

# **Tumors of the Mediastinum**

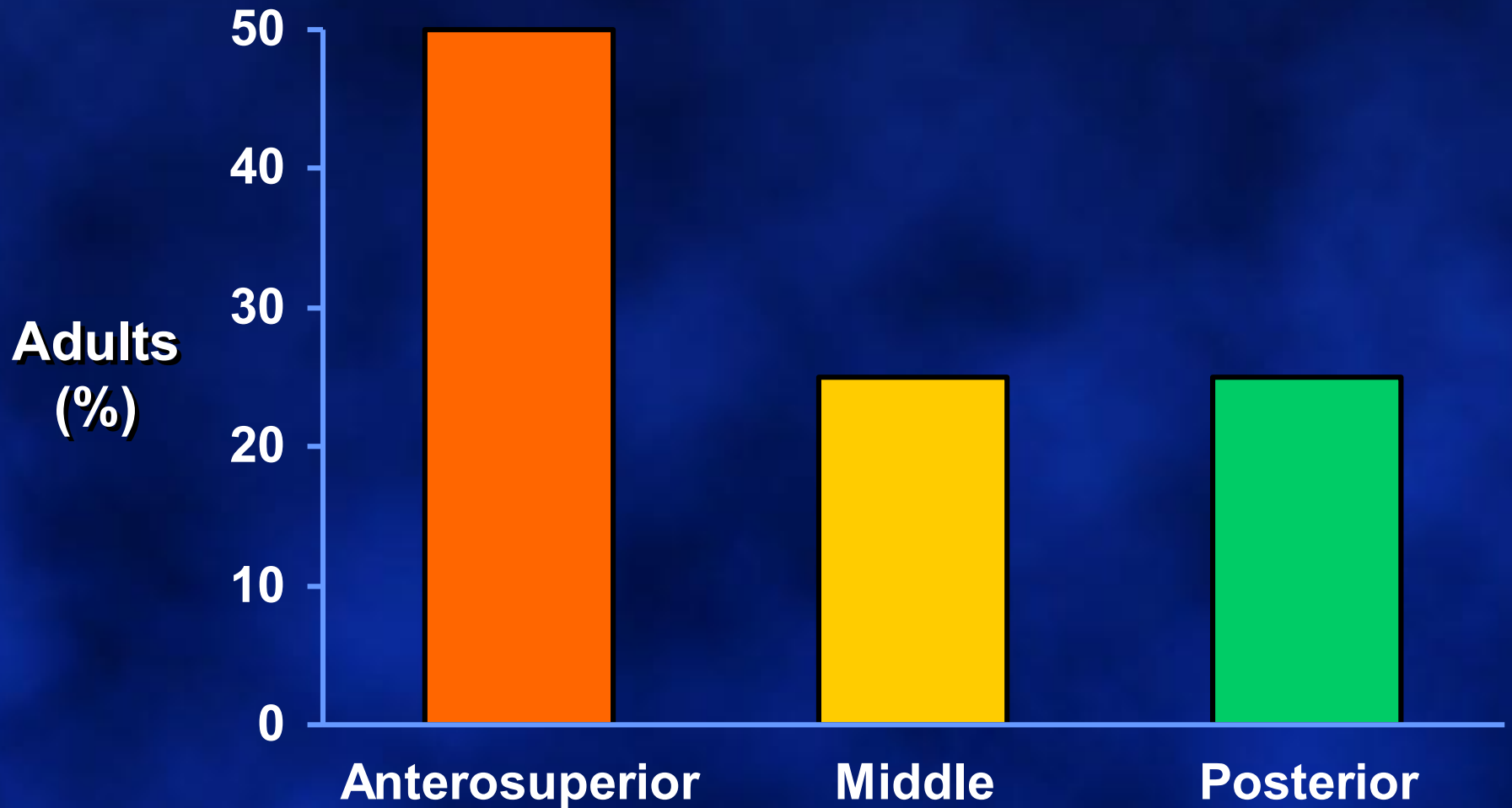
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**Hillenbrand Professor of Thoracic Oncology**

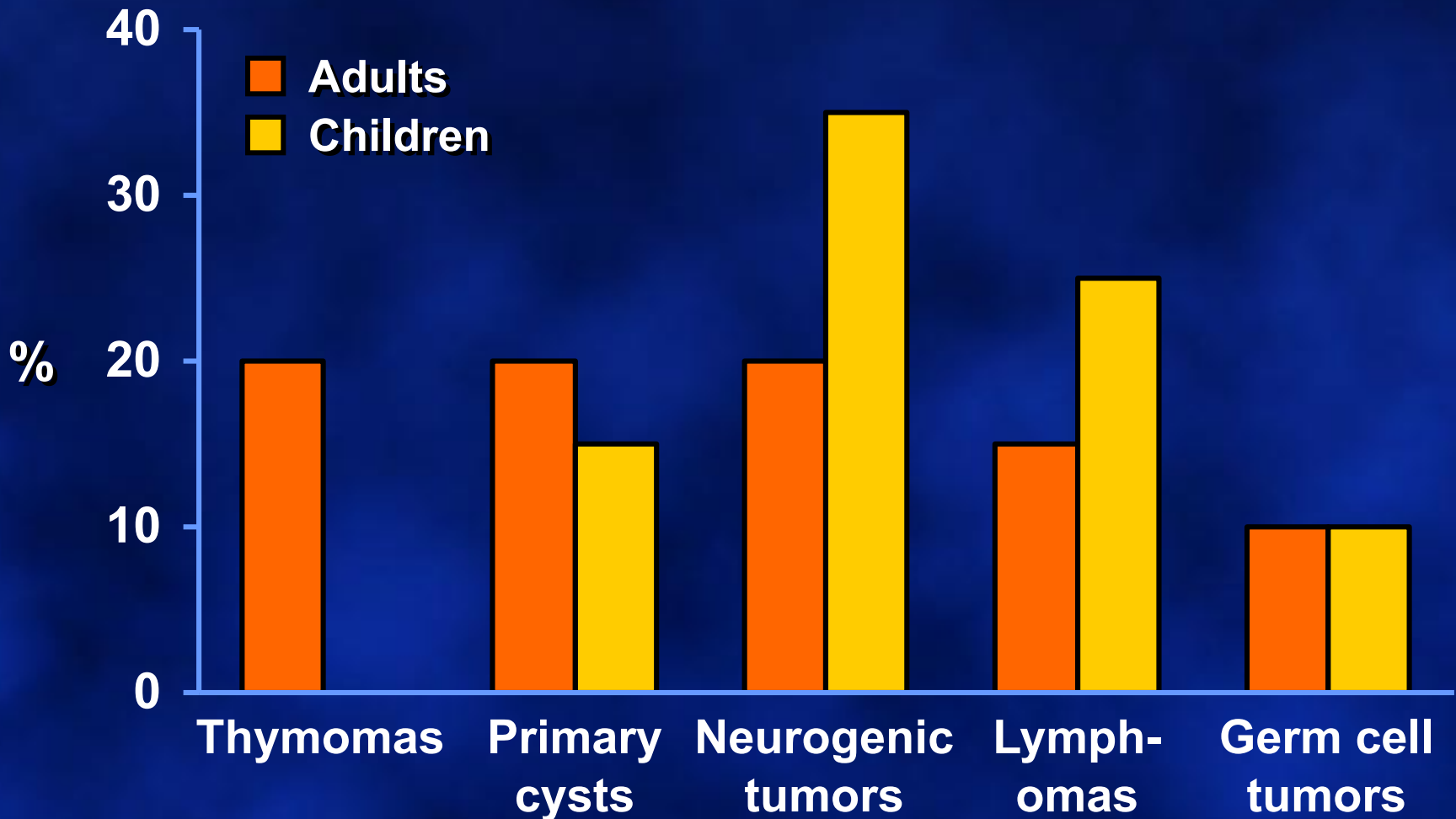
**Medical University of South Carolina**

**Charleston, SC**

# Location of Mediastinal Masses



# Most Common Mediastinal Masses



# Presenting Symptoms in 441 Patients with a Mediastinal Mass

<b>Symptoms</b>	<b>Pt (%)</b>
<b>Chest pain</b>	<b>29</b>
<b>Dyspnea</b>	<b>22</b>
<b>Cough</b>	<b>18</b>
<b>Fever</b>	<b>13</b>
<b>Weight loss</b>	<b>9</b>
<b>Superior vena caval syndrome</b>	<b>8</b>
<b>Myasthenia gravis</b>	<b>7</b>
<b>Fatigue</b>	<b>6</b>
<b>Dysphagia</b>	<b>4</b>
<b>Night sweats</b>	<b>3</b>

