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Signalling pathways regulating galactosaminoglycan synthesis and structure in vascular smooth muscle: Implications for lipoprotein binding and atherosclerosis (Review)

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Abstract

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Atherosclerosis commences with the trapping of low density lipoproteins (LDLs) in blood vessels by modified proteoglycans (PGs) with hyperelongated glycosaminoglycan (GAG) chains. GAG chain synthesis and growth factor mediated hyperelongation regulates the composition and size of PGs in a manner that would cause low density lipoprotein (LDLs) retention in vessel wall. Galactosaminoglycans are a class of GAGs, commonly observed on PGs. Multiple enzymes are involved in galactosaminoglycan biosynthesis. Galactosaminoglycan synthesis is regulated by various signalling pathways which are amenable to pharmacological manipulation to treat atherosclerosis. Receptor mediated signalling pathways including protein tyrosine kinase receptors (PTKRs), serine/threonine kinase receptors (S/TKRs) and G-protein coupled receptors (GPCRs) pathways regulate galactosaminoglycan synthesizing enzyme expression. Increased expression of these enzymes modify galactosaminoglycan chain structure by making them hyperelongated. This review focuses on the signalling pathways regulating the expression of genes involved in galactosaminoglycan synthesis and modification. Furthermore, there are multiple other processes for inhibiting the interactions between LDL and galactosaminoglycans such as peptide mimetics of ApoB100 and anti-galactosaminoglycan antibodies and the therapeutic potential of these strategies is also addressed. © 2018 Elsevier Inc.

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	University of Queensland	UQ	See opportunities by UQ
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