

Glutathione measurements in blood samples are influenced by oxygen saturation

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Dear Editor

Heinicke et al. (2009) describe a temporary increase in erythrocyte reduced glutathione concentration by 12–20% in venous blood samples after ascent to 2,800 m above the sea level. I wonder why the authors do not present also oxidized glutathione which yield additional insight since their method (Tietze 1969) allows determination of both forms. Also, they have difficulties to interpret their result as improved antioxidant defense, since the values return to control values within 2 weeks at altitude. The cause is probably that the changes are at least partly measuring artifacts: hemoglobin that binds glutathione much better in oxygenated than deoxygenated form (Craescu et al. 1986) is precipitated before analysis; thus, an unknown amount of glutathione disappears from the supernatant. We have shown that after in vitro equilibration with different oxygen pressures measured total glutathione concentrations decrease by 20% between 0 and 100% O₂ saturation (Hütler et al. 2000); the decrease in reduced glutathione is even larger (30%), whereas the small fraction of oxidized glutathione increases fivefold. As venous oxygen content falls markedly during ascent and later rises again, this might be the cause of glutathione concentration changes. The possible

error is easy to correct if the authors have measured venous O₂ saturations. In addition, the change in concentrations of free reduced and oxidized glutathione within the red cell after a decrease in average O₂ saturation should influence synthesis and trans-membrane transport of this substance. Therefore, all investigations without considering these effects do not allow clear conclusions about antioxidant defense by glutathione in blood.

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