

Gold Loaded Thermoresponsive Nanogels with Multiple-Associated Anti-Tumour Effects

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Most chemotherapeutic treatments include combination therapy to inhibit tumour growth, yet the systemic method of administration involving separate drug formulations results in undesirable side effects with a complicated dosing strategy. Consequently, the ability to combine multiple drugs in a single nanoparticulate delivery system is of interest. In this context, we have explored thermosensitive nanogels based on polyethylene glycol methacrylate decorated with gold nanoparticles (AuNPs) for their ability to deliver drugs upon external stimuli. Within these vehicles we include two drugs of interest for tumour treatment, doxorubicin and pomalidomide. The biological effects of doxorubicin are well documented whereas pomalidomide remains a relatively novel drug that has shown promising results in the treatment of multiple myeloma (MM), among other actions including the inhibition of angiogenesis and anti-inflammatory cytokines secretion. *In vitro* experiments were conducted to assess the cytotoxic and anti-angiogenic effects of released doxorubicin and pomalidomide respectively. Additionally we investigated the ability of external stimuli and the usage of near infrared light as trigger for combination therapy and hyperthermia. We further demonstrate that an additional polymer coating on the nanogel surface can decrease uncontrolled drug leakage, and modulate cellular uptake and drug release profiles.