



شبكة المعلومات الجامعية
التوثيق الإلكتروني والميكرو فيلم

بسم الله الرحمن الرحيم



HANAA ALY



شبكة المعلومات الجامعية
التوثيق الإلكتروني والميكرو فيلم



شبكة المعلومات الجامعية التوثيق الإلكتروني والميكرو فيلم



HANAA ALY



شبكة المعلومات الجامعية
التوثيق الإلكتروني والميكروفيلم

جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات



يجب أن

تحفظ هذه الأقراص المدمجة بعيدا عن الغبار



HANAA ALY



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

Essay

*Submitted for partial fulfillment of Master Degree
In Radiodiagnosis*

By

Ahmed Mahmoud Maher Taha

M.B.B. Ch.

Under The Supervision Of

Prof. Dr. Khaled Talaat

Professor of Radio diagnosis

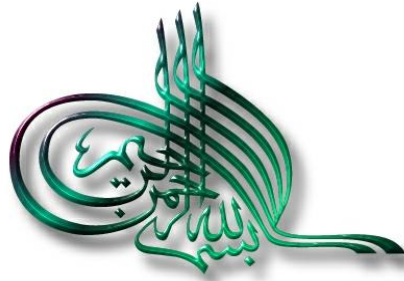
Faculty of Medicine, Ain Shams University

Dr. Mohamed Sobhi Hassan

Lecturer of Radiodiagnosis

Faculty of Medicine, Ain Shams University

**Faculty of Medicine
Ain Shams University
2015**



وَقُلْ اَعْمَلُوا فَسَيَرَى اللَّهُ
عَمَلَكُمْ وَرَسُولُهُ وَالْمُؤْمِنُونَ



سورة التوبة رقم الآية ١٠٥



*First of all I thank **God** who blessed me in all my steps.*

*I would like to express my deepest appreciation and respect to **Prof. Dr., Khaled Talaat** Professor of Radio diagnosis, Faculty of Medicine-Ain Shams University for her priceless effort, generous guidance and patience.*

*I am grateful to **Dr., Mohamed Sobhi Hassan** Lecturer of Radio diagnosis, Faculty of medicine-Ain Shams University for his help.*

I would like to thank my precious family, friends and colleagues for believing in me and their continuous support.



Ahmed Taha

List of Contents

Chapter	Page
Introduction & Aim of the work	1
Anatomy of lymphatic system	3
Pathology of Lymphoma	26
Technique of PET/CT	60
Manifestations of PET/CT in pediatric lymphoma.	89
Summary & Conclusion	115
References.	117
Arabic Summary	١

List of Abbreviations

ABBREVIATION	NAME
ALCL	Anaplastic large cell lymphoma
ALL	Acute Lymphoblastic Lymphoma
AML	Acute myeloid leukemia
BL	Burkitt lymphoma
BM	Bone marrow
BMB	BM biopsy
CD	Cluster of differentiation
CIMs	Conventional imaging modalities
CNS	Central nervous system
COPP	Cyclophosphamide, vincristine, procarbazine and prednisolone
CT	Computed tomography
DLBCL	Diffuse large B-cell lymphoma
EBV	Epstein-Barr Virus
EIA	External iliac arteries
ESR	Erythrocyte sedimentation rate
FDG	¹⁸ F-2-deoxy-d-glucose
Ga 67	Gallium-67
HD	Hodgkin's disease
HIV	Human immunodeficiency virus
HL	Hodgkin lymphoma
HTLV-1	Human T Leukemia Virus I
IFRT	Involved field radiation therapy
IIA	Internal iliac artery
IJV	Internal jugular vein
IMA	Inferior mesenteric artery

LDH	Lactate dehydrogenase
LBL	Lymphoblastic lymphoma
LMP-1	Latent membrane protein-1
MRI	Magnetic resonance imaging
NHL	Non-Hodgkin lymphoma
NPV	Negative predictive value
OEPA	Vincristine, etoposide, prednisolone and adriamycin
PET	Positron emission tomography
PHL	Pediatric Hodgkin's lymphoma
PL	Pediatric lymphoma
PNHL	Pediatric non-Hodgkin's lymphomas
PPV	Positive predictive value
SMA	Superior mesenteric artery
SUV	Standardized uptake value
WHO	World Health Organization

List of Figures

Figure	Title	Page
- Chapter 2 “Anatomy of lymphatic system ”		
1	Structure of lymph node	6
2	Anatomy of thoracic duct	8
3	Lymphatic drainage of the scalp	9
4	Lymphatic system in the neck	12
5	Lymph nodes and vessels in the axilla	14
6	Lymphatic drainage of the lower limb	16
7	Lymphatic drainage of the abdominal portion of the gastrointestinal tract	18
8	Pelvic lymphatics	20
9	Lymphatic drainage of the perineum	20
10	Lymphatic drainage of the thoracic wall	22
11	Lymphatic drainage of lungs	24
12	Lymphatic drainage of the breast	25
- Chapter 2 “ Pathology of Lymphoma”		
13	Origin of lymphoid neoplasms. Stages of B- & T-cell differentiation from which lymphoid tumors emerge	35
14	Burkitt lymphoma	38
15	Acute lymphoblastic leukemia/lymphoma.	40
16	Anaplastic large-cell lymphoma	44
17	Diffuse large B-cell lymphoma	45
18	Diffuse large B-cell lymphoma involving the spleen	47
19	Hodgkin's lymphoma, mixed cellularity, showing multinucleated Reed-Sternberg cells in a background of cells that include lymphocytes, plasma cells, eosinophils, histiocytes, and mononuclear Reed-Sternberg cells (B) Hodgkin's lymphoma. High magnification of a classical Reed-Sternberg cell with two nuclei containing the typical large nucleoli	48

20	Proposed signals mediating “cross-talk” between Reed-Sternberg cells and surrounding normal cells in classical forms of Hodgkin lymphoma	50
21	Pathogenetic mechanisms leading to the histologic features of Hodgkin's lymphoma	51
22	Reed-Sternberg cells and variants	53
23	Hodgkin lymphoma, nodular sclerosis type	57
- Chapter 3 “ Technique of FDG PET CT ”		
24	Uptake of FDG	63
25	Annihilation reaction	65
26	Production of F-18	66
27	A typical PET/CT scanner	67
28	A typical commercial block detector (8 x 8) attached to four square PM tubes (bottom) and a packaged module	67
29	Typical scout image obtained during an FDG PET–CT study	72
30	Photograph (side view) of a hybrid PET-CT scanner shows the PET (P) and CT (C) components	73
31	Typical imaging protocol for combined PET/CT	74
32	Display screen of the syngo software platform shows fused PET-CT images in the sagittal, coronal, and axial planes of a patient with recurrent esophageal carcinoma	76
33	Normal distribution of FDG.	82
34	Physiologic diaphragmatic uptake in a 49-year-old woman with a history of abdominal lymphoma and severe chronic obstructive pulmonary disease who was referred for post-therapy follow-up	82
35	Physiologic bowel uptake in a 36-year-old man with malignant thymoma who had undergone surgical tumor resection	83
36	Metal ring on left breast of patient produces streaking artifacts and high CT numbers	86