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Multifunctional Gold Nanoparticles as Nanoseeds for Targeted Chemoradiotherapy of Glioblastoma Multiforme (GBM)

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Gold nanoparticles (AuNPs) can play a pivotal role in the design of new theranostic tools for cancer treatment. This is due to their appealing properties for medical application such as, biocompatibility, easy functionalization with molecular vectors and good biological half-life. Additionally, AuNPs can also be explored as multifunctional platforms for targeted-delivery of radionuclides and chemotherapeutic drugs. Herein, we will report on the synthesis, characterization and biological evaluation of AuNPs decorated with Pt(IV) prodrugs, a DOTA-based chelator for coordination of medically relevant trivalent metals (e.g. 67Ga, 111In, 177Lu)1 and a bioactive peptide (bombesin (BBN) analogue or substance P (SP) derivative) that recognizes the gastrin releasing peptide receptor (GRPr) or the NK1 receptor overexpressed in GBM cells. Some of the SP-containing AuNPs were also labeled with 125I profiting from the presence of a Tyr residue in the peptide sequence. The studies included the assessment of cellular uptake and cytotoxic activity in GBM U87 cells for the designed multifunctional nanoparticles, aiming to obtain a first insight on their suitability for targeted chemoradiotherapy of glioblastoma.

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