



PET/CT versus CECT in diagnosis and staging of lymphoma

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diagnosis*

Presented by

Ahmed Salah El-dein Abd El-aliem Fath El bab Nasar

M.B.B.CH.

Faculty of medicine-Ain-shams university

Supervised by

Prof. Dr. Moustafa Mahmoud Gamal El-dein

Professor of Radiology

Radio-diagnosis department

Faculty of medicine-Ain-shams university

Dr. Mohamed Gamal El-dein Abd EL-motaleb

Associate professor of Radiology

Radio-diagnosis Department

Faculty of medicine-Ain-shams university

**Faculty of Medicine
Ain Shams University**

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بكالوريوس الطب و الجراحة
كلية الطب – جامعة عين شمس
تحت اشراف

الأستاذ الدكتور /مستطفى محمود جمال الدين

أستاذ الأشعة التشخيصية
كلية الطب – جامعة عين شمس

الدكتور / محمد جمال الدين عبد المطلب

أستاذ مساعد الأشعة التشخيصية
كلية الطب – جامعة عين شمس

كلية الطب
جامعة عين شمس

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Contents

	Page No
List of Abbreviations	II
List of Figures	III
List of Tables	X
Introduction and aim of the work	1
<u>Review of Literature</u>	
Physics of FDG-PET/CT.	5
Technique of PET/CT and how to interpret.	23
Imaging classification of lymph nodes stations.	50
Lymphoma pathophysiology.	75
PET-CT vs CECT For Baseline Staging Of Lymphoma.	88
Patients and methods.	120
Results and illustrative cases.	124
Discussion.	141
Summary and conclusion.	144
References.	146
Arabic summary.	157

List of Abbreviations

Abbreviation	
PET	Positron emission tomography
ENL	Extra-nodal lymphoma
FDG	Flouro-deoxyglucose
CECT	Contrast enhanced computed tomography
GLUTs	Glucose transporters
PDGF	Platelet derived growth factor
VEGF	Vascular endothelial growth factor
BFGF	Basic fibroblast growth factor
SUV	Standardized uptake value
BAT	Brown adipose tissue
ROIs	Regions of interest
IASLC	International Association for the Study of Lung Cancer
WHO	World Health Organization
DLBCL	Diffuse large B-cell lymphoma
NHL	Non Hodgkin lymphoma
FL	Follicular lymphoma
MALT	Mucosa associated lymphoid tissue
MCL	Mantle cell lymphoma
HD	Hodgkin Disease
HL	Hodgkin lymphoma
TNM	Tumor Node Metastasis
NK	Natural killer
Mev	Milli electron volt
Kev	Kilo electron volt
HU	Housefield unit
mci	millicurie
MZL	Marginal zone lymphoma
IFRT	Involved field radiotherapy
μ map	attenuation map

LIST OF FIGURES

<u>Figure no</u>	<u>content</u>	<u>Page</u>
<u>Fig.1</u>	Photograph of a hybrid PET-CT scanner.	<u>5</u>
<u>Fig.2</u>	Illustrative diagram of combined PET/CT scanner components.	<u>6</u>
<u>Fig.3</u>	imaging protocol for combined PET/CT.	<u>8</u>
<u>Fig.4</u>	Annihilation reaction.	<u>10</u>
<u>Fig.5</u>	Production of F-18.	<u>11</u>
<u>Fig.6</u>	Uptake of FDG.	<u>13</u>
<u>Fig.7</u>	Structure and metabolism of FDG.	<u>14</u>
<u>Fig.8</u>	Transmission scans used PET attenuation correction factors.	<u>16</u>
<u>Fig.9</u>	Linear attenuation co-efficients for bone and muscle.	<u>17</u>
<u>Fig.10</u>	Misregistration artifact.	<u>18</u>
<u>Fig.11</u>	Curvilinear cold artifact.	<u>19</u>
<u>Fig.12</u>	respiratory motion artifact.	<u>19</u>
<u>Fig.13</u>	implantable catheter port artifact.	<u>20</u>
<u>Fig.14</u>	metallic implants artifact.	<u>21</u>

