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Self Assessment Module on Nuclear Medicine and PET/CT Case Review

FDG PET/CT IN LYMPHOMA AND MELANOMA

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Cases 27-39

Case 27: Pre and post therapy PET scans in a 37 year old woman with lymphoma.

a. Good response
b. Poor response
c. Indeterminate
d. Biopsy indicated

Answer: a is correct

Rationale:
The literature data supports the fact that PET scan is very effective in assessing therapy response.
b. Incorrect because there is no evidence for FDG uptake in the follow up scan.
c. Incorrect because of complete resolution of metabolic activity on the post therapy scan
d. Incorrect as PET scan has been shown to be good indicator of good response

Reference:
Kostakoglu et al; 18F-FDG PET Evaluation of the response to therapy forlymphoma and for breast, Lung, and colorectal carcinoma. Journal of Nuclear Medicine 2003; 44(2):224-239

ase 28: PET scan with an anterior mediastinal density and lower neck metabolic activity.

a. High grade lymphoma
a. Benign process
b. Inflammatory lymphadenopathy
c. Sub-sternal thyroid

Answer: b is correct

Rationale:
This is the most likely process as there is no metabolic activity in the anterior mediastinal density. The lower neck and upper chest activity is related to brown fat.
a. is incorrect as high grade lymphomas have high FDG uptake.
c. is incorrect as the pattern of uptake is typical for brown fat activity.
d. is incorrect as the anterior mediastinal density is more focal and not related to thyroid gland.

References:

1) Hubner et al; Differentiating Benign from Malignant Lung Lesions using Quantitative Parameters of FDG PET Images, Clinical Nuclear Medicine 1996; 21(12):941-949.

2) Cohade et al; Uptake in Supraclavicular Area Fat ("USA-Fat"): Description on 18F-FDG PET/CT; J Nucl Med 2003; 44:170–176

Case 29: 45 Yr old man with PET scan for suspected lymphoma.

a. Negative for lymphoma.
b. Physiologic uptake
c. Positive for lymphoma
d. Low grade lymphoma

Answer: C is correct:

Rationale:

c. is correct because of intense right nasal uptake proven to be lymphoma.
a. is incorrect because there is intense of intense and asymmetric metabolic activity in the right nasal cavity.
b. is incorrect because of intense and asymmetric right nasal cavity uptake ,unlikely physiological
d. is incorrect because of high metabolic activity.

Reference:

Okada et al; The use of FDG-PET in the detection and management of malignant lymphoma; Correlation of uptake with prognosis. J. Nucl. Med. 2004; 32:686-691

Case 30: Patient with weight loss and fever has advanced lymphoma. Therapeutic response is best assessed by

a. CT scan
b. PET scan , visual
c. PET scan , SUV
d. PET and CT scan

Answer b is correct:

Rationale:

B is correct as it has been shown that visual analysis is sufficient in the clinical scenario.
a. is incorrect as CT scan is relatively insensitive to measure therapeutic response.
c. is incorrect as SUV does not add to visual analysis.
d. is incorrect because often residual lesions are seen on CT scan without metabolic activity.

Reference:

Juweid ME et al; Use of Positron tomography for response assessment of lymphoma: Consensus of the imaging Subcommittee of International Harmonization Project in Lymphoma. J. Clin Oncol 2007; 25(5):571-8

Case 31: 10 Yr. old boy S/P chemotherapy for lymphoma. Therapy response assessment in this case is

a. Easy and straightforward.
b. Good response; No metabolic activity
c. Poor response; Persistent activity
d. Not easy and complicated

Answer d is correct:

Rationale:
D is correct because in pediatric and young adults there is thymic rebound with FDG uptake post therapy and may not be able to separate from residual disease.
a. is incorrect because of thymic rebound .
b. is incorrect because normal thymic uptake may be present even if good response in pediatric group.
c. is incorrect because persistent FDG uptake in thymus may be present with good response because of cellular proliferation and FDG uptake.

Reference:
1) Ferdinand, B, Gupta, P. and Kramer, EL; Spectum of Thymic activity at 18F-FDG PET. RadioGraphics 2004; 24:1611–1616

2) Miller et al; Role of 18F-FDG PET/CT in staging and follow-up of lymphoma in pediatric and young adult patients. J Comput Assist Tomogr 2006; 30:689-94.

Case 32: Patient with RUQ pain had liver biopsy. The pathology was

a. hemangioma
b. hepatoma
c. lymphoma
d. Stage 1 lymphoma

Answer d is correct:

Rationale:
D is correct based on AJCC staging.
a. is incorrect as the blood pool images were negative.
b. is possible as hepatomas may have low uptake
c. is incorrect, only liver is involved.

References:
1) AJCC Cancer Staging Manual, fifth Edition. American joint Committee on Cancer.

2) Delbeke, D. et al; Evaluation of Benign vs Malignant Hepatic Lesions with Positron Emission Tomography. Arch Surg. 1998; 133:510-516.

