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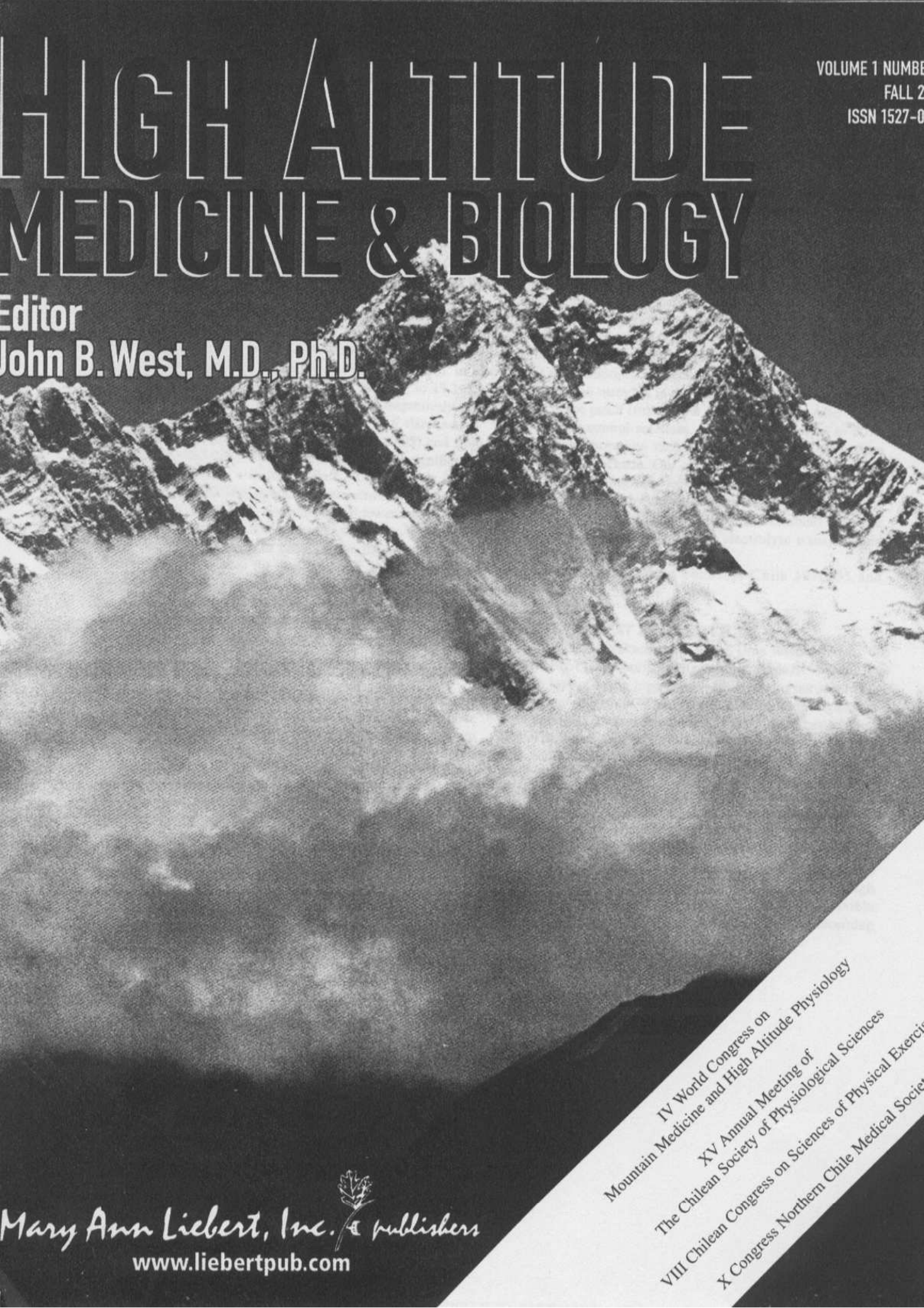

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81) CHANGES IN HEMOGLOBIN MASS AND BLOOD VOLUME IN ELITE BIATHLETES DURING A THREE WEEK PERIOD OF ALTITUDE TRAINING

