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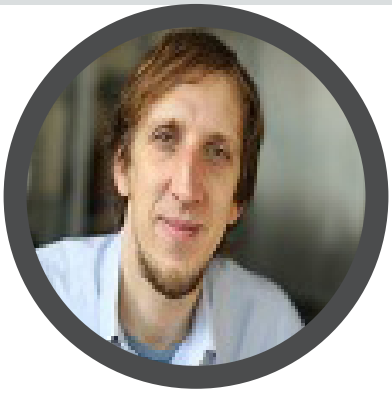
MIXED MONOLAYER AND PEG LINKER FUNCTIONALISED GOLD NANOPARTICLES

D Dixon[1], J Coulter[2] and C Dooley[1]

[1]Ulster University, UK
[2]Queen's University Belfast, UK

In order to create a clinically useful nanoparticle based treatment, it is necessary to functionalise the surface of the nanoparticles. Poly ethylene glycol (PEG) is often added to stop aggregation in-vivo and to prolong the circulation time by inhibiting any undesired immune responses. Other groups such as antibodies can be added to target nanoparticles to tumours, while peptides can be used to enhance cell uptake and induce endosomal escape. Finally therapeutic payloads such as drugs can also be attached to the nanoparticle surface. In the case of gold nanoparticles (AuNPs), thiol chemistry is frequently used to tether the various groups to the surface and two different attachment arrangements are possible. Firstly, all the groups can be attached directly to the AuNP surface creating a mixed monolayer arrangement or the biologically active groups can be attached via a linker unit such as PEG. In this case, one end of the PEG is attached to the AuNP surface with the biologically active group reacted with the free end. This linker arrangement has the potential benefits of permitting higher loading levels, and should allow for improved biological availability, as the biologically active groups are freely available on the outside of the functionalised nanoparticles. We report that the attaching H5WYG, an internalisation and endosomal escape peptide to ~15nm AuNPs via a PEG linker rather than using a mixed monolayer arrangement results in greater levels of cell uptake and enhanced radiosensitisation behaviour. We also report on the influence of pH on the attachment of peptides to AuNPs using thiol chemistry, investigate the low term stability of functionalised AuNPs, and highlight some of our published animal data on the radiosensitisation potential of peptide modified AuNPs.



Biography

D Dixon has received his PhD in Polymer Science from Queen's University Belfast in 2000 and is currently, serving as a Senior Lecturer in Nanotechnology, at Ulster University in Northern Ireland. His work is focused on functionalised gold nanoparticles for applications in cancer treatment. He has published around 50 papers.