

SE Asian Perspectives on PET

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Overview

- Tuberculosis
- Hepatocellular Carcinoma
- Nasopharyngeal Carcinoma

Tuberculosis

Tuberculosis

- High prevalence of TB in SE Asia
- Increased FDG uptake in areas of active inflammation/ infection because of increased glucose utilisation.
- Active infection can mimic malignancy as it will have increased FDG uptake

Tuberculosis

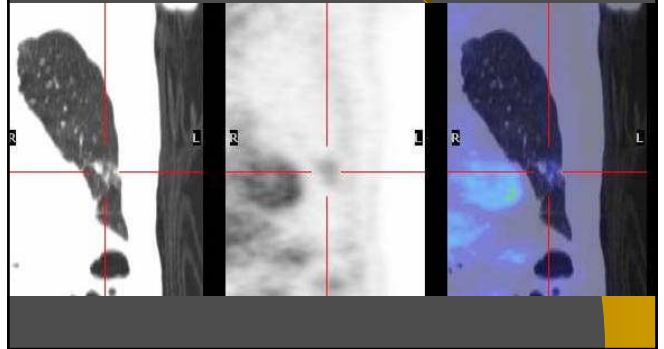
- Can be difficult to differentiate tumour from infection
- Pattern of uptake of FDG may be helpful
- Characteristic location
 - Apical segments
 - Associated CT findings may be helpful

Patterns of Disease

- Parenchymal changes
- Nodal disease
- Tuberculoma (Solitary Pulmonary Nodule)
- Coexistent TB and tumour

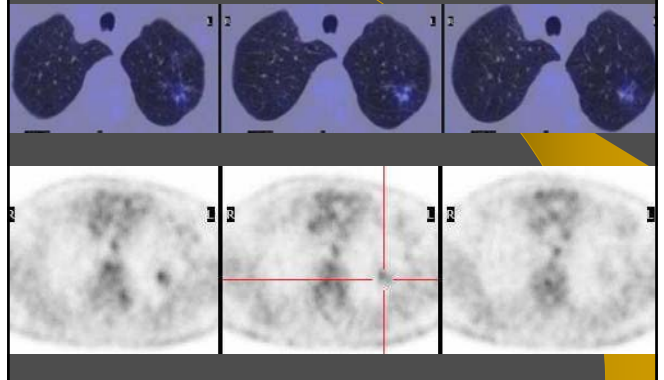
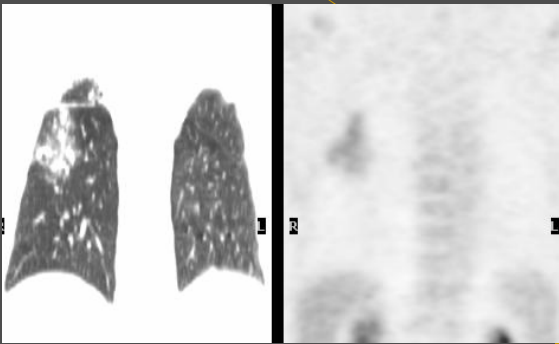
Parenchymal Changes