# Malignant and Benign Mediastinal Tumors 1929-1968

<b>Type</b>	<b>Cases</b>	
	<b>No.</b>	<b>%</b>
<b>Malignant</b>	<b>243</b>	<b>23</b>
<b>Lymphoma</b>	<b>107</b>	<b>44</b>
<b>Thymoma</b>	<b>51</b>	<b>21</b>
<b>Mesenchymal tumors</b>	<b>33</b>	<b>14</b>
<b>Primary carcinoma</b>	<b>25</b>	<b>10</b>
<b>Neurogenic tumors</b>	<b>14</b>	<b>6</b>
<b>Teratoma</b>	<b>13</b>	<b>5</b>
<b>Benign</b>	<b>821</b>	<b>77</b>
<b>Total</b>	<b>1,064</b>	<b>100</b>

# Question 1

Which of the following is not usually discovered in the anterior mediastinum

1. Neurogenic Tumor
2. Lymphoma
3. Thymoma
4. Germ cell tumor

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# Differential Diagnosis of Mediastinal Lesions

## Anterior

Thymoma

Lymphoma

Germ cell  
tumors

Endocrine  
lesions

Mesenchymal  
tumors

## Middle

Lymphoma

Developmental  
cysts

Mesenchymal  
tumors

Vascular  
lesions

## Posterior

Neurogenic  
tumors

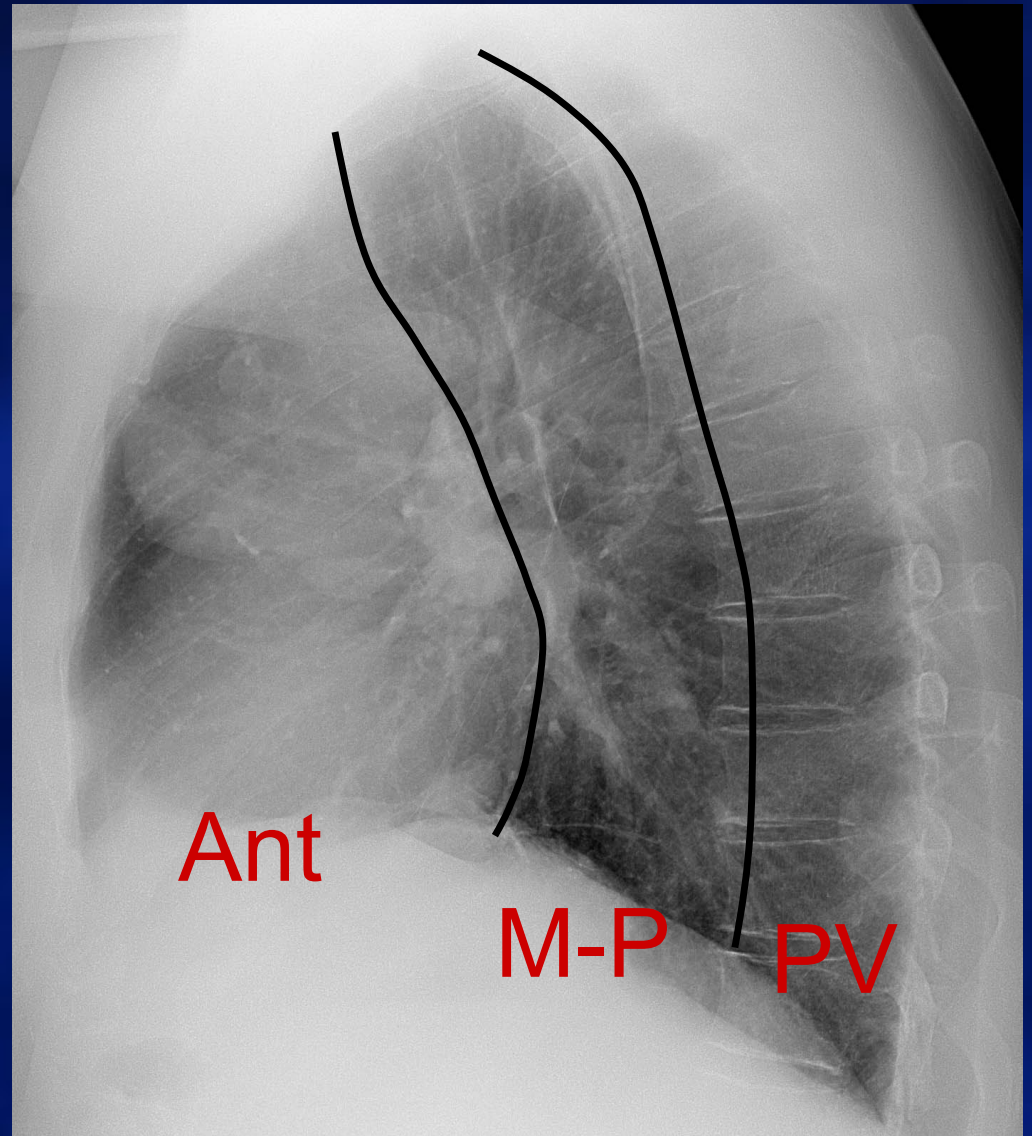
Mesenchymal  
tumors

Esophageal  
lesions

Vascular  
lesions

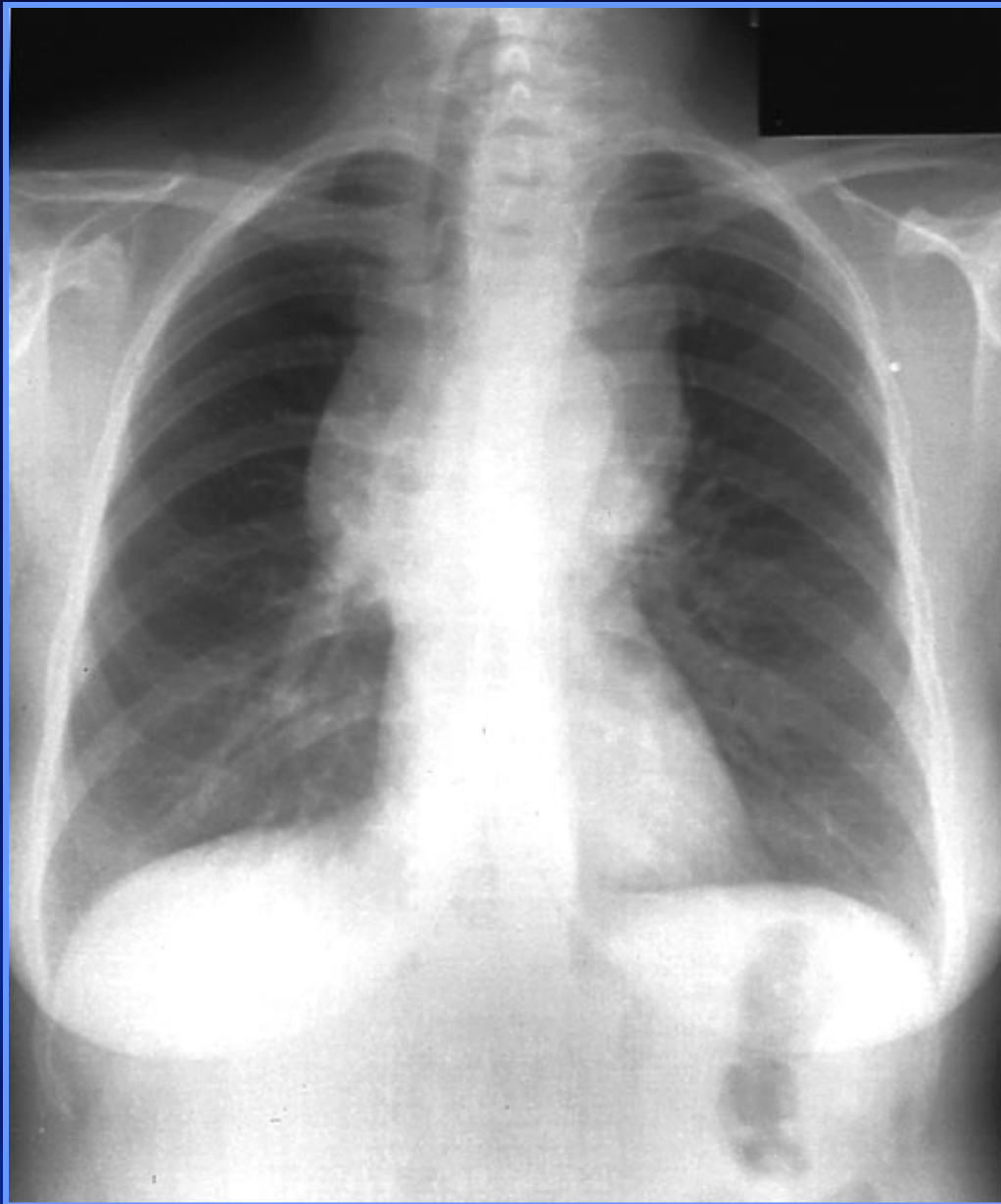


# Animated display

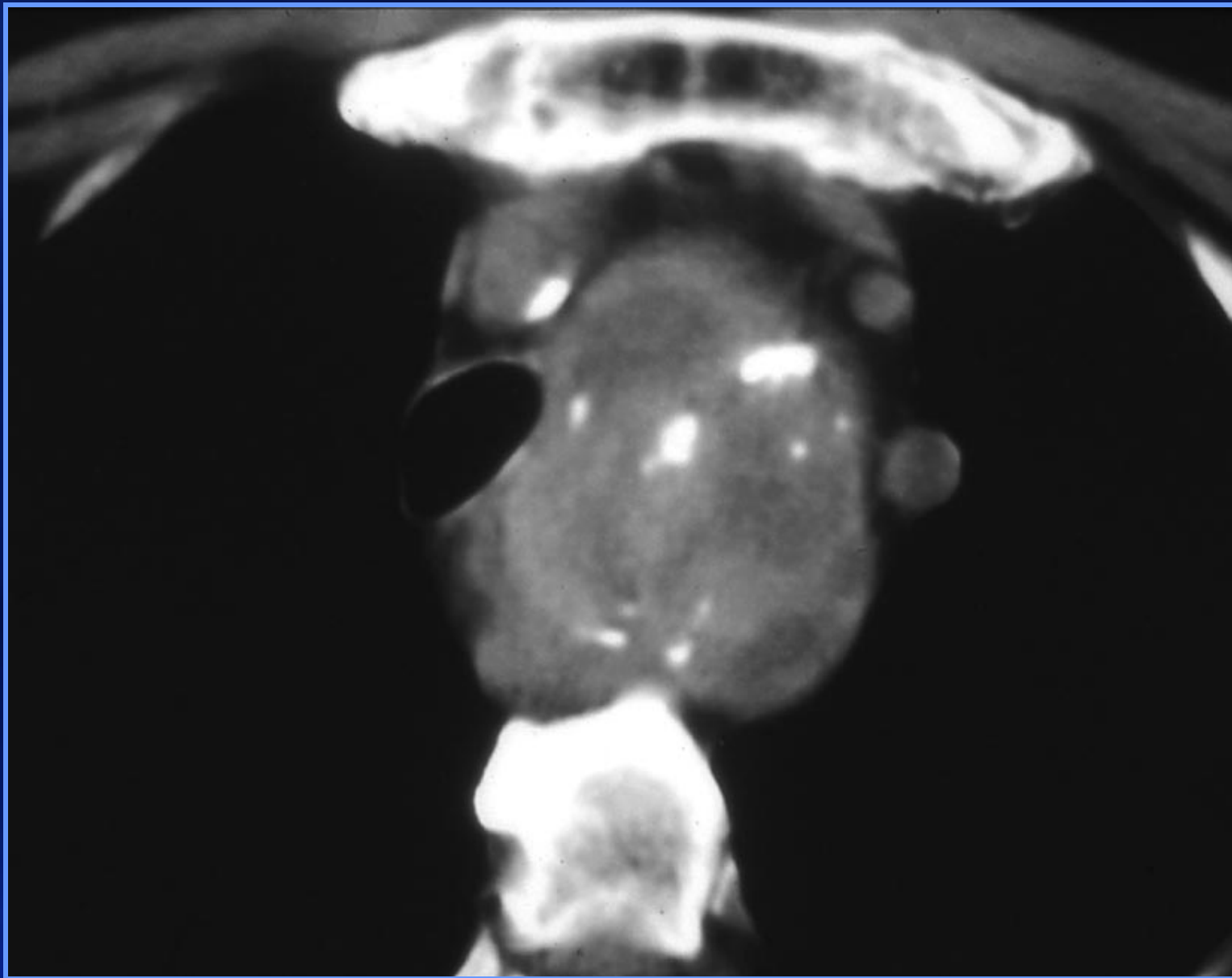


# Anterior Mediastinum Mass

- **Thymoma**
- **Germ cell tumors/teratoma**
- **Lymphoma**
- **Thyroid**
- **Parathyroid**
- **Mesenchymal tumors**
  - Lipoma, fibroma, hemangioma, lymphangioma**

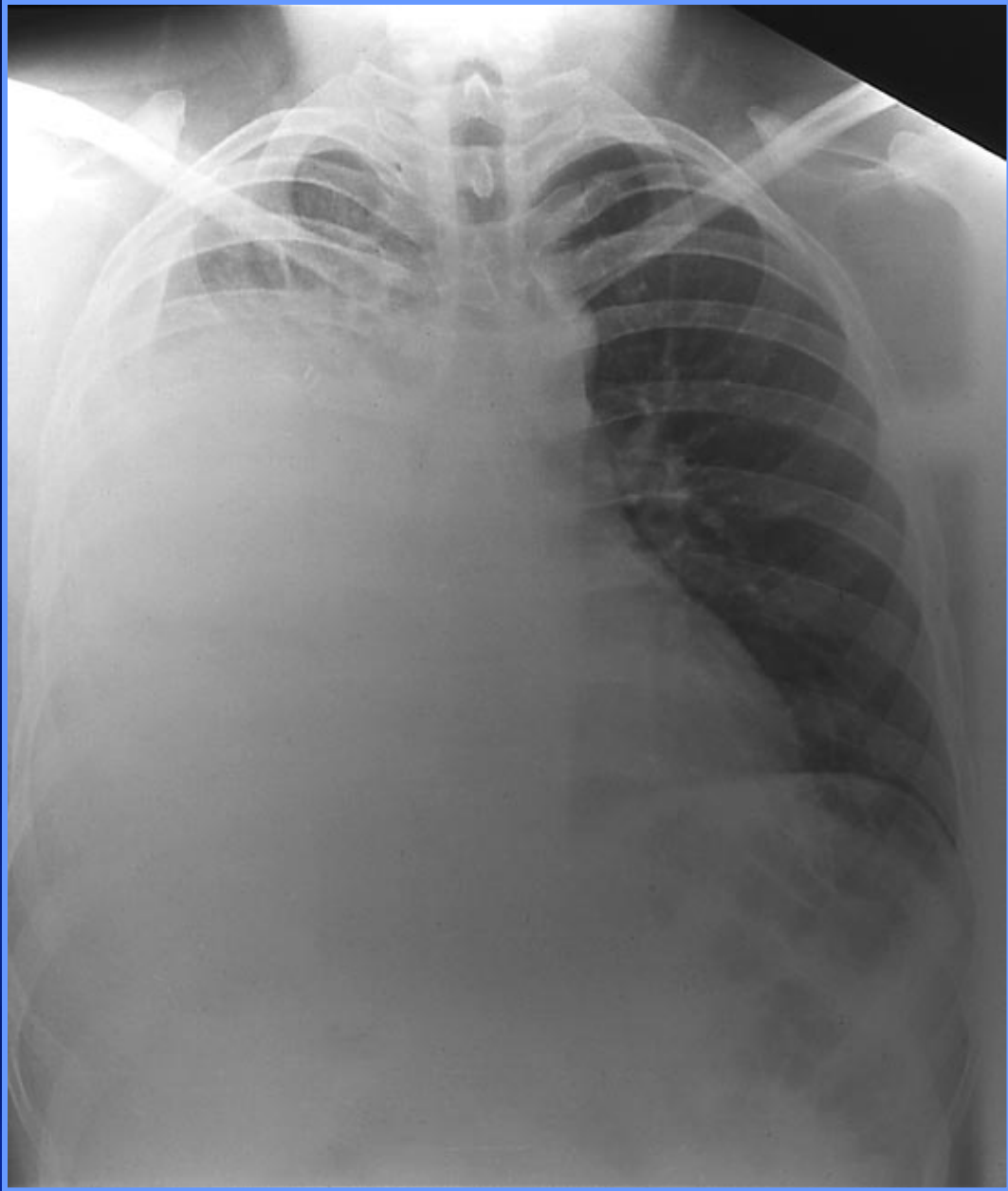


# Substernal Thyroid



# Germ Cell Tumors

- **Benign teratoma (dermoid)**
- **Seminoma**
- **Choriocarcinoma**
- **Embryonal cell**
- **Yolk sac (endodermal)**
- **Malignant teratoma**





# A 25-Year Single Institution Experience With Surgery for Primary Mediastinal Nonseminomatous Germ Cell Tumors

Kenneth A. Kesler, MD, Karen M. Rieger, MD, Zane T. Hammoud, MD, Laura E. Kruter, MS, Susan M. Perkins, PhD, Mark W. Turrentine, MD, Bryan P. Schneider, MD, Lawrence H. Einhorn, MD, and John W. Brown, MD

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**Kesler et al Ann Thorac Surg 2008;85:371-378**



# Primary Mediastinal Nonseminomatous Germ Cell

- 1981-2006 University of Indiana
  - 158 patients ( 3 females)
  - Mean age 29 (range 12-50)
- 143 of 152 had elevated markers
  - AFP (90%); Beta HCG (39%)
- 19 (14%) has post-op respiratory failure:  
9 deaths—all received bleomycin
- Zero of 17 respiratory failures with VIP  
( no bleomycin)

## Question 2

- Which tumor is most likely to be associated with Myasthenia Gravis
1. Thyroid carcinoma
  2. Thymoma
  3. Germ cell tumor
  4. Leiomyoma

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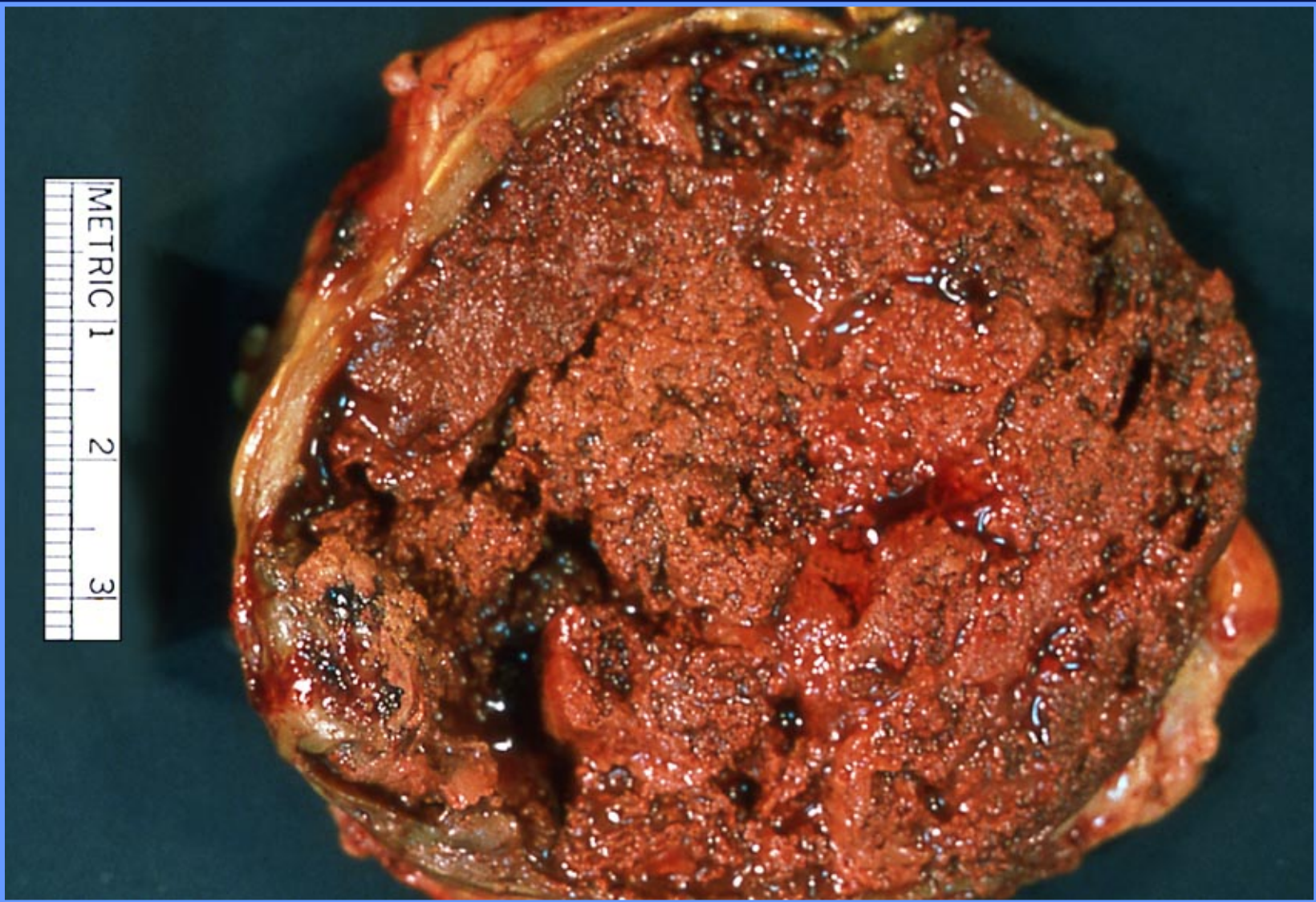
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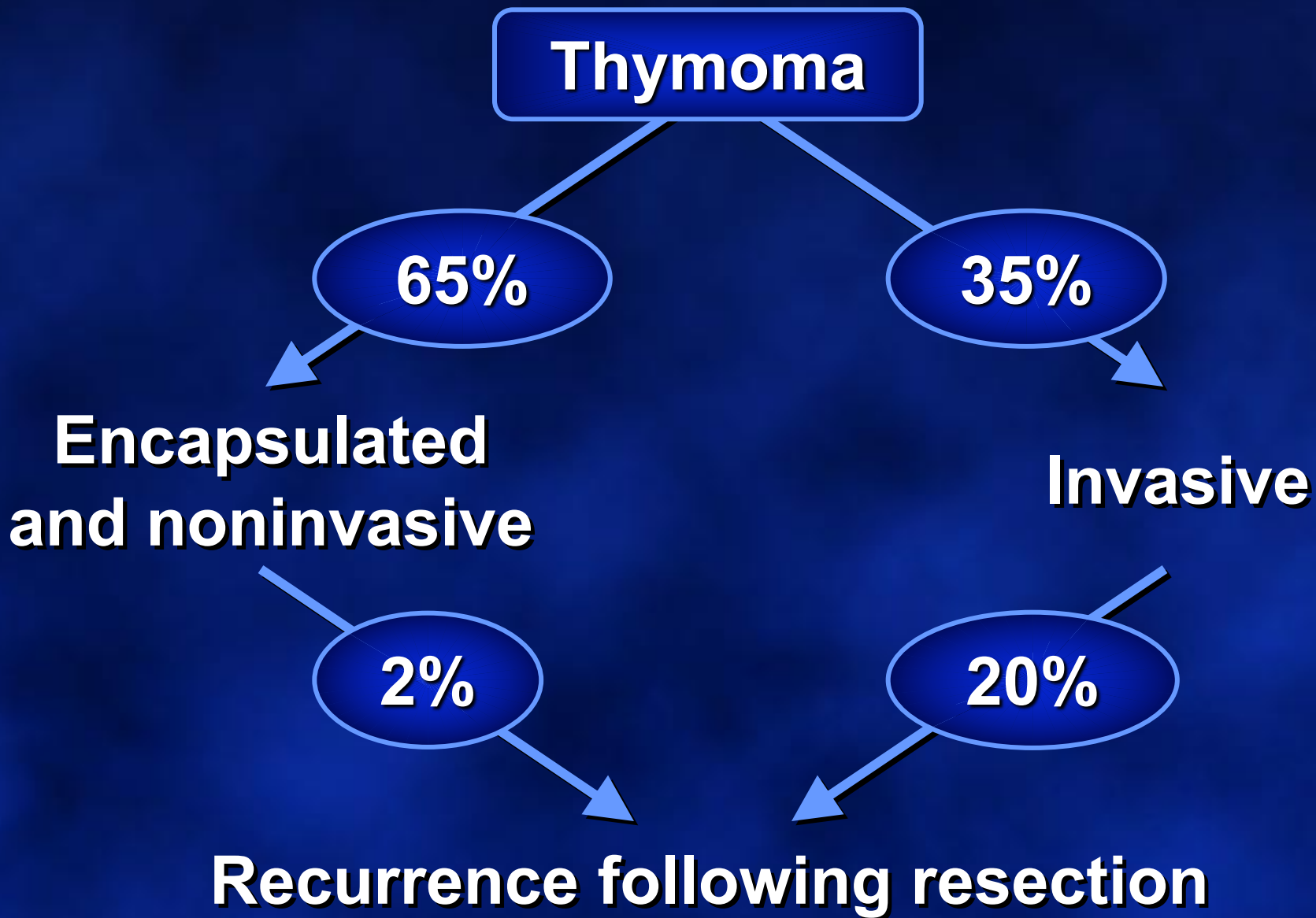
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W:400 L:40

