

# Radiology / Pathology Conference

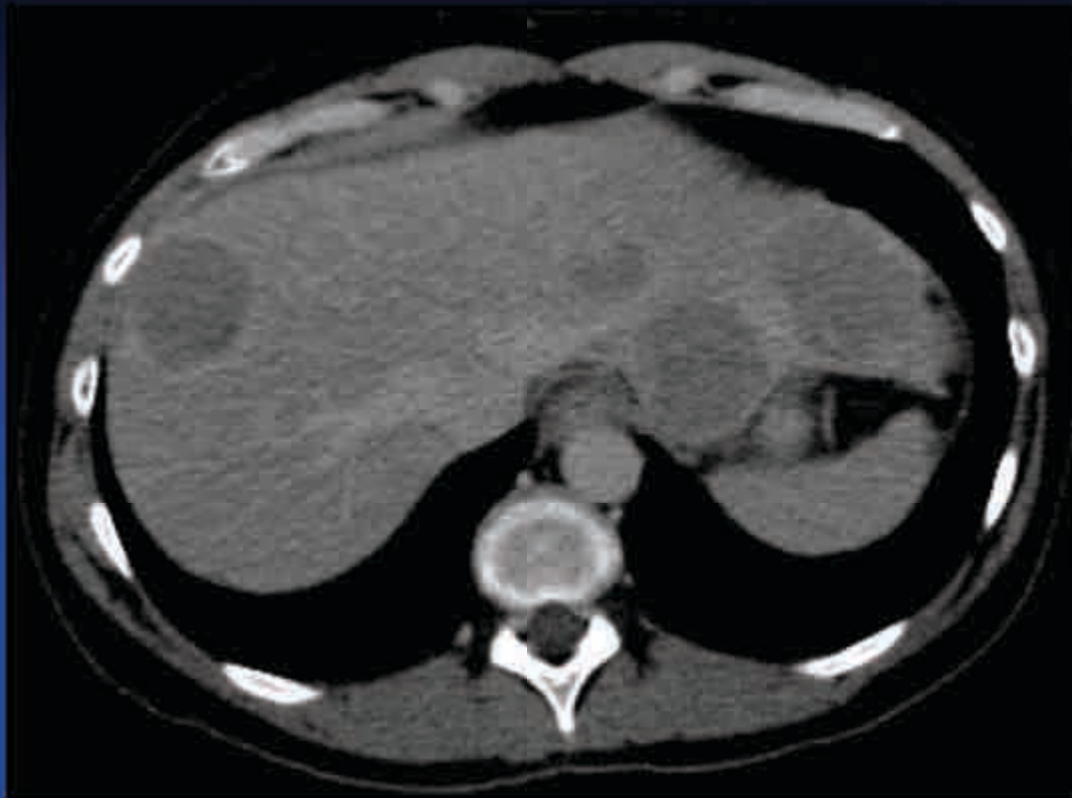
November 2010

Wade Hedegard, Radiology Resident

Kirsten Woolf, Cytopathology Fellow

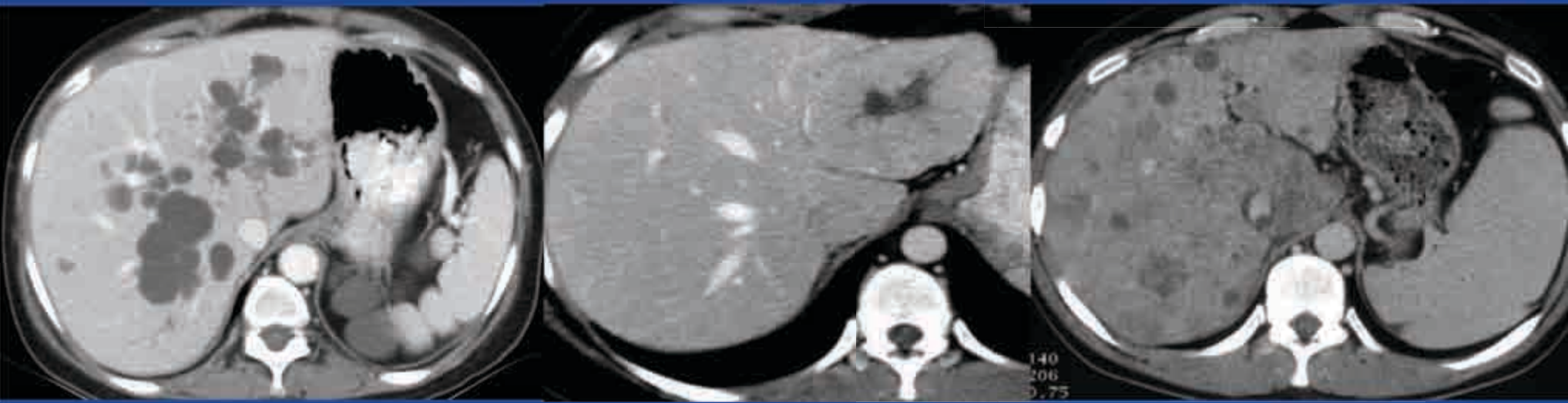
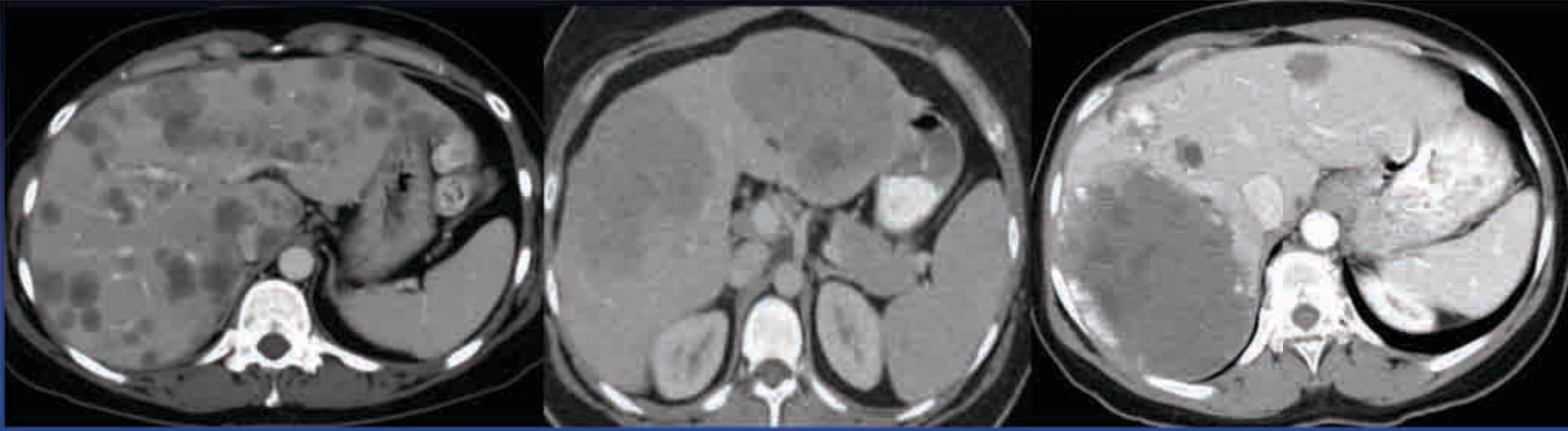
# Case 1

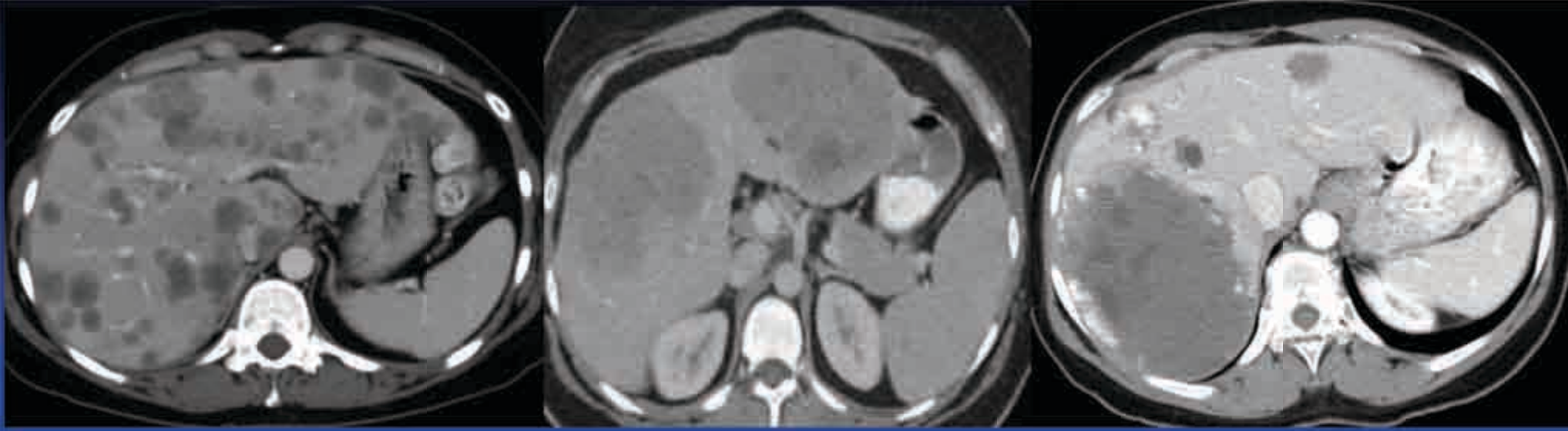
**47 year old female presents  
with 2 weeks of abdominal  
pain and constipation**



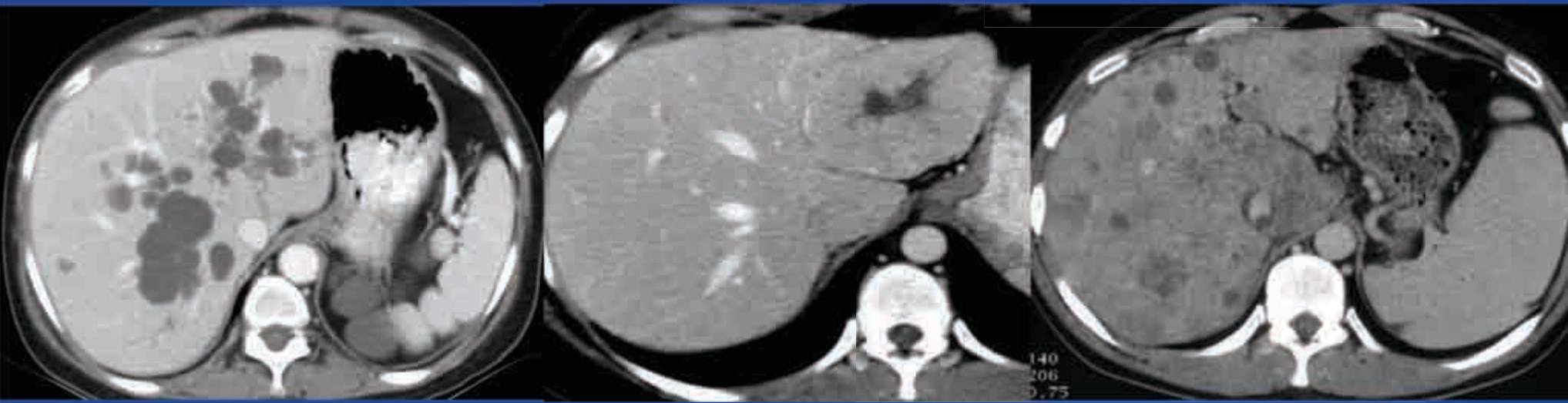
# Multiple Hypodense Liver Lesions DDx:



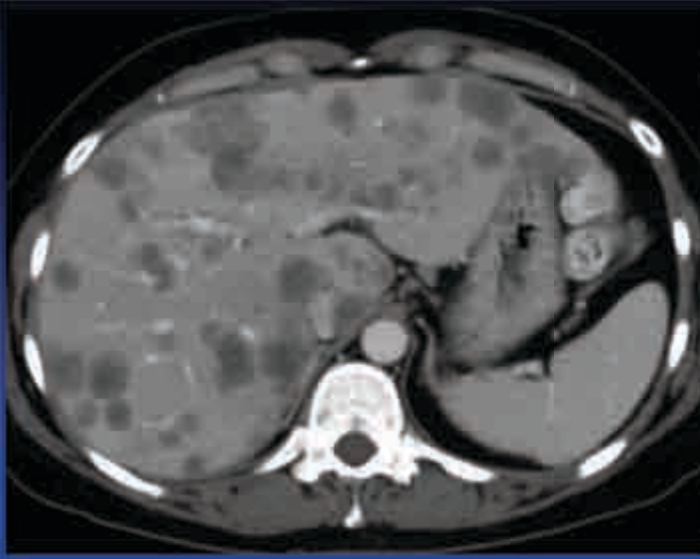




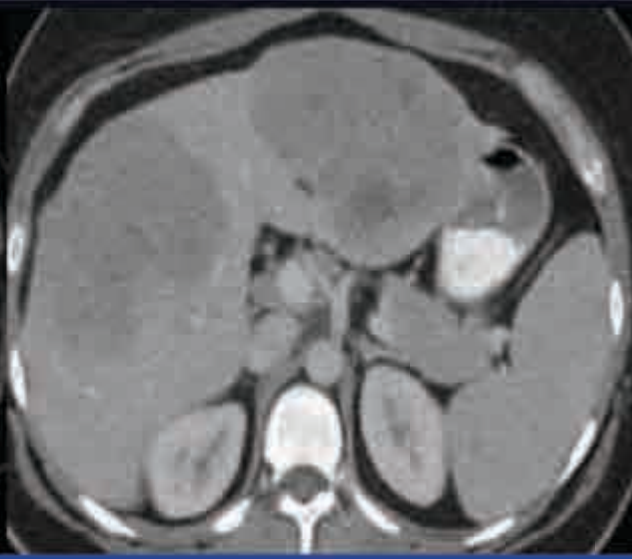
## Metastases



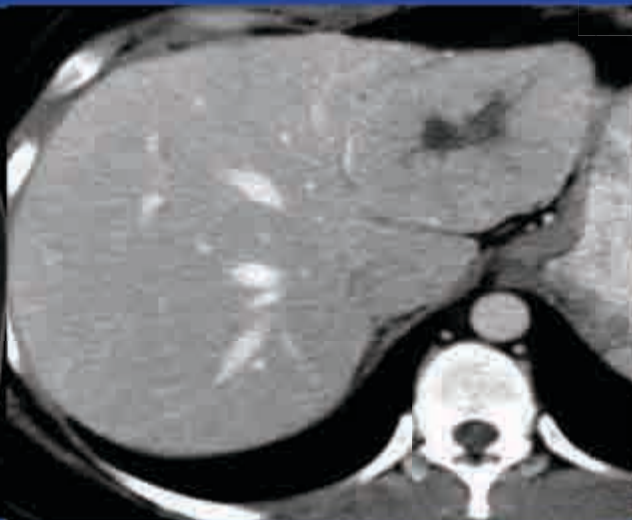
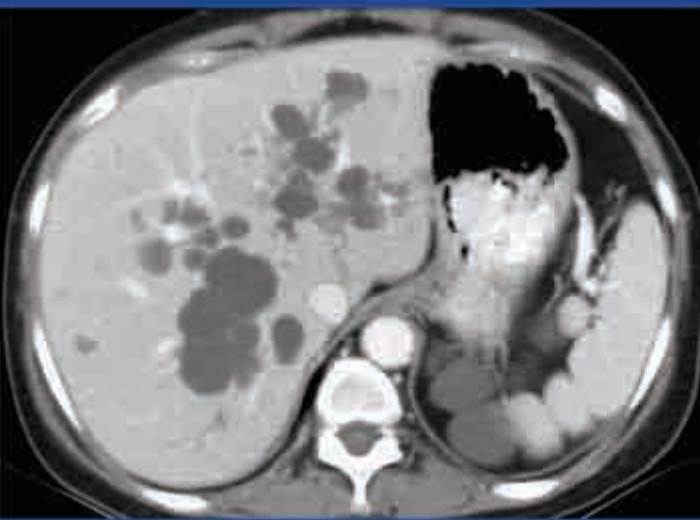
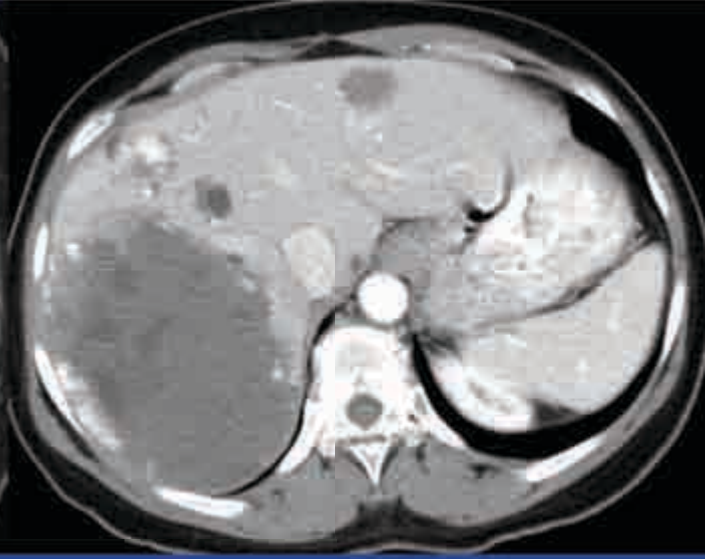


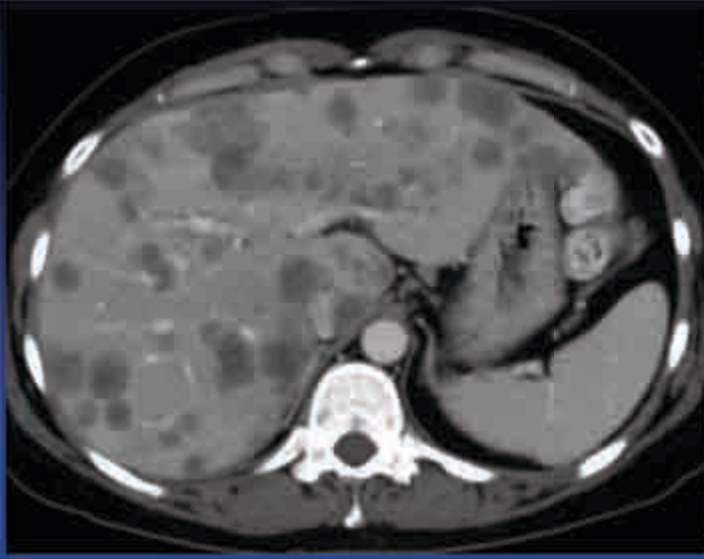


Metastases

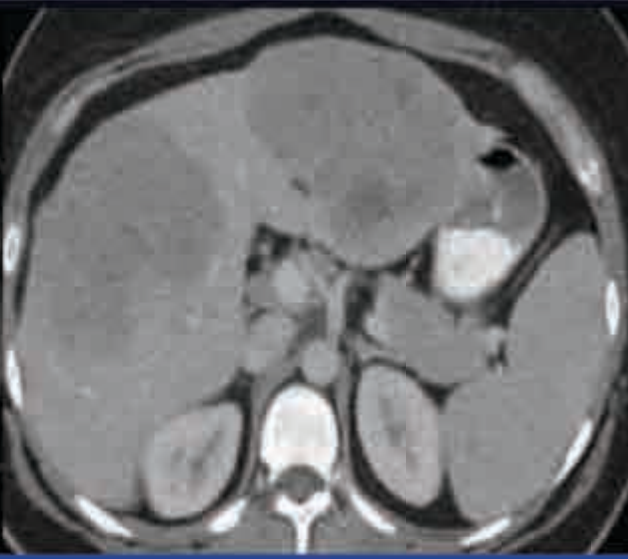


Lymphoma

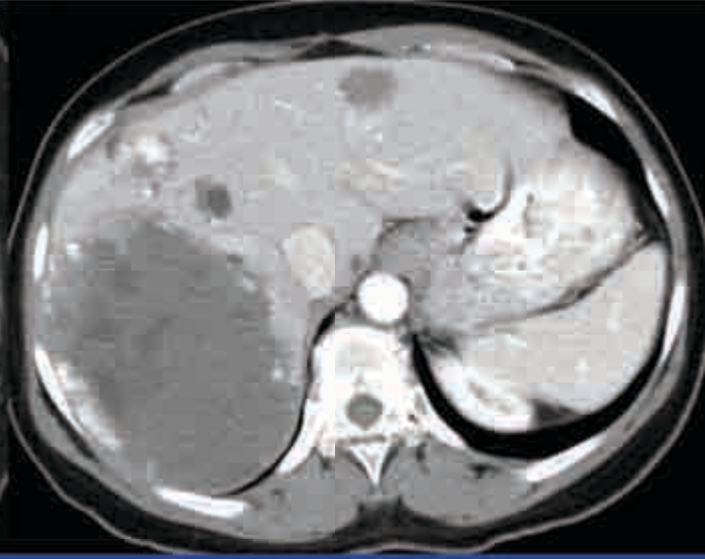




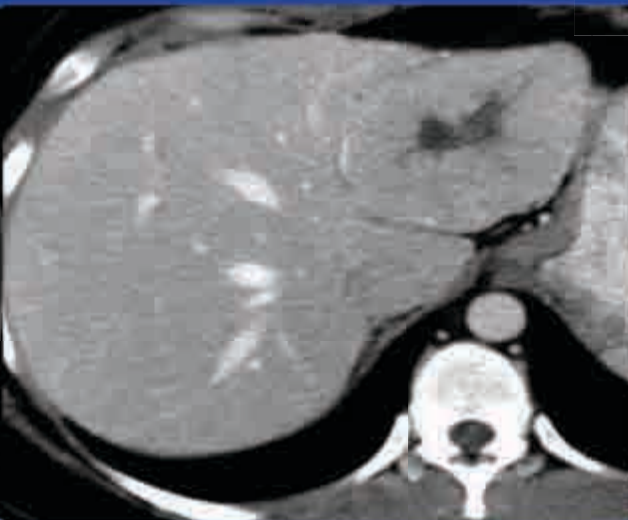
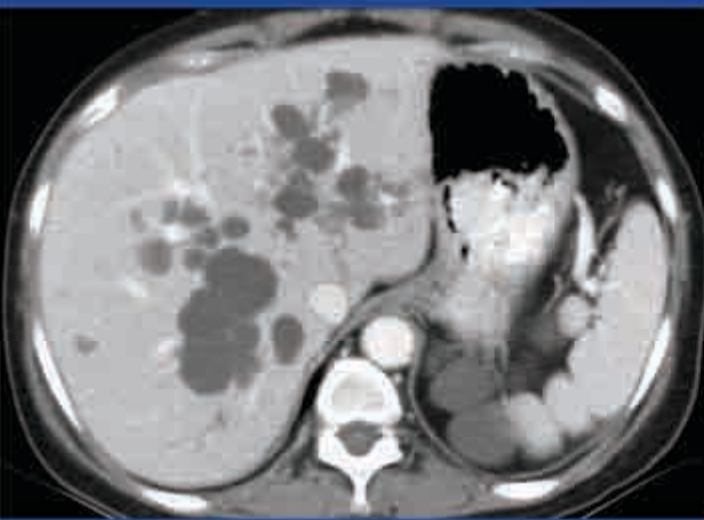
Metastases



