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©Journal of Sports Science and Medicine (2013) 12, 205 - 206 **Letter to editor**

Does Man Age Faster at the Everest Peak? A Hypothesis Paper

Camillo Di Giulio

More Information

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Dear Editor-in-Chief

Survival of metazoan organisms is dependent upon their ability to generate energy through the process of mitochondrial oxidative phosphorylation. Phosphorylation carries the inherent risk of generating reactive oxygen species (ROS) (Kang et al., 2003) Low levels of ROS are utilized for signal transduction, but prolonged elevation of ROS results in oxidation of proteins, lipids and nucleic acids, leading to cell dysfunction or death. The oxygen gradient diffusion of capillaries is essential for cell survival. Oxygen delivery and utilization must be balanced, and maintenance of oxygen homeostasis in arterial blood is mediated by reflexes that are sensitive to oxygen decrease and by release of several factors like Hypoxic Inducible Factor (HIF), which plays a key role in this homeostatic regulation (Semenza, 2011). In response to hypoxia, cellular adaptive mechanisms induce expression of HIF, which in turn stimulates Vascular Endothelial Growth Factor (VEGF), important also in pregnancy (Wang et al., 2012), in tumor angiogenesis, during sleep apnea, typical of the elderly and in obese subjects.

Intermittent hypoxia represents a risk for sudden death, cardiac failure and certain forms of hypertension (Jain, 2007; Lavie, 2003), also for diseases involved with reduced oxygen diffusion due to an increase in the distance between the capillary bed and mitochondria. Chronic hypoxia, a common link of many diseases, induces adaptations in the tissue geometry, for example the human fetus develops oxygen tension values equal to the altitude of Mount Everest (PaO_2 = 28 mmHg) (Tonse and Raju, 2007). Considering that acute exposure above 5000 m without adaptation is not possible and less than 200 climbers have reached the Everest peak without supplementary oxygen, the PO_2 at high altitude is not comfortable for most climbers, and even though the Everest is the highest mountain in the world, probably it does not represent the limit of human tolerance. Life is possible at any existing altitude on our planet, Even Zubieta-Castillo quoted "life is possible anywhere on this planet, provided that adequate nutrition and housing are available, and enough time is allowed for slow adaptation" (Zubieta-Castillo et al., 2003). West reports that 5340 m is probably the altitude limit for permanent residents (West, 2009). Statistically, life expectancy at high altitude decreases with increasing altitude, considering that VO_2 max decreases by 9 % every 100 m above an altitude of 1100 m, and aging is characterized by decrease in VO_2 max of 1% per year (Wagner, 1996). There are many correlations between VO_2 max decreases in aging and in altitude.