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The aim of the study was to evaluate the effects of a three week altitude training camp (2050m) on total hemoglobin mass (tHb), blood volume (BV) and erythropoietic activity in highly trained endurance athletes. THb and BV were investigated from 6 male (M, VO2max 81.7±2.7 ml/kg*min) and 4 female (F, VO2max 66.8±0.9 ml/kg*min) members of the German national biathlon team on day 1 and 20 during the stay at altitude (M and F) as well as 16 days thereafter at sea level (M) by using the CO-rebreathing method. Hematocrit (Hct), plasma erythropoietin (EPO) and transferrin receptor (TFR) levels as well as the iron status were determined before, on day 1, 2, 4, 10, 20, and after day 16 (M). Hct continuously increased up to day 20 by 3.0±2.6% in M ($p<0.05$) and by 3.6±2.5% in F ($p=0.06$). In M tHb and BV significantly increased from 14.0±0.2 to 15.3±1.0 g/kg and from 99.5±7.7 to 106.6±10.0 ml/kg respectively, and remained at a higher level 16 days after. In F tHb and BV increased from 13.0±1.0 to 14.2±1.3 g/kg ($p<0.05$) and from 100.4±7.1 to 107.0±8.6 ml/kg (n.s.). Plasma EPO significantly increased up to day 4 in M (+9.0±2.2 U/l) and day 2 in F (+4.7±2.2 U/l). TRF was significantly elevated only in M on day 10 and 20 by about 13%. Ferritin showed lower values during the training camp (M, $p<0.05$), whereas serum iron and transferrin remained unchanged. In conclusion a three week altitude training camp increases the erythropoietic activity leading to remarkable higher tHb and BV.

82) REGULATION OF HUMAN PLACENTAL CHLORIDE CHANNEL BY STEROID HORMONES

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Steroid hormones have been implicated in the modulation of some transport processes, including conductive chloride transport in epithelial cells. Micromolar concentration for these hormones has been measured in the blood of pregnant women. The purpose of this work was to explore the effects of steroid hormones on the electrophysiologic properties of the maxi chloride channels present in apical membranes from human placenta. Apical membrane chloride channels from human term placentas were reconstituted in giant liposomes. These cell-sized liposomes, generated by the method of cycle dehydration and rehydration of lipid vesicles, are suitable for electrophysiologic studies by the patch-clamp method. Low micromolar concentrations of steroid hormones reversibly inhibit maxi chloride channels in excised patches. Addition of 1 mmolar 17-b-estradiol in the bath solution decrease the total current in the patch (from 100% control to 33%). After washing, with the control solutions, activity recovered up to 80%. Other steroid hormone such as progesterone and tamoxifen show similar blockade. Our results strongly suggest that the action of steroid hormone on the chloride channel are direct rather than mediated by a receptor as indicated in other studies. The control of these channels by steroid hormones could be important in regulating epithelial electrolyte transport and nutrient delivery to the fetus.

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83) LINEAGE SPECIFIC METABOLIC RESPONSES TO ACUTE HYPOXIA: THE LACTATE PARADOX

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Both oxygen and lactate metabolism show characteristics that differ in low vs high altitude natives. The field of lactate metabolism in high altitude conditions has been perplexing to physiologists for two reasons. First, it was noted that the higher the altitude for acclimatization (or long term adaptation), the lower the peak, post exercise blood lactate concentrations during a given exercise protocol. While some features of this observation, first noted over a half century ago, differ in high vs low altitude natives, overall it is non-controversial; but, because less lactate is found under more and more oxygen limiting conditions, the henomenon became known as the lactate paradox. To physiologists, there was a second reason for being perplexed; namely, the observation, frequently reported, of attenuation of lactate accumulation during the hypoxia acclimation despite maintained hypoxia. The origin of the hypoxia acclimation induced lowering of peak blood lactate concentrations relative to levels in acute hypoxia is controversial (in the literature this is included in the so-called lactate paradox). We consider that the controversies in this area may be caused (i)by differing inter-tissue lactate processing in different individuals/groups, and/or (ii) by differing interactions between the phosphagen system and glycolysis within working muscles per se. The theory behind the latter is complex and will form the bulk of this analysis. Supported by NSERC(Canada)

84) THE BRAIN AT HIGH ALTITUDE

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The joys of being high come with a cost to our most precious organ-the brain. The brain is a demanding organ that does not do well when its supply of oxygen becomes too limited. The hypoxia of high altitude can limit oxygen delivery sufficiently to impair function, particularly depending upon the acuity of the exposure, its duration and its severity. Impairment takes two forms, that occurring during the exposure as a consequence of the immediate consequences of oxygen lack, and that remaining after the oxygen lack is corrected by return to sea level; the latter presumably reflects an at least temporary injury to the brain. The presentations refer to the price to be paid afterward for sustained exposure to extremely high altitudes, exploring neuropsychological changes, possible causes of individual susceptibility, and speculation concerning mechanism of brain cell injury and death.