Nanotechnology and the differentiated medicine

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Pharmaceutical nanotechnology involves the formation of drug loaded nanoparticles from polymers, lipids and surface active agents [1]. Such nanoparticles have been used to formulate approved drugs, which target a particular clinical problem, such as: avoiding cardiotoxicity in the case of Doxil and avoiding hypersensitivity reactions in the case of the excipient used in Abraxane [2,3]. To gain approval, provide real patient benefit and encourage prescribing, it is essential that nanomedicines are sufficiently differentiated from a clinical perspective and preclinical data should support such potential differentiation, prior to proceeding to expensive clinical testing. An increase in bioavailability, for example, is often an insufficient driver for clinical development.

Over the last two decades, we have designed a large variety of self assembling polymers [4-6] and peptides [7,8] and used these to develop nanomedicines, which may be administered via the intravenous [7-9] oral [10-12] and intranasal [13] routes. Some of these preclinical stage nanomedicines have already demonstrated that they are well differentiated in a manner that is relevant to their clinical use. These nanomedicines show advantageous alterations in drug biodistribution and additional studies have illuminated some interesting mechanisms [7,12,14]. These nanomedicines will be discussed in the talk. Additionally diagnostic platforms are now being investigated within our laboratory [15].

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Back to Programme