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# Gold Nanoparticles for advanced Prostate Cancer Brachytherapy

*Wednesday 31 May 2017 16:00 (30 minutes)*

Prostate cancer (PCa) is one of the leading causes of death among men, and brachytherapy is widely used to treat this type of cancer. Low-dose brachytherapy for instance, requires the implantation of tens of radioactive seeds per organ. This treatment causes discomfort, and the implants cannot be removed. They usually generate image artefacts impeding the delineation of recurrent cancers. Our research group has focused on the development of gold nanoparticles used as radiosensitizers and as radioactive seeds, for the treatment of PCa. This presentation will review the principles of radiosensitization, as well as the topic of radioactive gold nanoparticles containing low-energy gamma emitters (103Pd, 125I) for low-dose rate brachytherapy. In particular, a new class of products made of core-shell 103Pd@Au nanoparticles, will be presented as an alternative to the current implantation of massive seeds. The particles are synthesized by a rapid one-pot process, and they have a diameter of 36 –48 nm. Low volume (2 - 4 µL), single dose injections (1.6 - 1.7 mCi) were administrated in xenograft tumours of PCa (a murine model). After 4 weeks, a tumor volume inhibition of 56% was observed, and this confirmed the strong potential of radioactive gold nanoparticles for low-dose brachytherapy treatments. A comprehensive histological study, coupled to microdosimetric calculations, will allow a better understanding of the optimal intratumoral and pericellular distribution to be achieved in future brachytherapy treatments relying on this technology. Overall, this presentation will describe the strengths, advantages and potential pitfalls of gold nanoparticles as substitutes for the current radioactive seeds in brachytherapy.

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