


Imaging of Lymph Nodes: Update

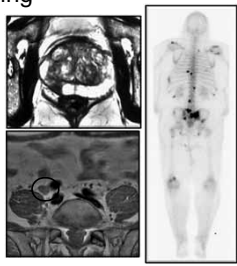
Mukesh G Harisinghani, MD



- ### Learning Objectives
- Discuss importance of lymph node imaging
 - Discuss localization and characterization of nodal metastases
 - Discuss caveats in nodal assessment
 - Discuss emerging imaging techniques for nodal assessment

Cancer Staging

- T Stage
- N Stage
- M Stage

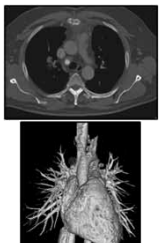


- ### Why is N Stage Important
- Therapeutic implications
 - Prognostic implications

Lung Cancer

Therapeutic Implications

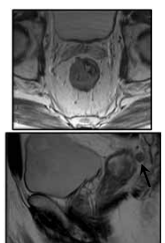
- Mediastinal Positive Node
 - Stage III
 - Presurgical chemo and/or radiation



Colorectal Cancer

Prognostic Implications

- 5 survival rates
 - **80 percent** in stage II disease (who have no lymph-node metastases)
 - **45 to 50 percent** in those with TNM stage III disease (lymph node metastases present)

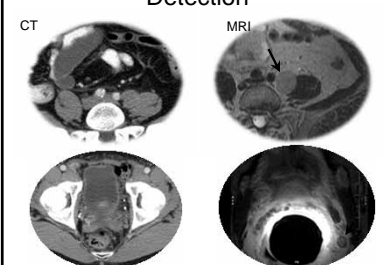


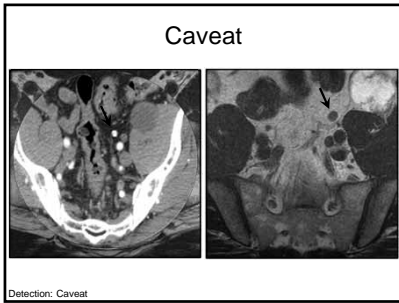
Nodal Staging



- ### Lymph Node Assessment by Imaging
- Detect Nodes (Yes or No)
 - Anatomically Localize Nodes (Where)
 - Characterize Nodes (Are they Malignant)

Detection

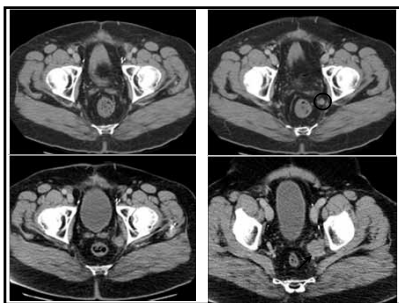
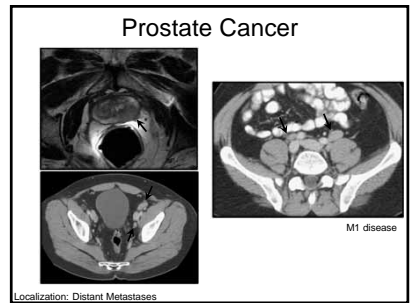
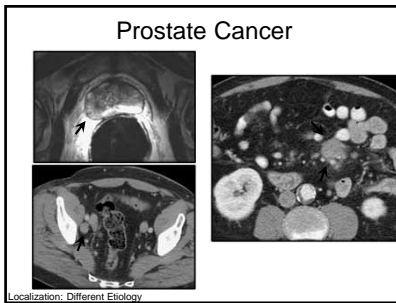
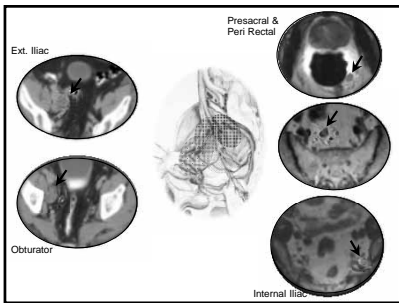




Nodal Localization

- Tumors follow predictable patterns of drainage into regional and then into distant lymph nodes
 - If not within this pattern
 - Different etiology
 - Distant nodes in addition to regional
 - Considered distant metastases or "M" disease