<u>Fig.15</u>	intravenous contrast material artifact.	<u>21</u>
<u>Fig.16</u>	oral contrast material artifact.	<u>22</u>
<u>Fig.17</u>	Effect of exercise on skeletal muscle 18F-FDG uptake.	<u>24</u>
<u>Fig.18</u>	Brown fat 18F-FDG uptake.	<u>27</u>
<u>Fig.19</u>	imaging protocol for PET/CT.	<u>30</u>
<u>Fig.20</u>	imaging protocol for PET/CT.	<u>32</u>
<u>Fig.21</u>	Physiologic FDG uptake in the thymus.	<u>37</u>
<u>Fig.22</u>	Physiologic submandibular uptake.	<u>40</u>
<u>Fig.23</u>	<i>Normal distribution of FDG.</i>	<u>42</u>
<u>Fig.24</u>	<i>FDG-uptake in breast.</i>	<u>44</u>
<u>Fig.25</u>	postsurgical inflammatory FDG uptake.	<u>45</u>
<u>Fig.26</u>	FDG-avid cavitory granulomatous lesion.	<u>46</u>
<u>Fig.27</u>	Talc pleurodesis FDG uptake.	<u>48</u>
<u>Fig.28</u>	Drawing shows anatomy & margins of neck nodal classification.	<u>56</u>
<u>Fig.29</u>	<i>Level I &II nodes of the neck.</i>	<u>57</u>
<u>Fig.30</u>	<i>Level VII nodes of the neck.</i>	<u>57</u>
<u>Fig.31</u>	<i>Level III&Va nodes of the neck.</i>	<u>58</u>

<u>Fig.32</u>	<i>Level IV, Vb & VI nodes of the neck.</i>	<u>58</u>
<u>Fig.33</u>	Illustration shows the IASLC lymph node map.	<u>60</u>
<u>Fig.34</u>	Classification of non-regional thoracic lymph nodes.	<u>63</u>
<u>Fig.35</u>	Method for distinguishing low cervical lymph nodes from superior mediastinal lymph nodes.	<u>63</u>
<u>Fig.36</u>	Stations 3a and 3p of the thoracic lymph nodes.	<u>64</u>
<u>Fig.37</u>	Upper zone: stations 2R, 2L, 3a, 3p, 4R, and 4L of the thoracic lymph nodes.	<u>64</u>
<u>Fig.38</u>	Stations 5 and 6 of the thoracic lymph nodes.	<u>65</u>
<u>Fig.39</u>	Station 7 of thoracic lymph nodes.	<u>65</u>
<u>Fig.40</u>	Lower zone: stations 8 and 9 of thoracic lymph nodes.	<u>66</u>
<u>Fig.41</u>	Stations 10R and 10L of thoracic lymph nodes.	<u>66</u>
<u>Fig.42</u>	Stations 11R and 11L of thoracic lymph nodes.	<u>67</u>
<u>Fig.43</u>	gastro-oesophageal, hepatic artery ,splenic ,gastro-omental ,left gastric ,hepatoduodenal ligament lymph nodes .	<u>70</u>
<u>Fig.44</u>	left gastric, coeliac , diaphragmatic , paraoesophageal, lesser curvature lymph nodes.	<u>70</u>
<u>Fig.45</u>	coeliac ,hepaticartery ,left gastric ,gastroduodenal ,superior mesenteric lymph nodes .	<u>71</u>
<u>Fig.46</u>	right colic , superior mesenteric , middle colic , paracolic , left colic , sigmoid , inferior mesenteric lymph nodes.	<u>71</u>
<u>Fig.47</u>	inter-aortocaval , inguinal , internal iliac , external iliac , pre-caval , common iliac , left para-aortic lymph nodes.	<u>71</u>

<u>Fig.48</u>	left gastric , greater curvature , left inferior phrenic lymph nodes.	<u>72</u>
<u>Fig.49</u>	lesser curvature , hepatic artery , greater curvature , pericolic , middle colic lymph nodes.	<u>72</u>
<u>Fig.50</u>	greater curvature, right gastric , right colic lymph nodes.	<u>72</u>
<u>Fig.51</u>	gastroduodenal , pericolic, superior mesenteric , inter aorto-caval , right gastroepiploic lymph nodes.	<u>72</u>
<u>Fig.52</u>	right gastroepiploic , peri-portal , superior mesenteric , inferior pancreatic lymph nodes.	<u>72</u>
<u>Fig.53</u>	Splenic, periportal , anterior pancreatic , hepatic lymph nodes.	<u>72</u>
<u>Fig.54</u>	coeliac axis , hepato-duodenal , common hepatic lymph nodes.	<u>73</u>
<u>Fig.55</u>	lateral aortic , right gastroepiploic , interaortocaval , pyloric , superior mesenteric lymph nodes.	<u>73</u>
<u>Fig.56</u>	coeliac axis, splenic , greater omental , anterior pancreatico-duodenal , posterior pancreaticoduodenal , inferior pancreatic lymph nodes.	<u>73</u>
<u>Fig.57</u>	renal hilar , retro-aortic , superior mesenteric lymph nodes.	<u>73</u>
<u>Fig.58</u>	lateral aortic , retrocaval, interaortocaval , juxtaintestinal , pericolic , left colic lymph nodes.	<u>73</u>
<u>Fig.59</u>	lateral aortic , retrocaval, lateral caval , pre-aortic , pre-caval lymph nodes.	<u>73</u>
<u>Fig.60</u>	inferior mesenteric , juxta-intestinal , anterior ileocolic , posterior ileocolic lymph nodes.	<u>74</u>
<u>Fig.61</u>	anterior diaphragmatic, gastro-oesophageal , middle diaphragmatic lymph nodes.	<u>74</u>
<u>Fig.62</u>	retrocrural , inferior diaphragmatic , middle colic lymph nodes.	<u>74</u>
<u>Fig.63</u>	Common iliac lymph nodes.	<u>74</u>
<u>Fig.64</u>	External iliac lymph nodes.	<u>74</u>

