Radiology / Pathology Conference

March 2010

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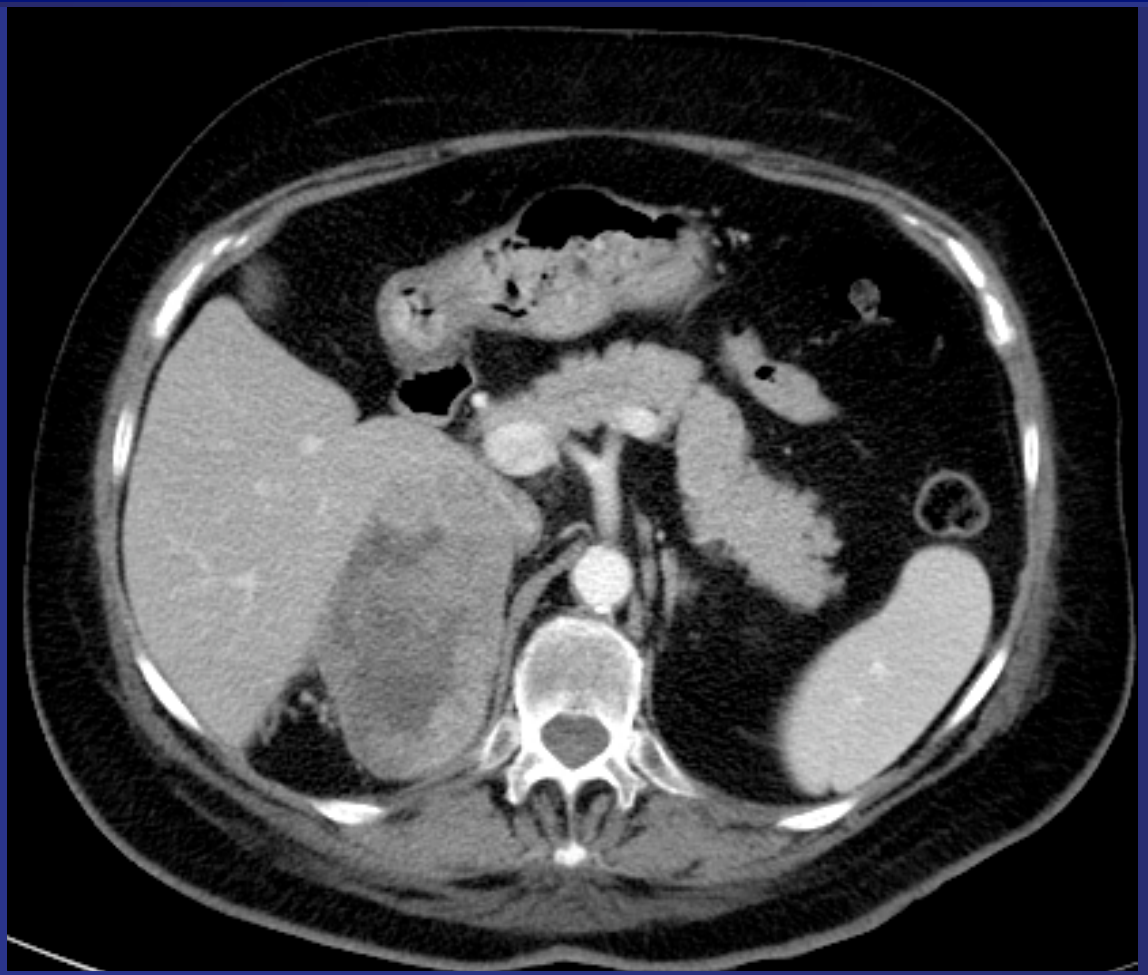
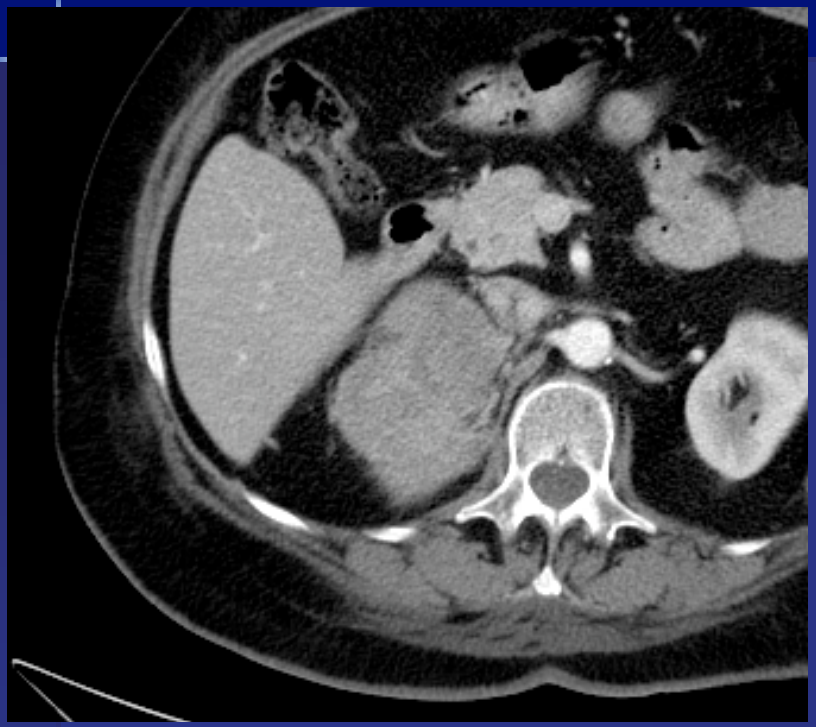
Case 1

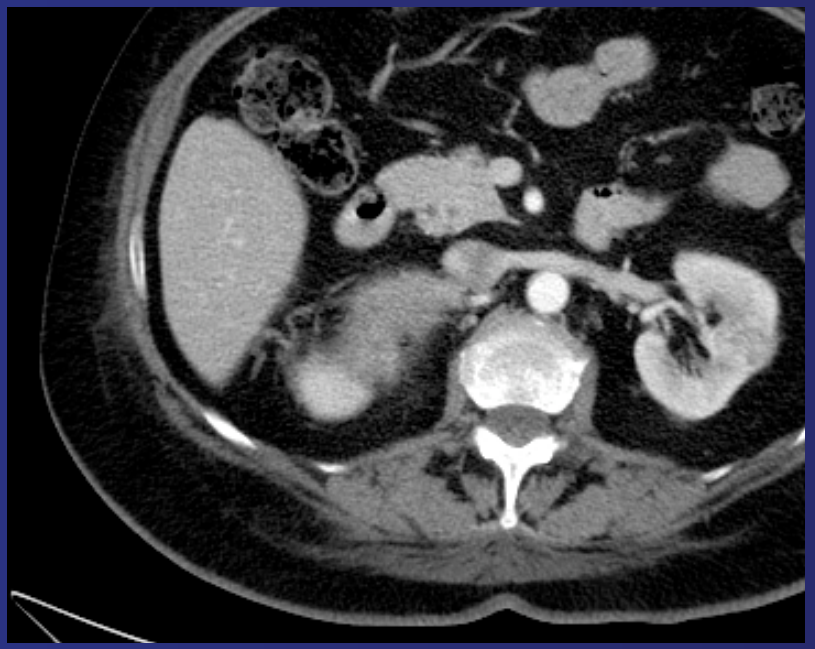
- 77 year old female with dyspnea on exertion and hypertension

Case 1



Case 1





Case 1

- Differential Diagnosis
  - Pheochromocytoma
  - Adrenal Cortical Carcinoma
  - Metastasis

Case 1

- Patient originally presented from an outside hospital with diagnosis of adrenal mass and refractory hypertension.
- Should you be concerned about administering IV contrast for CT?

Case 1

- IV contrast administration induces catecholamine release that can potentially cause hypertensive crisis in a patient with pheochromocytoma.
- Effect is potentiated if patient has beta blockade on board.
  - Unapposed alpha adrenergic effect

Case 1

- OBJECTIVE: To examine whether intravenous low-osmolar contrast administration during CT induces catecholamine release that increases blood pressure or heart rate.
- Prospective study with 22 patients with known pheochromocytoma and 8 unmatched controls.
  - 15 non adrenal
  - 7 adrenal

Baid SK; Lai EW; Wesley RA; Ling A; Timmers HJ; Adams KT; Kozupa A; Pacak K . Brief communication: Radiographic contrast infusion and catecholamine release in patients with pheochromocytoma. Ann Intern Med. 2009 Jan 6;150(1):27-328

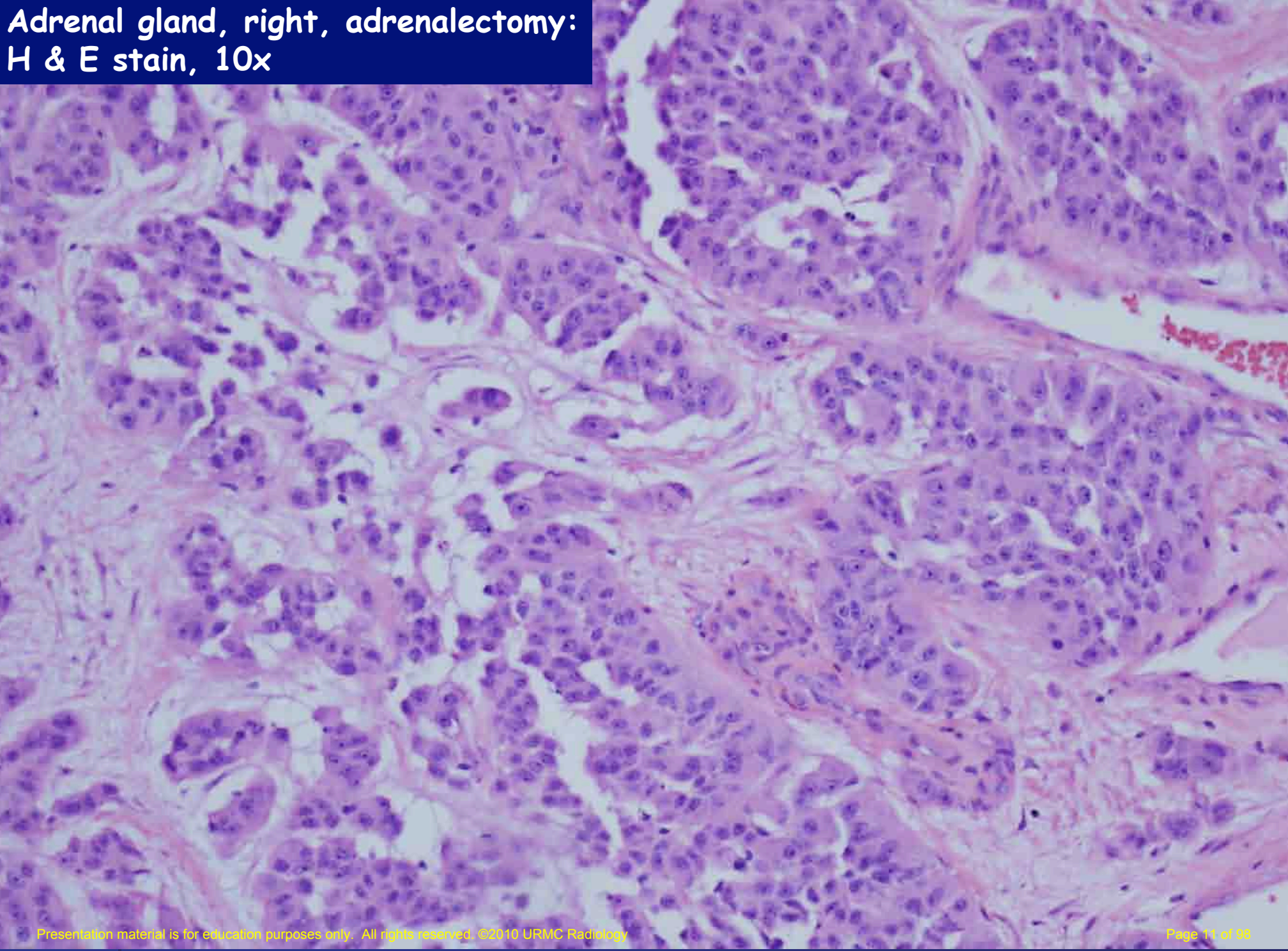
Case 1

- Results
  - No episodes of hypertensive crisis
  - Plasma catecholamine levels within and between groups did not significantly differ before and after intravenous administration of low osmolar contrast
  - Study limited by small sample size and lack of placebo

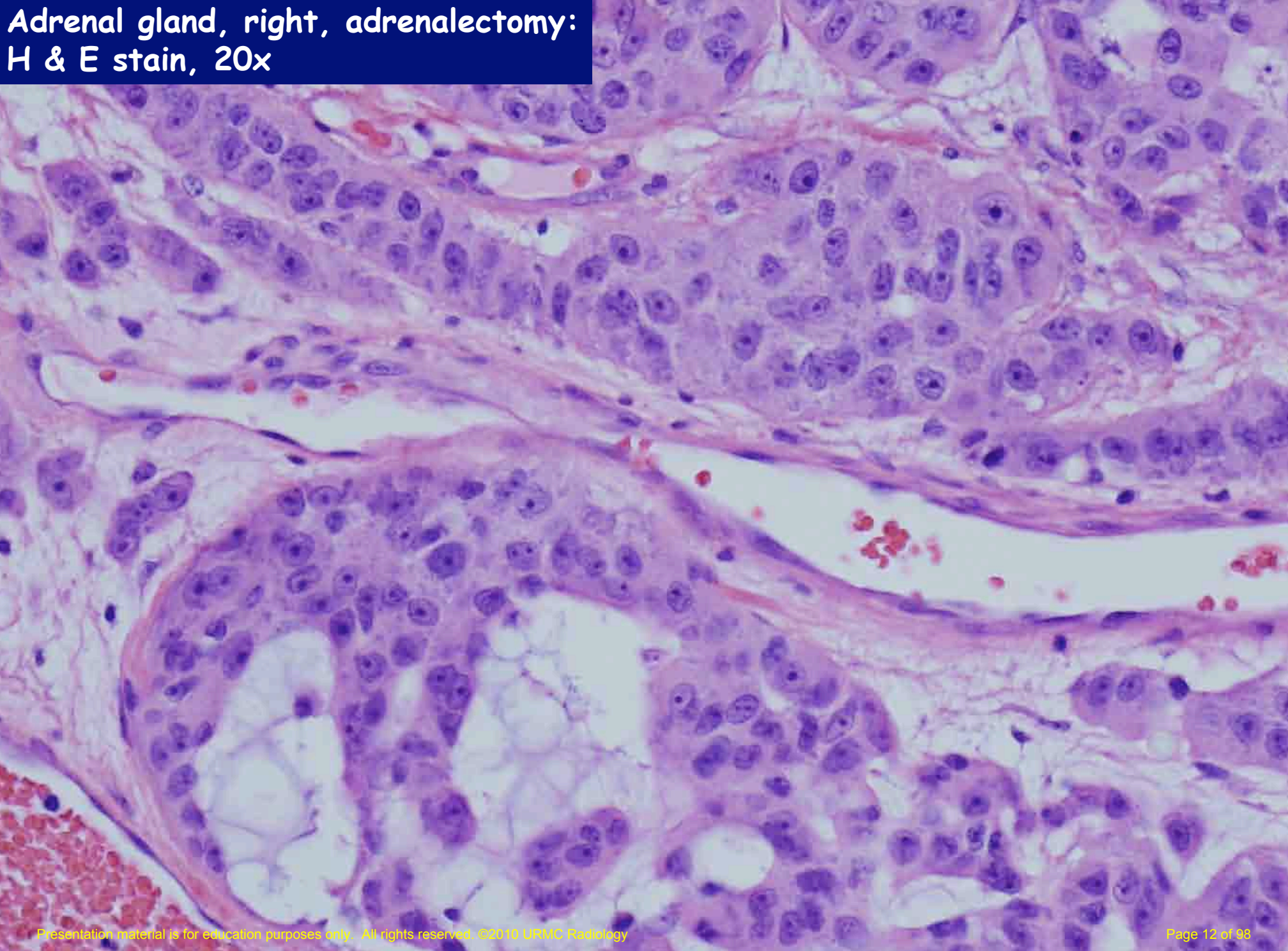
Case 1

- Recommendation: Intravenous low-osmolar contrast-enhanced CT can safely be performed in patients with known or suspected pheochromocytoma who are not receiving alpha- or beta-blockers
- Additional Questions
  - Did we even need IV contrast?
  - What to do next?

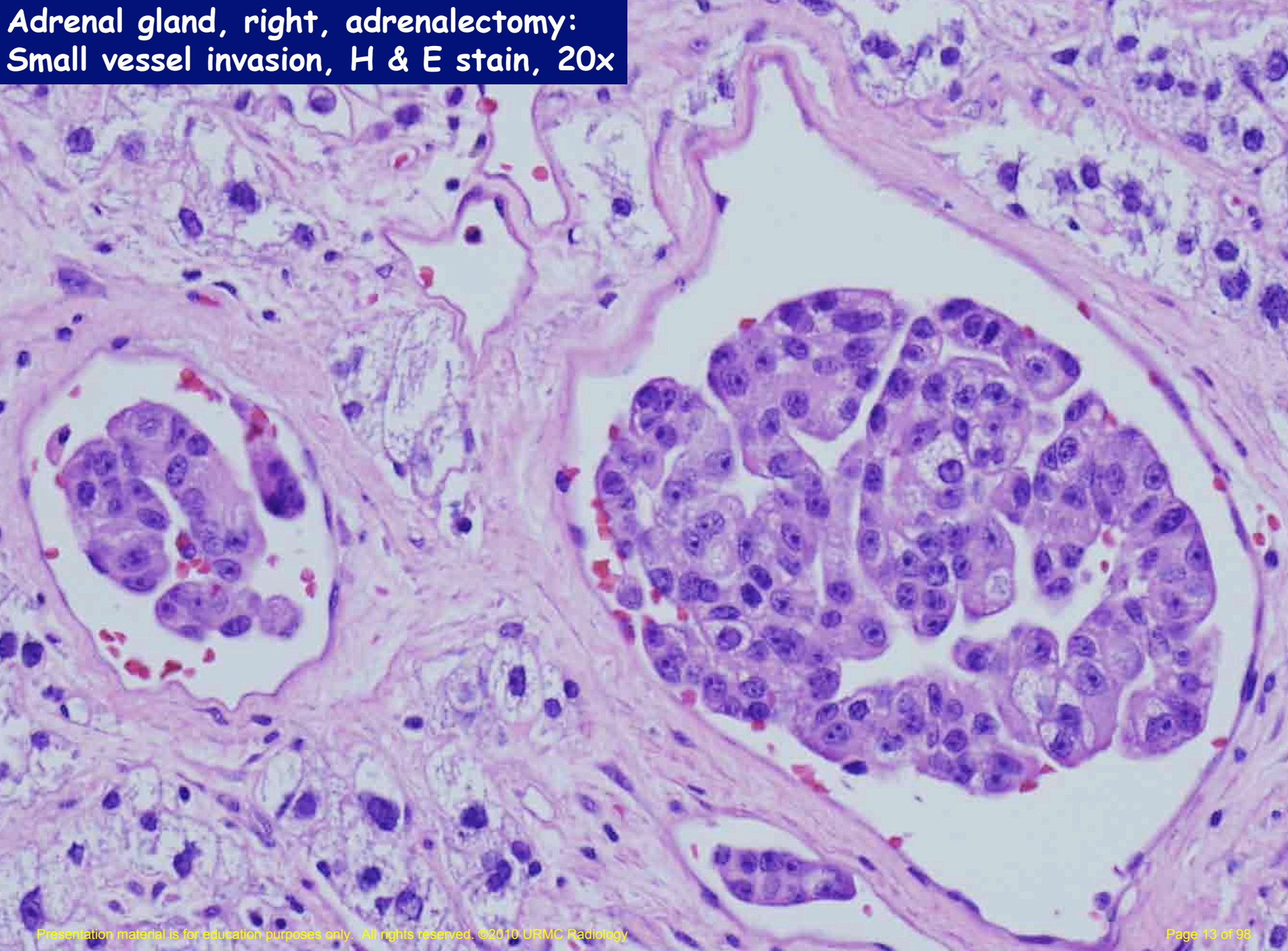
Adrenal gland, right, adrenalectomy: H & E stain, 10x



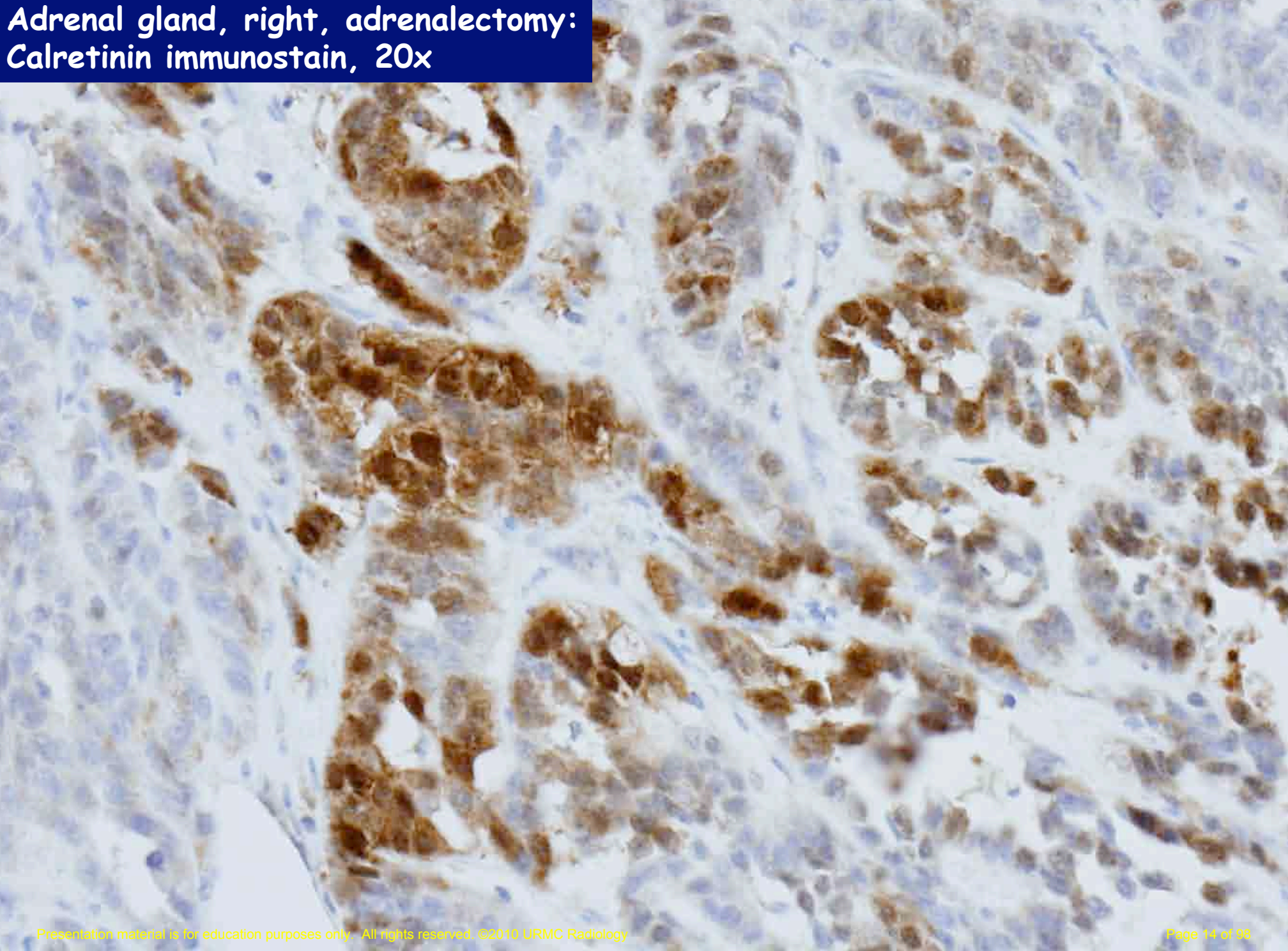
Adrenal gland, right, adrenalectomy: H & E stain, 20x



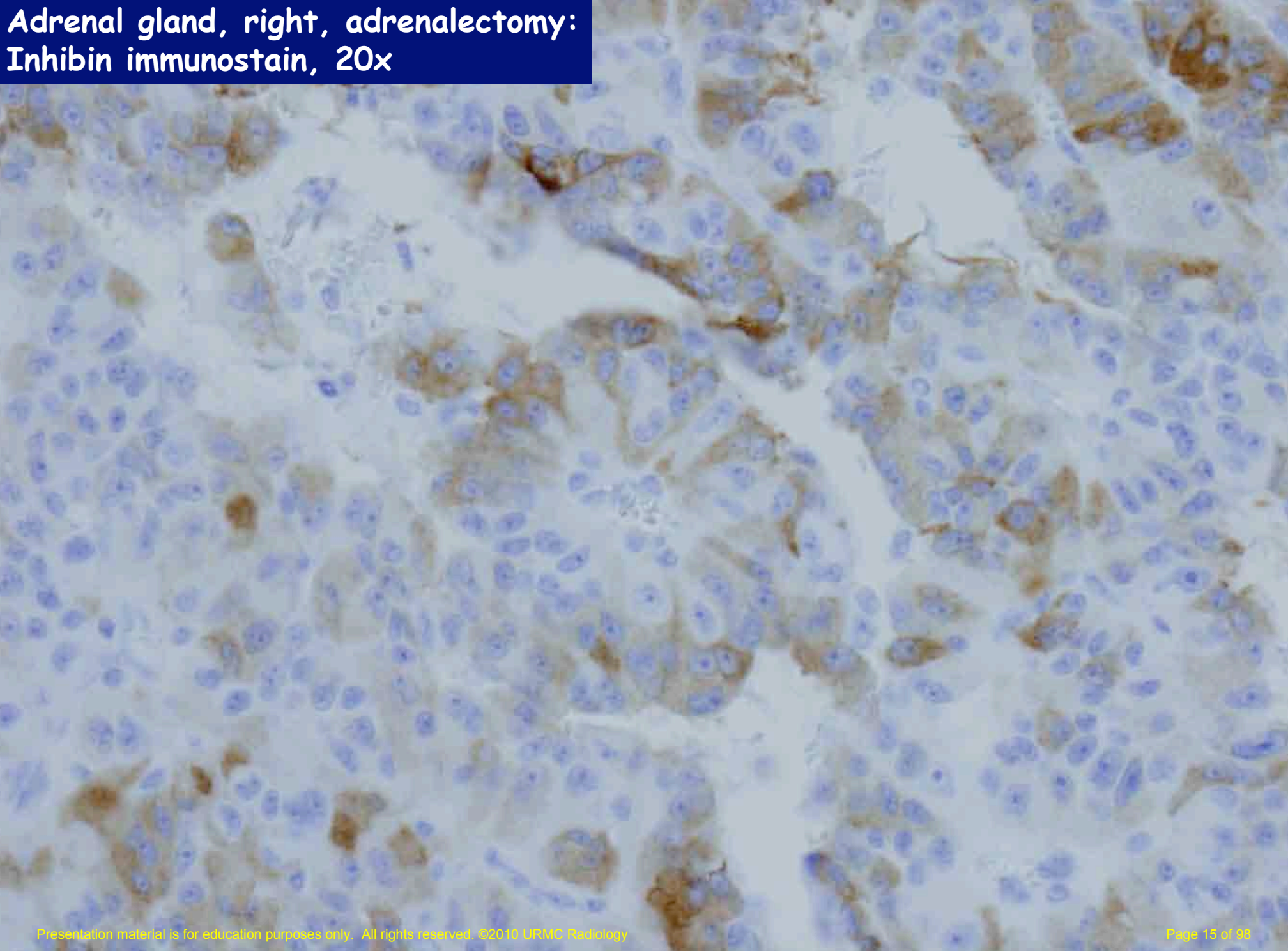
Adrenal gland, right, adrenalectomy: Small vessel invasion, H & E stain, 20x



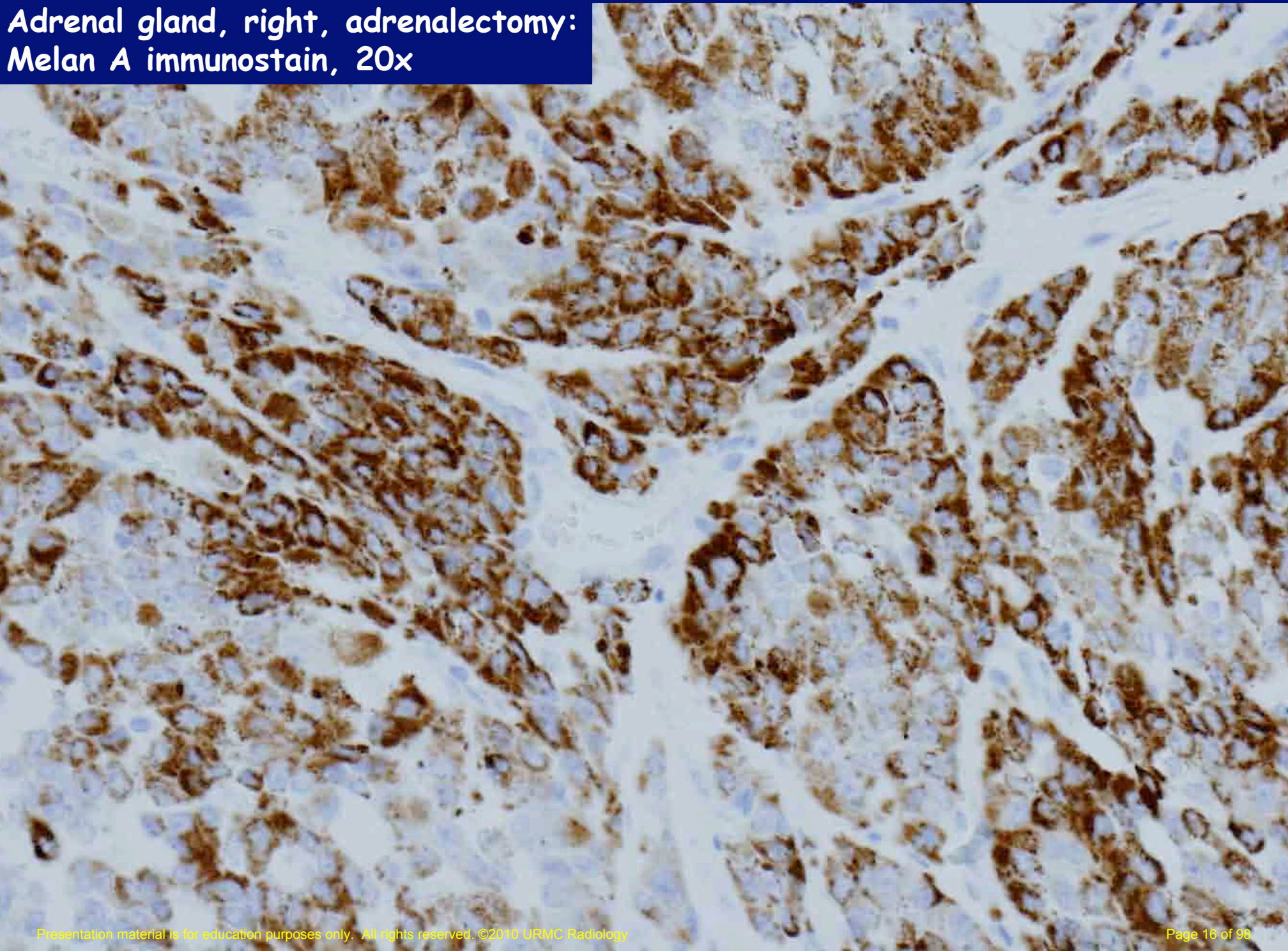
Adrenal gland, right, adrenalectomy: Calretinin immunostain, 20x



