Effects of exercise training and age on optimal hematocrit/viscosity ratio and hematocrit

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It is well known that aging impairs blood rheology and that exercise training improves it. We previously reported that regular cycling is unable to prevent aging-related increase in red cell rigidity and aggregability. The purpose of this study was to investigate whether this adaptation of viscosity factors due to age and training is related to a regulation of hematocrit setting it closer from its ideal value as can be predicted by a model using Quemada´s equation. Thirty-two subjects [16 middle-aged men: 8 cyclists and 8 sedentary men and 16 young men: 8 cyclists and 8 sedentary men] carefully matched to make 4 groups of comparison, were included in this study. Training was associated with a reduced hematocrit in middle age subjects but not in 25 yr old ones. The model predicts higher h/v values than the actual ones and this discrepancy is lower in young subjects, p<0.05. The model predicts the same ideal hct (46 ± 1.2 %), but actual hct is lower than ideal in all groups (p<0.05). These results show that both training and younger age are associated with a lower predicted value of h/v, and that actual values of both h/v and hct are lower than their model-predicted ‘optimal value’. The correlations between model-predicted values and actual ones support the validity of the concept of optimal hematocrit and its prediction with this model. The discrepancies may indicate a ´reserve´ preventing hematocrit to increase during exercise above its optimal value.