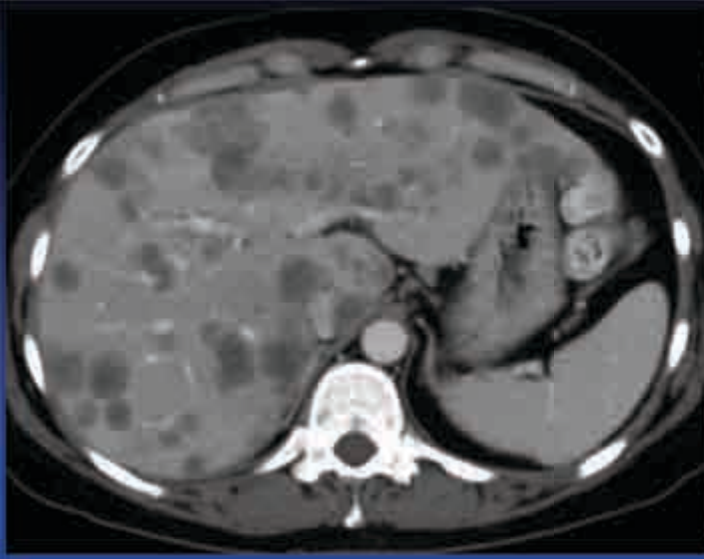
Lymphoma



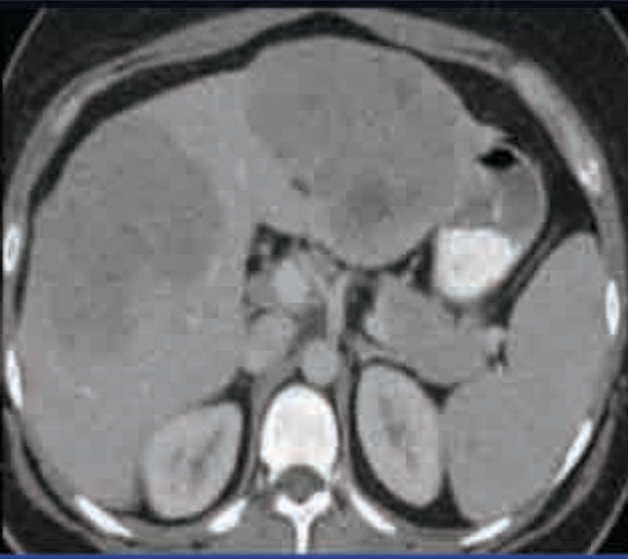
Cavernous Hemangiomas



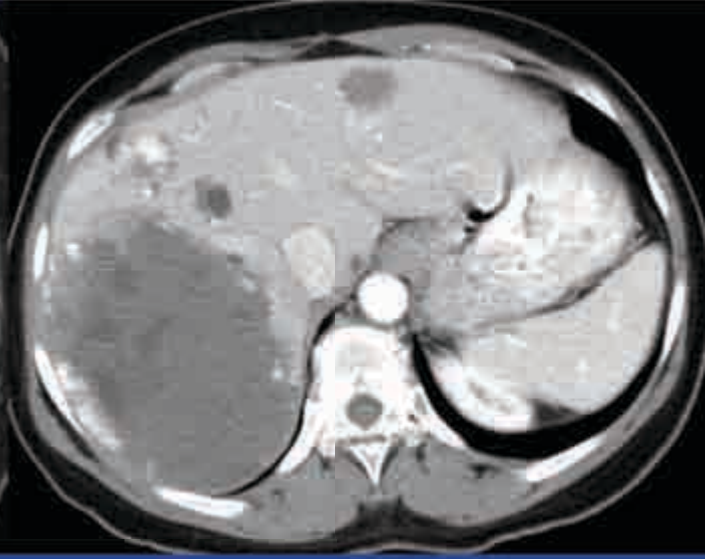




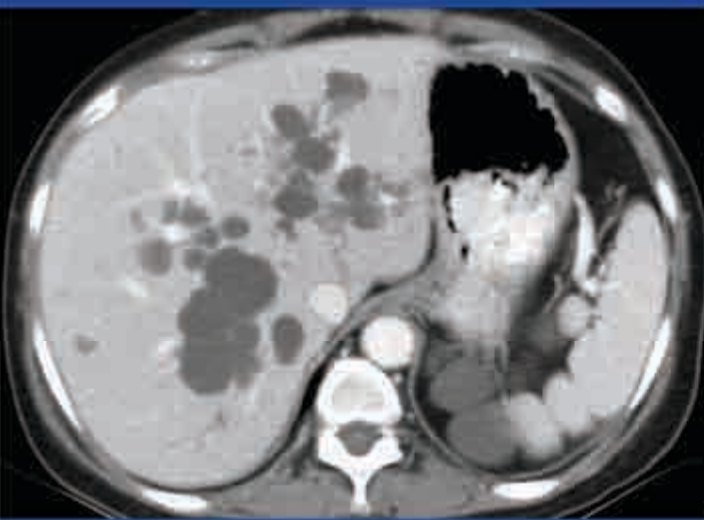
Metastases



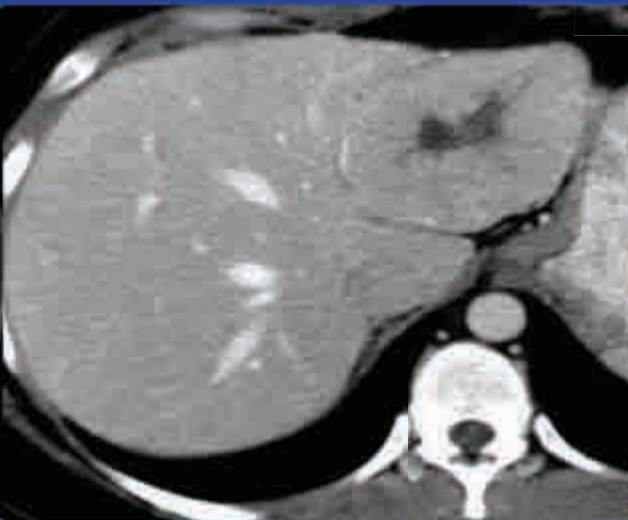
Lymphoma

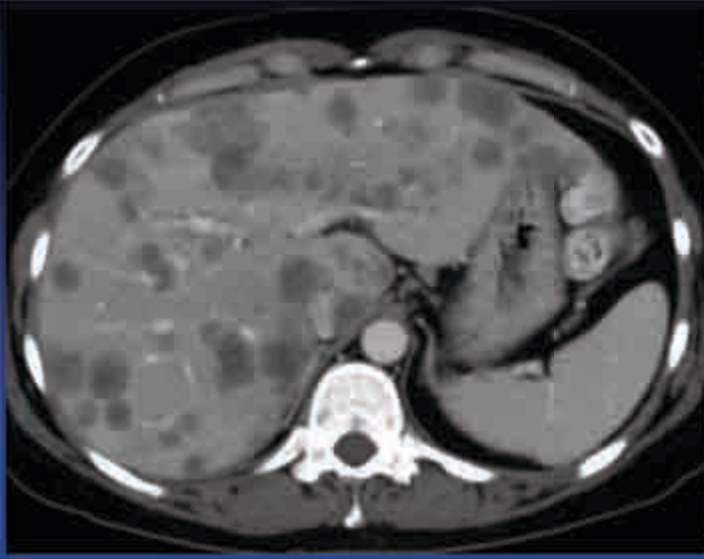


Cavernous Hemangiomas

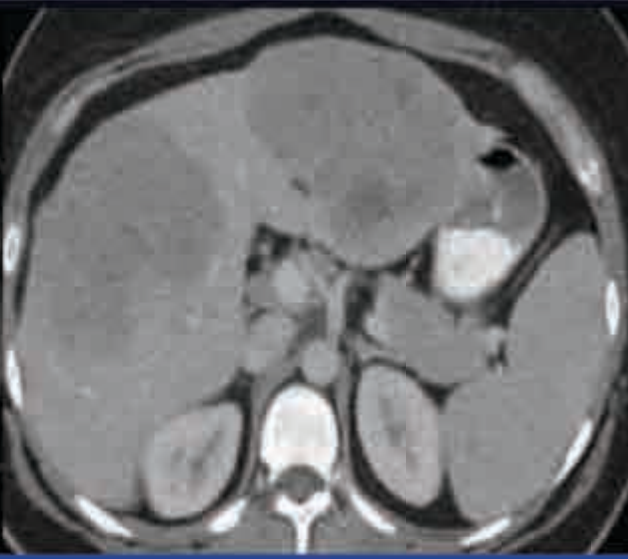


Hepatic Cysts

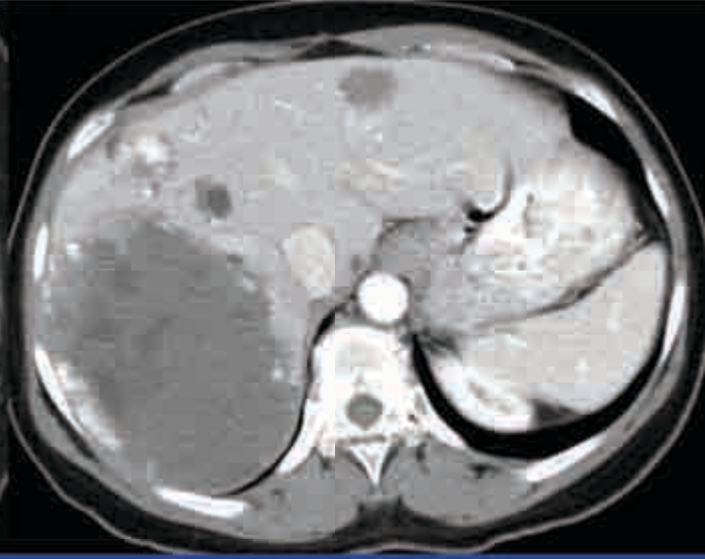




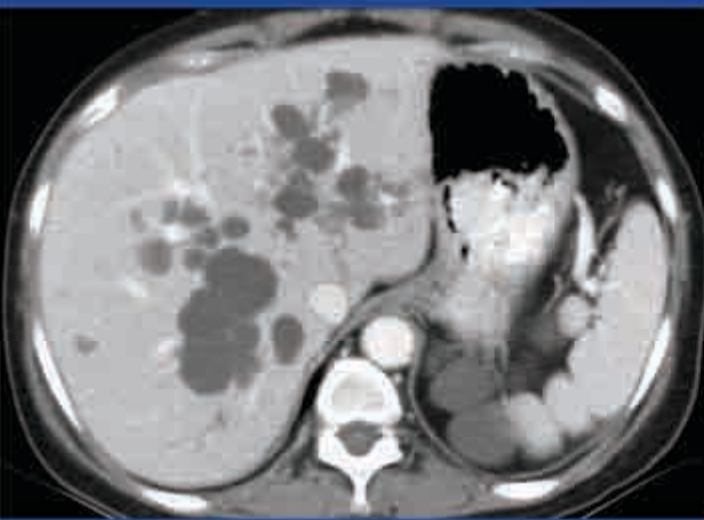
Metastases



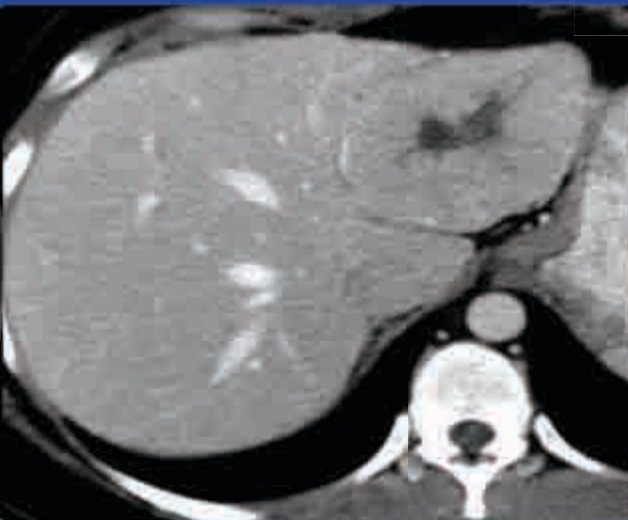
Lymphoma



Cavernous Hemangiomas



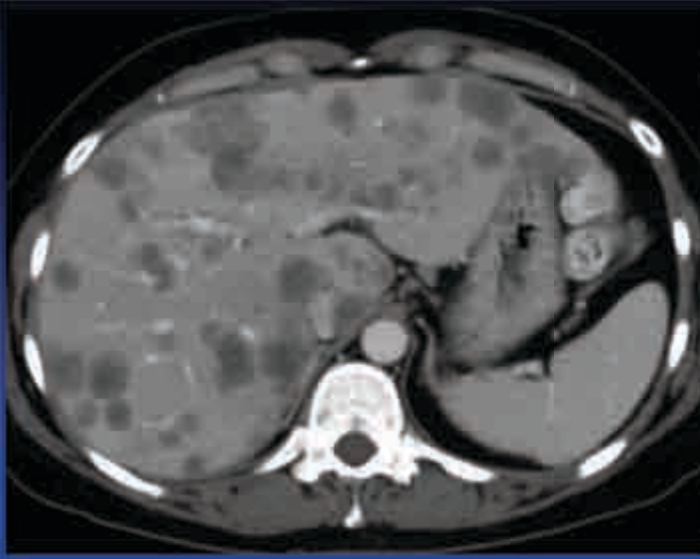
Hepatic Cysts



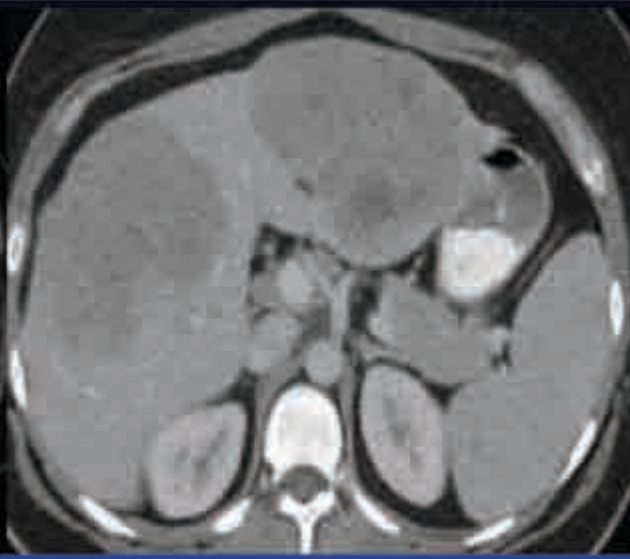
FNH



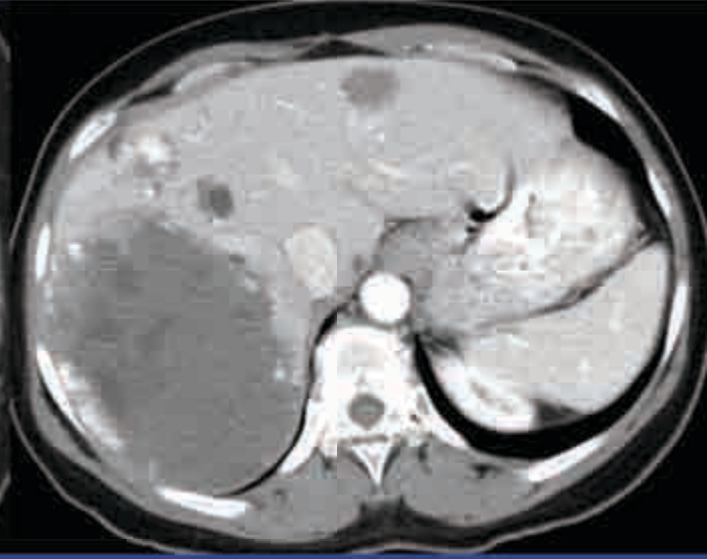




Metastases



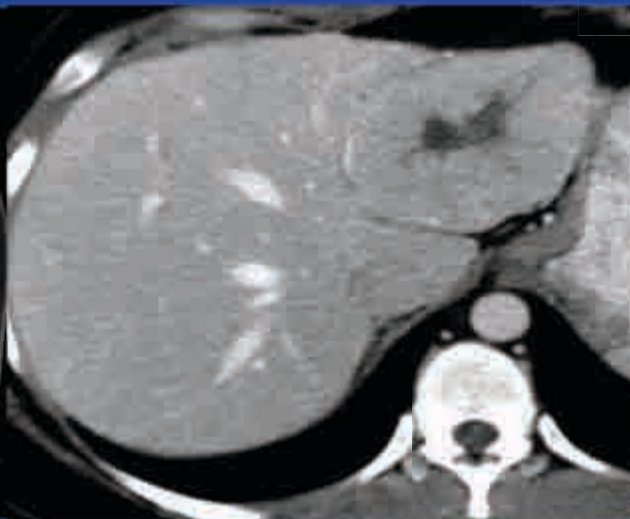
Lymphoma



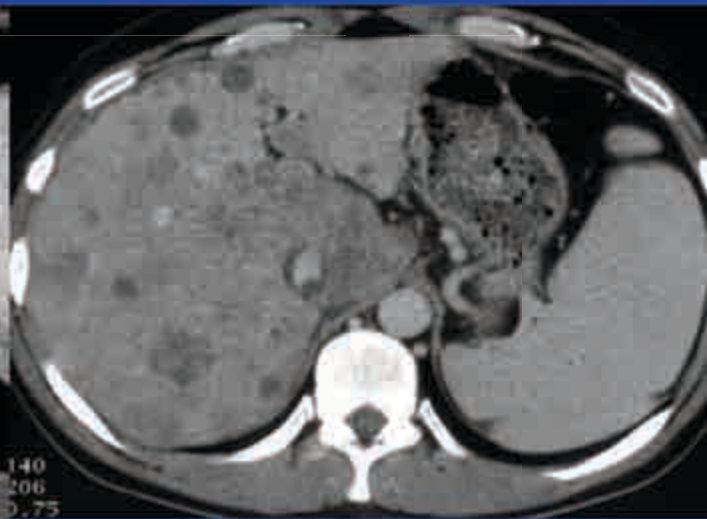
Cavernous Hemangiomas



Hepatic Cysts

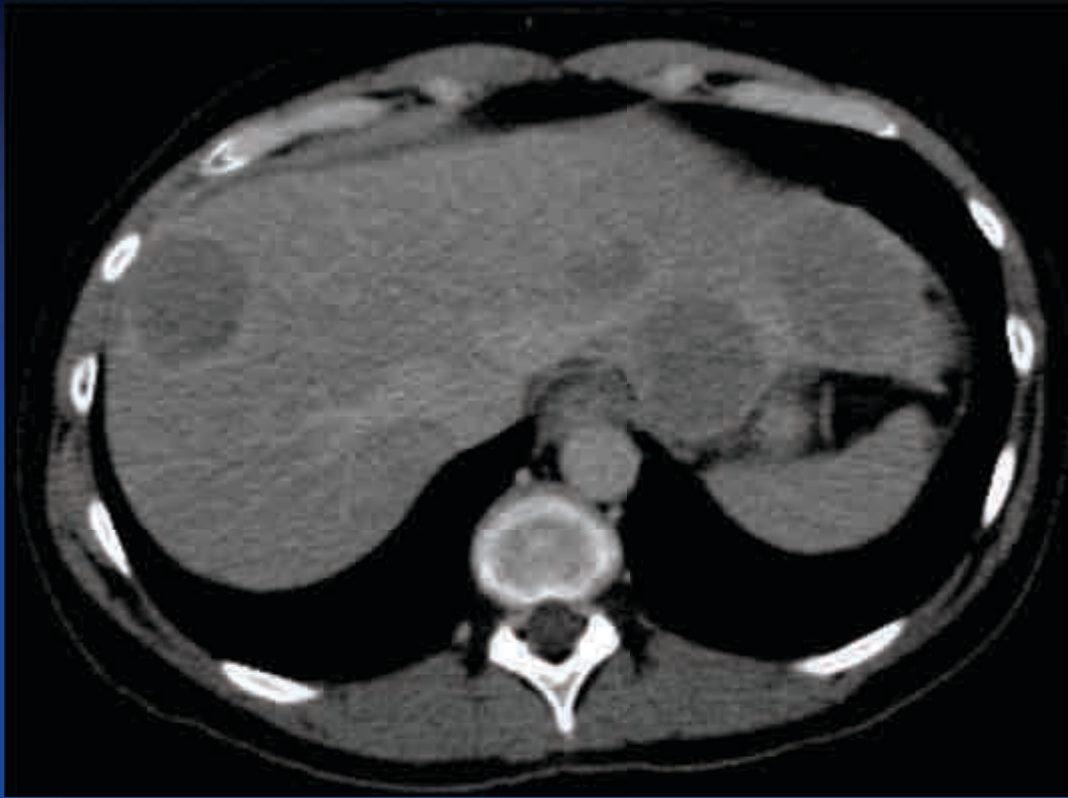


FNH

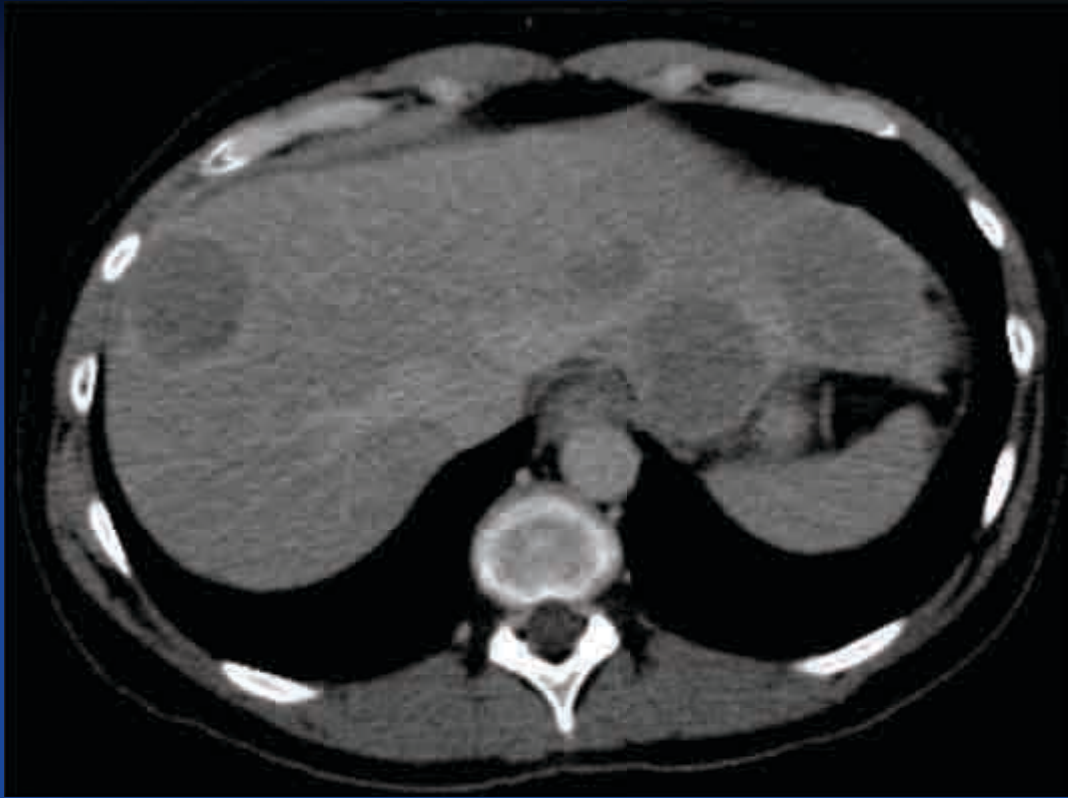


Multifocal HCC



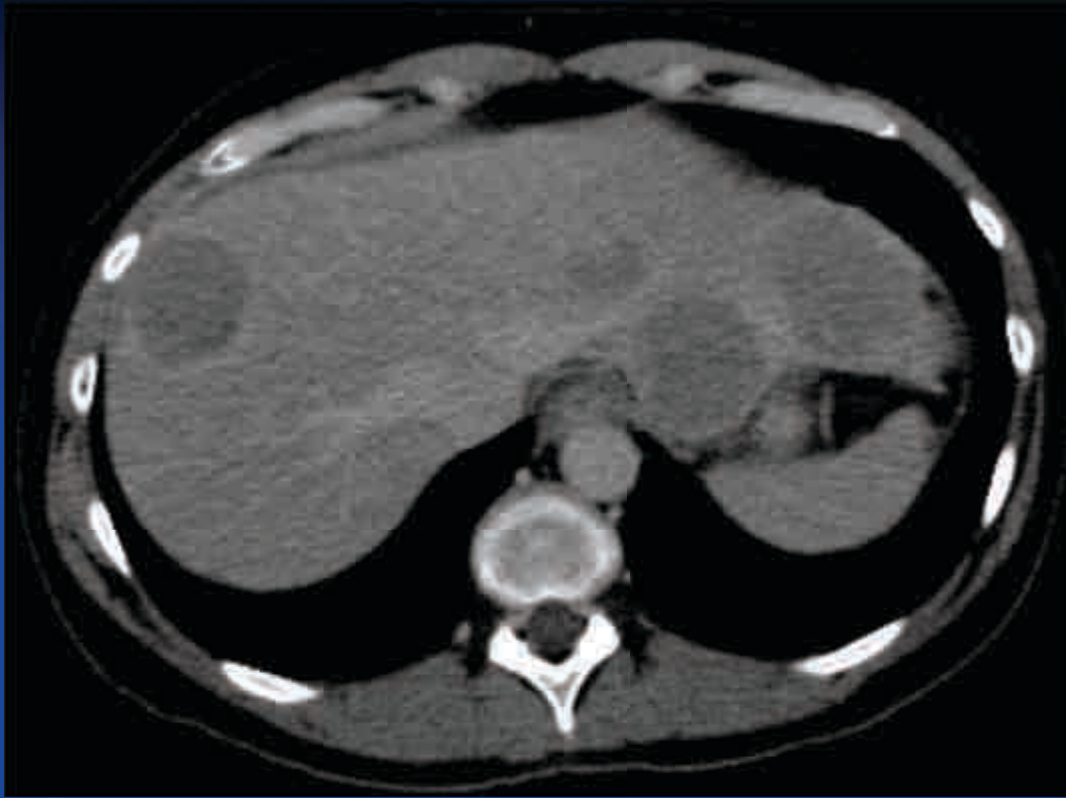


**Most Likely?**



**Most Likely?**

■ **What do you do next?**



**Most Likely?**

- **What do you do next?**
  - Biopsy and/or search for a primary



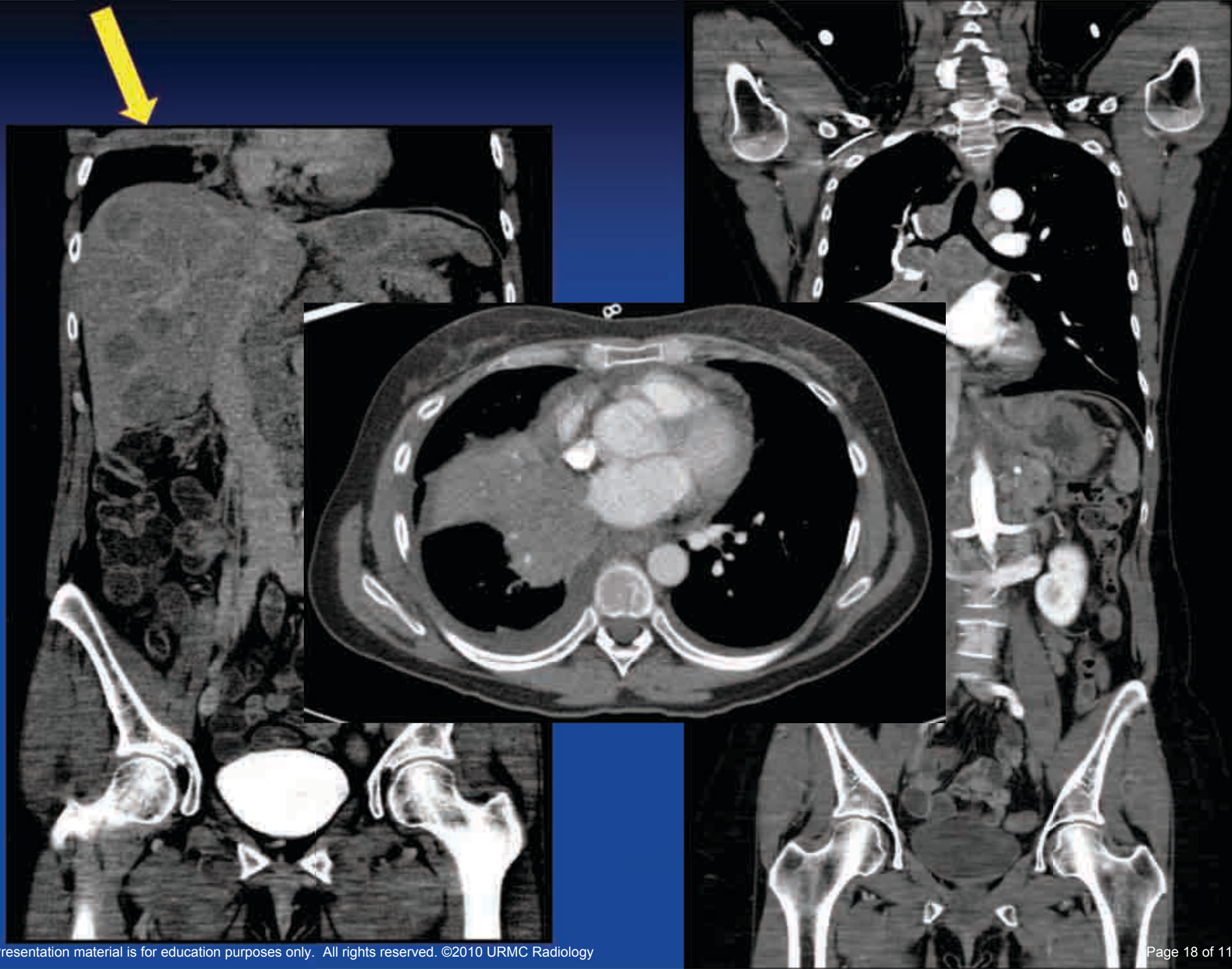


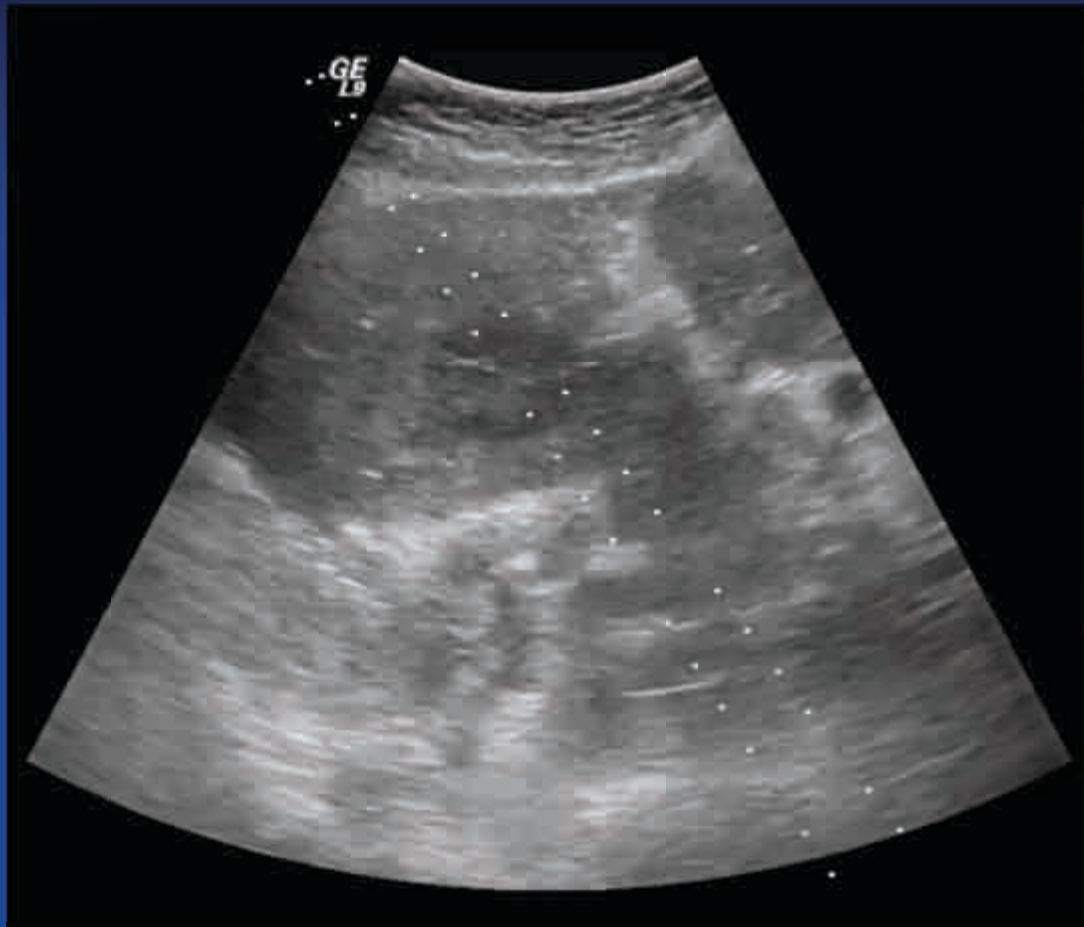






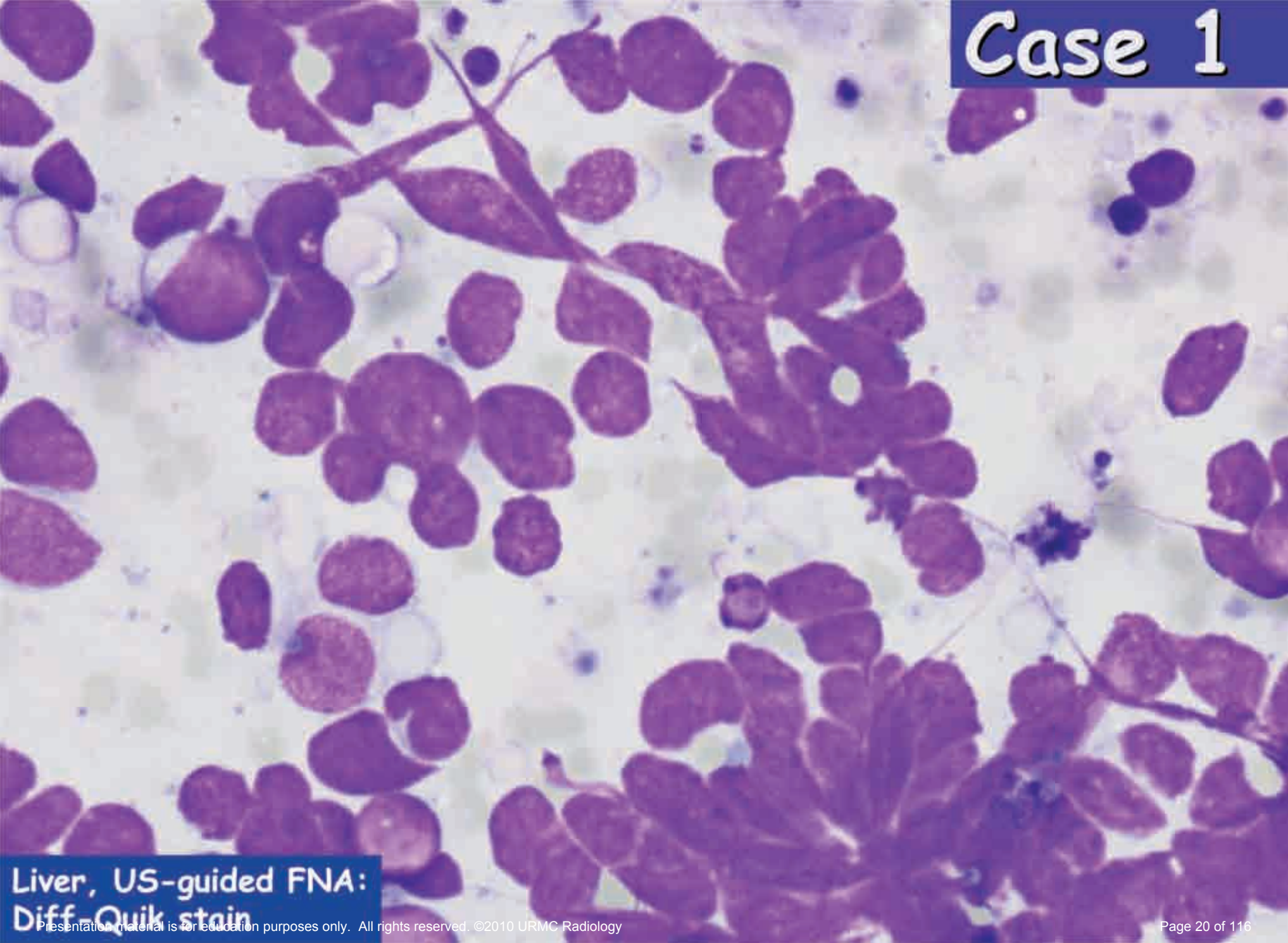






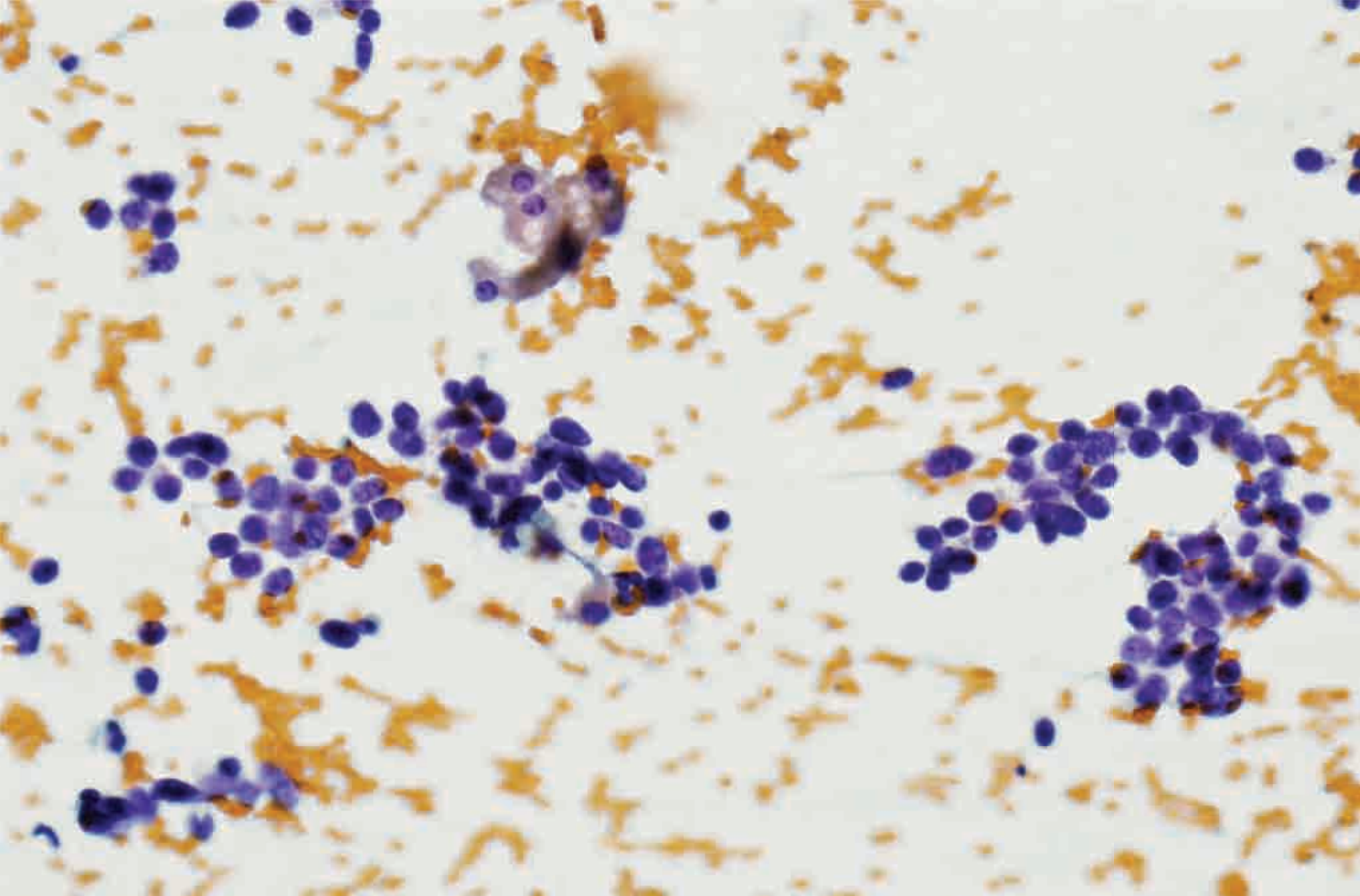


# Case 1

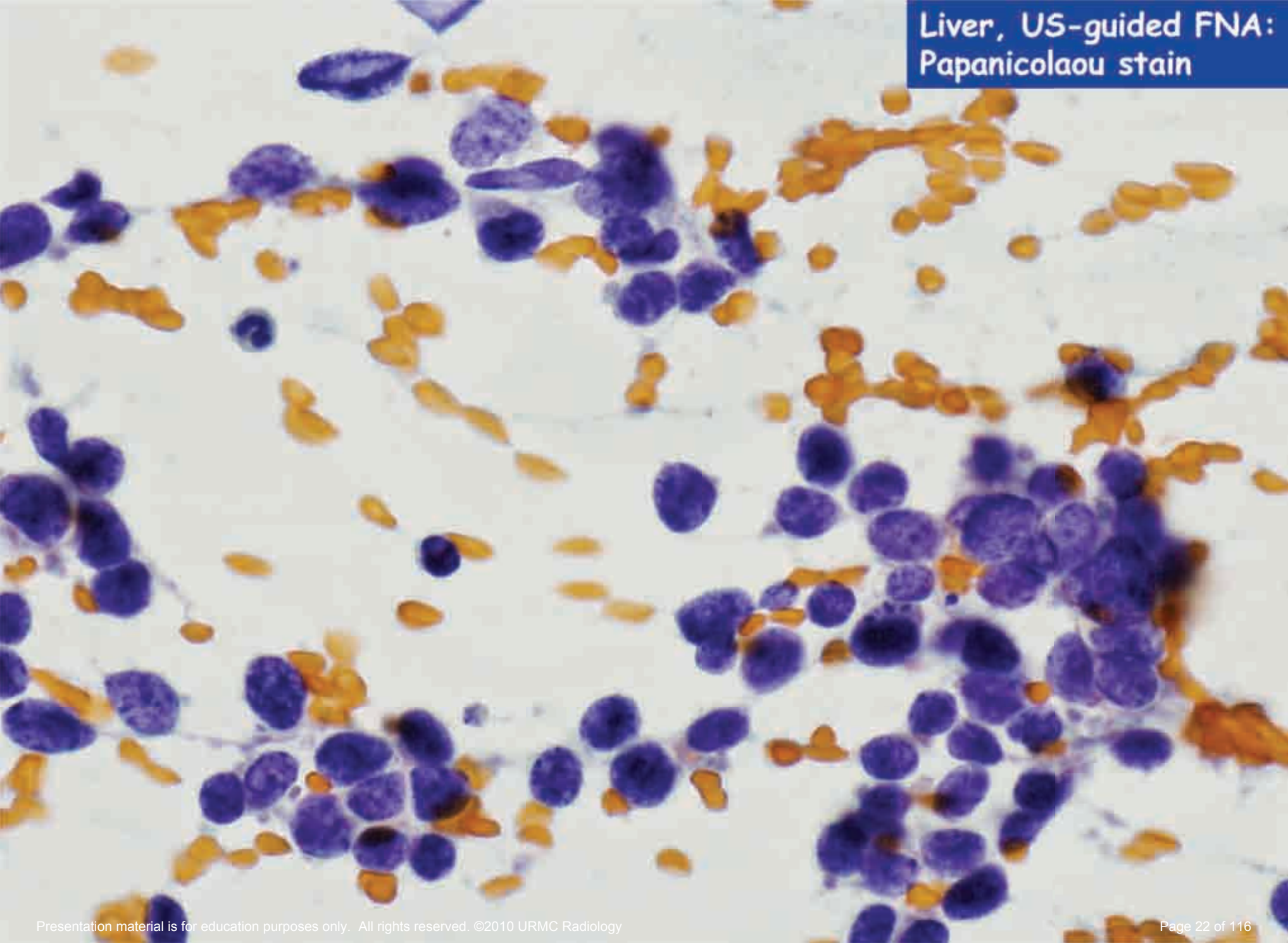


**Liver, US-guided FNA:  
Diff-Quik stain**

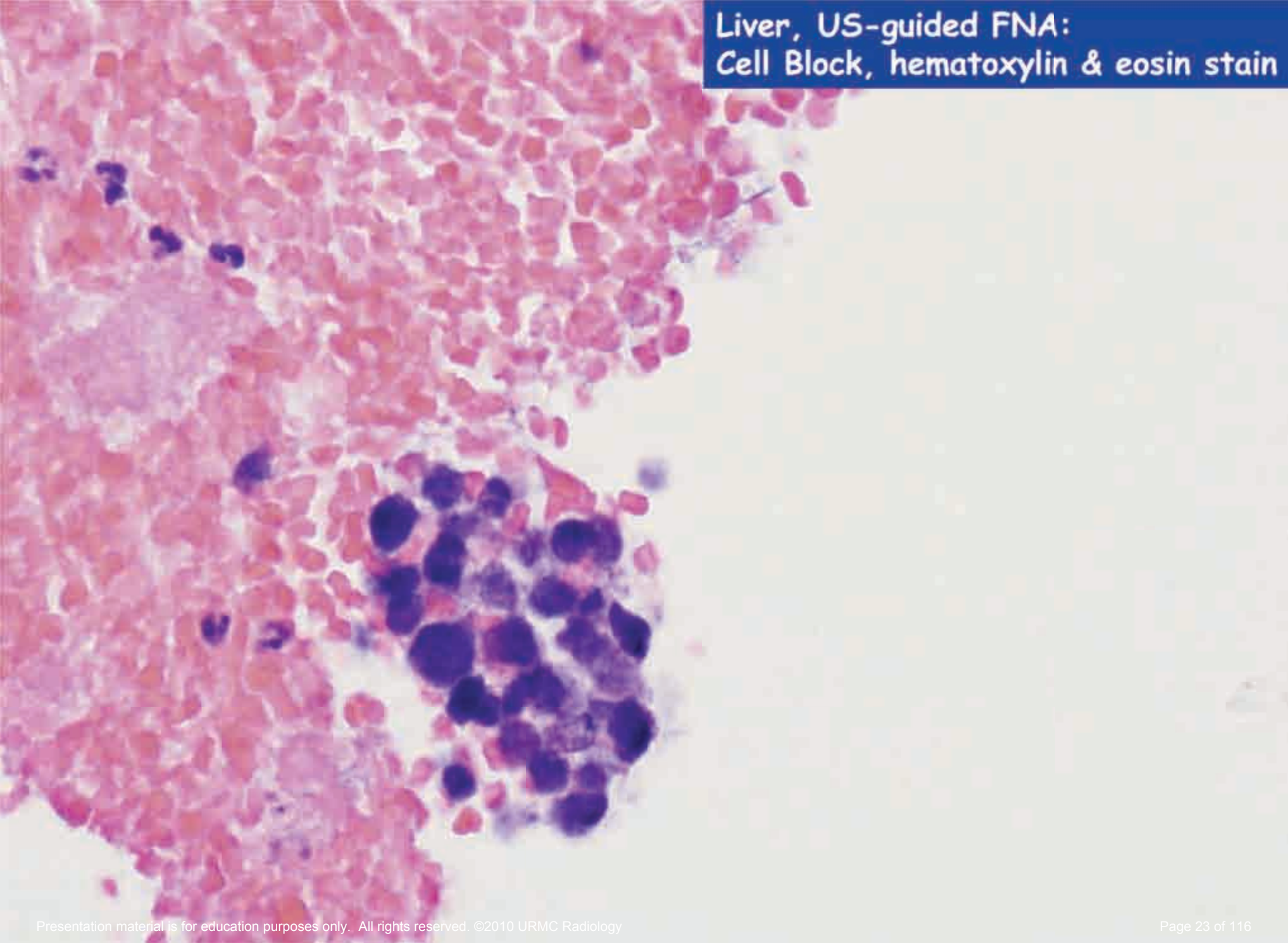




**Liver, US-guided FNA:**  
**Papanicolaou stain**

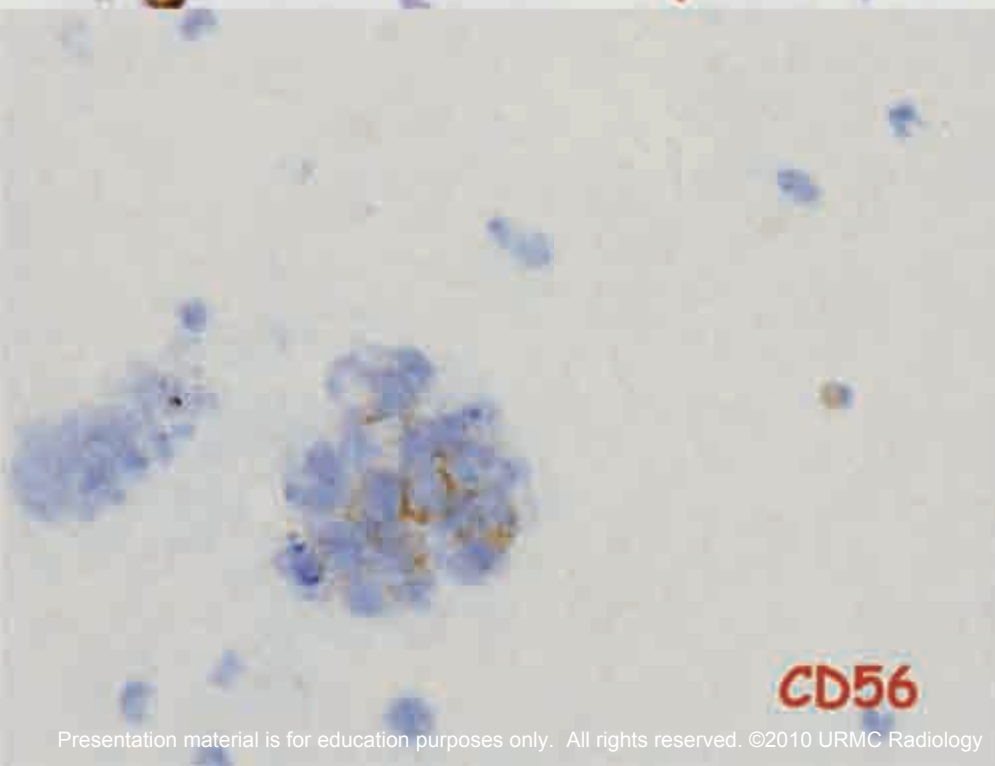
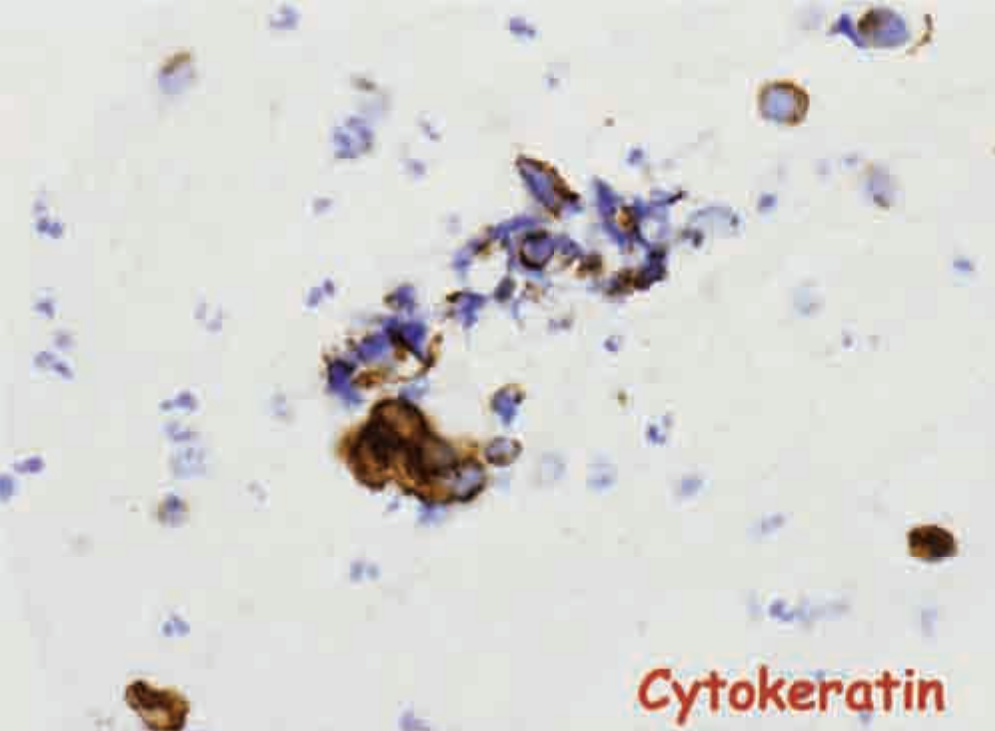








**Liver, US-guided FNA:  
Cell Block, Immunohistochemical stains**



# Liver, ultrasound-guided fine needle aspiration:

Malignant tumor cells present derived from small cell carcinoma.