Active Infection



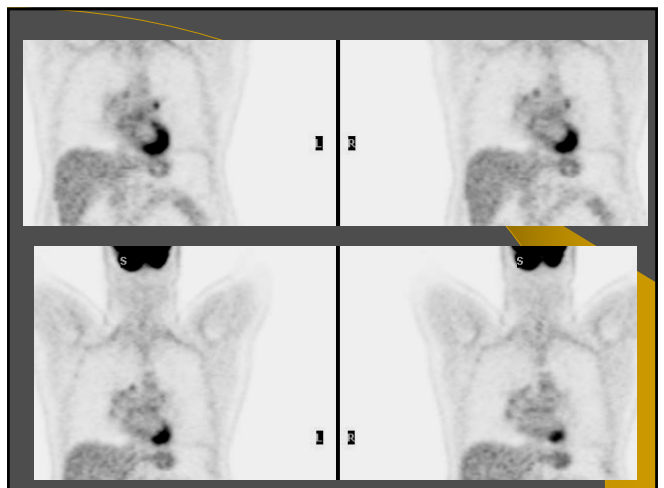
Active Infection

Active TB



Nodal Disease

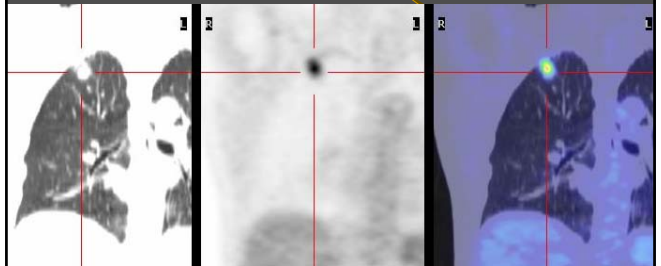
- Nodal uptake
 - Hilar, subcarinal, right paratracheal uptake is often seen in granulomatous disease, either TB or sarcoid



Solitary Pulmonary Nodule Tuberculoma Vs Malignancy

- Tuberculomas can mimic malignancy on PET and CT
- Will have increased FDG uptake
- May not have any inflammatory changes in the adjacent lung

Tuberculoma



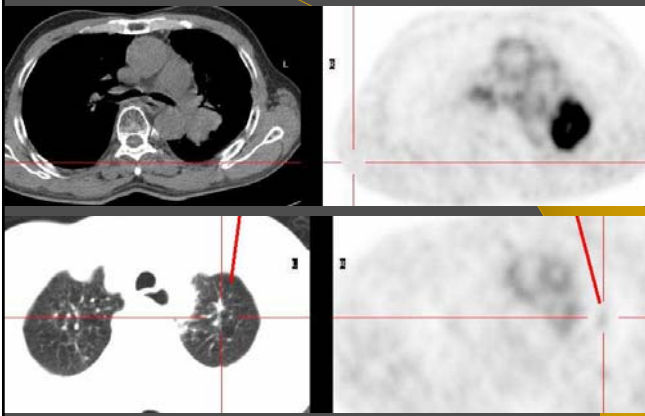
Standardised Uptake Value

- SUV of less than 2.5 has been suggested as a cut off for benign nodules
- 90% of tuberculomas false positive for malignancy if SUV of 2.5 used
 - Jin MG Radiology 2000 216; 117-121

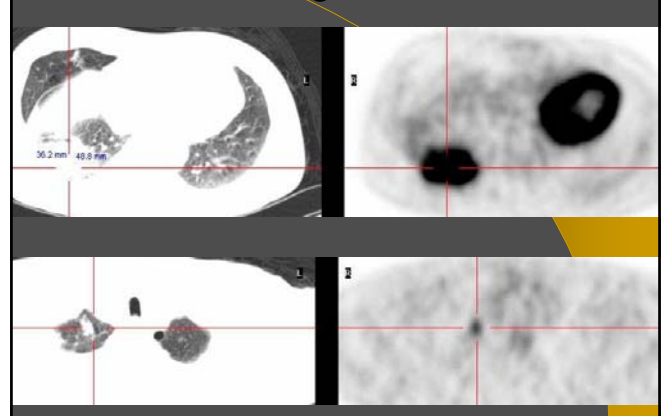
Combined Tumour and TB

- Very difficult situation
- Can be very difficult to differentiate active TB from malignancy
- Can lead to false positive upstaging of the tumour for intraparenchymal metastases and for nodal metastases

