PET imaging with the glucose analog $^{18}$F-fluorodeoxyglucose (FDG-PET) has been evaluated in numerous studies to monitor tumor response in patients undergoing radio and radiochemotherapy. In lung, esophageal and cervical cancer tumor FDG uptake after therapy or treatment induced changes in tumor FDG uptake have been shown to correlate with histopathologic response and patient survival. However, studies have also shown that FDG PET cannot differentiate between patients with microscopic residual disease and histopathologic complete response. Thus patients with a negative PET scan after completion of therapy cannot be considered as locally cured. There are also reports that radiation induced inflammation causes intense FDG uptake and limits the usefulness of FDG-PET for assessing tumor response to radiotherapy. The time course of radiation induced inflammation and its relationship to FDG uptake need, however, further study, as other studies have shown only minimally increased FDG uptake of normal tissues following radiotherapy. Several studies have suggested that changes in tumor FDG uptake may allow prediction of tumor response and patient outcome early in the course of therapy. When FDG-PET is performed early in the course of radiotherapy, tumor FDG uptake may also be less confounded by radiation induced inflammation.

PET imaging provides several new approaches to assess tumor response to therapy. By identifying responding tumors earlier and more accurately than standard morphologic imaging techniques, PET imaging has the potential to personalize radio(chemo)therapy according to the individual chemo- and radiosensitivity of the tumor tissue.