P 180









# Association of Thymoma and Other Disorders

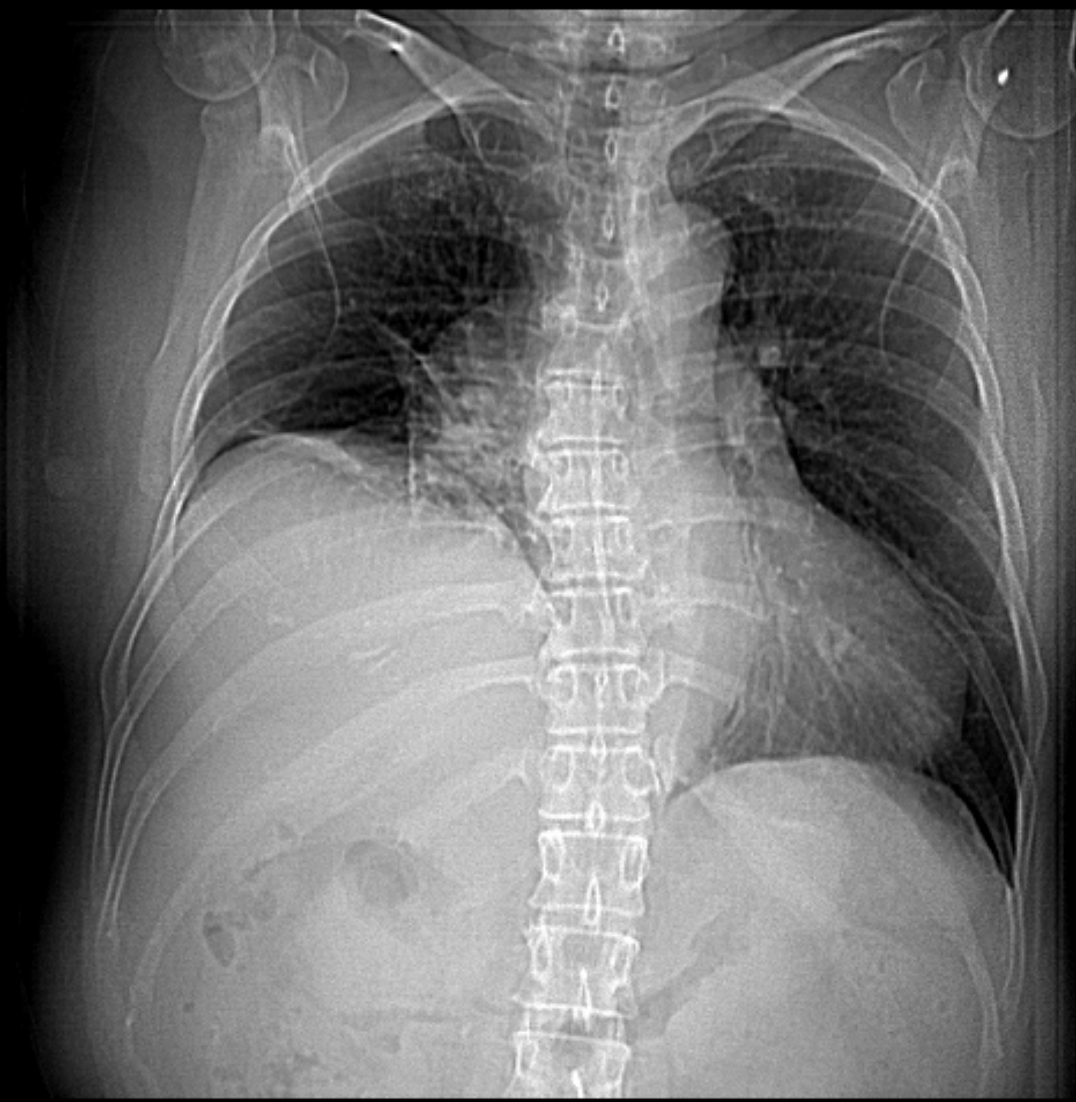
<b>Disorder</b>	<b>With thymoma (%)</b>	<b><u>With disorder</u> thymoma</b>
<b>Myasthenia gravis</b>	<b>35</b>	<b>15</b>
<b>Pure red cell aplasia</b>	<b>5</b>	<b>50</b>
<b>Hypogammaglobulinemia</b>	<b>5</b>	<b>10</b>

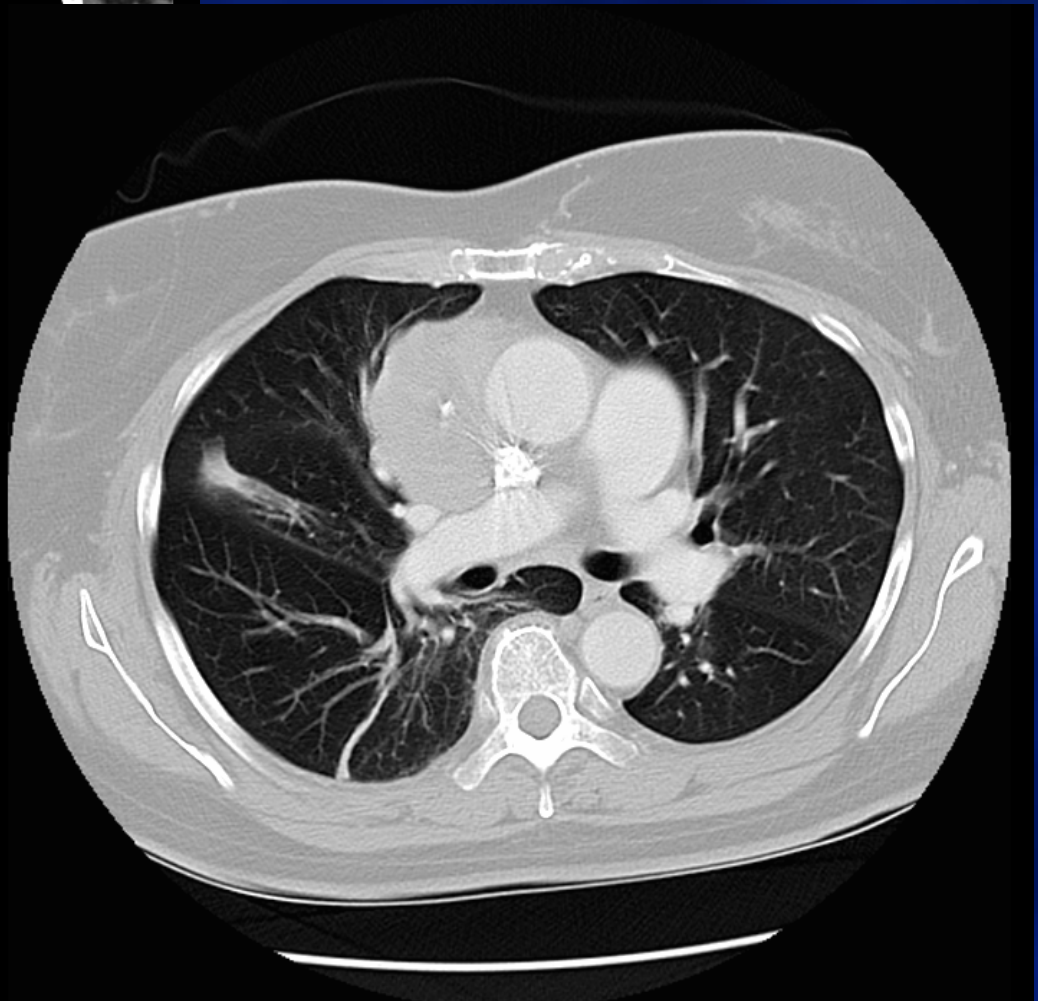
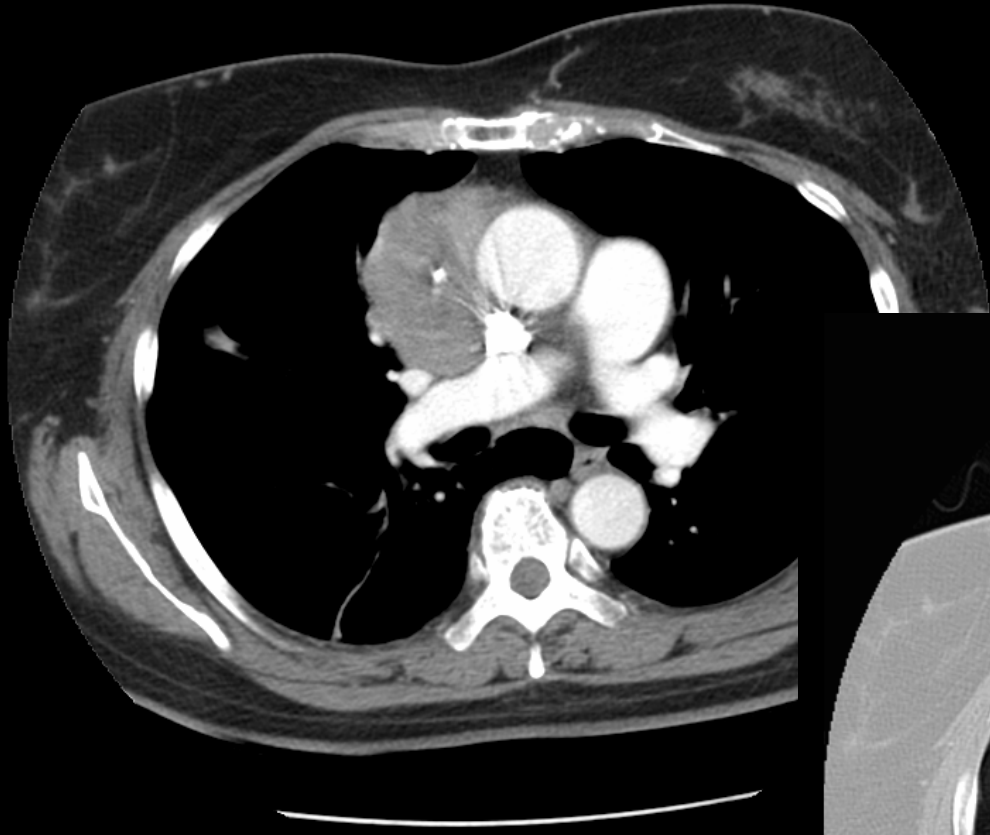
Rosenow & Hurley: Arch Intern Med 144:763, 1984

# Paraneoplastic Conditions

148 Patients

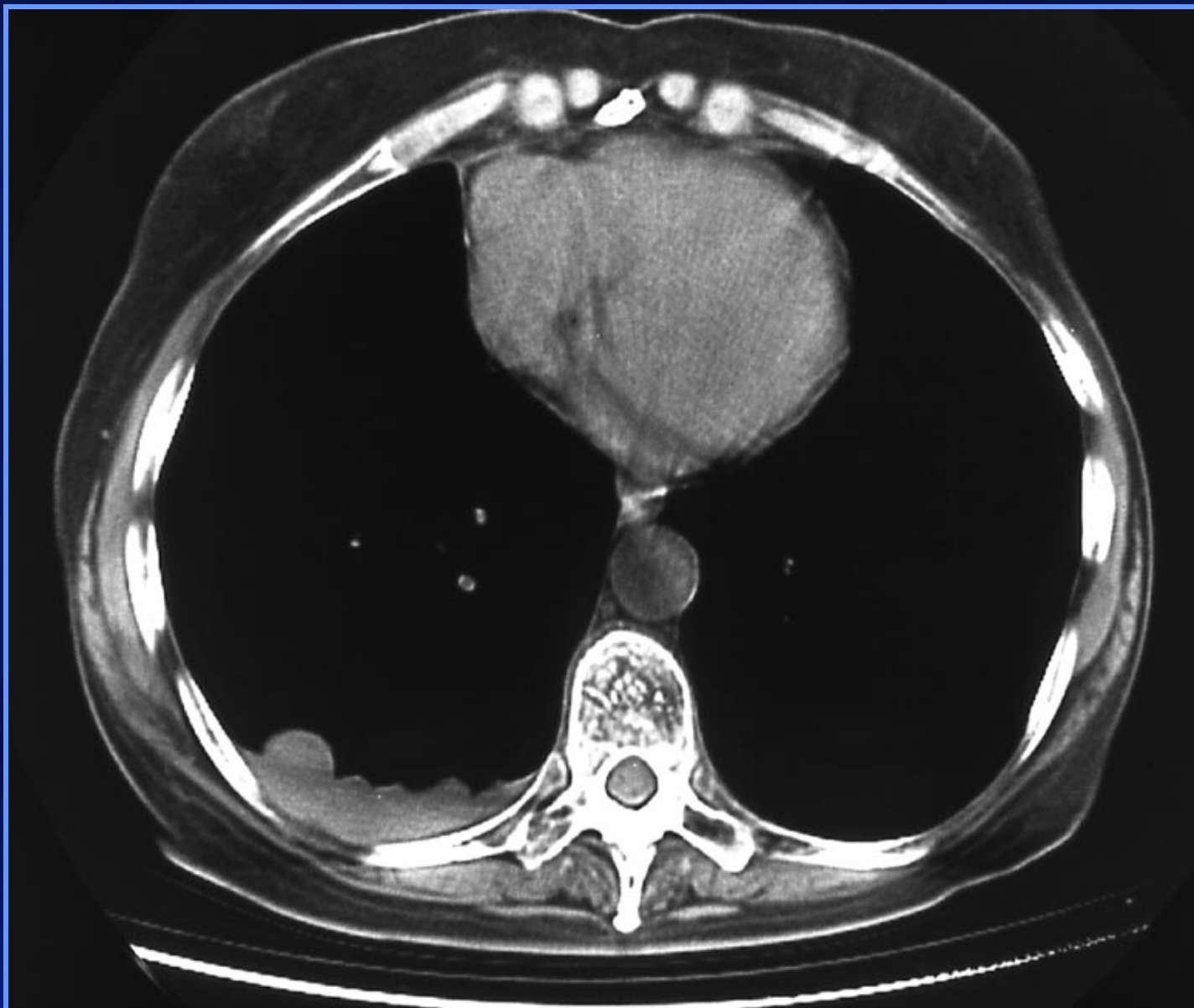
<b>Condition</b>	<b>No.</b>
<b>Myasthenia gravis</b>	<b>130</b>
<b>Hematologic abnormalities</b>	<b>11</b>
<b>Hypogammaglobulinemia</b>	<b>5</b>
<b>Pure red cell aplasia</b>	<b>2</b>
<b>Aplastic anemia</b>	<b>4</b>
<b>Possible autoimmune disease</b>	<b>15</b>
<b>Pernicious anemia</b>	<b>3</b>
<b>Positive LE preparation</b>	<b>3</b>
<b>Polymyositis</b>	<b>2</b>
<b>Miscellaneous</b>	<b>8</b>





# Thymic Carcinoma

- **KIT mutations identified (8.8%) in Exon 11 (Juxta membrane) and Exon 14, and Exon 17 of TK domain**
- **V560 del; L576P; H697Y; Y553N, and P557-579 del confer sensitivity to targeted agents**
  - **Imatinib, sunitinib, dasatinib**
- **D820E (Exon 17) confers decreased sensitivity**



# Masaoka Staging System of Thymomas and Corresponding Therapy

Stage	Definition	Treatment Consideration
<b>I</b>	<b>Encapsulated tumor with no gross or microscopic invasion</b>	<b>Complete surgical excision</b>
<b>II</b>	<b>Macroscopic invasion into the mediastinal fat or pleura or microscopic invasion into the capsule</b>	<b>Complete surgical excision and postoperative radiotherapy to decrease the incidence of local recurrence</b>
<b>III</b>	<b>Invasion of the pericardium, great vessels, or lung</b>	<b>Complete surgical excision and postoperative radiotherapy to decrease the incidence of local recurrence</b>
<b>IV</b>	<b>Pleural or pericardial metastatic spread</b>	<b>Surgical debulking, radiotherapy, and chemotherapy</b>
<b>V</b>	<b>Lymphatic or hematogenous</b>	<b>Surgical debulking, radiotherapy, and chemotherapy</b>

# Survival of Thymoma by Stage: The Memorial Sloan Kettering Experience

Stage	5-Year Survival	10-Year Survival
I	90%	80%
II	90%	80%
III	60%	30%
IV	Less than 25%	N/A



# Thymoma Pearls

- **Thymoma is uncommon in pt  $\leq 20$  yr even in those with MG**
- **Presence of anti-AChR antibody may herald onset of MG**
- **Myasthenia gravis may develop after thymoma has been resected**

