degree of hypoxia.

Sixteen athletes from the men’s Bulgarian national rowing team, with an average age of 18.7 years, took part in the study. They completed a three-week training camp at 2100 m above sea level at the Belmeken National Sports Base.

Seven days before (T1), at the end (T2), and on the 7th (T3) and 18th day (T4) after the training camp each participant performed an incremental test – 4 stages x 40W apart x 3min with 30sec rest periods on a rowing ergometer.

Before tests venous blood samples were obtained for analysis of: hemoglobin concentration (Hb), red blood cells count (RBC), hematocrit (Hct), reticulocytes (Ret%), white blood cells (WBC), platelets (Plt), iron, total iron binding capacity (TIBC), and total plasma protein (PP).

The Hb increased significantly with 8.5 g/L as well as Hct with 0.03 and RBC (with 0.39 T/L at the end of the high-altitude training camp (T2). In addition, the Hb-independent parameters PP and Plt also increased significantly in T2. However, one week after training camp (T3), all of these parameters returned to their initial levels and remained unchanged even one week later (T4).

We have proposed the equation for resolving the metrological problem with the measurement of real hemoglobin changes during the “living high, training high” training model.

Keywords: hemoglobin, high altitude, hypoxia, training, rowing