Designer therapeutic and diagnostic tools: From cancer to chemical weapons

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Magnetic resonance imaging (MRI) is a powerful non-invasive technique which becomes considerably more potent when contrast agents (CAs) are introduced. Molecular contrast agents based on Gd-chelates (e.g. Dotarem®) are regularly used in the clinic, however these usually lack specificity for selective disease or biomarker diagnostics, and can also suffer from poor signal-to-noise and blood circulation half-life, which can limit their clinical utility. Carefully designed contrast agents, and contrast agents based on nanomaterials have the potential to overcome these issues. In this talk, I will introduce our approaches to the careful design and development of MRI contrast agents tuned for different applications.