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FACULDADE DE CIÊNCIAS E TECNOLOGIA
UNIVERSIDADE NOVA DE LISBOA

Life Sciences Department

AuNPs for Cancer Photothermal Therapy

CIGMH/Nanotheragnostics Group, FCT/UNL

CIGMH

FACULDADE DE CIÊNCIAS E TECNOLOGIA
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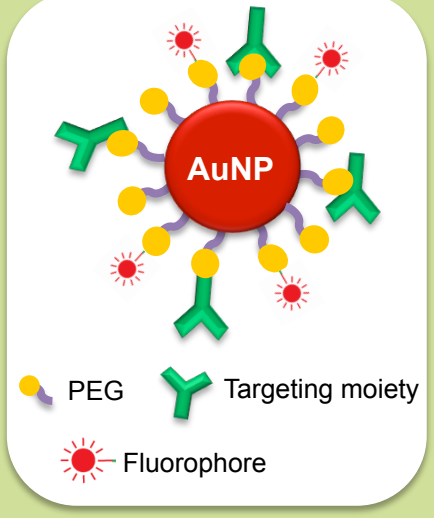
2010 – 2011: Postdoctoral Fellow at Department of Dermatology, Columbia University

2006 – 2010: PhD studentship at Centre for Cutaneous Research (ICMS), QM University of London

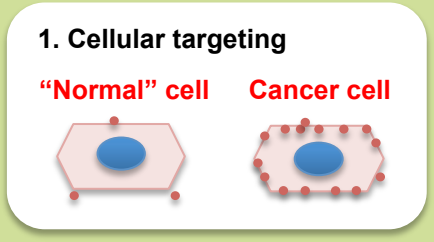
Objectives

The goal of this project is to develop conjugated gold nanoparticles (AuNPs) for selective anti-cancer photothermal therapy (PTT). AuNPs exhibit a well-defined surface plasmon resonance (SPR) band, strongly dependent upon size and shape, which enables them to absorb and scatter light several orders of magnitude more strongly than the conventional photo-absorbing agents used in photothermal therapy. Their ability to convert NIR (large NPs) or visible (small NPs) radiation into heat can be used to cause localised hyperthermia and cell damage. Here, we aim to study the effects of (1) changing the size and shape of the Au-nanoconjugates and of (2) different targeting, on the efficiency of AuNP-mediated photothermal therapy.



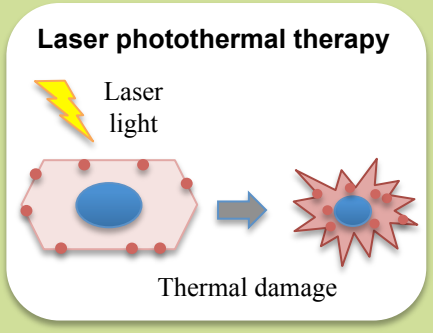
Methodology

1) AuNP **synthesis**: different sized spherical AuNPs;
2) AuNPs will be **functionalised** with stabilising biomolecules – poly ethylene glycol (**PEG**) - and with a suitable dye fluorophore for **cellular tracking**. AuNPs and AuNP-conjugates will be **characterised** by UV/vis absorption spectroscopy, DLS and TEM;
3) For **tumour-specific cellular targeting**, AuNPs will be conjugated to an **antibody** or **peptide**;
4) **Cellular targeting** will be assessed at different time points by confocal fluorescence microscopy and TEM.
5) Following incubation with the AuNP-conjugates for different periods of time, non-tumour and tumour cells will be exposed to **laser light** of the appropriate wavelength;
6) **Cell viability** will be assessed by a number of cellular and biochemical assays.



Expected Results

Conjugated AuNPs, which can interact with tumour biomarkers are expected to **target cancer cells** more efficiently than non-tumour cells. During the first few hours following incubation on the cells, AuNPs are expected to bind to and, therefore, to **localise on the cell membrane**. Upon exposure to appropriate laser light at specific time points, AuNPs are expected to cause higher levels of photothermal damage. Larger AuNPs are expected to provide greater thermal damage, given their higher photothermal energy conversion efficiency.



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