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Golden treatment for blindness: The use of gold nanoparticles as an enhanced-drug delivery system in age-related macular degeneration

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Background: Age-related Macular Degeneration (AMD) has fast become one of the leading causes of blindness in the developed world. There are number of effective bio-macromolecule therapeutics available to treat patients with AMD but due to their susceptibility to biodegradation these drugs are required to be administered at regular intervals via monthly intravitreal injections. This invasive procedure can be unpleasant for the patient and lead to detrimental side effects. Gold nanoparticle-based drug delivery systems have been emerging as an attractive alternative. Studies have shown that these nanoparticles can be used as drug depots that can control the release of drugs by exposing them to light.

Method: Three studies, which used *in vitro* and *in vivo* models to test these drug delivery systems, were presented and analyzed.

Results: These studies demonstrated successful application of gold nanoparticles, *in vivo* and *in vitro*, in releasing multiple biologics for ocular therapeutics using polymer-coated gold nanoparticles (AuNPs) inside an agarose hydrogel as therapeutic depot. Hydrogel infused with gold nanoparticles could, when exposed to light, release pre-loaded therapeutics.

Conclusion: Although success was shown using gold nanoparticle delivery systems *in vivo* and *in vitro*, human trials must be considered along with longer term studies before these techniques can be implemented. The method can potentially reduce the number of intravitreal injections required.

Biography

Umesh Manni is currently pursuing Bachelor's degree in Medicine at the University of Liverpool, UK. He currently sits on the Liverpool Research Committee as a Treasurer. He has a special interest in ophthalmology and nanotechnology.

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