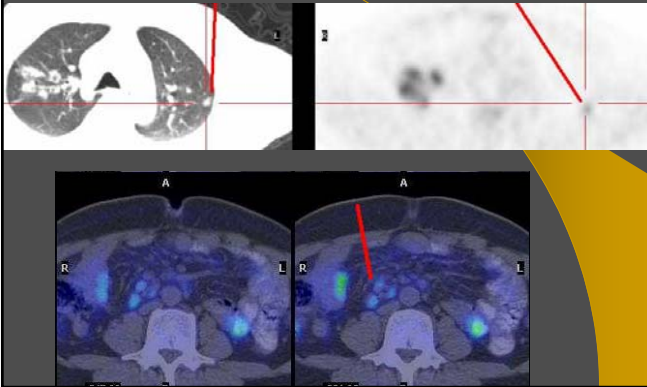
Tumour and Infection



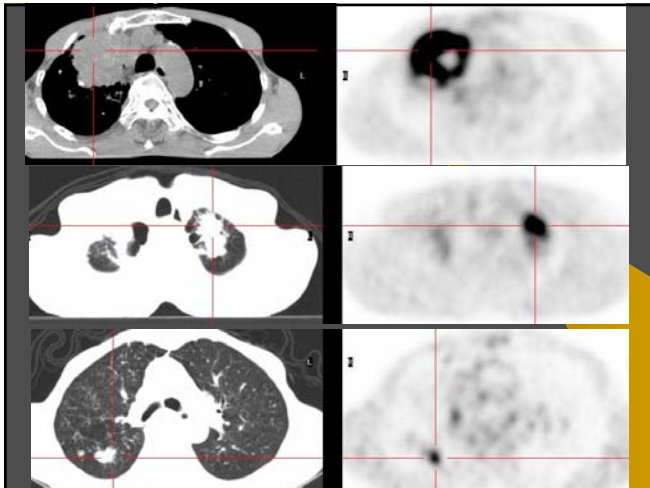
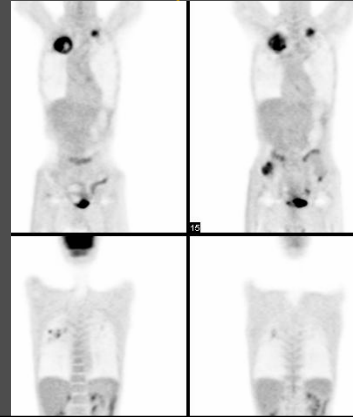
Ca Lung and TB



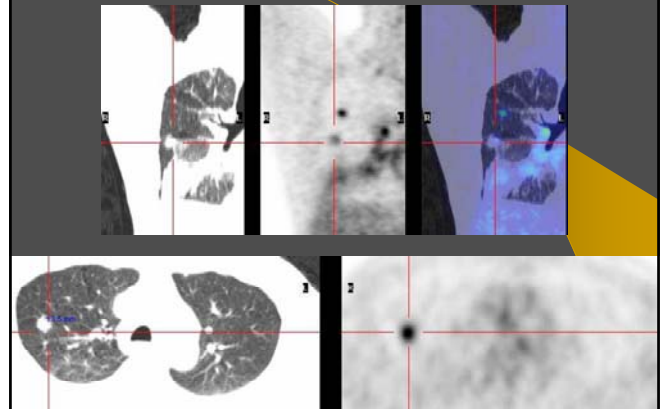
Renal Cell Carcinoma and TB



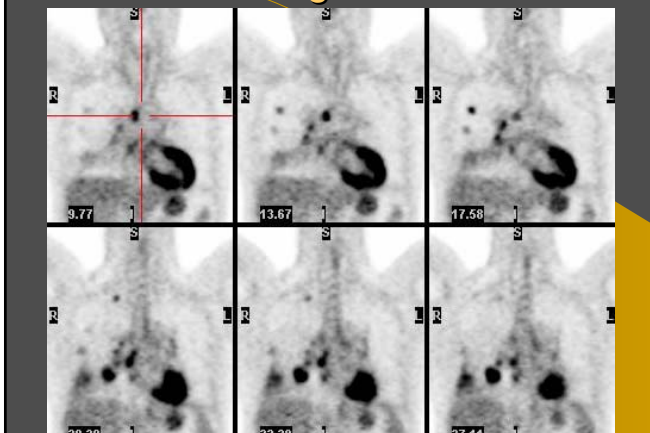
RUL SCC and Clinically Active TB



Ca Lung and TB



Ca Lung and TB



TB, Lung Cancer and Nodes

- Presence of active TB with malignancy can be problematic
- Active TB can lead to nodes or nodules being positive on PET when not involved by malignancy
- In these cases important not to deny someone potentially curative treatment
- Should go to nodal sampling or biopsy

