Inhibitors of MicroRNA-miR712/miR205 for the Treatment of Atherosclerosis and Other Vascular Conditions

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Technology description

Market Summary

Heart disease is the leading cause of death worldwide, resulting in one in every four deaths in the United States. The health care services, medications, and lost productivity for coronary heart disease cost United States $108.9 billion annually. Atherosclerosis is a chronic inflammatory disease that involves the accumulation of fat on the artery walls over time and thickening of the artery walls, which leads to heart attack or stroke. Current therapies for atherosclerosis include hyperlipidemia-lowering drugs, blood thinners, surgical and nonsurgical removal of plaques, and insertion of a metal stent to prevent re-narrowing of blood vessels. These can successfully lower the incidence of heart attack, but none treat the chronic inflammation that leads to atherosclerosis, nor do they address remodeling of the aortic wall which can lead to abdominal aortic aneurysm. Currently, the only effective treatment for aortic aneurysm is surgery, which is often a higher risk than no surgery. Due to these factors, alternative therapies for both atherosclerosis and abdominal aortic aneurysm are needed.

Technical Summary

A key feature of atherosclerosis is that it preferentially occurs in arterial regions exposed to disturbed flow, which is characterized by low and oscillatory shear stress. Emory researchers identified microRNA-712 and microRNA-205 as mechanosensitive microRNAs that are up-regulated by disturbed flow where atherosclerosis lesions develop. The expressions of these microRNAs also increase in abdominal aortic endothelium where aneurysms most commonly occur. Emory researchers identified an antisense oligonucleotide inhibitor of microRNA-712 that rescues the expression of anti-atheroma proteins, and in turn reduces atherosclerosis in murine models. This inhibitor of microRNA-712 and microRNA-205 also reduces the incidence of abdominal aortic aneurysm significantly by inhibiting extracellular matrix degradation.

Application area

Antisense oligonucleotide inhibitors of microRNA-miR712/miR205 to prevent or treat atherosclerosis and aortic aneurysm.

Advantages

80% reduction on the expression of their microRNA targets.
Reduces atheroma plaque formation in a mouse model of atherosclerosis.
Provides potential non-surgical treatment for aortic aneurysm.

Institution

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