Comment:

Immunohistochemical stains:

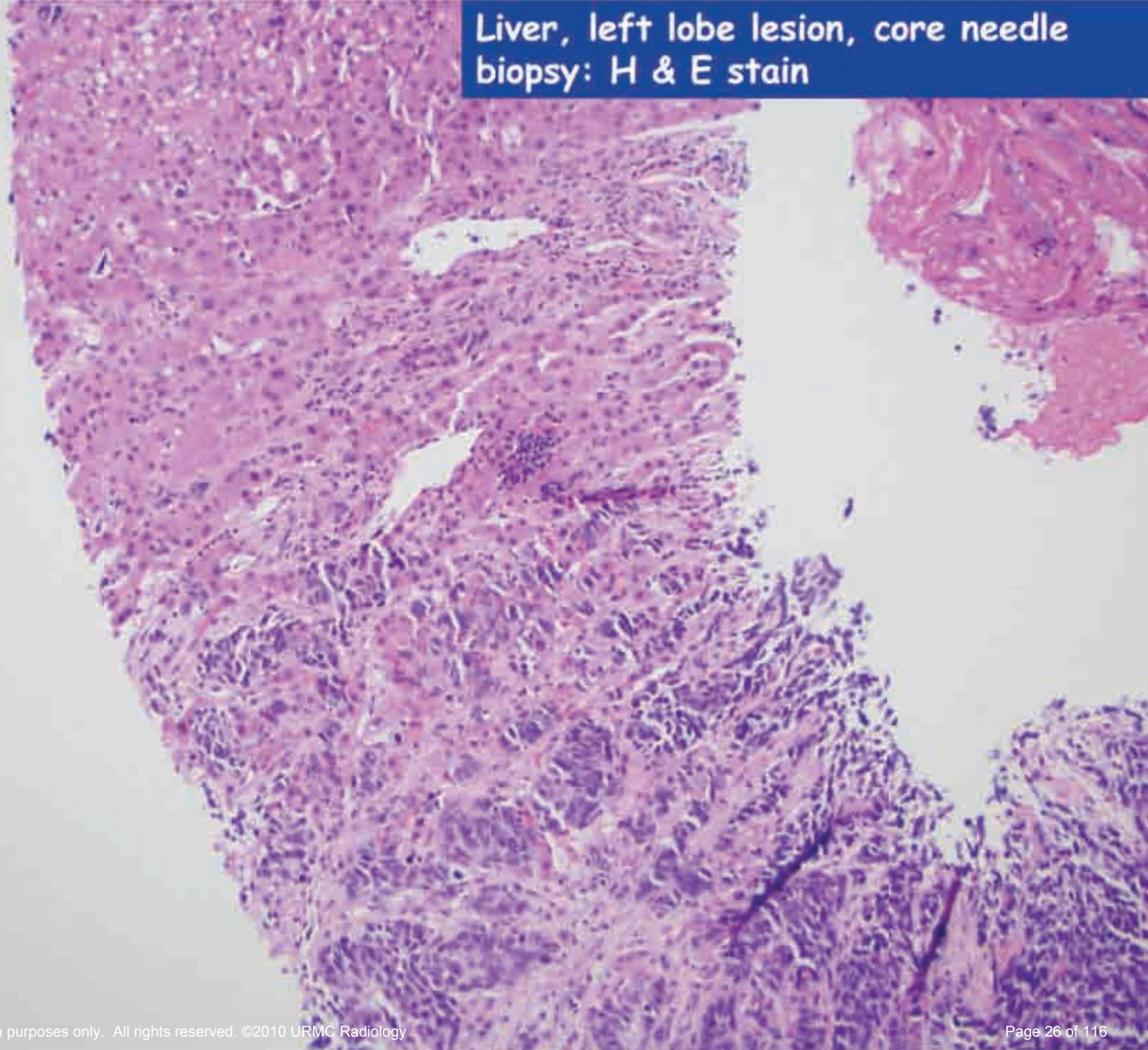
Positive: TTF-1, CD56, CK

Negative: synaptophysin and chromogranin

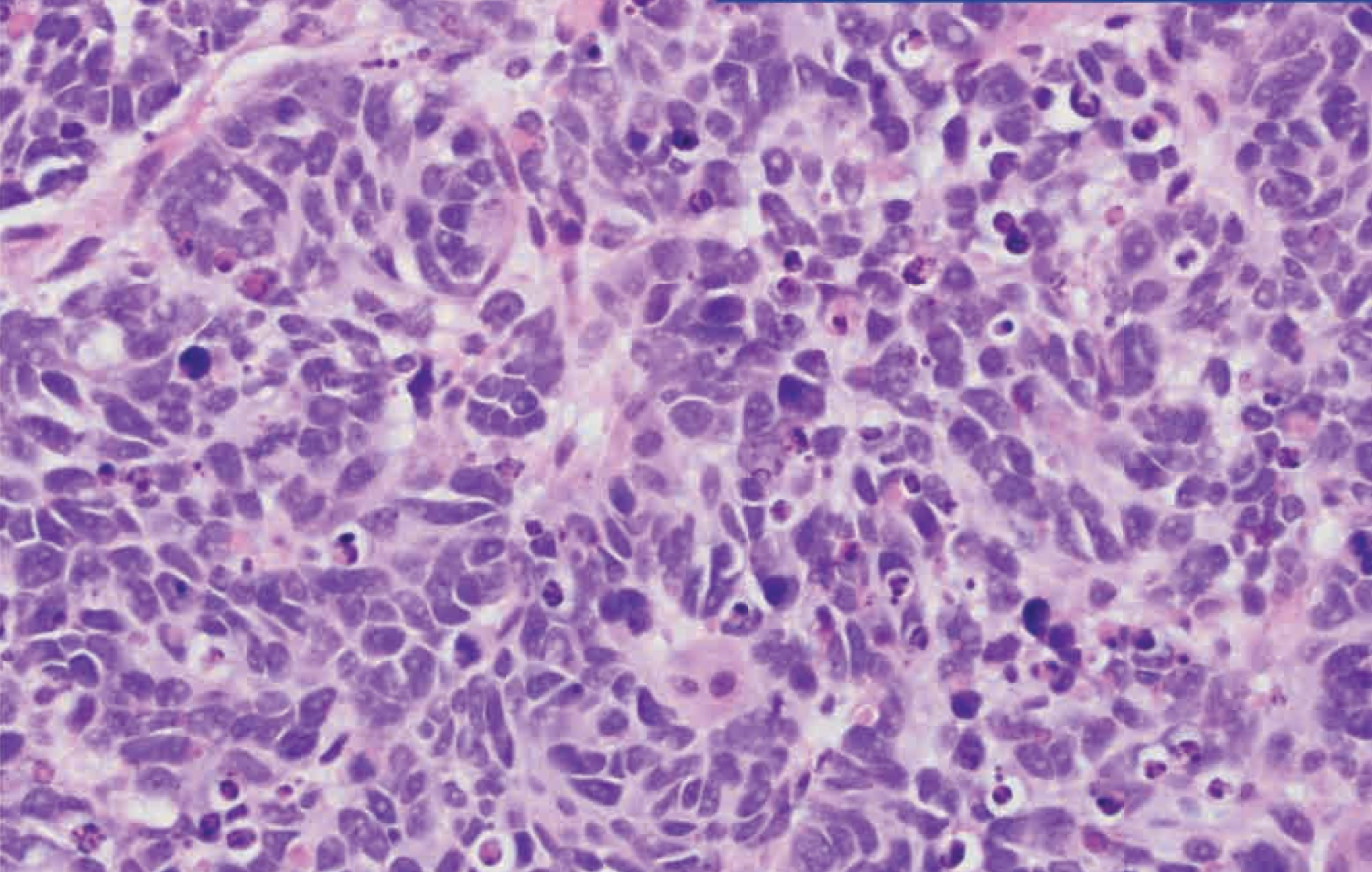
This staining pattern supports small cell carcinoma, likely derived from the lung.  
Clinical correlation is recommended.



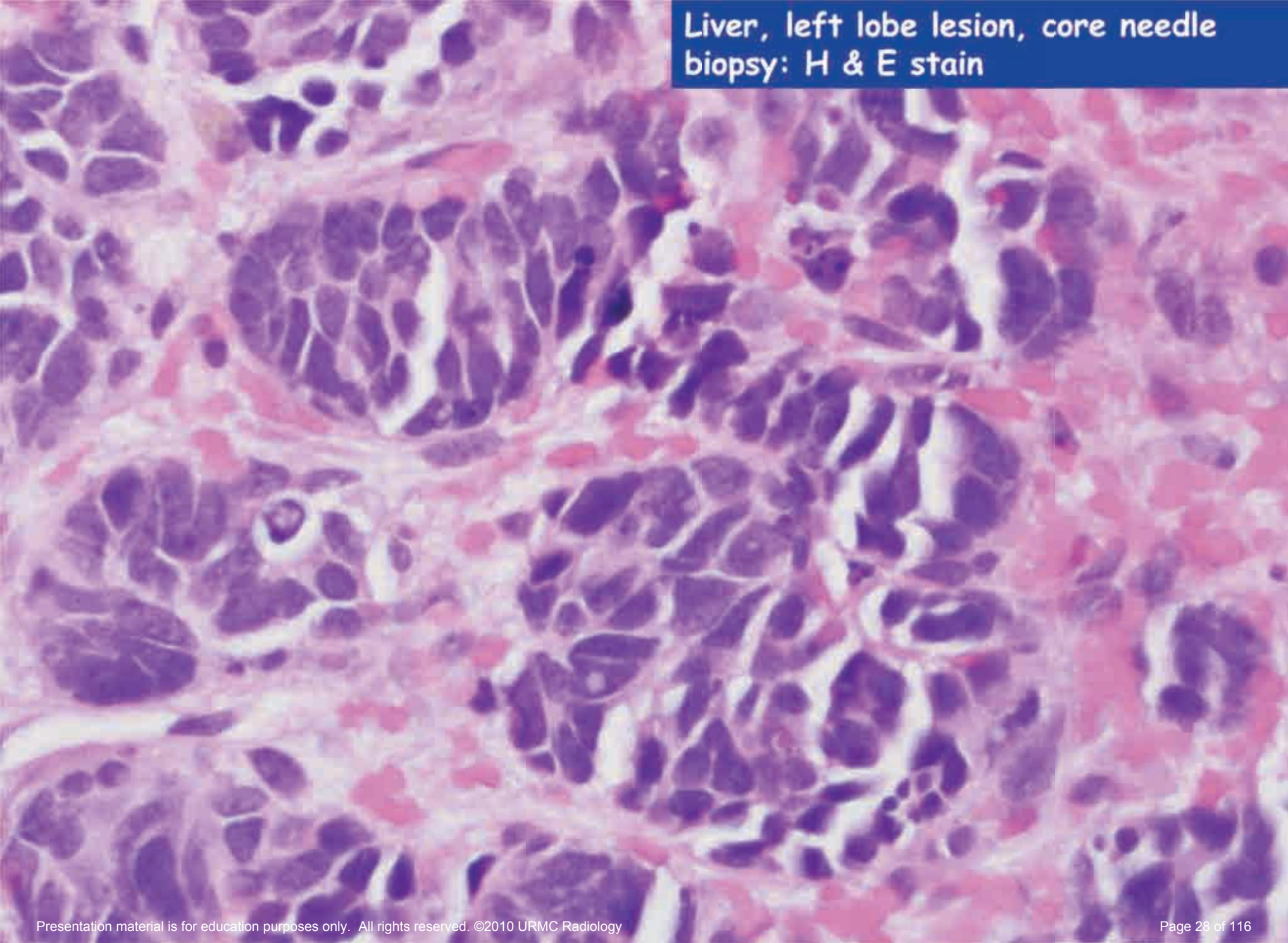
**Liver, left lobe lesion, core needle  
biopsy: H & E stain**











Liver, left lobe lesion, core  
needle biopsy:

Small cell carcinoma

Flow cytometry: Negative for  
monoclonal B-cell population.



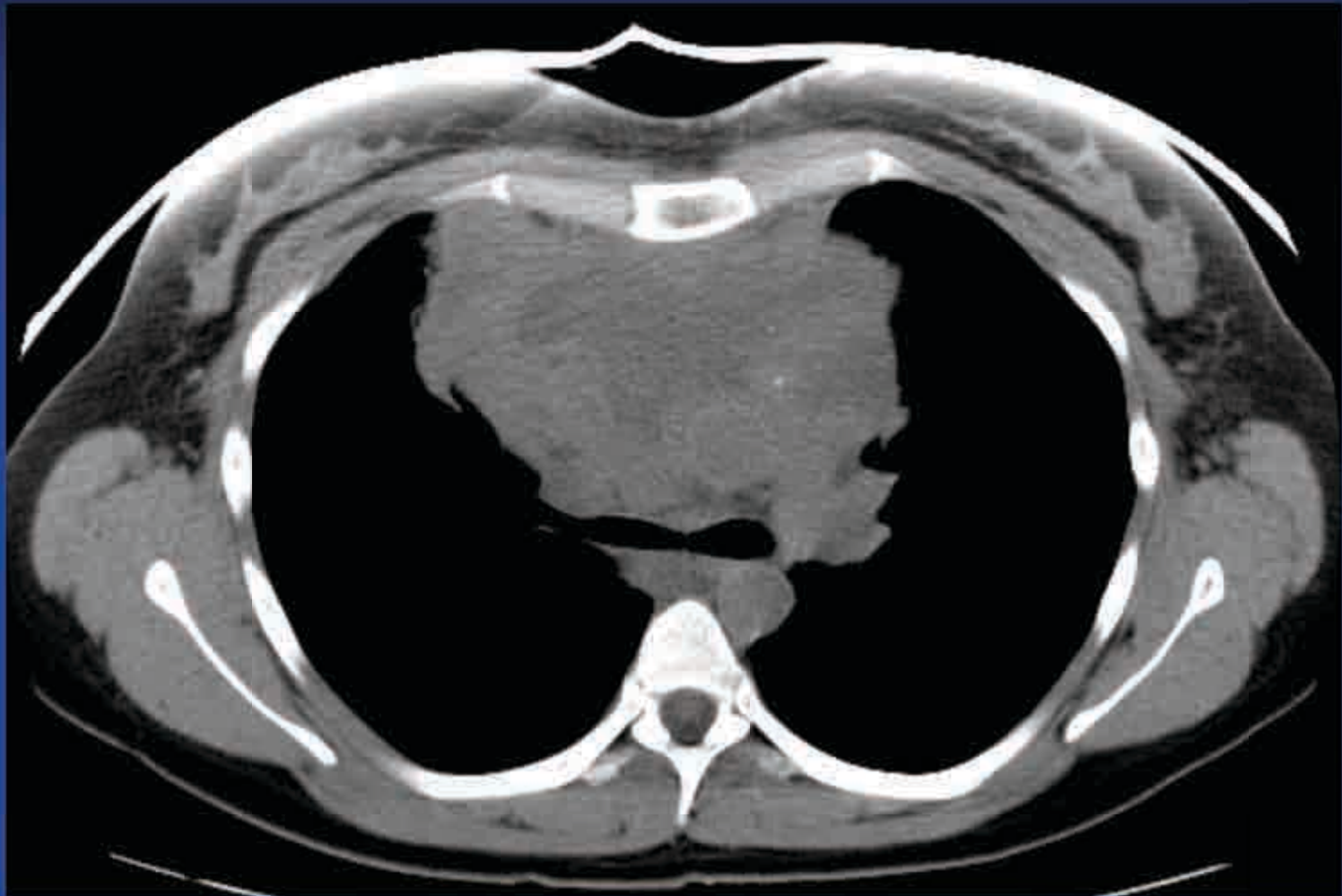
# Small Cell Carcinoma

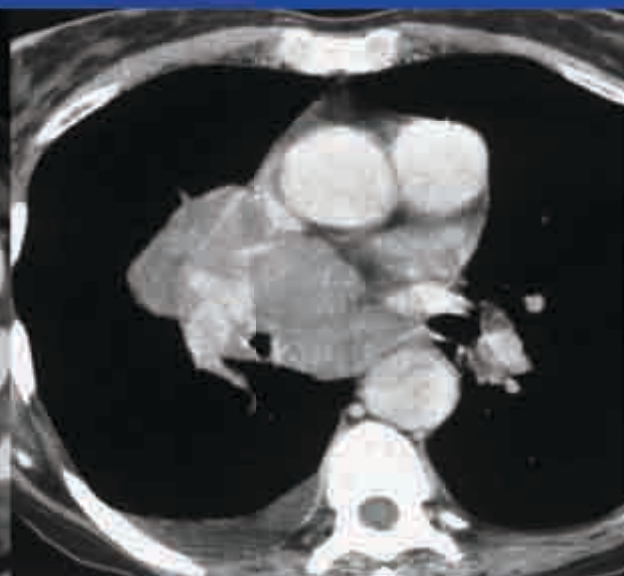
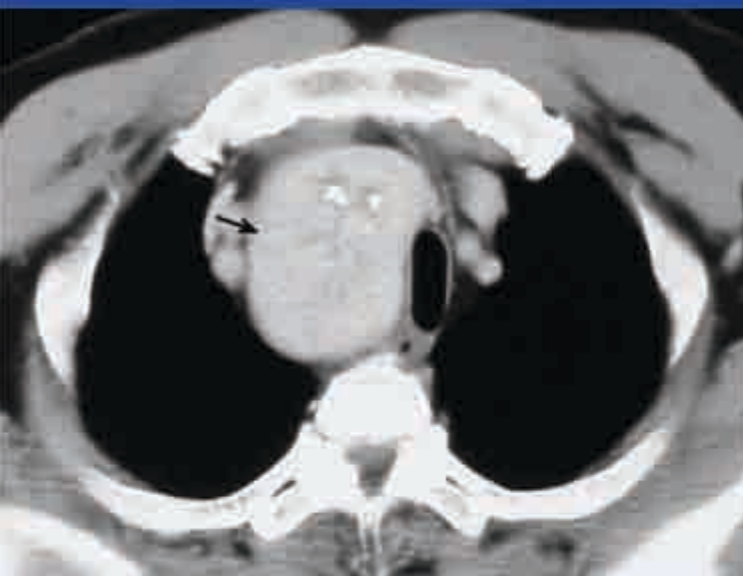
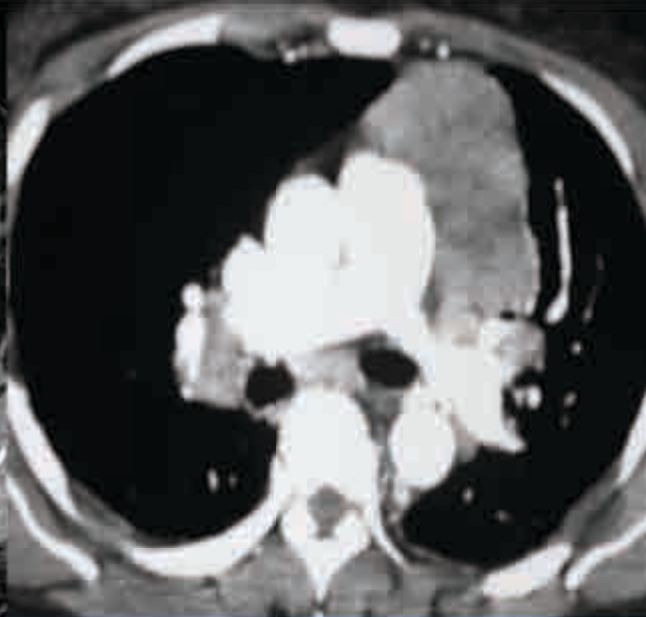
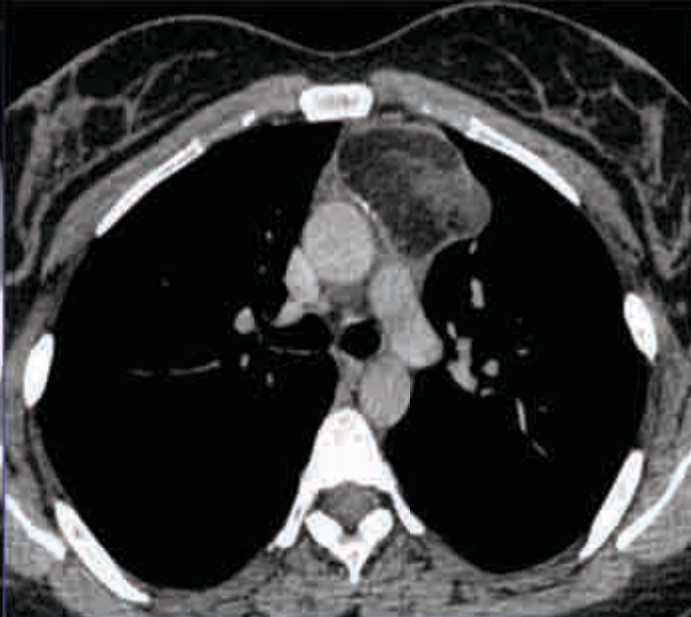
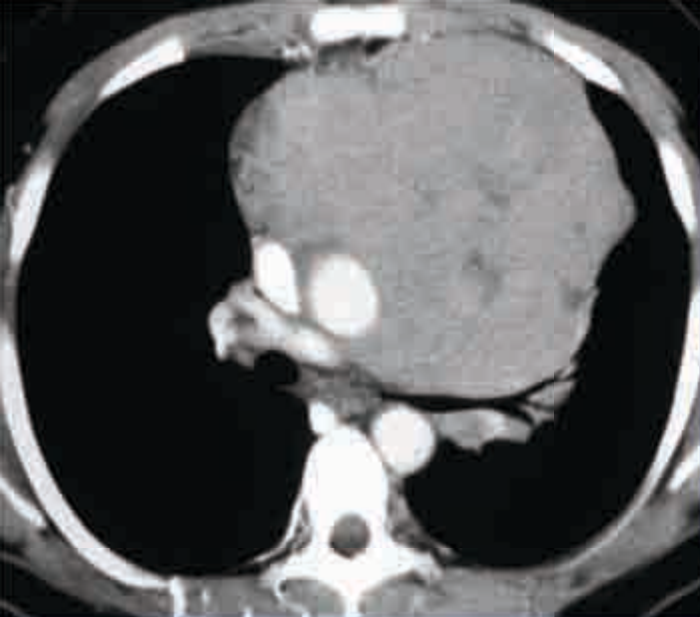
- 10-20% of lung carcinomas
- M>F, median age 60, 99% smokers
- Can be associated with paraneoplastic syndromes (ADH, ACTH, PTH, calcitonin, etc.)
- Aggressive, often present with positive lymph nodes
  - 5 year survival stage I-II: 30-40%, stage III-IV: 10-20%
- Usually hilar mass with necrosis
- Immunohistochemistry: CK, TTF1 (90%), CD56, synaptophysin, chromogranin

# Case 2

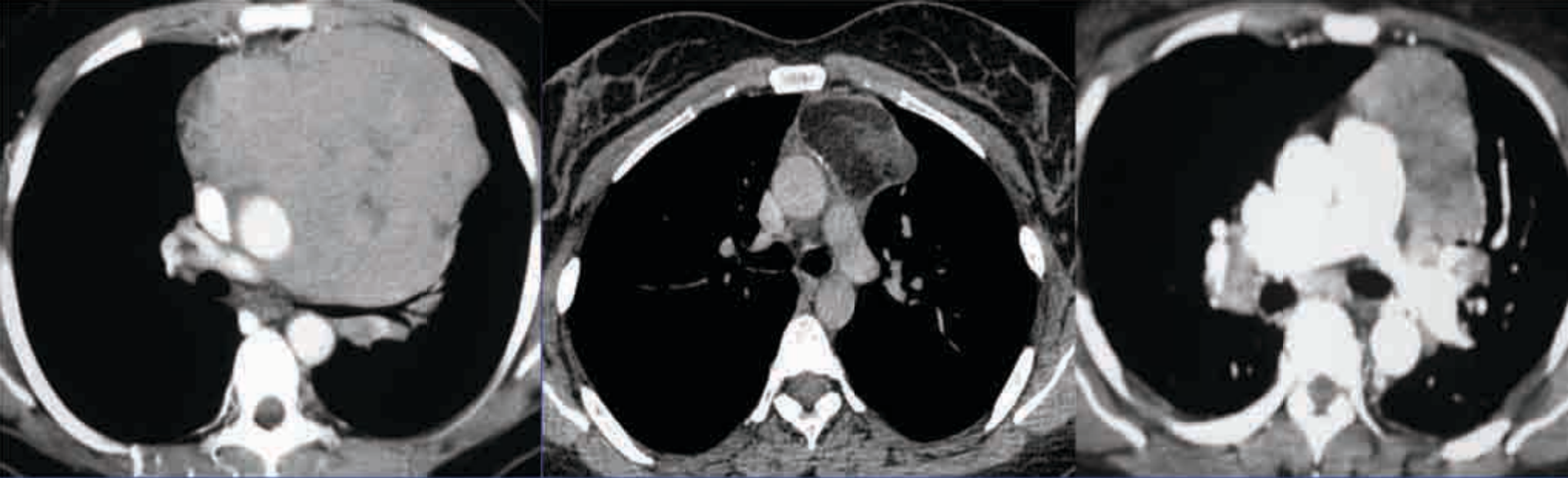
**30 year old female presents with two weeks of headache, neck swelling, blurry vision and epistaxis**





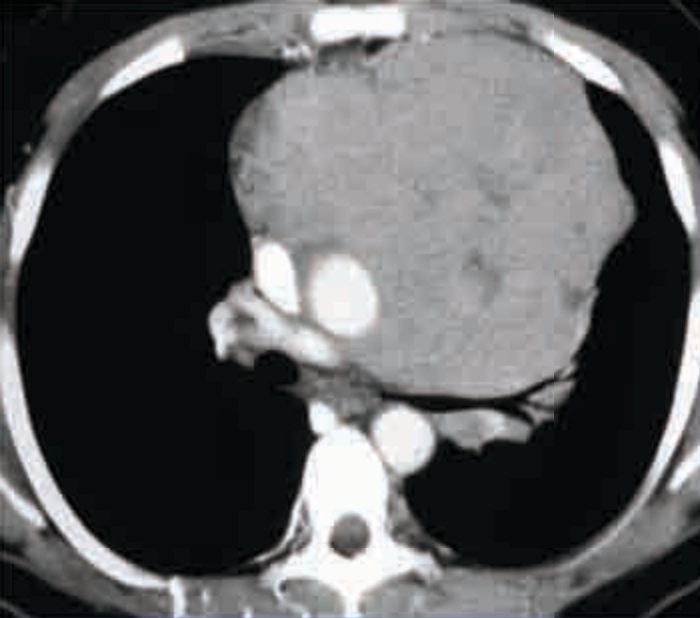




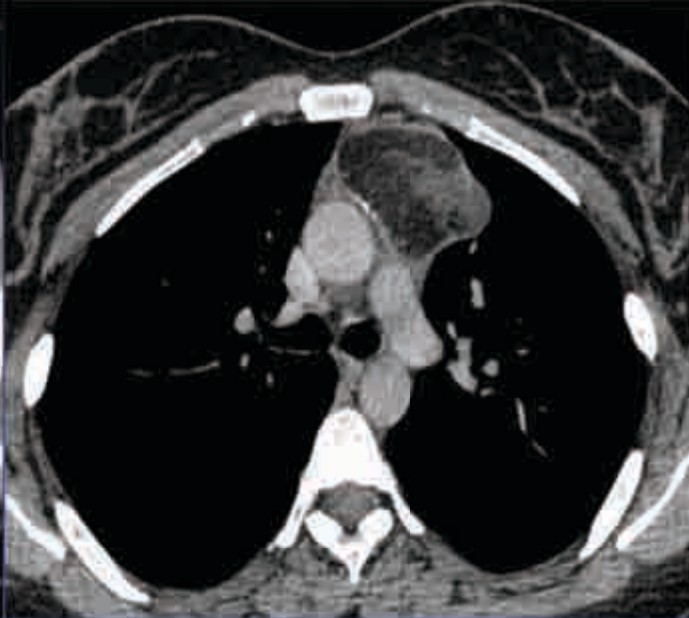


Lymphoma

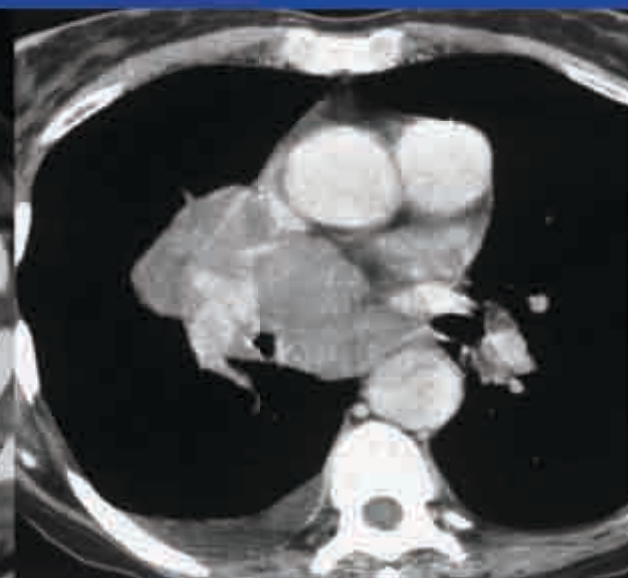
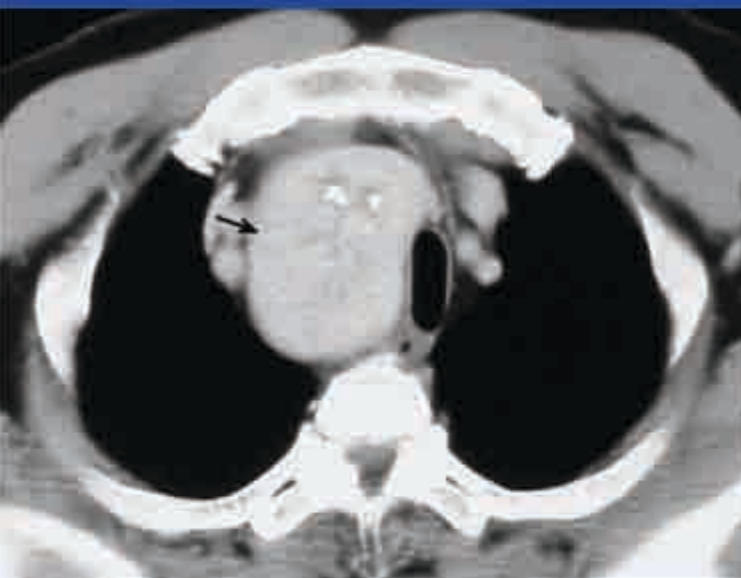




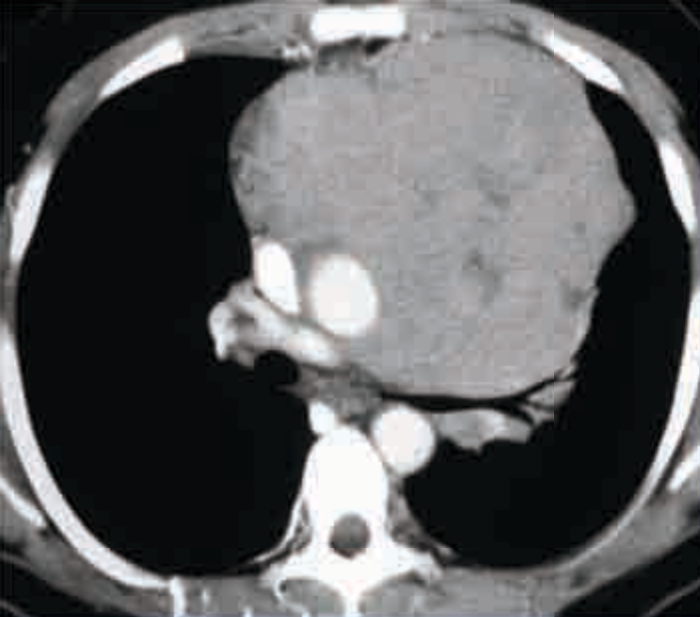
Lymphoma



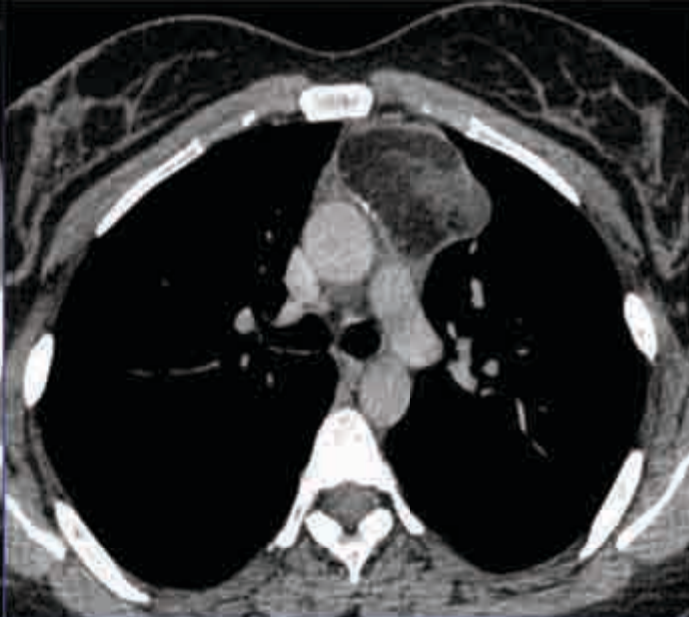
Teratoma (Germ Cell)







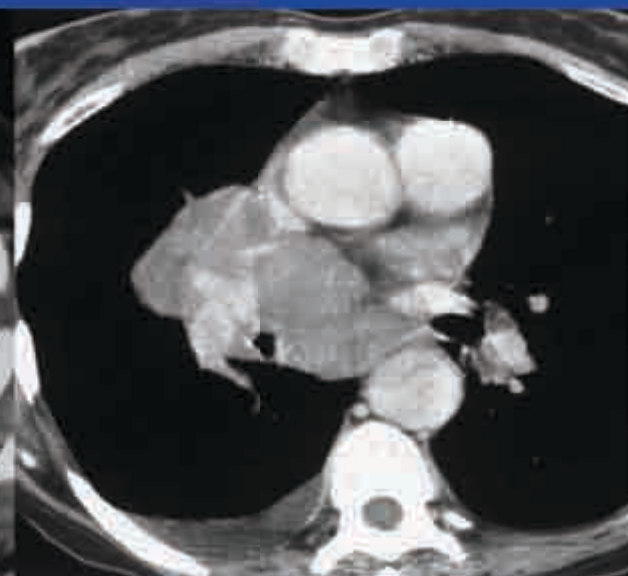
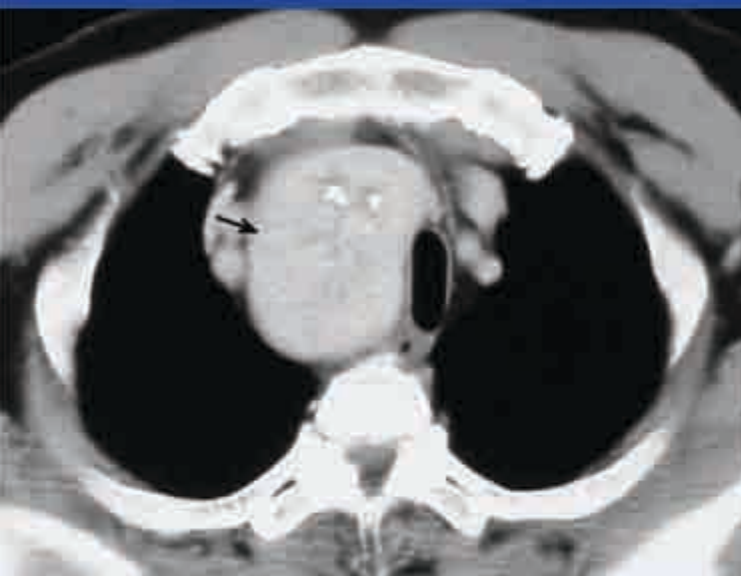
Lymphoma

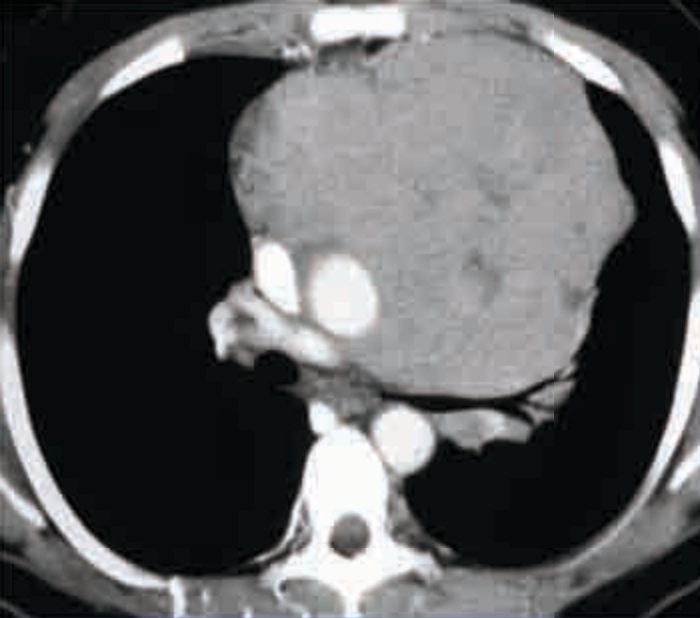


Teratoma (Germ Cell)

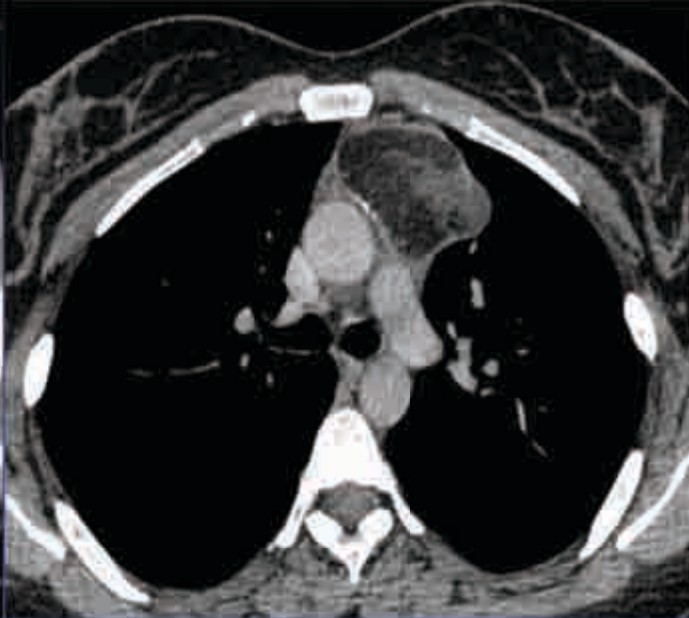


Thymoma





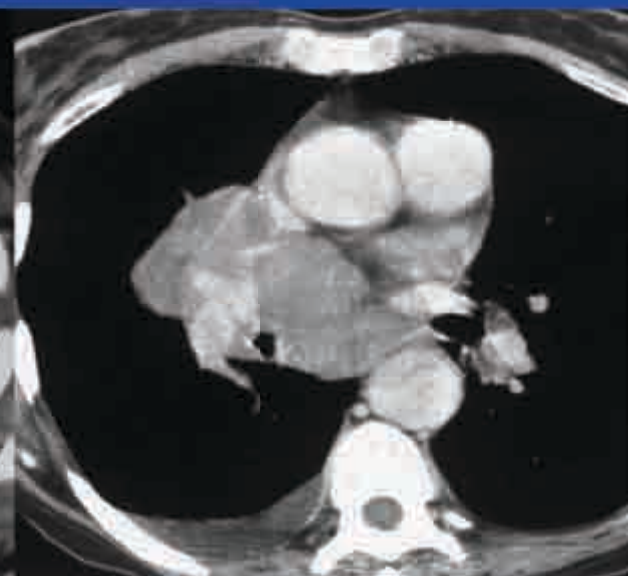
Lymphoma



Teratoma (Germ Cell)

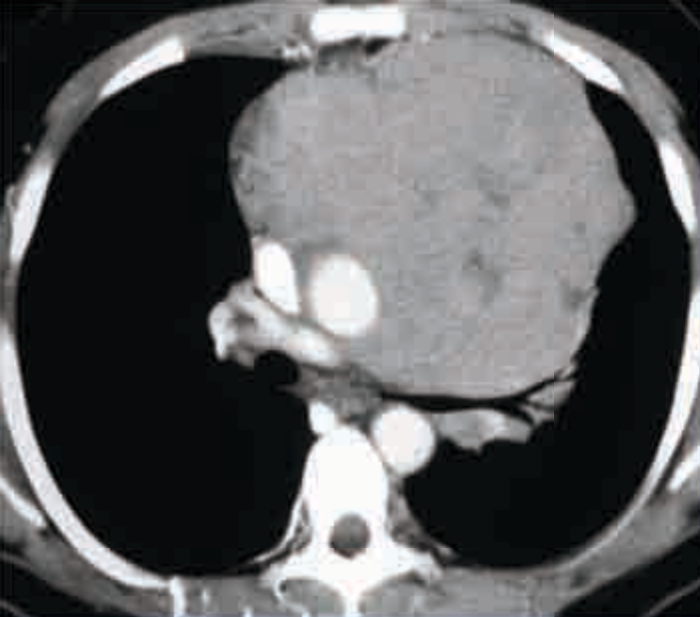


Thymoma

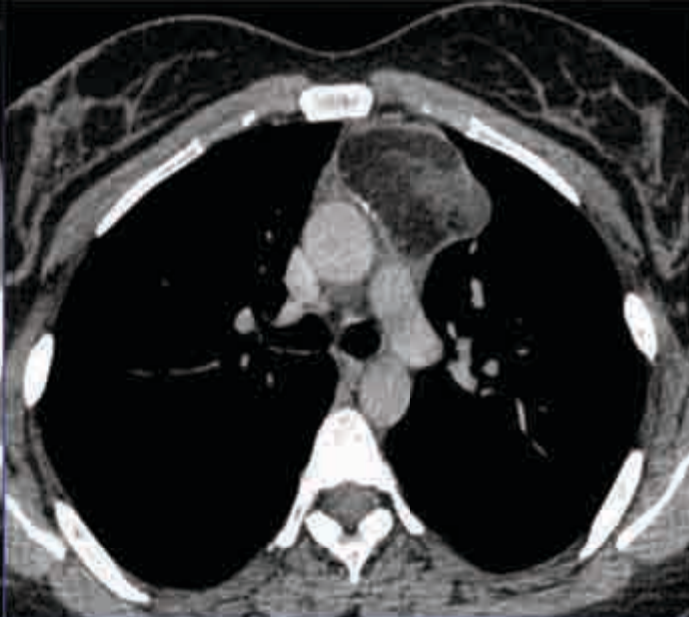


Thyroid Goiter/CA





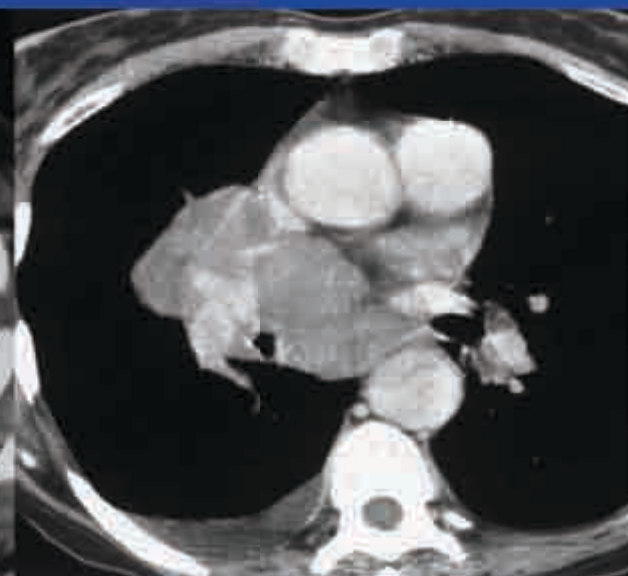
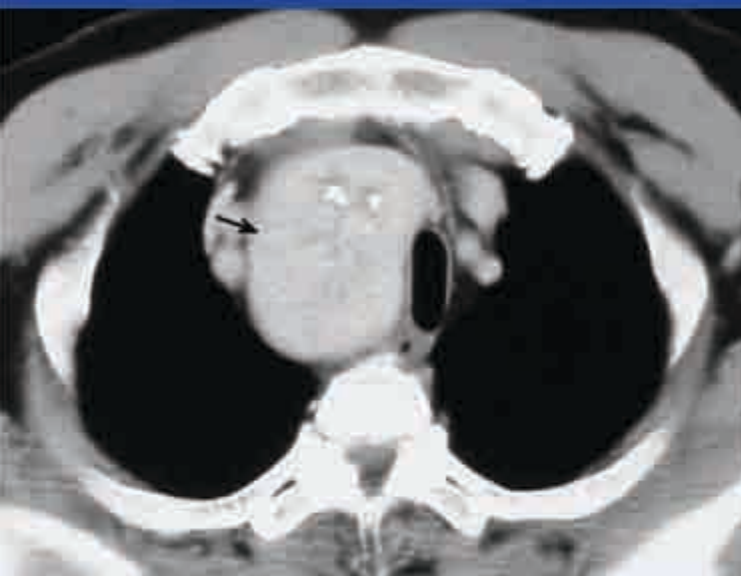
Lymphoma



