Carbonic anhydrase IX (CAIX) specific probes to overcome the hypoxia limitation in photodynamic therapy

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Abstract: In photodynamic cancer therapy (PDT), PDT-induced hypoxia is a major challenge that affects therapeutic efficacy. This problem can lead to cancer recurrence and progression through activation of various angiogenic factors and significantly reduce treatment outcomes. Here, we report a system of acetazolamide-conjugated near infrared photosensitizer (AZ-CY780) to diminish the effects of PDT-based hypoxia by combining the advantages of anti-angiogenesis therapy with PDT. Acetazolamide, a carbonic anhydrase isoform IX (CAIX) inhibitor, was covalently linked to an iodinated cyanine dye, so called AZ-CY780. The conjugate was found to target CAIX overexpressed cells (MDA-MB-231) and showed anti-angiogenesis effect. While the treated cells were exposed to the NIR light, singlet oxygen was produced and the cells were devastated. This could be an attractive approach to target CAIX-overexpressing tumors.

Keywords: Photodynamic therapy; Tumor hypoxia; Near infrared photosensitizers; Combination therapy