Radiolabelled Gold Nanoseeds for Glioblastoma Theranostics

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Glioblastoma multiforme (GBM) is among the most aggressive cancers and remains essentially an incurable disease. Therefore, there is an urgent need for innovative therapies against GBM. To tackle this goal, we have focused on multifunctional gold nanoparticles (AuNPs) for image-guided GBM chemoradiotherapy, using an unprecedented strategy that relies on the simultaneous delivery of Pt(IV) prodrugs and therapeutic radionuclides. By considering AuNPs for the design of these new theranostic tools, we took into consideration their appealing properties for medical application, such as biocompatibility, easy functionalization with molecular vectors and good biological half-life.[1-3]

As a first step, we have proceeded with the synthesis, characterization and biological evaluation of AuNPs decorated with a DOTA-based chelator for coordination of medically relevant trivalent metals (e.g. ^{67}Ga, ^{177}Lu) and a bioactive peptide (substance P (SP) derivatives) that recognizes the neurokinin-1 (NK1) receptor overexpressed in GBM cells. Some of the SP-containing AuNPs were also labeled with ^{125}I profiting from the presence of a Tyr residue in the peptide sequence. As reported in this communication, the studies included the evaluation of cellular uptake and radiocytotoxicity in GBM cells for the designed multifunctional nanoparticles, aiming to obtain a first insight on their suitability as targeted nanoseeeds for the theranostics of glioblastoma

Keywords: gold nanoparticles, substance P, theranostic; radionuclide therapy; glioblastoma multiforme.

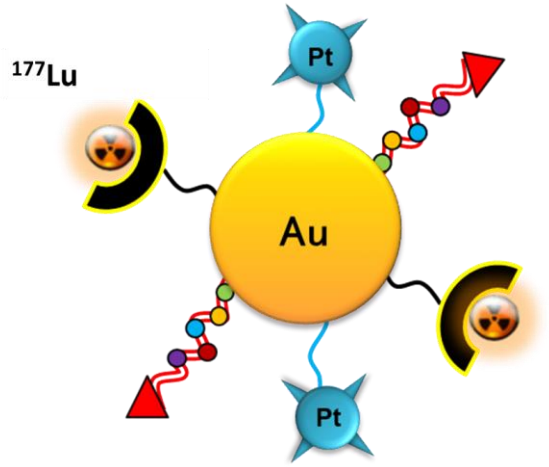

Figure 1: Schematic drawing of the multifunctional AuNPs, carrying a therapeutic radionuclide (^{177}Lu), cytotoxic drug and Substance P peptide to target the NK1 receptor.

References:

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