Response to therapy in breast cancer.

Increasing numbers of patients with newly diagnosed breast cancer receive primary systemic therapy followed by surgery. Histopathology provides an accurate assessment of treatment efficacy on the basis of the extent of residual tumor and regressive changes within tumor tissue. However, only approximately 20% of breast cancer patients achieve a pathologic complete response, a fact that necessitates methods for monitoring therapeutic effectiveness early during therapy. (18)F-FDG PET and (18)F-FDG PET/CT provide essential information regarding a response to primary chemotherapy. Patients with low tumor metabolic activity on pretreatment (18)F-FDG PET are not likely to achieve a histopathologic response. The degree of changes in (18)F-FDG uptake after the initiation of therapy is correlated with the histopathologic response after the completion of therapy. Thus, tumor metabolic changes assessed early during therapy predict therapeutic effectiveness in individual patients. Early identification of ineffective therapy also might be helpful in patients with metastatic breast cancer because many palliative treatment options are available. Changes in metabolic activity generally occur earlier than changes in tumor size, which is the current standard for the assessment of a response. Although treatment stratification based on a metabolic response is an exciting potential application of PET, specific PET response assessment criteria still need to be developed and validated on the basis of patient outcomes before changes in treatment regimens.
can be implemented. There is increasing clinical evidence for metastatic breast cancer and other tumors that (18)F-FDG PET/CT is the most accurate imaging procedure for assessment of the response at the end of treatment when both CT information and tumor metabolic activity are considered. Importantly, in the setting of primary chemotherapy, neither PET/CT nor conventional imaging procedures can assess the extent of residual breast cancer as accurately as histopathology. Observation of changes in tumor blood flow or tumor cell proliferation is an additional encouraging approach for predicting a response. Ultimately, the prediction of therapeutic effectiveness by PET and PET/CT could help to individualize treatment and to avoid ineffective chemotherapies, with their associated toxicities.