The Role of Positron Emission Tomography/ Computed Tomography (PET/CT) in assessment of therapeutic response in Non-Hodgkin lymphoma

Thesis

Submitted for partial fulfilment of Master degree in **Radiodiagnosis**

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بسم الله الرحمن الرحيم

قالوا

سبحانك لا علم لنا إلا ما علمتنا إنك أنت العليم الحكيم

صدق الله العظيم

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Hussein Ali Fadhil

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List of Abbreviations

Abbrev.		Full-term
AC/AL	**:**	Attenuation correction/Alignment
ACFs	**:**	Attenuation correction factors
AIDS	**:**	Acquired immunodeficiency syndrome
ALP	**:**	Alkaline phosphatase
BG	**:**	Blood glucose
BGO	**:**	Bismuth Germinate
CBC	**:**	Complete blood picture
CECT	**:**	Contrast enhanced computed tomography
CNS	**:**	Central nervous system
CR	**:**	Complete Response
CRu	**:**	Unconfirmed complete response
CRu	**:**	Unconfirmed complete response
CT	**:**	Computed Tomography
DLBCL	**:**	Diffuse large B-cell lymphoma
ENL	**:**	Extranodal lymphoma
ESR	**:**	Erythrocyte sedimentation rate
F 18	**:**	Fluorine 18
FDG	**:**	FluoroDeoxyGlucose
FL	**:**	Follicular lymphoma
GI	**:**	Gastrointestinal tract
GLUT	**:**	Glucose Transporters
GSO	**:**	Gadolinium Silicate
GTD	**:**	Greatest transverse diameter
GU	**:**	Genitourinary tract
H+	**:**	Hydrogen ion
H2 (F-18)	**:**	Hydrogen fluoride
HD	**:**	Hodgkin disease
HIV	**:**	Human immunodeficiency virus
HL	**:**	Hodgkin lymphoma
ICML	**:**	International Conference on Malignant Lymphomas
IFRT	**:**	Involved field radiotherapy
IHP	**:**	International harmonization project
IPFP	**:**	International prognostic factors project
IV	**:**	Intravenous

IWC	**:**	International Workshop Criteria
IWG	**:**	International Workshop Criteria
KeV	**:**	Kilo electron Volt
KV	**:**	Kilo Volt
LDH	**:**	Lactate dehydrogenase
LSO	**:**	Lutetium Oxyorthosilicate
MALT	**:**	Mucosa-associated lymphoid tissue
MBq	**:**	Mega Becquerel
MCL	**:**	Mantle cell lymphoma
MeV	**:**	Mega electron Volt
MRI	**:**	Magnetic Resonance Imaging
MTB	**:**	Metabolic tumor burden
MTV	**:**	Metabolic tumor volume
MZL	**:**	Marginal zone lymphoma
N	**:**	Neutron,
n.sec	**:**	Nano second
NaI	**:**	Sodium Iodide
NED	**:**	No evidence of disease
NHL	**:**	Non Hodgkin lymphoma
NK/T-cell lymphoma	**:**	Natural killer T-cell lymphoma
No.	**:**	Number
NPV	**:**	Negative prodective value
OS	**:**	Overall Survival
P	**:**	Proton
PD	**:**	Progressive disease
PET	**:**	Positron Emission Tomography
PET/CT	**:**	Positron Emission Tomography/ Computed Tomography
PFS	**:**	Progression Free Survival
PPV	**:**	Positive prodective value
PR	**:**	Partial Response
SD	**:**	Stable disease
SLL	**:**	Small-cell lymphocytic lymphoma
SPD	**:**	Sum of the product of the diameters
SPD	**:**	Sum Of The Products Of The Greatest Diameters
ß-	**:**	Electron
ß+	**:**	Positron
SUV	**:**	Standardized uptake value

SUV	**:**	Standardized Uptake Value
SUVavg	**:**	Average Standardized Uptake Value
SUVmax	**:**	Maximum Standardized Uptake Value
US	**:**	Ultrasound
WBC	**:**	White blood cells
WHO	**:**	World Health Organization
Wt	**:**	Weight
XRT	**:**	Radiotherapy
γ	**:**	Photon
μCi	**:**	Micro Curies
μ maps	**:**	Attenuation map
18F-FDG	**:**	18F- FluoroDeoxyGlucose
2D	**:**	Two dimensional
3D	**:**	Three Dimensional
68Ge	**:**	Germanium-68

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ABSTRACT

Background: Lymphoma is the most common primary hematopoietic malignancy,make up of neoplastic diseases of lymphocytes origin broadly divided into Hodgkin disease (HD) and non-Hodgkin's lymphoma (NHL), In the past decade, functional imaging with 18F-FDG PET has been the fastest growing diagnostic modality in oncology, Addition of CT (anatomical imaging) to PET (metabolic imaging) improves specificity and sensitivity, the addition of PET to CT adds sensitivity and specificity in tumor imaging. Thus, PET/CT is a more accurate test than either of its single device components

***Purpose**:* The aim of this work was to evaluate the role the PET/CT in assessment of response to chemotherapy and or radio therapy, follow up and assessment of remissions and relapses in patients with lymphoma, detection of recurrence, Highlighting the advantages obtained by using the two modalities together through a combined PET/CT in-line system than the advantage gained by using each modality alone. In particular, a five-point scale (Deauville criteria) to classify response using PET-CT, which can be adapted for -therapeutic response assessment and comparing the result with (CT) evaluation by IHP (international harmonizing project).

Patient and Methods: Retrospective diagnostic interventional study in Ain shams university hospitals. Study population: Non Hodgkin lymphoma patients receiving therapy.

- **Study tools**: The PET/CT at Ain shams university hospitals.is a general electric discovery brand that will be used in this study, intravenous glucose fluorodeoxyglucose (FDG) dose depending on the protocol of department.after 60 min of 18F-FDG injection MCDT diagnostic nonionic contrast examination for anatomical localization followed by PET images.
- The whole study took approximately 20-30 minutes.
- Sampling Method: convenience non probability sampling By using pass program, setting alfa error at 5%& power at 90%. result from previous studies showed that average sensitivity 95% and specificity 90% based on this the needed sample 20