ISSN: 2157-7439
Journal of Nanomedicine & Nanotechnology

OPEN ACCESS Freely available online

Letter To Editor

Editorial Note on Coronary Artery Disease in Nanomedicine

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LETTER TO EDITOR

'Nano' is derived from the Greek word for midget. Nanotechnology, as the name implies, is concerned with the study and creation of extremely small materials and machines whose functional organisation is measured in nanometers. A nanometer is defined as one billionth of a metre in the metric system. This is the world of the living cell, invisible to the naked sight. Nanotechnology makes use of molecular-scale technological gear. A nanometer is approximately 10 water molecules or 6 carbon atoms wide. 4 A ribosome is around 20 nm in diameter, a nucleus is approximately 6 mm in diameter, and a single strand of DNA is approximately 2 nm in width.

The fascinating science of nanotechnology has experienced a boom in the last decade, with exciting new developments taking place on a regular basis. Despite the vastness of the topic of nanomedicine, the focus of this review is on the application of nanomedicine in coronary artery disease. The review is broken down into the sections below. Historical Background, Nanomedicine-based Drug Delivery, Coronary Artery Disease Global Mortality Burden, Nanomedicine Therapeutic Options for CAD Nanomedicine and Imaging, Challenges Facing Routine Nanomedicine Application in CAD Treatment, and the Future of Nanomedicine in CAD Treatment. Because of the anatomical peculiarities and inflammatory changes in sick tissue, nanomedicine can be used in a variety of ways. For targeted nano medication delivery, local and site-specific inflammation can be exploited. Increased retention and duration of action of nanomedicines are caused by increased vascular permeability and decreased lymphatic outflow caused by inflammation. In high-, middle-, and low-income nations, coronary artery disease is the leading cause of death in adults. Between 1990 and 2020, it was predicted that CAD mortality in industrialised countries will climb by roughly 48 percent in men and 29 percent in women. The estimate for poor countries was 137 percent for men and 120 percent for women. Males over the age of 40 have a 49 percent lifetime risk of having CAD, while females have a 32 percent lifetime risk. Males have a lifetime risk of 35 percent, while females have a lifetime risk of 24 percent [1].

CAD is a substantial danger for all populations, especially as the frequency of metabolic syndrome, hypertension, and obesity rises internationally. Innovative therapeutics, such as targeted nanomedicine, has the potential to be promising. Atherosclerosis develops slowly over time, with plaque buildup in the body's major arteries. Myocardial ischemia or infarction can occur when such a plaque grows large enough in the coronary artery. Because atherosclerosis begins at the cellular level, only a successful intervention at this level can stop it from progressing. As a result, nanomedicine appears to be a viable therapy option for CAD. Nanotechnology can be employed in the treatment of coronary artery disease in a number of ways. This strategy could lead to the development of new and innovative therapeutic techniques. For CAD, there are essentially two therapy choices. Medical therapy combined with non-invasive management Mechanical revascularization is an invasive therapy. Statins, which have been proved to reduce morbidity and death in CAD, are the most often used pharmacological therapy. High-dose statin therapy has also been shown to have anti-inflammatory and anti-oxidant properties [2].

Due to dose-dependent adverse effects, high-dose statin therapy is limited. One study looked at the effectiveness of a targeted vesicle system for delivering high-dose statin directly to the patient. The researchers employed pravastatin-loaded vesicles with oligonucleotide surface functionalization. These oligonucleotides had a high affinity for inflammatory macrophages, which meant they were less harmful to the rest of the body. It showed a 15-fold reduction in muscle cell cytotoxicity. This research suggests that nanoparticle-based medication delivery technologies in CAD have a promising future. HDL transfers cholesterol from peripheral tissues to the liver and protects against atherosclerosis by acting as an anti-inflammatory agent. The amount of biomimetic nanoparticle-based synthetic HDL in the blood can be enhanced. In severe disease conditions, neo-vessel formation develops within atherosclerotic plaques. Plaque angiogenesis is thought to promote plaque growth, plaque bleeding, and plaque rupture. As a result, angiogenesis-targeting medicines have been tested as well. Fumagillin is a well-known anti-angiogenic agent [3].

Therapies that restrict angiogenesis are thought to be able to stabilise or regress atherosclerotic plaques. At the site of

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Received: 3-Apr-2022, Manuscript No: jnmnt-22-16137, **Editor assigned:** 05-Apr-2022, Pre QC No jnmnt-22-16137 (PQ), **Reviewed:** 19-Apr-2022, QC No: jnmnt-22-16137, **Revised:** 21-Apr-2022, Manuscript No jnmnt-22-16137 (R), **Published:** 28-Apr-2022, DOI: 10.35248/2157-7439.22.13.613.

Citation: Stanly J (2022) Editorial Note on Coronary Artery Disease in Nanomedicine. J Nanomed Nanotech. 13: 613.

atherogenic angiogenesis, fumagillin delivery via integrin-targeted nanoparticles has been tested. Fumagillin's negative systemic effects can be effectively mitigated by using target-specific nanoparticle medication delivery. In a separate study, cholesterol-fed rabbit models were given statin therapy as well as Fumagillin nanoparticles. The findings revealed long-term anti-angiogenic effects [4].

Liposomal formulations containing dimyristoyl phosphatidylcholine (DPMC) can aid in cholesterol extraction from peripheral tissues. HDL surface molecule DPMC has long been known. In another investigation, cholesterol-fed rabbits were given DPMC liposomes. The findings reveal a decrease in aortic plaque volume and cholesterol content [5].

CONFLICT OF INTEREST

None

ACKNOWLEDGEMENT

None

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