TB Summary

- Some specific patterns of active infection are present on PET
- But at times it is not possible to differentiate from malignancy and the patient should proceed to a biopsy

Hepatocellular Carcinoma

HCC

- Not as straight forward as other tumours in knowing where PET fits into management

HCC

- HCC's accumulate FDG to varying degrees
- Overall sensitivity of PET for the detection of HCC is approximately 60%
– J Hepatology 2000 32(5)

HCC

- Relatively high background uptake of FDG in normal liver
- Well differentiated and lower grade tumours have a relatively low uptake of FDG
- Moderately and poorly differentiated tumours have higher uptake of FDG

HCC

- PET also gives information about cellular behaviour which structural imaging doesn't
- HCC's that don't demonstrate increased FDG uptake are likely to be the lower grade tumours and are therefore less likely to metastasise or recur

Role of PET

- Primary detection
- Pre transplant work up
- Assessment of treatment response and for recurrence

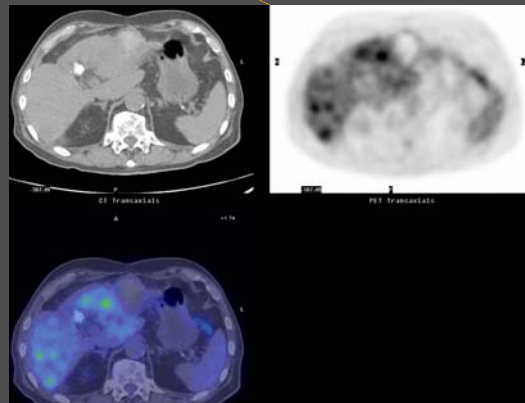
Primary detection

- Most HCC's detected by standard structural imaging
- PET used for staging

Primary detection

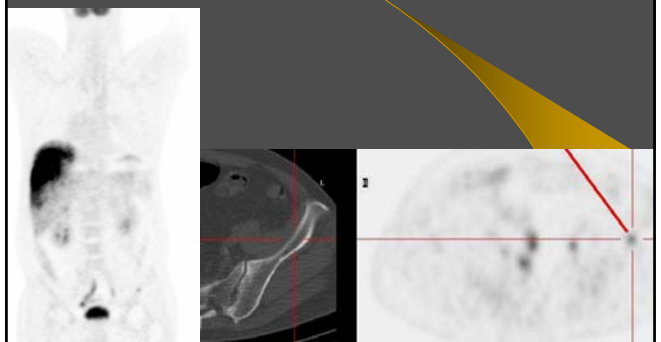
- Can be used for primary detection in patients with raised tumour markers
- Because some HCC's are not FDG avid, if there is strong clinical evidence of malignancy but a negative PET, a diagnostic angiogram or close follow up would be warranted.

