

Colonic navigation: Nanotechnology helps deliver drugs to intestinal target

November 4 2010

Nanoparticles could help smuggle drugs into the gut, according to a study published this month in the *International Journal of Nanotechnology*.

There are several drugs that would have more beneficial therapeutic effects if they could be targeted at absorption by the lower intestine. However, in order to target the colon for treating [colon cancer](#) for instance, medication delivered by mouth must surmount several barriers including stomach acidity, binding to mucus layers, rapid clearance from the gut, and premature uptake by cells higher up the gastrointestinal tract. Being able to deliver a drug by mouth has several benefits over injection or suppository: ease of dosing, for instance, and better patient compliance.

Various methods have been tried, including coating drug molecules with a polymer shell. However, Kevin P. O'Donnell and Robert O. Williams III of the Division of Pharmaceutics, at The University of Texas at Austin, have reviewed the various techniques on offer and suggest that encapsulating a drug molecule within [nanoparticles](#) offers the best option for controlling [drug delivery](#) and targeting the colon.

The Texas team has reviewed the state of the art in nanotechnology for delivery of therapeutic agents to the colon. They explain that advances in particle engineering techniques have recently made it possible to make drug products on the nanoscale. Techniques such as spray drying, antisolvent methods, dialysis methods, emulsion methods and cryogenic methods are all now available for drug formulation. Converting a drug

powder into nanoparticles can often render a compound that is poorly soluble in water soluble or increase bioavailability simply through an increase in the surface area to volume ratio. Smaller particles mean a bigger surface area to interact with absorbing surfaces in the [gastrointestinal tract](#). Indeed, fatty but solid nanoparticles of the compound quercetin (a health supplement) are absorbed almost 6 times more effectively by the gut in nanoparticle form than the common drug suspension formulation.

The researchers explain that nanoparticle drug delivery could be particularly beneficial for patients suffering from inflammatory bowel diseases including Crohn's Disease, ulcerative colitis and irritable bowel syndrome, all which often require long-term treatment. However, they also add that because there are no digestive enzymes in the colon and its neutral pH it is a prime target for the delivery of therapeutic proteins, peptides, viral vectors, and nucleotides for a wide range of disease not simply those associated with the colon.

More information: "Nanoparticulate systems for oral drug delivery to the colon" in *International Journal of Nanotechnology*, 2010, 8, 1/2, 4-20

Provided by Inderscience Publishers

Citation: Colonic navigation: Nanotechnology helps deliver drugs to intestinal target (2010, November 4) retrieved 10 April 2024 from <https://phys.org/news/2010-11-colonic-nanotechnology-drugs-intestinal.html>

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