Teratoma (Germ Cell)

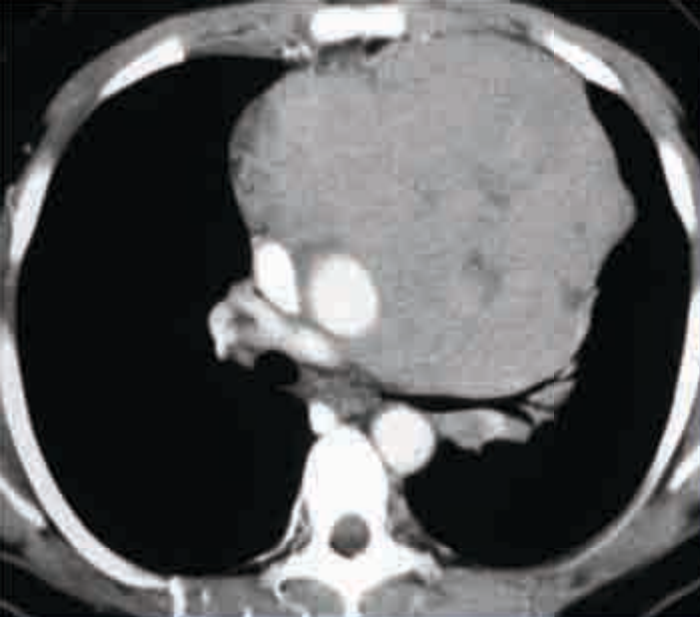


Thymoma

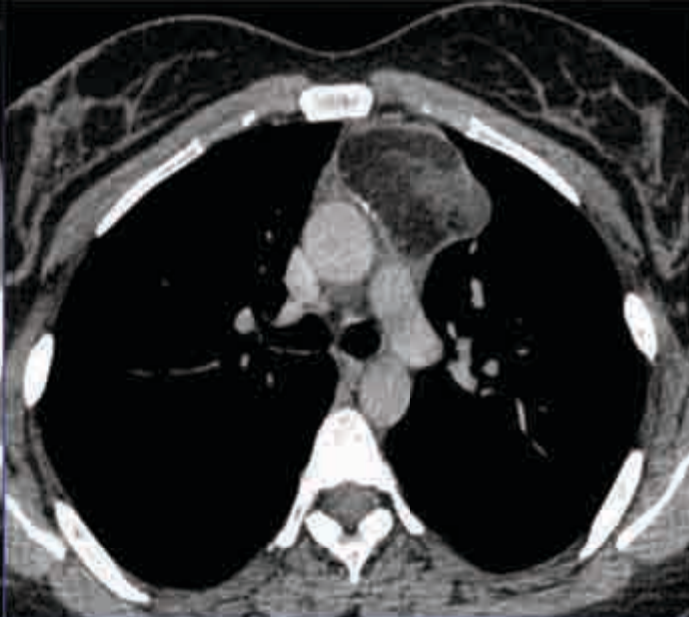


Thyroid Goiter/CA

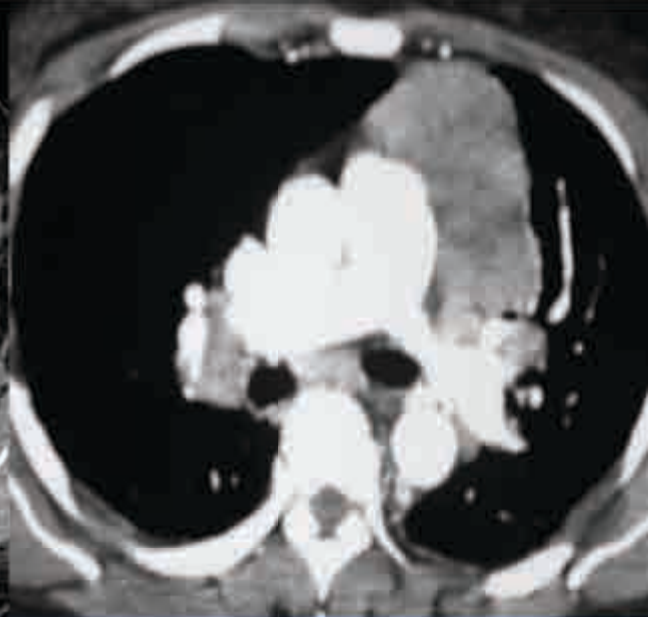
Metastases



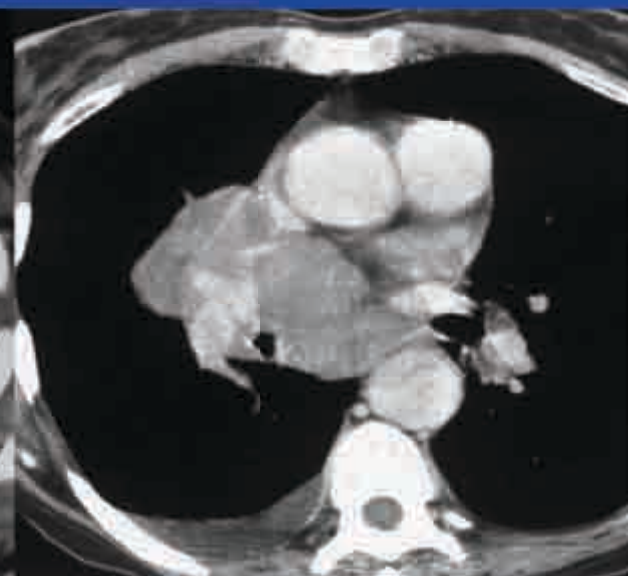
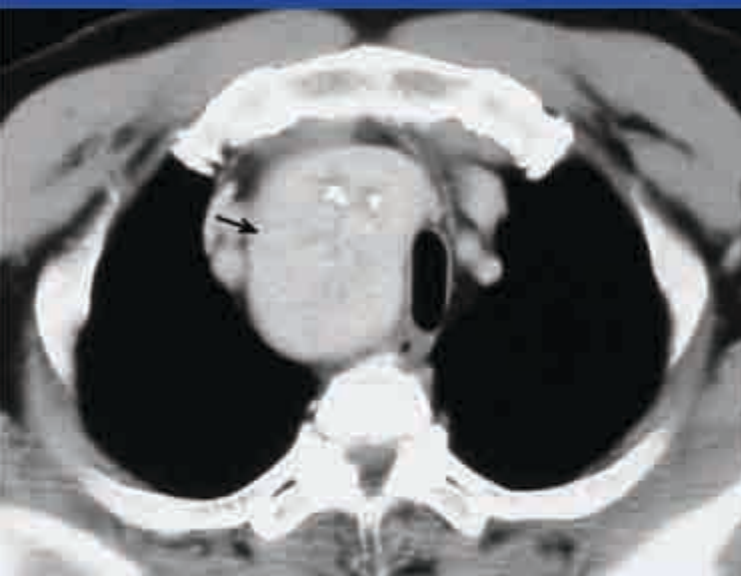
Lymphoma



Teratoma (Germ Cell)



Thymoma

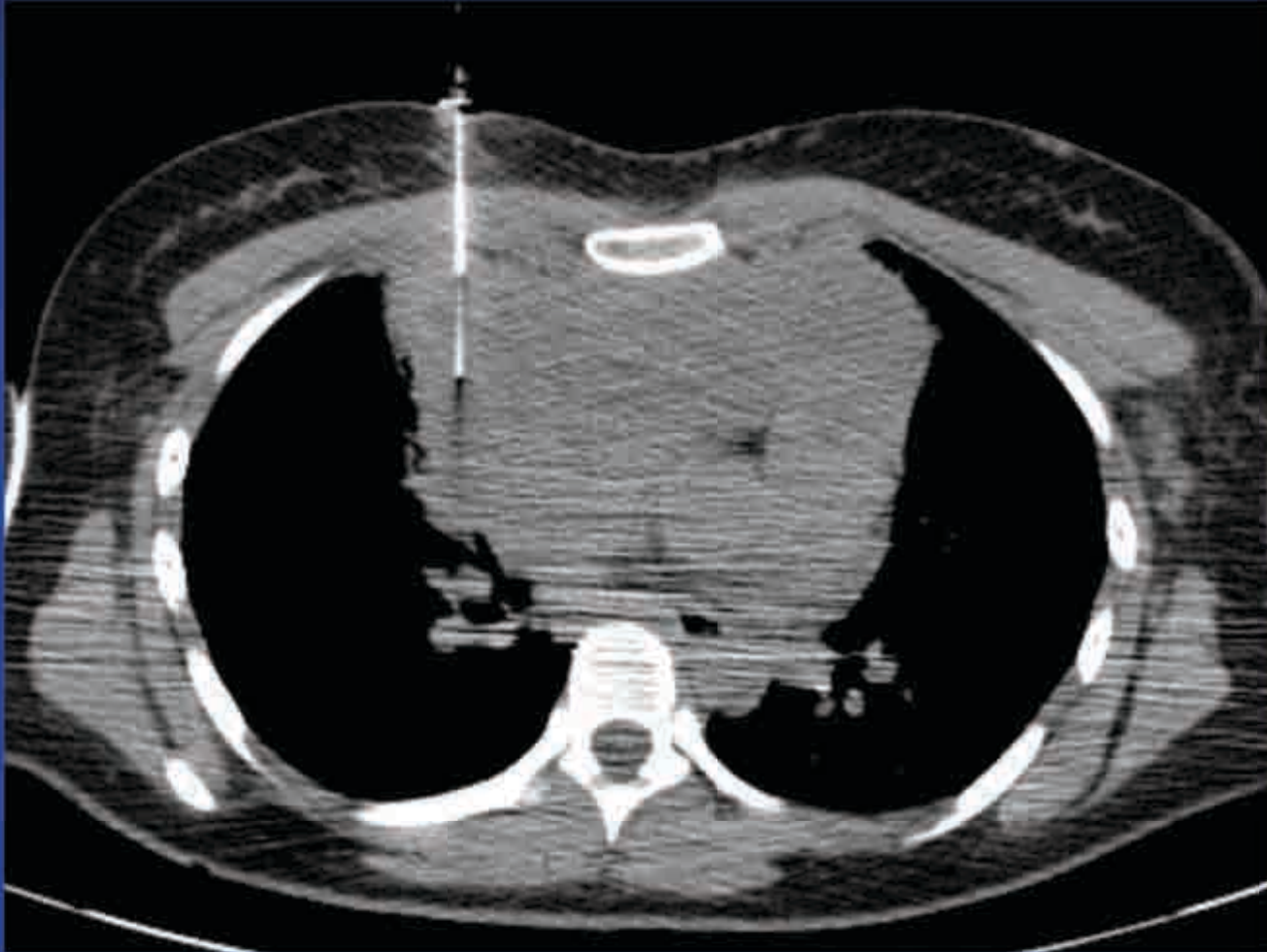


Thyroid Goiter/CA

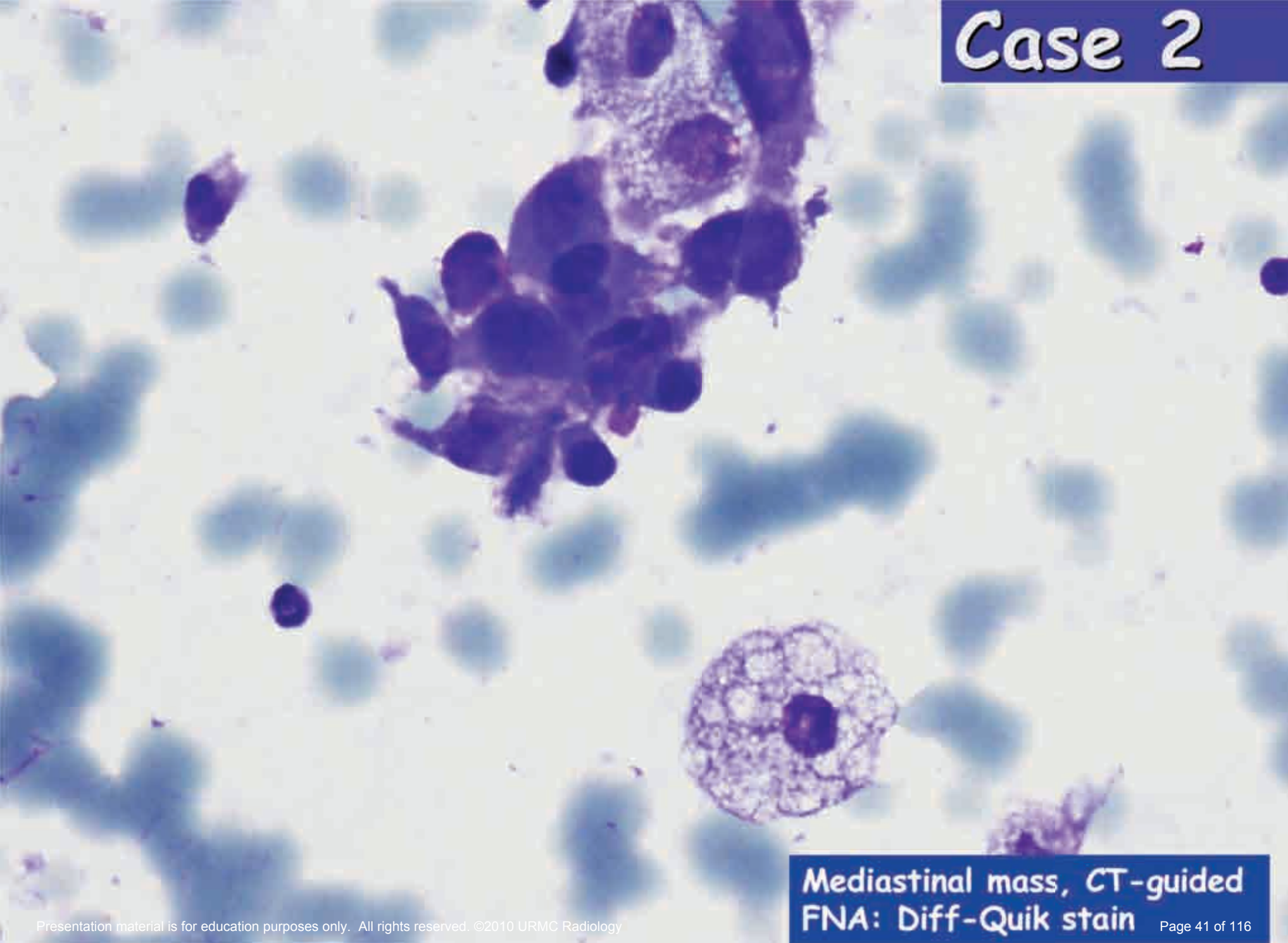
Metastases

Small Cell CA



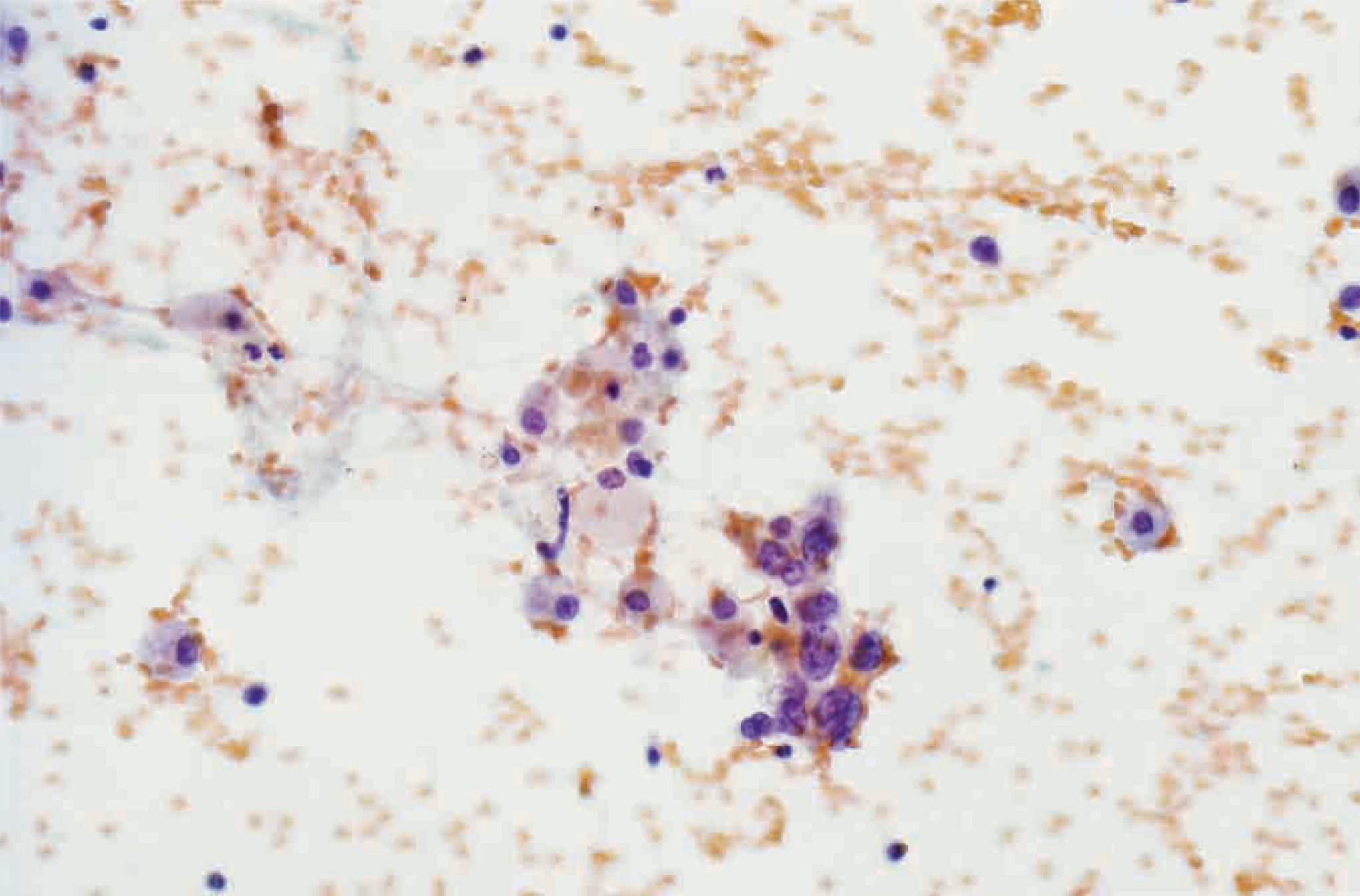


# Case 2

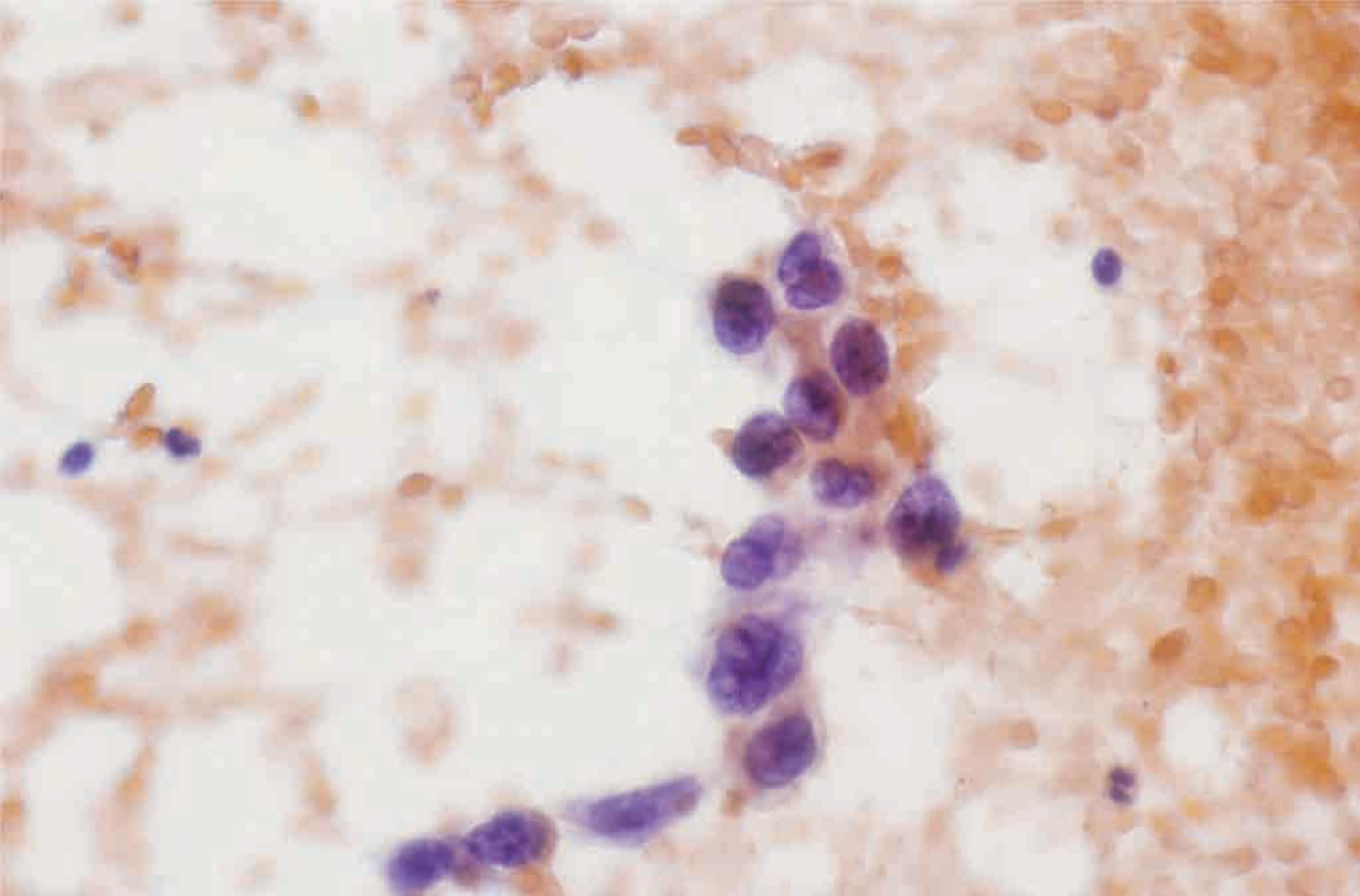


**Mediastinal mass, CT-guided  
FNA: Diff-Quik stain**



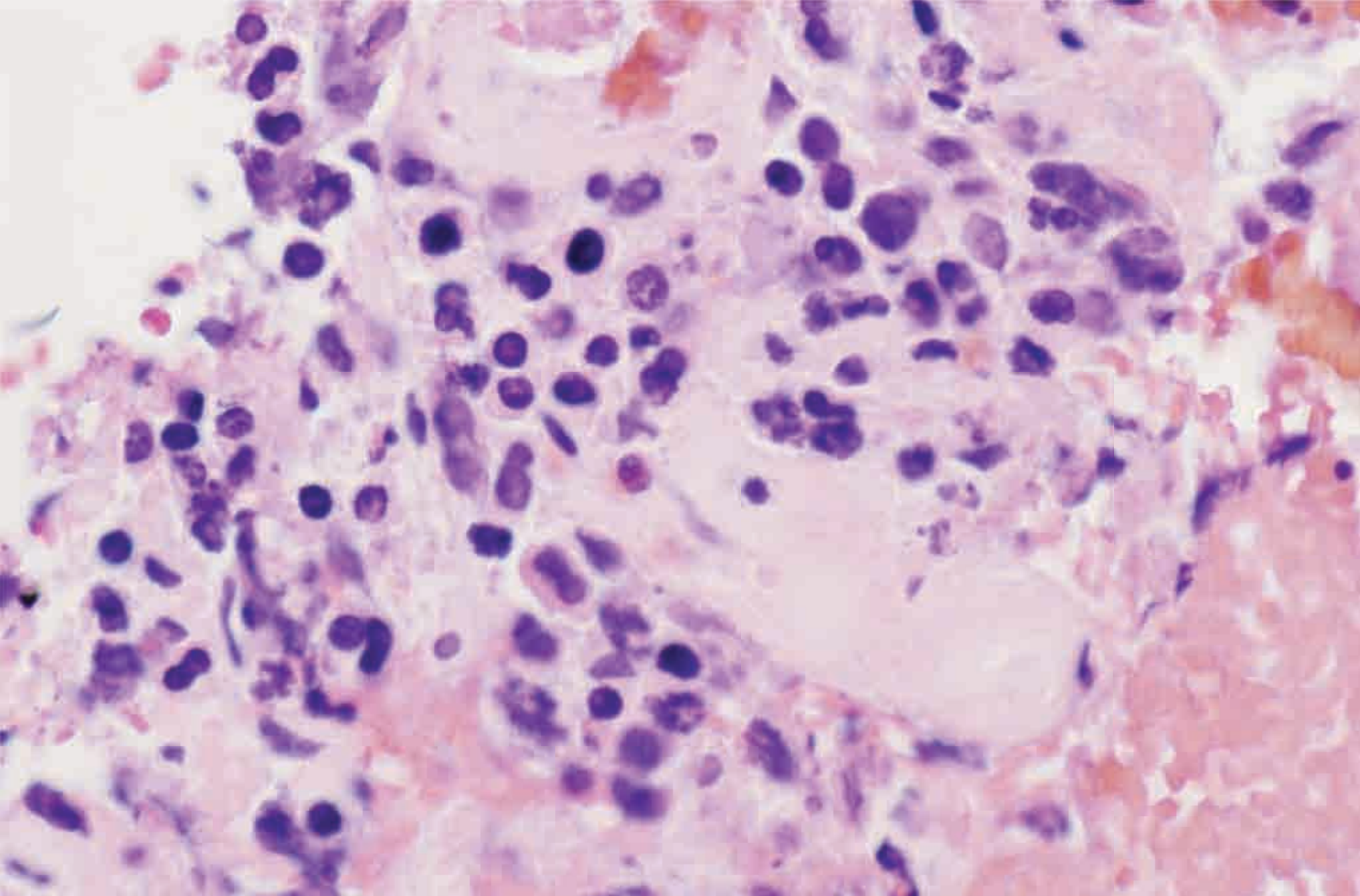


**Mediastinal mass, CT-guided  
FNA: Papanicolaou stain**



**Mediastinal mass, CT-guided  
FNA: Papanicolaou stain**





**Mediastinal mass, CT-guided FNA:  
Cell Block, Hematoxylin & eosin stain**

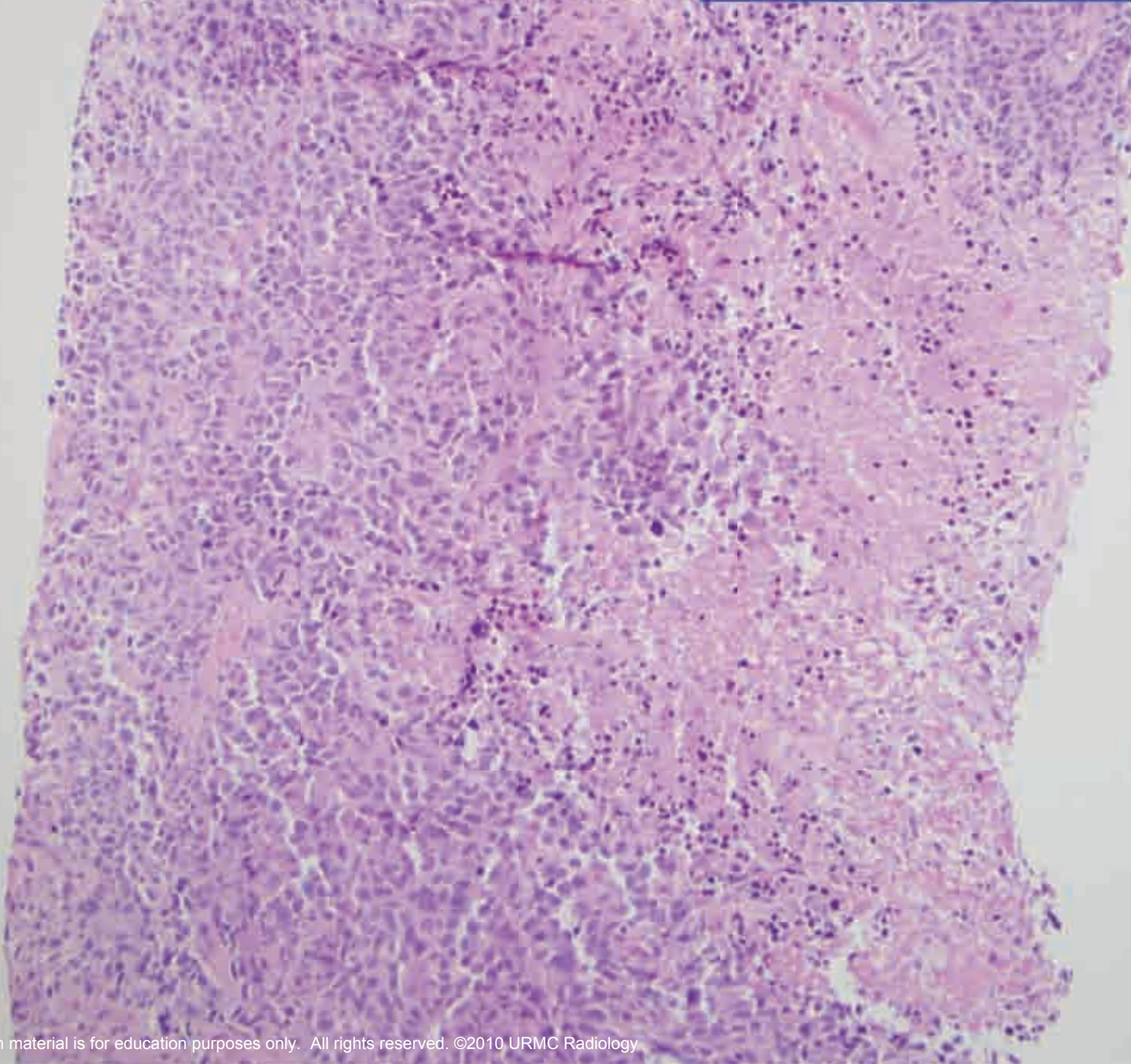
# Mediastinal Mass, CT-guided fine needle aspiration:

