ANTIBODY-TARGETED PHOTODYNAMIC THERAPY USING TRASTUZUMAB-CONJUGATED CHLORIN E6 FOR HER2-POSITIVE GASTROINTESTINAL CANCERS

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A novel HER2-targeted photosensitizer, G-Ce6-trastuzumab, demonstrated significantly enhanced tumor selectivity and photodynamic cytotoxicity in HER2-overexpressing gastric cancer cells compared with conventional photosensitizer G-Ce6.

KEY POINTS

- In HER2-high NCI-N87 gastric cancer cells, G-Ce6-trastuzumab achieved an IC50 of 1.14 ± 0.40 nM compared to 8.35 ± 2.17 nM for G-Ce6 alone, indicating substantially improved therapeutic efficacy.
- G-Ce6-trastuzumab exhibited markedly enhanced cellular uptake and significantly increased ROS generation in HER2-overexpressing cells following photodynamic therapy with 660 nm light at 16 J/cm^2.
- The therapeutic advantage was selective to HER2-high cells, with less pronounced differences observed in HER2-low MKN-45 cells (IC50 3.16 ± 0.68 nM vs 5.98 ± 1.30 nM).
- Antibody-mediated targeting improved both selectivity and therapeutic efficacy while minimizing potential damage to surrounding normal tissues.
- This antibody-drug conjugate approach may provide a translational platform for precision photodynamic therapy in HER2-positive gastrointestinal cancers, though in vivo validation is still needed.

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