HCC

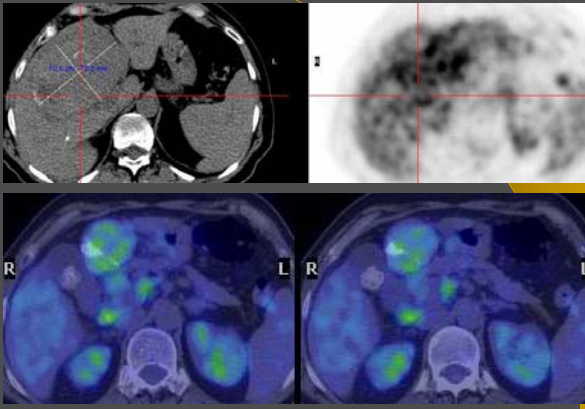


Pre Transplant Assessment

Pre Transplant Assessment



Pre transplant assessment

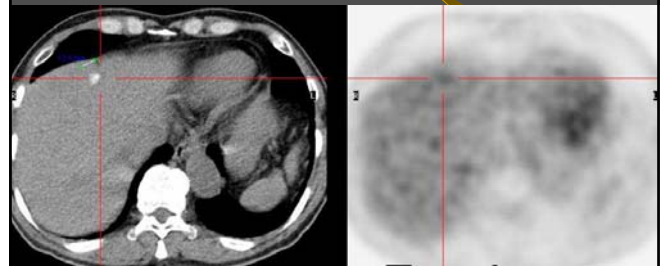


Treatment Assessment

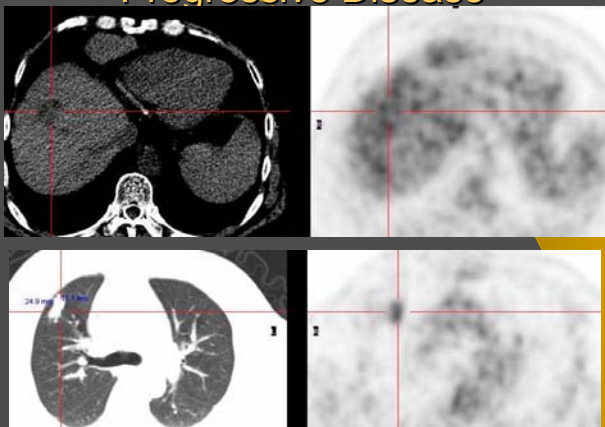
Treatment Assessment

- PET can be used to assess treatment response for residual metabolically active disease

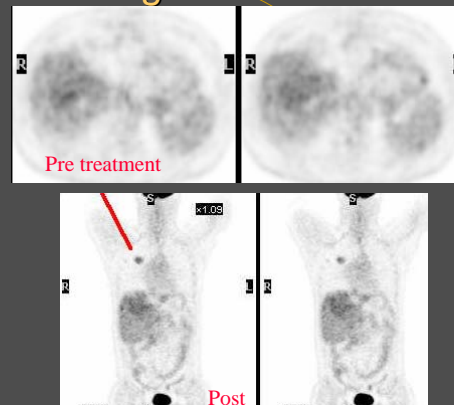
Post Chemoembolisation



Progressive Disease



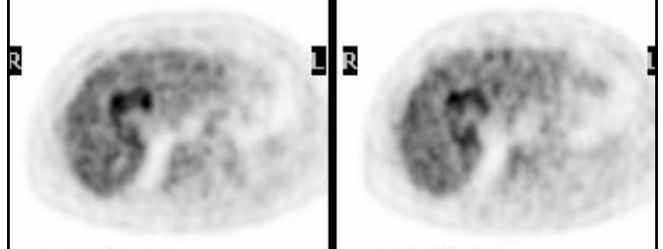
Progressive Disease



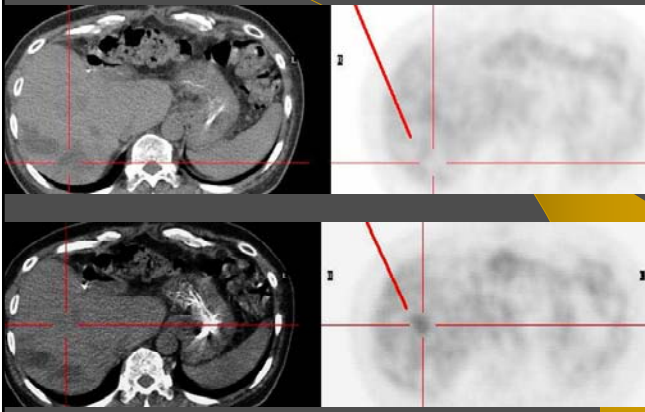
Radio Frequency Ablation

- PET can be used to monitor post RFA for residual or recurrent disease
- More sensitive and specific than CT or MRI for detection of recurrent tumour
 - Clin Nucl Med 2003 28(3)

RFA: Recurrence at margins



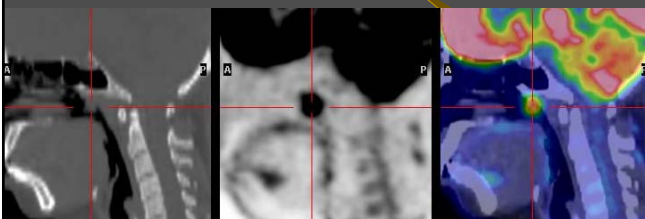
Post RFA



HCC Summary

- PET has to be seen as part of the work up and not a complete replacement of other modalities
- Good for staging and in detecting moderate to high grade tumours
- But may still need angiogram if
 - If PET findings are significantly discordant with other findings
 - If treatment would be altered by the presence of disease in other liver segments

