Light Activated Drug Delivery using Cell-Penetrating Peptides for Diagnostic and Therapeutic Applications

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Cell-penetrating peptides (CPPs) have been successfully used for intracellular delivery of a broad variety of cargoes including various nanoparticulate pharmaceutical carriers (liposomes, micelles, nanoparticles, polymer-conjugates). However the cationic nature of all CPP sequences and thus lack of cell-specificity limits their in vivo use for drug delivery applications.

The Technology

A novel strategy for site-specific delivery of drugs to tumor cells by using polymers bearing light activated caged Cell-penetrating peptides (cCPP) has been developed.

Illuminated by UV-light, the CPP facilitate rapid intracellular delivery of polymer-drug conjugates into tumor cells.

As little as ten minutes of illumination is sufficient to enhance the penetration of polymer-drug conjugates into 80% of the target cells to promote a 'switch' like cytotoxic activity.

As little as ten minutes of illumination is sufficient to obtain a shift from 100% to 10% in cell viability within as little as 2 h following the illumination.

This report is the first example for tumor targeting by means of light activation of cell-penetrating peptides for intracellular drug delivery.

Illumination time and dose dependence of the cell viability of PC-3 cell incubated with 80 M (solid blue), 40 M (dashed blue), 20 M (dots blue) P(cCPP)-drug conjugate; 80 M drug alone (solid green), 80 M P-(cCPP) without drug (solid red), as determined by MTT assay.

Patent Status

Patent Pending

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