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Short Communication

Study of the activity of endogenous human neuraminidases in lipofibrotic plaques of the thoracic aorta

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Abstract

Aims: Modified low density lipoproteins (LDL) play a significant role in atherosclerosis. Desialylated LDL has greater susceptibility to accumulation in the intima. It can lead to the development of atherosclerotic lesions. The main enzyme involved in sialic acid metabolism is sialidase/neuraminidase (NEU). Our study aimed to investigate the expression of endogenous sialidase genes in atherosclerotic lesions. Studying of sialidase transcriptional activity will allow us to complement our understanding of atherogenesis.

Methods: Real-time qPCR was used to evaluate the expression of lysosomal (NEU1), cytosolic (NEU2), plasma (NEU3), and mitochondrial (NEU4) sialidase genes. Samples of fatty streaks and lipofibrous plaques were collected from an autopsy of the thoracic aorta. These samples are characterized by a high lipid content and they are suitable for studying the onset and development of atherosclerotic lesions. Samples of unaffected areas of human aortic intima were used as control.

Results: The results of differential gene expression analysis of four sialidases in atherosclerotic lesions compared to healthy tissue samples were obtained. The level of NEU1 gene transcripts in lipofibrous plaques samples was increased 3-fold as compared to healthy tissue samples ($p=0.05$). The level of NEU2 gene expression in fatty streaks did not change, but it was 20-fold overexpressed in lipofibrous plaques compared to healthy tissue ($p=0.02$). In addition, mRNA high levels of the NEU3 and NEU4 genes in fatty streaks (3-fold, $p=0.007$) and lipofibrous plaques (20-fold, $p=0.005$) were found in comparison with the control.

Conclusion: We have demonstrated the transcriptional activity of the NEU2 and NEU4 genes, which indicates their active participation in the atherosclerosis progression. Increased NEU1 gene expression affects lipid metabolism, inflammatory responses, and insulin resistance, and NEU3 is a specific marker of atherosclerotic plaque instability. This work was supported by the Russian Science Foundation («Institute of General Pathology and Pathophysiology» Grant # 18-15-00254).

Biography

Kashirskikh Dmitry has completed his Master's degree last year. He is a Junior Researcher of the laboratory of angiopathology at the Institute of General Pathology and Pathophysiology, Moscow, Russia. He has 7 publications in Journals, 2 of which are cited in Web of Science and Scopus, and 7 abstracts in conference proceedings, and his publication H-index is 1. He is a participant in 2 research projects supported by Russian Science Foundation Grants.

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