ROLE OF PET-CT IMAGING IN STAGING OF BRONCHOGENIC CARCINOMA

Thesis

Submitted for partial fulfillment Of the M.D. Degree in Radiodiagnosis

By

Islam Mohamed Sameh Ebrahim

M.B.B.Ch, M. Sc Radiodiagnosis

Ain Shams University

Under Supervision of

Prof. Dr. Hesham Mahmoud Ahmed Mansour

Professor of Radiodiagnosis

Faculty of medicine - Ain shams University

Prof. Dr. Ahmed Fathy Abdel Ghany

Professor of Radiodiagnosis

Faculty of medicine - Ain Shams University

Dr. Amir Louis Louka

Lecturer of Radiodiagnosis

Faculty of Medicine - Ain Shams University

Faculty of Medicine

Ain Shams University

2016

Acknowledgement

*First and foremost, thanks to **Allah**, to whom I am grateful for any success achieved in my life.*

*I would like to express my deepest gratitude and extreme appreciation to **Prof. Dr. Hisham Mahmoud Mansour,** Professor of Radiodiagnosis, Faculty of Medicine, Ain Shams University, for his kind supervision, advices, constructive encouragement, generous help and guidance throughout the whole work which could not be a fact without his guidance and kind help.*

*I would like to express my great thanks to **Prof. Dr. Ahmed Fathy Abdel Ghany,** Professor of Radiodiagnosis, Faculty of Medicine, Ain Shams University and **Dr. Amir Louis Louka,** Lecture of Radiodiagnosis, Faculty of Medicine, Ain Shams University for their kind advice and help throughout the whole work.*

*I would like to express my respect, appreciation and thanks to my **wife**, **family and friends** for their assistance, encouragement and their pray for me.*

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Abbreviations

Abbreviation	Name
18F	*Fluorine -18*
99m TC MDP	*99m Technetium-methylene diphosphonate*
ATP	*Adenosine Tri-Phosphate*
BAC	*Broncho-alveolar Carcinoma*
Cm	*Centimeters*
COPD	*Chronic Obstructive Pulmonary Disease*
CT	*Computed tomography*
CXR	*Chest X Ray*
FDG	*Fluorodeoxyglucose*
G	*Gauge*
Gy	*GRAY*
HU	*Hounsfield Unite*
IASLC	*International Association for the Study of Lung Cancer*
LMSB	*Left main stem bronchus*
MBq	*Megabecquerel*
Mci	*Millicurie*
MIP	*Maximum Intensity Projection*
Mm	*Millimeters*
NPV	*Negative predictive Value*
NSCLC	*Non-small cell lung cancer*
PA	*Postero-Anterior*
PET	*Positron emission tomography*
PPV	*Positive Predictive Value*
RMSB	*Right main stem bronchus*
SCC	*Squamous Cell Carcinoma*
SCLC	*Small cell lung cancer*
SPN	*Solitary Pulmonary Nodule*
STD	*Standard deviation*
SUV	*Standardized uptake value*

TB	*Tuberculosis*
UICC	*Union International Cancer Control*
VALSG	*Veterans Administration Lung Cancer Study Group*

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Abstract

PET/CT is extremely useful in initial staging of bronchogenic carcinoma which is very important in planning the management strategies due to its large advantages over anatomical imaging in detecting hidden lesions which is missed by the use of other imaging modalities. Detecting local and distant metastatic disease process before they are visible on conventional imaging. The main drawbacks of PET/CT staging of bronchogenic carcinoma include radiation exposure and high cost. The use of diagnostic contrast enhanced CT with PET/CT also exposes the patients for more radiation risks.

Key word

PET/CT -18F-FDG - Carcinoma - Staging - IASLC

Introduction and Aim of the Work

Introduction:

Bronchogenic carcinoma is one of the leading causes of cancer related mortality in both men and women throughout the world. Lung cancer is the second only to that of prostate cancer in men and breast cancer in women. Most bronchogenic carcinomas are diagnosed at late advanced stage, carrying poor prognosis ***(Huq et al, 2009).***

Two major classes of bronchogenic carcinomas are present according to the division of the WHO: Non-small cell lung cancer (NSCLC) which accounts for more than 85% of lung cancer cases and small cell lung cancer (SCLC). Non small cell lung cancer accounts has 2 major subtypes: Squamous cell carcinoma and non squamous cell carcinoma (Adenocarcinoma and large cell carcinoma) ***(Koma et al, 2013)***.