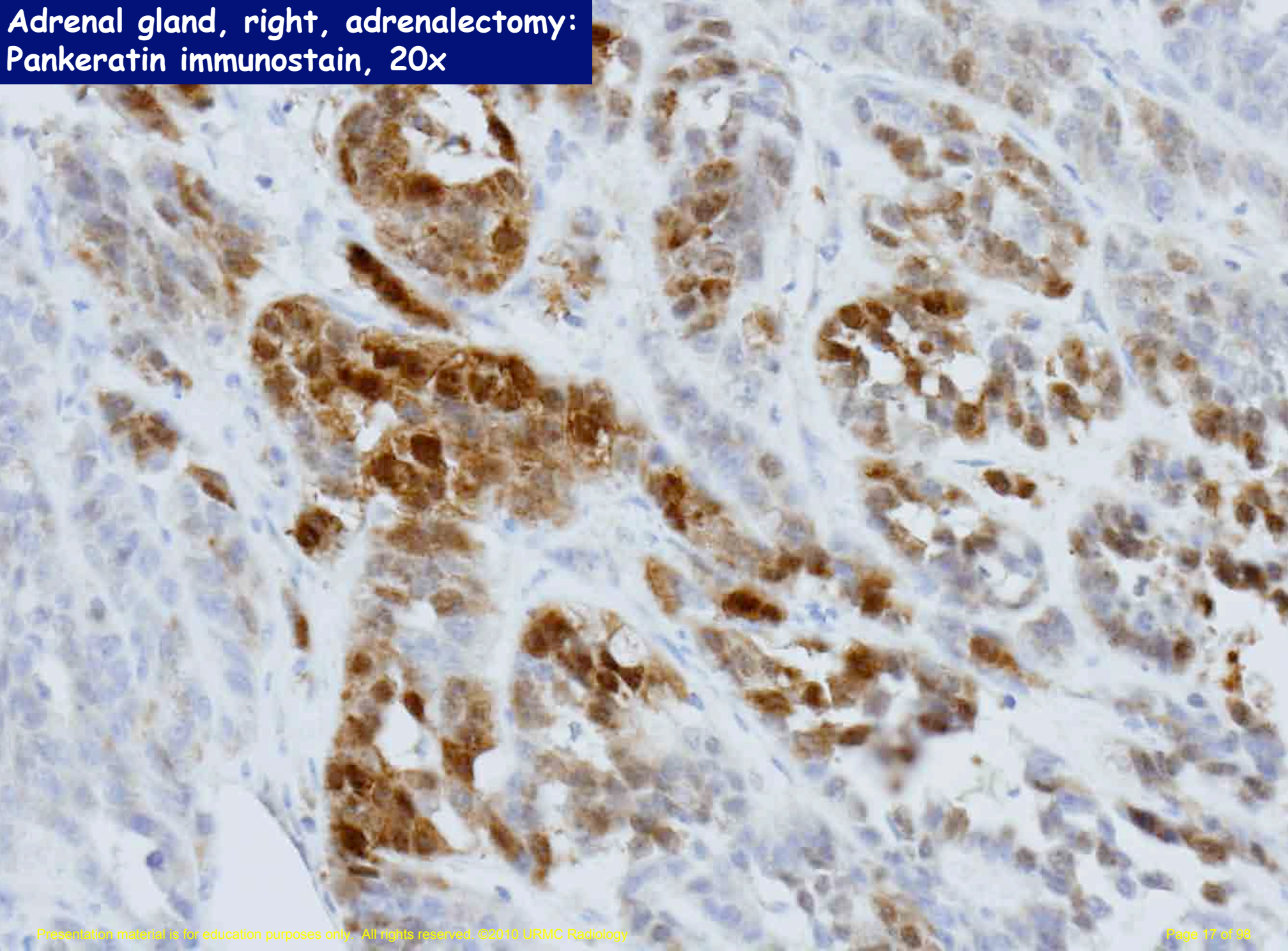
Adrenal gland, right, adrenalectomy: Inhibin immunostain, 20x



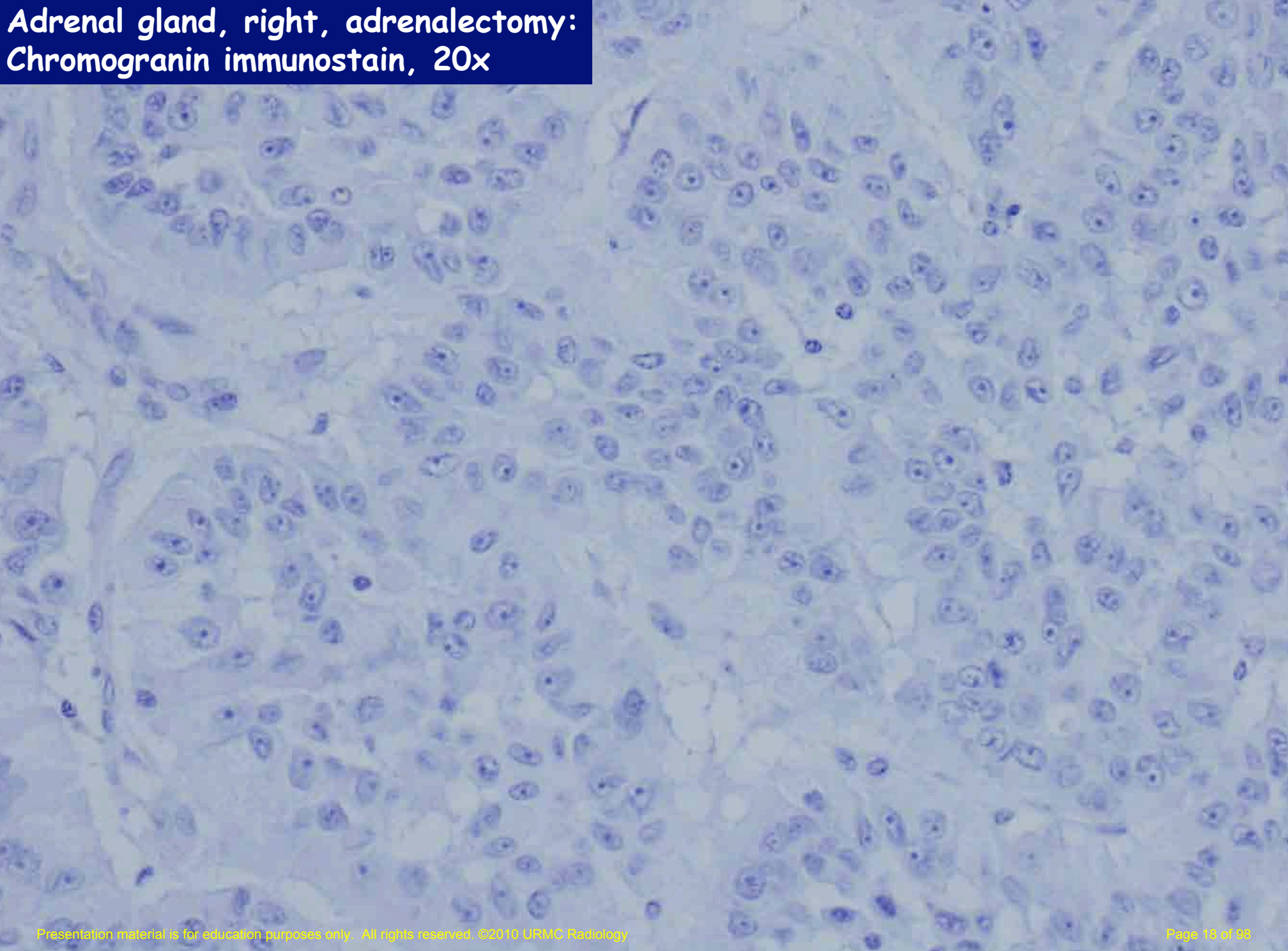
Adrenal gland, right, adrenalectomy: Melan A immunostain, 20x



Adrenal gland, right, adrenalectomy: Pankeratin immunostain, 20x



Adrenal gland, right, adrenalectomy: Chromogranin immunostain, 20x



Adrenal gland, right, adrenalectomy:

Adrenal cortical carcinoma

- Tumor grade: moderately differentiated
- Tumor size: 13.5 x 7.0 x 6.0 cm
- Tumor necrosis: identified
- Small vessel invasion: identified
- Extra-adrenal invasion: identified
- Mitotic count: 10/50 high power fields
- Margins of resection: negative

Adrenal Cortical Adenoma

Adrenal Cortical Carcinoma

Adrenocortical Carcinoma

- 75-115 new cases diagnosed in US/year
- Extremely uncommon tumors
- Average age of patients 40-50 years
- Tumor has poor prognosis, 14 months median survival
- Most present as large, advanced masses with extra-adrenal spread
- Metastases include lungs, liver, lymph nodes, bone, pancreas and diaphragm
- Size important for accessing malignancy in primary adrenal masses, most carcinomas exceed 6 cm in diameter

Adrenocortical Carcinoma

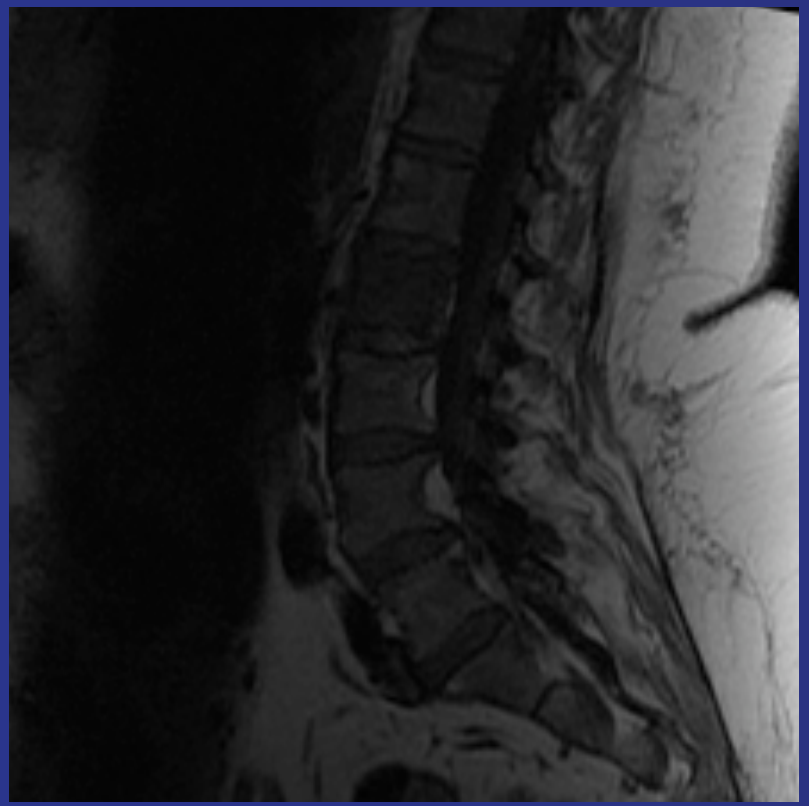
- Immunohistochemistry

ACC	RCC	Pheochromocytoma
Inhibin+	low wt CK+	S-100+
Melan A+	EMA +	Chromogranin+
Calretinin+		
Synaptophysin+		
Chromogranin-		

Case 2

- 59 year old with back pain

Case 2



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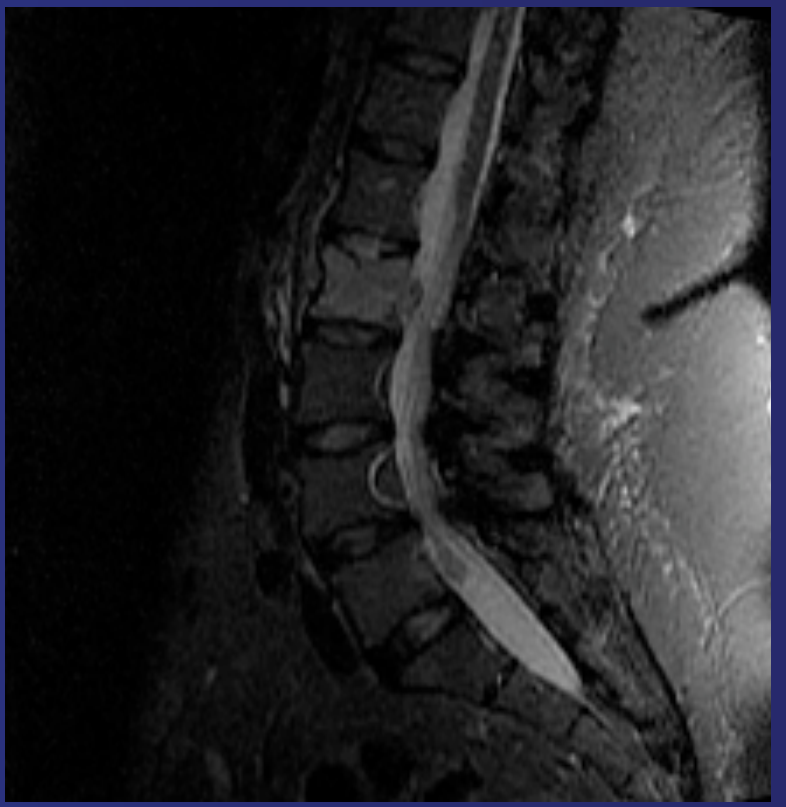

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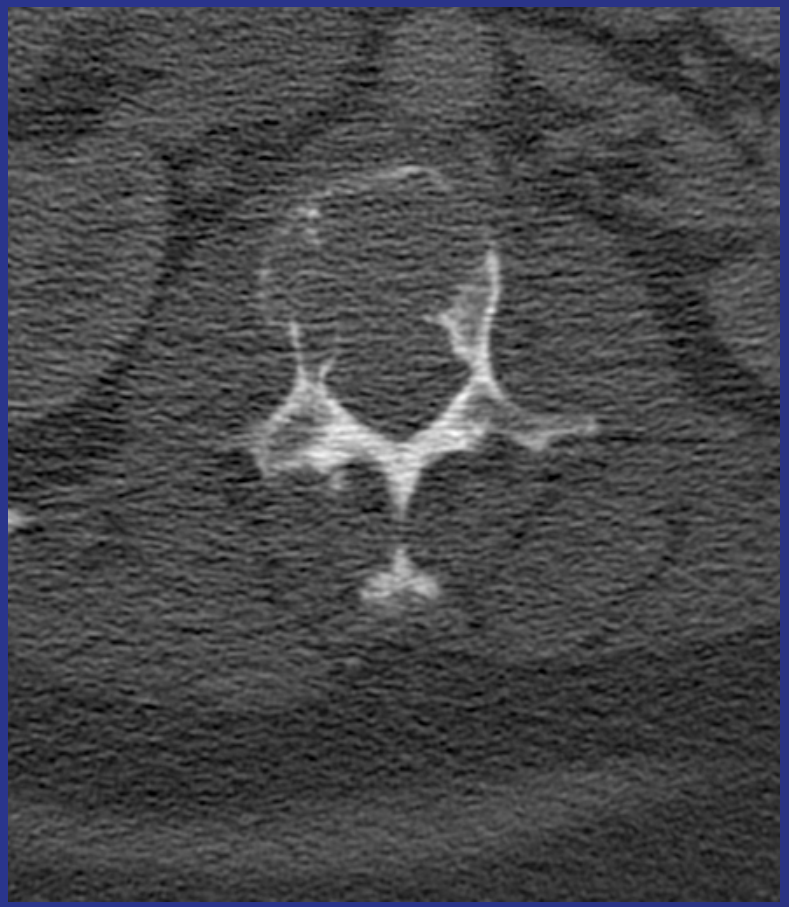
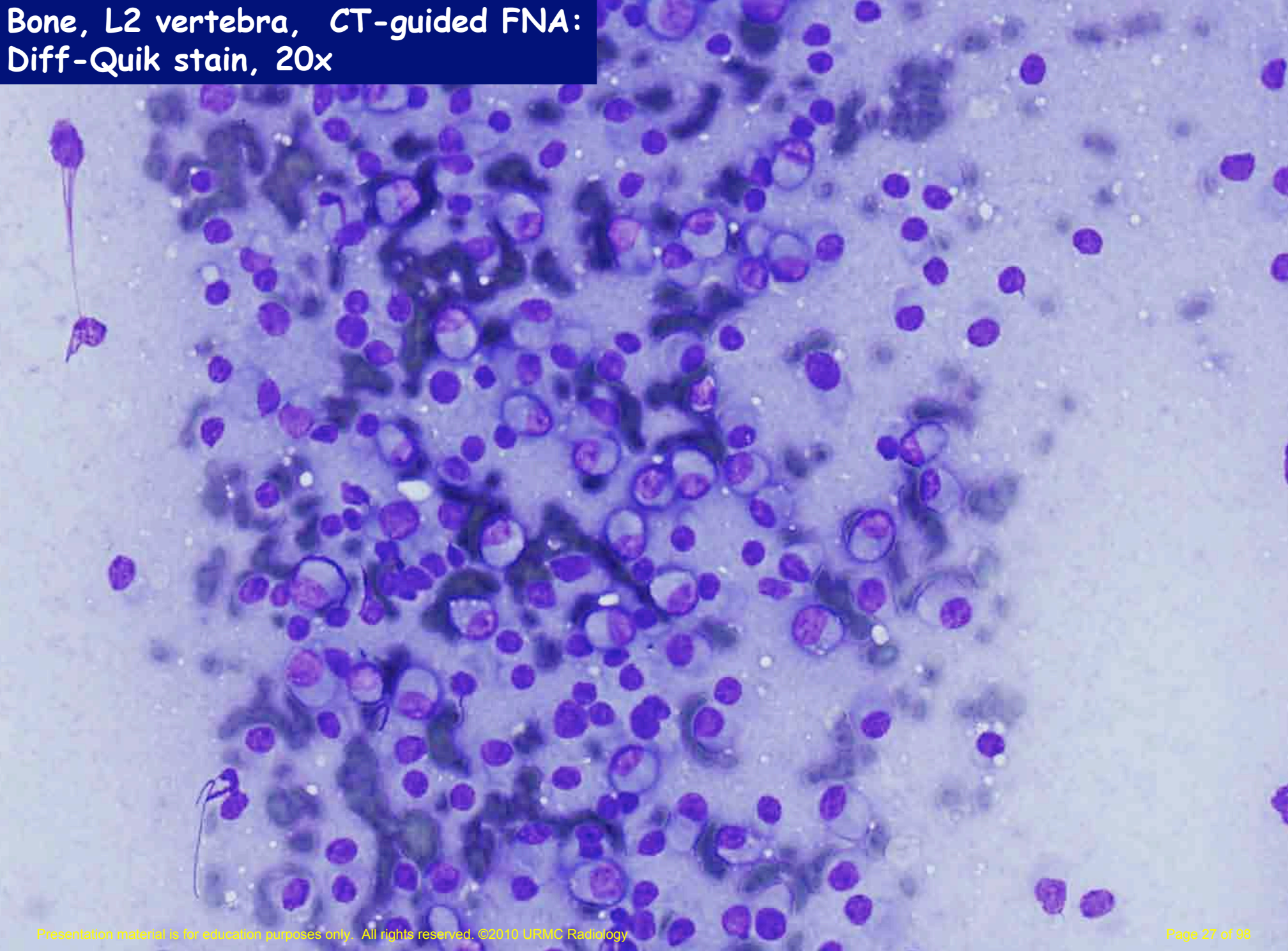
Case 2



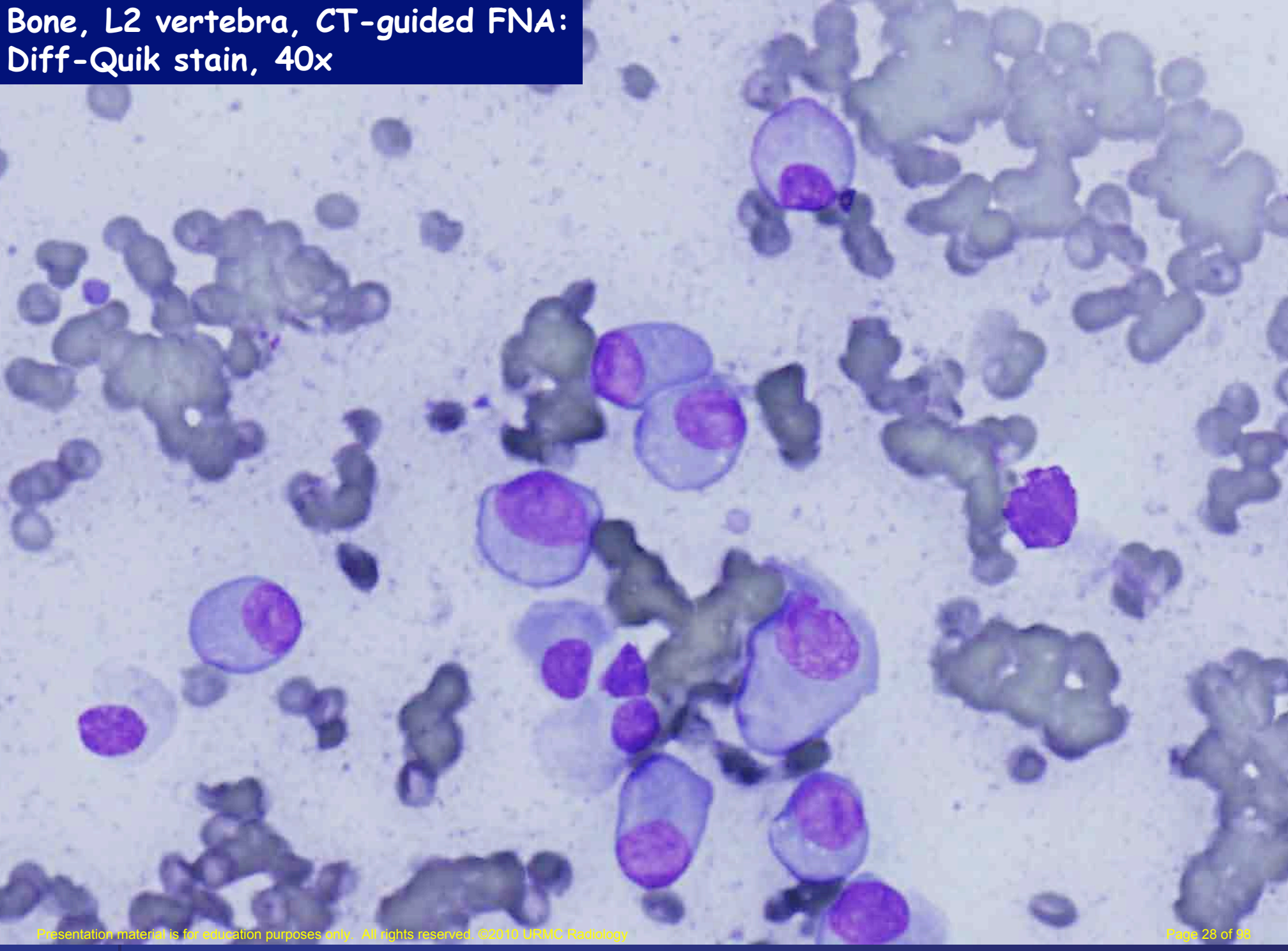
Case 2

- Differential Diagnosis
  - Metastasis
  - Plasmocytoma
  - Myeloma
  - Lymphoma
  - Aneurysmal Bone Cyst
  - Osteomyelitis
  - Pott's Disease
  - Osteoblastoma

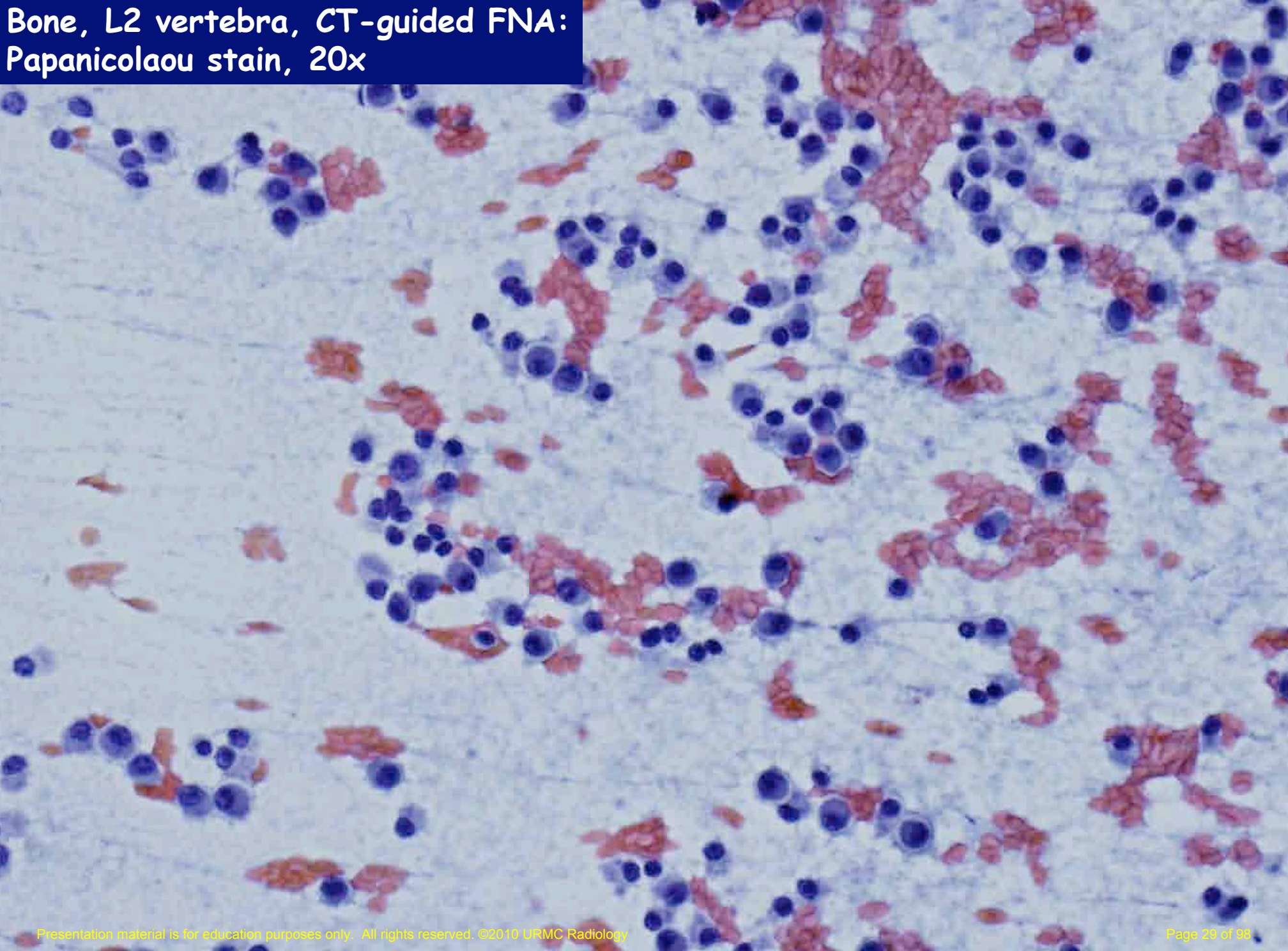
Bone, L2 vertebra, CT-guided FNA: Diff-Quik stain, 20x



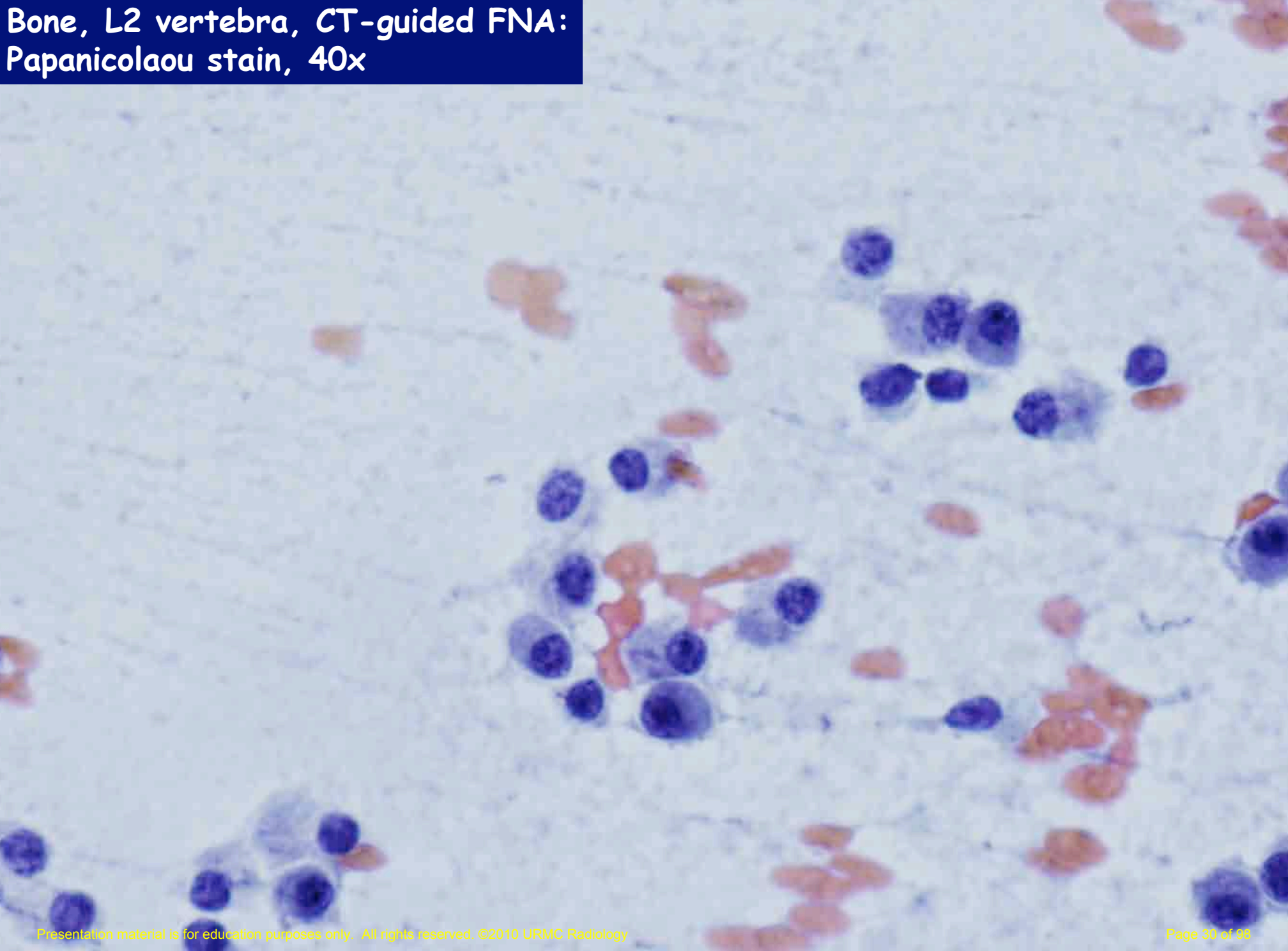
Bone, L2 vertebra, CT-guided FNA: Diff-Quik stain, 40x



