Liposome Nanoparticle for the Treatment of Vascular Diseases

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Purpose: The leading causes of death globally stems from cardiovascular diseases such as stroke and heart failure, which both involve atherosclerosis. Atherosclerosis refers to the buildup of plaque in and on the artery walls that can restrict blood flow. Most treatments for atherosclerosis reduce the plaque temporarily and must be conducted repeatedly to maintain plaque reduction. The nitric oxide gas (NO) can be used to maintain cardiovascular homeostasis as one of the many functions of NO is to retain dilation of blood vessels, promote endothelialization, and prevent smooth muscle cell proliferation. Therefore, the main goal of this project is to develop a liposome that can deliver NO to atherosclerosis sites and maintain a steady release of NO so that arteries can regulate blood and nutrients properly. Hypothesis: NO carrier peptides are encapsulated by a liposome. The liposomes maintain a steady release of NO in sites of atherosclerosis to decrease the amount of plaque buildup and stimulate healthy blood flow. Procedure: Liposomes were synthesized by mixture of a neural charge DOTAP and a positive charge DPPC in 1:2, 1:4, and 1:6 ratios. NO was reacted with K5 peptides. Data: 3 different charges of liposomes were synthesized and filtered with extruder. The sizes of liposomes were characterized as 100-150 nm by transmission electron microscope. NO release kinetics were evaluated up to 5 days by Griess assay. Conclusion: NO releasing K5 peptides and liposomes were successfully synthesized and characterized.

Awards Won: