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Nano-antibiotics for targeted antibiotic delivery for bacteria

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The work demonstrates the use of carbohydrate-conjugated nanomaterial (glycol-nanomaterial) to target bacterial pathogens. A collection of systematic studies done by several groups has demonstrated that bacteria can be specifically targeted using various oligosaccharides. Through our preliminary investigations we have discovered that oligosaccharide conjugated nanoparticles (glycol-nanoparticles) could be used to target strain specific bacteria. For example D-maltoheptaose (G7) and trehalose conjugated nanoparticle used to effectively target *Escherichia coli* and *Mycobacterium* spp. Antibiotic resistance in pathogenic bacterial strains is a growing global concern. We have demonstrated that these glycol-nanoparticles have been used as a carrier for antibiotics that would help target bacteria and reduce minimum inhibitory concentration of a conventional antibiotic. Antibiotic Streptomycin (Str) is a broad range aminoglycoside typically used in the treatment of tuberculosis. We have bi-functionalized a nanoparticle using carbohydrate-G7 antibiotic-Str to produce Glycol-Nano-antibiotics (GNAs). As proof of concept for active targeting GNAs are used against a highly Str resistant E. coli strain. The GNAs demonstrated size dependent increased antibacterial efficacy few log folds improvement over the free the free antibiotic (Str).

Biography

Surangi Jayawardena has her research focuses on theranostic nanostructures capable of providing both therapeutic and diagnostics *in vivo* and *in vitro* environments for infectious diseases. Her laboratory utilizes synthetic analytical and material characterization techniques to design theranostic systems; these include small molecule synthesis for bio-conjugation, synthesis of various inorganic and organic nanomaterial and application in *ex vivo*, *in vitro* and *in vivo* settings.

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