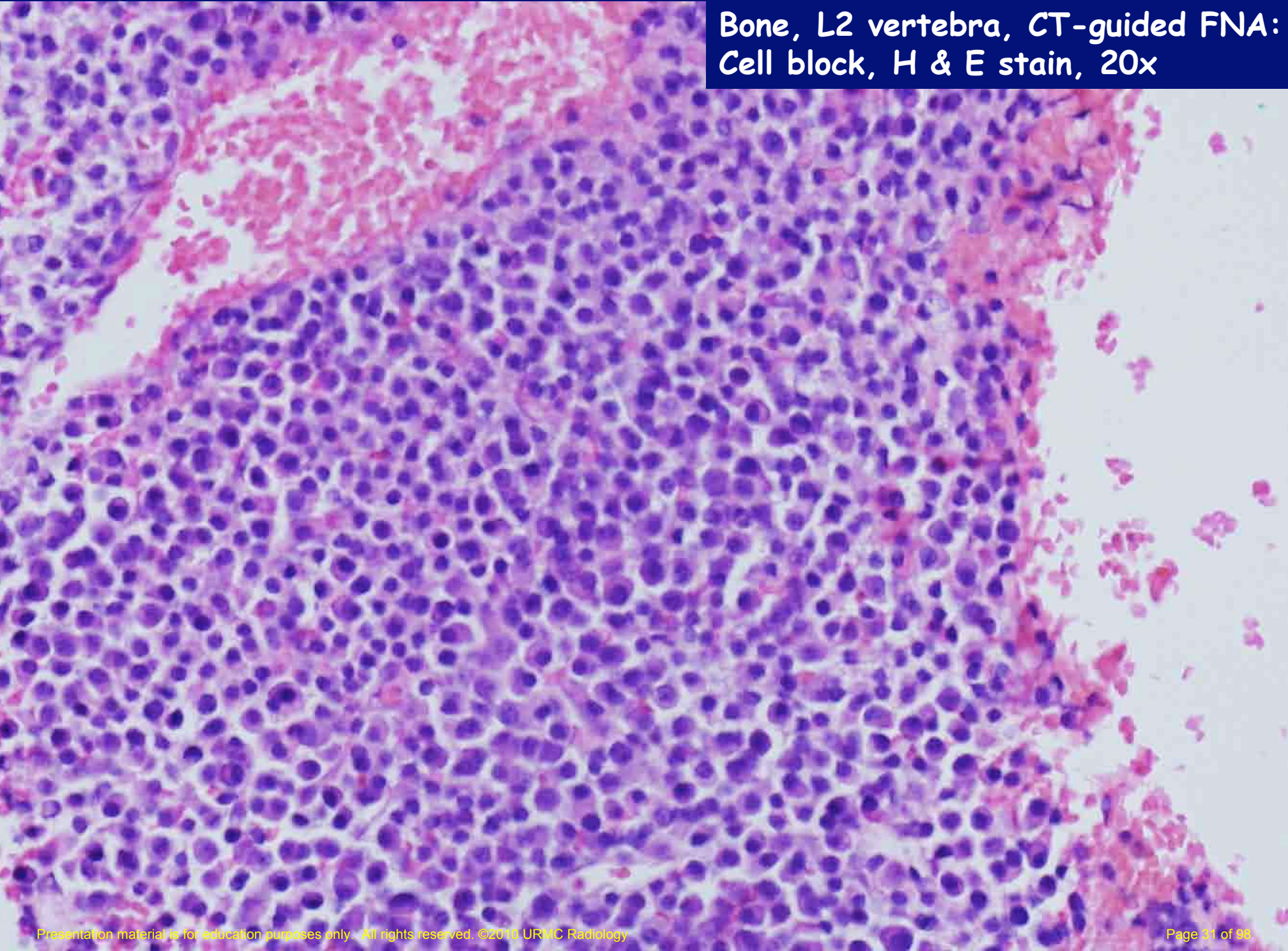
Bone, L2 vertebra, CT-guided FNA: Papanicolaou stain, 20x



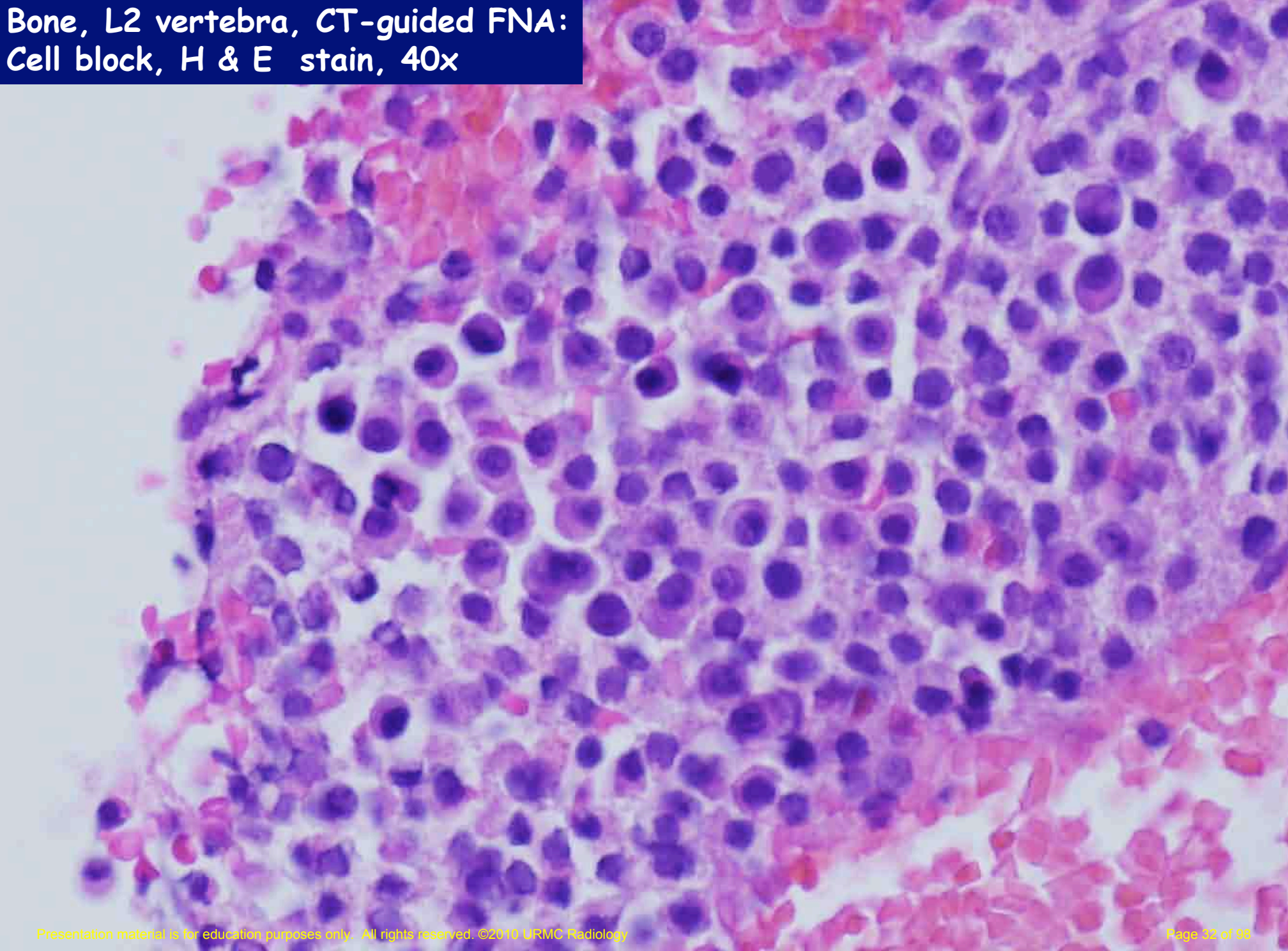
Bone, L2 vertebra, CT-guided FNA: Papanicolaou stain, 40x



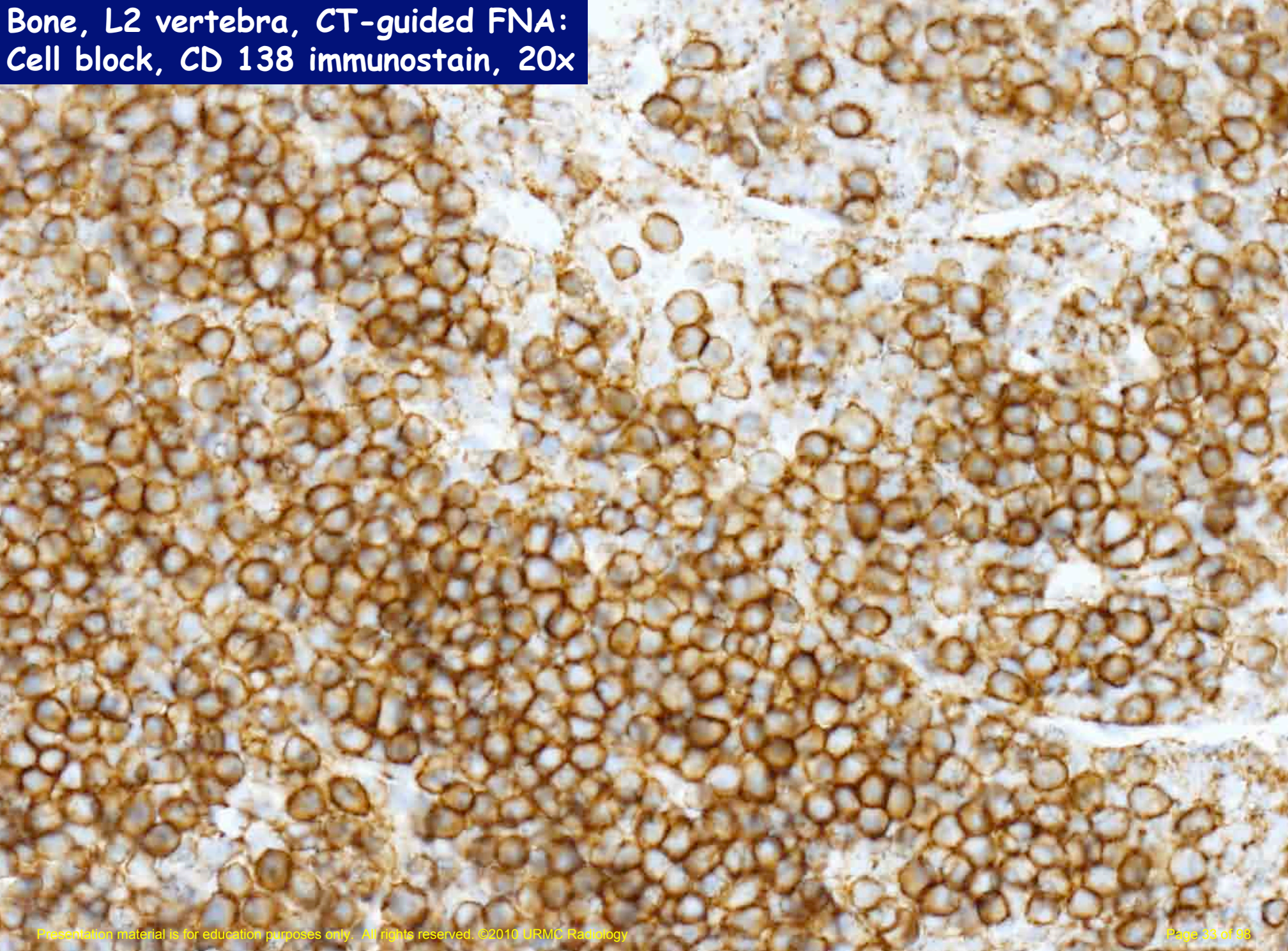
Bone, L2 vertebra, CT-guided FNA: Cell block, H & E stain, 20x



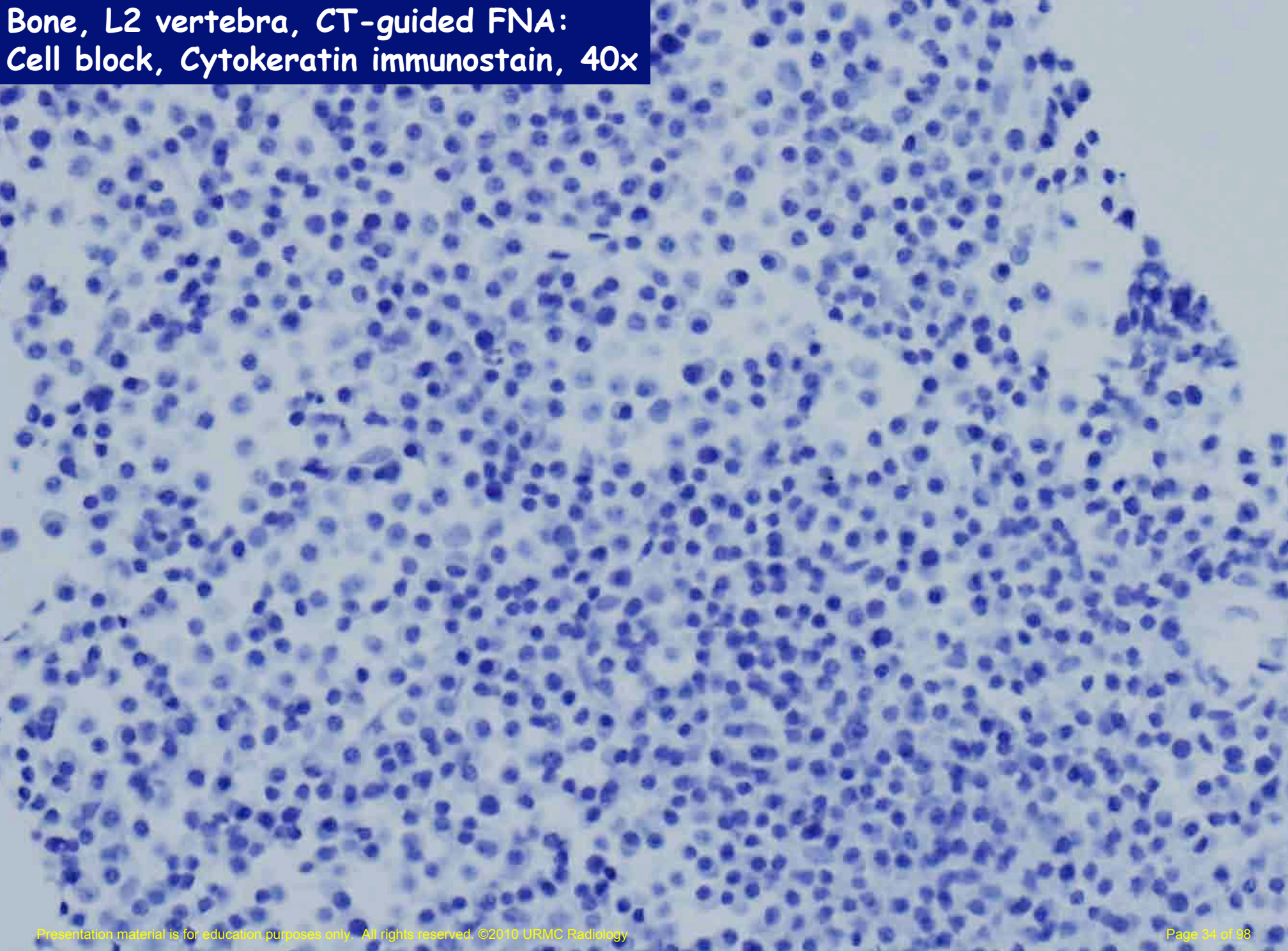
Bone, L2 vertebra, CT-guided FNA:
Cell block, H & E stain, 40x



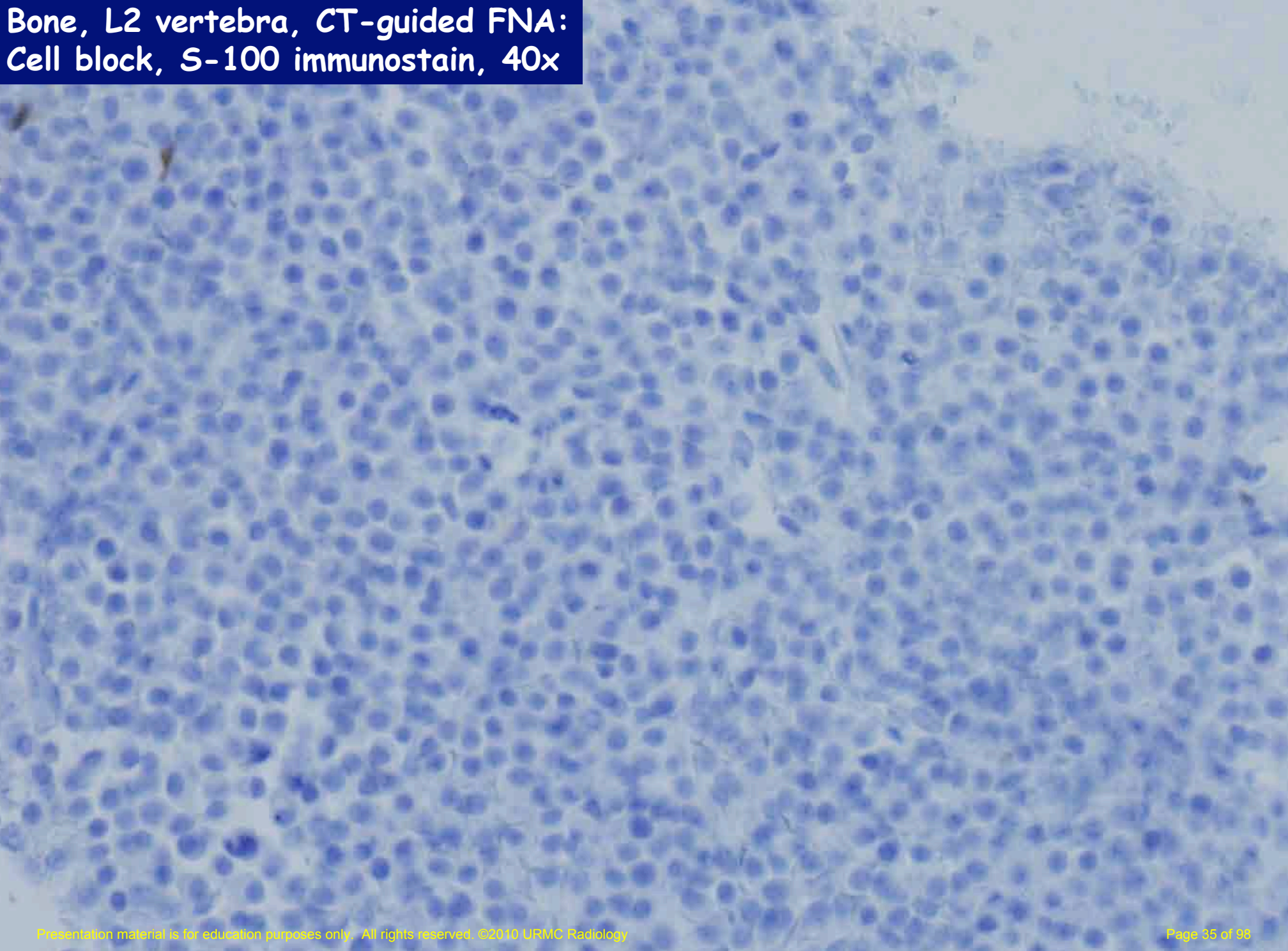
Bone, L2 vertebra, CT-guided FNA: Cell block, CD 138 immunostain, 20x



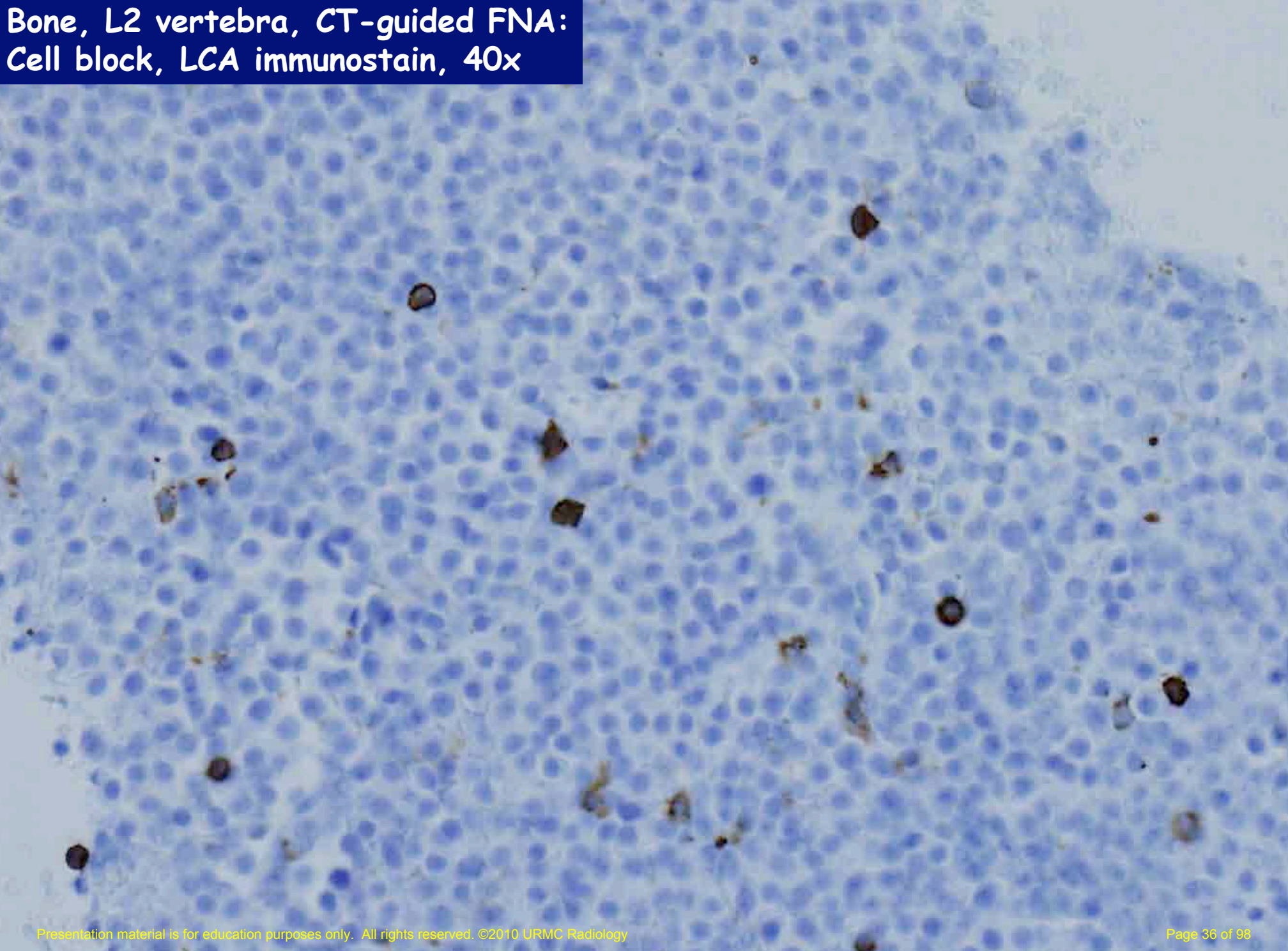
Bone, L2 vertebra, CT-guided FNA: Cell block, Cytokeratin immunostain, 40x



Bone, L2 vertebra, CT-guided FNA: Cell block, S-100 immunostain, 40x



Bone, L2 vertebra, CT-guided FNA: Cell block, LCA immunostain, 40x



Bone, L2 Vertebra, CT-guided fine needle aspiration:

Plasma cell neoplasm.

Cell block and cytologic preparations examined.

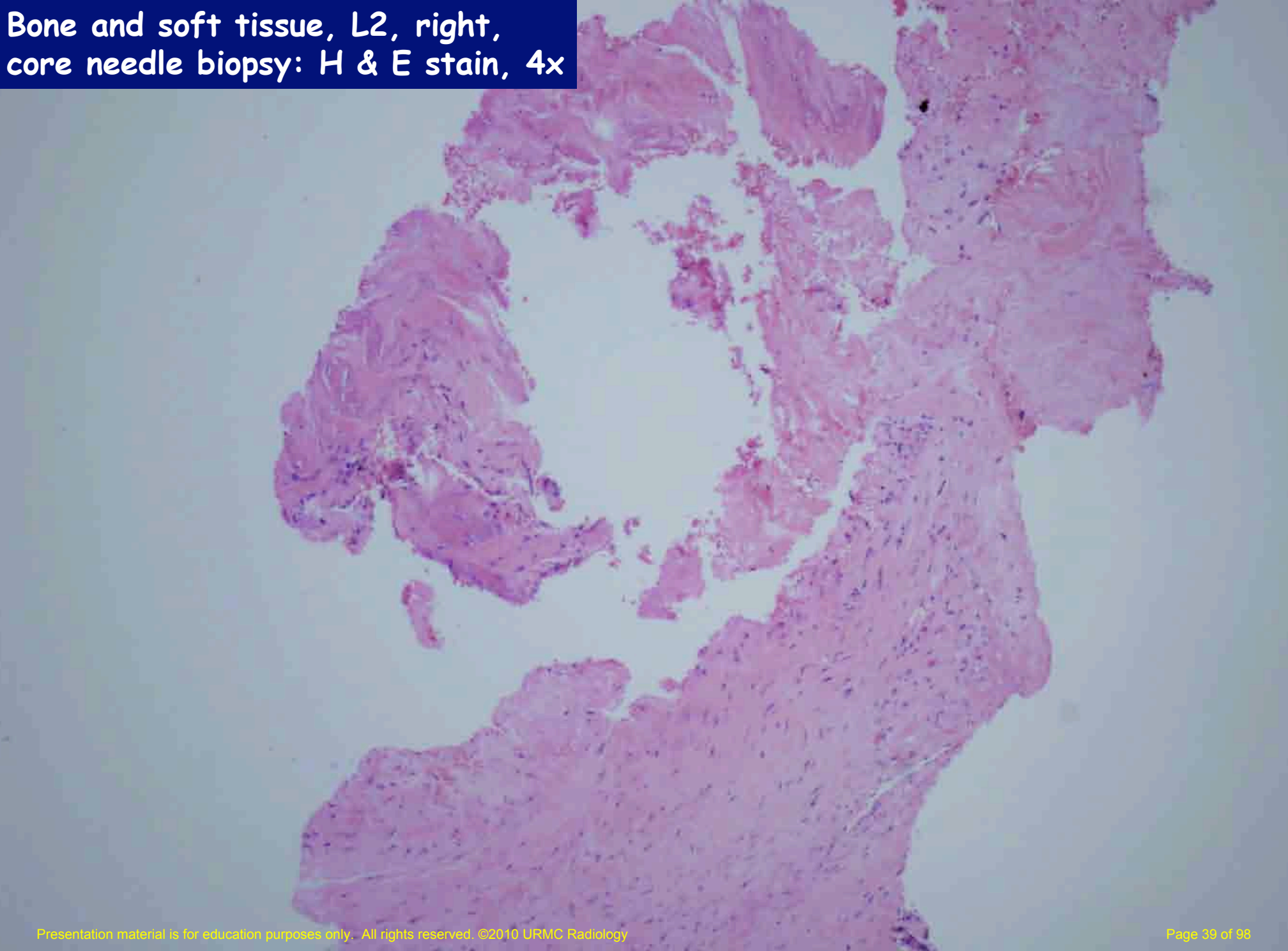
Comment: Immunohistochemical stains show the cells of interest are positive for CD138 and negative for pancytokeratin, S-100 and leukocyte common antigen (LCA).

Bone and soft tissue, L2, right, core needle biopsy:

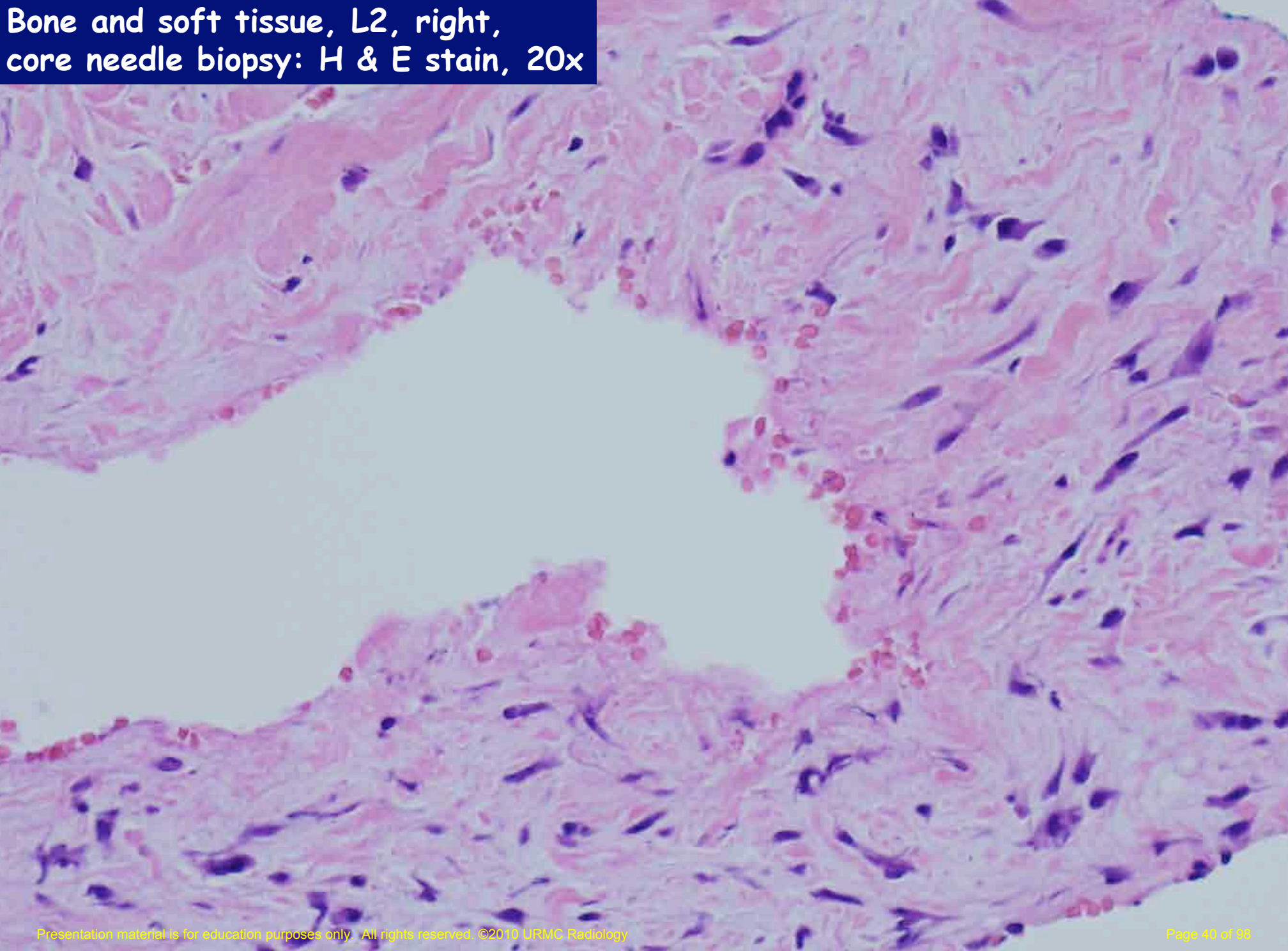
Bone and fibrous tissue with focal fibrosis and reactive changes.

No malignancy identified.

Bone and soft tissue, L2, right, core needle biopsy: H & E stain, 4x



Bone and soft tissue, L2, right, core needle biopsy: H & E stain, 20x



Plasma Cell Neoplasm

Monoclonal proliferation of plasma cells, commonly produce osteolytic lesions

Common in 6th and 7th decades

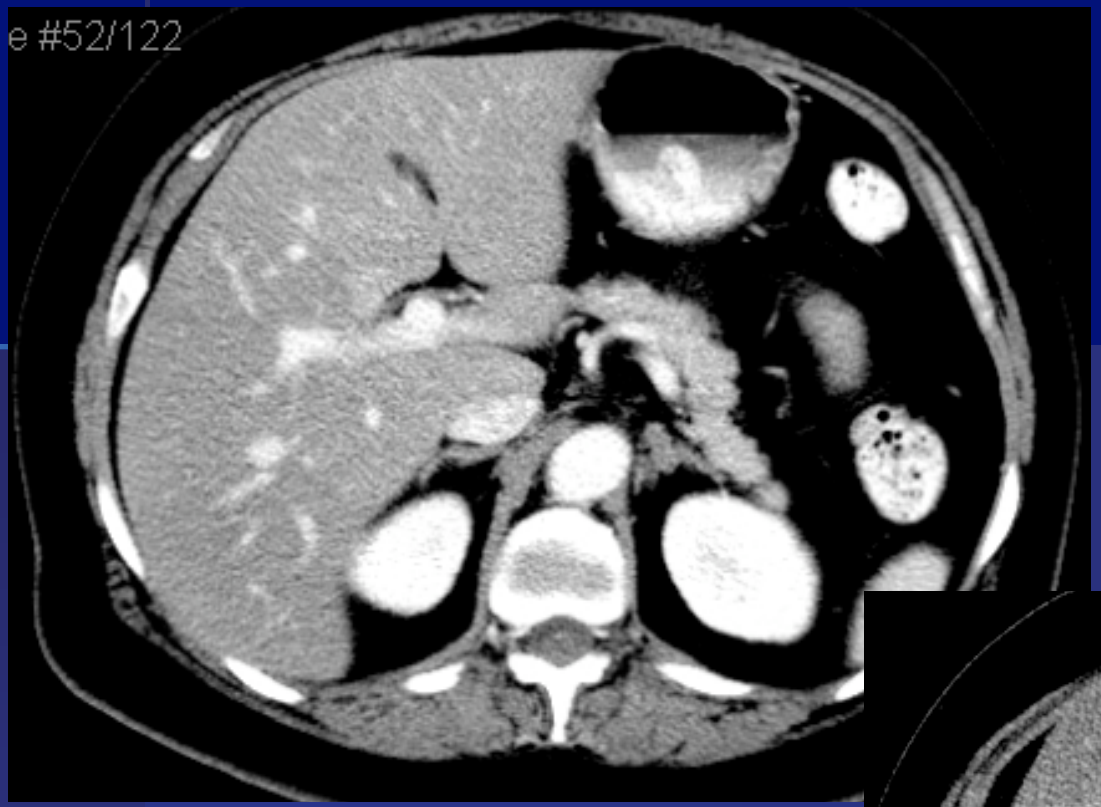
Common sites: vertebra, ribs, skull, pelvis, femur, clavicle and scapula

Differential diagnosis:

- -reactive conditions with increase plasma cells
- -lymphoma
- -melanoma

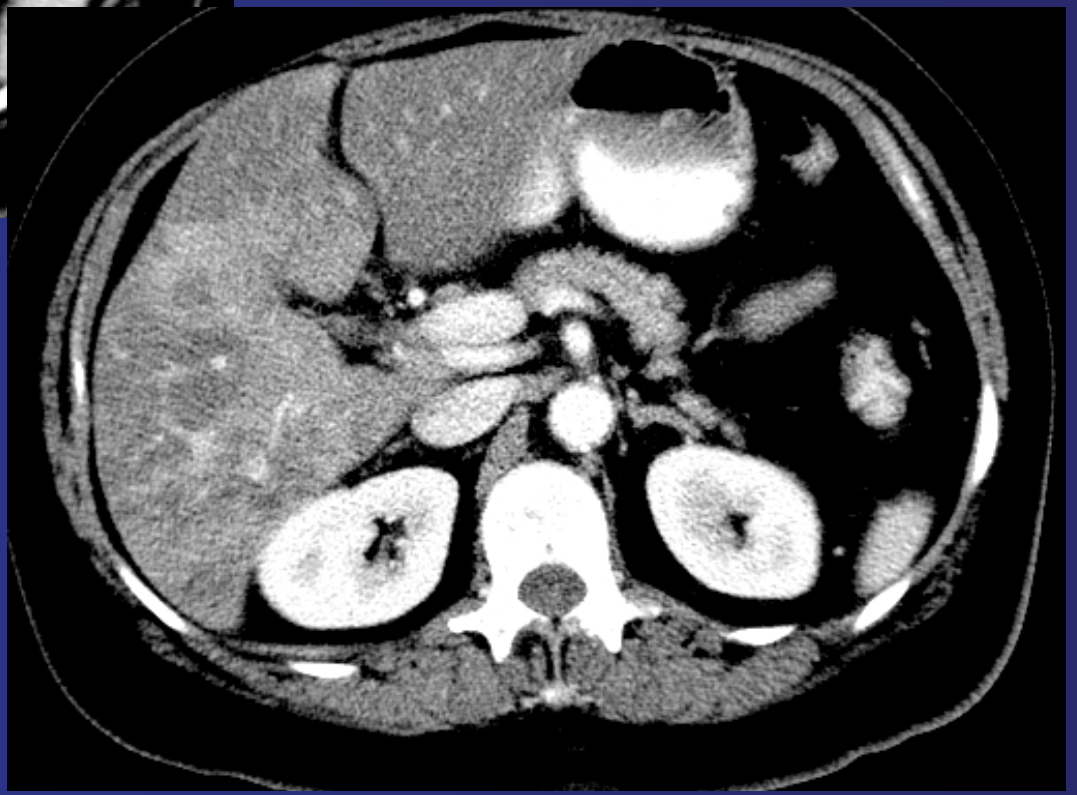
Case 3

- 59 year old with a history of inflammatory breast cancer



9/09

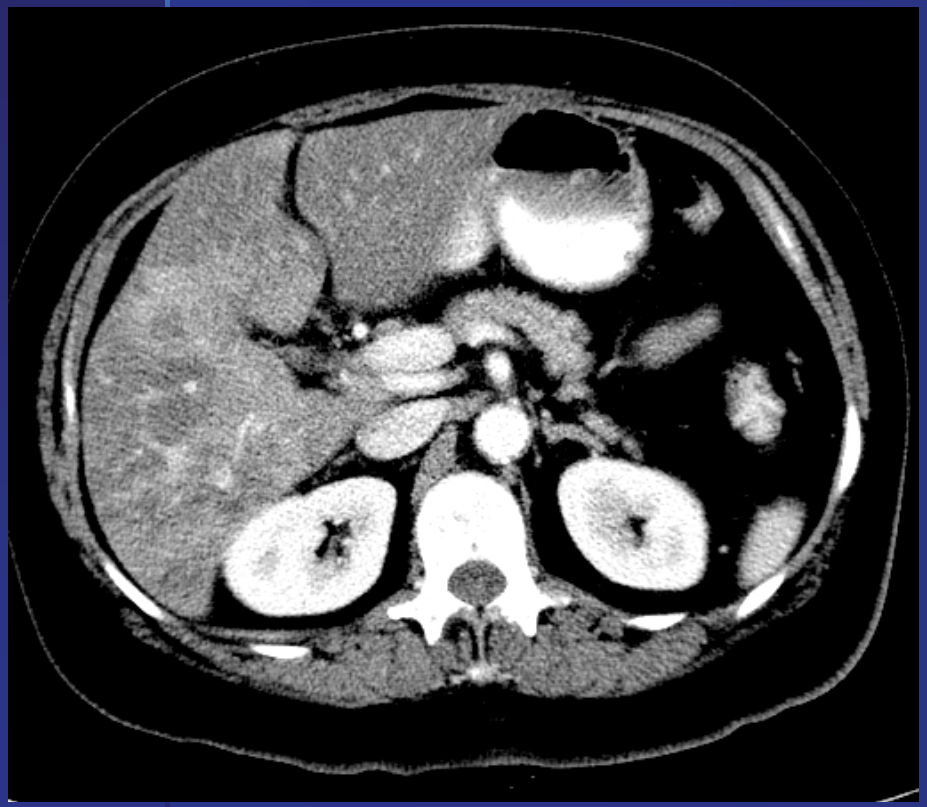
12/09



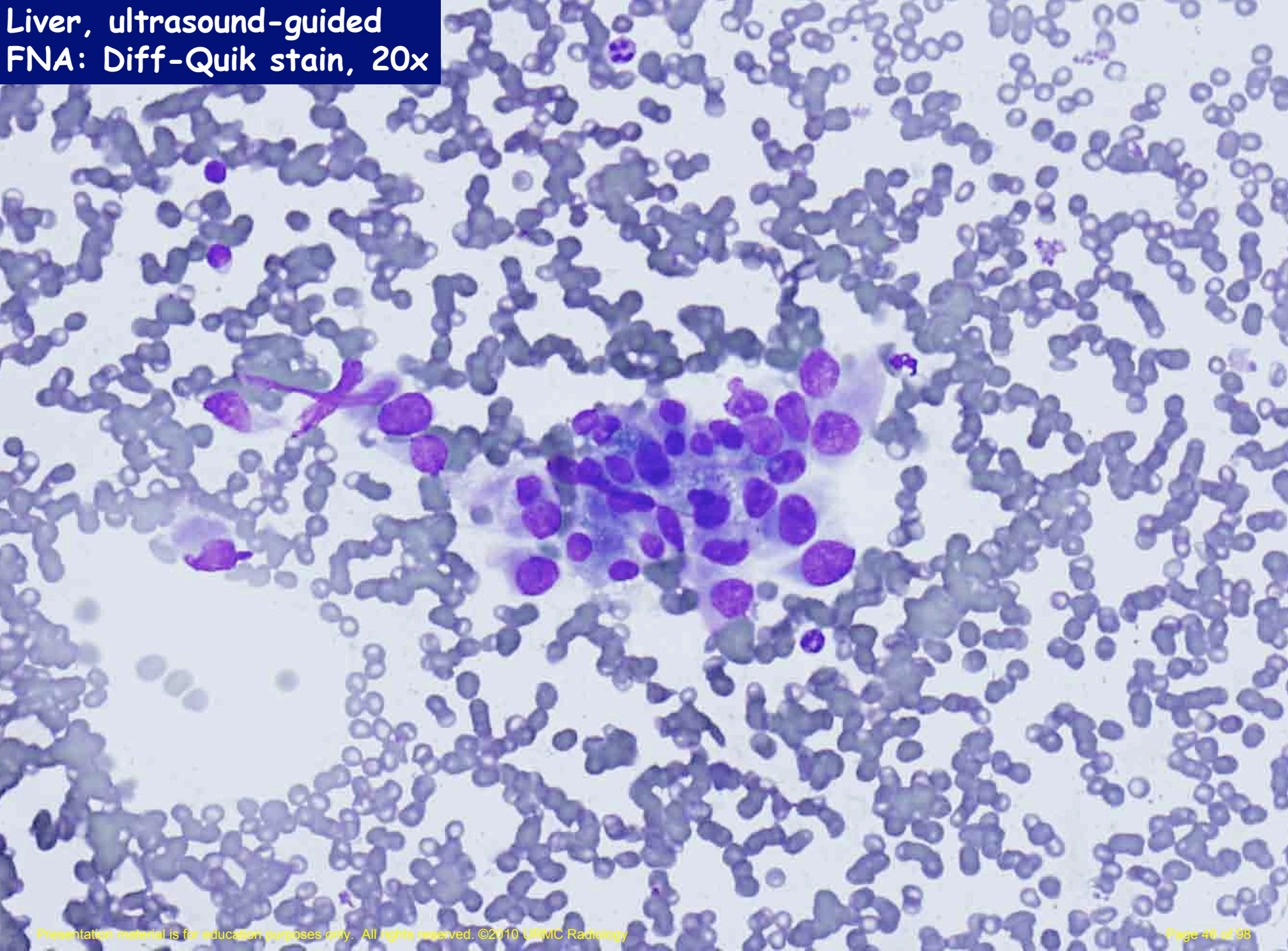
Case 3

- Differential Diagnosis
  - Metastatic Breast Ca
  - HCC
  - Fatty infiltration

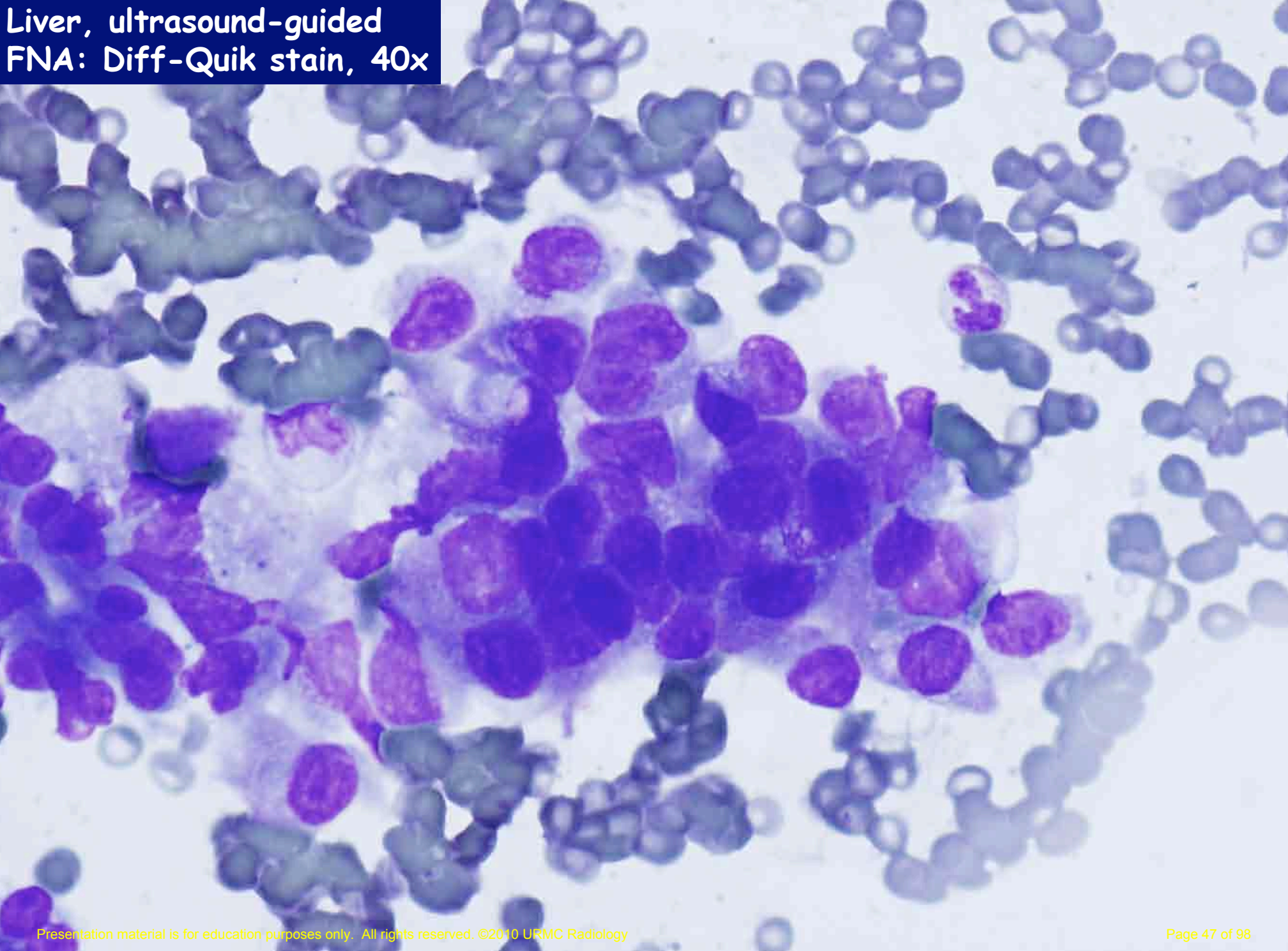
Case 3

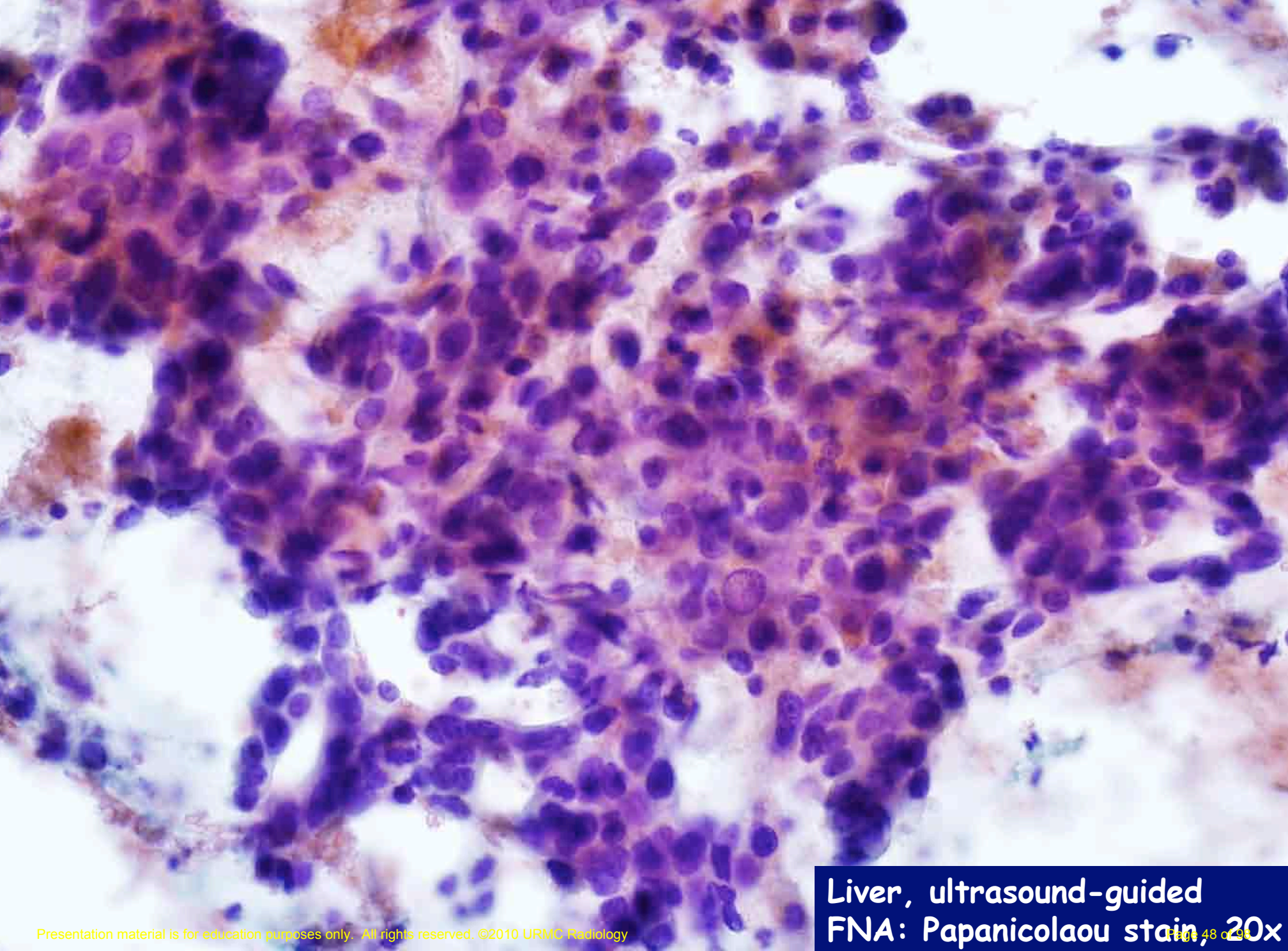


Liver, ultrasound-guided
FNA: Diff-Quik stain, 20x



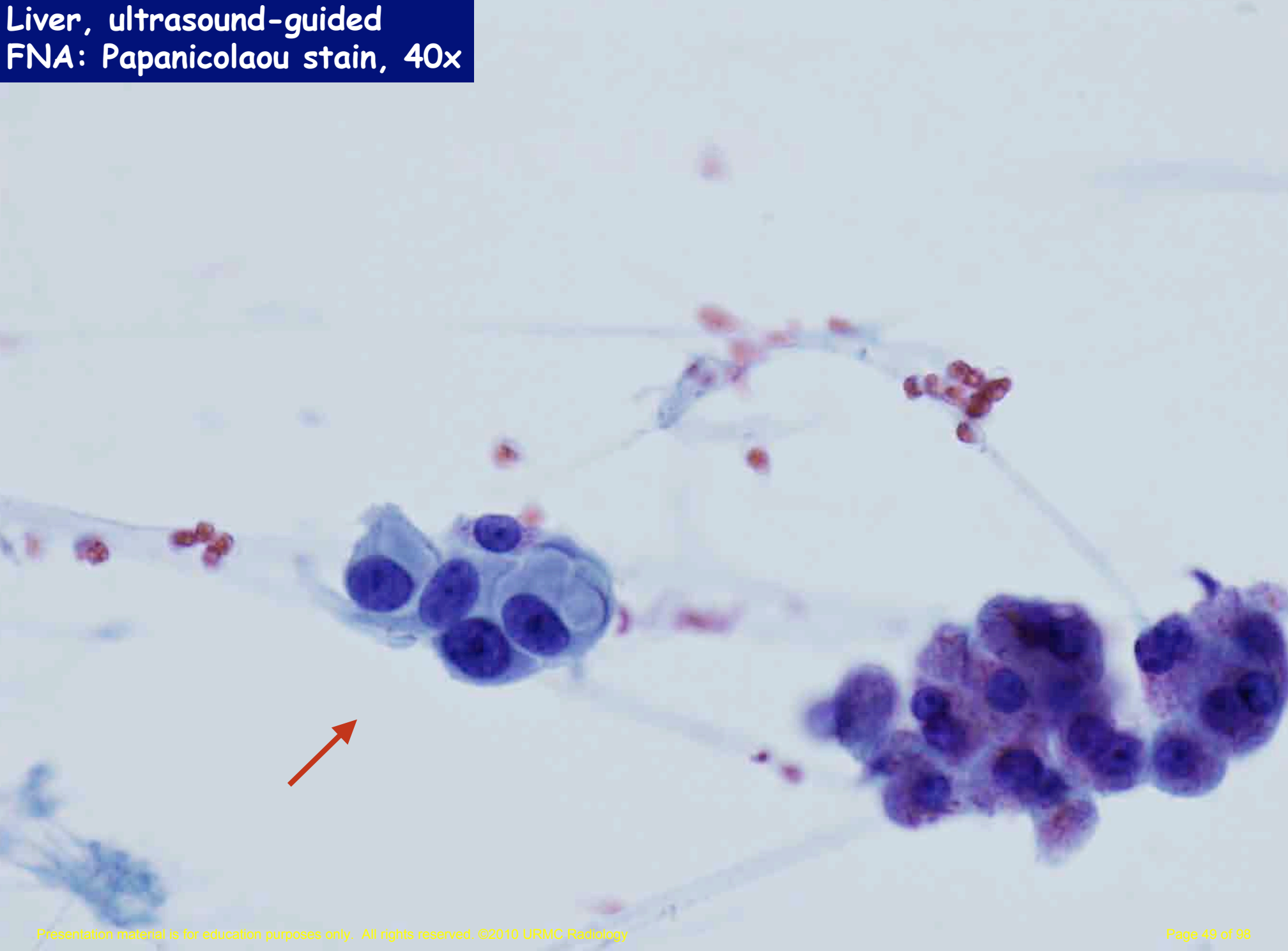
Liver, ultrasound-guided FNA: Diff-Quik stain, 40x

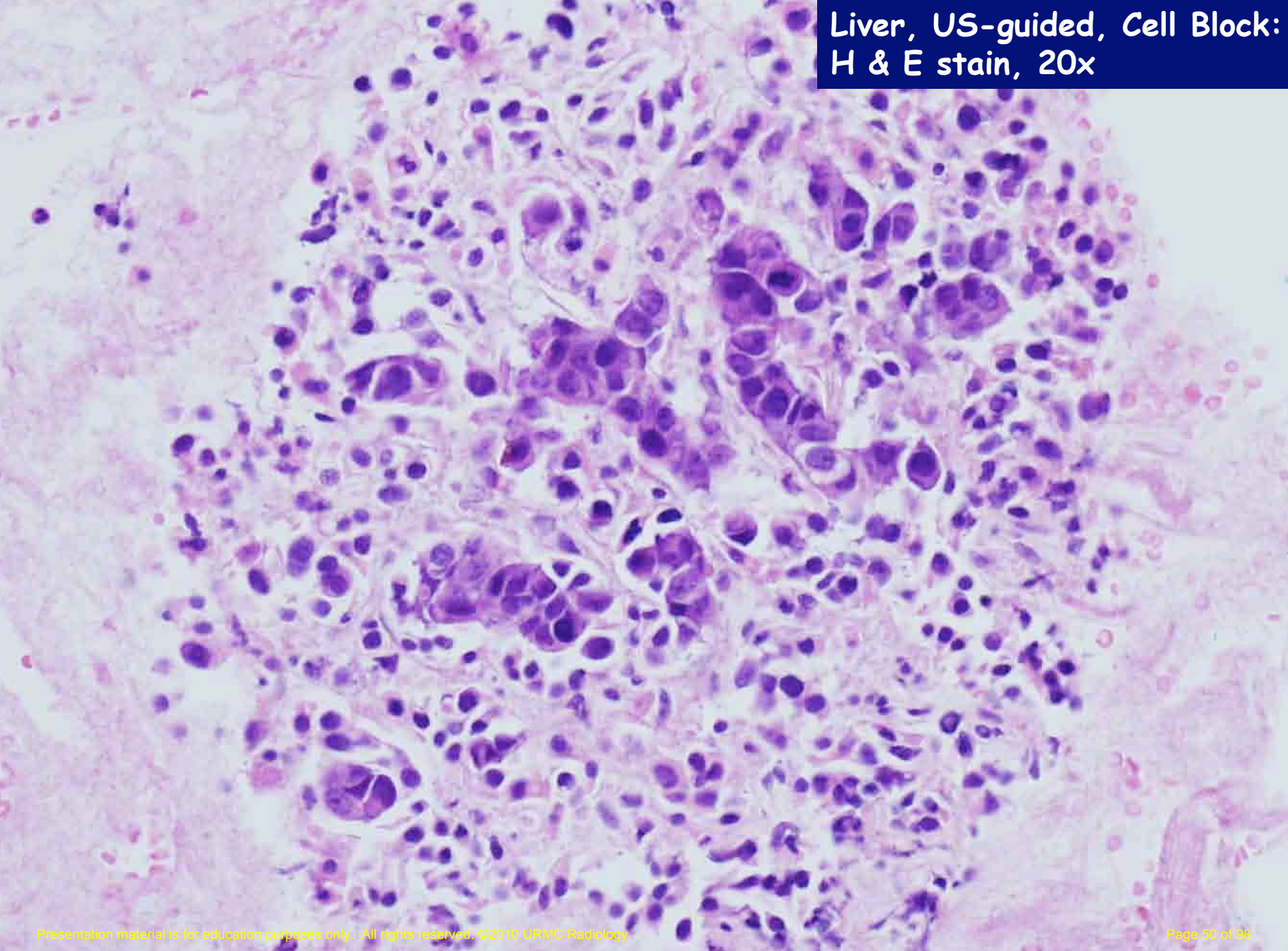




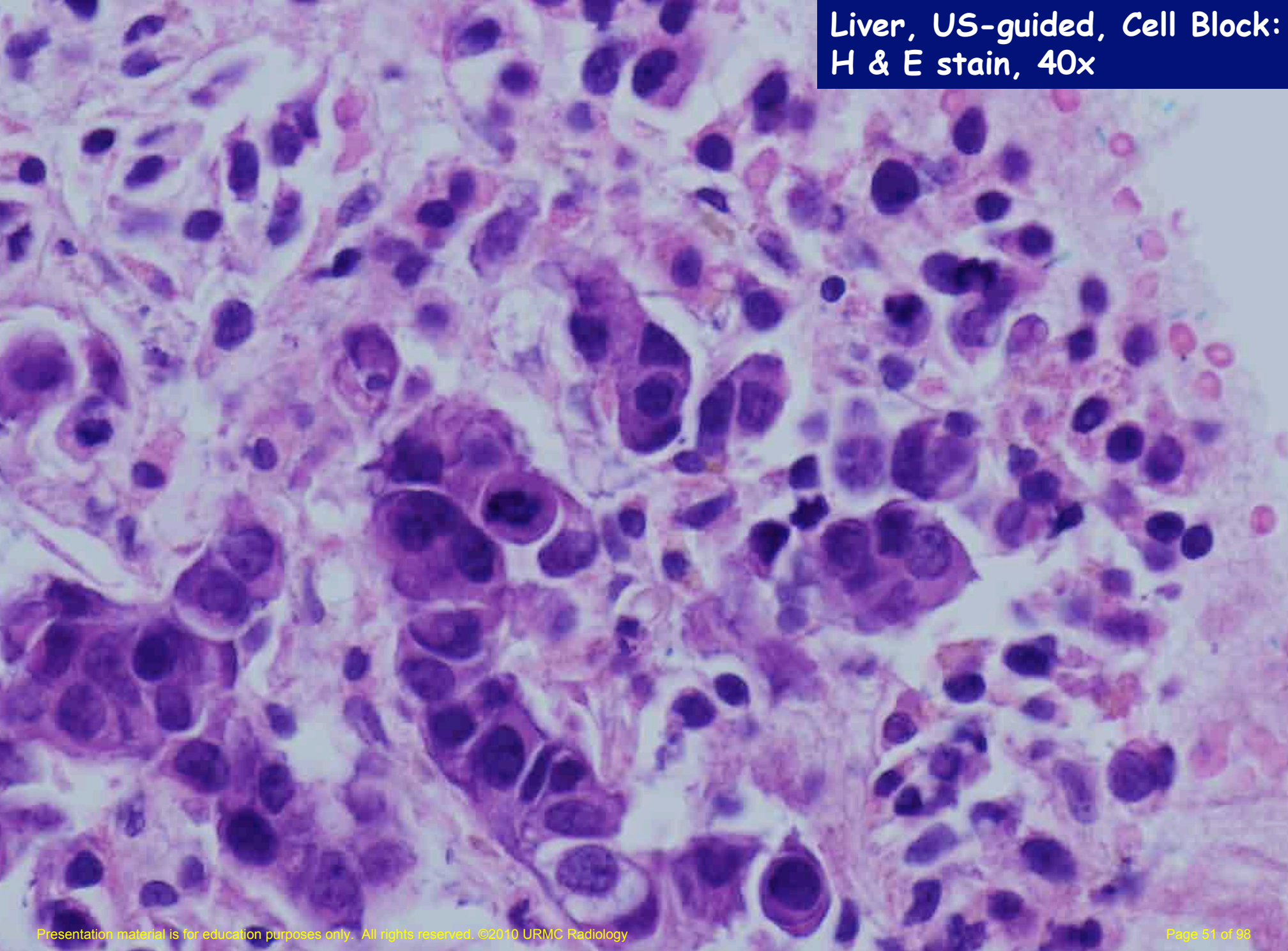
Liver, ultrasound-guided FNA: Papanicolaou stain, 20x

