New strategies to enhance photodynamic therapy for solid tumors

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Photodynamic therapy for cancer uses laser light to activate tumor-localized dyes (photosensitizers), resulting in the production of highly toxic reactive molecular species at the tumor site. As a result, tumor cells sustain massive intracellular damage, the blood vessels that provide the tumor with nutrients is destroyed, and the immune system is activated to remove residual tumor cells. Together, these events synergize to eliminate the malignant tissue. However, this potentially effective and patient-friendly therapy has seen limited clinical application due to the suboptimal characteristics of the photosensitizers, the inability of the photosensitizers to accumulate at the tumor tissue, and the inherent capability of tumor cells to adapt to therapy that enables their survival. To resolve these shortcomings and address these challenges, the aim of this research was to develop a drug delivery system that targets photosensitizers towards the tumor tissue and to investigate how tumor cells respond to the therapy in their attempt to survive. The results of these investigations were used to guide the design of photodynamic therapy-based combination treatments, in which photosensitizers and survival-inhibiting chemo-therapeutics were simultaneously packaged into nanoparticle formulations.

This thesis was prepared at the Department of Experimental Surgery of the Academic Medical Center, University of Amsterdam under the supervision of prof. dr. Thomas M. van Gulik and dr. Michal Heger.
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NEW STRATEGIES TO ENHANCE PHOTODYNAMIC THERAPY FOR SOLID TUMORS

ACADEMISCH PROEFSCHRIFT

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