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The use of nano- and micro-delivery systems in the pharmaceutical space: Gold and beyond

Gold nanoparticles (AuNPs) have shown great potential for use in nanomedicine and nanotechnologies due to their ease of synthesis and functionalization. However, their apparent biocompatibility and biodistribution is still a matter of debate due to the lack of clear safety data. To investigate the biodistribution of AuNPs, monodisperse 14nm dual radiolabeled [¹⁴C] citrate coated [¹⁹⁸Au]AuNPs were synthesized and their physico-chemical characteristics compared to those of non-radiolabeled AuNPs synthesized by the same method. The dual radiolabeled AuNPs were administered to rats by oral or intravenous routes. After 24 h the amounts of Au core and citrate surface coating were quantified using gamma spectroscopy for ¹⁹⁸Au and liquid scintillation for the ¹⁴C. The Au core and citrate surface coating had different biodistribution profiles in the organs/tissues analyzed and no oral absorption was observed. We conclude that the different components of the AuNPs system, in this case the Au core and citrate surface coating, did not remain intact resulting in the different distribution profiles observed. These results will be compared with those obtained with other organic-based drug delivery systems, such as the Pheroid* delivery system, where both the carrier and the active ingredient were also radiolabeled. A better understanding of the biodistribution profiles of surface attachments or cargo of delivery vehicles in relation to the carrier itself is required to successfully use the various organic and inorganic systems in drug delivery.

Biography

Anne Grobler is the Director of the National Platform Preclinical Drug Development in South Africa, a joint initiative between the state and the academic sector. She has a PhD in Pharmaceutics from the North-West University and MSc in Medical Biochemistry from the University of Stellenbosch, South Africa. She has published more than 40 papers in reputed journals and is the Inventor of 5 patents granted in various countries. She has received a number of awards, including the BHP Billiton awards for her contribution to innovation.

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