Liver, ultrasound-guided FNA: Papanicolaou stain, 40x

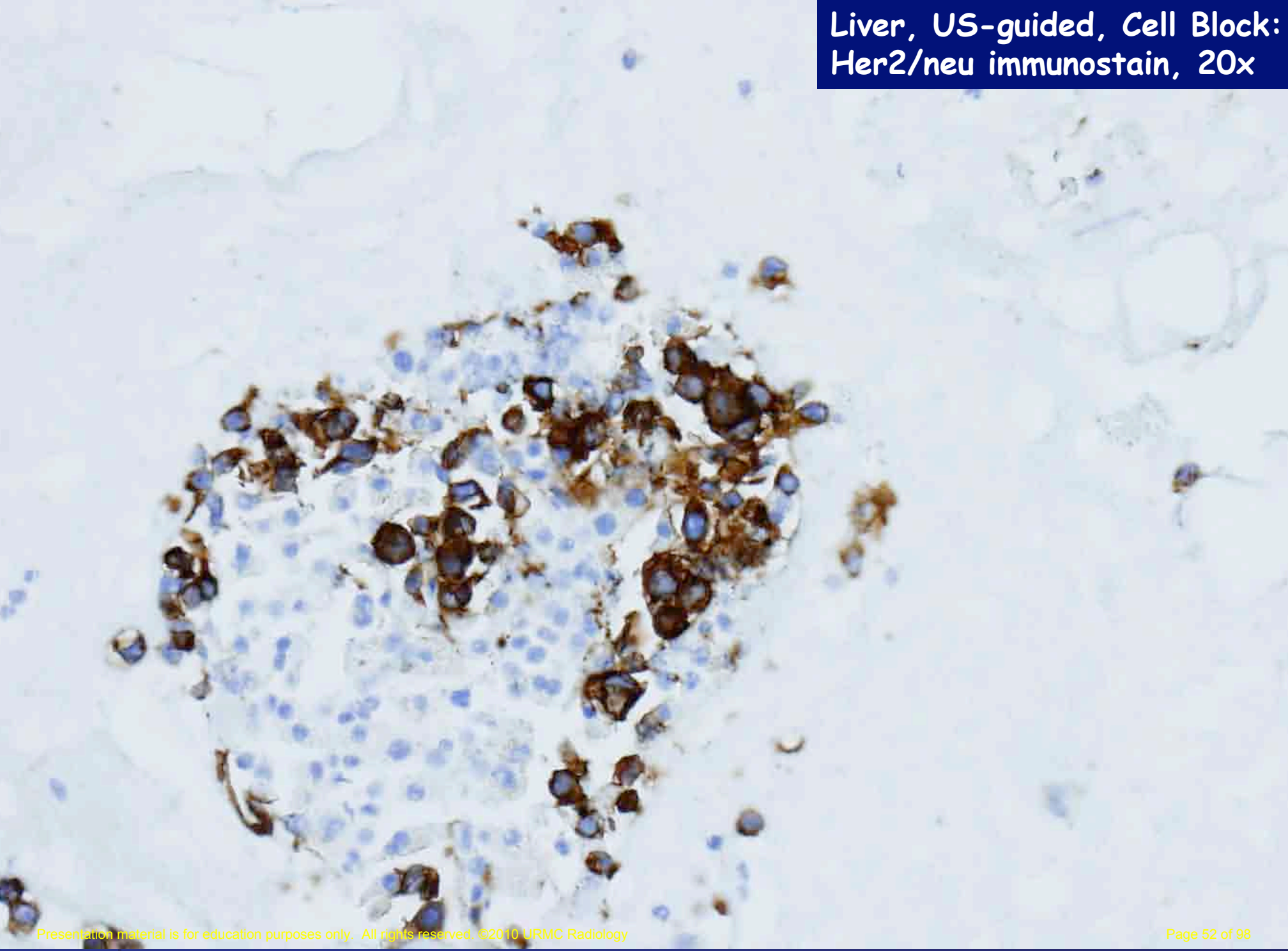




Liver, US-guided, Cell Block: H & E stain, 40x



Liver, US-guided, Cell Block: Her2/neu immunostain, 20x



Liver, ultrasound-guided fine needle aspiration:

Malignant tumor cells present derived from metastatic adenocarcinoma, consistent with breast primary.

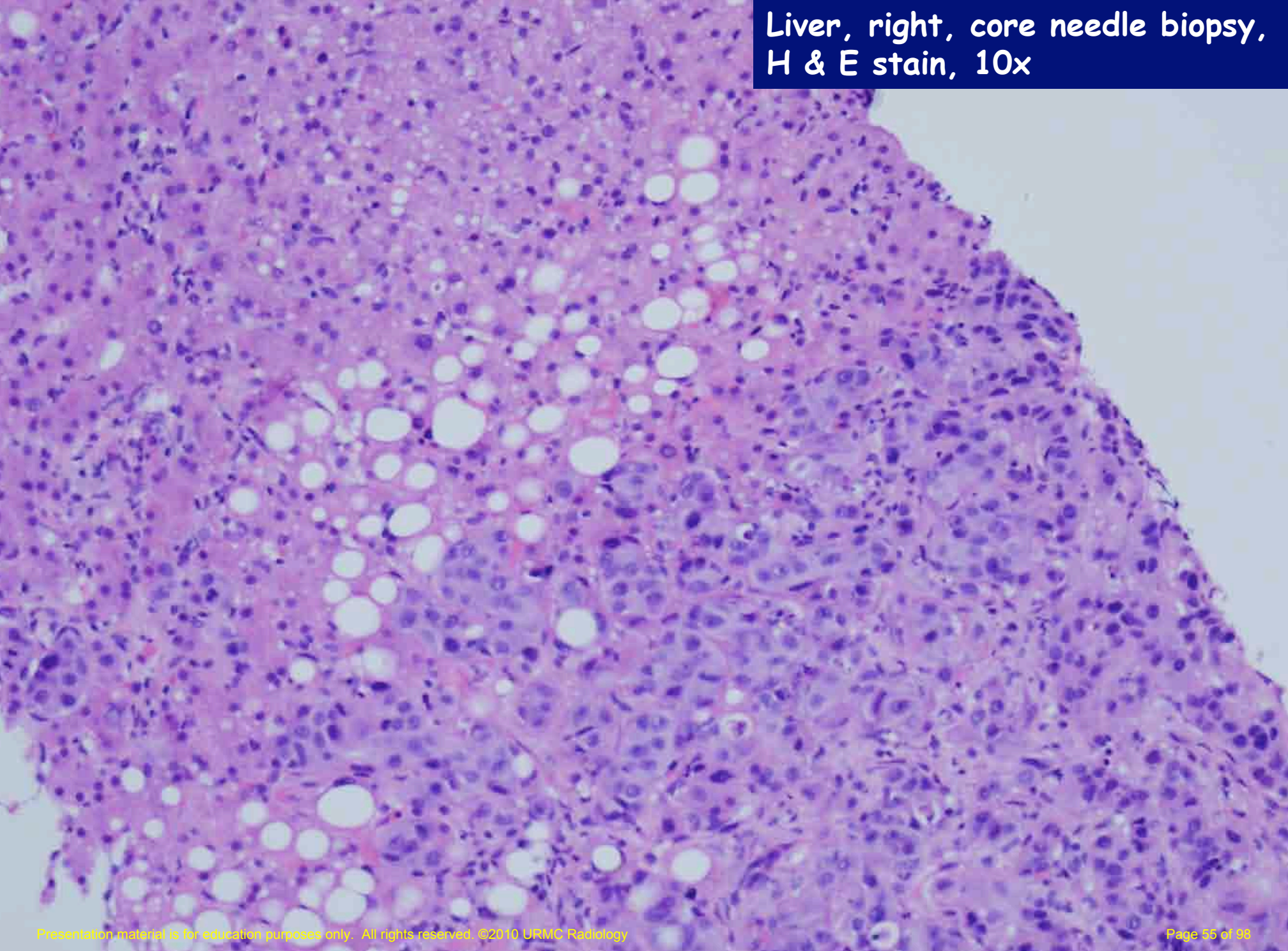
Tumor cells are staining positive for immunohistochemical stains CK 7, mammoglobin, Her2/neu (3+) and negative for CK 20, BRST-2, ER and PR. The results support the diagnosis of metastatic breast adenocarcinoma.

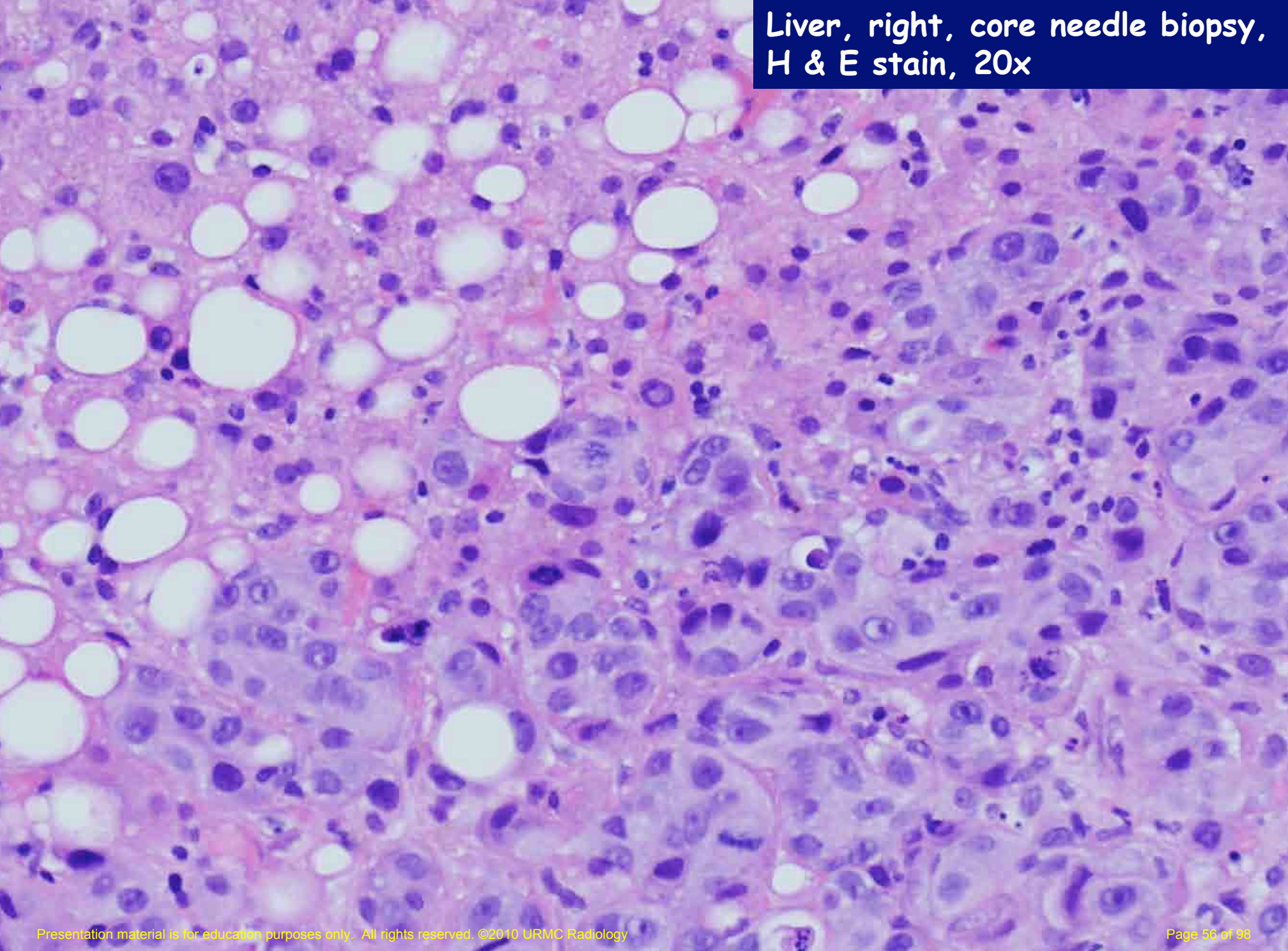
Liver, right, core needle biopsy:

Metastatic carcinoma, consistent with origin from breast.

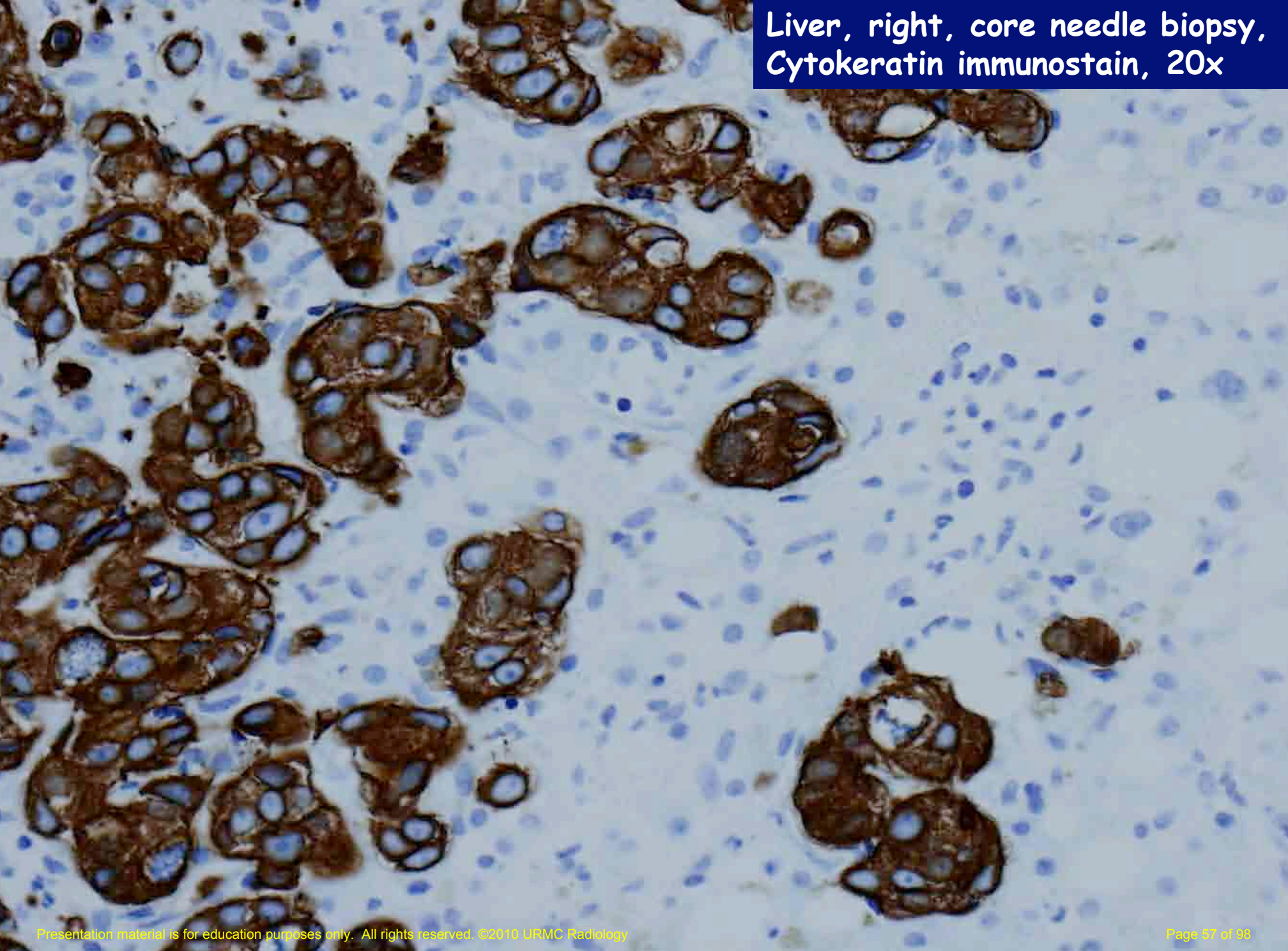
Comment: The tumor cells are positive for immunohistochemical stains CK 7 and CK 19 and negative for CK 20, ER and PR. The tumor cells are strongly positive (3+) for Her2/neu and focally positive for mammoglobin supporting the diagnosis of metastatic breast carcinoma.

Liver, right, core needle biopsy, H & E stain, 10x

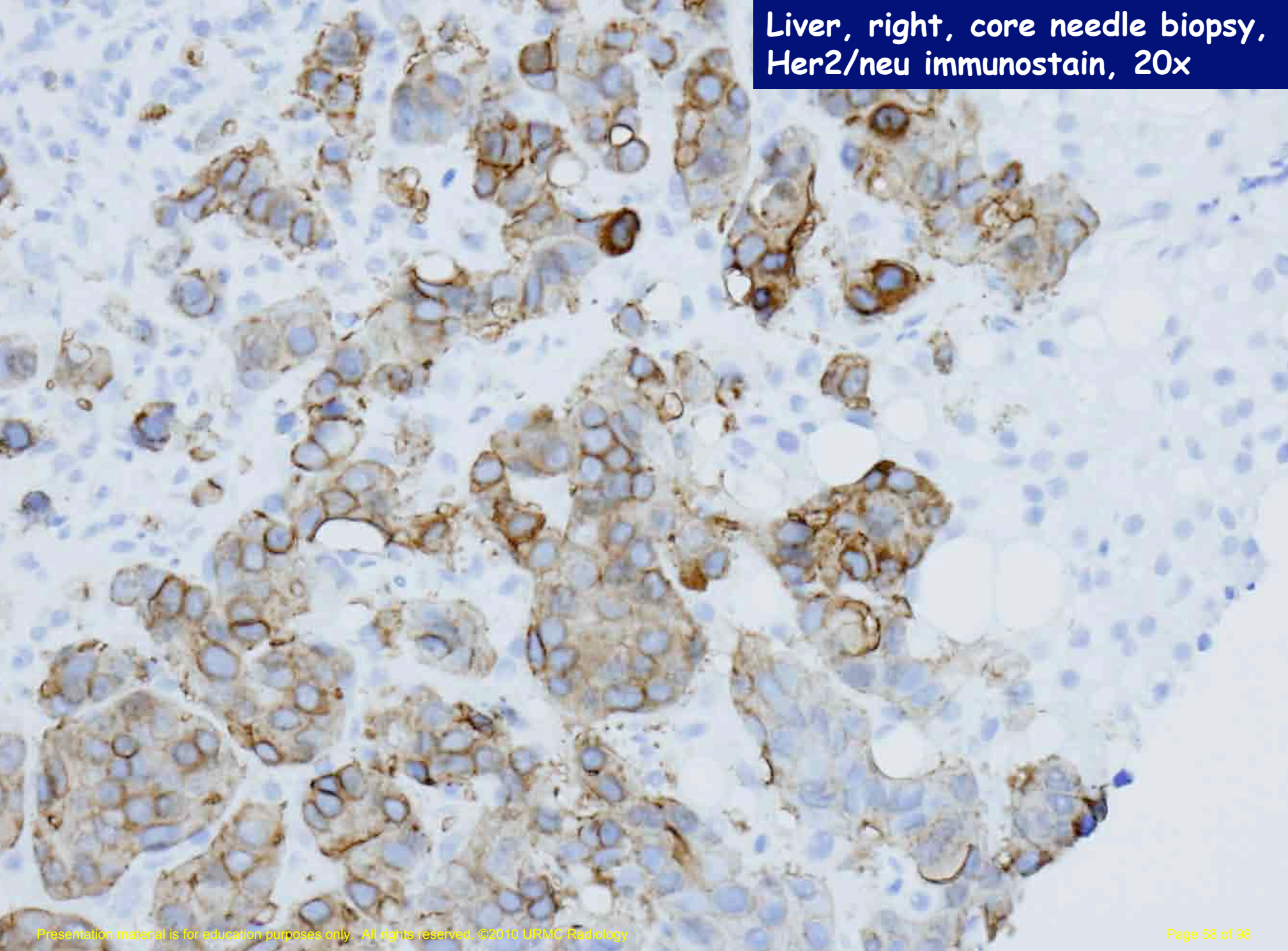


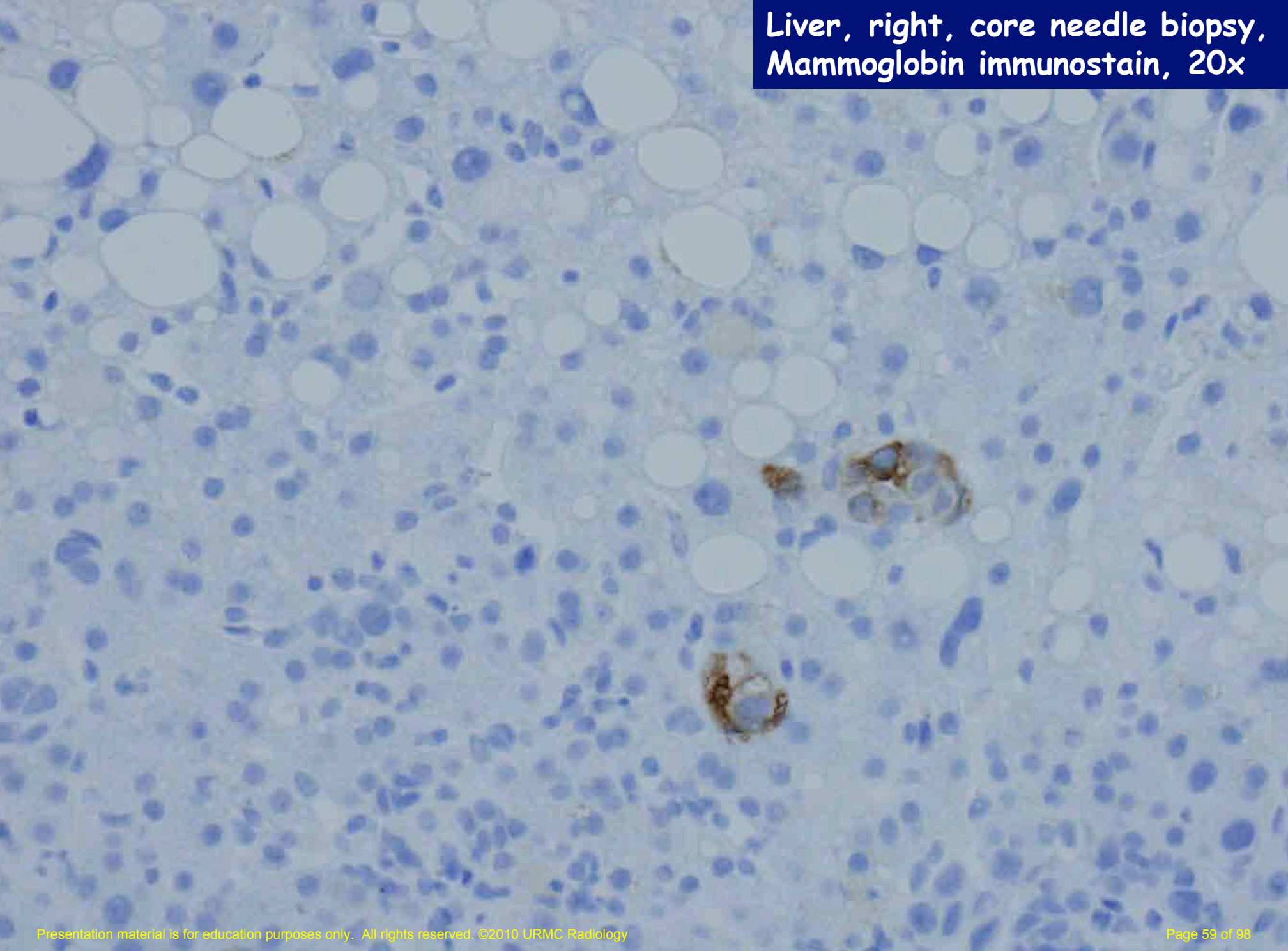


Liver, right, core needle biopsy,
Cytokeratin immunostain, 20x



Liver, right, core needle biopsy, Her2/neu immunostain, 20x

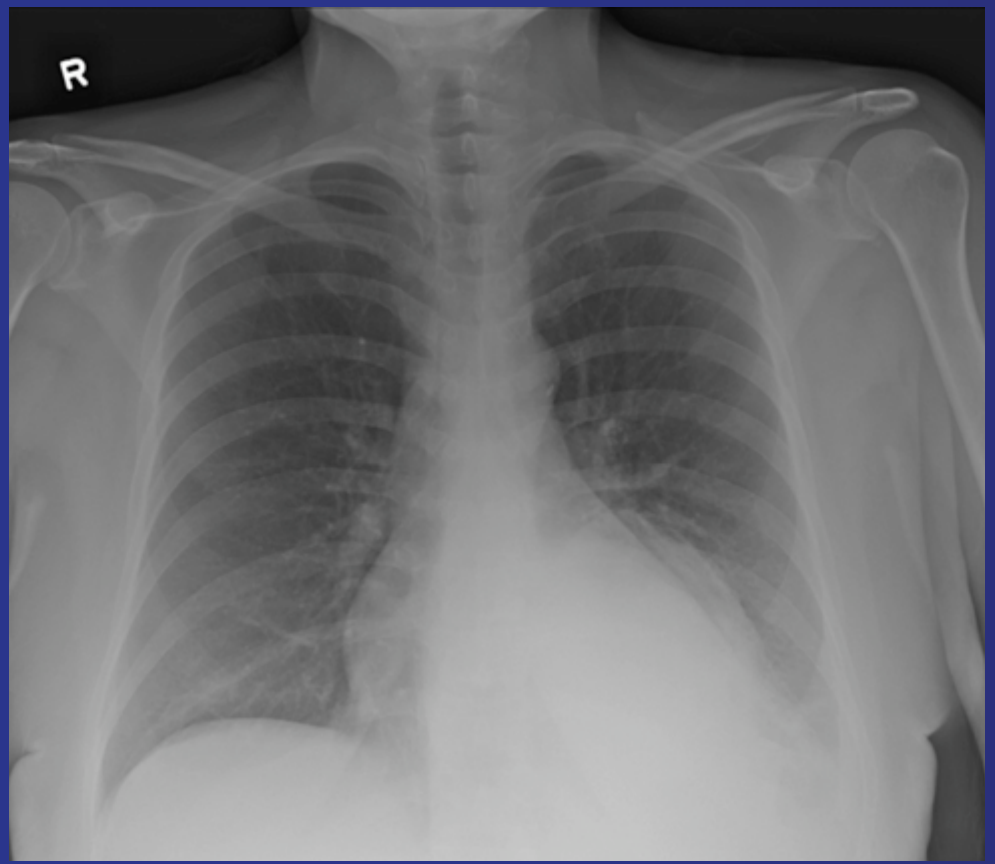




Metastatic Carcinoma

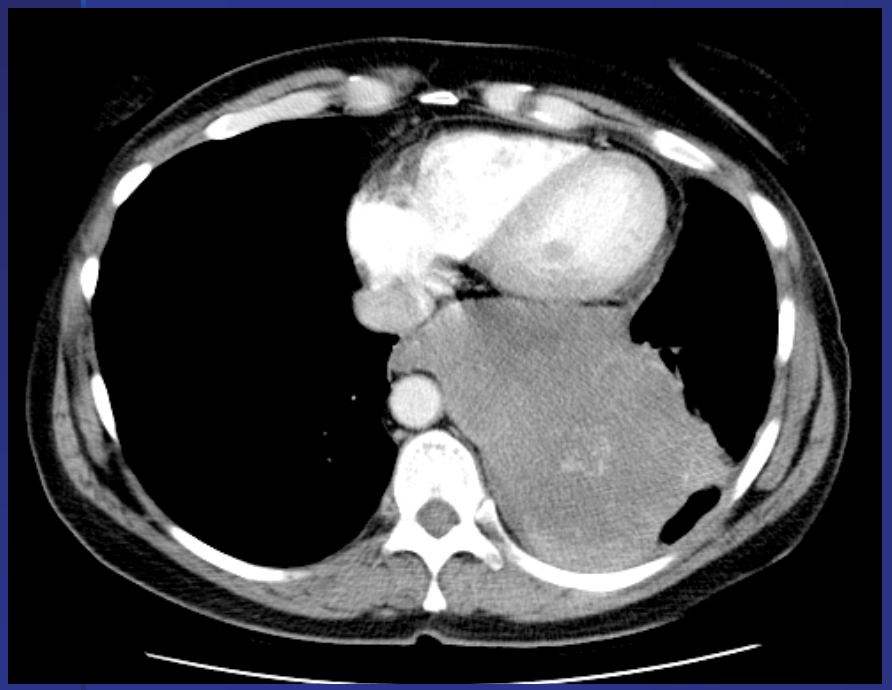
- Metastatic disease to liver is common
- Cancer cells reach liver through portal vein, hepatic artery, hilar lymphatics or direct extension
- Metastatic disease grows rapidly in liver
- Immunohistochemistry useful to confirm primary origin

