EL5. Metabolic Imaging in Oncology

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Disease is not viewed in terms of structure, but as process. Cancer is often associated with varied clinical manifestations, and its diagnosis can be easily made by fine needle aspiration or core biopsy. CT and MRI fail to provide prognostic tumor grade and content, and also cannot reliably differentiate cancer from post-therapy changes. Positron emission tomography (PET) as a probe of *in vivo* chemistry makes it possible to view cancer by measuring tumor utilization of various subtrates which supply energy or nucleotides and also by providing pharmacokinetic data of radiolabeled drugs. PET using F-18 FDG has shown the potential to detect various cancers. Differentiation of tumors and posttreatment changes has been possible by using F-18 FDG or C-11 methionine. The most important and unique application of PET seems in predicting response and tailoring treatment by measuring tumor uptake of radiolabeled drugs. F-18 estradiol or tamoxifen uptake makes it possible to determine proper treatment of breast cancer on the basis of functioning estrogen receptors. Proton MR spectroscopy (MRS) has shown decreased N-acetylaspartate (NAA) concentration in brain tumors and increased choline in brain or prostate cancers. Many tumors produce increased lactate due to anaerobic glycolysis which is a sensitive indicator of the malignant degree. Phosphorus MRS evaluates bioenergies and membrane metabolites, reflecting viability and proliferation of tumor cells. Advances in PET and MRS provides the physiologic view of tumor biology, which no other method can provide and they may also offer many research opportunities to explore in the field of oncology.