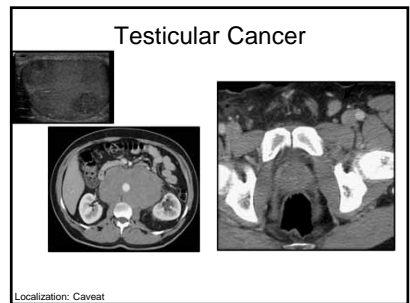
Localization



Caveat

- Prior surgery can alter regional nodal drainage

Localization: Caveat




Lymph Nodes: Benign or Malignant

- Size
- Morphology
- Clinical markers

Characterization

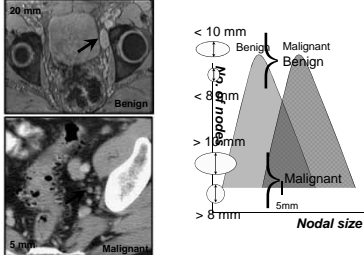
Size

- RECIST 1.1
 - Short Axis used instead of Long Axis
 - Most reproducible and optimal predictor of malignancy
 - Less dependent on the spatial orientation and shape of the lymph node



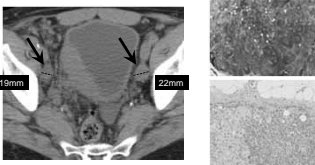
Eisenhauer et al Eur Jour Cancer 2009

Nodal Characterization

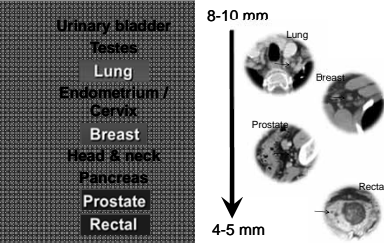


Challenges Lymph Node System Poses

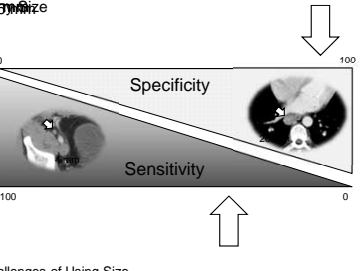
- Lymph Nodes
 - Response to benign and malignant insult is the same



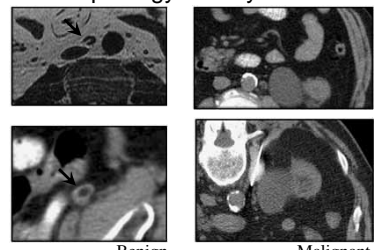
Size of metastatic node varies



Challenges of Using Size

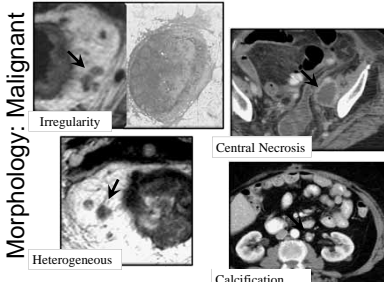


Morphology – Fatty Hilum



Benign Malignant

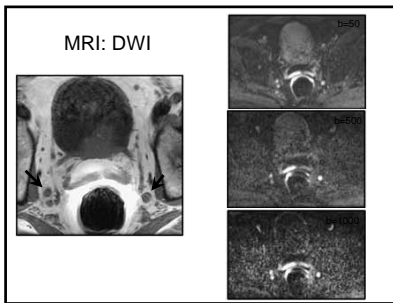
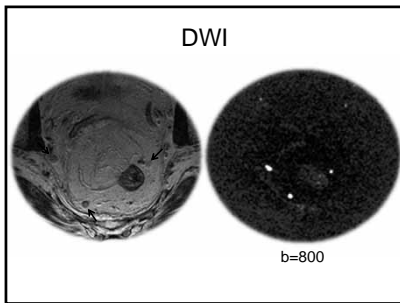
Morphology: Malignant



Characterization: Morphology

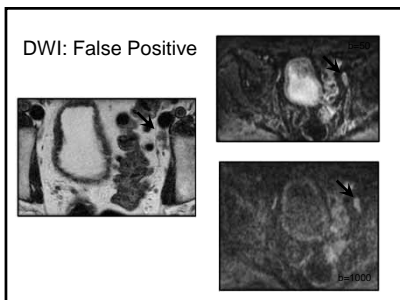
Quest for Better Non Invasive Tool for Nodal Assessment

- PET CT
- Diffusion Weighted MRI
- MRI Contrast Agents
 - Positive (Gadolinium Based)
 - Negative (Magnetic Nanoparticles)



