



RELATIONSHIP BETWEEN THE SIZE AND FLUORODEOXYGLUCOSE UPTAKE OF THE PRIMARY LESION IN NON-SMALL CELL LUNG CARCINOMA

Radiology

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ABSTRACT

Background: We sought to explain if any relationship exists between the size and Fluorodeoxyglucose [FDG] uptake of primary tumour in non-small-cell lung carcinoma [NSCLC]

Methods: 35 patients with histologically proven non-small cell lung carcinoma who underwent staging Fluorodeoxyglucose - positron emission tomography/computed tomography [FDG-PET/CT] were retrospectively evaluated. Statistically compared the size and the FDG uptake of the primary tumour

Results: Poor relationship exists between the size and the FDG uptake of the primary tumour in non-small cell lung carcinoma

KEYWORDS

Non-small cell lung carcinoma , positron emission tomography , standardized uptake value

INTRODUCTION:

Lung carcinoma is the most prevalent cancer worldwide (1) . Amongst the different histological subtypes , Non-small cell lung carcinoma [NSCLC] accounts for nearly 80 % of the Lung carcinomas (2) .

Fluorodeoxyglucose- positron emission tomography/computed tomography [FDG-PET/CT] is currently used for staging lung carcinoma. Measurement of maximum standardized uptake value [SUV max] in FDG - PET/CT , quantifies the glucose imaging the of the tumour. Fluorodeoxyglucose uptake correlates positively with the proliferative activity of the tumour. It is not considered as an independent prognostic factor in patients with Lung carcinoma (3, 4, 5) .

The objective of our study is to assess whether relationship exists between the size and the Fluorodeoxyglucose uptake of primary non-small cell lung carcinomas.

METHODS:

Our study was an retrospective observational study. The study was approved by the institutional ethics committee .

FDG-PET/CT of 31 patients who underwent staging PET/CT for lung malignancy at our Institute [Sri Ramachandra Medical College Hospital, Porur, Chennai, India] were evaluated retrospectively.

Patients with proven non-small cell lung carcinoma by histopathology were included in the study. Patients were asked to fast at least 6 h before the FDG-PET-CT scan. All patients had a glucose level below 180 mg/dl and were injected intravenously with 0.22 mCi (8.14 MBq)/kg (10–15 mCi/370–555 MBq) FDG. At 60–90 min after the injection, data were acquired from the vertex to the upper thigh. The first CT scan was performed using 120 kV, 50 mA, and a 3-mm section thickness. Immediately after CT, a PET scan (Siemens Biograph Horizon ; Siemens Medical Solutions, Inc., Malvern, PA, USA) was performed for about 7 mins, with seven to eight bed positions and 1 min/position. PET images were reconstructed iteratively with CT data for attenuation correction . Images were then transferred to Siemens Syngovia workstation . Computerized tomography integrated positron emission tomography fusion images in transaxial, sagittal, and coronal planes were evaluated .

Largest diameter in the trans-axial plane was measured in the

workstation and documented for tumour size.

Maximum standardised uptake values [SUV max] were based on the hottest pixel within the region of interest [ROC] drawn around the primary tumour on an attenuation-correction/ PET-CT fused image.

Analysis of the data was done using Pearson's correlation coefficient.

RESULTS:

35 patients were included in the study. The size and SUV max of the 35 NSCLC cases are summarized in Table 1. Age group varied from 35 to 77 years. 25 patients were male and 13 were female.

Maximum diameter of the lesion in the study was 115 mm and the minimum diameter was 16 mm. The mean diameter was 57.98 mm with a standard deviation of 27.65 . Maximum measures SUV max was 25.5 and the least measured SUV max was 1.07 . The mean SUV max was 10.74 with a standard deviation of 4.81

The Pearson's correlation coefficient was 0.197 , suggestive of negligible correlation (6) . There is a weak but positive correlation between the size of the NSCLC lesion and its FDG uptake .

DISCUSSION:

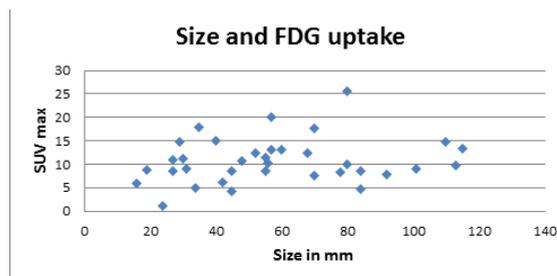
Key Results:

Until recently, CT and MRI were the maistay in diagnosis and staging of lung cancer. With the advent of PET-CT , their role has diminished (7) . Now, PET -CT in addition to staging , has a prognostication role based upon the uptake of FDG (8) . Positive correlation exists between the uptake of FDG and worse prognosis (9) .

We examined if there is positive relationship between the tumour size and FDG uptake. Significant association was found between the size of a malignant tumour and SUV max , with tumours less than 3 cm having a lower FDG upyake than tumours more than 3 cm. (10) . Study by Lu G et al , demonstrated a positive correaltion between the size of primary tumour and FDG uptake (11). FDG uptake by large cell carcinomas were not significantly different from squamous cell carcinomas , but greater than that by adenocarcinomas (12) .

In our study , although the larger lesions showed a greater FDG uptake , the relationship was not linear . The smaller lesions tended to have lesser uptake but there were too many outliers in this group to suggest a direct linear association.

Fig 1 . Scatter diagram demonstrating the distribution.



Most of the lesions generally had a high FDG uptake (more than 2 times the uptake in liver) with very few lesions having less FDG uptake than the liver.

Although only Non-small cell lung carcinoma lesion were included in the study , differentiation between the various histopathological types [adenocarcinoma vs squamous cell carcinoma] and the grade of the tumour were not used in subdivision of the lesions

CONCLUSION:

The size of the NSCLC lesion cannot be used to predict the lesion's FDG avidity and the assumption cannot be made that a large lesion with low FDG uptake is not malignant.

FDG uptake of the lesion is not dependant on the size alone , but a outcome of various others factors such as histology , grade and proliferation index.

OTHER INFORMATION:

Funding: Nil

Conflict Of Interest: Nil

Author contributions:

Dr.Arunan Murali conceived the presented idea and wrote the manuscript.

Dr.Akshaya collected the data and analysed the data.

Dr.Gokulakrishnan proof read the manuscript.

Prof.Venkatasai supervised the study.

Acknowledgements:

The authors express our sincere thanks to our statistician Mrs.Gayathri for her valuable input and time

ATTACHMENTS:

Table 1.

S.NO	Primary lung Carcinoma	
	Size in mm	SUV max
1.	55	8.53
2.	35	18
3.	29	14.8
4.	60	13
5.	84	4.76
6.	80	9.97
7.	42	6.19
8.	45	4.30
9.	57	13.2
10.	40	15
11.	16	5.9
12.	115	13.26
13.	31	8.9
14.	56	10.1
15.	55	11.4
16.	68	12.28
17.	78	8.29
18.	92	7.92
19.	34	4.93
20.	52	12.46
21.	101	9.05
22.	45	8.56
23.	24	1.07

24.	110	14.8
25.	48	10.67
26.	19	8.83
27.	30	11.1
28.	57	20.14
29.	70	7.57
30.	27	8.54
31.	84	8.52
32.	27	11
33.	80	25.5
34.	70	17.68
35.	113	9.67

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