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The effect of p-cresyl sulfate on vascular smooth muscle cell proliferation and inflammation

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Objectives: Vascular access failure is leading cause of hospitalization and morbidity in patients undergoing hemodialysis, and occurs predominantly as a result of neointimal hyperplasia formation due to vascular smooth muscle cell (SMC) proliferation. Recent study has reported that p-cresyl sulfate (p-CS) was related to the outcome of vascular access in hemodialysis patients. However, the mechanism of vascular toxicity induced by p-CS was poorly understood. The aim of this study was to determine whether p-CS promote SMC proliferation and endothelial dysfunction.

Methods: Aortic SMCs were treated with p-CS (10-1000 μmol/L), and aortic SMC proliferation was measured BrdU cell proliferation assay. Western blot analysis was done for ERK1/2 and p38 MAPK. Human umbilical vein endothelial cells (HUVECs) were also treated with p-CS (1000 μmol/L). The productions of NF-κB, ICAM-1, MCP-1 and iNOS in HUVECs were assessed using RT-PCR and ELISA.

Results: p-CS stimulated the proliferation of aortic SMCs in a dose dependent manner, and promoted the phosphorylation of ERK1/2 and p38 MAPK. In HUVECs, p-CS stimulated the production of NF-κB, ICAM-1, MCP-1 and iNOS.

Conclusions: Our data confirmed that p-CS was attributed to vascular SMC proliferation and inflammatory process in HUVECs in vitro. Further evaluation will be needed to clarify the role of p-CS in vascular access stenosis and neointimal hyperplasia.