**Malignant tumor cells present.**

**Comment: See surgical biopsy report for further characterization.**

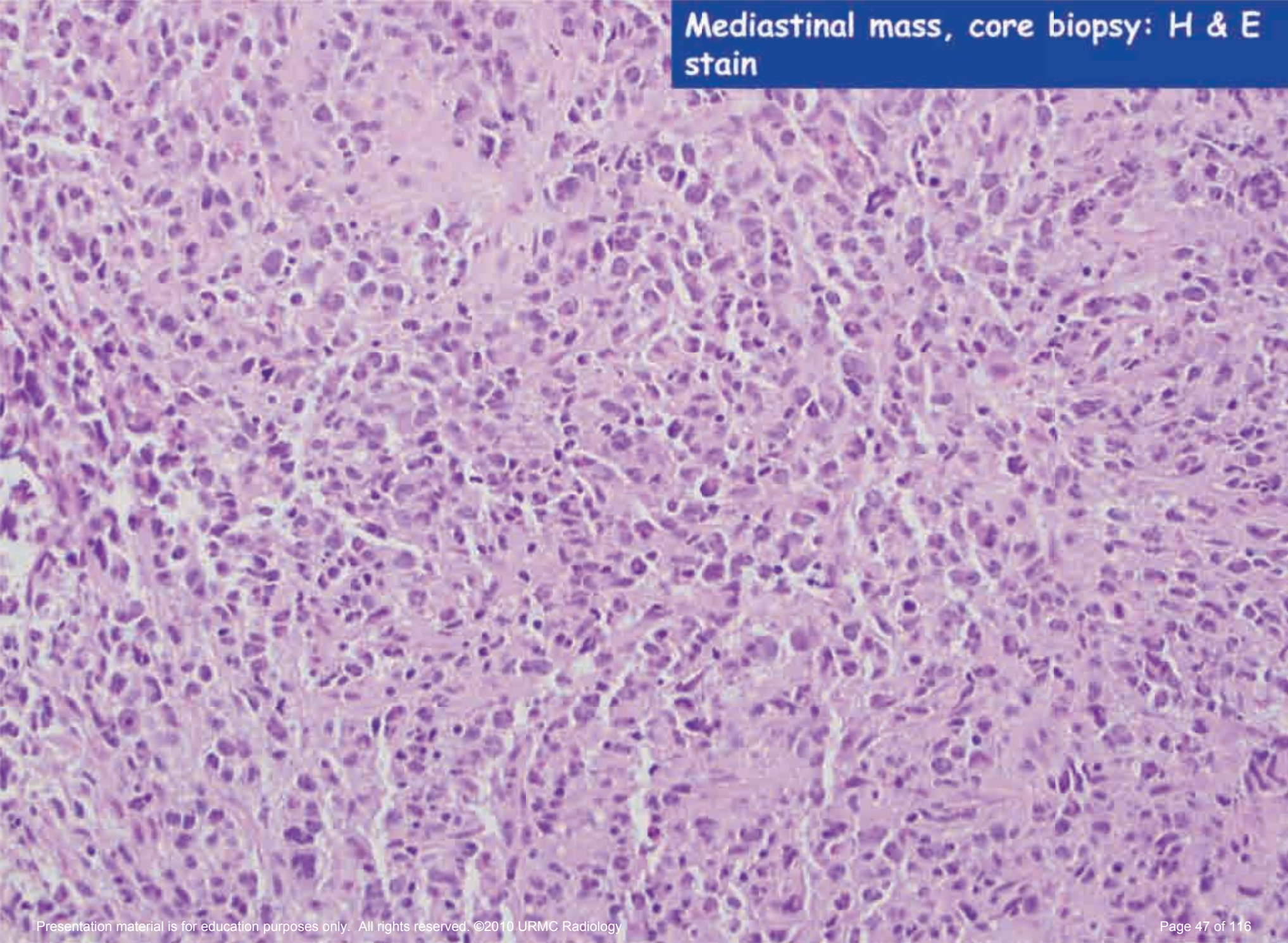


## Mediastinal mass, core biopsy: H & E stain

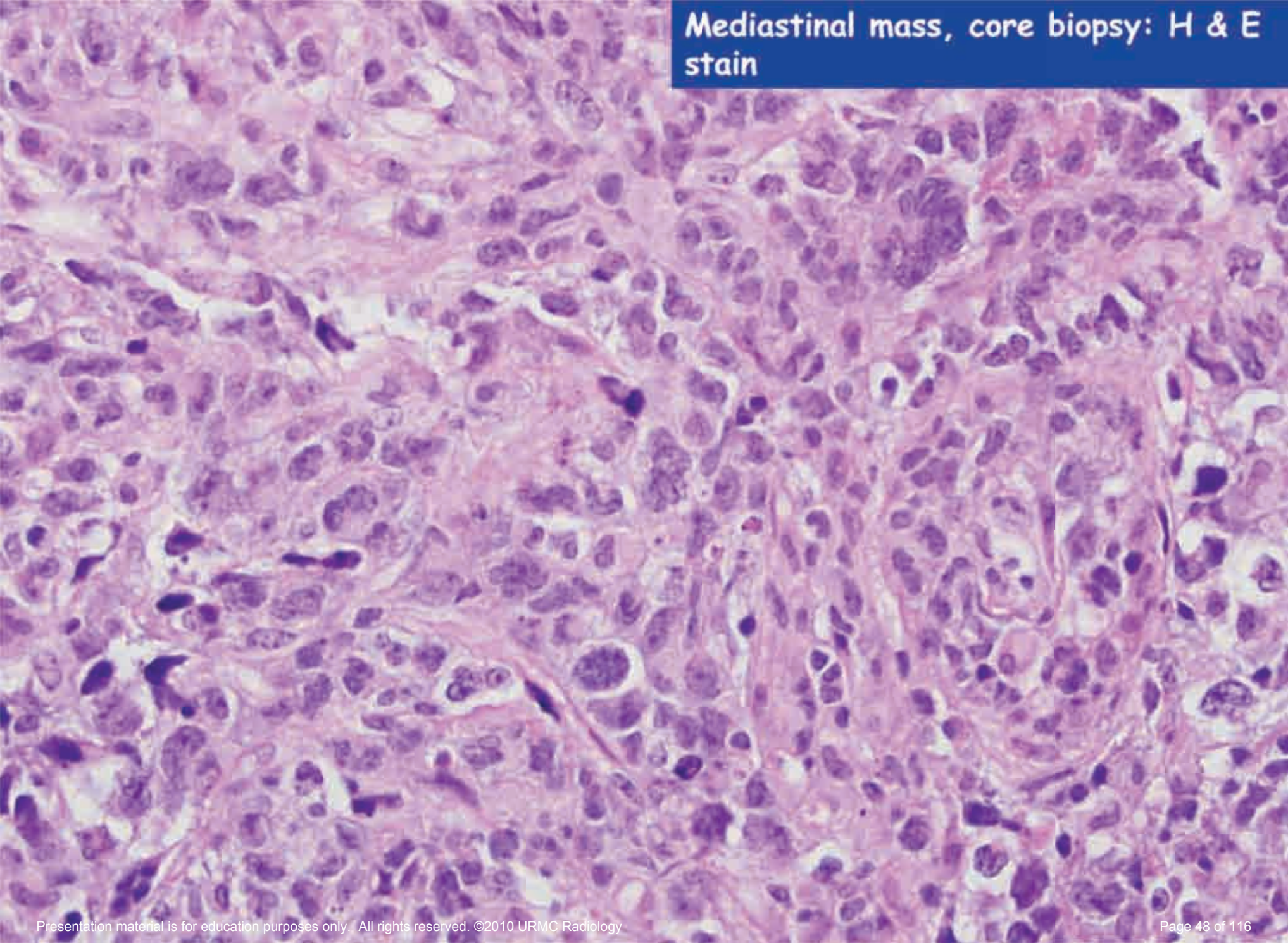




## Mediastinal mass, core biopsy: H & E stain

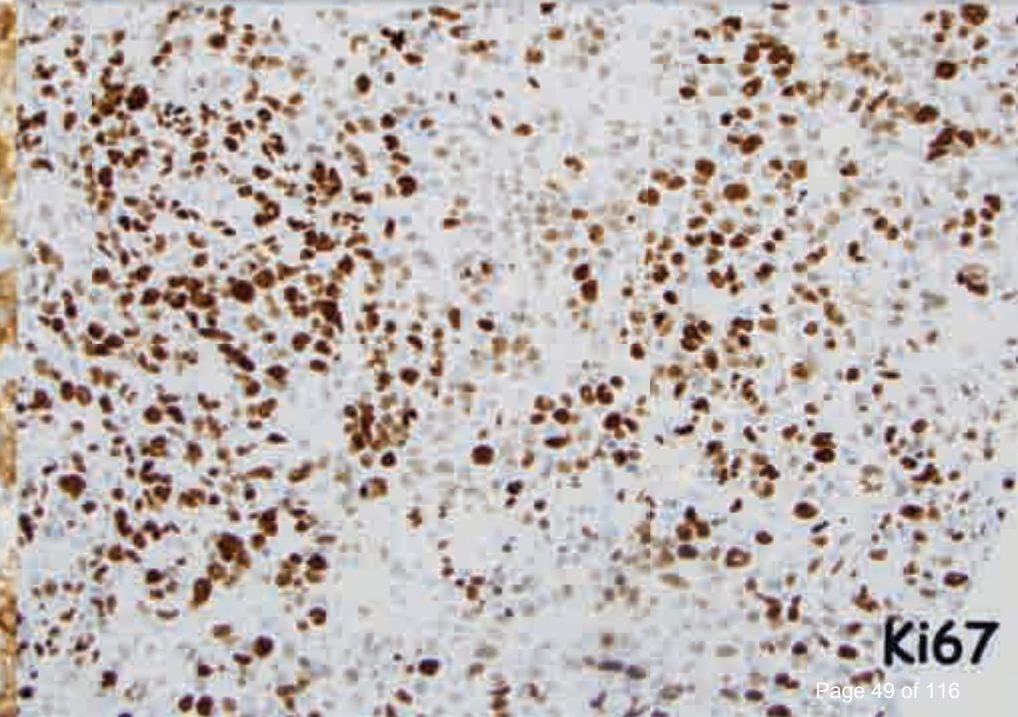
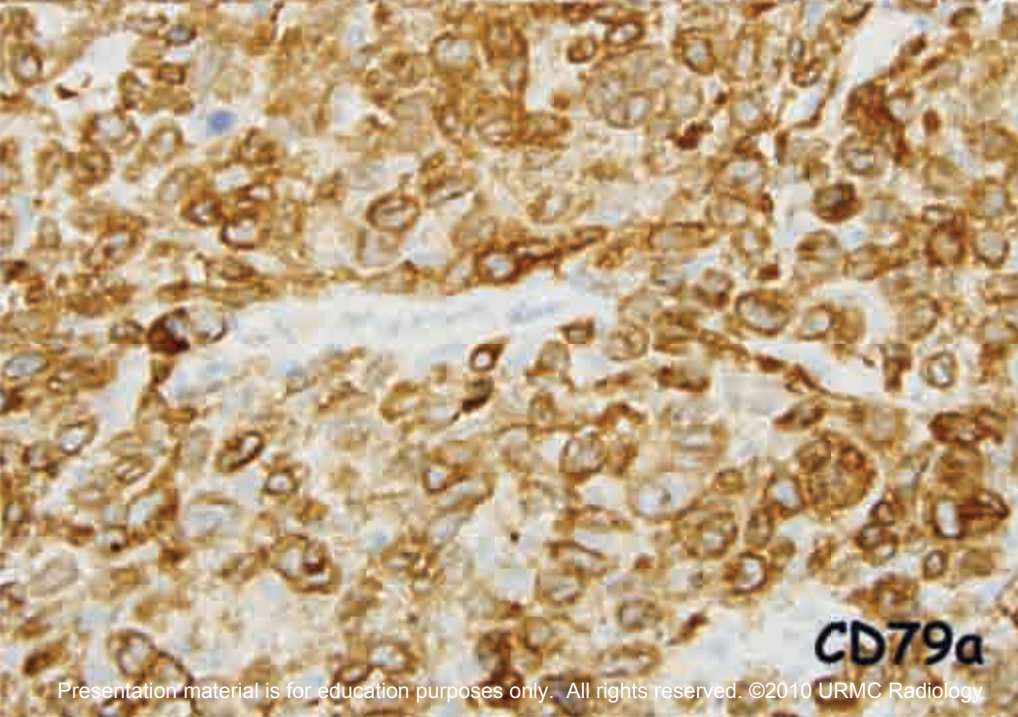
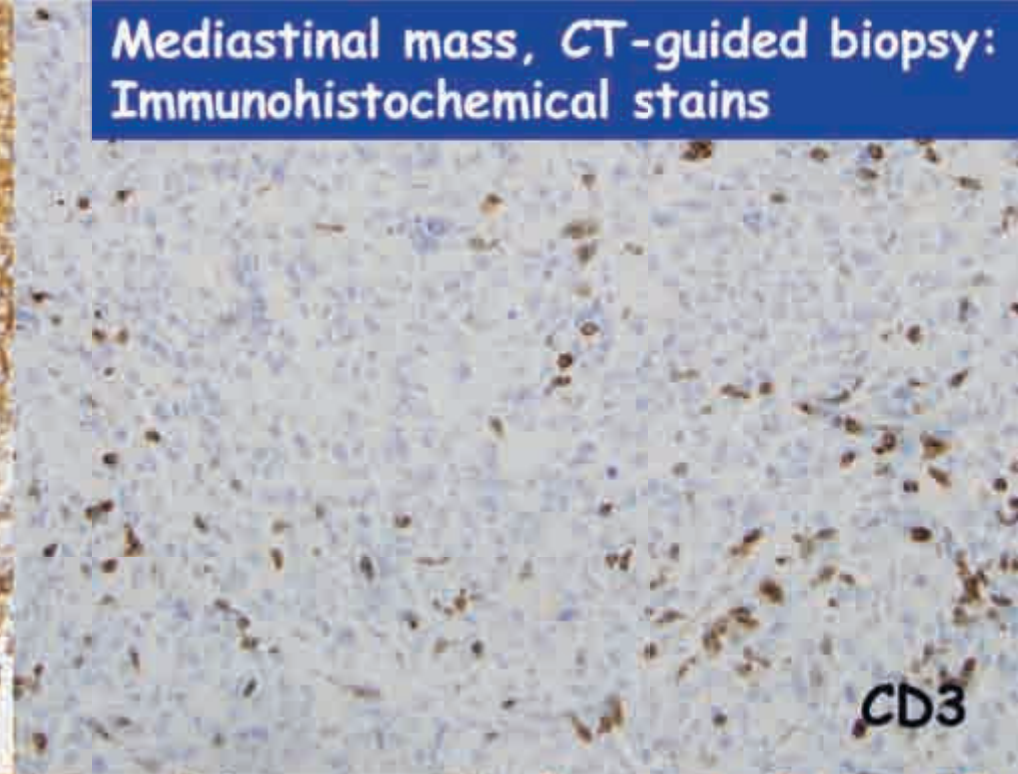
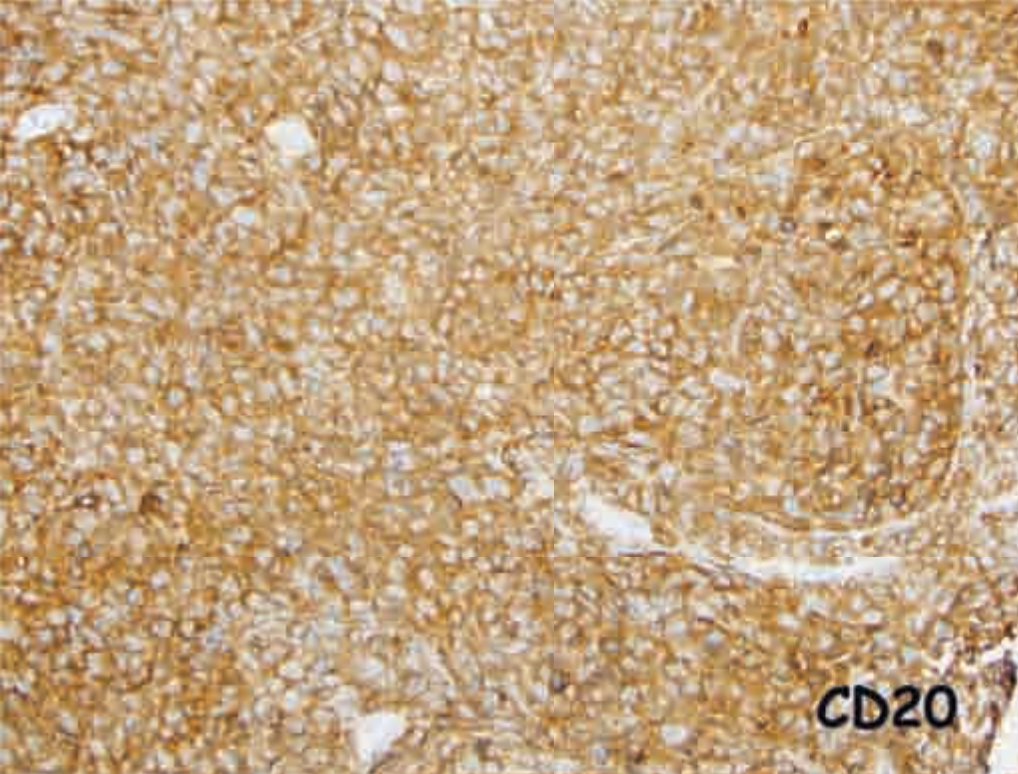








## Mediastinal mass, CT-guided biopsy: Immunohistochemical stains





# Mediastinal Mass, CT-guided core biopsy:

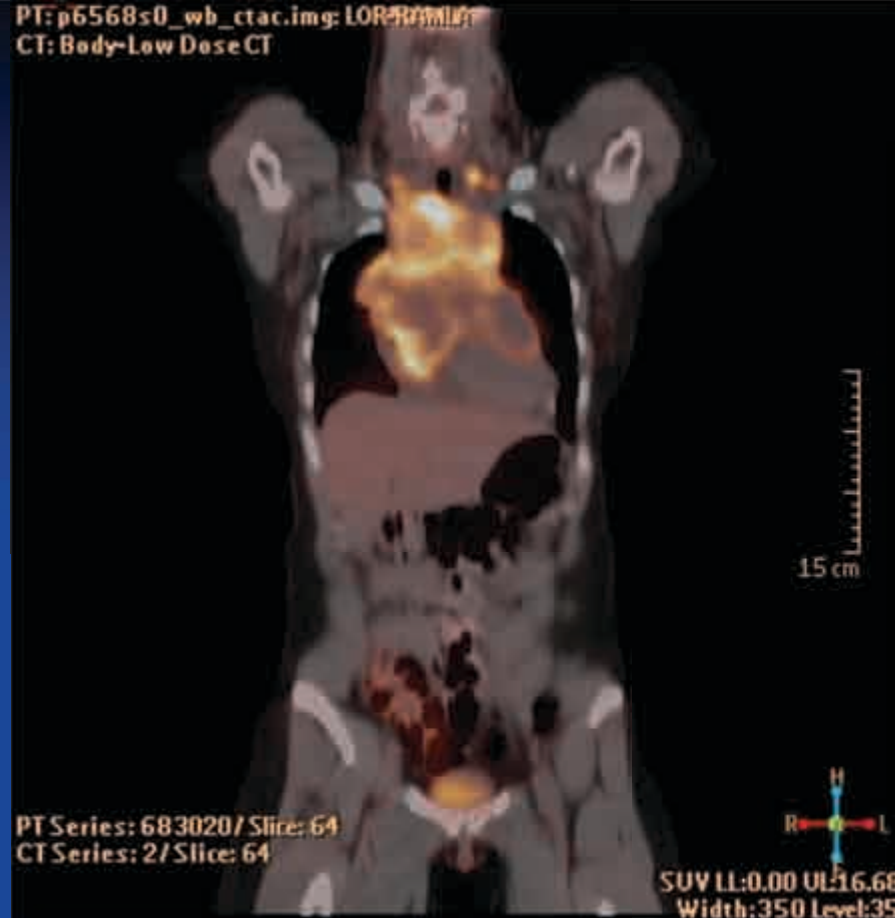
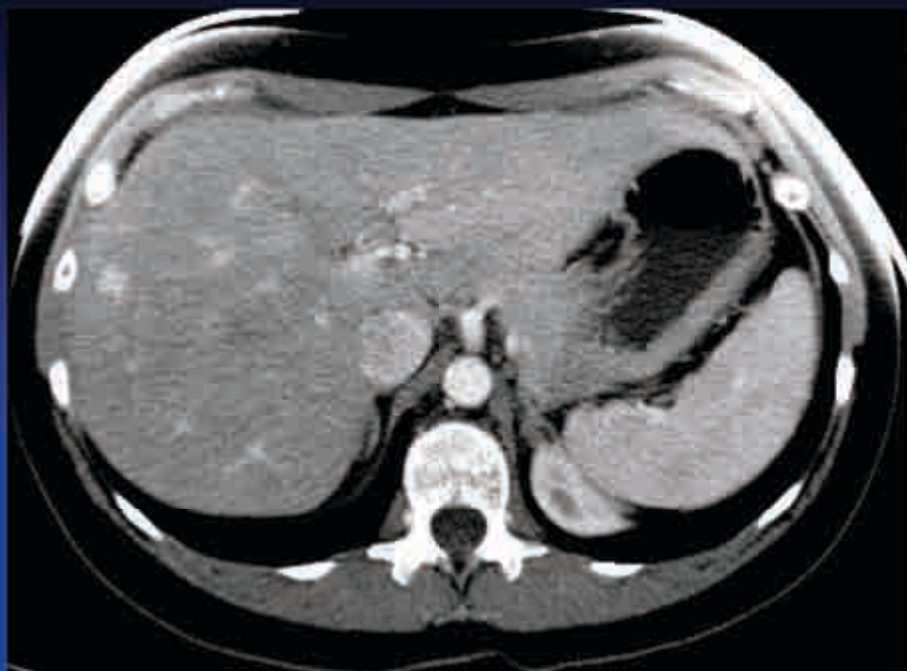
Primary mediastinal large B-cell lymphoma.

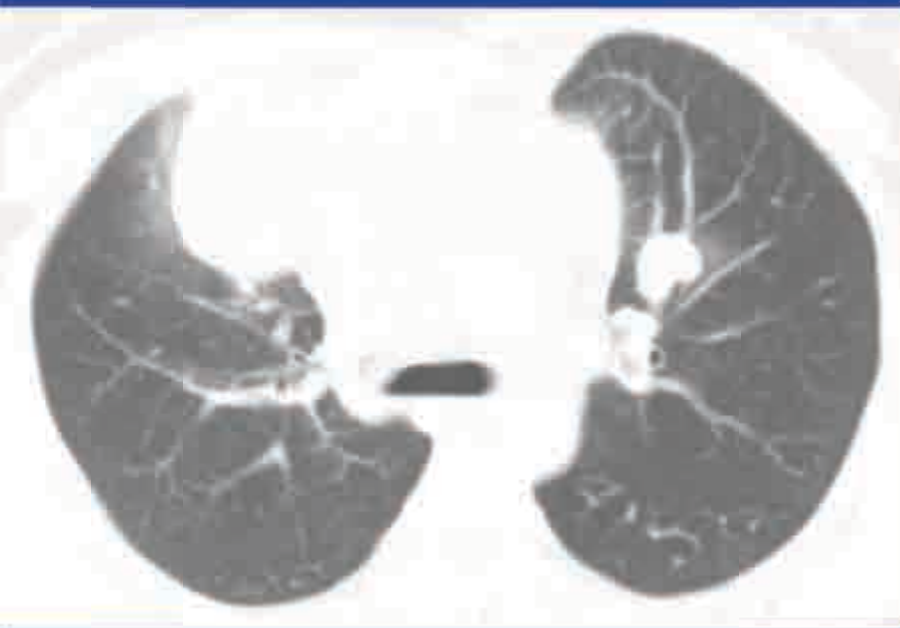
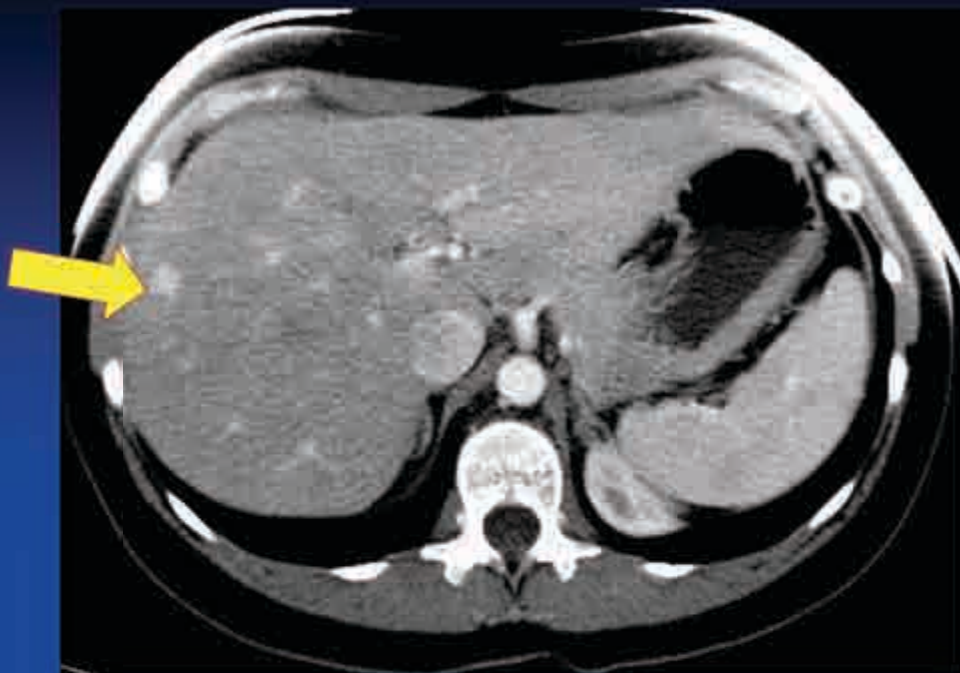
**Comment:** Core biopsy shows sheets of large lymphoid cells with pleomorphic nuclei, often compartmentalized by fine sclerosis. Cells are strongly positive for CD20, CD79a, and weakly positive for CD45 with scattered small CD3 positive T-cells in the background.

# Primary Mediastinal Large B-cell Lymphoma

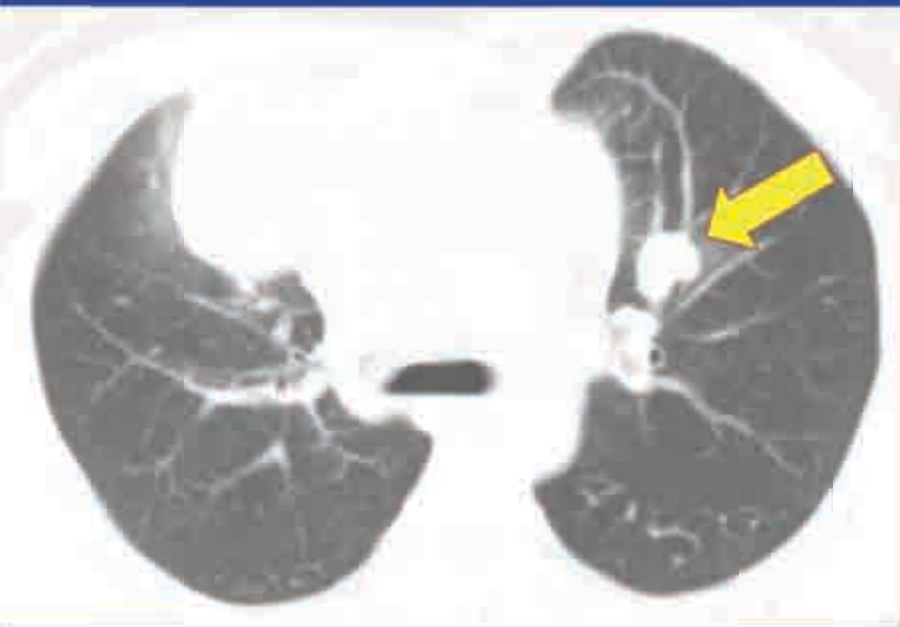
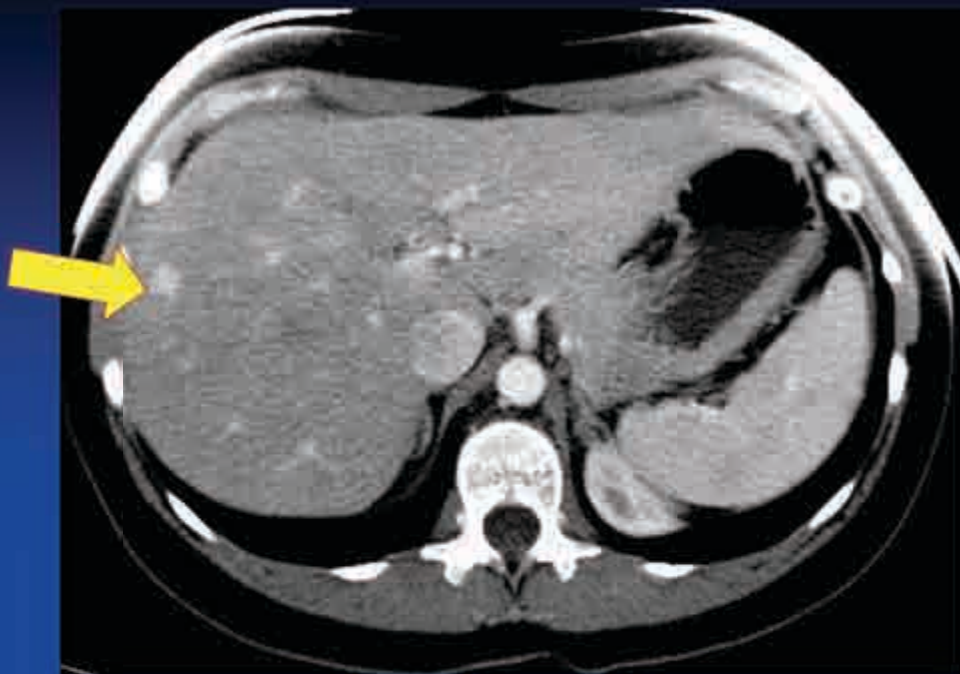
- Thymic B-cell origin
- Median age 35, M:F = 1:2
- Most commonly present with SVC syndrome and/or B symptoms
- Present with bulky mass and can involve regional nodes, but no systemic involvement (or DLBCL)
- Morphology: Usually uniform cells with pale cytoplasm, but can be pleomorphic and often associated with compartmentalizing fibrosis







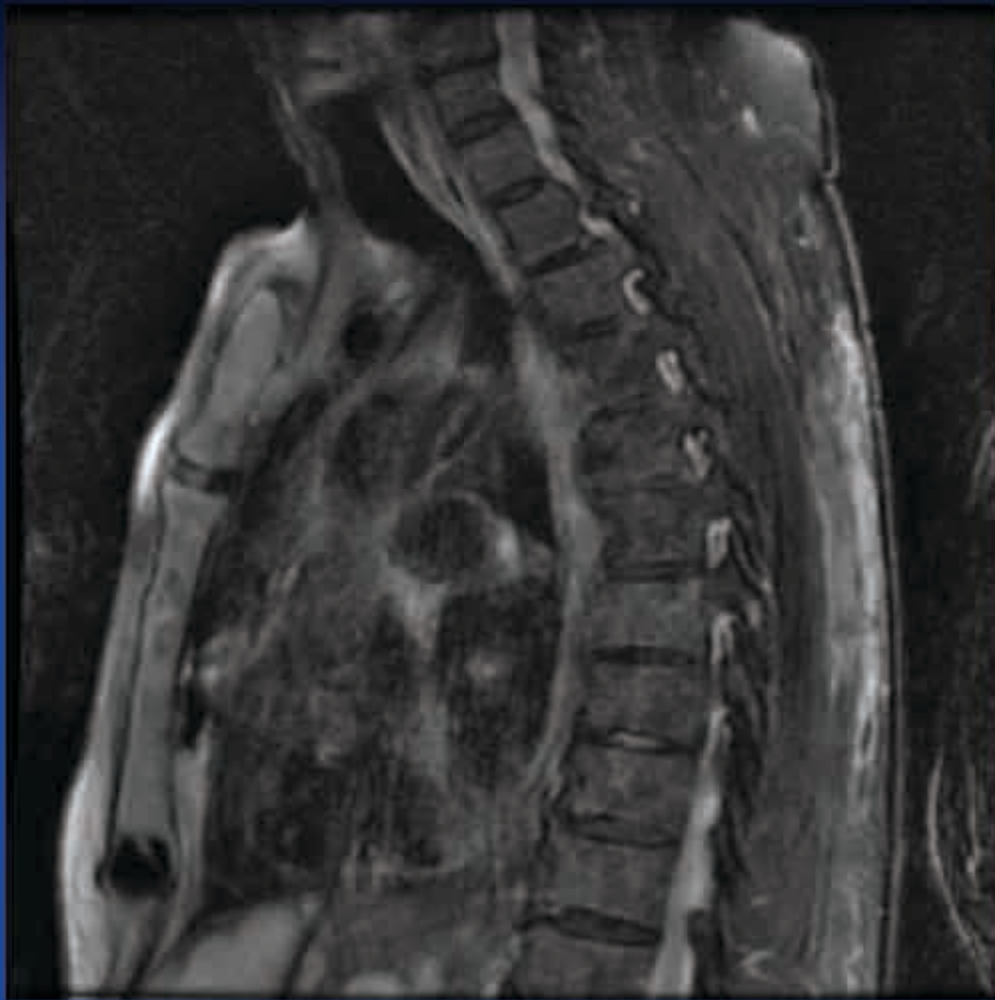




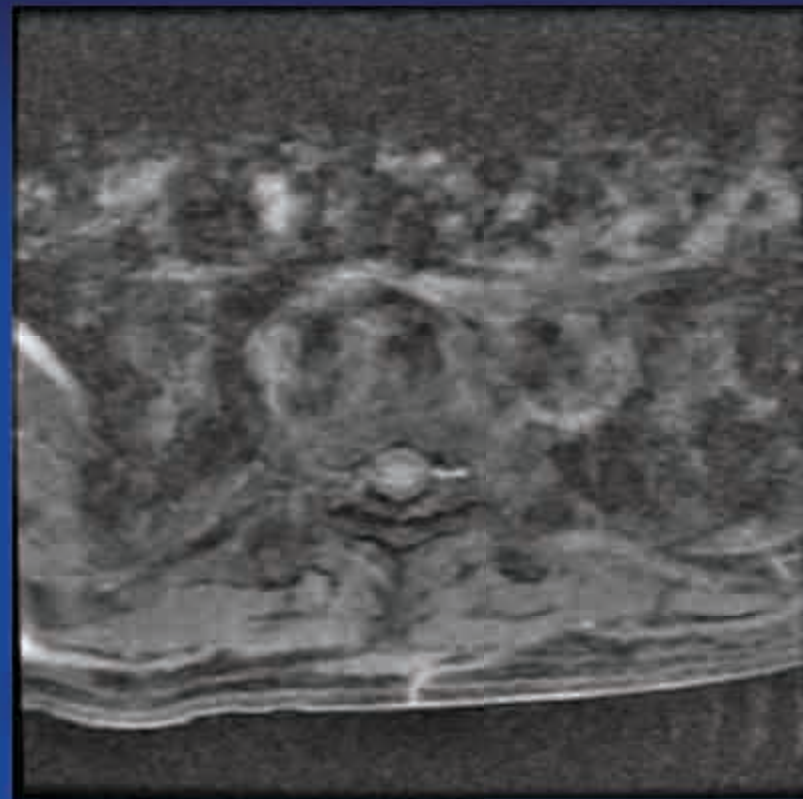
# Case 3

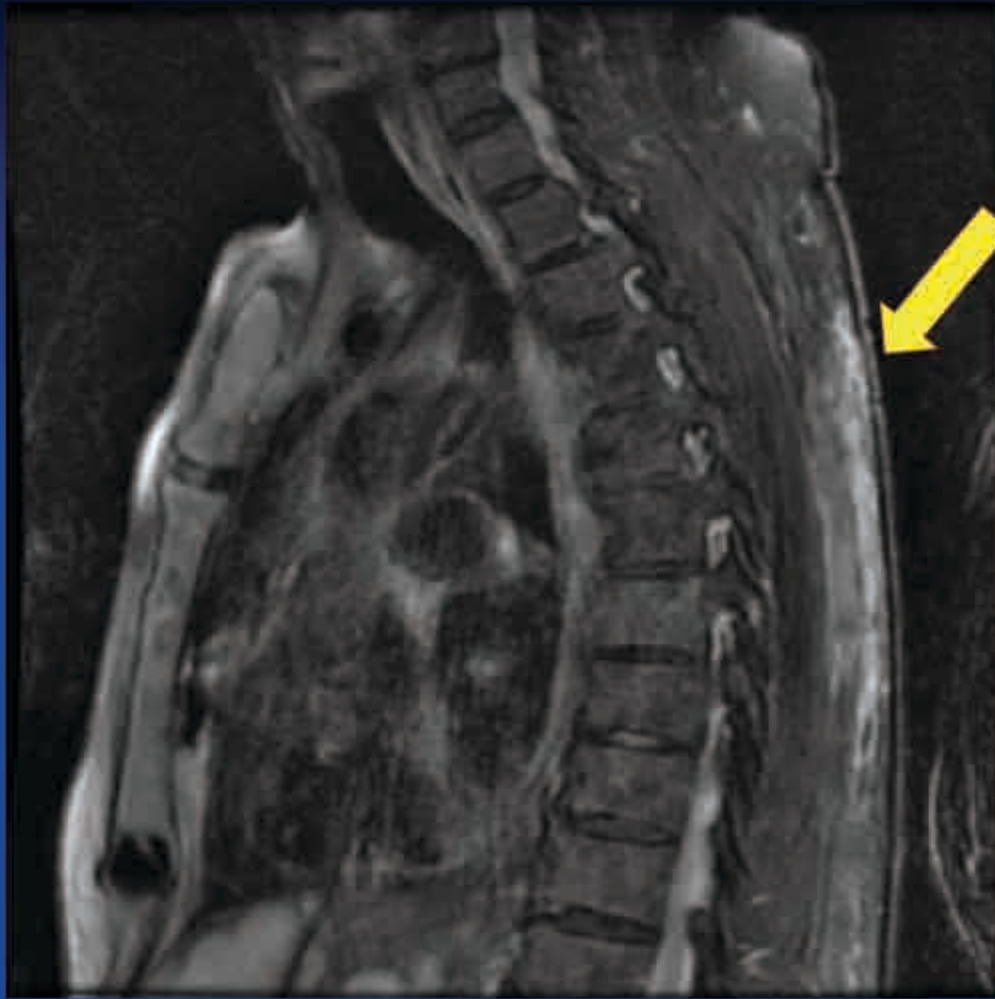
83 yo Male with Hx of dedifferentiated  
liposarcoma of the back and chest wall  
s/p resection and chemoradiation



