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# Recombinant Antibody-Conjugated Silver Nanoparticles for Improved Drug Delivery in Photodynamic Therapy for Metastatic Melanoma

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Melanoma is the most dangerous skin cancer and is inherently chemoresistant; thus, alternative theranostic strategies are needed for its management. Immunotherapy involves the use of antibody technology to target cancer-associated-antigens; photodynamic therapy (PDT) involves the irradiation of a photosensitiser to generate cytotoxic levels of singlet oxygen and reactive oxidative species; and nanomedicine involves the use of nanomaterial drug delivery systems for enhanced drug biodistribution and uptake. We aim to establish a chemical conjugation model allowing for directional attachment of SNAP-tag-based recombinant antibodies (rAbs) to nanobioconjugates composed of the photosensitiser zinc phthalocyanine tetra-sulphonic acid attached to silver nanoparticles for the photoimmunotheranostic management of melanoma. The initial aim was to express and purify rAbs comprising the anti-CSPG4 mAb9.2.27 single-chain variable fragment (scFv) and the SNAP-tag enzyme and to validate the selective binding of the protein to CSPG4-positive melanoma cells. To accomplish this, HEK293T cells transfected with plasmids containing the mAb9.2.27 scFv and SNAP-tag DNA sequences, co-expressing the green fluorescent protein reporter gene, were used as a transient mammalian vector expression system. Cell culture supernatant containing secreted protein was purified using his6-tag for affinity capture. The protein was then characterised using SDS-PAGE and Western blot, demonstrating retention of functional protein of interest during purification. The rAb was then validated using fluorescent markers to confirm selective binding to target cells. These preliminary results indicate the feasibility of this rAb as a targeting ligand for antibody-mediated nano-PDT against melanoma.

## Apply to be considered for a student ; award (Yes / No)?

Yes

## Level for award;(Hons, MSc, PhD, N/A)?

PhD

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