Case 33: Patient with lymphoma s/p chemotherapy

a. Residual lymphoma
b. Physiologic FDG uptake
c. Cannot evaluate without baseline study
d. Artifact

Answer d is correct:

Rationale:
D is correct because of significant residual barium and artifactual increase in FDG uptake In lower abdomen.
a. is incorrect because the non-attenuation corrected images show no FDG uptake
b. is incorrect because non AC images show no uptake.
c. is incorrect because the teaching point in this case is to look at both AC and Non AC images to separate artifacts from true findings.

Reference:
Sureshbabu et al; PET imaging artifacts. Journal of Nuclear Medicine Technology 2005; 33(3):2005 156-161.

Case 34: 4.5 cm melanoma and PET scan; The TNM classification is

a. T3, N3, M0
b. T4, N2, M0
c. T4, N1, M0
d. T3, N2, M1

Answer b is correct:

B is correct since greater than 4 cm melanoma is T4 and greater than 1 node is N2 and no evidence for metastasis = M0
a. is incorrect based on TNM classification
c. is incorrect because more than one lymph node involved
d. is incorrect because there is no evidence for metastasis

Reference:
AJCC, Cancer Staging Manual, 5th Edition, American Cancer Society

Case 35: 89 yr old man for restaging of high risk melanoma. The most accurate statement regarding PET scan in melanoma staging;

a. Highly sensitive and specific
b. Highly specific but not sensitive
c. Highly sensitive and not specific
d. Highly sensitive and specific with the exception of brain

Answer d is correct:

Rationale:
A, b, and c are incorrect because PET scan is both sensitive and specific when compared to conventional imaging for melanoma staging. However, small brain lesions are best imaged with MRI.

References:
1) Rinne D, Baum RP, Hor G, Kaufmann R.; Primary Staging and Follow–up of High Risk Melanoma Patients with Whole-Body 18-F-Fluorodeoxyglucose Positron Emission Tomography, Results of a Prospective Study of 100 Patients. Cancer 1998; Volume 82(9):1664-71.

2) Rohren et al; Screening for Cerebral Metastases with FDG PET in Patients Undergoing Whole–Body Staging of Non-cerebral Nervous System Malignancy. Radiology 2003; 226(1):181-187.

Case 36: PET scan for restaging of Melanoma; The scan is positive for metastases in

a. Bone
b. Lung
c. Bone and lung.
d. No definite metastases

Answer d is correct

Rationale:
a. is incorrect as increased uptake in the spine is related to vertebroplasty artifact.
b. the lung nodules are too small for resolution.
c. is incorrect as explained above.

Reference:

Gupta et al; Probability of malignancy in solitary pulmonary nodules using fluorine -18-FDG and PET. J Nucl Med 1996; 37:943-947.

Case 37: The correct statement in this patient with melanoma is

a. PET scan has replaced lymphoscintigraph
b. PET scan is not very sensitive for palpable lymph node metastasis
c. Sentinel lymph node dissection is the standard of care
d. The sensitivity and specificity of PET for melanoma is 50%

Answer c is correct

Rationale:
a. is incorrect , because PET scan does not detect microscopic metastases.
b. is incorrect because PET scan is more sensitive than conventional imaging for lymph node evaluation.
d. is incorrect because the reported sensitivity is greater than 90% for melanoma staging.

Reference:
Macapinlac et al; FDG PET and PET/CT imaging in lymphoma and melanoma. Cancer J 2004; 10:262-270

Case 38: S/P melanoma resection one week prior to PET scan

a. Residual melanoma is excluded.
b. Negative for lymph node metastases.
c. CT scan would be helpful for pulmonary metastases.
d. B and C

Answer d is correct:

Rationale:
PET scan is more sensitive for detection of lymph node metastases and CT is more sensitive for detection of small pulmonary metastases.
a. is incorrect because post surgical changes may obscure residual disease.

Reference:
Gritters et al; Initial assessment of positron emission tomography using 2- fluoro-2-deoxy- D- glucose in the imaging of malignant melanoma. J Nucl Med.1993: 34:1420-1427

Case 39: In the initial diagnostic ABCD criteria for melanoma, the “D” stands for
a. depth
b. diameter
c. drainage, lymph node
d. duration of lesion

Answer b is correct

Rationale:
a. is incorrect as depth cannot be assessed visually.
c. is incorrect as the lymph nodes are evaluated histologically.
d. is incorrect, asymmetry, border, color and diameter greater than 6 mm are of concern for cutaneous melanoma

Reference:

1) Dial WF; ABCD rule aids in preoperative diagnosis of malignant melanoma. Cosmetic Dermatol 1995; 8(3):32-4, 1995.

2) Friedman RJ, Rigel DS, and Kopf AW; Early detection of malignant melanoma: the role of physician examination and self-examination of the skin. CA Cancer J Clin 1985; 35(3):130-51

3) Friedman RJ, Rigel DS, Silverman M, and Kopf AW; The continued importance of early detection of malignant melanoma. CA 1991; 41:201-26, 1991