Abstract

Cardiovascular disease (CVD) is the leading cause of morbidity and mortality in developed countries, with an increasing prevalence due to an aging population. The pathology underpinning CVD is atherosclerosis, a chronic inflammatory state involving the arterial wall. Nanotechnology offers therapeutic strategies, which may have advantage overclassical treatments and treatment for atherosclerosis.

The purpose of this research is to create multifunctional nanoparticles (Theranostics) for the diagnosis and treatment of atherosclerotic plaque, which is the result of a large inflammatory process within the arterial wall. To achieve this goal, we fabricated PLGA nanoparticles as drug delivery system, containing curcumin and chitosan modified, in order to increase their biocompatibility. Then we continue with the exploration of their morphologica1 properties. The next part of this study was the radiolabeling of 99mTc nanoparticles. Furthermore, we studied the in vitro drug release kinetic behavior of Curcumin from polymeric nanocarries. The nanoparticles were further studied with respect to stability and crystalline state of constituents.

Finally, we conducted some cell toxicity experiments and examined the impact of system in the development and cell proliferation. We found that Electrospray technique seems to perform quite well as a single-step method to develop an improved biocompatible drug delivery system of Curcumin, with successful and easy radiolabeling. The biomedical applications of nanotechnology expand the boundaries of Healthcare.

The range of possible applications of nanotechnology in cardiovascular medicine is rapidly expanding, providing promising options in the treatment of atherosclerosis (through targeted drug delivery) but also in atherosclerotic plaque imaging. Therefore, nanotechnology may evolve into a valuable tool in the battle against atherosclerotic disease in the near future.