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Heparinase: A promising target

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There is a rising prevalence of cardiovascular disease that has resulted in an increased mortality rate in people of most ethnicities. A serious cardiac issue arises when there is a formation of a blood clot inside the blood vessel of a heart which may lead to myocardial infarction, resulting in the death of an individual. Heparin, an antithrombotic drug has been commonly used in treating such disorders and is highly in demand. Heparin as well as heparan sulphate are linear polysaccharides that contain sulphate groups in them. Sometimes, when these substances are synthesised, there occurs an incomplete sulphation by certain enzymes, which results in more complex structural polysaccharides. Therefore, it becomes very difficult to illustrate such structures. Hence, heparinases are used to break down the complex structures into simpler forms that help in the study of the structure of heparin. Concerning this, bacteria that produce heparinases have been discovered and researched from marine soil and brackish water. Screening of bacteria producing heparinases has been beneficial as this has led to the discovery of many novel strains that produce heparin lyases. The bacteria that produce heparinases are Gram-negative and show a positive result for simple heparinase-producing detection. The intracellular heparinases synthesised by the bacteria have the ability to depolymerise heparin to generate low-molecular-weight heparin. Studies in bacteria related to their mechanistic action, structural details, and genomics involved in heparinase production have been performed for the large-scale production of heparinase for antithrombotic applications. Apart from cardiovascular disorder treatment, heparinase extends its applications in the field of organ transplantation, such as the use of heparinase-modified thrombelastography in liver transplantation, in neutralising heparin-induced thrombocytopaenia, etc. In the field of medicine, heparinase has shown many applications currently and to increase its commercial production many strains are being successfully cloned and expressed through recombinant technology.

Keywords: Coronary thrombosis, Myocardial infarction, Heparin, Heparan sulphate, Heparinase, Thrombelastography, Thrombocytopaenia

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