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Antibody conjugated nanoparticles encapsulating a photosensitizer: A photodynamic therapeutic strategy

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Over the past few decades, nanoparticles have achieved a notable research interest in drug delivery. The ultimately small size of the nanoparticles offers several advantages over conventional free drug delivery. These advantages include modifying the pharmacokinetics of the encapsulated drug(s) by preferential accumulation and targeting, and by controlled release of the encapsulated drug in the vicinity of the diseased tissue. Drugs can be entrapped, adsorbed, or chemically conjugated to the surface of the nanoparticles. Nanoparticles can be targeted to the desired site of action by two mechanisms; passive and active mechanisms. Passive targeting is due to the leaky malformed vasculature in cancer tissue that allows nanoparticles to accumulate preferentially in the cancer tissue while being unable to penetrate well-differentiated vessels. In the active targeting, a ligand is conjugated to the surface of the nanoparticles that bind to a specific receptor overexpressed on the targeted tissue resulting in receptor-mediated endocytosis. Common ligands include antibodies, aptamers, peptides, glycopolysacchrides. In the present study, anti-DR-5 antibody was conjugated to the surface of chitosan/alginate nanoparticles. This modality was utilised to target a photosensitizer (TMP) towards colorectal cancer cells. Results showed a dramatic increase in the uptake and photocytotoxic effect of antibody conjugated TMP-loaded nanoparticles as compared to nude nanoparticles.

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