# Middle-Posterior Mediastinum

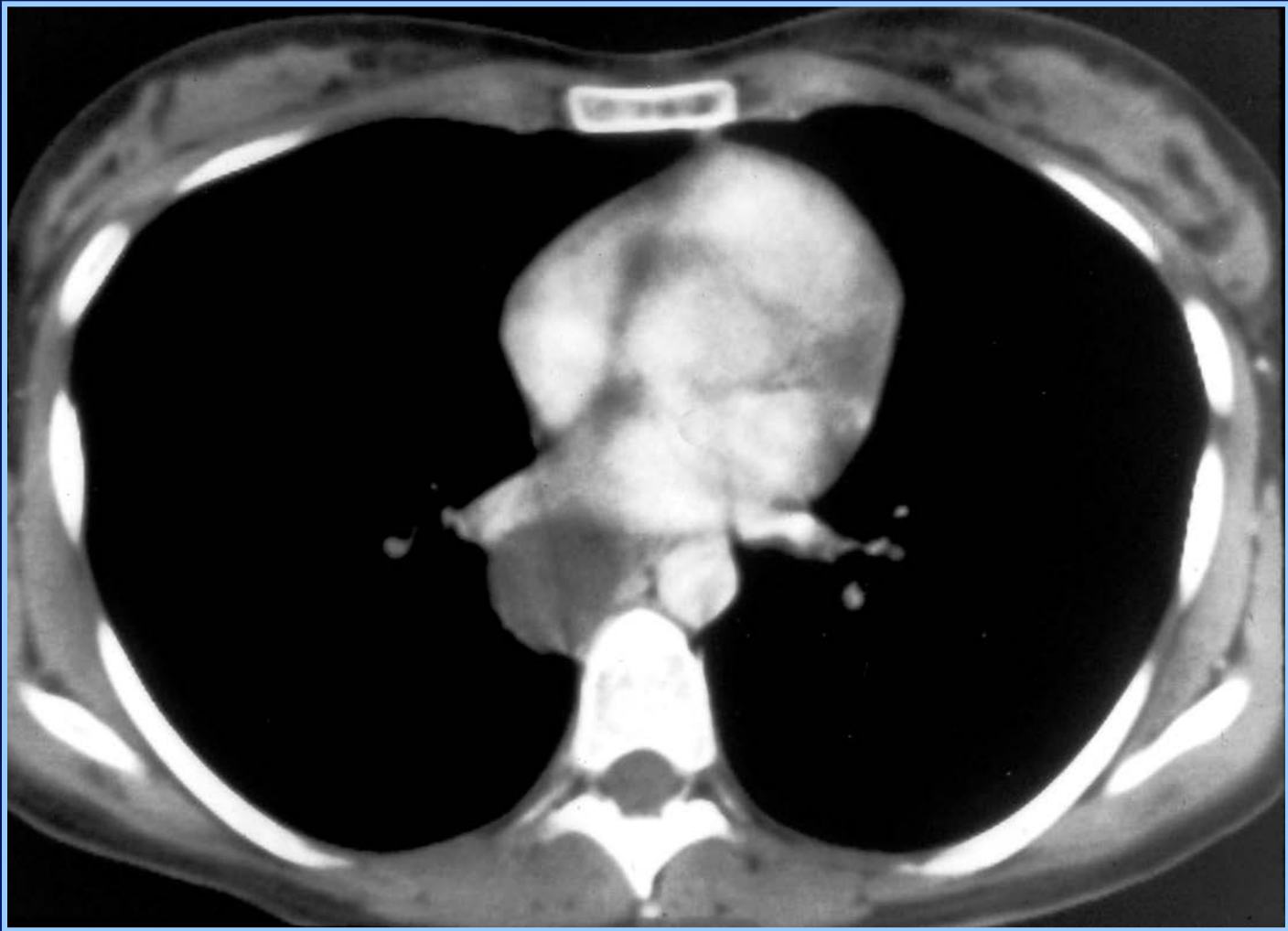
- **Compartment located between the anterior and the paravertebral compartments**

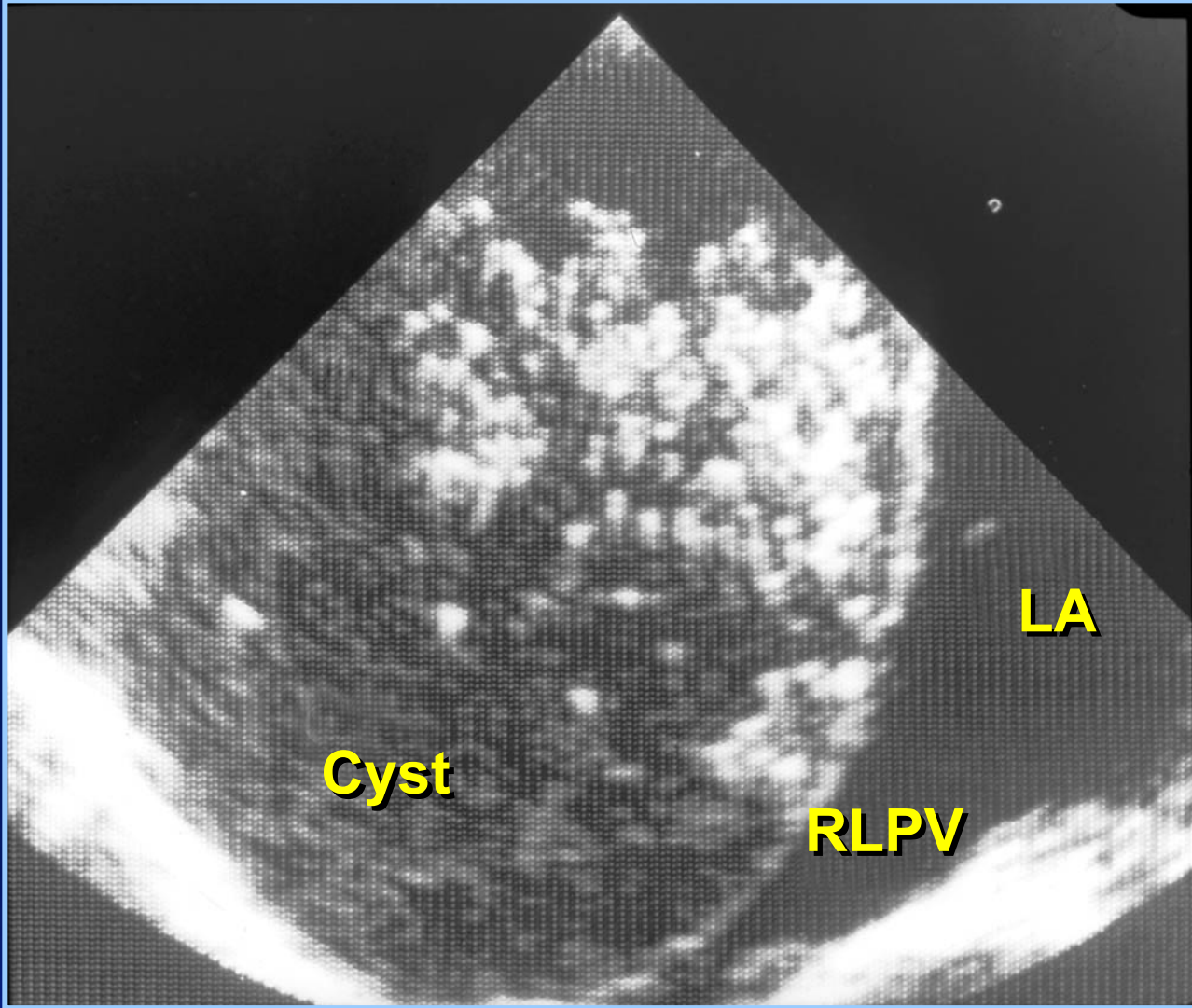
# Middle Mediastinal Mass

- **Lymph nodes**
  - Lymphoma**
  - Metastasis**
  - Granulomatous**
  - Hyperplasia**
- **Developmental cysts**
  - Pericardial**
  - Bronchogenic**
  - Enteric**
- **Vascular masses and enlargements**
- **Diaphragmatic hernia**

# Benign Cysts of the Mediastinum

<b>Enterogenous cysts</b>	<b>83</b>
Bronchogenic (respiratory epithelium)	<b>54</b>
Esophageal (squamous epithelium)	<b>27</b>
Duplication, gastric or intestinal or both	<b>2</b>
<b>Pericardial cysts</b>	<b>72</b>
Without pericardial communication	<b>63</b>
With pericardial communication	<b>9</b>
<b>Thymic cysts</b>	<b>19</b>
<b>Nonspecific cysts</b>	<b>17</b>
<b>Cystic hygroma</b>	<b>5</b>