Management of lung cancer had significant advances seen over the past decade. The primary treatment of lung cancer and the best chance for a complete cure is achieved through the total resection of localized disease. Once developed nodal or distant metastases, primary surgical intervention is ruled out and is considered for adjuvant chemotherapy with or without radiation therapy. Accurate delineation of disease extent is therefore critical in treatment planning of patients with lung cancer ***(Sundaram and George, 2011)***.

Introduction and aim of the work

The primary role of imaging is accurate initial staging which is very important for management strategies and evaluation of prognosis ***(Koma et al, 2013)***.

Functional imaging with the use of positron emission tomography (PET) is playing an increasingly important role in proper diagnosis and initial staging of malignant disease, in image guided therapy planning, and in treatment monitoring. PET imaging with the fluorine 18 labeled glucose analogue fluorodeoxyglucose (18-FDG) complements the more conventional anatomic imaging modalities of CT and MRI imaging ***(Blodgett et al, 2007)***.

Combined PET/CT imaging has been contributing widely to the treatment of patients through its large advantages over anatomical imaging from screening to initial staging. CT images demonstrate the anatomical information, while PET images provide the functional activity inside the patient's body. Hence, the existence of suspicious malignant cells can be diagnosed in PET images but since the structural location and position can't be defined on PET images, we need to retrieve the information from CT images ***(Avazpour et al, 2009)*.**

Combined PET/CT imaging will become the new standard of mediastinal staging. 18F-FDG PET/CT imaging strength lies in its increased sensitivity and very high negative predictive value. It may alleviate the need for surgical staging when FDG-PET/CT studies of the mediastinum are negative **(*Schimmer et al, 2006).***

Aim of the work

The aim of this work is to highlight the role of PET/CT imaging in staging of patients with Bronchogenic carcinoma.

Gross Lung Anatomy

Overview:

The anatomy of the respiratory system can be divided into 2 major parts, airway anatomy and lung anatomy (**Figure 1**).

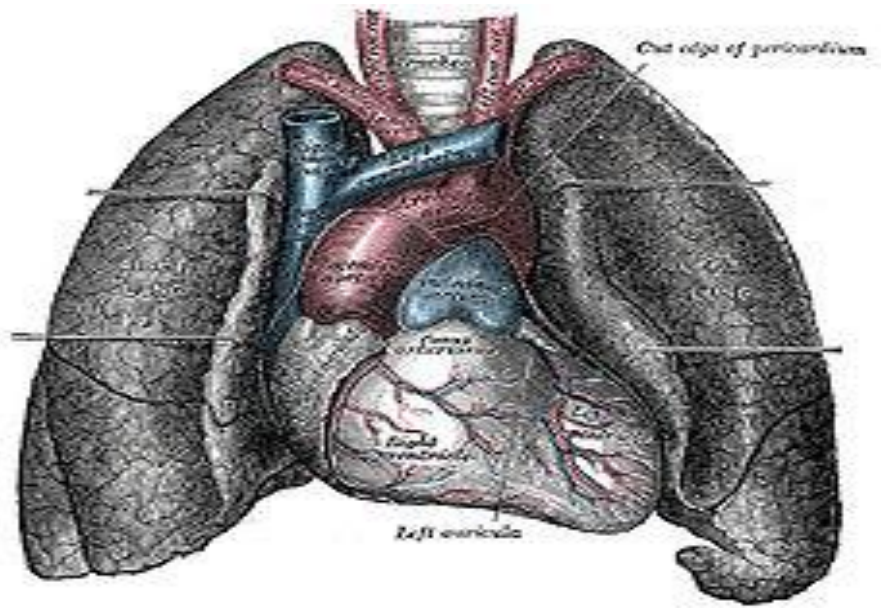

Figure 1: *Anatomy of the lung* ***(Standring, 2005).***

Anatomy of the tracheobronchial tree

Trachea

A solitary tube representing the entrance to the lungs' airways. Between the entrance and periphery of the airways, lies a system of branching airways that conduct the inspired air into those peripheral channels which carry alveoli in their walls