<u>Fig.65</u>	Internal iliac lymph nodes.	<u>74</u>
<u>Fig.66</u>	Ann arbor lymphoid regions.	<u>83</u>
<u>Fig.67</u>	<i>Diagram showing the Ann Arbor Staging System for HL and NHL.</i>	<u>86</u>
<u>Fig.68</u>	<i>PET scans illustrating the Ann Arbor Staging System for HL and NHL.</i>	<u>87</u>
<u>Fig.69</u>	Diffuse large B-cell lymphoma of the prostate gland.	<u>92</u>
<u>Fig.70</u>	Bone marrow involvement by diffuse large B-cell lymphoma.	<u>92</u>
<u>Fig.71</u>	Bone marrow involvement by Hodgkin disease.	<u>92</u>
<u>Fig.72</u>	Mantle cell lymphoma.	<u>95</u>
<u>Fig.73</u>	large B-cell lymphoma involving spleen.	<u>100</u>
<u>Fig.74</u>	Splenic involvement by NHL.	<u>100</u>
<u>Fig.75</u>	NHL with lymphomatous mass in region of liver.	<u>101</u>
<u>Fig.76</u>	peritoneal lymphomatosis.	<u>101</u>
<u>Fig.77</u>	Lymphoma involving the gallbladder.	<u>102</u>
<u>Fig.78</u>	large B-cell lymphoma involving pancreas.	<u>103</u>
<u>Fig.79</u>	Gastric lymphoma.	<u>104</u>
<u>Fig.80</u>	Intestinal lymphoma.	<u>105</u>
<u>Fig.81</u>	Esophageal MALT lymphoma.	<u>106</u>

<u>Fig.82</u>	head and neck lymphoma with primary diffuse large B-cell carcinoma of the nasopharynx.	<u>107</u>
<u>Fig.83</u>	Primary follicular lymphoma of the parotid and submandibular glands.	<u>108</u>
<u>Fig.84</u>	Lymphoma involving the nervous system.	<u>109</u>
<u>Fig.85</u>	NHL with involvement of the nerve sheet (neurolymphomatosis).	<u>109</u>
<u>Fig.86</u>	NHL with lung and mediastinal involvement.	<u>110</u>
<u>Fig.87</u>	Lymphoma involving the pleura.	<u>111</u>
<u>Fig.88</u>	Burkitt's lymphoma involving the breast .	<u>112</u>
<u>Fig.89</u>	Burkitt's lymphoma involving the cervix.	<u>113</u>
<u>Fig.90</u>	NHL involving retroperitoneal nodes, spermatic cord, and testis.	<u>113</u>
<u>Fig.91</u>	Peri-pelvic follicular lymphoma of kidney.	<u>114</u>
<u>Fig.92</u>	large B-cell lymphoma involving kidneys.	<u>114</u>
<u>Fig.93</u>	NHL involving retroperitoneal lymph nodes with invasion of left kidney.	<u>115</u>
<u>Fig.94</u>	NHL and extranodal involvement of skeleton and adrenal glands.	<u>115</u>
<u>Fig.95</u>	Primary cutaneous T-cell lymphoma.	<u>116</u>
<u>Fig.96</u>	Diffuse reactive bone marrow activity after CTH.	<u>117</u>
<u>Fig.97</u>	False-positive impression of diffuse BM involvement after treatment by CTH.	<u>119</u>

<u>Fig.98</u>	Pie chart showing age of the patients	<u>125</u>
<u>Fig.99</u>	Pie chart showing histological type of the patients	<u>125</u>
<u>Fig.100</u>	Pie chart showing gender of the patients	<u>125</u>
<u>Fig.101</u>	Bar chart showing how PET-CT affects initial staging of the patients	<u>126</u>
<u>Fig.102</u>	Bar chart showing role of CT vs PET-CT in initial staging of lymphoma.	<u>128</u>

