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PET/CT in pediatric oncology.

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Abstract

Radionuclide functional imaging has become a central part of pediatric oncological practice. There have been a number of major advances in imaging technology in recent years, but multislice CT with PET is the modality generating most interest in cancer imaging. In this review, we discuss the common uses and specific issues with regard to PET-CT imaging in pediatric practice. Brain tumors form a significant percentage of pediatric oncology. Use of FDG-PET in brain tumors has helped distinguish viable, residual, or recurrent tumor from post-therapeutic changes and necrosis. High-grade tumors show high uptake of FDG at diagnosis. FDG-PET results may also not accurately correlate with tumor progression after intensive radiation therapy. FDG-PET has been applied to accurate biopsy of infiltrative tumors, tumor grading, and prognostication. Limited available data also suggest that FDG-PET findings correlate well with histopathology and clinical outcome in children. FDG uptake is generally greater in higher grade lymphomas than in lower grade lymphomas. FDG-PET reveals disease sites that are not detected by conventional staging methods, resulting in upstaging of disease with potential therapeutic review. FDG-PET is useful for assessing need for marrow biopsy, residual or recurrent soft tissue masses seen on CT after therapy. The primary role of FDG-PET in neuroblastoma is in non-MIBG concentrating tumors. [11C]-Hydroxyephedrine ([11C]-HED), an analogue of norepinephrine, and [11C]-epinephrine PET have also been used in evaluating neuroblastoma. Uptake of these tracers is demonstrated within minutes after tracer administration, an advantage over MIBG imaging. The exact roles of FDG-PET in osteosarcoma and Ewing's sarcoma are not definitive. FDG-PET may play an important role in monitoring response to therapy Another diagnostic role may be in assessing patients with suspected metastatic disease.

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