MOLECULAR IMAGING OF CANCER FOR PRECISION MEDICINE

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Significance
Noninvasive multimodality molecular and functional imaging technologies are at the core of precision medicine because of their potential ability to make transformative advances in cancer and pre-cancer subtyping and in precision image-guided therapy of cancer.

Theranostic imaging is a rapidly expanding aspect of molecular imaging that is creating exciting new possibilities for personalized precision medicine in cancer by combining diagnosis with therapy. Molecular imaging can be applied to identify targets specific to cancer with imaging, design agents against targets and visualize their delivery, monitor response to treatment, and minimize collateral damage to normal tissue.

Multiple therapeutic and molecular imaging projects in our Department have the potential to achieve precision medicine of different aspects of the tumor ecosystem including cancer cells, stromal cells, and immune cells. Here we have presented some representative examples of molecular imaging of cancer for precision medicine.

Projects
- Project 1: Theranostic imaging of PSMA (prostate specific membrane antigen).
- Project 2: Phototheranostics of CD44-positive cells.
- Project 3: Molecular imaging of cancer cachexia.
- Project 4: Non invasive imaging of CXCR4, a receptor involved in invasion and metastasis.
- Project 5: Click chemistry to achieve target-specific image-guided treatment.
- Project 6: Non invasive imaging of PD-1, a check-point molecule, whose inhibition unleashes the immune system against cancers.
- Project 7: Multiparametric MRI and MRSI to detect and characterize prostate cancer.
- Project 8: Application of multiparametric, (23)Na sodium MRI, and multimodality PET/CT/MRI imaging to monitor chemotherapy.
- Project 9: Improving early detection of ovarian cancer using MRI.

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