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## Hemoconcentration following spleen contraction

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Hemoconcentration following stress has often been explained in terms of increased number of erythrocytes and unchanged plasma volume (polycythemia vera, secondary polycythemia) and decreased plasma volume and constant number of erythrocytes (stress-polycythemia). However, another potential mechanism is hemoconcentration following contraction of the spleen. During exercise and hypoxia many mammals can mobilize large numbers of erythrocytes from the spleen in order to improve oxygenation of metabolically active tissue. Such “auto-transfusion” of erythrocytes improves O<sub>2</sub>-carrying capacity and increases both the aerobic performance in terrestrial mammals and the diving capacity of, e.g., seals. In adult humans, the splenic reservoir contains on the average 200-250 ml of blood with more than twice the hematocrit of normal arterial blood. The extent of splenic contraction after apnea and exercise in humans has been reported to be 18-56% resulting in a concomitant increase in hemoglobin concentration by typically 3-6%, a response not seen in splenectomized individuals. The response is not due to hemoconcentration from extravasation of plasma and is reversible within approximately 10 minutes. Numerous animal studies implicate the importance of the sympathoadrenergic system for initiation of splenic contraction. Adrenoreceptors are located in the splenic capsule and parenchyma and the splenic nerve is composed of 98% sympathetic nerve fibers. Consequently, neurostimulation, epinephrine, norepinephrine all cause  $\alpha$ -mediated contraction of the spleen and infusion by low-dose epinephrine also produce rapid spleen contraction in humans. It is known that spleen contraction can be increased by hypoxia and hypercapnia and is evident in healthy subjects and COPD and OSA patients.

### Biography

Harald Engan has completed his PhD in Health Sciences in 2015 at Mid Sweden University and he is currently working as a Researcher in the Norwegian Lung and Heart Association as well as at the Department of Health Sciences at Mid Sweden University. He is working in a multidisciplinary research field including experimental environmental physiology, cardiac exercise and cancer rehabilitation research. He has published 5 papers in reputed journals regarding the effects of spleen contraction on hemoconcentration during physiological stress.

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