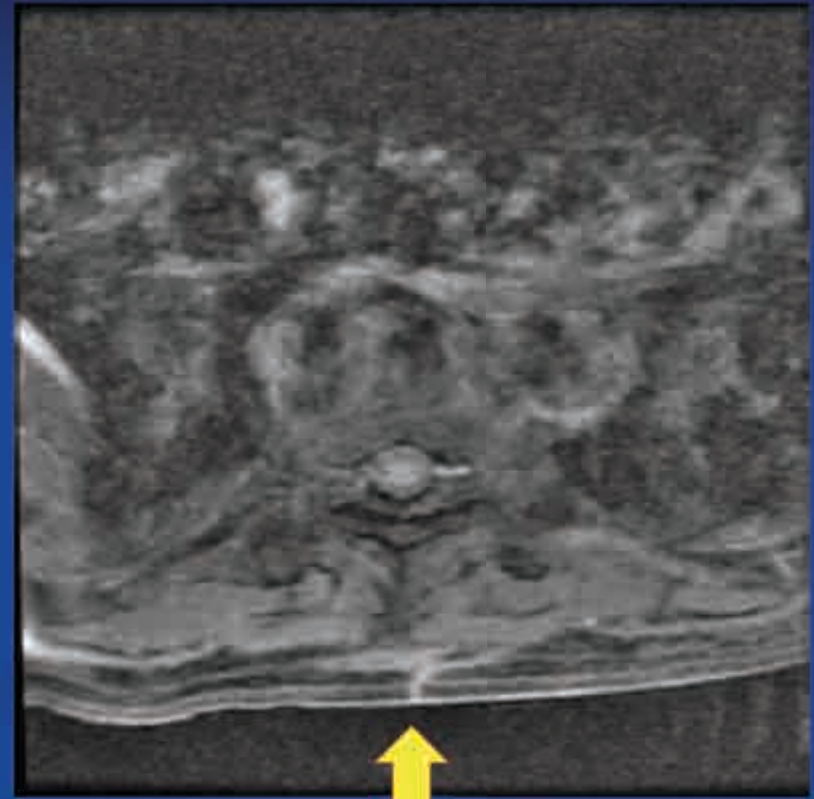


T2 w/ fat-sat



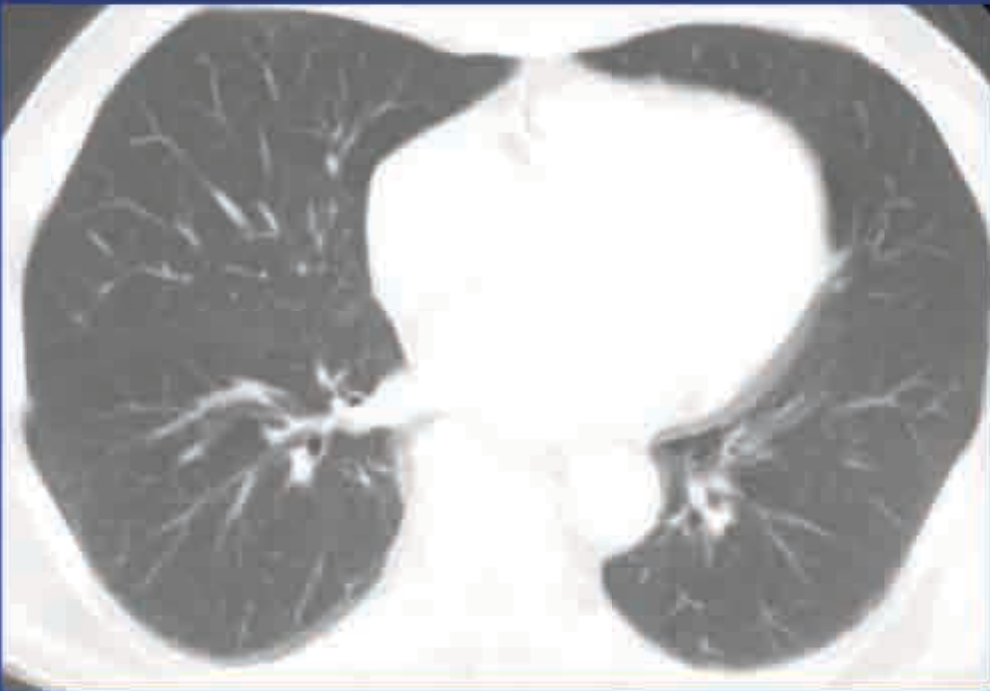


T2 w/ fat-sat



## Post-treatment Changes



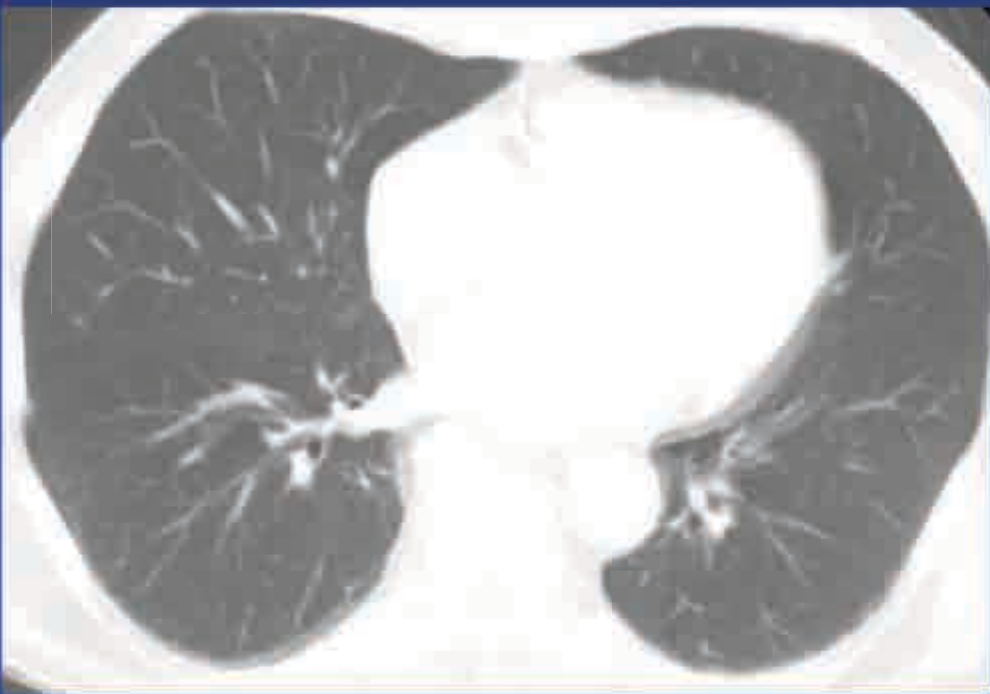


**1 month post-op**



**3 month post-op**

## DDX: Atelectasis, Early Fibrosis, Infection, Metastasis



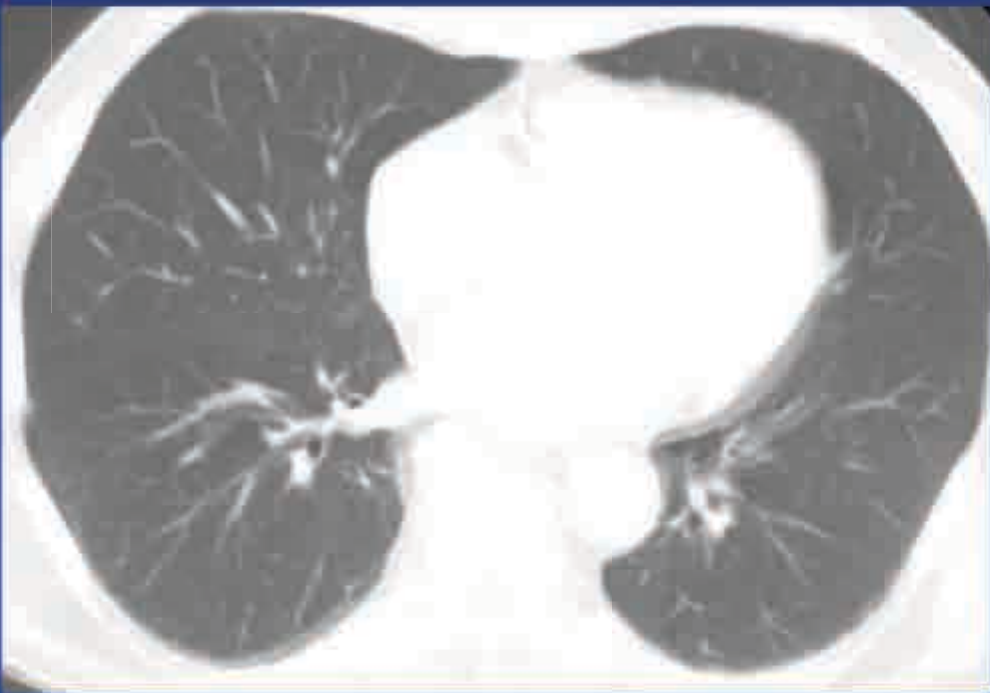
1 month post-op



3 month post-op



## DDX: Atelectasis, Early Fibrosis, Infection, Metastasis



1 month post-op



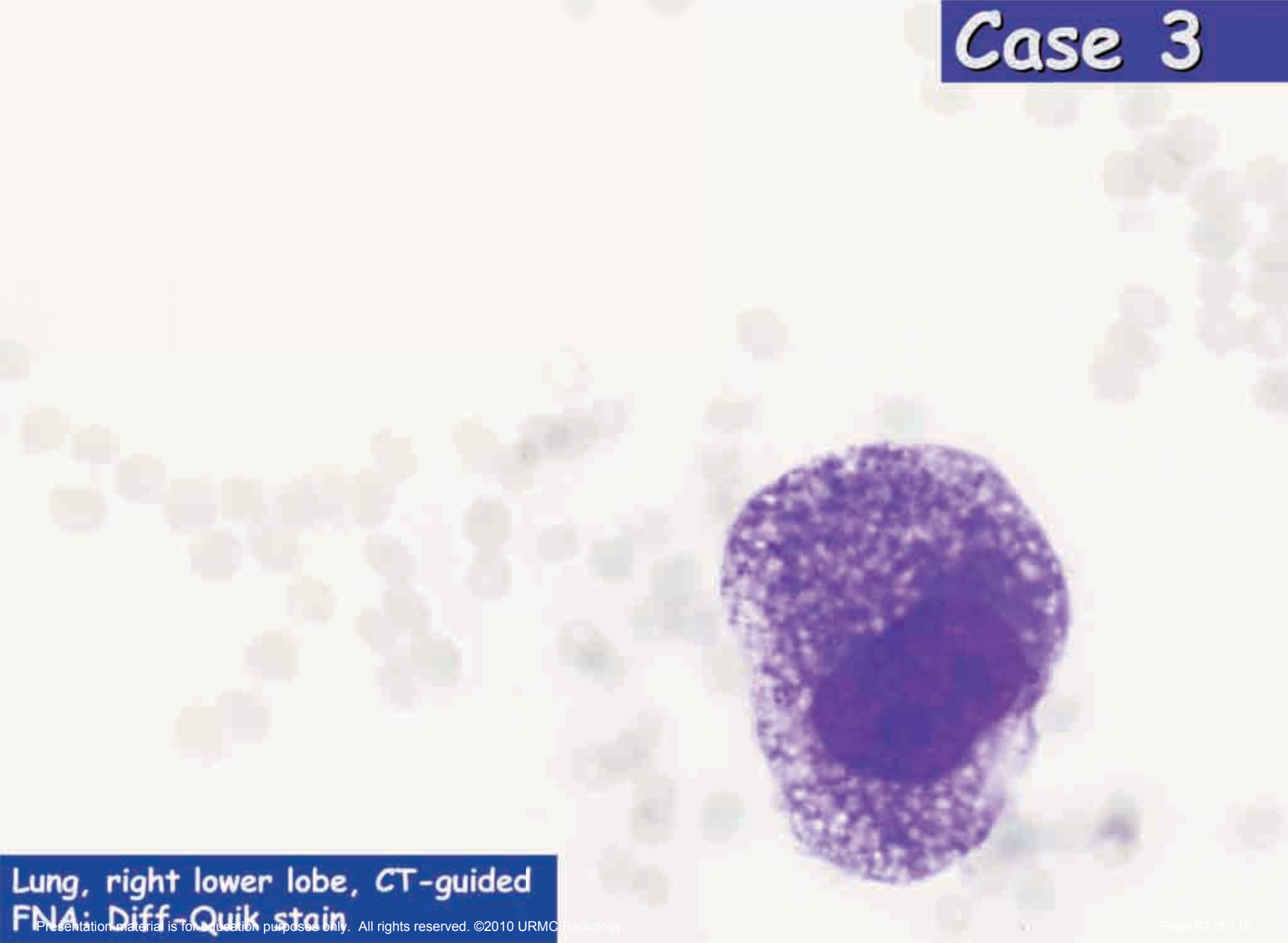
3 month post-op

## What do you do next?





# Case 3



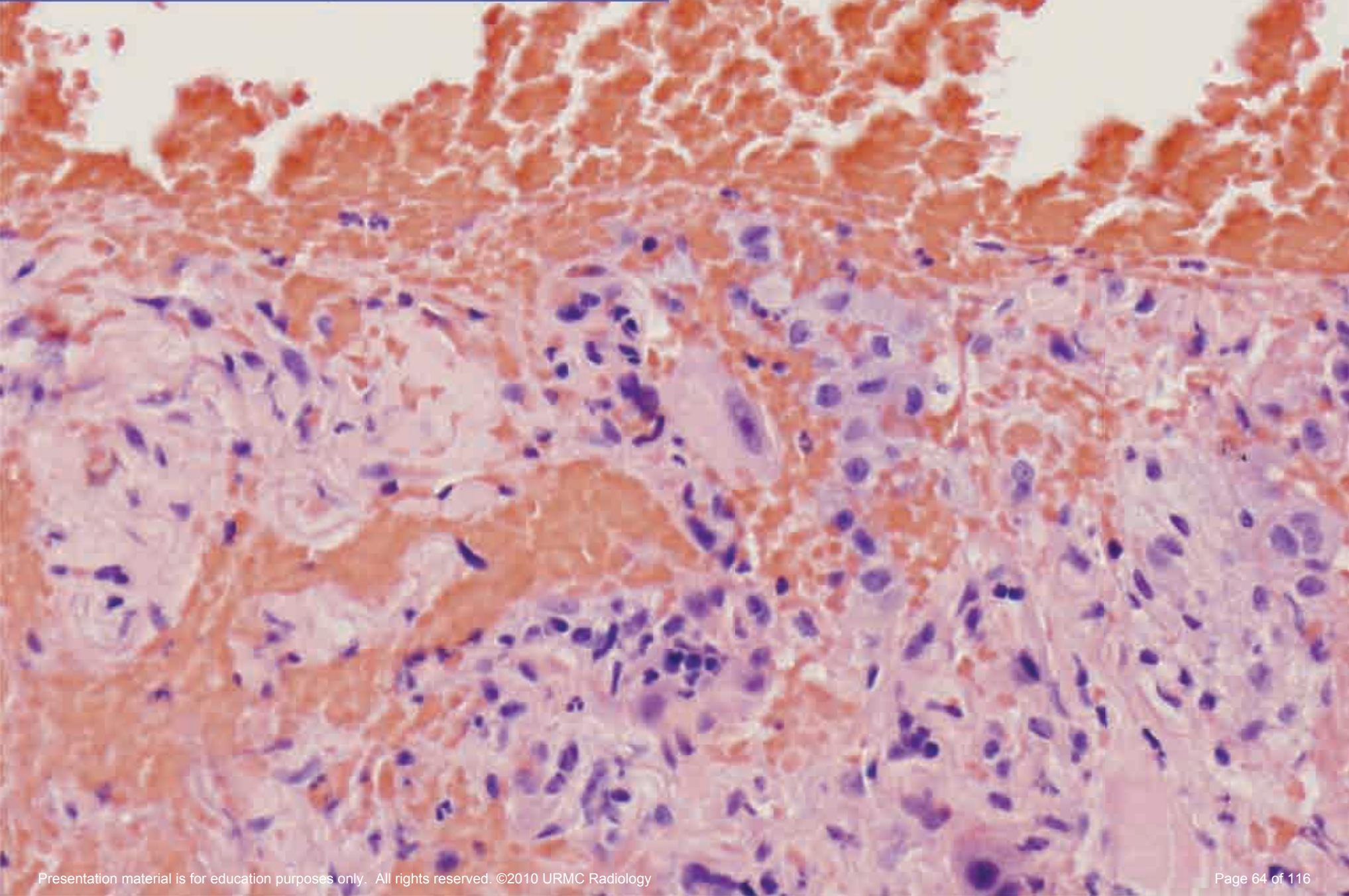
Lung, right lower lobe, CT-guided  
FNA: Diff-Quik stain



**Lung, right lower lobe, CT-guided  
FNA: Papanicolaou stain**

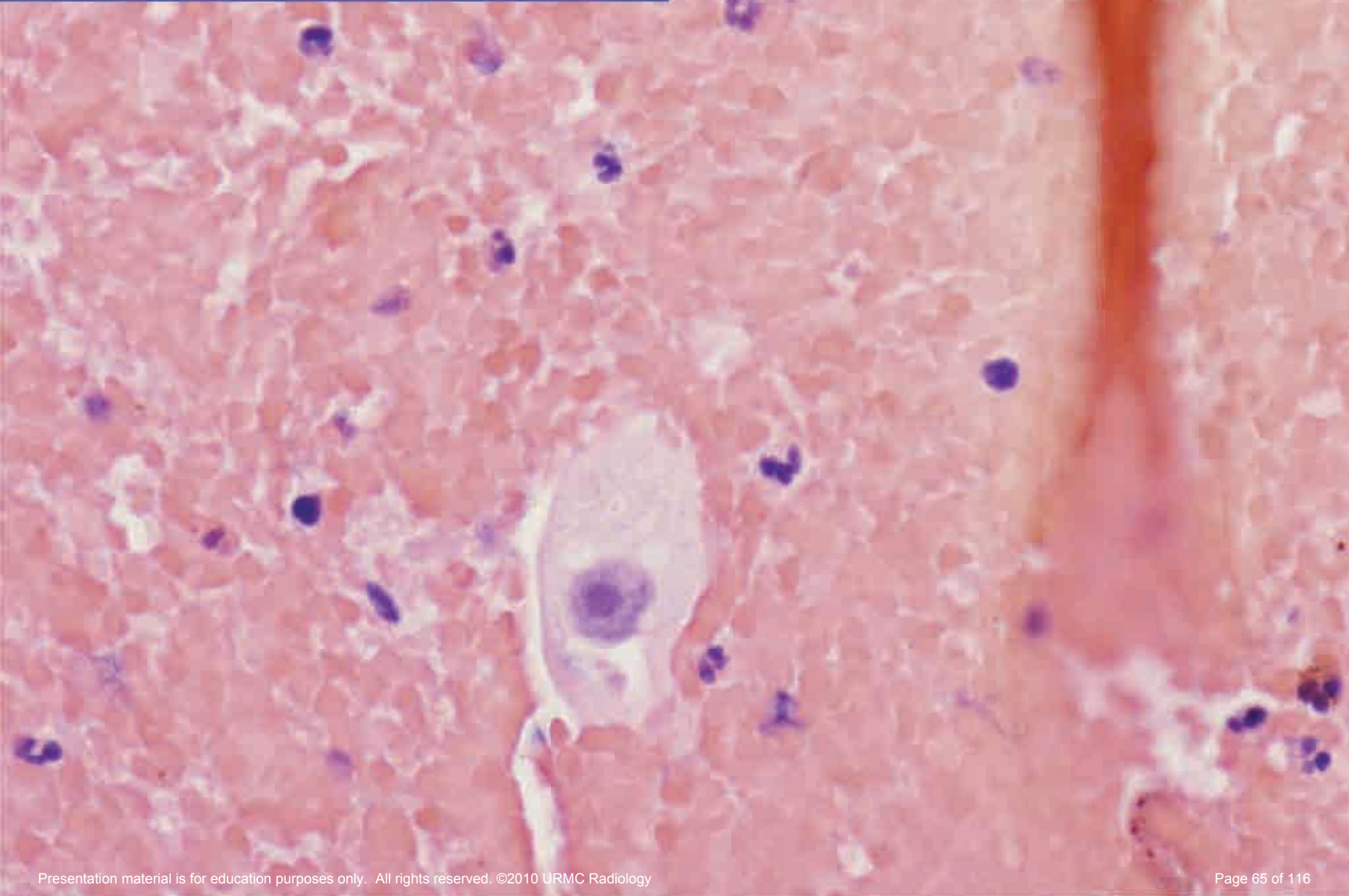


**Lung, right lower lobe, CT-guided FNA:  
Cell Block, hematoxylin & eosin stain**



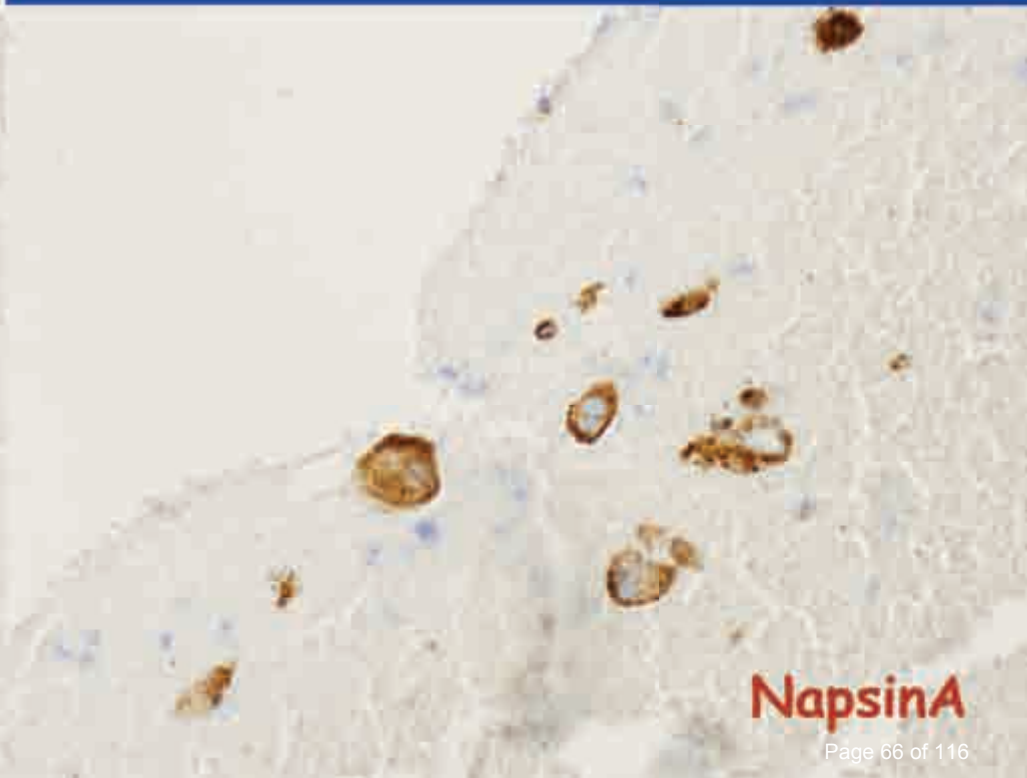
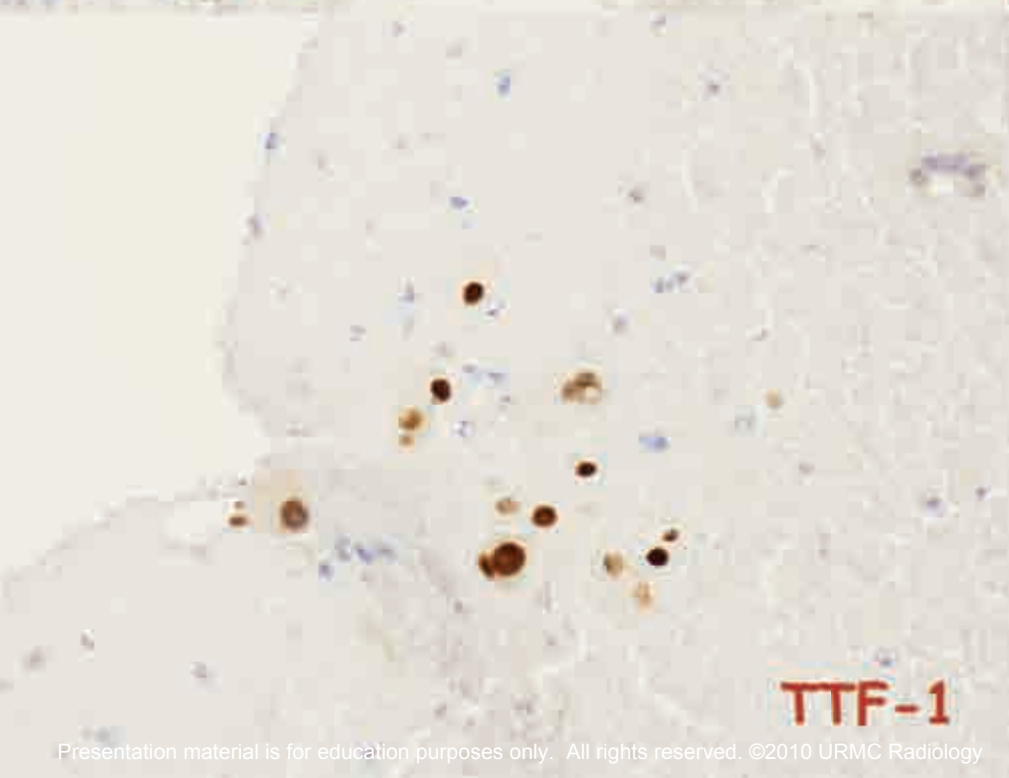
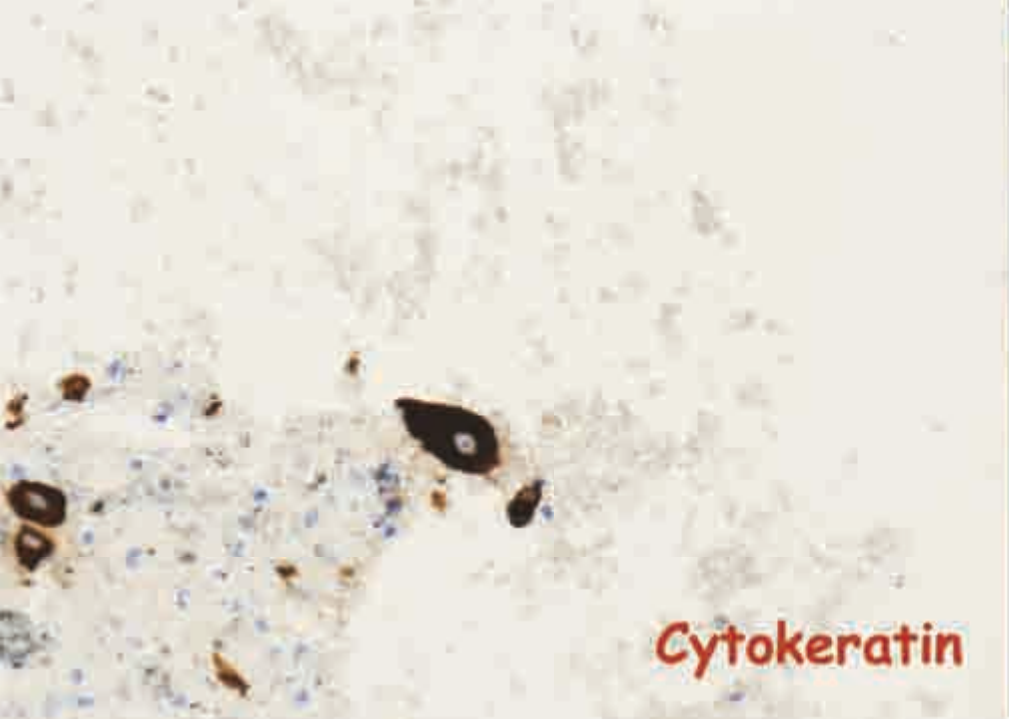


**Lung, right lower lobe, CT-guided FNA:  
Cell Block, hematoxylin & eosin stain**





Lung, right lower lobe, CT-guided FNA:  
Cell Block, Immunohistochemical stains



# Lung, right lower lobe, CT-guided fine needle aspiration:

Scant atypical cells, favor reactive.

**Comment:** Scant atypical cells with enlarged nuclei and prominent nucleoli are present, but the N:C ratio remains low and bubbly cytoplasm is noted. Findings favor reactive change, most likely due to radiation therapy.

**Immunostains:**

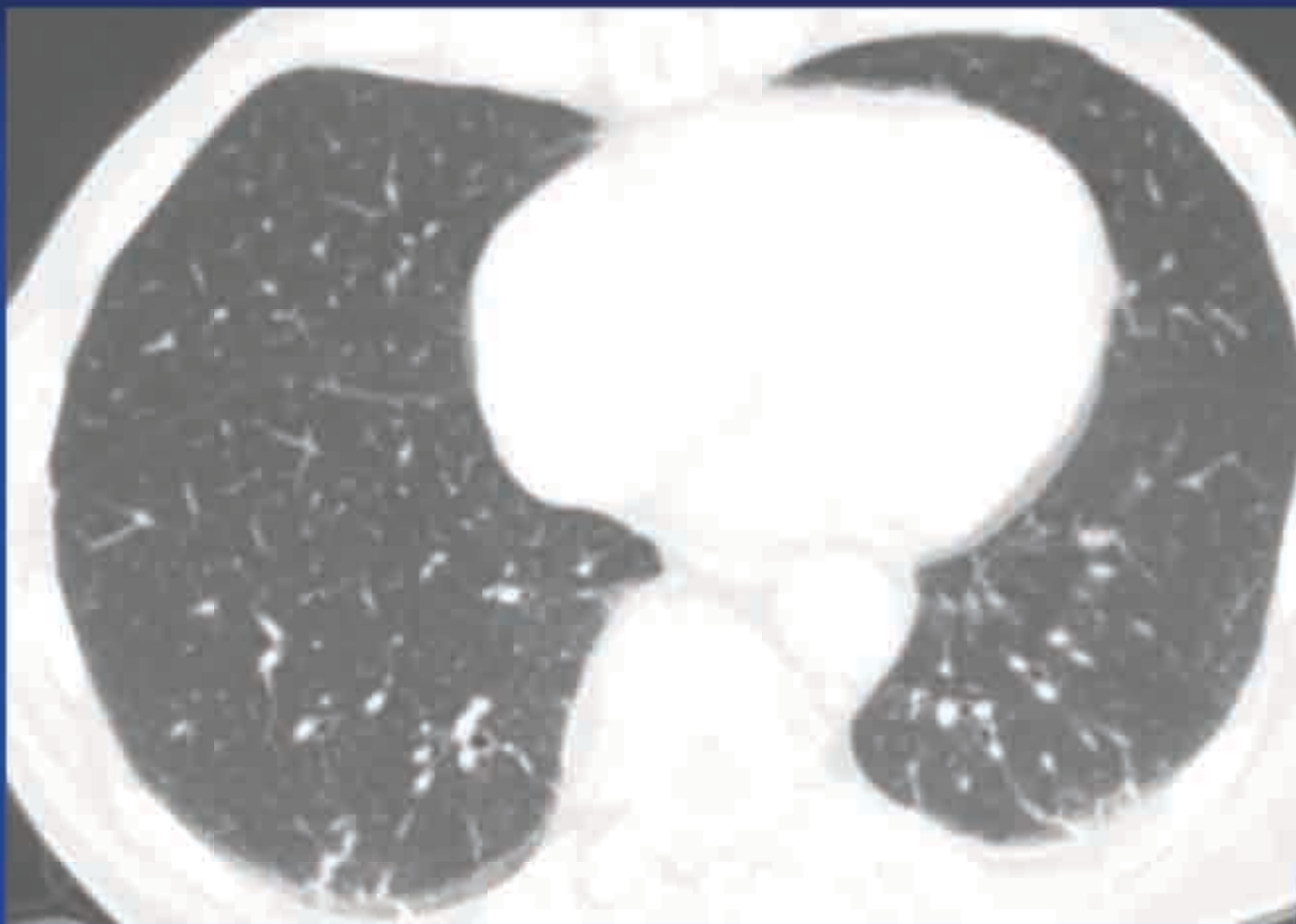
**Positive:** CK, TTF-1, NapsinA

**Negative:** S100, PSA, PSAP, PAX8, RCC

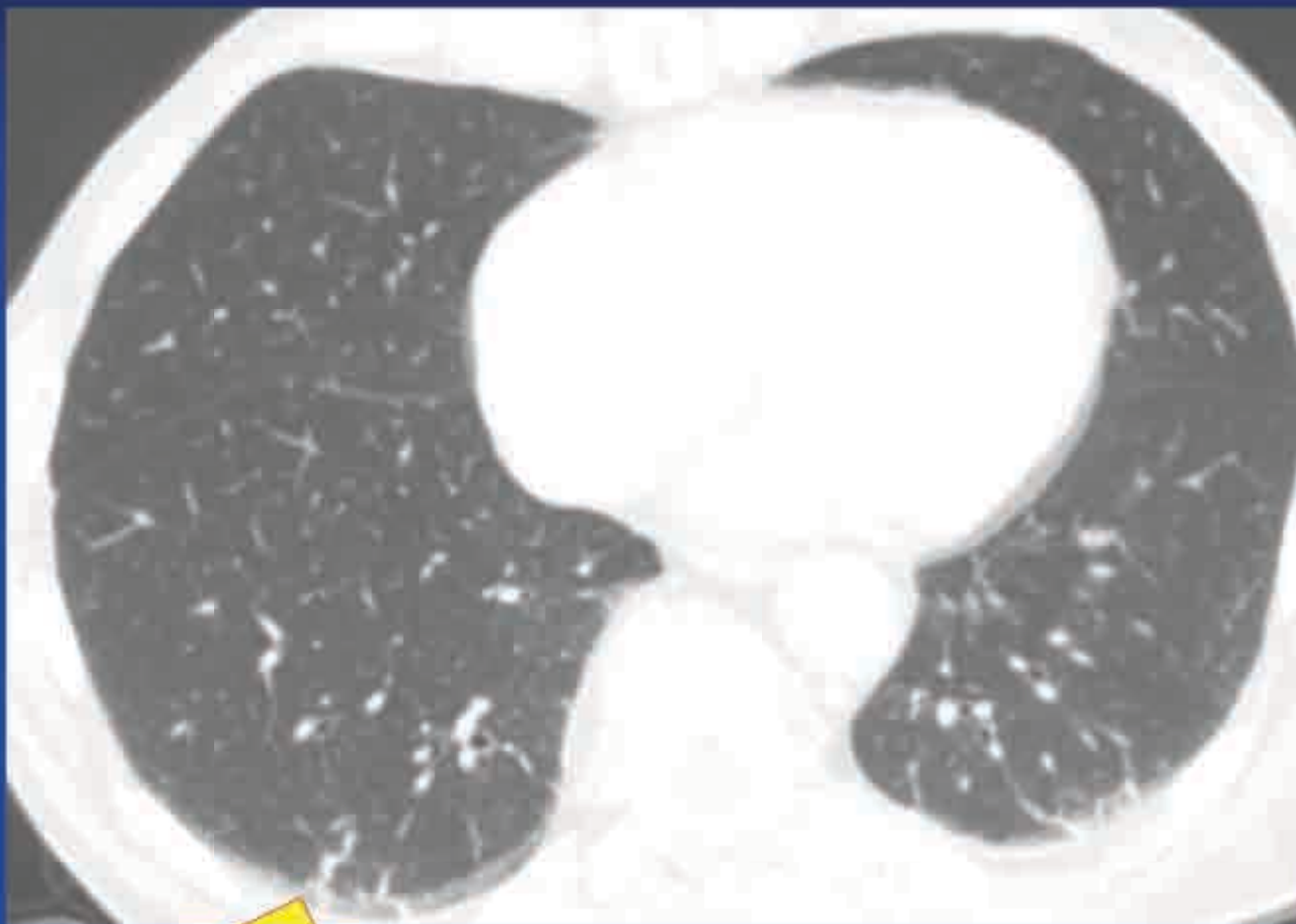


# Radiation Change

- Radiation changes can disappear over time or persist
- Hypocellular smears
- Increased size of cells, low N:C
- Multinucleation or binucleation
- Hyperchromatic smudgy nuclei or vacuolated nuclei, round, +/- nucleoli
- Dense cytoplasm, often vacuolated



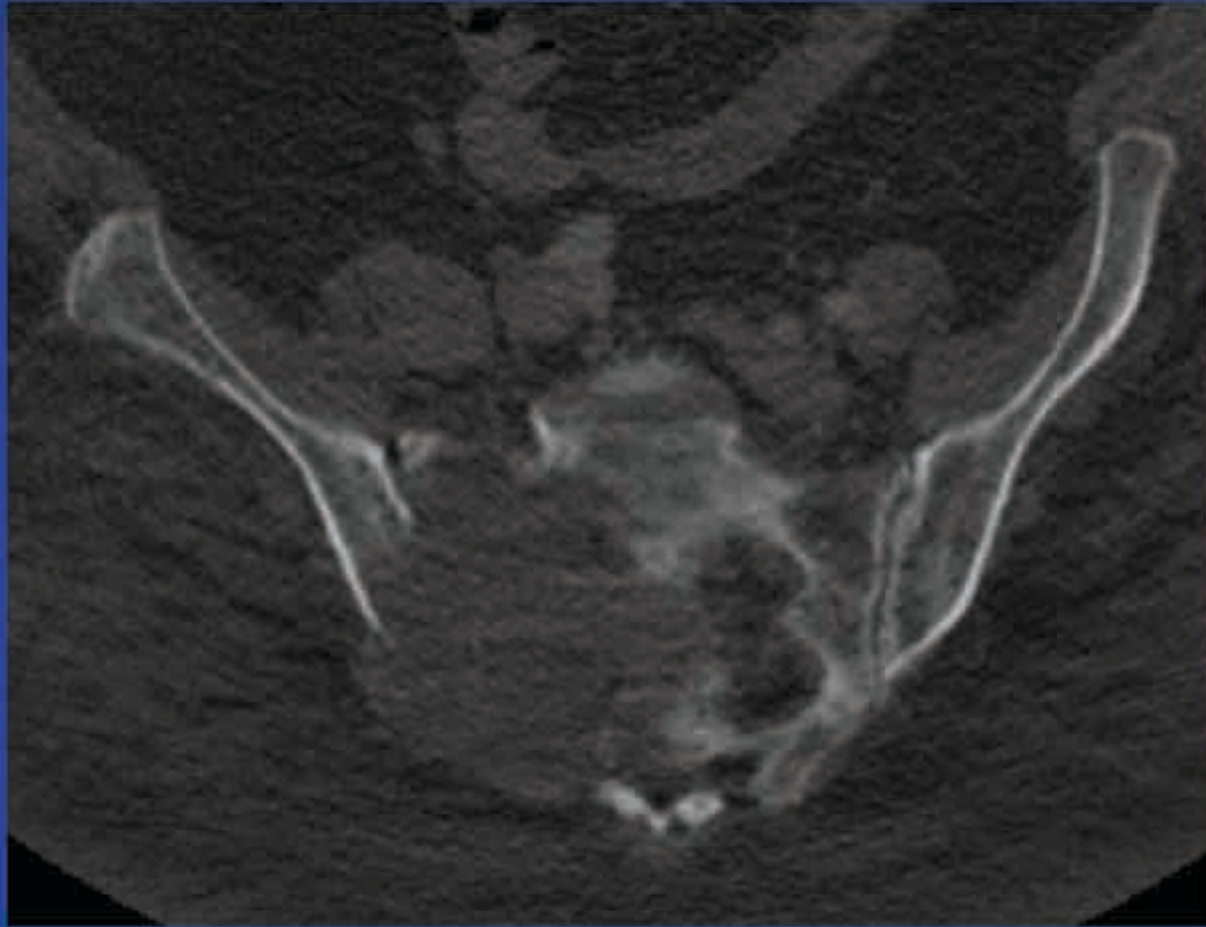




# Case 4

47 yo female presents with  
radicular pain in her right  
lumbosacral region





# DDx Destructive lesion of sacrum



# DDx Destructive lesion of sacrum

- Metastases

- Lung, Breast, RCC, Thyroid

# DDx Destructive lesion of sacrum

- Metastases

- Lung, Breast, RCC, Thyroid

- Multiple Myeloma



# DDx Destructive lesion of sacrum

- Metastases

- Lung, Breast, RCC, Thyroid

- Multiple Myeloma

- Lymphoma

# DDx Destructive lesion of sacrum

- Metastases

- Lung, Breast, RCC, Thyroid

- Multiple Myeloma

- Lymphoma

- Chondrosarcoma



# DDx Destructive lesion of sacrum

- Metastases

- Lung, Breast, RCC, Thyroid

- Multiple Myeloma

- Lymphoma

- Chondrosarcoma

- Chordoma

# DDx Destructive lesion of sacrum

- Metastases

- Lung, Breast, RCC, Thyroid

- Multiple Myeloma

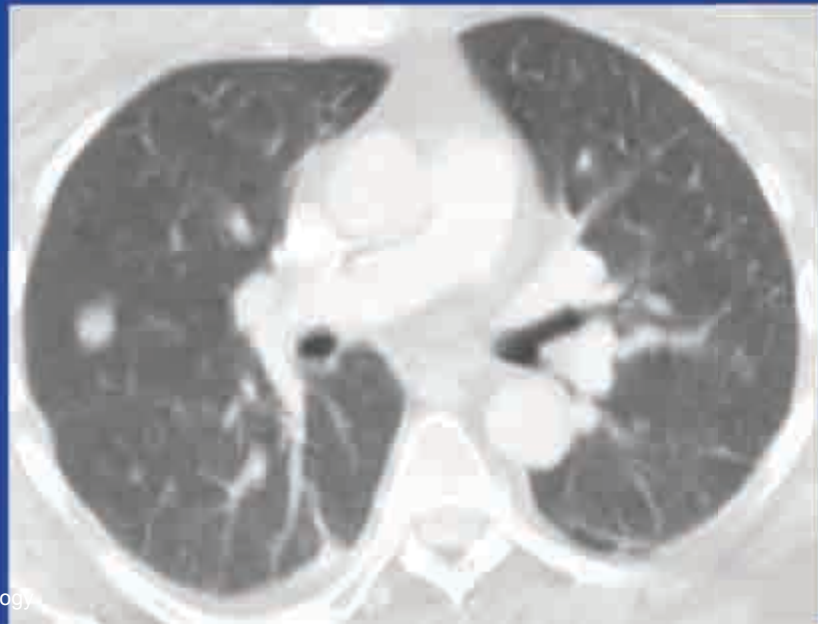
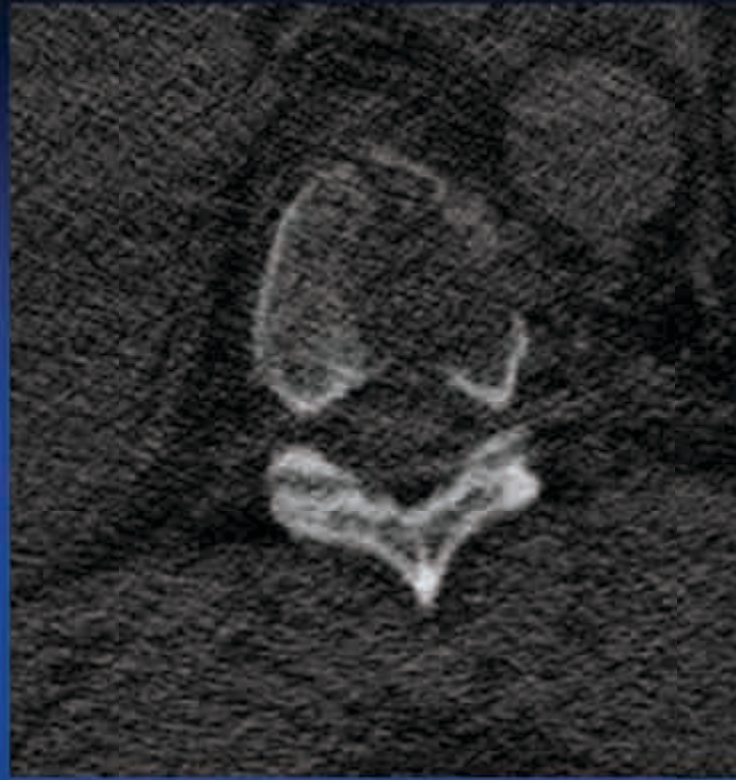
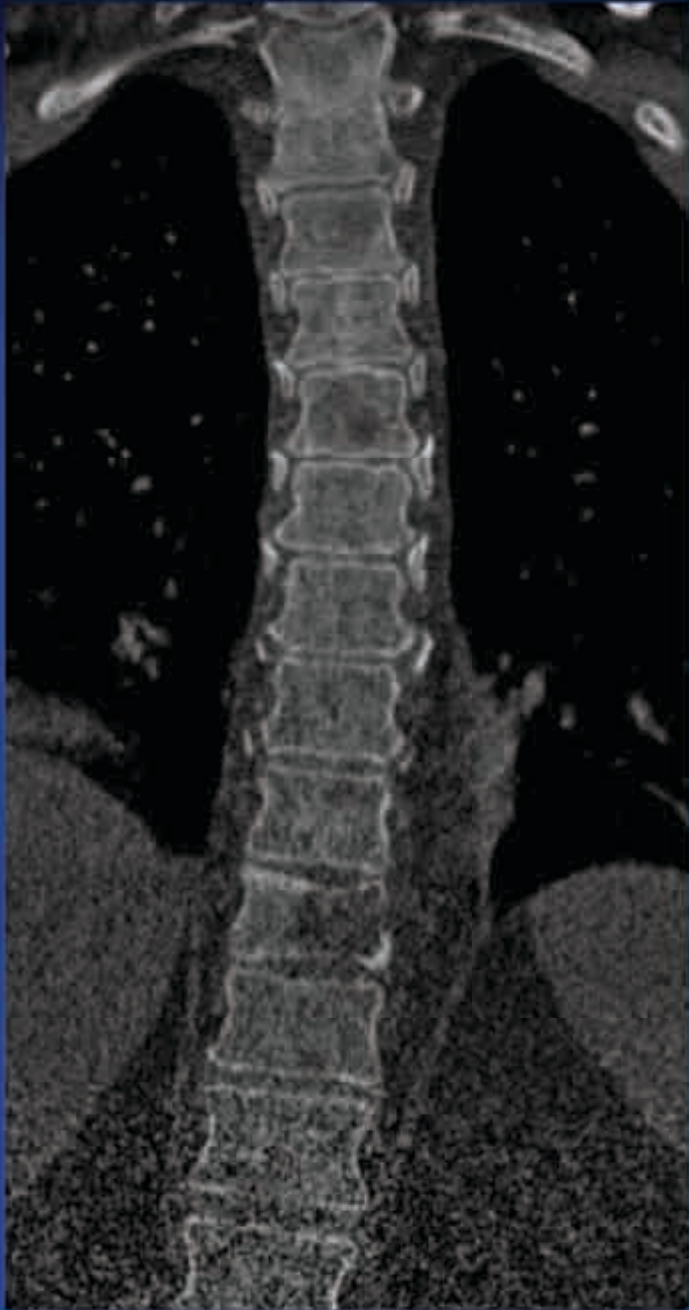
- Lymphoma

