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NEW TECHNOLOGY

Improved nanoparticle delivery and elimination—it's in the DNA

In a recent study, Warren Chan and colleagues engineered large, highly adaptable composite 'superstructures', comprising a central core nanoparticle joined to an outer layer of satellite particles using complementary single-stranded DNA linkers. *In vivo*, these superstructures accumulated more efficiently in tumours than either of the smaller component nanoparticles alone.

"We picked DNA to 'glue' the nanoparticles together as it is a very versatile molecule; the DNA spacer could be varied in length, it could hold drugs and contrast agent or be made to target a specific biomolecule," explains Chan. He continues, "our novel nanoparticle design scheme may allow us to engineer the nanosystem for optimal targeting of diseased sites, but is likely to be safe in the long-term, as the nanotechnology can be removed from the body." Indeed, the DNA linkers seemed to promote rapid degradation of the superstructures and release of the small component nanoparticles, which were eliminated via the kidney. In addition, polyethylene-glycol-modification of the satellite nanoparticles reduced macrophage uptake of the superstructures, and might also reduce binding to serum proteins.

Together, these design features might reduce reticuloendothelial accumulation and, therefore, immune system and organ toxicity, while increasing tumour dissemination of the nanoparticles. "This is exciting as it provides a new strategy to build nontoxic nanoparticles that have great potential to improve cancer diagnosis and treatment," Chan concludes.

David Killock

Original article Chou, L.Y. *et al.* DNA assembly of nanoparticle superstructures for controlled biological delivery and elimination. *Nat. Nanotechnol.* doi:10.1038/nnano.2013.309.