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Glycosylated zinc phthalocyanine-gold nanoparticle conjugates for photodynamic therapy: Effect of nanoparticle shape.

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Abstract

In this work, we report on the synthesis of tris-[(2,2,7,7-tetramethyltetrahydro-3aH-bis([1,3]dioxolo)[4,5-b:4',5'-d]pyran-5-yl)methoxy)-2-(4-benzo[d]thiazol-2-ylphenoxyphthalocyaninato] zinc(II) (complex **3**) and its linkage to gold nanoparticles (AuNPs) of different shapes through S-Au/N-Au self-assembly. The conjugates of complex **3 (**with both gold nanorods (AuNR) and nanospheres (AuNS)), displayed decreased fluorescence quantum yield with corresponding improved triplet and singlet quantum yields compared to complex **3** alone, however **3**-AuNR showed improved properties than **3**-AuNS. Complex **3** showed relatively low *in vitro* dark cytotoxicity against the epithelial breast cancer cells with cell survival ≥ 85% at concentration ≤ 160 μg/mL but afforded reduced photodynamic therapy activity which may be due to aggregation. **3**-AuNR afforded superior PDT activity with less than 50% viable cells at concentration ≥ 40μg/mL in comparison to **3**-AuNS with less than 50% viable cells at concentration ≥ 80μg/mL. The superior activity of **3**-AuNR is attributed to the photothermal therapy effect since nanorods absorb more light at 680 nm than nanospheres.

Key words: Glycosylation, zinc phthalocyanine, photodynamic therapy, gold nanoparticles.

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