LIST OF TABLES

<u>TABLE</u> <u>No.</u>	<u>CONTENT</u>	<u>PAGE</u> <u>No.</u>
<u>1</u>	Proposed Standard Patient Preparation Protocol for FDG PET and PET-CT.	<u>28</u>
<u>2</u>	comparison between the TNM atlas terminology and the Robbins classification of the L.Ns of the neck.	<u>51</u>
<u>3</u>	Robbins classification for head and neck L.Ns.	<u>52</u>
<u>4</u>	Imaging based nodal classification of the head and neck.	<u>55</u>
<u>5</u>	Nodal stations and zones in the IASLC lymph node map.	<u>60</u>
<u>6</u>	Normal nodal size according to the anatomical regions in abdomen and pelvis.	<u>70</u>
<u>7</u>	Clinical differences between HD and NHLs	<u>84</u>
<u>8</u>	FDG uptake in various histologic subtypes of NHL and HL.	<u>96</u>
<u>9</u>	Performance of CT & PET-CT for detection of affected sites	<u>128</u>
<u>10</u>	No of sites involved at staging detected by PET-CT	<u>129</u>
<u>11</u>	No of sites involved at staging detected by CECT	<u>131</u>

Introduction

Lymphoma comprises a histologically heterogeneous group of cancers derived from the cells of the immune system. The hallmark of the disease is the enlargement and proliferation of lymph nodes or secondary lymphoid tissues. Although rare, both NHL and Hodgkin disease may arise from or involve almost any organ of the human body. **(Paes et al, 2010).**

Lymphoma is generally divided into two groups: Hodgkin's disease (HD) and an inhomogeneous group of conditions called non-Hodgkin's lymphoma (NHL). HD tends to involve a single nodal group and spread in a fixed pattern along the lymphatic chain, with infrequent extra lymph node involvement. NHL is a multifocal disease which often presents late with disseminated extranodal spread **(Drake et al, 2007)**

The extra nodal involvements are compromising in approximately 40% of patients. The term extra-nodal involvement refers to lymphomatous infiltration of anatomic sites other than the lymph nodes. **(Paes et al, 2010).**

It is due to regional spread of nodal disease or hematogenous dissemination. In decreasing order of frequency, the spleen, liver, gastrointestinal tract, pancreas, abdominal wall, genitourinary tract, Waldeyer ring, central nervous system, lung, bone, skin, adrenal, peritoneal cavity and biliary tract are involved **(Lee et al, 2008).**

Differentiation between disseminated lymph nodal disease involving an extranodal site and primary extranodal disease is challenging. Primary extranodal disease usually presents at an early stage; up to 74% in stage II. **(Paes et al, 2010).**

Lymphomas are very sensitive to chemotherapy and radiotherapy. Recent developments in treatment have improved the outcome markedly and are cost-effective. Most patients with Hodgkin's disease (HD) or non-Hodgkin's lymphoma (NHL) can be treated successfully with curative intent. **(Strobel et al, 2007).**

Accurate staging is critical for identifying patients with early-stage (stage I or II) lymphoma, which is treated with involved-field radiation therapy. PET/CT may be of particular value prior to therapy in patients with early-stage lymphoma. Chemotherapy is performed in patients with more advanced stage disease (stage III or IV) **(Okada et al, 2010).**

Thus accurate staging is the basis for the selection of an appropriate therapeutic approach, in order to prevent over or under treatment as well as to minimize morbidity related to the radio-chemotherapy regimens given **(Barrington et al, 2014).**

CT has been the main imaging technique used for the staging and follow-up of lymphoma. The fact that CT assessment of disease is based on anatomic criteria of size and shape and on abnormal contrast enhancement implies limitations in the depiction of pathologic changes in normal-sized lymph nodes and in the assessment of extranodal disease **(Rodri'guez-Vigil et al., 2006).**

In the last decade, Imaging of tumor metabolism with (FDG-PET) has facilitated the identification of affected nodal and extra-nodal sites, even when CT has demonstrated no lesions. It also plays a role for more correct staging prior to treatment and post treatment follow-up. **(Paes et al, 2010)**

However, detection depends not only on tumor size but also on the degree of FDG avidity, tumor-to-background ratio and effect of motion. A smaller than 1 cm lesion can be detected when conditions are favourable **(Groheux et al., 2013)**.

In PET-CT systems the CT portion provides the anatomic information useful for accurate interpretation of PET signal. It also provides a map used for attenuation correction of PET images **(Groheux et al., 2013)**.

Therefore PET-CT systems have replaced PET alone in most nuclear medicine departments. The performance of FDG PET-CT is better than the performance of FDG PET alone in oncology; however the added value might differ according to the clinical situation **(Groheux et al., 2013)**.

Basic knowledge of the mechanism of cancer imaging with FDG PET-CT is essential for accurate interpretation of PET-CT images **(Kobayashi et al., 2012)**.