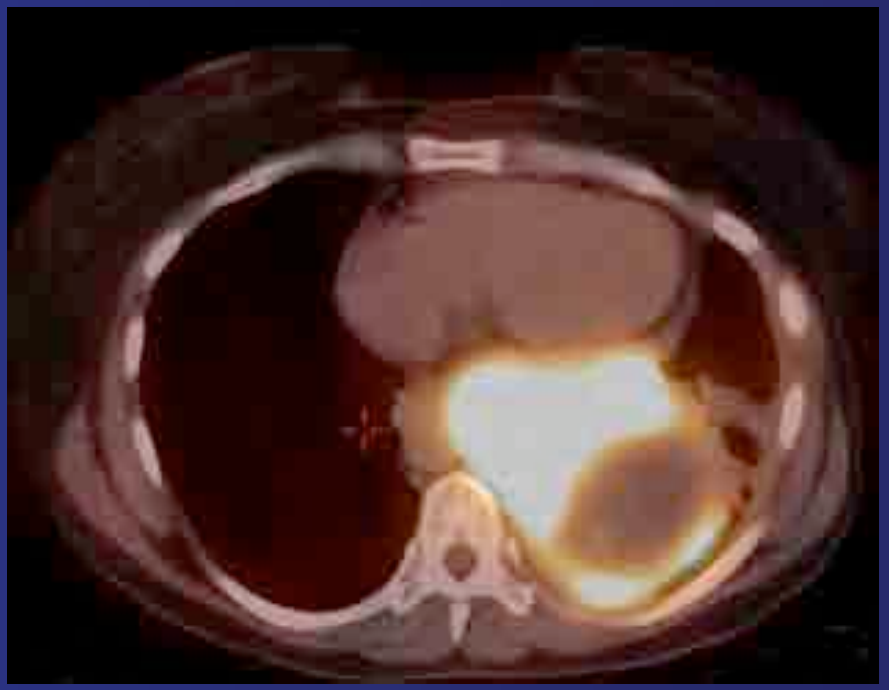
Case 4



No history provided

Case 4





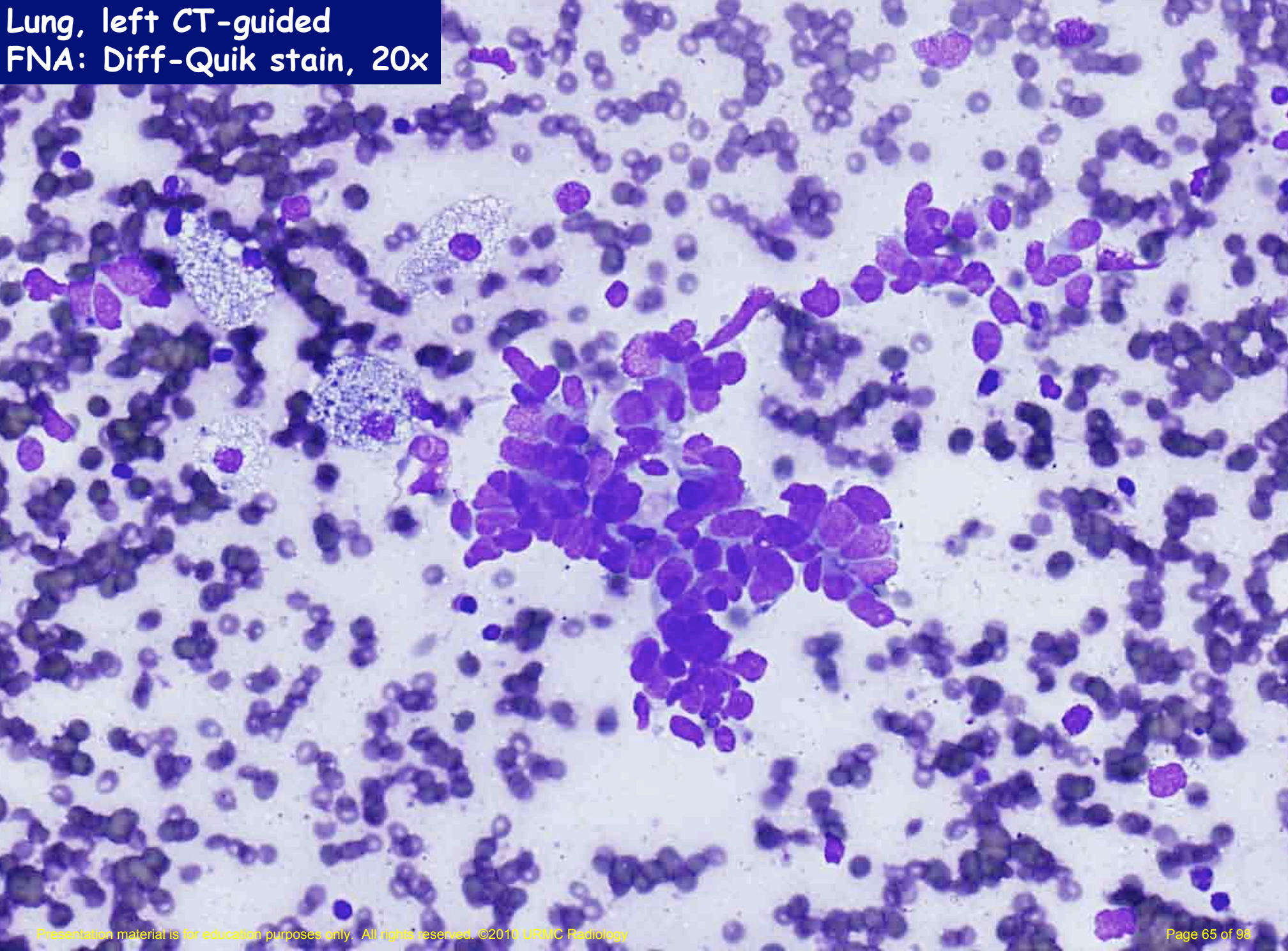
Case 4

- Differential Diagnosis
  - Lung Cancer
  - Metastasis
  - Neurogenic Tumor
  - Lymphoma

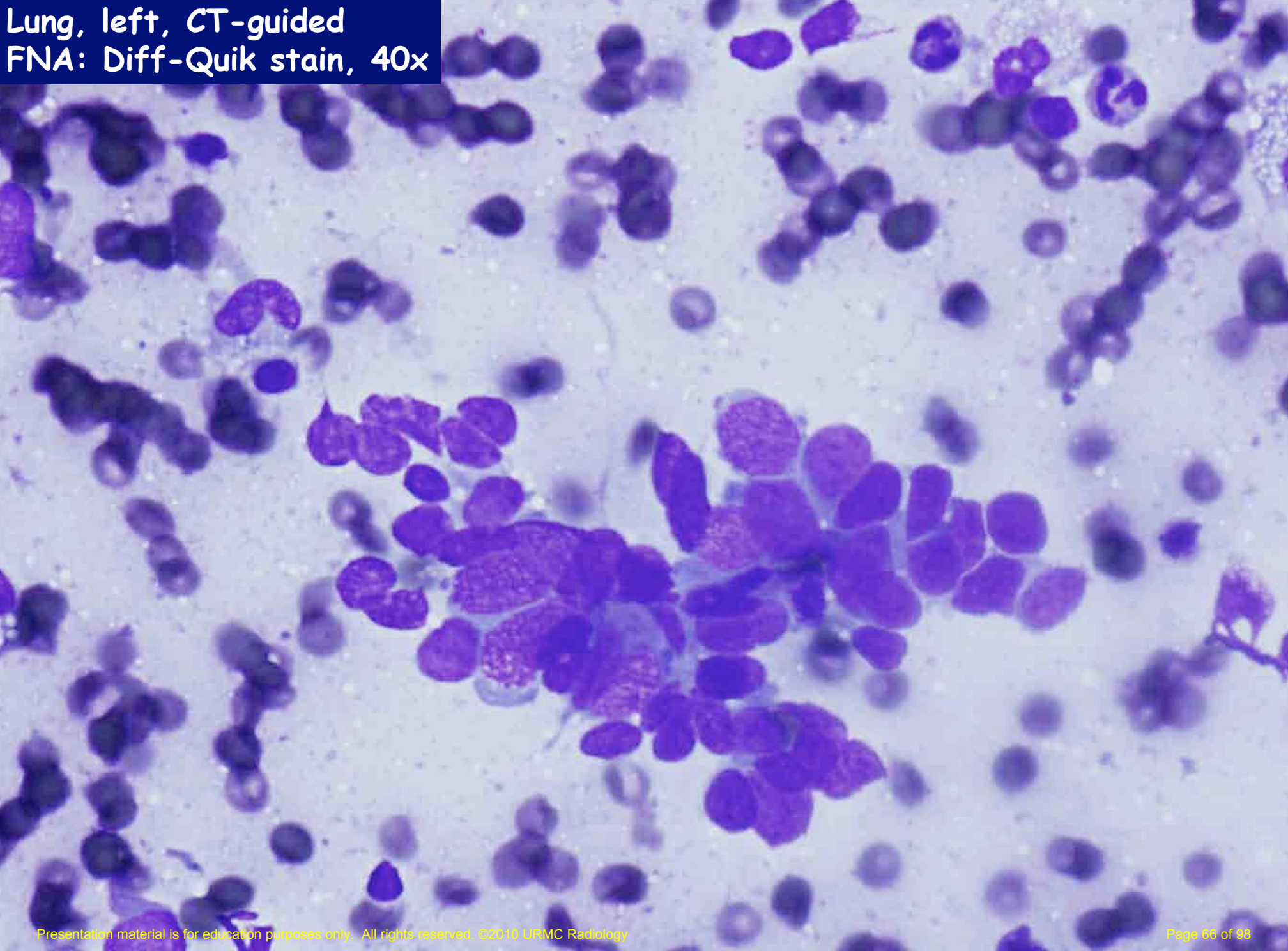
Case 4

Biopsy is performed with patient prone

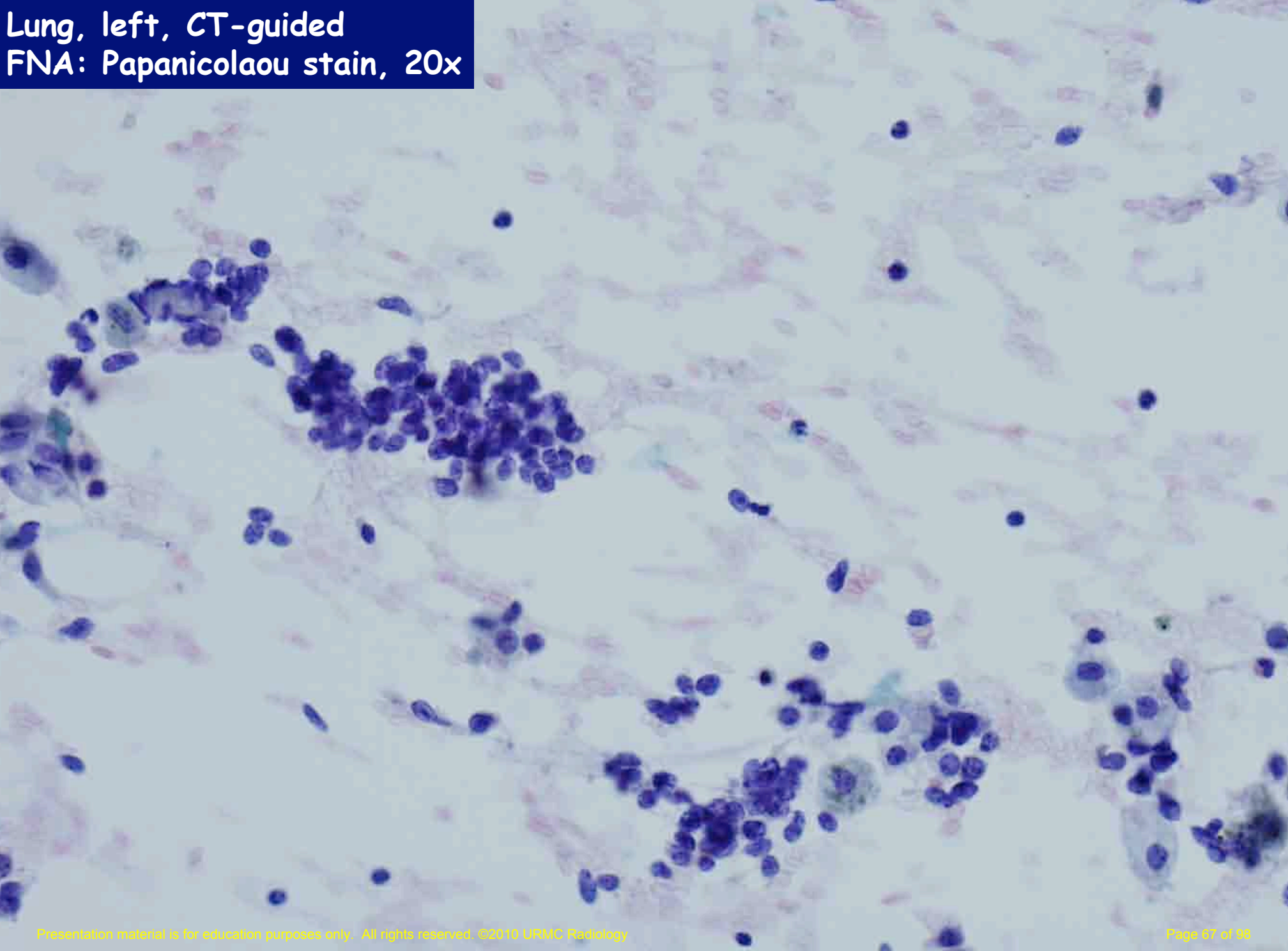
Lung, left CT-guided
FNA: Diff-Quik stain, 20x



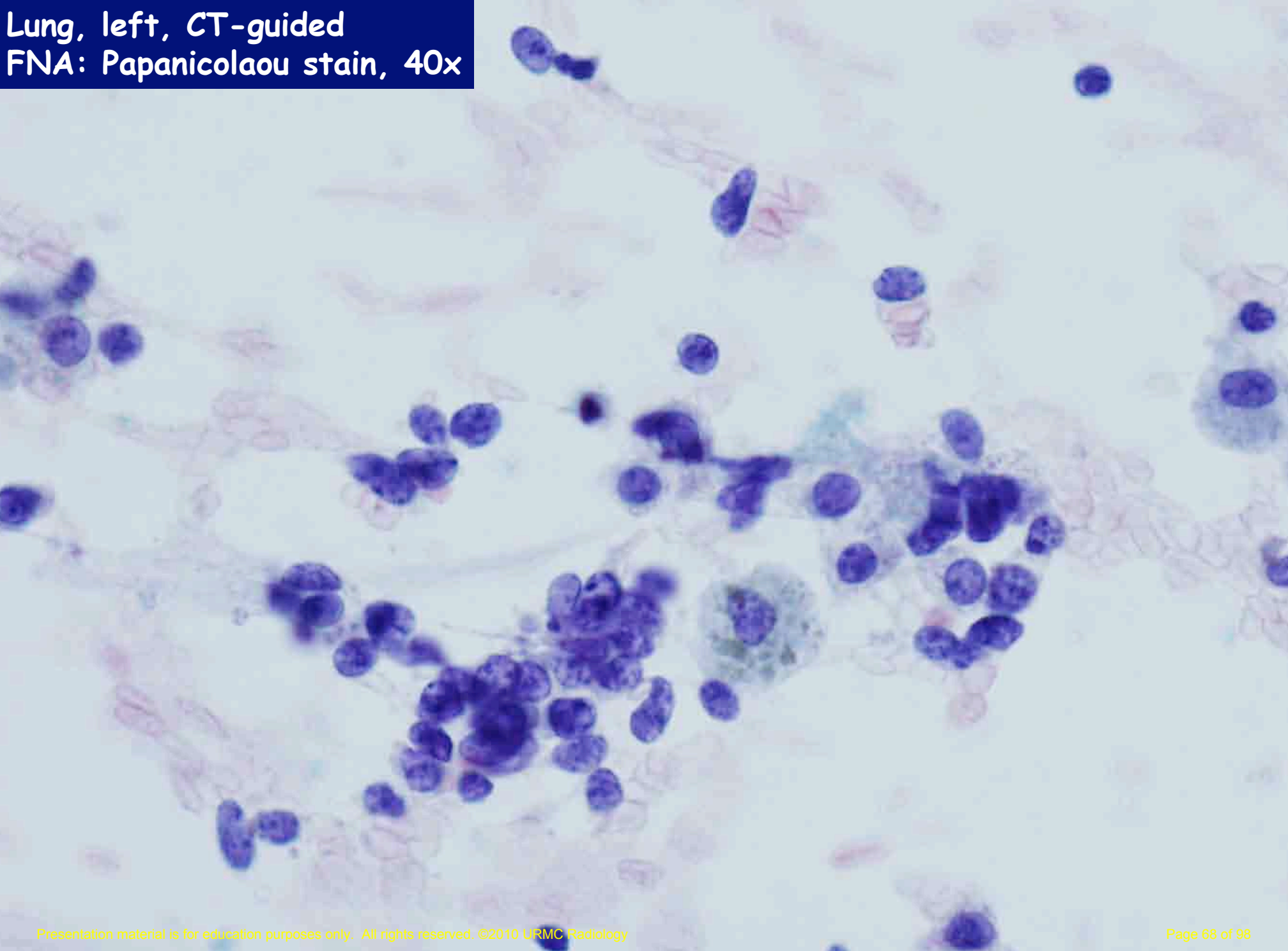
Lung, left, CT-guided
FNA: Diff-Quik stain, 40x



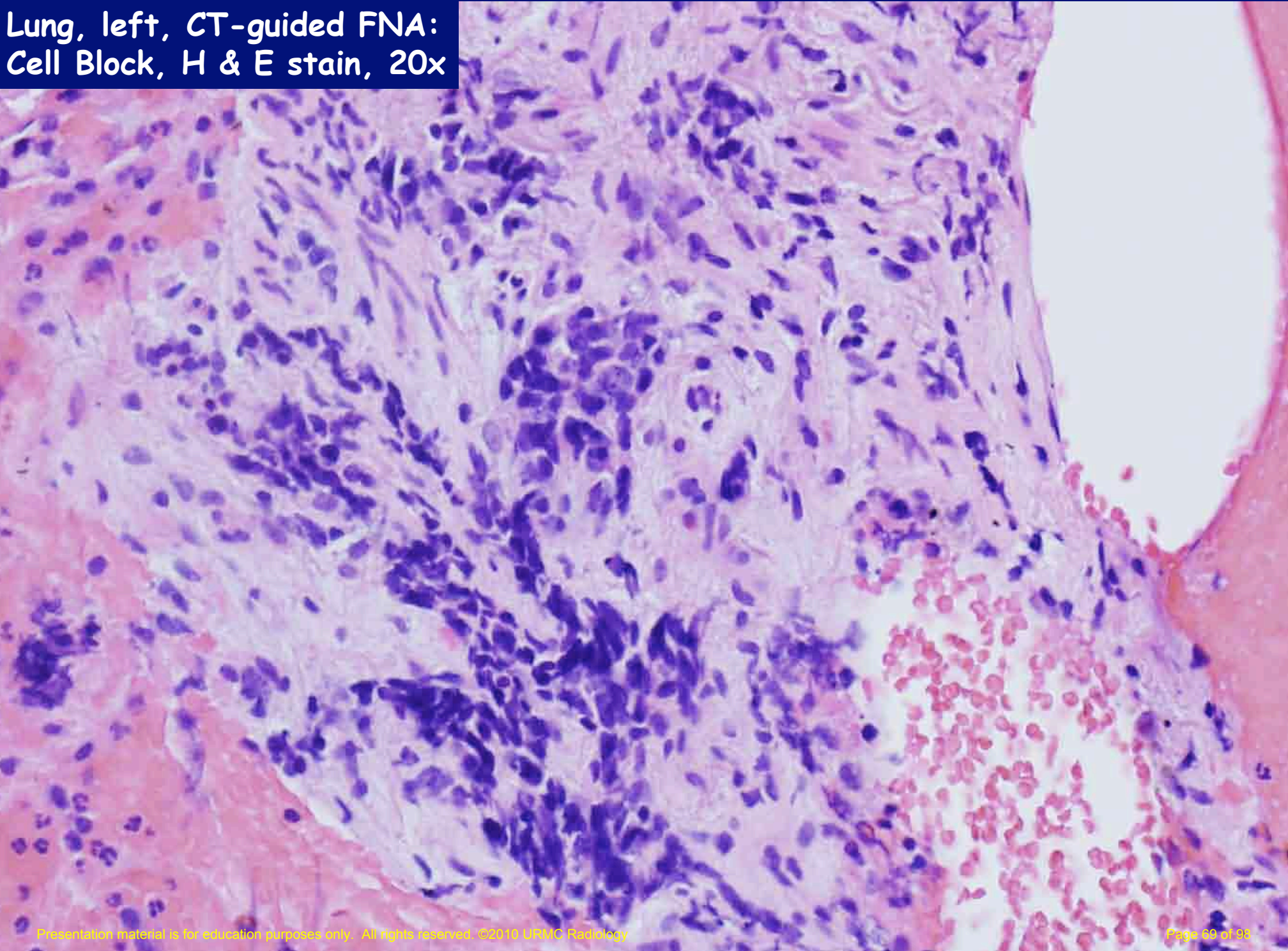
Lung, left, CT-guided
FNA: Papanicolaou stain, 20x



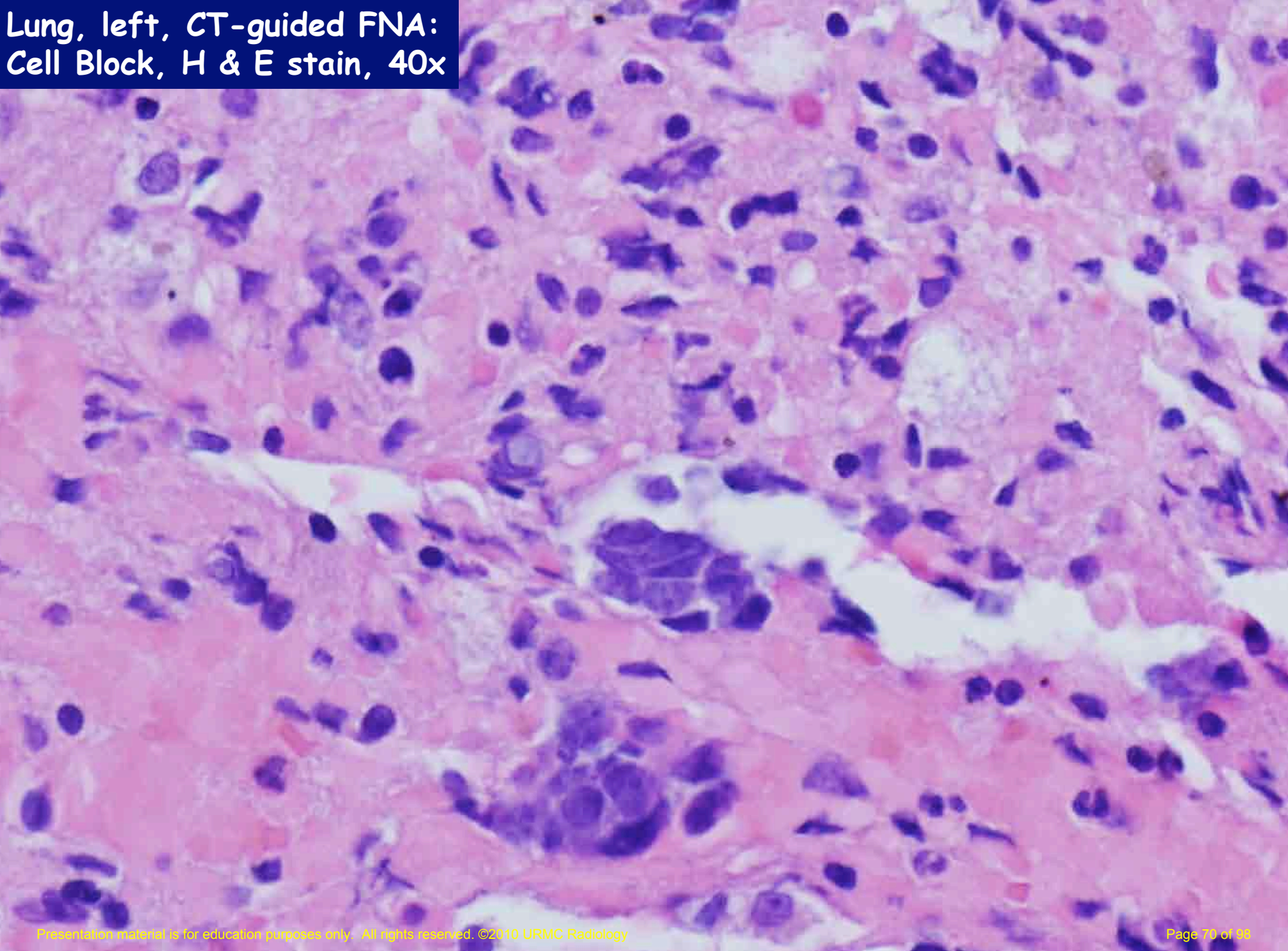
Lung, left, CT-guided
FNA: Papanicolaou stain, 40x



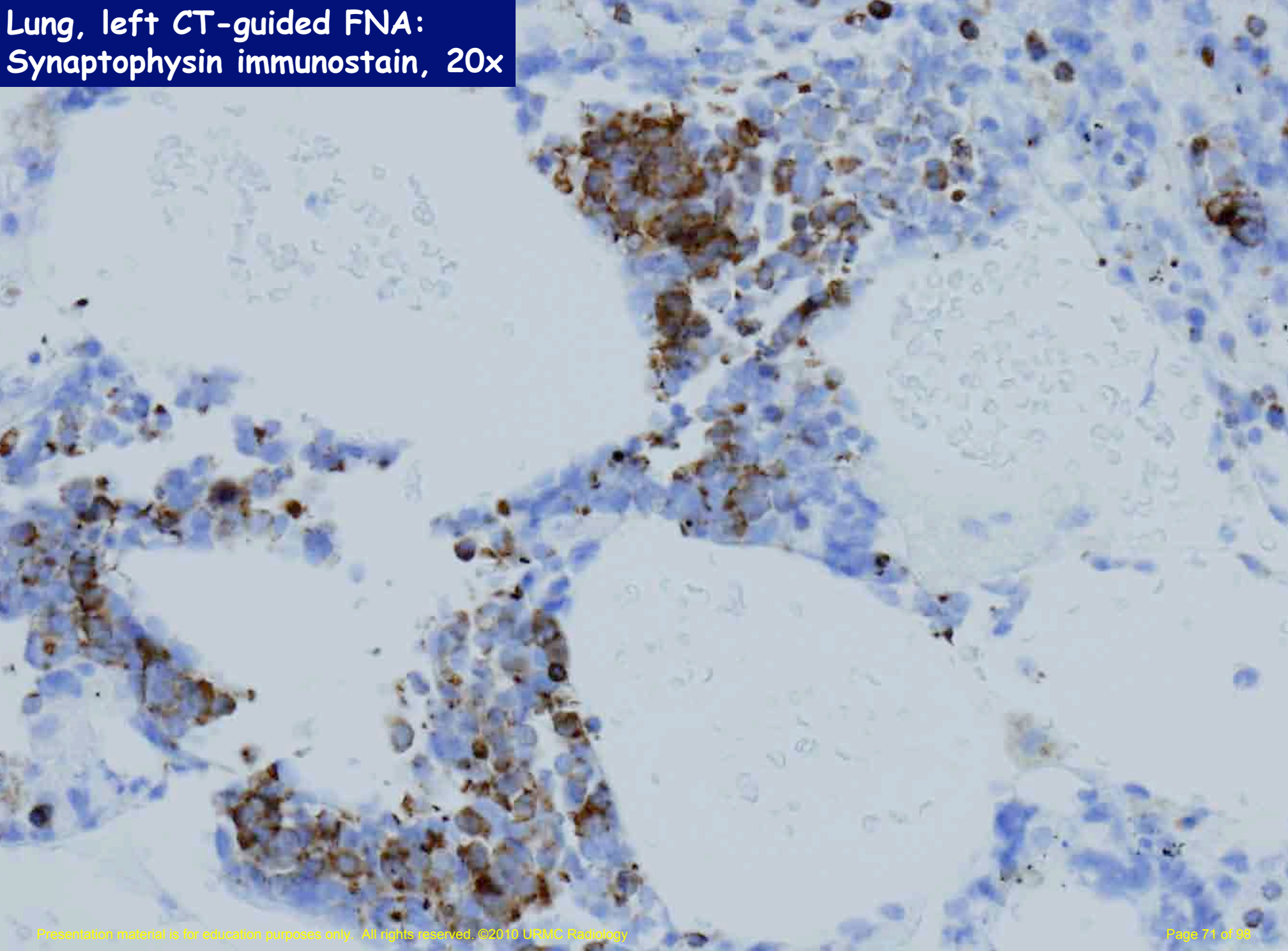
Lung, left, CT-guided FNA: Cell Block, H & E stain, 20x



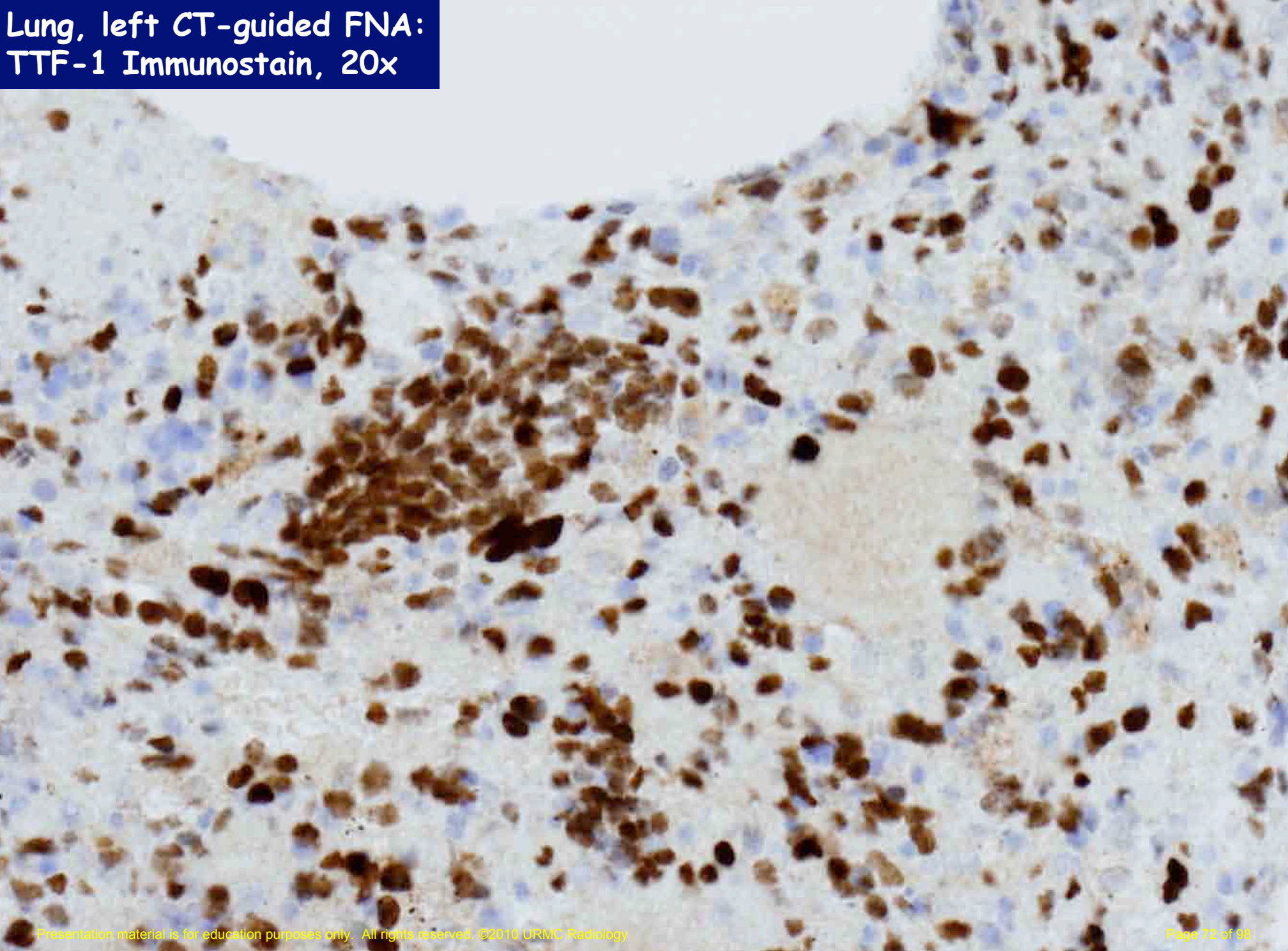
Lung, left, CT-guided FNA:
Cell Block, H & E stain, 40x



Lung, left CT-guided FNA: Synaptophysin immunostain, 20x



Lung, left CT-guided FNA: TTF-1 Immunostain, 20x



Lung, left, CT-guided fine needle aspiration:

Malignant tumor cells present derived from small cell carcinoma.

