Anticancer nanotech

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Tiny particles of albumin, a protein found in the blood, can be used to carry radioactive isotopes to the site of a cancerous tumour in the body and so avoid many of the side-effects of conventional radiotherapy.

Virginia Nazarica Borza, Elena Neacsu and Catalina Mihaela Barna of the "Horia Hulubei" National Institute of R&D for Physics and Nuclear Engineering, in Bucharest, Romania, report details of the preparation of human serum albumin nanospheres labelled with rhenium-188 radioisotope, in the current issue of the *International Journal of Nanotechnology and Biomaterials*.

Drug-delivery agents that can target the site of disease in the body have often been referred to "magic bullets". Previously, such systems have not lived up to their name. However, the advent of nanotechnology is bringing such agents a step closer. The delivery of drug directly to the site where it is needed and at the level that is required for treatment is essential if efficacy is to be improved and side effects minimised. Due to their particular chemical and physical properties, nanoparticles offer the possibility of devloping such therapeutic or diagnostic agents.

Now, Borza and colleagues have found a way to load up nanospheres of water-soluble protein from blood plasma with the radioactive element rhenium-188. This radionuclide emits beta particles, high-energy electrons, as it decays radioactively, but is short-lived so causes no long-term problems. Such high-energy beta-emitter radioisotopes coupled to nanoparticles could deliver a high therapeutic dose of radioactivity to a tumour, while sparing more distant tissues from toxicity.

The team has determined the optimal safe parameters for making the cancer-killing nanospheres and tested their overall stability in the laboratory. They load up the albumin nanoparticles, a process known as radiolabelling, by heating the albumin nanospheres and rhenium-188, in the presence of a tin salt, stannous chloride and a claw-like chelating agent, tartrate, which can grab on to the rhenium-188.

The next step is to carry out pre-clinical studies on how well the radiolabelled nanospheres can target tumour cells and to demonstrate by how much therapeutic efficacy might be improved using these drug-delivery agents.

More information: "Preparation of human serum albumin nanospheres labelled with 188Re" in *Int. J. Nano and Biomaterials*, 2009, 2, 547-553.

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