- Chondrosarcoma

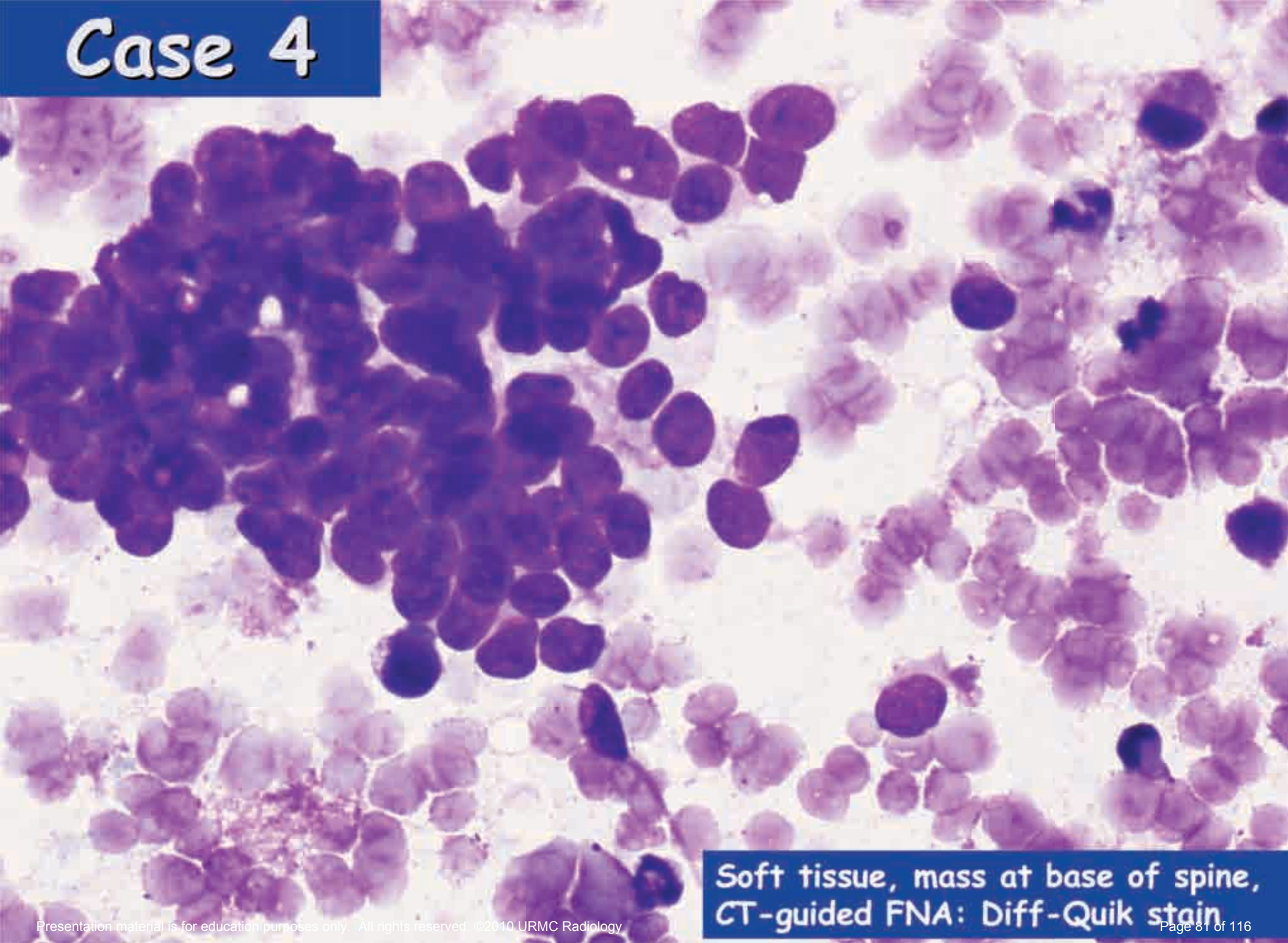
- Chordoma

- Giant Cell Tumor





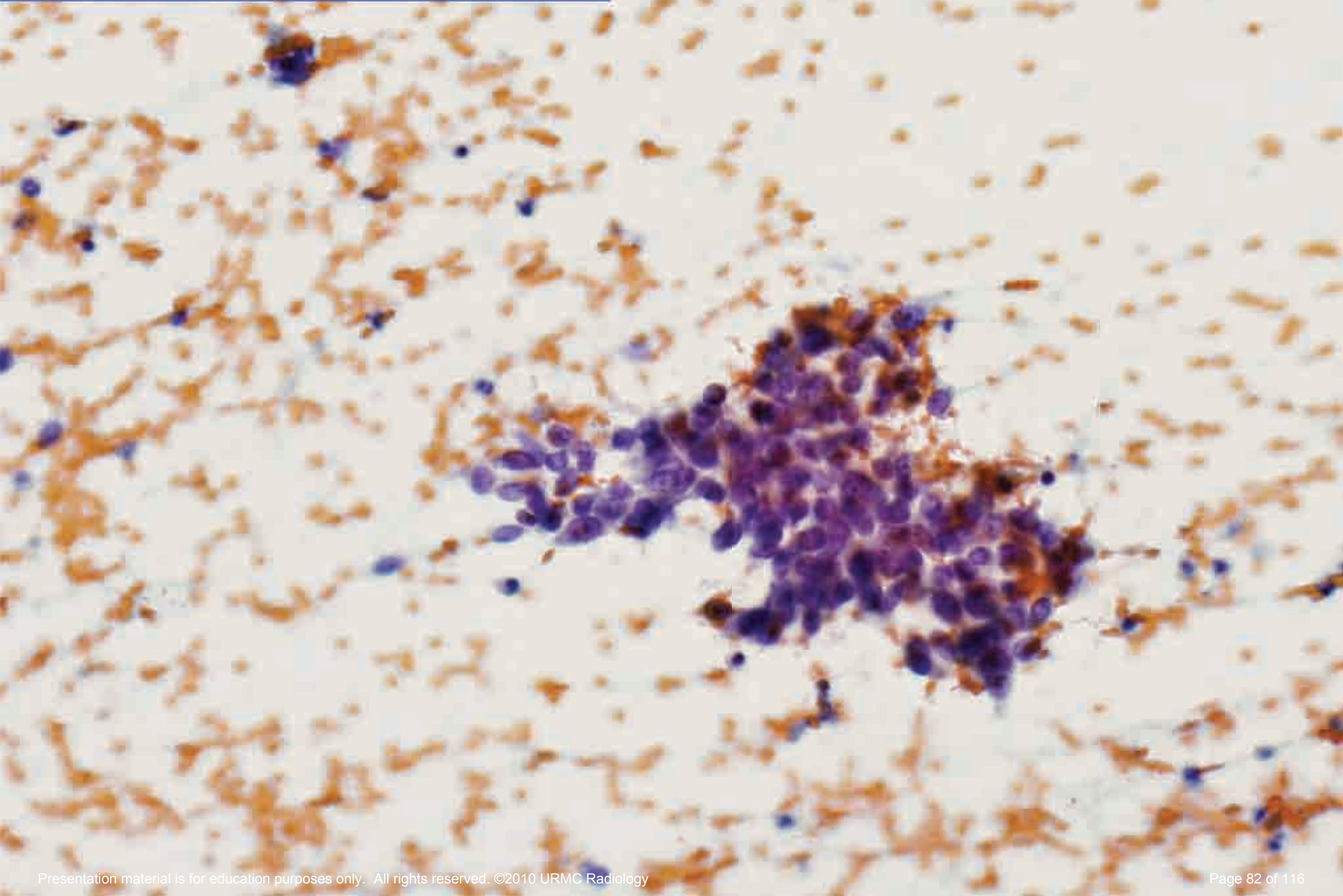
# Case 4



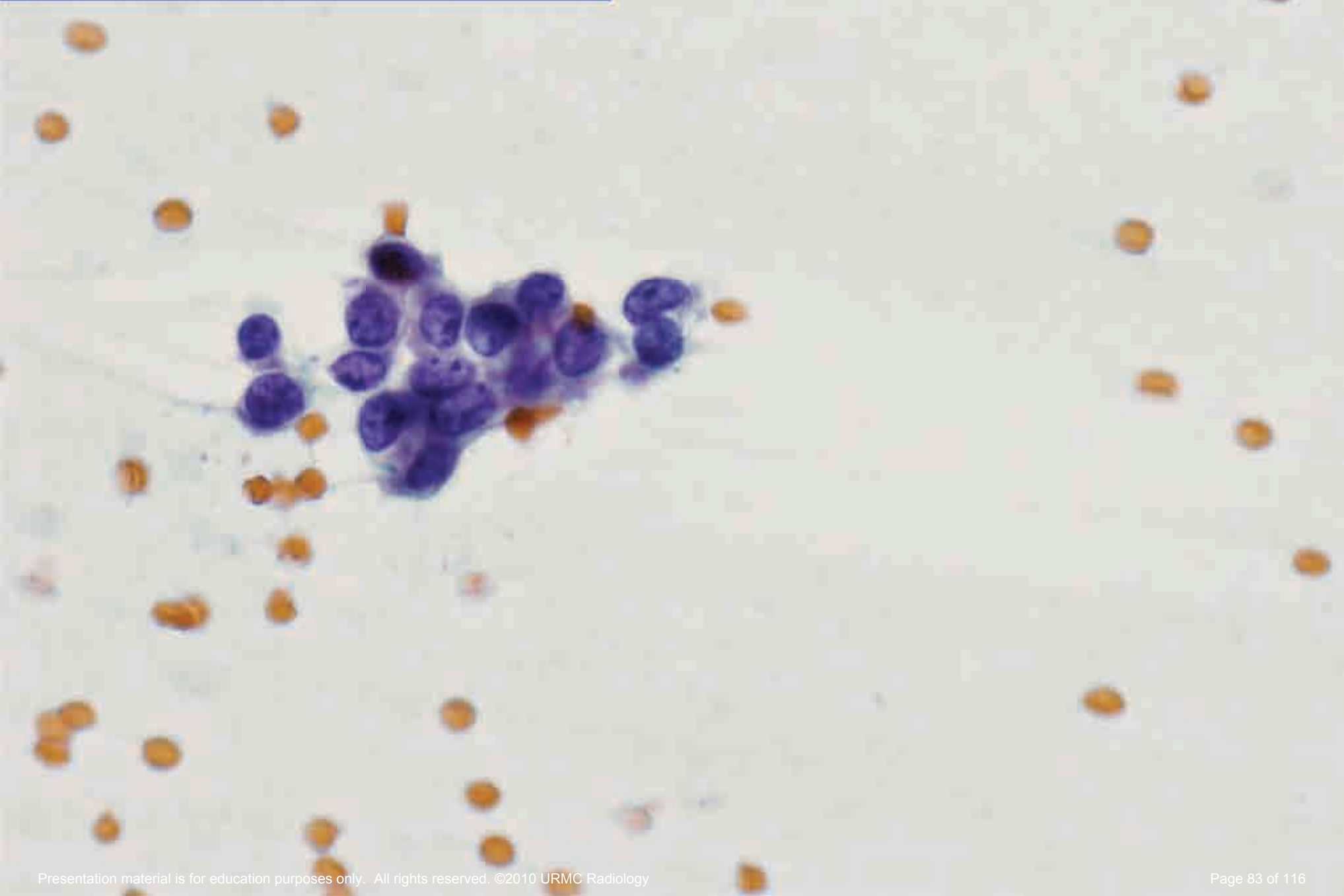
Soft tissue, mass at base of spine,  
CT-guided FNA: Diff-Quik stain



Soft tissue, mass at base of spine,  
CT-guided FNA: Papanicolaou stain

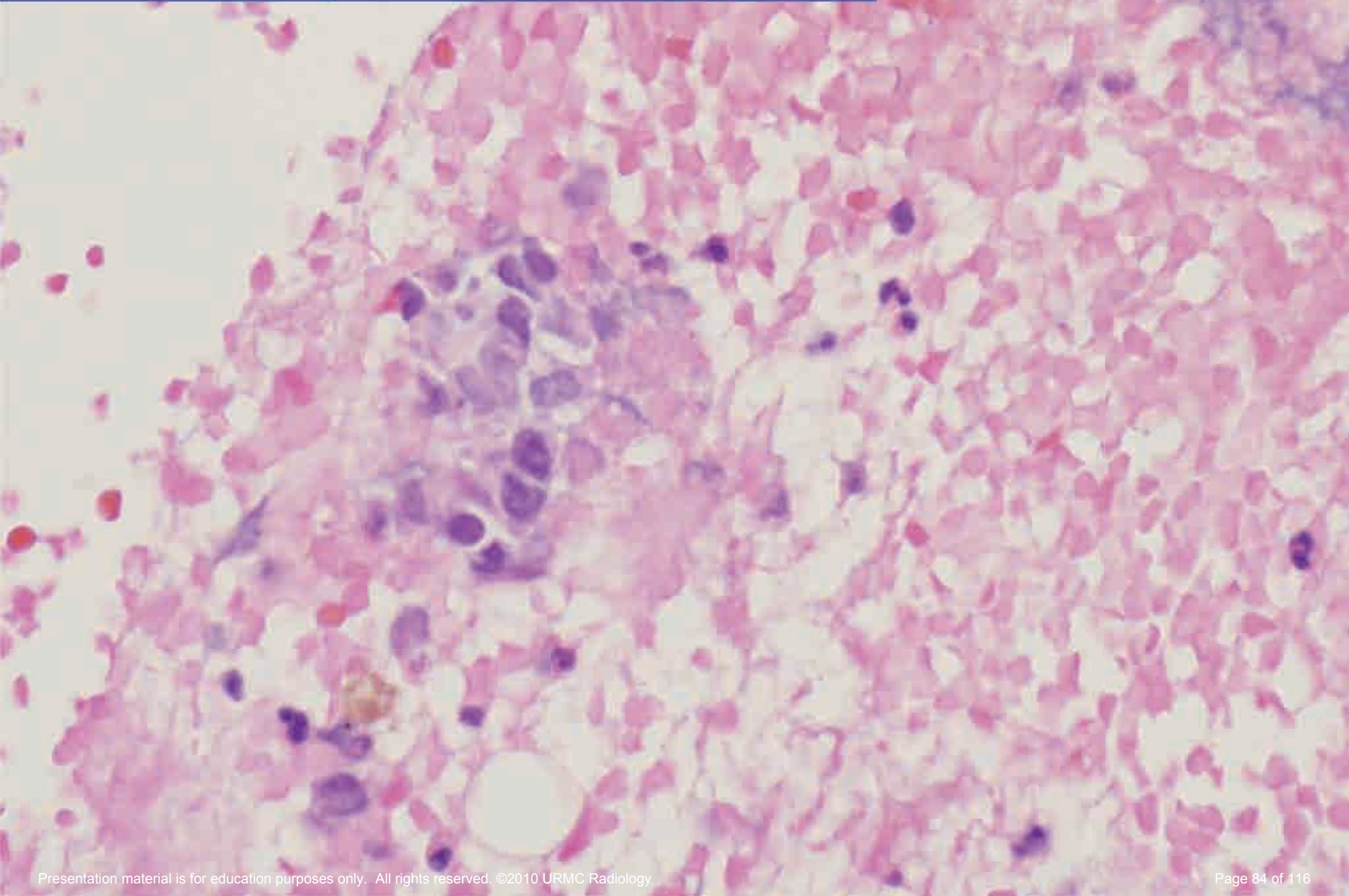


Soft tissue, mass at base of spine,  
CT-guided FNA: Papanicolaou stain





**Soft tissue, mass at base of spine, CT-guided FNA:  
Cell Block, hematoxylin & eosin stain**



**Soft tissue, mass at base of spine,  
CT-guided fine needle aspiration:**

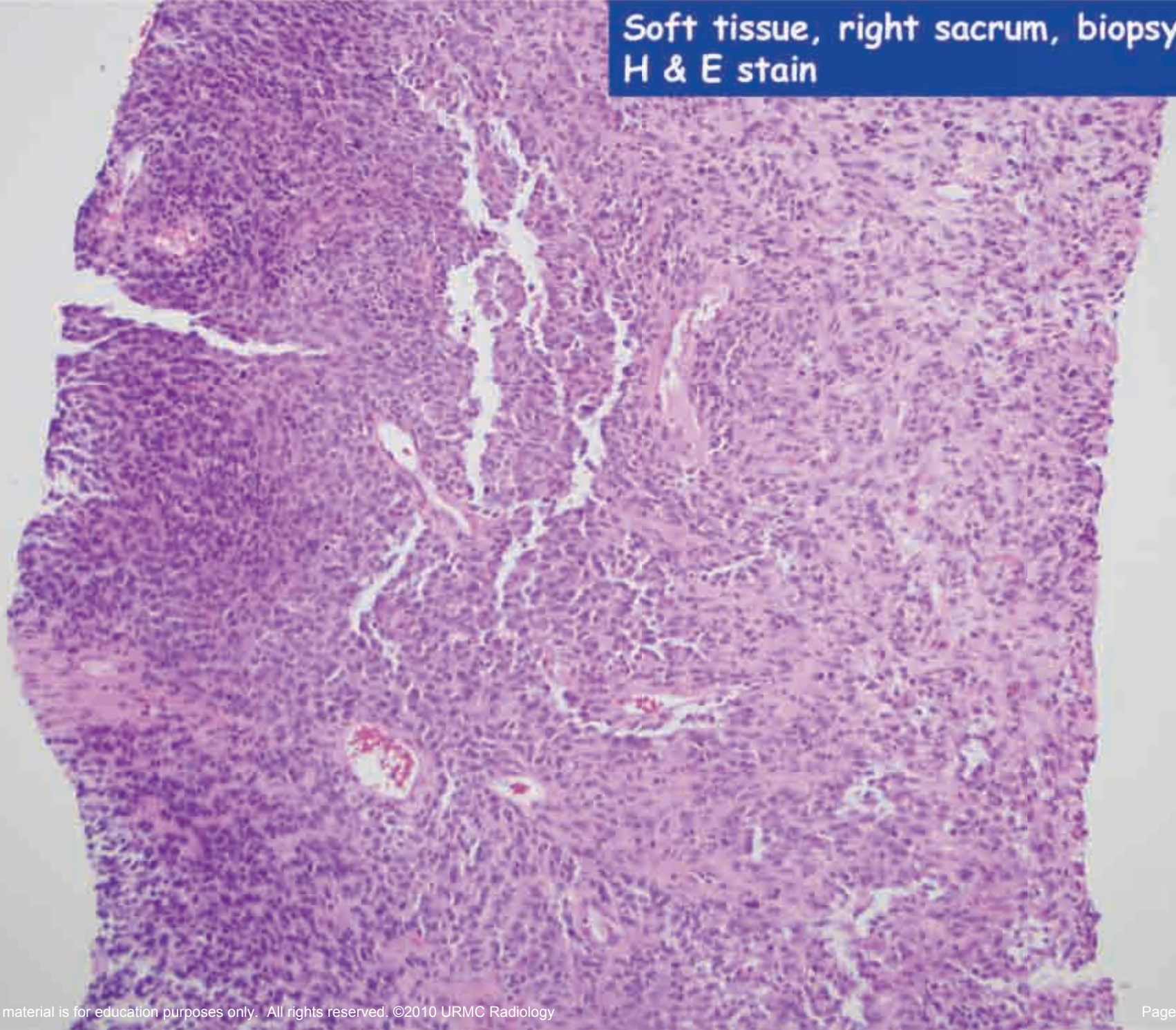
**Malignant tumor cells present consistent  
with origin from metastatic melanoma.**

**Immunohistochemical stains:**

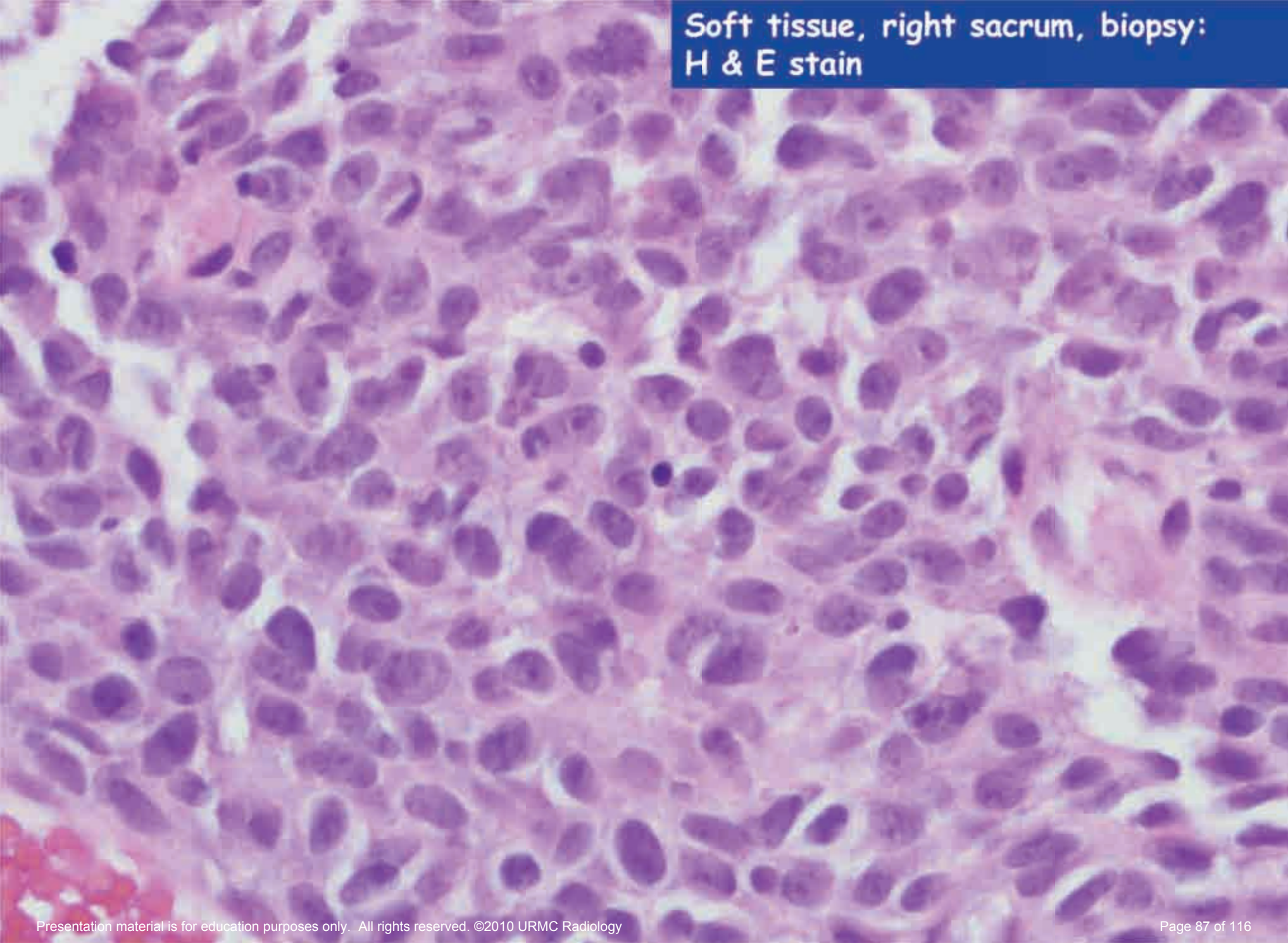
**Positive: S100**

**Negative: Cytokeratin, MelanA**

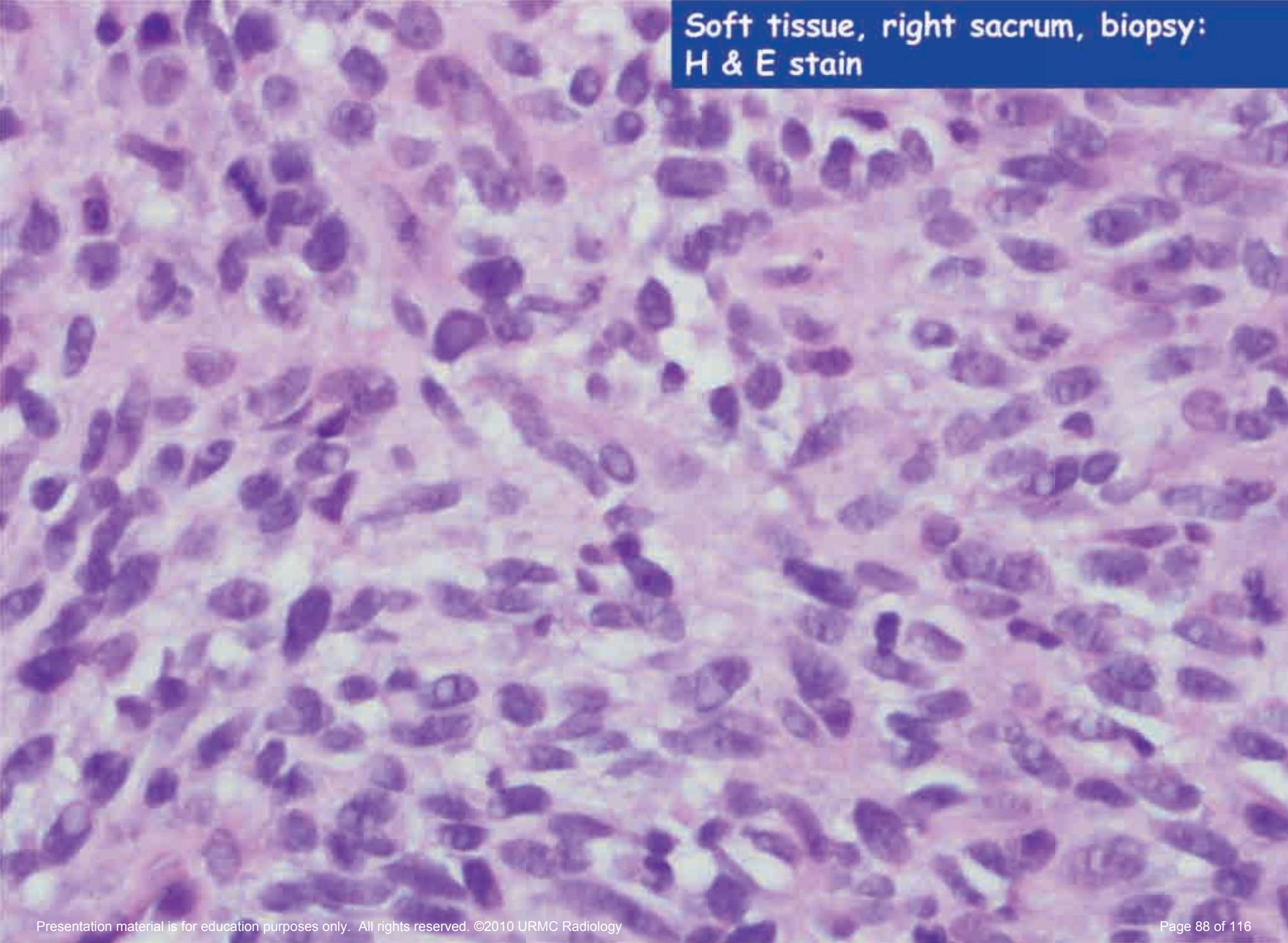






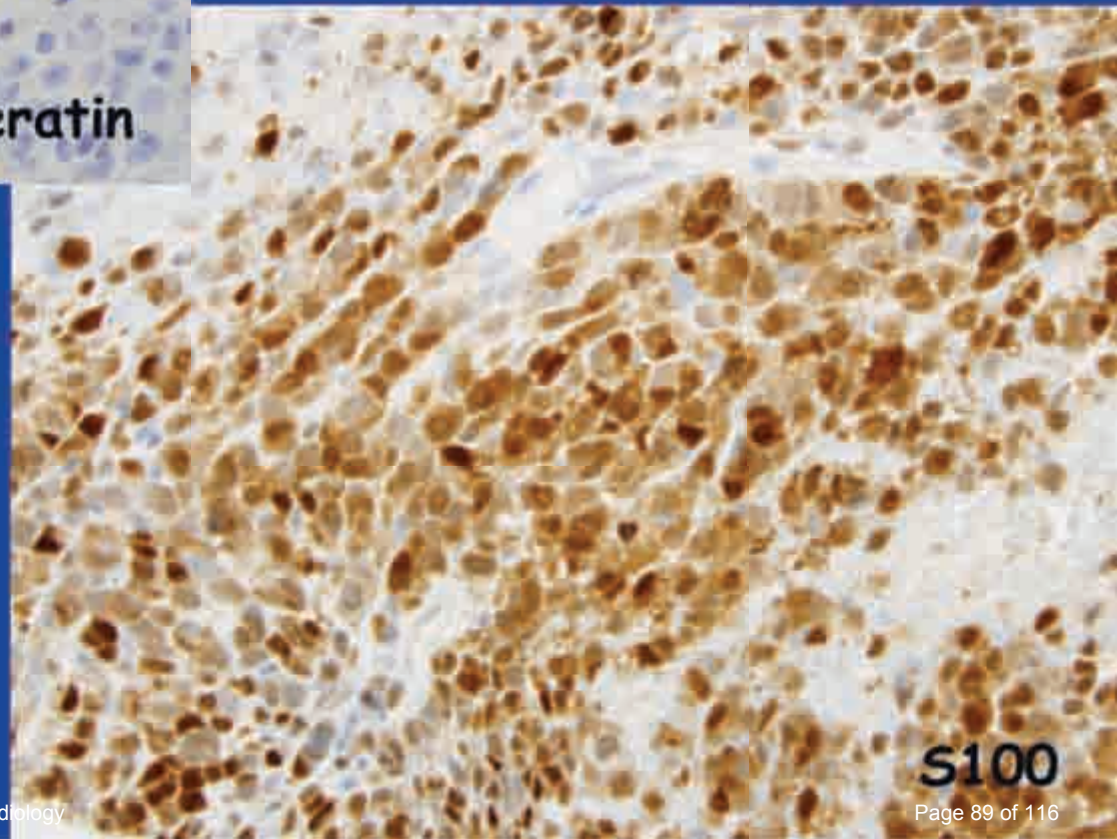
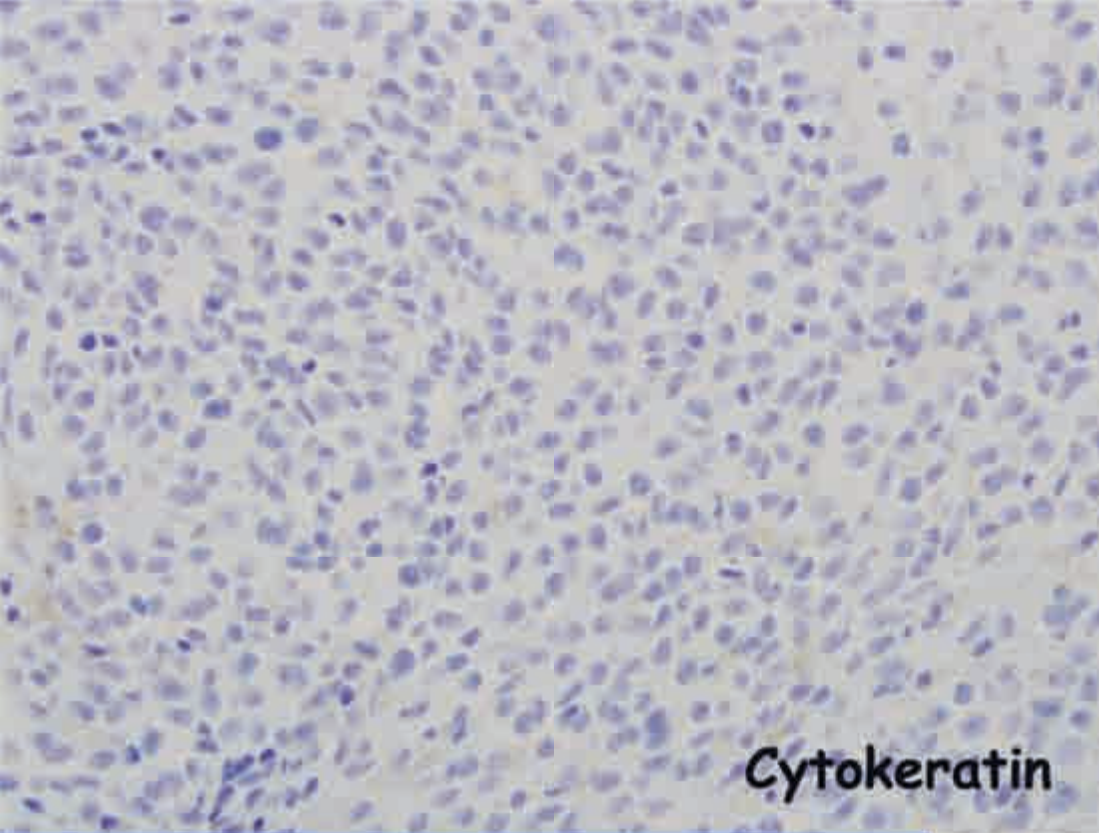








Soft tissue, right sacrum, biopsy:  
Immunohistochemical stains





**Soft tissue, right sacrum, biopsy:**

**Malignant neoplasm with areas of necrosis  
consistent with malignant melanoma.**

**Comment: Tumor cells are positive for S100  
and negative for cytokeratin. The prior  
specimen (2009) was also reviewed.**

# Metastatic Melanoma

- Most common site harboring metastatic disease = lymph nodes
- Metastatic carcinoma is by far the most common type of malignancy affecting the skeleton
- Bones of the axial and proximal appendicular skeleton such as vertebral column, large bones, ribs and skull – more commonly involved by metastasis
- Clinical history is essential
- Negative staining for Cytokeratin
- Positive staining for S100, HMB45, and MelanA



# Case 5

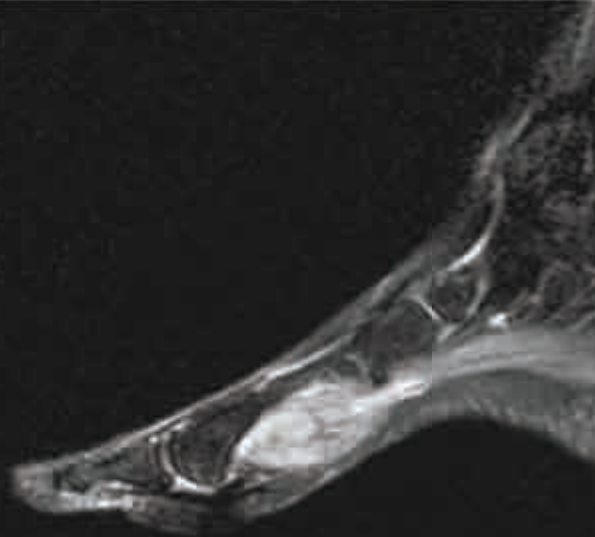
**29 yo female presents with  
discomfort while walking  
and her “left shoe feels tighter”**







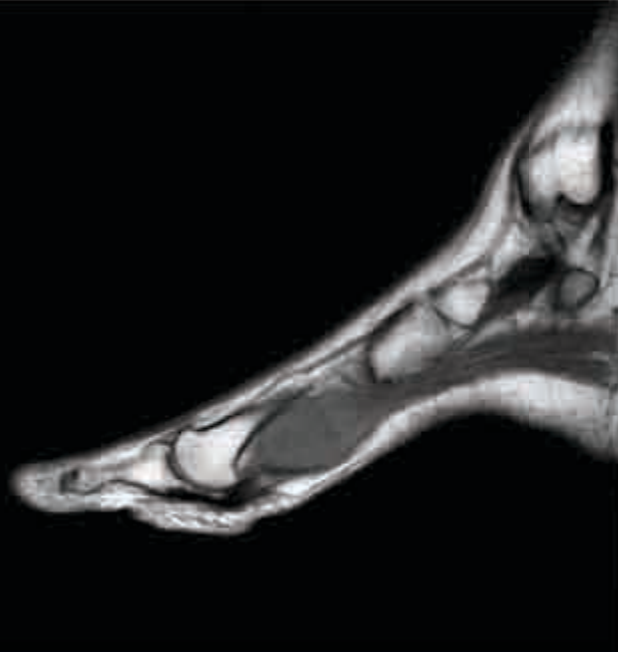
**Isointense on T1**



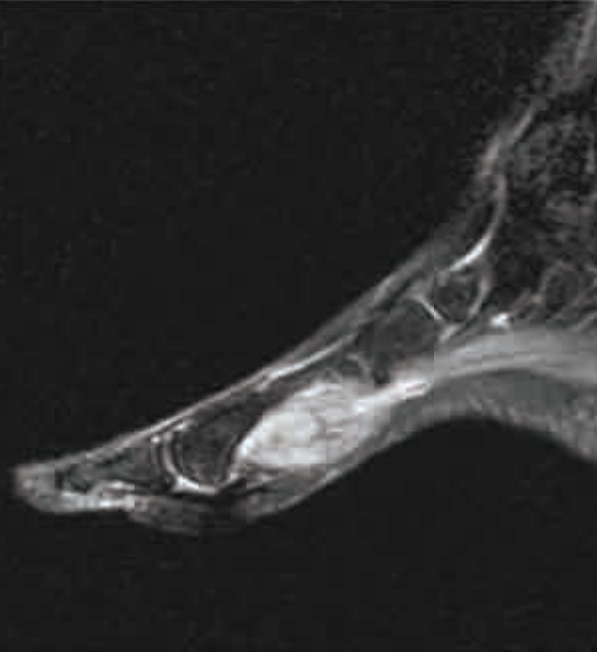
**Hyperintense on T2**



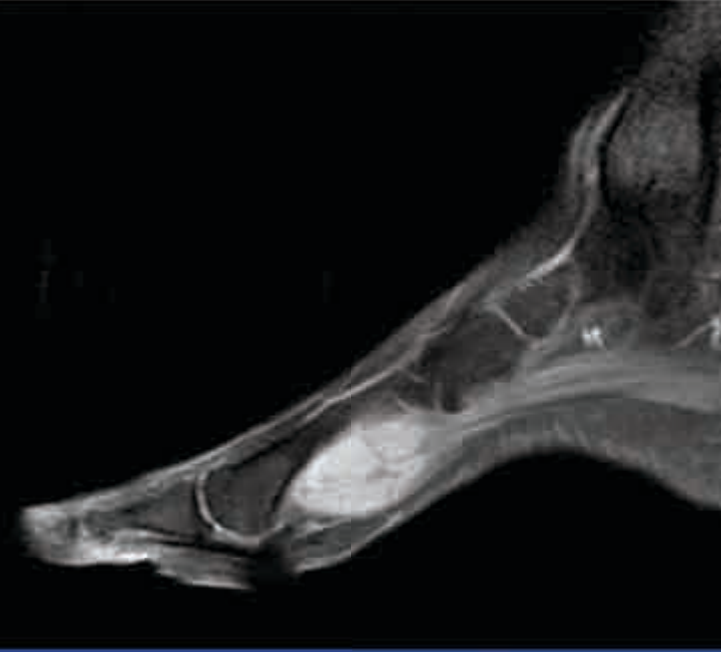
**Enhancement on fat-sat  
T1 post contrast**



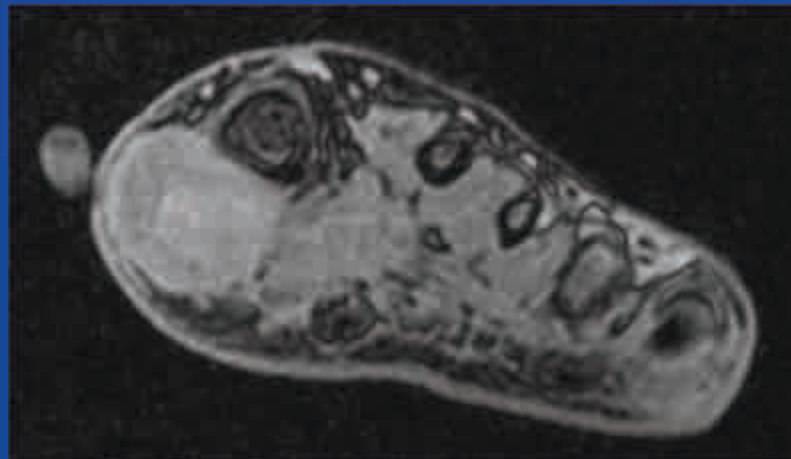
**Isointense on T1**



**Hyperintense on T2**



**Enhancement on fat-sat  
T1 post contrast**





▼ COMMON

■ Bursitis

- Tendon, Injury
- Plantar Fasciitis
- Ganglion Cyst
- Plantar Fibroma
- Morton Neuroma
- Gouty Tophus
- Lipoma, Soft Tissue

▼ LESS COMMON

- Charcot, Neuropathic
- Hemangioma, Soft Tissue
- Soft Tissue Abscess
- Giant Cell Tumor Tendon Sheath
- Pigmented Villonodular Synovitis (PVNS)
- Glomus Tumor

▼ RARE

- Rheumatoid Nodule
- Xanthoma (Fibro-xanthoma)
- Aneurysm
- Accessory Muscle
- Soft Tissue Neoplasms

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## ▼ RARE

- Rheumatoid Nodule
- Xanthoma (Fibro-xanthoma)
- Aneurysm
- Accessory Muscle
- Soft Tissue Neoplasms

## Soft-Tissue Tumors and Tumorlike Lesions: A Systematic Imaging Approach<sup>1</sup>

Jin S. Wu, MD  
Mely G. Huchman, MD

Soft-tissue tumors are frequently encountered by radiologists in everyday clinical practice. Characterization of these soft-tissue lesions remains problematic, despite advances in imaging. By systematically using clinical history, lesion location, assessment on radiographs, and signal intensity characteristics on magnetic resonance images, one can (a) determine the diagnosis for the subset of determinate lesions that have characteristic clinical and imaging features and (b) narrow the differential diagnosis for lesions that demonstrate indeterminate characteristics. If a lesion cannot be characterized as a benign entity, the lesion should be reported as indeterminate, and the patient should undergo biopsy to exclude malignancy.

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<sup>1</sup> From the Department of Radiology, Section of Musculoskeletal Imaging, Beth Israel Deaconess Medical Center, 330 Brookline Ave, Boston, MA 02215. Received Aug 5, 2008; revision accepted August 28; revision accepted September 10, 2008; accepted March 19 final version accepted March 21. Address correspondence to J.S.W. (e-mail: jwu@rics.bwh.harvard.edu).

