Image-guided drug delivery

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Nanomedicines are 1-100(0) nm-sized carrier materials designed to improve the biodistribution of low-molecular-weight (chemo-) therapeutic agents. By delivering drug molecules more efficiently to pathological sites, and by preventing them from accumulating in potentially endangered healthy tissues, nanomedicines are able to improve the balance between efficacy and toxicity. Nanomedicines rely on the Enhanced Permeability and Retention (EPR) effect, which is notoriously known to be highly variable, both in animal models and in patients. To overcome this high variability, we are working on strategies to modulate the EPR effect, to bypass EPR via vascular targeting or intravascular release, and to image EPR-mediated drug targeting to tumors and metastases. In the present lecture, several of these approaches will highlighted, with a particular focus on the use of theranostic nanomedicine formulations for individualizing and improving chemotherapeutic treatments.

References:

[1] Lammers et al, J Control Rel 161, 175-187 (2012)
[2] Lammers et al, Clin Cancer Res 18, 4889-4894 (2012).
[3] Kunjachan et al, Chem Rev (in press)