High soluble endoglin levels and high fat diet effects on mouse aorta

Jezkova, Katerina1; Rathouska, Jana, PhD1; Nemeckova, Ivana, PhD1; Serwadczak, Agnieszka2; Bernabeu, Carmelo, PhD3; Lopez-Novoa, Jose Miguel, PhD4; Chlopicki, Stefan, MD, PhD2; Nachtigal, Petr, PhD1

1Department of Biological and Medical Sciences, Faculty of Pharmacy in Hradec Kralove, Charles University in Prague, Czech Republic; 2Jagiellonian Centre for Experimental Therapeutics, Krakow, Poland; 3Centro de Investigaciones Biologicas, Madrid, Spain; 4Department of Physiology and Pharmacology, University of Salamanca, Spain

Objectives: Soluble endoglin (sEng) is a plasma protein, a cleavage product of the extracellular domain of membrane endoglin, which is strongly expressed by vascular endothelium. sEng was supposed to be a biomarker in several cardiovascular pathologies, including preeclampsia, hypertension, hypercholesterolemia and diabetes mellitus. However, the specific role of sEng in these pathologies is still poorly understood. Therefore, we hypothesized whether high fat diet in combination with high levels of sEng may affect aortic endothelium in vivo.

Methods: Six-month-old transgenic female mice overexpressing human sEng on CBAxC57BL/6J background were fed high fat diet for the following 3 months. Mice were divided into two groups according to plasma levels of sEng determined by ELISA (Sol-Eng+ group vs. control group). Cholesterol levels were measured and Western blot analysis of eNOS, peNOS, P-selectin, ICAM-1, pNFkB, iNOS, HO-1, NOX-2 expressions in aorta were performed. Functional parameters of aorta were assessed by means of wire myograph 620M.

Results: Cholesterol levels did not differ between Sol-Eng+ group and control group of mice. The expression of P-selectin, ICAM-1, pNFkB, iNOS, HO-1 and NOX-2 were significantly higher in Sol-Eng+ group than in control group. Endothelium-dependent response induced by acetylcholine was more profoundly impaired in control group than in Sol-Eng+ group.

Conclusions: Results of the study demonstrated that high plasma levels of sEng might induce a pro-inflammatory and oxidative stress phenotype of aorta, which is however compensated by an improved endothelial function in Sol-Eng+ mice. Potential mechanism of this compensatory response is now under investigation.

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