Impaired hydrogen sulfide protein expression in patients with peripheral artery disease

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INTRODUCTION: Hydrogen sulfide (H_2S) is a gaseous signaling molecule that serves various roles in the vasculature, such as upregulating angiogenesis, vascular smooth muscle relaxation, protecting endothelial function, and regulating redox balance. Despite H_2S's positive impacts on vascular homeostasis, it is important to note that its actions depend on its concentrations. At high concentrations, H_2S has been reported to increase oxidative stress damage, such as oxidation of cysteine residues and lipid peroxidation. This may indicate that H_2S may act as a 'double-edged sword' in the field of vascular physiology. Peripheral artery disease (PAD) is an atherosclerotic disease which manifested by claudication (leg pain during walking). Growing evidence suggests that abnormal H_2S level may present with vascular diseases, however, only a few animal studies investigated the H_2S and H_2S -mediated oxidative stress damage in vascular disease models, and there are currently no available studies for human vascular disease patients, such as patients with PAD. Therefore, the purpose of this study was to examine the H_2S and oxidative stress damage in peripheral blood mononuclear cells (PBMCs) and skeletal muscle tissues from patients with PAD. **METHODS:** Western blot was performed using skeletal muscle tissues and PBMCs to examine protein expression of cystathionase (CTH), which catalyzes production of H_2S, and glutathione peroxidase-4 (GPx-4) and catalase (CAT), which are antioxidant markers, from healthy adults (CON) and patients with PAD (PAD). **RESULTS:** Patients with PAD show a lower expression of CTH compared to CON ($P < 0.01$, PAD: 1.61 ± 0.44, CON: 8.53 ± 0.46). However, CAT expression was not different between groups ($P = 0.429$, PAD: 0.03 ± 0.02, CON: 0.01 ± 0.01). In addition, CAT and GPx-4 expression was assessed in CON PBMCs (CAT: 5.07 ± 1.14, GPx-4: 0.63 ± 0.3). **CONCLUSION:** CTH protein expression in the skeletal muscle is attenuated in PAD compared to CON. However, CAT protein expression in the skeletal muscle is not different between groups. These data suggest an impairment is present in the H_2S signaling system in the skeletal muscle of patients with PAD.