EFFECTS OF HYDRATION AND DEHYDRATION ON BLOOD RHEOLOGY IN SICKLE CELL TRAIT CARRIERS DURING EXERCISE

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This study compared the hemorheological responses of a group of sickle cell trait (SCT) carriers with those of a control (Cont) group in response to 40 min of submaximal exercise (exercise intensity, 55% aerobic peak power) performed in two conditions: one with water offered ad libitum, i.e., the hydration (Hyd) condition, and one without water, i.e., the dehydration (Dehyd) condition. Blood and plasma viscosities, as well as red blood cell rigidity, were determined at rest, at the end of exercise, and at 2 h recovery with a cone plate viscometer at high shear rate and 37 degrees C. The SCT and Cont groups lost 1 +/- 0.7 and 1.6 +/- 0.6 kg of body weight, respectively, in the Dehyd condition, indicating a significant effect of water deprivation compared with the Hyd condition, in which body weight remained unchanged. Plasma viscosity increased with exercise and returned to baseline during recovery independently of the group and condition. As previously demonstrated, resting blood viscosity was greater in the SCT carriers than in the Cont group. Blood viscosity increased by the end of exercise and returned to baseline at 2 h recovery in the Cont group in both conditions. The blood viscosity of SCT carriers did not change in response to exercise in the Dehyd condition and remained elevated at 2 h recovery. This extended hyperviscosity, in association with other biological changes induced by exercise, could be considered as a risk factor for exercise-related events in SCT carriers, similar to vasoocclusive crises, notably during the recovery. In contrast, the Hyd condition normalized the hyperviscosity and red blood cell rigidity of the SCT carriers, with blood viscosity values reaching the same lower values as those found in the Cont group during the recovery. Adequate hydration of SCT carriers should be strongly promoted to reduce the clinical risk associated with potential hyperviscosity complications. **[Am J Physiol Heart Circ Physiol. 2010; 299(3):H908-H914]**

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BLOOD RHEOLOGY ABNORMALITIES AND VASCULAR CELL ADHESION MECHANISMS IN SICKLE CELL TRAIT CARRIERS DURING EXERCISE

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Sickle cell trait (SCT) is usually considered a benign disorder compared with sickle cell anemia (SS hemoglobinopathy). However, several authors have reported cases of exercise-related sudden death in this population. Among the mechanisms that could be involved in these fatal complications, vaso-occlusive processes, such as those occurring in SS hemoglobinopathy, may play a role. In sickle cell anemia, these vaso--occlusive processes involve inflammatory and adhesion molecules such as the cell adhesion molecules (CAM family), which play a role in the firm adhesion of reticulocytes and leukocytes to endothelial cells, and the selectins, which play a role in leukocyte and platelet rolling on the vascular wall. Recent results suggest that adhesion phenomena could be amplified in SCT carriers during exercise compared with non-carriers. Other mechanisms like alterations in blood coagulation and/or hemorheological properties can also favor the occurrence of vaso-occlusive processes. Although few studies have reported coagulation disturbances in SCT carriers at rest, we recently observed no difference between this population and control subjects in response to exercise. In contrast, by studying the behavior of several hemorheological parameters in response to several types of exercise, we detected hemorheological abnormalities in individuals with SCT. These abnormalities included higher red blood cell rigidity and higher blood viscosity in the SCT carriers compared with the non--carriers, particularly during the late recovery period (24 and 48 h after exercise). Therefore, we can suggest that the risks for microvascular complications in SCT carriers in response to exercise could be dependent on alterations in blood rheology and vascular adhesion processes. [**Clin Hemorheol Microcirc 2008; 39(1--4): 179-184].**

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HEMODILUTION THERAPY USING AUTOMATED ERYTHROCYTAPHERESIS IN CENTRAL RETINAL VEIN OCCLUSION: RESULTS OF A MULTICENTER RANDOMIZED CONTROLLED STUDY

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BACKGROUND: Central retinal vein occlusion (CRVO) leads to poor visual outcome in most eyes. Abnormal hemorheology was suspected to play a major role in its pathogenesis. CRVO treatment is still a matter of debate but several studies have pointed out the efficacy of isovolumic hemodilution. The aim of this study was to assess the feasibility and efficacy of hemodilution using automated erythrocytapheresis in recent-onset CRVO.

METHODS: In this prospective randomized controlled multicenter study, 61 consecutive CRVO patients were enrolled when they met the following criteria: CRVO lasting for 3 weeks or less, visual acuity ranging from 20/200 to 20/32, age between 18 and 85 years, no diabetes, no uncontrolled systemic hypertension, no antiplatelet or anticoagulant therapy, hematocrit higher than 38%, and signed informed consent. Patients were randomly assigned to the hemodilution group (n=31) or to the control group (n=30). Hemodilution therapy consisted of one session of erythrocytapheresis on outpatient basis, followed by additional session(s) for 6 weeks if needed. Target hematocrit was 35%. Follow-up was 12 months.

RESULTS: No statistical differences in age, associated risk factors, or CRVO characteristics were observed at baseline between both groups. Mean visual acuity was equivalent to 20/80 in the hemodilution group and to 20/63 in the control group (non-significant difference). In the treated group, mean number of hemodilution sessions was 3.3 (range, 1 to 6), and no major side-effects occurred. At the 12-month follow-up visit, 64.5% of the hemodilution group had visual acuity of 20/40 or better compared to 40% of the control group (p=.048). Visual change was a gain of 1.7 ETDRS line in the hemodilution group versus a loss of 2.3 lines in the control group (p=.007). There was less conversion into an ischemic form in the hemodilution group (11%) than in the control group (50%, p=.004). Mean final retinal thickness was 289 µm in the hemodilution group versus 401 µm in the control group (p=.068).

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CONCLUSIONS: This multicenter controlled randomized study demonstrated that automated erythrocytapheresis is a safe and effective tool for performing hemodilution and confirmed that hemodilution therapy can improve the final prognosis of CRVO when applied in the early phase of the disease. [**Graefes Arch Clin Exp Ophthalmol. 2010 Oct 17.** Pré-publicação electronica]

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COMENTÁRIO

A propósito do artigo de Glacet-Bernard e Cols, merecem destaque os resultados semelhantes que o Professor Paulo de Souza-Ramalho (professor de Oftalmologia da Faculdade de Medicina da Universidade de Lisboa , sócio fundador e antigo presidente da Assembleia Geral da SPHM, recentemente falecido) obteve em Portugal na década de 90 do século passado, com o apoio laboratorial do Instituto de Bioquímica da mesma universidade.