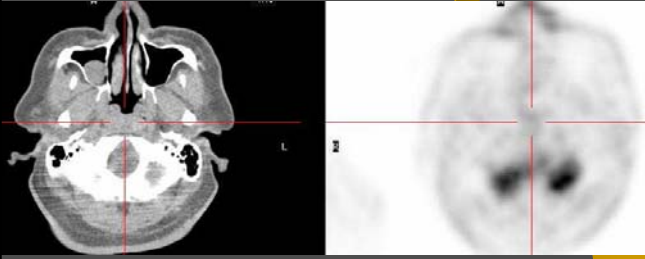
Nasopharyngeal Carcinoma



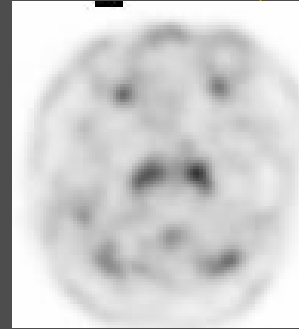
NPC

- Initial diagnosis is usually clinical but can be used for primary diagnosis
- Loco regional staging of nodes
- Staging for distant metastases
- Radiotherapy planning
- Assessment of treatment response
- Assessment of tumour recurrence

Normal Nasopharynx



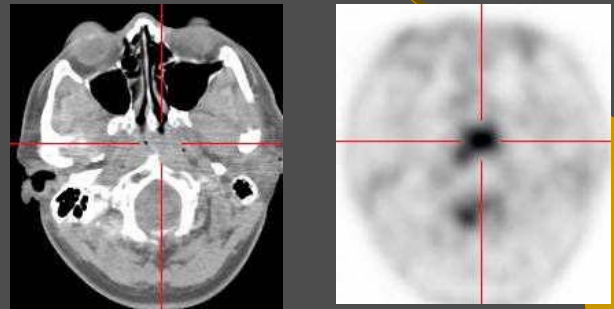
Normal Nasopharynx



Normal FDG uptake

- Normal lymphoid tissue in the nasopharynx can take up FDG
- Look for symmetry of uptake
- Characteristic elongated uptake along length of nasopharynx
- Correlate with CT for presence of a mass
- Sometimes can get normal asymmetry of uptake

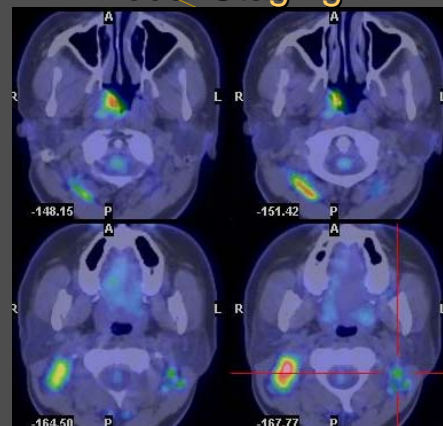
NPC



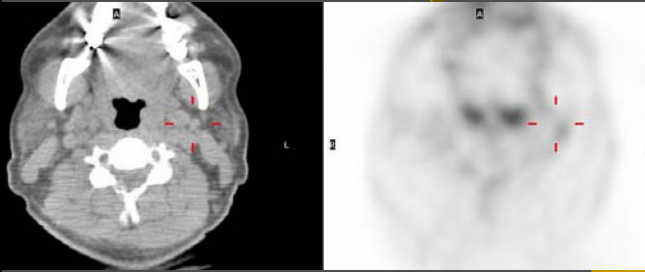
Nodal Staging

- PET sensitive for nodal spread
- Better assessment than CT for involvement of small nodes

