

SUMMARY

Positron emission tomography (PET) is a modern non-invasive imaging modality that is increasingly used for staging and follow-up of patients with cancer. The most common tracer used in clinical PET is ¹⁸Fluorine-fluorodeoxyglucose (FDG). FDG is a marker of glycolysis, which is enhanced in tumors compared to normal tissue.

Limited information is available on the use of PET in paediatric oncology. Childhood cancers have a high metastatic potential. Accurate staging is crucial for treatment planning; outcomes are poor when disease is advanced. In this study the efficacy of PET imaging in staging of children and adolescents with lymphoma and alveolar rhabdomyosarcoma (ARMS) was prospectively assessed and compared with conventional staging methods (CSMs).

Over a period of 9 years 125 children and adolescents with lymphoma and ARMS (median age 14 years, range 4–18 years) were recruited into the study. They underwent 131 FDG-PET studies using a dedicated whole-body PET scanner as a part of their initial staging work-up. Diagnostic efficacy was retrospectively determined on the basis of the reference standard comprising histopathology findings or clinical and radiological follow-up (>6 months). The impact of PET results on each patient's staging and therapy plan were determined.

In 38 % of children (50/131) PET detected additional disease sites not seen on CSM and/or identified absence of disease in some sites suspected to be involved. According to the PET scans, the staging correctly changed in 18 % of cases (24/131), leading to an upstaging of 22 patients and a downstaging of 2 patients. Only four out of 131 cases (3 %) were not accurately staged by PET.

Sensitivity for PET and CSM for pre-treatment staging was 97 % and 81 % ($p=0.0001$), specificity 94 % and 88 %, and accuracy 97 % and 82 %, respectively. Related to FDG-PET results the planned therapeutic approach was modified in 14 % of children (18/131).

FDG-PET is an efficient method for initial staging of children with lymphoma and ARMS. FDG-PET in combination with lung CT should be recommended as a screening method prior to other conventional used imaging modalities to plan a rational staging protocol.