The immunohistochemical stains show the tumor cells are positive for CK 7, TTF-1, synaptophysin and CD 56. they are weakly positive for chromogranin. The results support the diagnosis of small cell carcinoma.

Small Cell Carcinoma of Lung

- Accounts for approximately 25% of lung cancers
- Median age – 60 years, male predominance
- Strong association with smoking
- Ionizing radiation strong association
- Differential diagnoses include lymphoma and other neuroendocrine and non-neuroendocrine neoplasms

Arising centrally in this lung and spreading extensively is a small cell anaplastic carcinoma. The cut surface of this tumor has a soft, lobulated, white to tan appearance. The tumor seen here has caused obstruction of the main bronchus to left lung so that the distal lung is collapsed.

Case 4

- Systemic therapy required for all SCLC patients
- TNM staging not widely used since overlap in prognosis and therapy between diff groups (esp II and III)
- Chest radiotherapy is indicated for limited but not necessarily for extensive disease

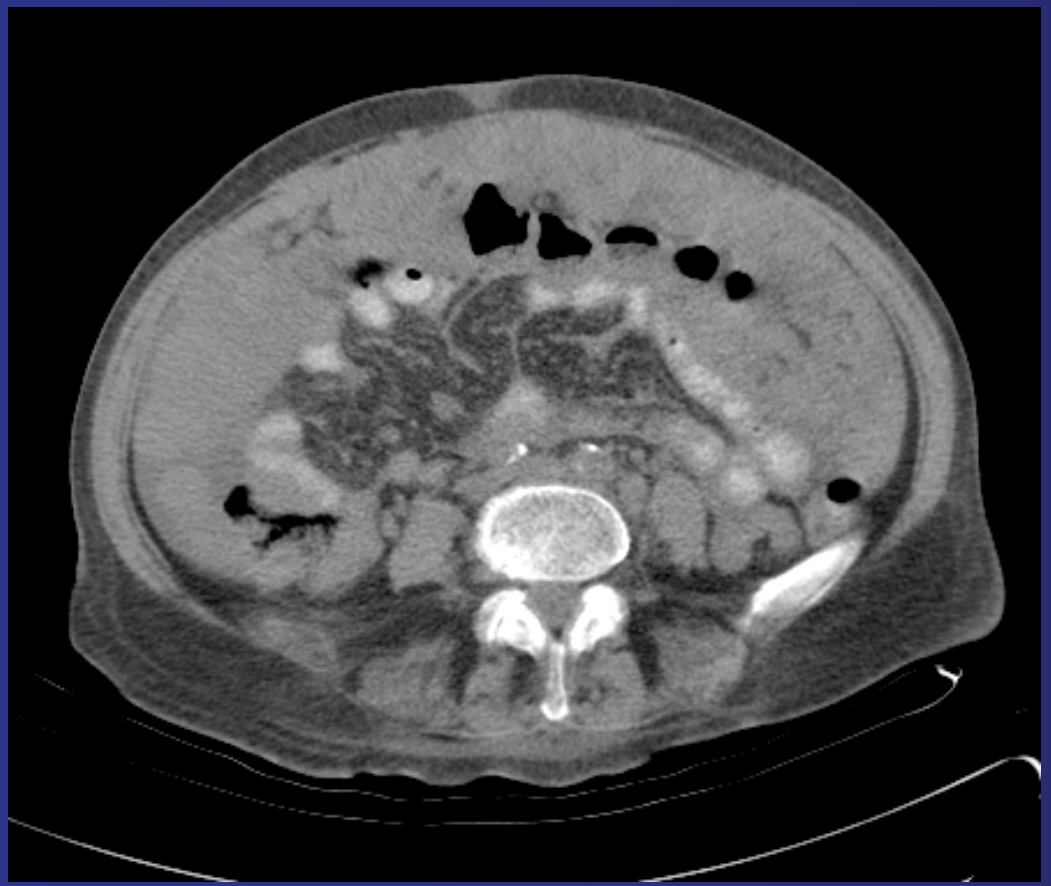
Case 4

- Veterans' Affairs Lung Study Group (VALSG)
  - Limited
    - Confined to ipsilateral thorax
    - Within single radiotherapy port
    - Corresponding partly to TNM stages I thru IIIB
    - Supraclavicular and scalene LNs considered limited
    - 30-40% patients at presentation
  - Extensive
    - Metastatic, outside the ipsilateral hemithorax
    - Malignant pleural effusion considered extensive
    - 60-70% patients at presentation

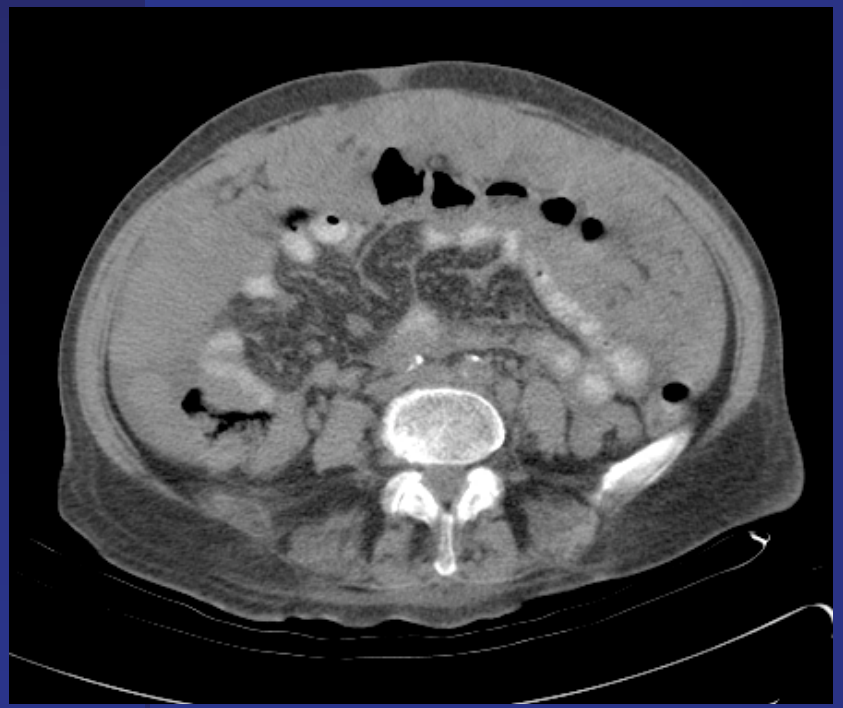
Case 5

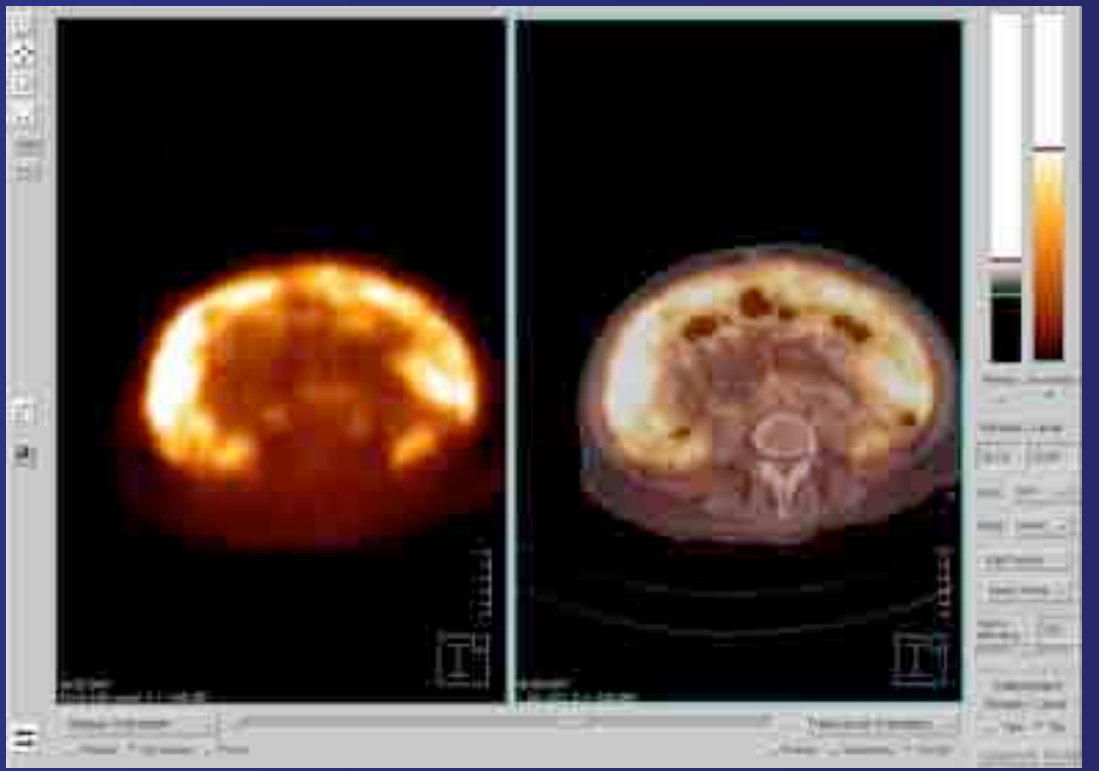
- 86 year old with weight loss

Case 5



Case 5

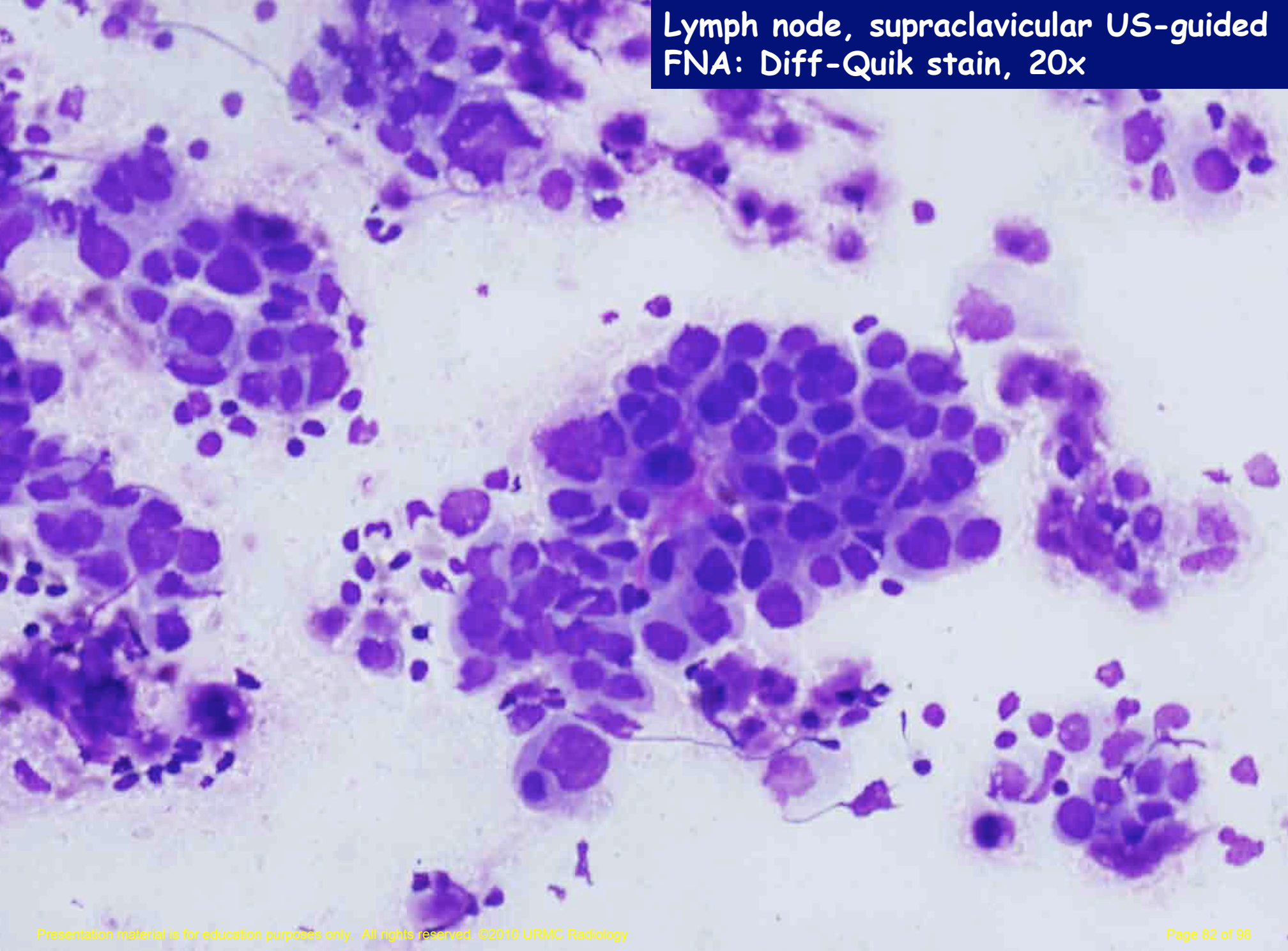




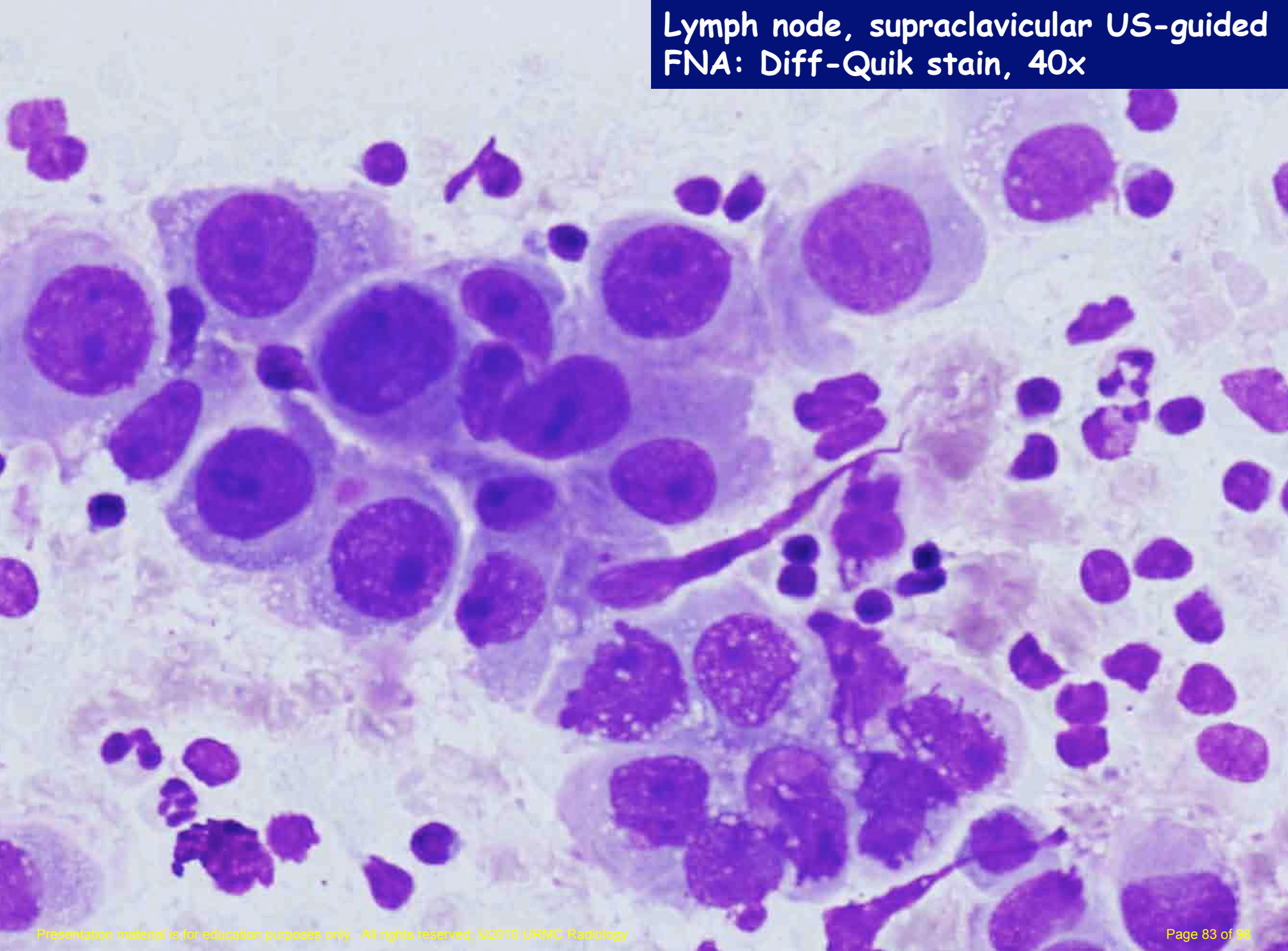
Case 5

- Omental Cake Differential Diagnosis
  - Metastasis
    - Ovarian
    - Cervical
    - Endometrial
    - GI
    - Lung
    - Renal
  - Peritoneal Malignant Mesothelioma
  - Tuberculous Peritonitis

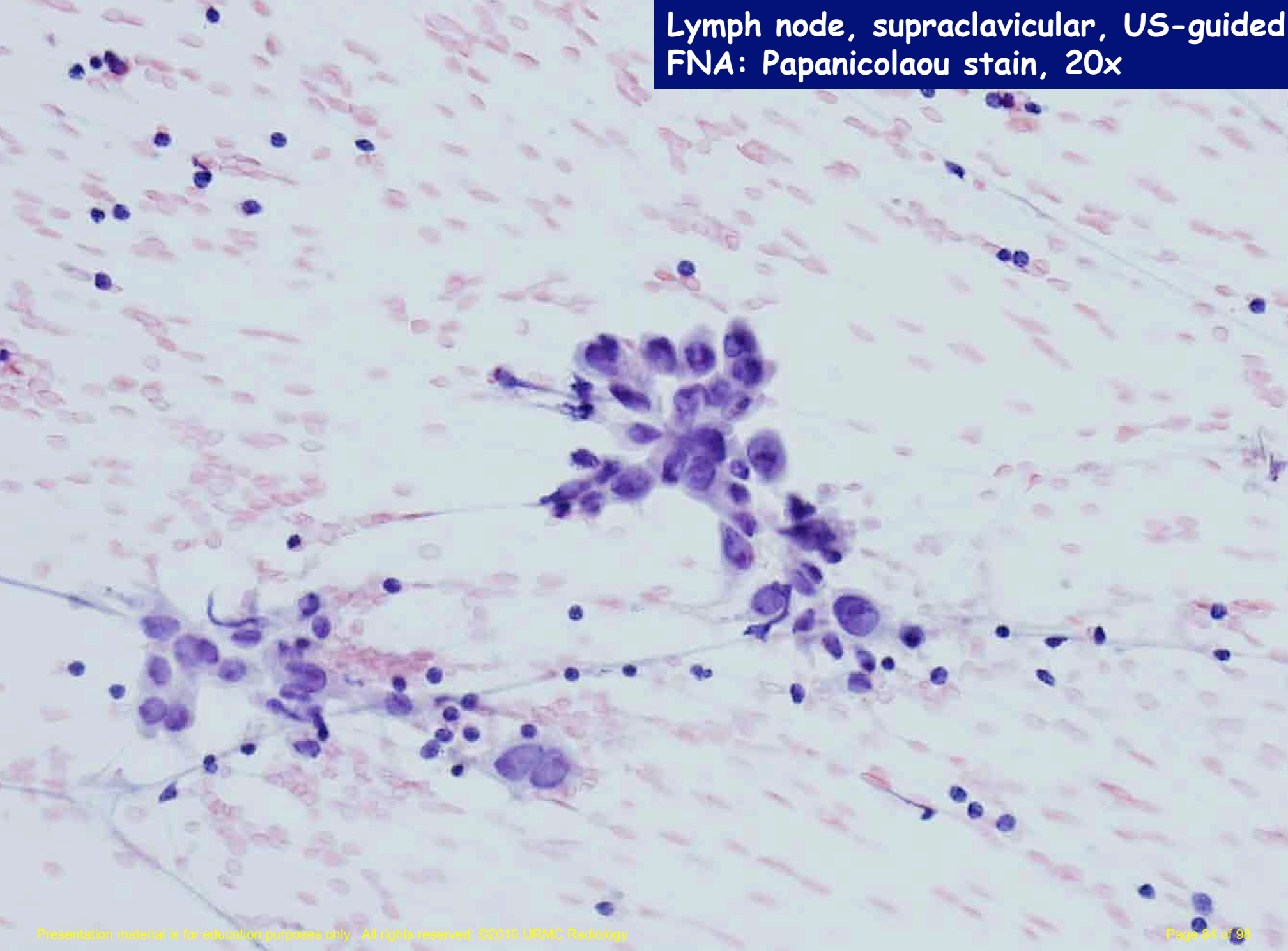
Lymph node, supraclavicular US-guided FNA: Diff-Quik stain, 20x



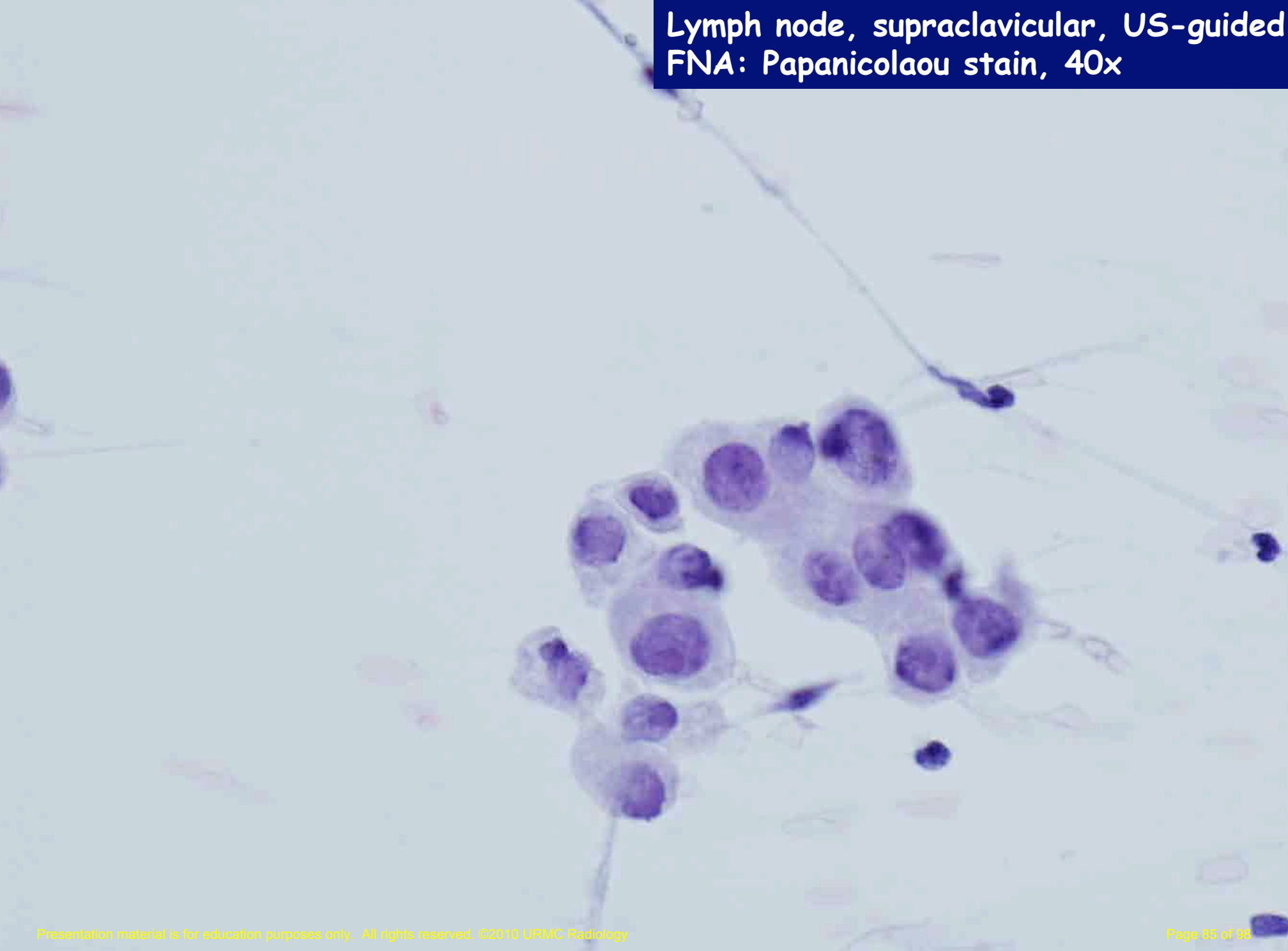
Lymph node, supraclavicular US-guided FNA: Diff-Quik stain, 40x



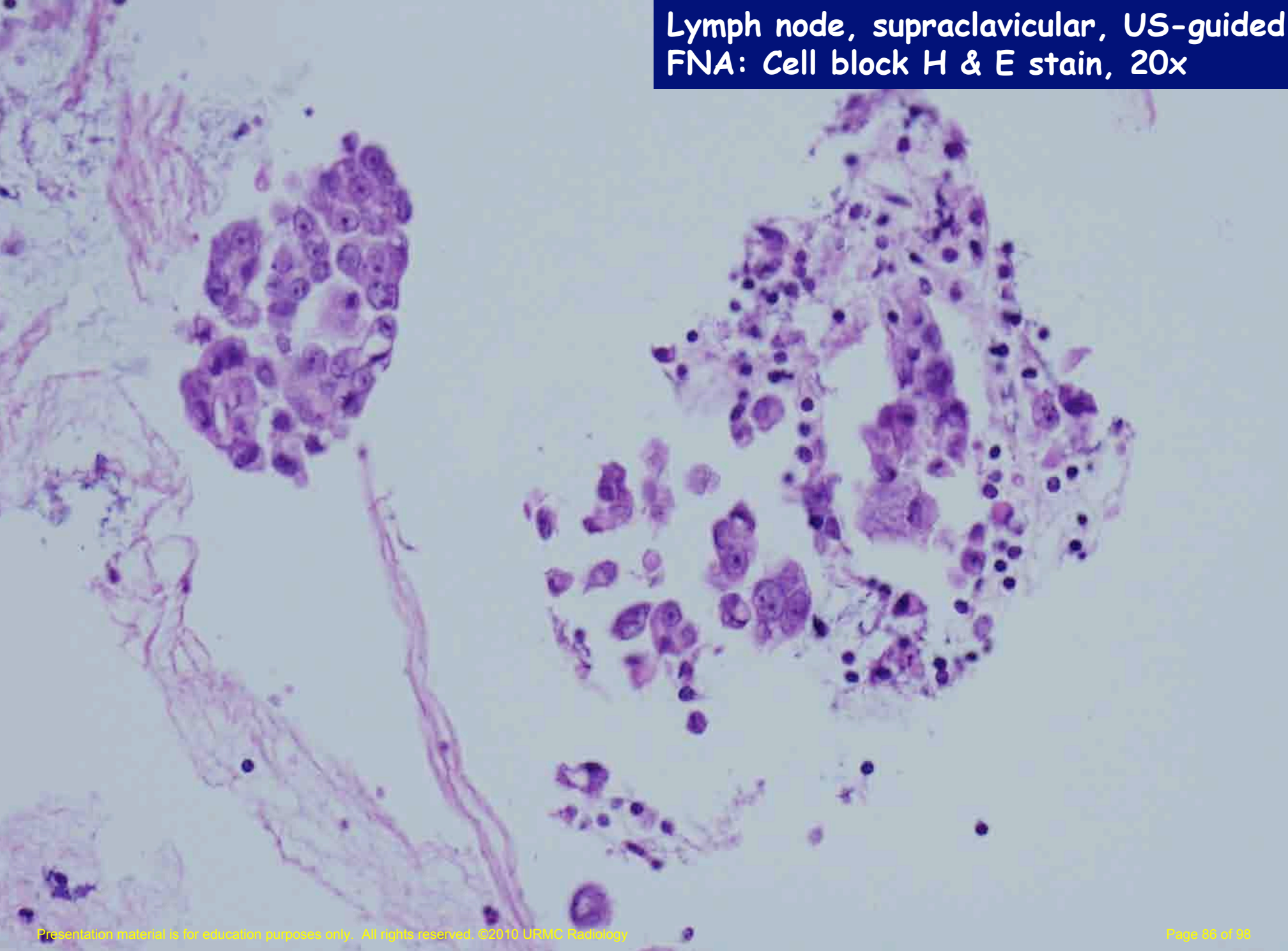
Lymph node, supraclavicular, US-guided FNA: Papanicolaou stain, 20x



