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Image-Guided Drug Delivery Developments in Cancer

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Rapid advancement in cancer imaging is giving the phrase “seek and destroy” new meaning in the discovery and treatment of cancer. Hybridization of imaging technologies provides high-resolution visualization of cancer needed to direct tissue-ablating ultrasound or to guide localized catheter deposition of chemotherapeutic release matrices. The use of Nanomedicine probes, envisioned for almost two decades, have now begun to reach the clinic, promising sensitive image-based detection, characterization and quantification of cancer in combination with delivering classic chemotherapeutics or newer DNA and RNA-based treatments. Collectively, these novel image-guided drug delivery approaches present a unique opportunity to personalize and focus cancer management strategies toward improved clinical outcomes with reduced morbidity. While the path from bench to patient is challenging, the vision of what can be achieved is evolving in animal models and patients alike. In a world economy in which human and economic resources are increasingly precious and pharmaceutical development risk remains high, image-guided drug delivery presents an unprecedented opportunity for academic, government, and private sectors to collaborate and to accelerate the clinical translation pace of these high impact technologies.