

Anti-atherosclerotic polymeric nanobiocatalysts for the dissolution of cholesterol crystals in atherosclerosis

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Abstract

Atherosclerosis is a systemic and chronic inflammatory condition in which plaques build up inside the arteries. Accumulation of cholesterol in early lesions leads to the formation of macrophage foam cells that ingest free cholesterol, eventually resulting in the presence of intra- and extracellular cholesterol crystal (CC) in advanced atherosclerotic plaques. Over time, growth of the necrotic core leads to plaque destabilization and vessel narrowing, which in turn increases the risk of rupture and thrombosis, leading to heart attacks and strokes. In this work we have developed novel catalytic and anti-inflammatory polymeric nanomedicines that are capable of directly diminishing a major detrimental effect of atherosclerosis; the formation of CCs within plaques. We present the development and characterisation of targeted polymeric nanobiocatalysts capable of selectively targeting atherosclerotic plaques and 'dissolving' CCs via a bioinspired catalytic approach based on innate cholesterol catabolic pathways.

Keywords: *polymeric nanobiocatalysts, drug delivery system, atherosclerosis disease, cholesterol*