Role of Positron Emission Tomography/Computed Tomography (PET /CT) in assessment of pediatric lymphoma

ESSAY

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3D	Three Dimensional
18FDG	18F- FluoroDeoxyGlucose
AC	Attenuation Corrected.
AC/AL	Attenuation correction/Alignment
BTV	Biological Target Volume
Cm	Centimeter
CT	Computed Tomography
CTV	Clinical Tumor Volume
CNS	Central nervous system
CSF	Cerebrospinal fluid
DVD	Digital video disk
EBV	Ebstein bar virus
FDG	Fluoro-Deoxy-D-Glucose
FNA	Fine Needle Aspiration
GCS-F	Granulocyte Colony Stimulating Factor
GLUT	Glucose Transporter
GTV	Gross Tumor Volume
HD	Hodgkin Disease
HRS	Hodgkin-Reed-Sternberg
IMRT	Intensity Modulated Radiotherapy
IWC	International Workshop Criteria.
KeV	Killo electron Volt
KV	Killo Volt
LCLs	Large cell lymphoma

LOR	Line Of Response
MA	Milli Ampere
MAS	Milli Ampere Second
MCi	Micro Curies
MeV	Mega electron Volt
MRI	Magnetic Resonance Imaging
NAC	Non Attenuation Corrected
NCI	National cancer Institute
NHL	Non Hodgkin lymphoma
NLPHD	Nodular lymphocyte predominant Hodgkin disease
OS	Overall Survival
PD	Progressive Disease
PET/CT	Combined Positron Emission Tomography And Computed Tomography
PET	Positron Emission Tomography
PFS	Progression Free Survival
PR	Partial Remission
PTV	Planned Target Volume
RTP	Radiotherapy Planning
SNCCLs	Small non cleaved Cell lymphoma.
SD	Stable Disease
SPD	Sum Of The Products Of The Greatest Diameters
SUV	Standardized Uptake Value
WHO	World Health Organization

ß+	Positron
ß-	Electron

INTRODUCTION

Lymphomas account for 10%-15% of all childhood cancers & are third in frequency after acute leukemia and brain tumors. It includes number of different pathologic subtypes, which arise from the constituent cells of the immune system or from their precursors. Two types of lymphomas include: Hodgkin's disease (HD) & non-Hodgkin's lymphoma (NHL) ***(Pastore et al, 2001)***.

Four histologic subtypes of HD in children are described: lymphocytic predominance, mixed cellularity, lymphocytic depletion and nodular sclerosis. Nodular sclerosis is the most common subtype, affecting about 60% of children. The most common subtype of NHL is Burkitt lymphoma (with the jaw and abdomen as the most common involved sites) ***(Magrathl, 2002)***.

HD is a nodal disease that affects lymph nodes while in NHL, the clinical presentation is much more often extranodal, the most frequently involved sites being intra-abdominal and intra-thoracic ***(Hudson, 2002)***.

Fortunately, HD and NHL are among the few malignancies that are potentially curable with current existing treatment modalities, even in advanced or recurrent disease. Accurate staging, early therapy monitoring and post treatment evaluation of lymphomas are important for optimum management of these patients ***(Rodriguez-Vigil et al, 2006)***.

Once the diagnosis of lymphoma is made, the extent and sites of disease must be determined to assess the prognosis and to plan therapy. Many conventional diagnostic imaging modalities were performed including: X-ray ,Ultrasonography (U/S),Computed Tomography(CT), Magnetic Resonance (MR) imaging, Technetium 99m bone scan for skeletal metastasis and Gallium 67 scanning for whole-body screening; however these modalities have limitations and results in a reduced sensitivity of lesion detection. Positron Emission Tomography (PET) offers a different approach in diagnosis of lymphoma ***(Lavely et al, 2003)***.

In patients with lymphoma, the size of the mass is only somewhat indicative of the number of viable tumor cells, especially after therapy. Metabolic imaging with FDG PET provides a more reliable measure of cancer burden, as the intensity of uptake reflects the number of viable cancer cells. Accordingly, in the past few years, the clinical applications of PET and PET/CT for lymphoma have evolved from staging to response assessment and now to response-adapted therapy ***(Kasamon et al., 2007).***

Positron emission tomography (PET) with 2-[fluorine-18] fluoro-2-deoxy-D-glucose (FDG) is increasingly being used in the evaluation of pediatric oncology patients. However, the normal distribution of ^{18}F FDG uptake in children is unique and may differ from that in adults. A number of physiologic variants are