0.0.1 Introduction

Head and neck squamous cell carcinoma (HNSCC) spread through the lymphatic system of the neck and form metastases in regional lymph nodes. Therefore, the target volume in radiotherapy of HNSCC patients includes, in addition to the primary tumor, parts of the lymph drainage volume [1], [2]. The nodal gross tumor volume nodal gross tumor volume (GTV-N) contains detectable macroscopic lymph node metastases, while the elective clinical target volume elective clinical target volume (CTV-N) contains parts of lymph drainage volume that is at risk of harboring microscopic tumor, i.e. occult metastases that are not yet visible with current imaging techniques.

GTV-N definition is primarily performed through imaging techniques (positron emission tomography (PET)-computed tomography (CT)/magnetic resonance imaging (MRI), MRI or CT) as well as fine needle punctures (fine needle aspiration (FNA)). Imaging criteria for lymph node metastases include size, round rather than oval shape, central necrosis, and FDG uptake as summarized by Biau et al [1]. Goel et al. gives an overview over clinical practice in PET/CT for the management of HNSCC [3]. However, all imaging techniques have finite sensitivity and specificity [4], [5], [6], i.e. they fail to detect small metastases or may incorrectly identify suspicious lymph nodes as tumor.