To review the current status and clinical effect of PET-MRI image fusion in the staging of head-and-neck cancer and to show its implications for imaging with future hybrid PET/MRI scanners. We reviewed the current literature in order to provide an overview of the potential of the combination of the anatomic and functional imaging capabilities of magnetic resonance imaging (MRI) and of the potential for molecular and metabolic imaging with Positron emission tomography (PET). The research question was whether these image devices might be of synergistic value. PET with [18F]-fluorodeoxyglucose has shown promising results for the assessment of lymph node involvement in cancer, the identification of distant metastasis and synchronous and metachronous tumors, and the evaluation of tumor recurrence or carcinoma of an unknown primary. For morphologic imaging, MRI has several advantages compared with computed tomography in the head-and-neck area. This is mainly because of the superior soft tissue contrast and fewer artifacts from dental implants. Moreover, MRI allows functional imaging, such as the assessment of perfusion with dynamic contrast-enhanced MRI. The published data indicate that image fusion should be beneficial in the case of the recurrence of oromaxillofacial cancer and in the evaluation of potential metastatic lymph nodes. However, retrospective image fusion
is technically demanding in the head-and-neck area, mainly because of the varied patient positions used for the various scanners and the anatomic complexity of this region. Combined PET/MRI scanners might overcome the above-named problems. Both sequential and fully integrated PET/MRI scanners are now available in selected departments, and future studies will show whether hybrid PET/MRI is of greater clinical value than PET/CT and retrospective image fusion techniques.