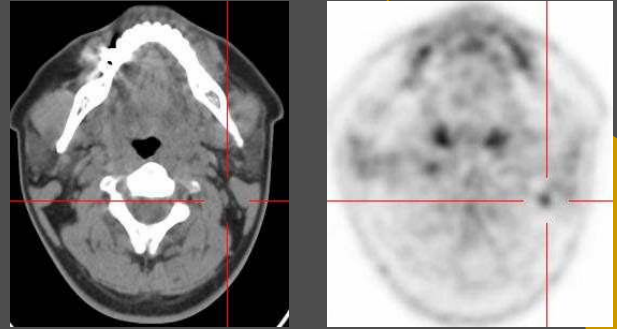
Nodal Staging



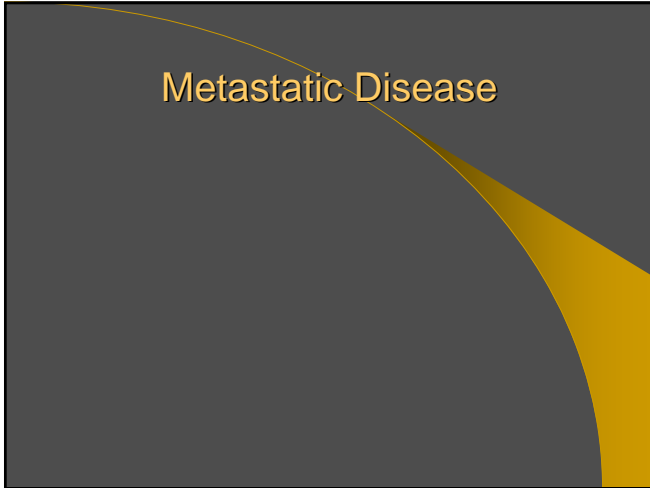
No Nodal Uptake



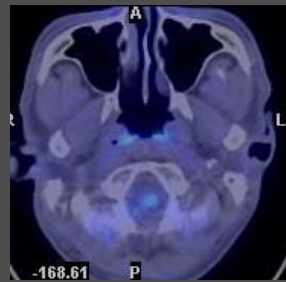
Nodal Staging



Metastatic Disease



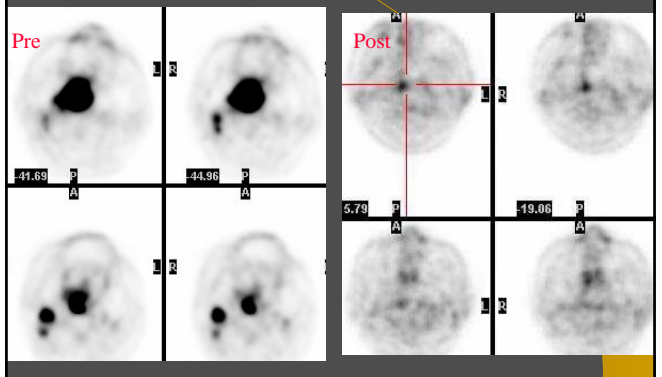
Metastatic Disease Negative Bone Scan



Treatment Response



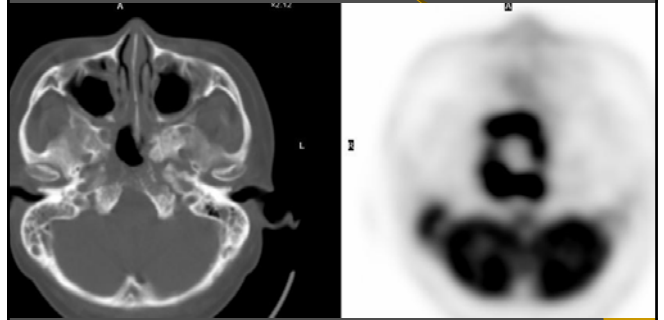
Partial Metabolic Response



Recurrence

- Post treatment changes make CT/ MRI evaluation for recurrence very difficult
- PET is more sensitive and specific than CT/MRI for detection of recurrence
Yen RF Cancer 2003 15;98

Recurrence



Conclusion

- PET has a definite role in the evaluation of HCC and NPC
- It is important to understand how to use PET in the assessment of HCC and where it fits in the imaging management
- Because of the prevalence of TB, it must always be considered in evaluating PET scans