Combinatory approaches against cancer based on Gold nanoparticles

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Cancer is estimated to impact more than 20 million people globally in the next years. It has been proposed that specific anti-cancer treatments should rely on combinatorial therapies targeting multiple components the disease, to minimize compensatory mechanisms that could result in relapse and resistance to treatment. Nanotechnology is expected to provide a range of tools for cancer diagnosis and treatment (theranostics) as their sizes are well matched in size to biologic molecules and cell structures. Noble metal NPs, and gold NPs (AuNPs) in particular, attract significant interest because of their ease of synthesis and functionalization derived from their large surface area to volume ratio suitable for multifunctional capacity [1]. Several strategies have been proposed based on AuNPs simultaneously functionalized with siRNA/antisense and targeting molecules (peptides, antibodies, etc) for the development of conceptual combinatory therapeutic approaches [1]. These may also profit from the intrinsic optical properties of AuNPs, which are efficacious light-to heat transducers that can be used for photothermal therapy (PTT) approaches [2]. Commonly, NIR irradiation is usually used with AuNPs, but recently, we demonstrated the potential of visible irradiation for photothermal induction using spherical AuNPs (17 nm) with a characteristic localized SPR band around 520 nm, with seemingly higher photothermal conversion efficiency [2]. Our group has been using AuNPs for combined anticancer nanotherapeutics *in vitro/in vivo*, including precise active targeting of cancer cells to deliver chemotherapeutics, gene silencing of crucial pathways involved in cancer development, and anti-angiogenic capability, which may be enhanced via photothermal induction [3,4].

REFERENCES

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FIGURES

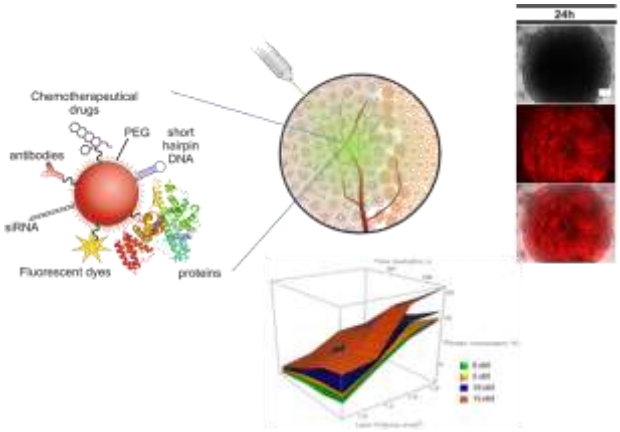

Figure 1: Multifunctional AuNPs for photothermal combinatory action against tumour cells