World Academy of Science, Engineering and Technology
International Journal of Biomedical and Biological Engineering
Vol:10, No:05, 2016

Inactivation of Semicarbazide-Sensitive Amine Oxidase Induces the Phenotypic Switch of Smooth Muscle Cells and Aggravates the Development of Atherosclerotic Lesions

Authors : Miao Zhang, Limin Liu, Feng Zhi, Panpan Niu, Mengya Yang, Xuemei Zhu, Ying Diao, Jun Wang, Ying Zhao

Abstract : Background and Aims: Clinical studies have demonstrated that serum semicarbazide-sensitive amine oxidase (SSAO) activities positively correlate with the progression of atherosclerosis. The aim of the present study is to investigate the effect of SSAO inactivation on the development of atherosclerosis. Methods: Female LDLr knockout (KO) mice were given the Western-type diet for 6 and 9 weeks to induce the formation of early and advanced lesions, and semicarbazide (SCZ, 0.125%) was added into the drinking water to inactivate SSAO in vivo. Results: Despite no impact on plasma total cholesterol levels, abrogation of SSAO by SCZ not only resulted in the enlargement of both early (1.5-fold, p=0.0043) and advanced (1.8-fold, p=0.0013) atherosclerotic lesions, but also led to reduced/increased lesion contents of macrophages/smooth muscle cells (SMCs) (macrophage: ~0.74-fold, p=0.0002(early)/0.0016(advanced); SMC: ~1.55-fold, p=0.0003(early) /0.0001(advanced)), respectively. Moreover, SSAO inactivation inhibited the migration of circulating monocytes into peripheral tissues and reduced the amount of circulating Ly6Chigh monocytes (0.7-fold, p=0.0001), which may account for the reduced macrophage content in lesions. In contrast, the increased number of SMCs in lesions of SCZ-treated mice is attributed to an augmented synthetic vascular SMC phenotype switch as evidenced by the increased proliferation of SMCs and accumulation of collagens in vivo. Conclusion: SSAO inactivation by SCZ promotes the phenotypic switch of SMCs and the development of atherosclerosis. The enzymatic activity of SSAO may thus represent a potential target in the prevention and/or treatment of atherosclerosis.

Keywords : atherosclerosis, phenotype switch of smooth muscle cells, SSAO/VAP-1, semicarbazide
Conference Title : ICA 2016 : International Conference on Atherosclerosis
Conference Location : London, United Kingdom
Conference Dates : May 23-24, 2016