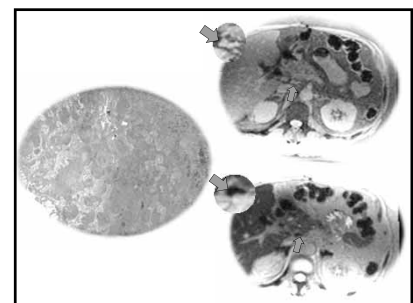
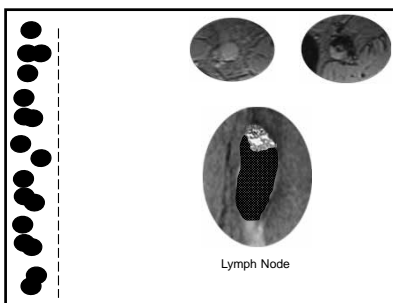
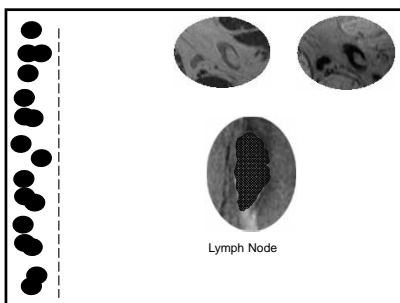
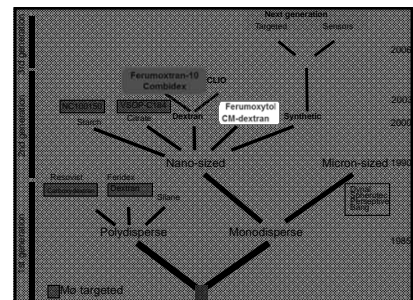
Challenges with DWI

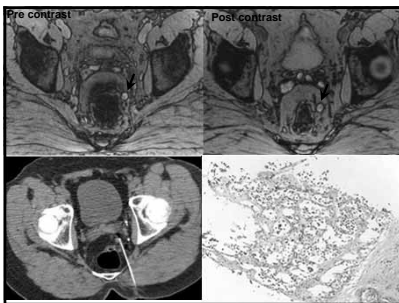
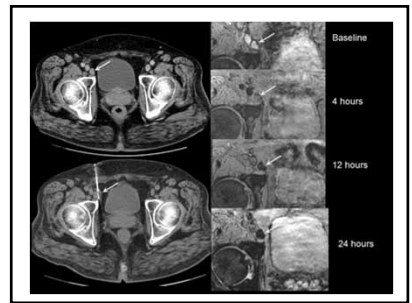
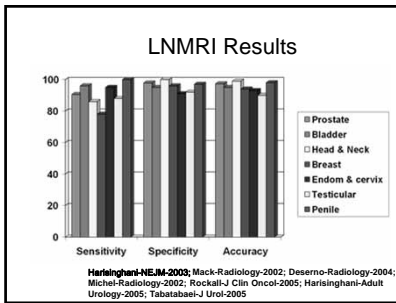
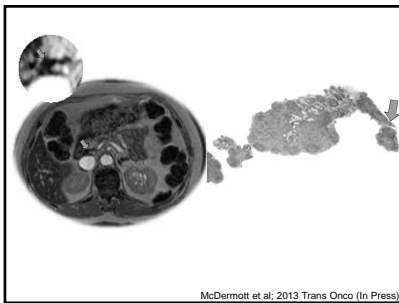
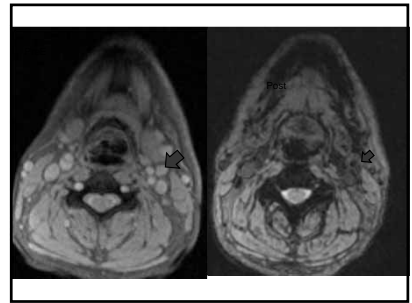
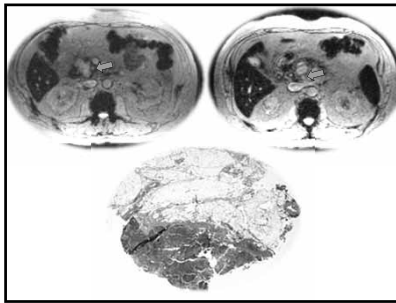
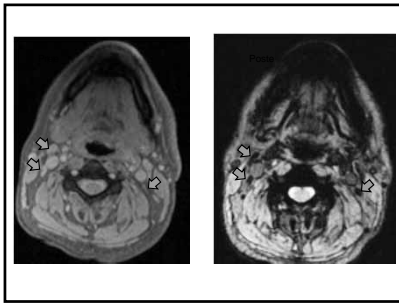
- Excellent nodal detection technique
- False positives and negatives



Emerging Techniques

- Lymphotropic Nanoparticle Enhanced MRI (LNMR)
 - MRI with ferumoxytol





Conclusion

- Important to pay attention to nodes when staging cancer patients
- Knowledge of drainage pathways is critical for staging nodes
- Size not an accurate parameter
- Gold standard limited; Emerging techniques may fill gaps in nodal staging