IMMOBILIZATION OF BIOLOGIC PHOTOSENSITIZER CONJUGATES ON NANOPARTICLES TO ENHANCE PHOTOIMMUNOTHERAPY EFFICACY

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Light-activatable immunoconjugates have recently shown promise for photoimmunotherapy and fluorescence-guided resection in patients suffering from incurable malignancies in early clinical trials. While possessing a number of unique advantages, photoimmunotherapy and fluorescence imaging for oncological diseases can be hampered by therapeutic inefficiency resulting from inadequate photosensitizer delivery. The study suggests that successful coupling of antibody-photosensitizer photoimmunoconjugates onto polymeric nanoparticles complements the promising attributes of simple photoimmunoconjugates in two significant ways: Not only does it improve photosensitizer delivery to tumor, but also offers a forward-looking opportunity to deliver significant and diverse second agents, which can be an imaging agent or a different therapeutic agent, to further enhance the theranostic benefits of photoimmunoconjugates. This approach, based on nanoparticle engineering, achieves effective photoimmunoconjugate delivery and enhances the anti-tumor efficacy in two EGFR-overexpressing cancer cell lines *in vitro* and in a xenograft tumor mouse model. Furthermore, the selectivity, photochemical and photophysical characteristics (e.g. absorbance, fluorescence quenching, and singlet oxygen yield) of the photoimmunoconjugated nanoplatform were thoroughly investigated. This next generation photoimmunoconjugate–nanoparticle delivery approach offers a unique opportunity to monitor disease, destroy cancer cells and co-deliver a follow-up treatment more efficiently, and thus merits further investigations in preclinical and clinical settings.