Hematocrit and hematocrit viscosity ratio during exercise in athletes: even closer to predicted optimal values?

Brun JF¹, Varlet-Marie E², Raynaud de Mauverger E¹
¹INSERM U1046
²Faculty of Pharmacy

The theory of optimal hematocrit suggests that the best value of hematocrit (hct) should be that which results in the highest value of the hematocrit/viscosity ratio h/v. Trained athletes compared to sedentary subjects have a lower hct, but a higher h/v, and endurance training reduces the discrepancy between the actual hct and the «ideal » hct that can be predicted with a theoretical curve of h/v vs hct constructed with Quemada’s model. In this study we investigated what becomes this homeostasis of h/v and hct during acute exercise in 19 athletes performing a 25 min exercise test. VO2max is negatively correlated to resting hct and positively correlated to discrepancy between actual and ideal resting hct which is correlated to the maximal rise in hct during exercise. Predicted and actual values of the h/v were fairly correlated ( r=0.970 p<0.001) but the actual value was lower at rest and this discrepancy vanished at 25 min exercise. Exercise-induced decrease in discrepancy between actual and theoretical h/v was negatively correlated with the score of overtraining. All these findings suggest that h/v is a regulated parameter and that its model-predicted «optimal» values yield a «theoretical optimal» hct which is close to the actual value and even closer when athletes are well trained. In addition, acute exercise sets h/v closer from its predicted ideal value and this adaptation is impaired when athletes quote elevated scores on the overtraining questionnaire.