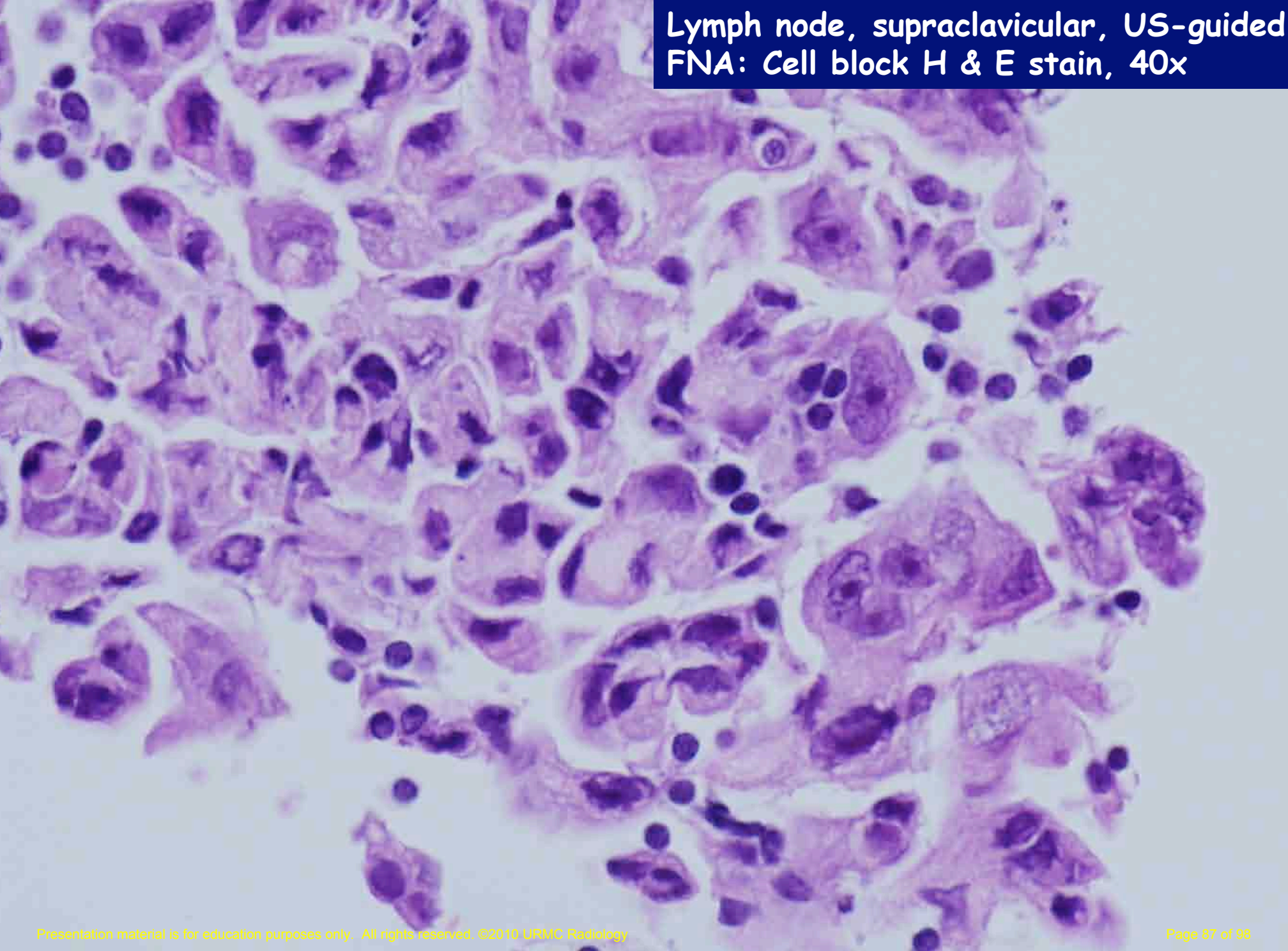
Lymph node, supraclavicular, US-guided FNA: Papanicolaou stain, 40x



Lymph node, supraclavicular, US-guided FNA: Cell block H & E stain, 20x



Lymph node, supraclavicular, US-guided FNA: Cell block H & E stain, 40x



Lymph node, supraclavicular, US-guided fine needle aspiration:

Malignant tumor cells identified consistent with peritoneal malignant mesothelioma.

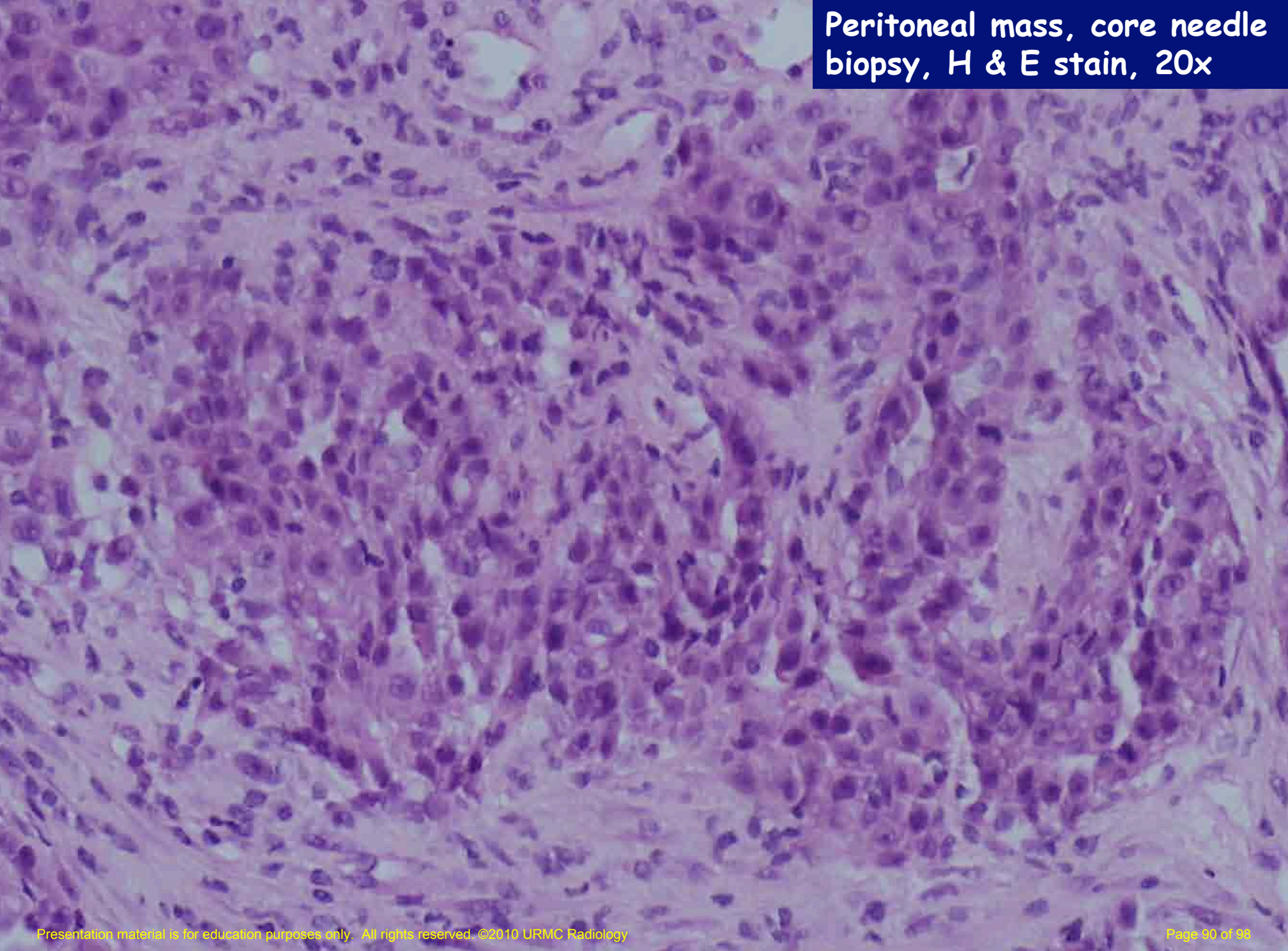
Cell block and cytologic preparations examined.

Peritoneal mass, core needle biopsy:

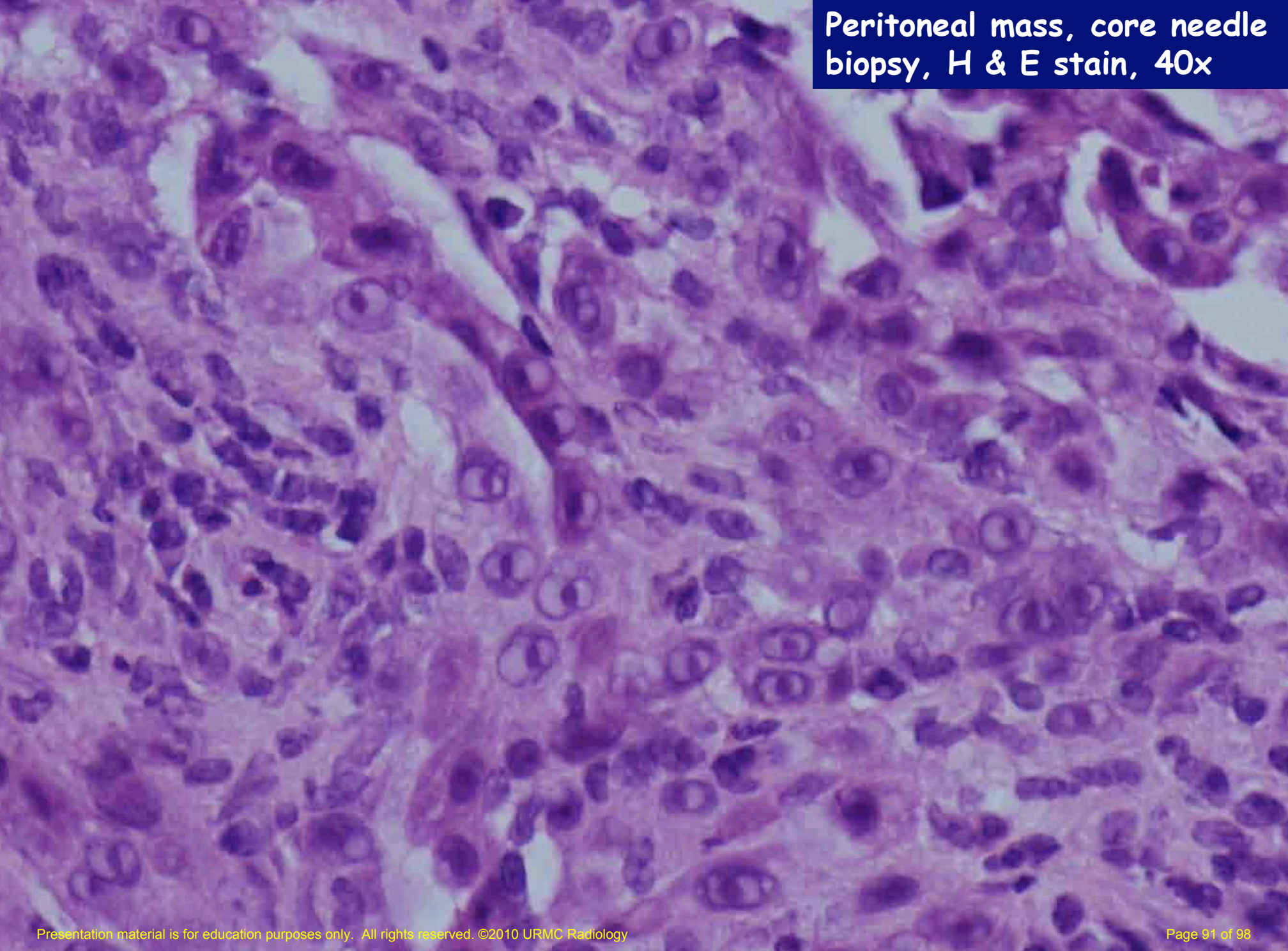
Consistent with peritoneal malignant mesothelioma.

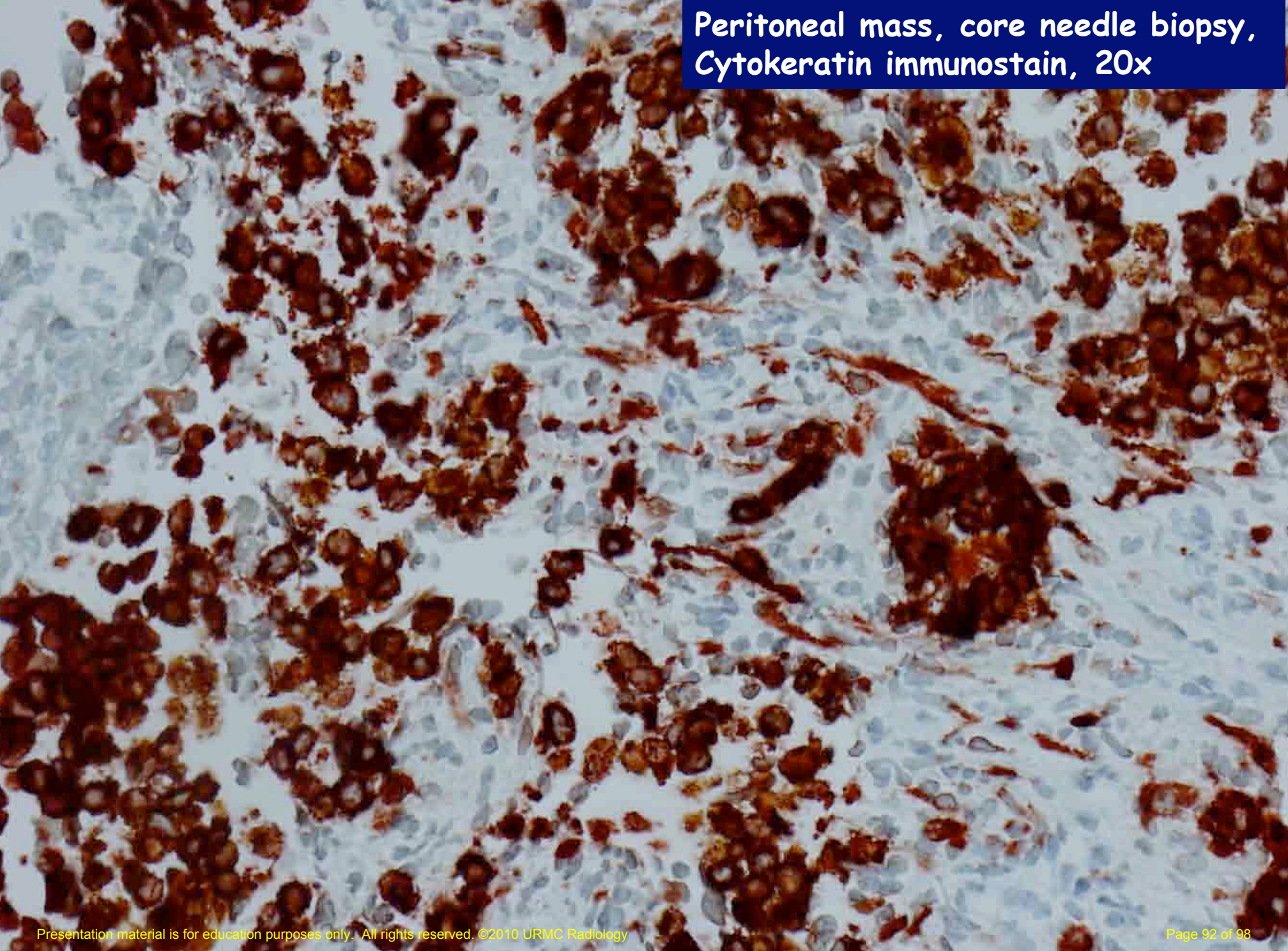
Comment: Tumor cells are positive for cytokeratin cocktail, CK-7, CK 5/6 and calretinin. B72.3, CK 20, TTF-1 and Kreyberg stains are negative. In the proper clinical setting these staining results are more consistent with mesothelioma rather than an ovarian serous carcinoma.

Peritoneal mass, core needle biopsy, H & E stain, 20x

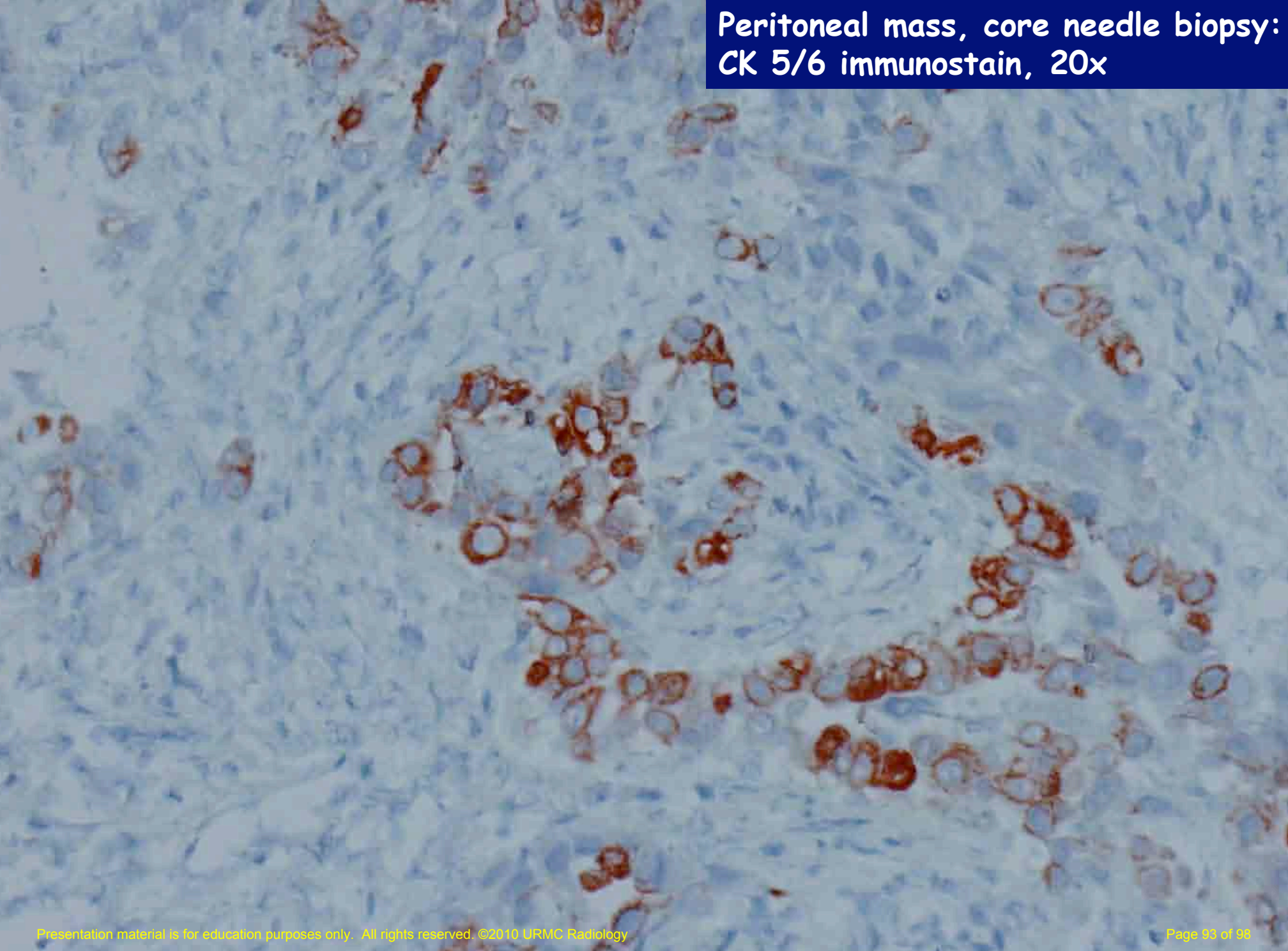


Peritoneal mass, core needle biopsy, H & E stain, 40x

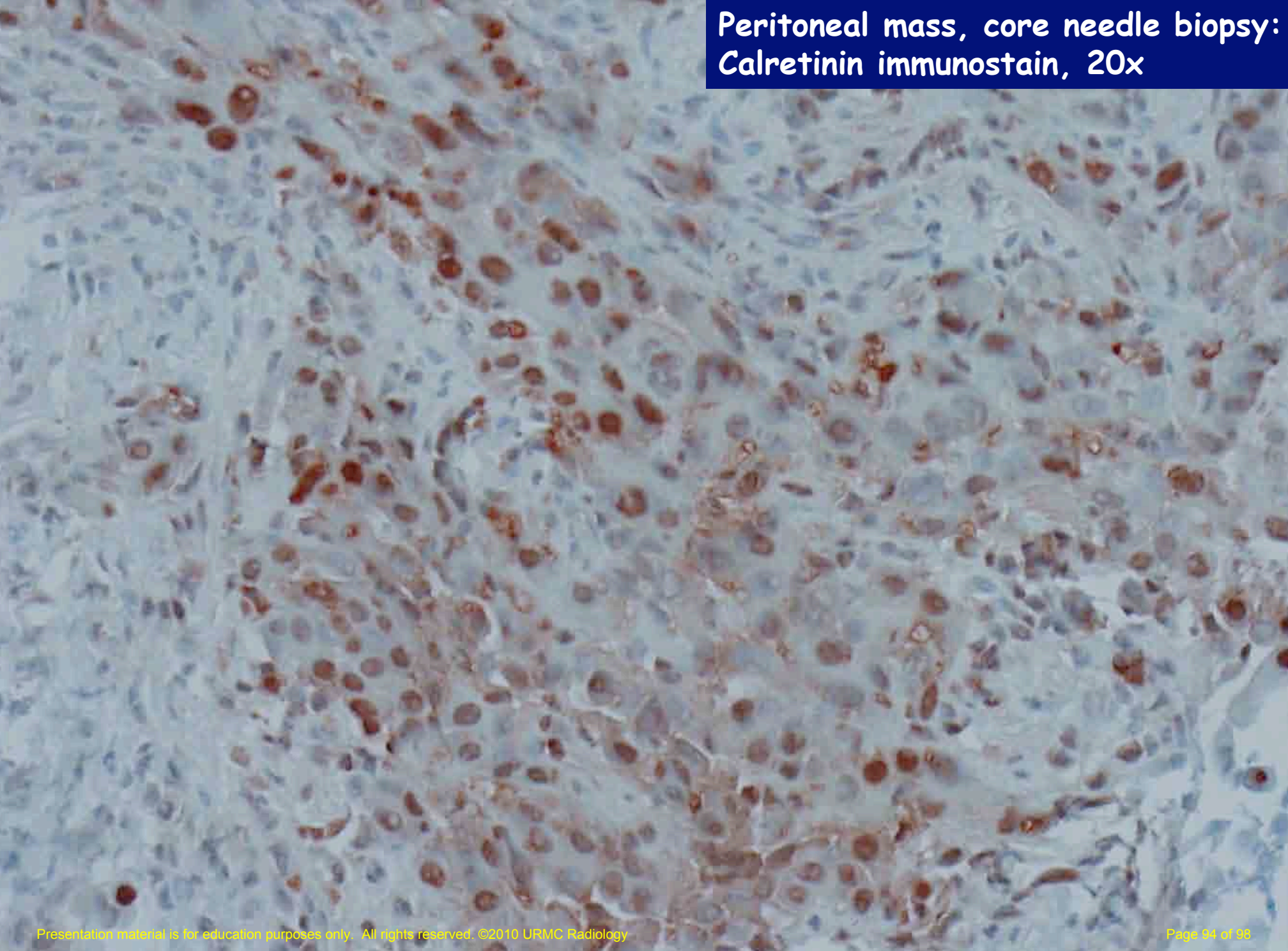




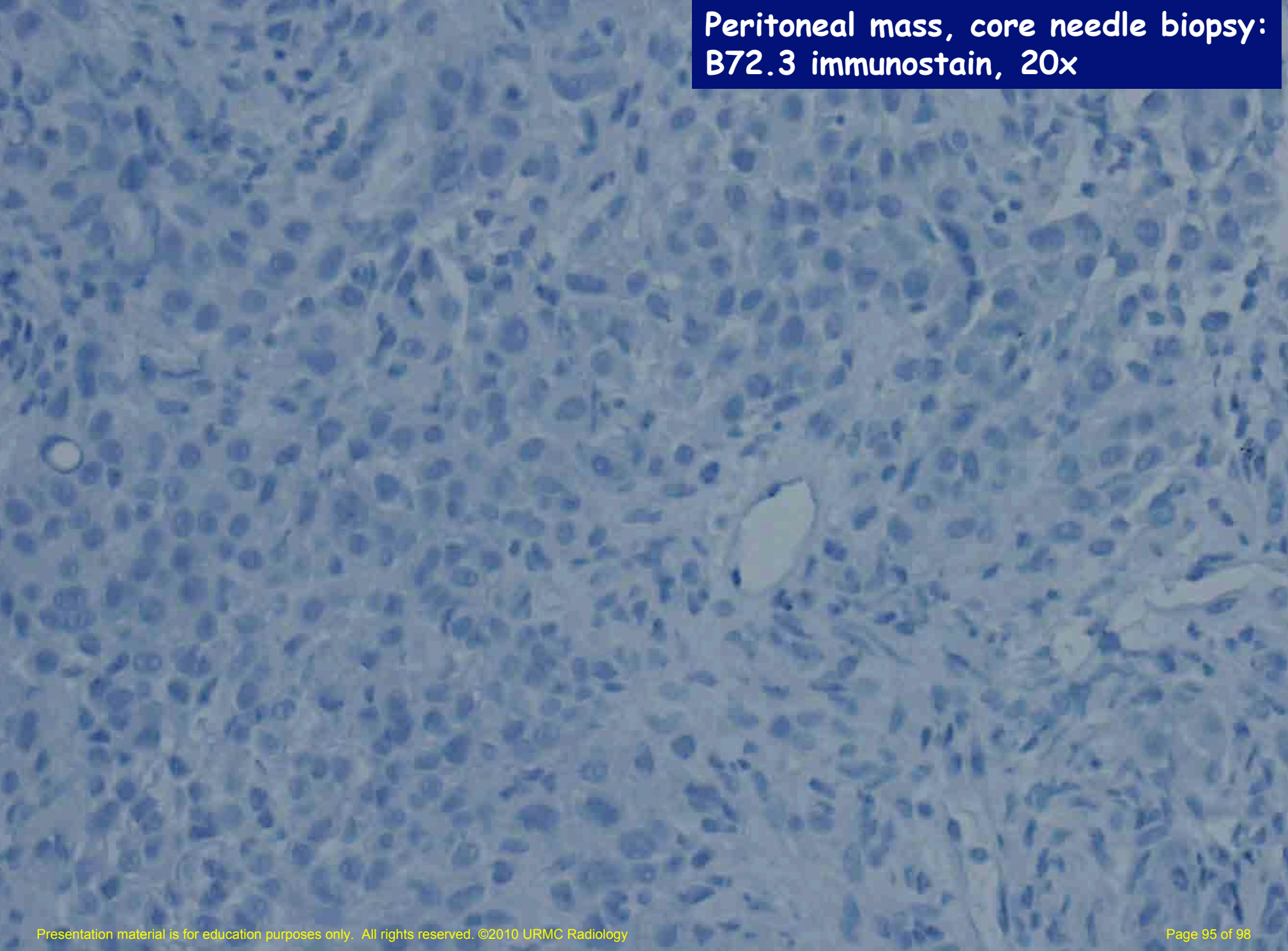
Peritoneal mass, core needle biopsy: CK 5/6 immunostain, 20x



Peritoneal mass, core needle biopsy: Calretinin immunostain, 20x



Peritoneal mass, core needle biopsy: B72.3 immunostain, 20x



Peritoneal Malignant Mesothelioma

- Diffuse malignant mesothelioma commonly arises from the pleura or peritoneum, rarely from the pericardium
- Abdominal swelling clinically
- Immunohistochemistry helpful in distinguishing mesothelioma from adenocarcinoma

Mesothelioma vs. Adenocarcinoma

	Staining Characteristics	
	Mesothelioma	Adenocarcinoma
CEA	-	+
B72.3	-	+
CK 5/6	+	-
Calretinin	+	-
E-cadherin	+	+
WT1	+	-
CD 15	-	+
EMA	+	+
Vimentin	+	-

Suggested Panels for the Classification of Various Tumors

Tumor Type	Common Immunomarkers
Carcinomas (Epithelial Tumors)	Pankeratin, CK 7 and CK 20,TTF-1, Napsin-A, CDX-2, CalR, CK 5/6, CEA, EMA, B72.3, Hep-Par1
Lymphomas	CD45,CD 3, CD 20, CD 30, CD 15, Kappa, Lambda, CD138 (plasma cell)
Sarcomas (Mesenchymal Tumors)	S-100, Myogenin, MSA, SMA, Vimentin CD 99, CD 31, CD 34, C-kit
Melanoma	S-100, HMB-45, Melan-A, Cytokeratin (-)
Neural/NE	Chromogranin, Synaptophysin, CD 56, GFAP