

AB082. Gold nanoparticles as a new drug vector for glaucoma therapy

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Background: Glaucoma is an optical neuropathy affecting over 67 million people in the world. Efficiency of current active molecules, as travoprost (hydrophobic) is limited when administered by ophthalmic drops. Indeed, more than 99.9% is discarded due to multiple factors including lacrimal drainage. Low retention time of drugs at the cornea leads to their poor penetration. The aim of the project is to develop a drug delivery system allowing the drug penetration through biological barriers. Our hypothesis is that a drug delivery system based on gold nanoparticles should enhance the efficiency of the drugs. The main objective is to study the encapsulation ability of gold nanoparticles towards travoprost. The specific objectives are (I) the synthesis and characterizations of gold nanoparticles; (II) the establishment of the encapsulation protocol; (III) the method development of the separation of free and encapsulated drugs and; (IV) the quantification of the encapsulated drugs.

Methods: Gold nanoparticles were synthesized by a new method developed in our laboratory. An encapsulation protocol was settled using aqueous conditions at 37 °C. The separation of free and encapsulated drugs was performed with magnetic beads. The quantification of the encapsulated drugs was then performed by high performance liquid chromatography and confirmed by UV-visible spectroscopy.

Results: Gold nanoparticles of 28±1 nm were synthesized and purified according to our new experimental conditions. The encapsulation protocol lasts 5 days in the optimised conditions. The separation method involving magnetic beads was optimized to get rid of non-specific interactions. The travoprost was incubated with the nanoparticles until the reach of equilibrium in solution.

Conclusions: We showed that active molecules used for glaucoma therapy, as travoprost, can be encapsulated in gold nanoparticles. Further analysis will allow identifying the encapsulation properties of various gold nanoparticles, differing by their size, shape and chemical surface. These data suggest the possible improvements.

Keywords: Gold nanoparticles; drug vector; glaucoma; travoprost

doi: 10.21037/aes.2018.AB082

Cite this abstract as: Masse F, Ouellette M, Boisselier E. Gold nanoparticles as a new drug vector for glaucoma therapy. *Ann Eye Sci* 2018;3:AB082.