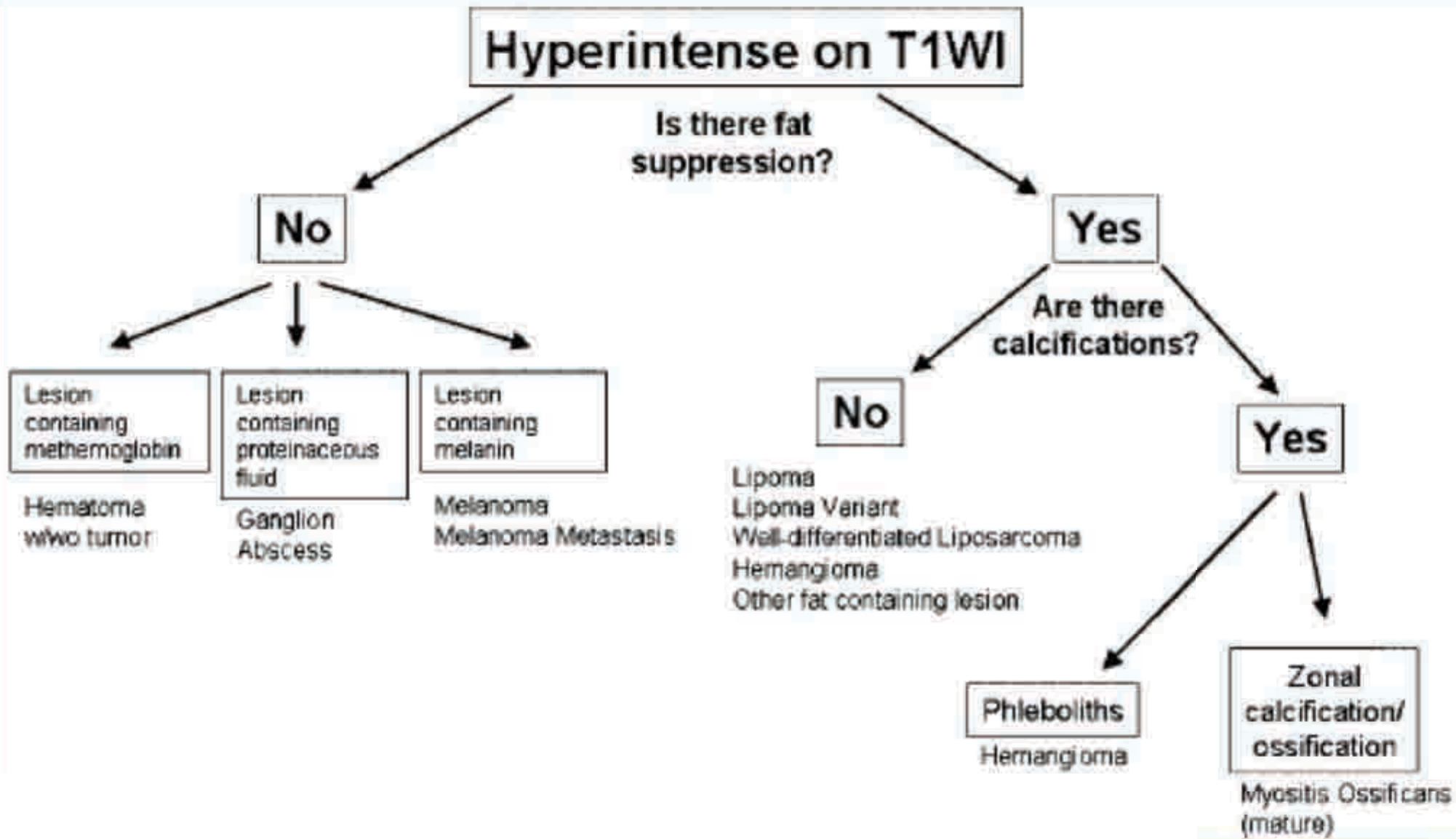
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Radiology: Volume 232: Number 2 • November 2009 • 297



## Lesion Characterization on the Basis of SI on MR Images

Appearance	Lesion
<b>T1 hyperintense</b>	
Lesion containing fat	Lipoma, lipoma variant, well-differentiated liposarcoma, hemangioma, myositis ossificans (mature)
Lesion containing methemoglobin	Hematoma
Lesion containing proteinaceous material	Ganglion, abscess
Lesion containing melanin	Melanoma
<b>T2 hypointense</b>	
Lesion containing fibrosis	Scar tissue, plantar fibroma, elastofibroma, desmoid, fibrosarcoma, GCT of tendon sheath, lymphoma (occasionally)
Lesion containing dense calcification	Gouty tophi, dystrophic calcification
Lesion containing hemosiderin	GCT of tendon sheath
<b>T2 hyperintense (cystlike)</b>	
Fluid-filled lesion	Ganglia, seroma, abscess, epidermoid inclusion cyst
Solid tumor	Myxoid lesion: intramuscular myxoma, myxoid liposarcoma; PNST; synovial sarcoma





# Hypointense on T2WI

Are there  
calcifications?

No

Yes

Lesion  
containing  
fibrous tissue

Lesion  
containing  
hemosiderin

Lesion containing dense  
calcification

Gouty tophi  
Dystrophic calcification

Where is it  
located?

Location  
specific

Location non-  
specific

Plantar fibroma  
GCT-TS  
Elastofibroma  
Post-op scar

Fibroma  
Desmoid  
Leiomyoma  
Fibrosarcoma

GCT-TS  
PVNS  
Hemorrhagic mass

# Hyperintense “cyst-like” on T2WI

What is the enhancement pattern?

**Rim**

Fluid containing lesion

Ganglion  
Seroma  
Abscess  
Epidermoid Inclusion Cyst  
Bursa

**Internal**

**Myxomatous tumor**

Intramuscular Myxoma  
Myxoid Sarcoma

**Other**

Synovial Sarcoma  
PNST  
Necrotic tumor





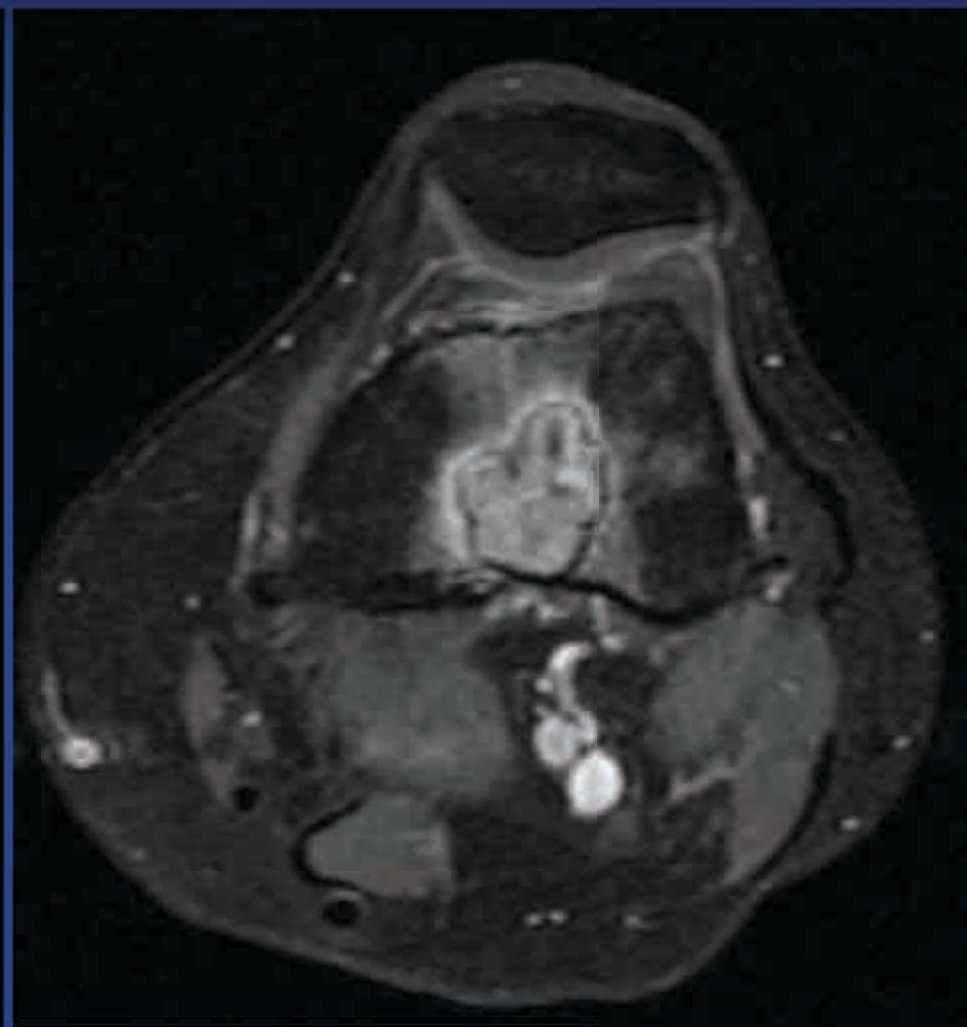
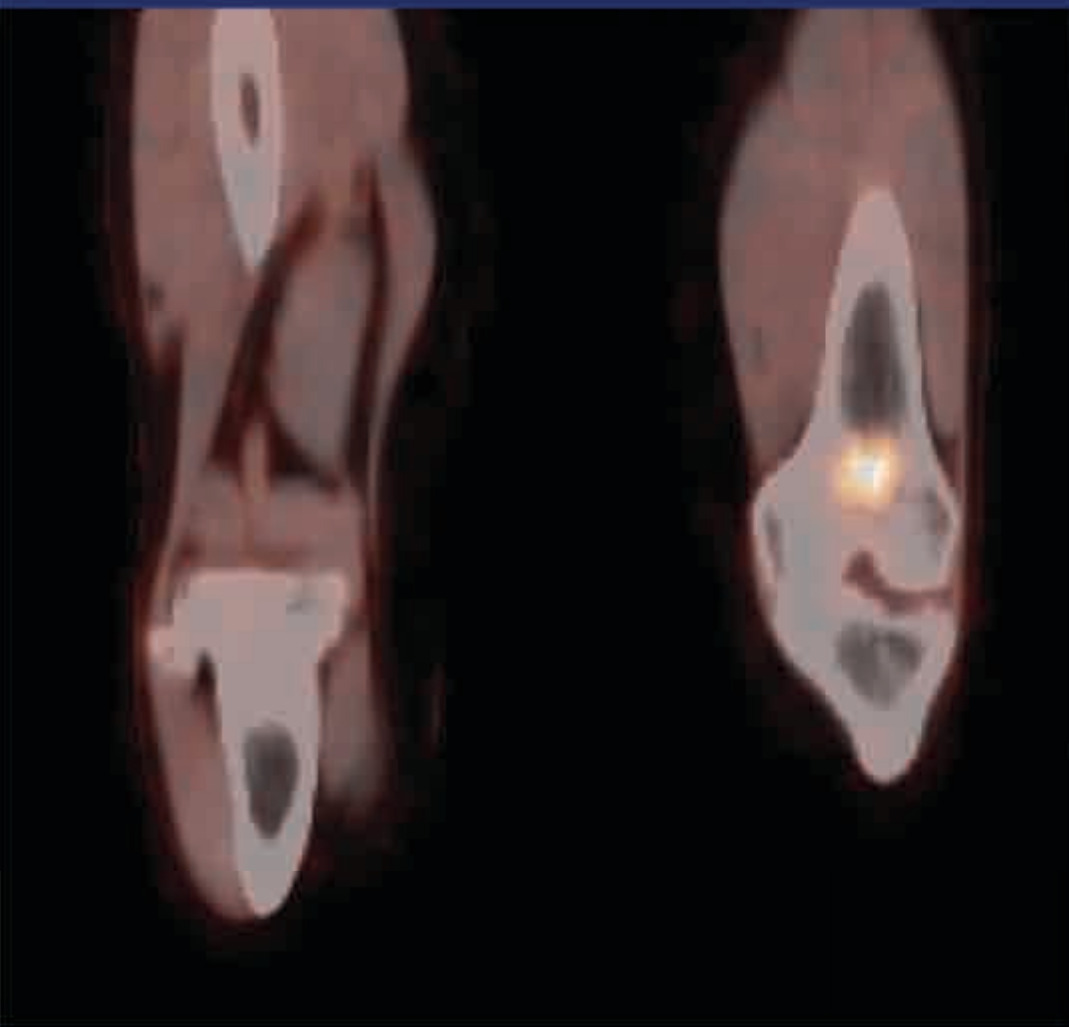




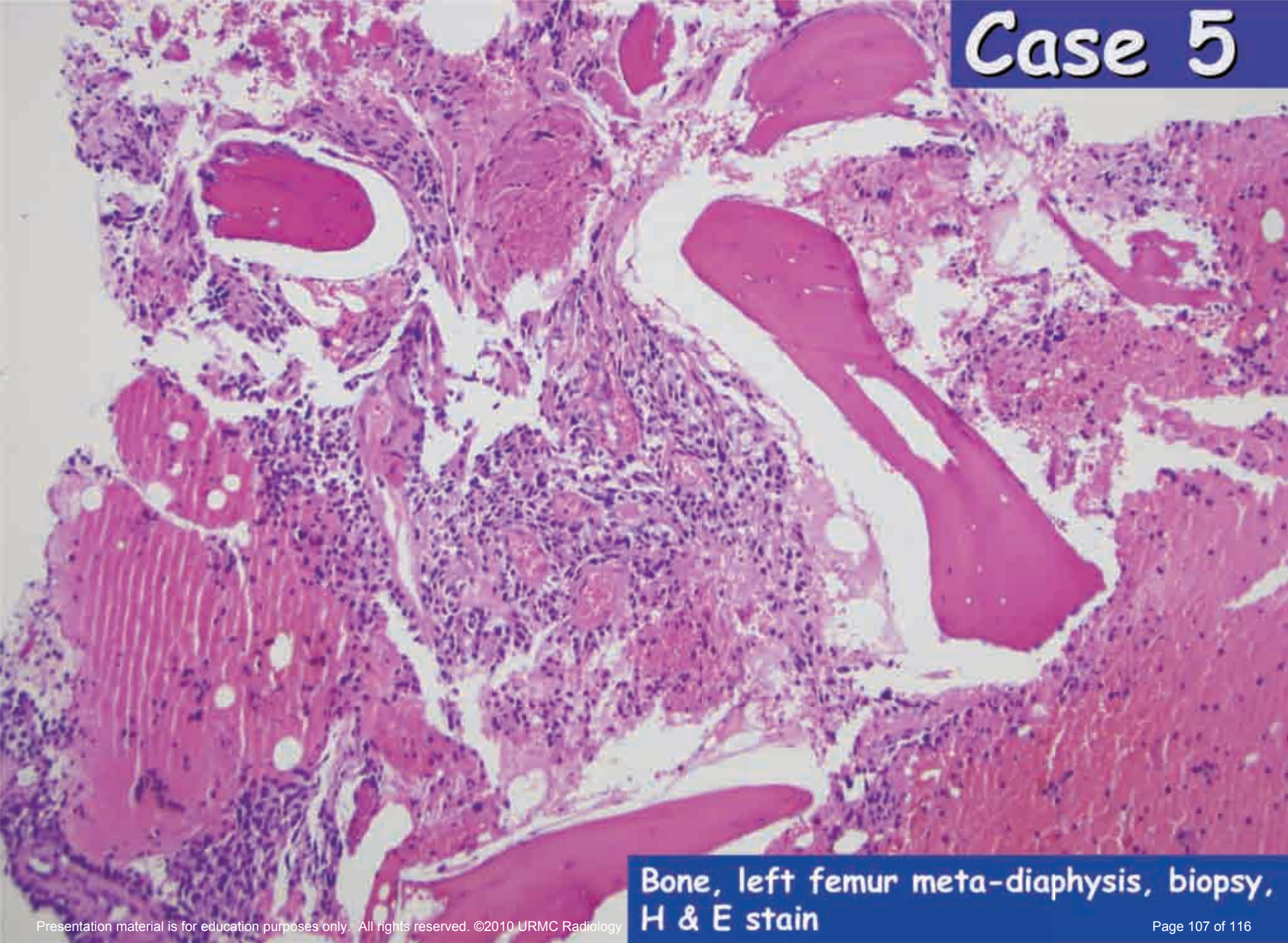






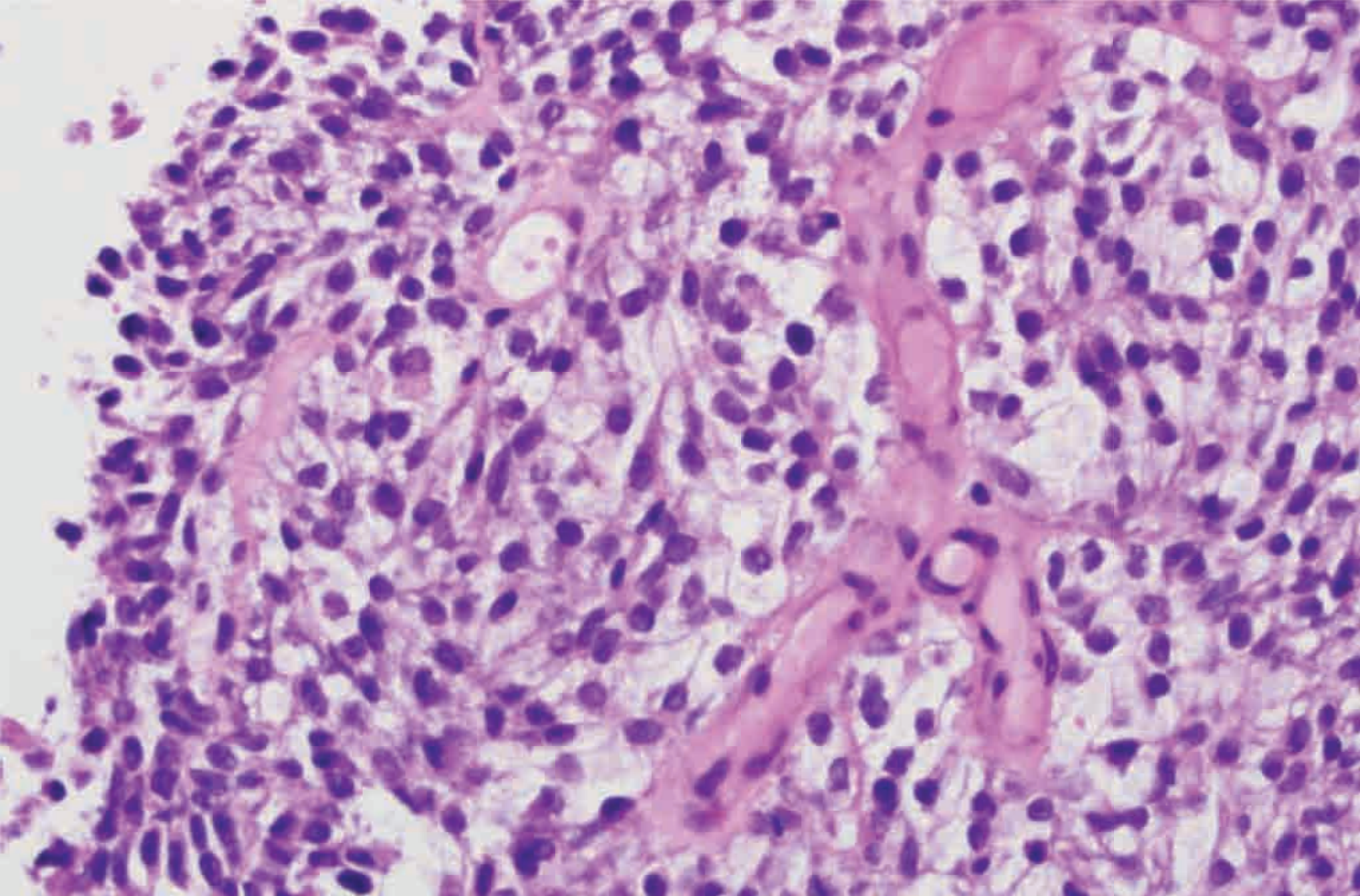


# Case 5



Bone, left femur meta-diaphysis, biopsy,  
H & E stain



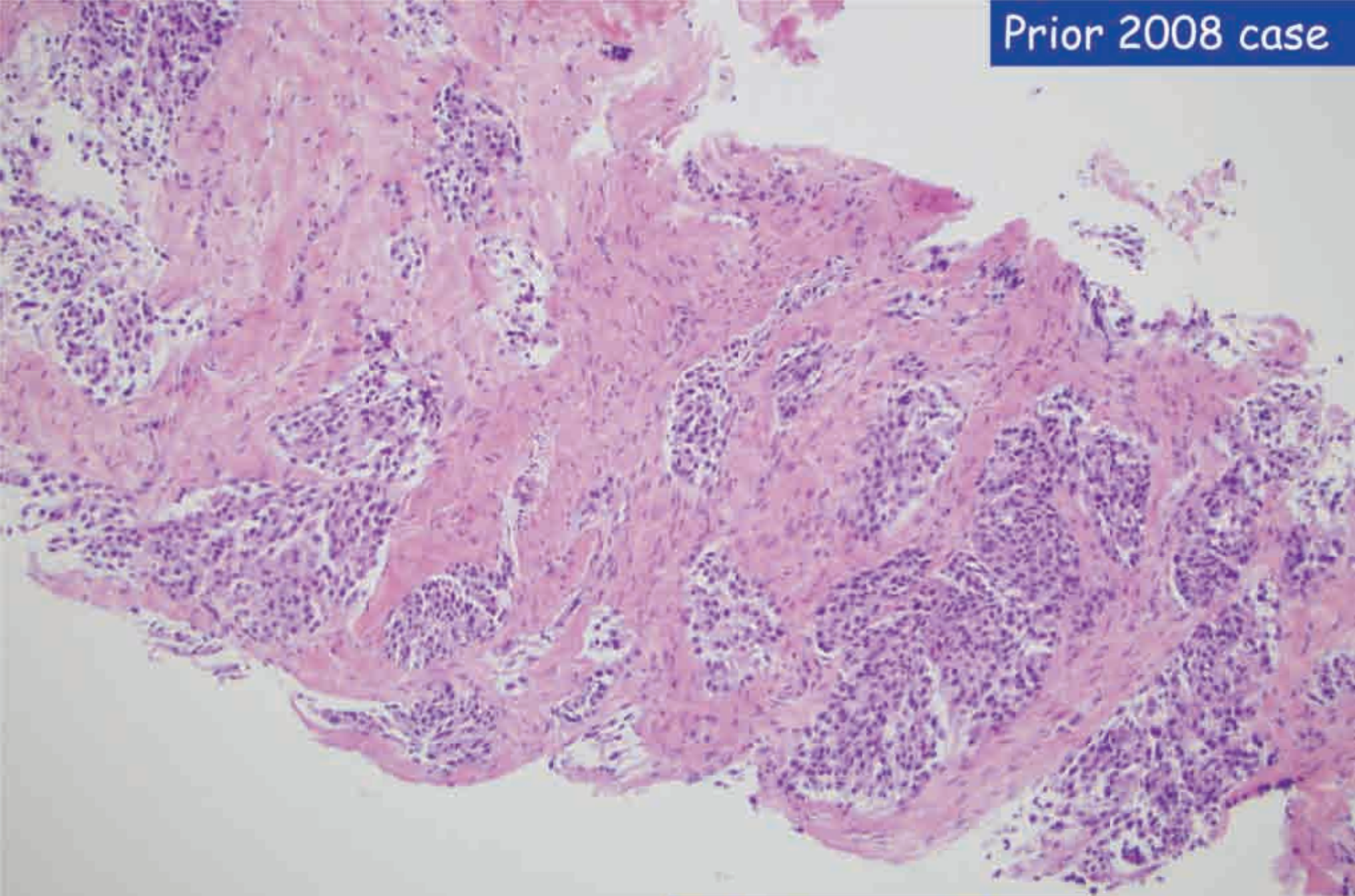


**Bone, left femur meta-diaphysis, biopsy,  
H & E stain**

**Bone, left femur meta-diaphysis,  
biopsy:**

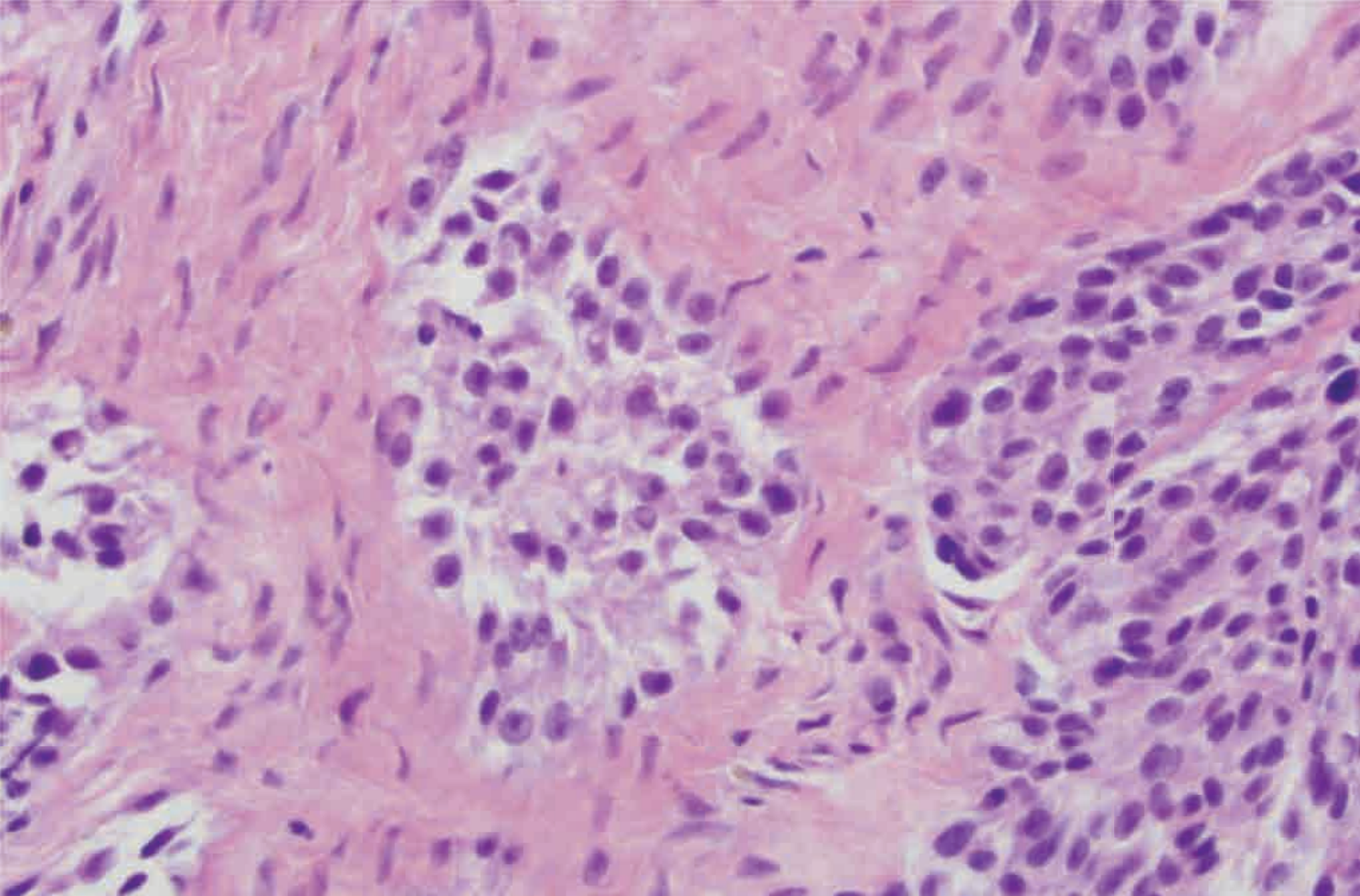
**Metastatic malignant neoplasm consistent  
with clear cell sarcoma (melanoma of soft  
parts).**





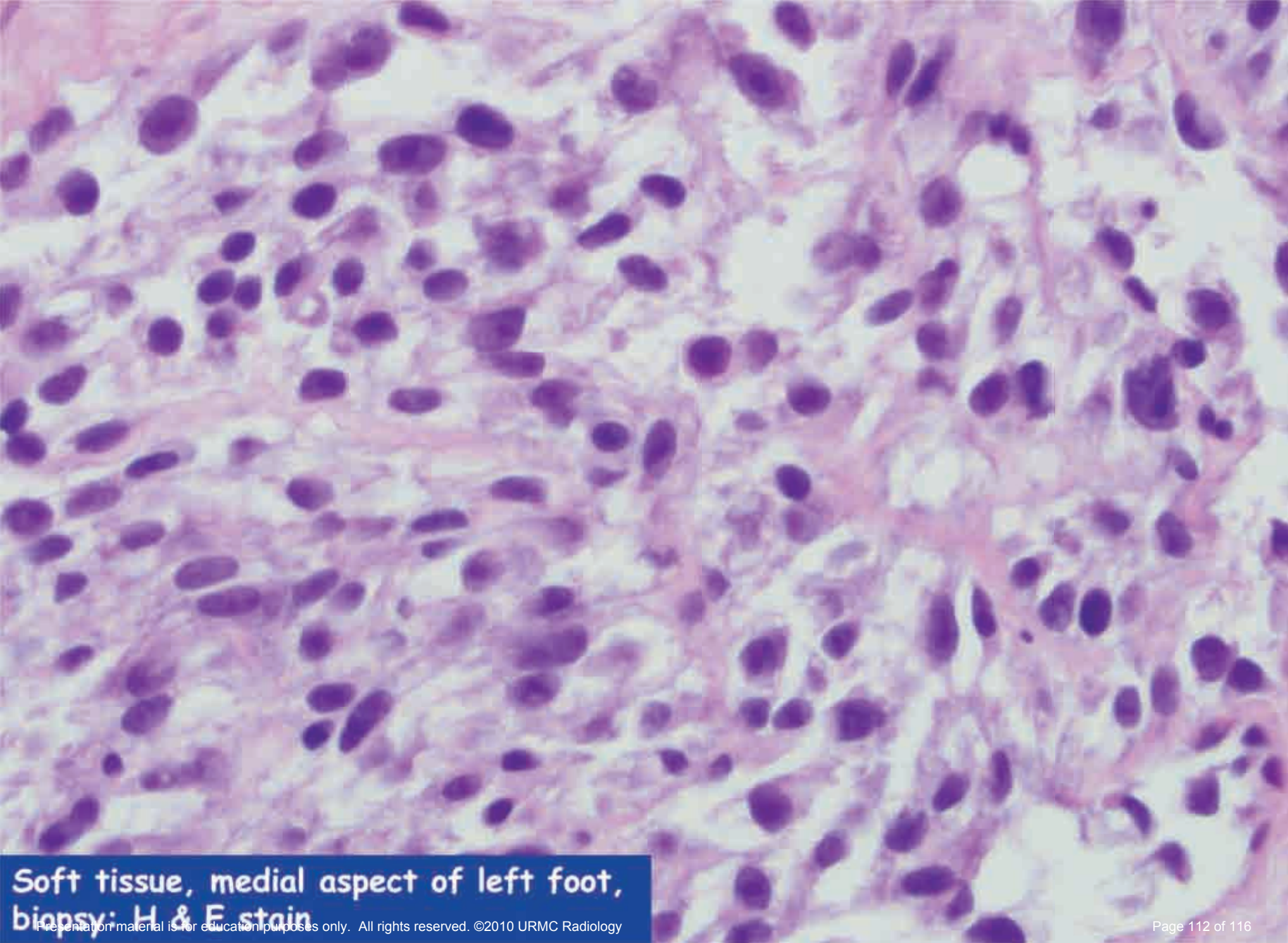
**Soft tissue, medial aspect of left foot,  
biopsy: H & E stain**





**Soft tissue, medial aspect of left foot, biopsy: H & E stain**

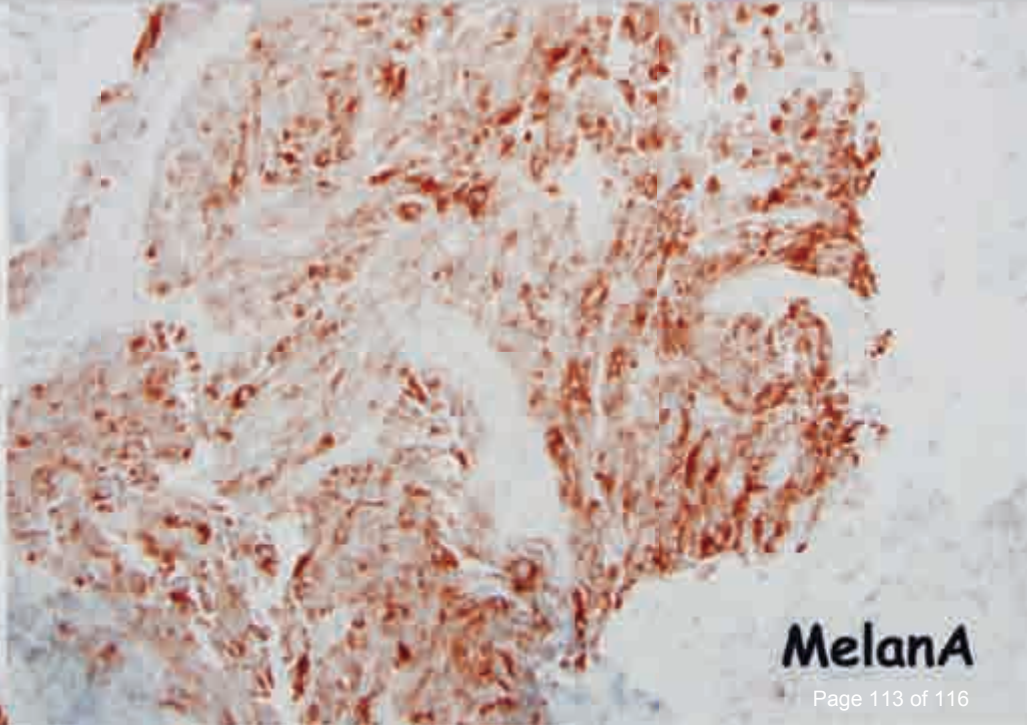
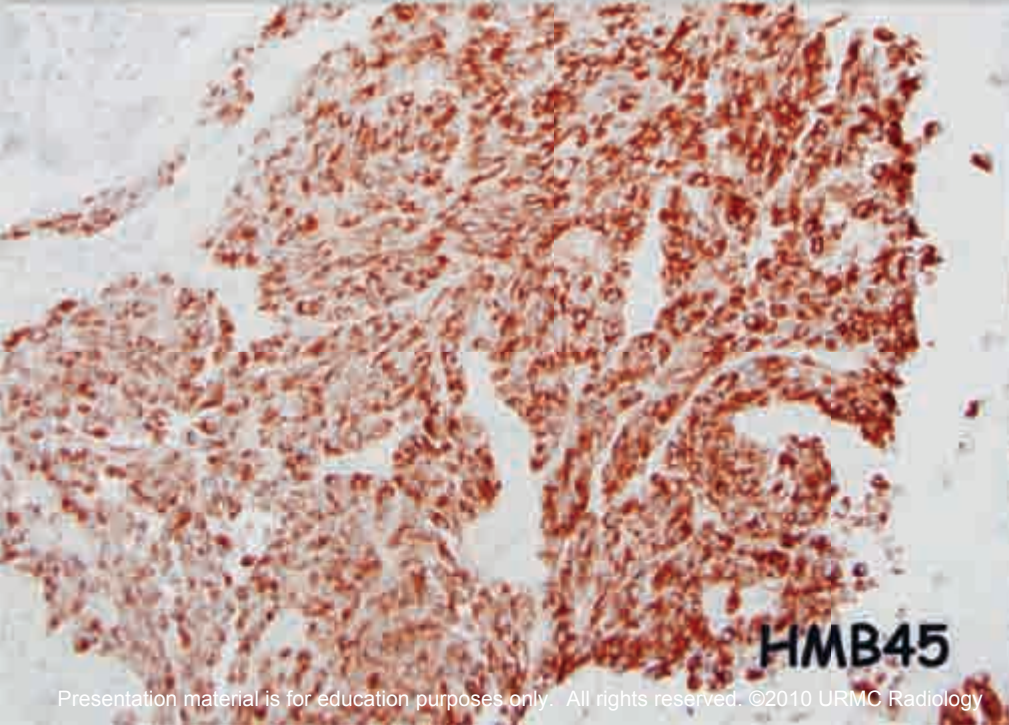
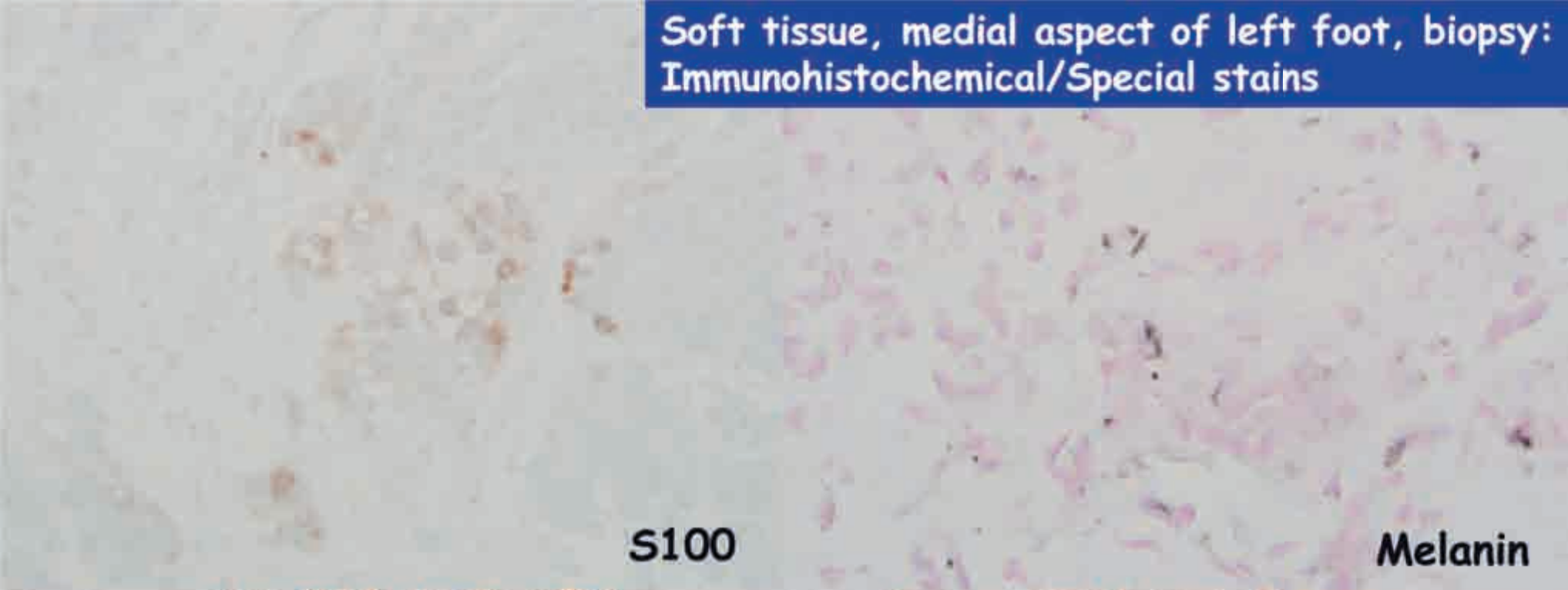




**Soft tissue, medial aspect of left foot,  
biopsy: H & E stain**



**Soft tissue, medial aspect of left foot, biopsy:  
Immunohistochemical/Special stains**





# Soft tissue, medial aspect of left foot, biopsy:

Malignant melanoma (clear cell tumor) of soft parts.

**Comment:** The tendinous and soft tissues of the specimen are infiltrated by packets of clear to eosinophilic small cells, some of which have intracytoplasmic melanin confirmed by melanin stain. The tumor cells are focally positive for S100, MelanA, and HMB45. All of these features, the age of the patient, and site of the lesion are typical of clear cell sarcoma.

# Clear cell Sarcoma

- Rare sarcoma of neural crest origin, melanocytic differentiation
- Young adults/adolescents, median age 30
- Presents as slowly growing, painful mass of extremities/limb girdle, associated with fascia, tendon or aponeuroses
- Slow progression, local recurrence common, eventual nodal and distant mets
- Micro: Nested growth pattern with spindled, epithelioid, and giant cells, often necrosis
- Stain with melanoma markers and 2/3 have scattered cells with intracytoplasmic melanin
- t(12;22), ATF1-EWS (not seen in melanoma)

# The End