

## AbstractID: 11889 Title: Imaging as a Biomarker

There is an increasing trend towards more individualized, targeted cancer therapy. This places new demands for tools to help guide treatment selection and evaluate early response to the selected therapy. While cancer treatment selection has traditionally depended on tissue-based biomarkers, functional and molecular imaging can play an important and complementary role in directing targeted cancer therapy and monitoring early response. Imaging has several capabilities distinct from tissue sampling and assay, including the ability to measure the heterogeneity of target expression and to characterize in vivo pharmacodynamics. The use of molecular imaging to direct cancer therapy departs from the traditional role of cancer imaging to detect and localize cancer sites. This implies an expansion of the scope of cancer imaging from detection methods that rely on features such as aberrant glycolysis that are present in tumors but not in normal tissues, to a broader approach using imaging to quantify in vivo phenotype. In the latter case, the absence of a particular tumor feature, such as a target receptor, may be as important as its presence. The need to simultaneously localize and characterize tumor sites places an emphasis on multi-modality imaging such as PET/CT or multiple PET images using combinations of different imaging probes. This talk will review applications of molecular imaging to targeted cancer therapy for clinical trials and clinical practice, focusing mostly on PET. Examples using molecular imaging to (1) predict tumor clinical behavior, (2) identify therapeutic targets, (3) predict therapeutic resistance, and (4) evaluate early response to therapy will be shown. The theme of the presentation will be that quantitative in vivo measures of tumor phenotype using imaging are complementary to in vitro assay in directing targeted, individualized cancer therapy.

### Learning Objectives:

1. Describe ways in which molecular imaging can help direct cancer therapy.
2. Discuss the complementary role of in vitro assay and in vivo imaging in measuring cancer phenotype.
3. List examples of how imaging can be used to help direct cancer therapy.