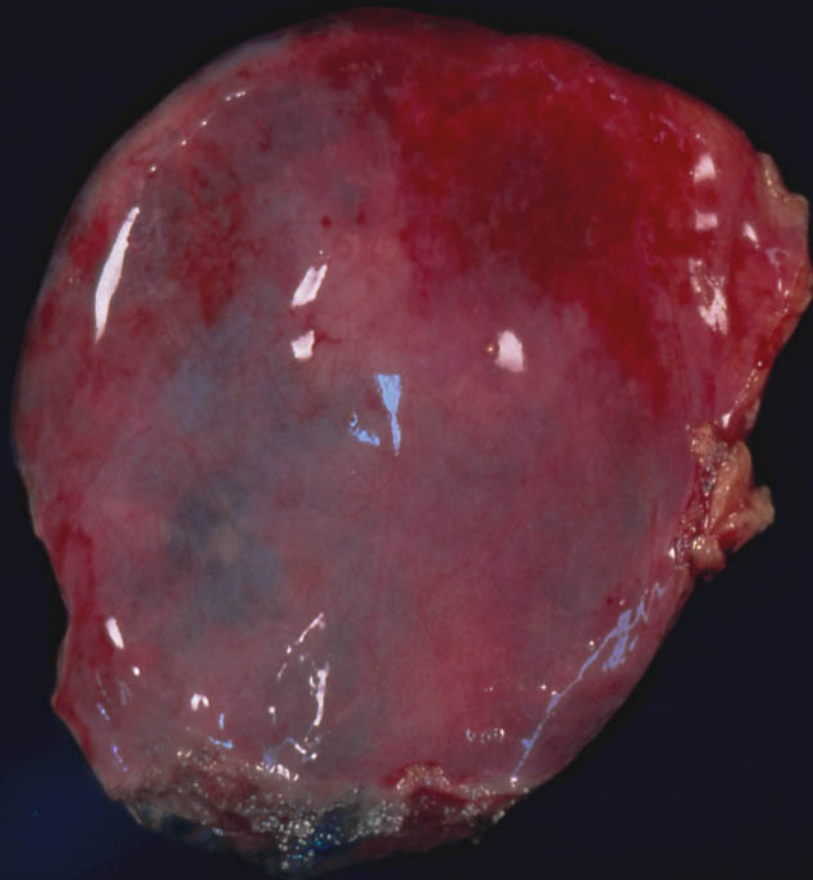




**Cyst**

**RLPV**

**LA**



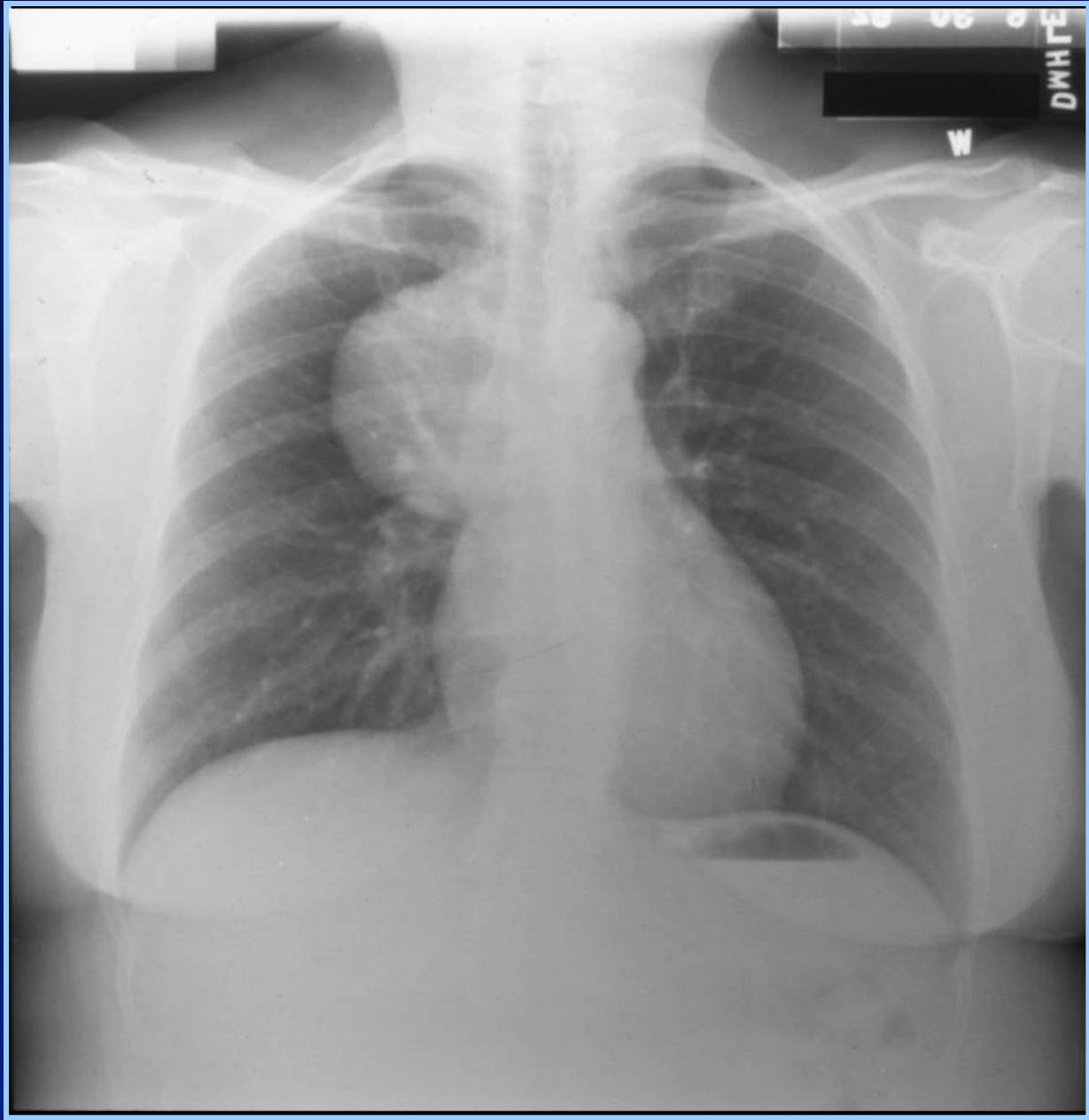
# Posterior Mediastinum

Located behind the heart, anterior to the vertebral column but includes the paravertebral gutters; located beneath the anterior superior mediastinum

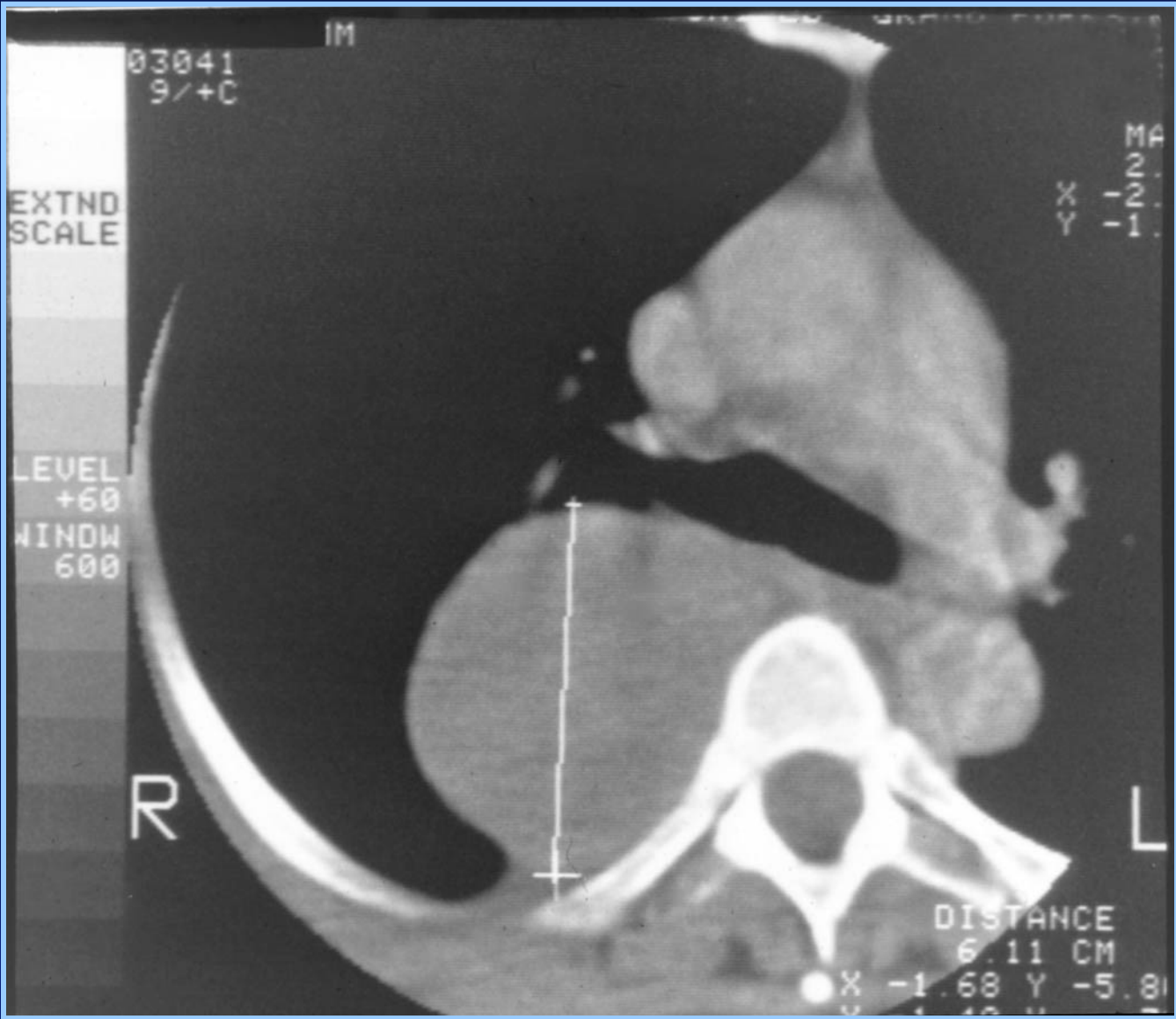


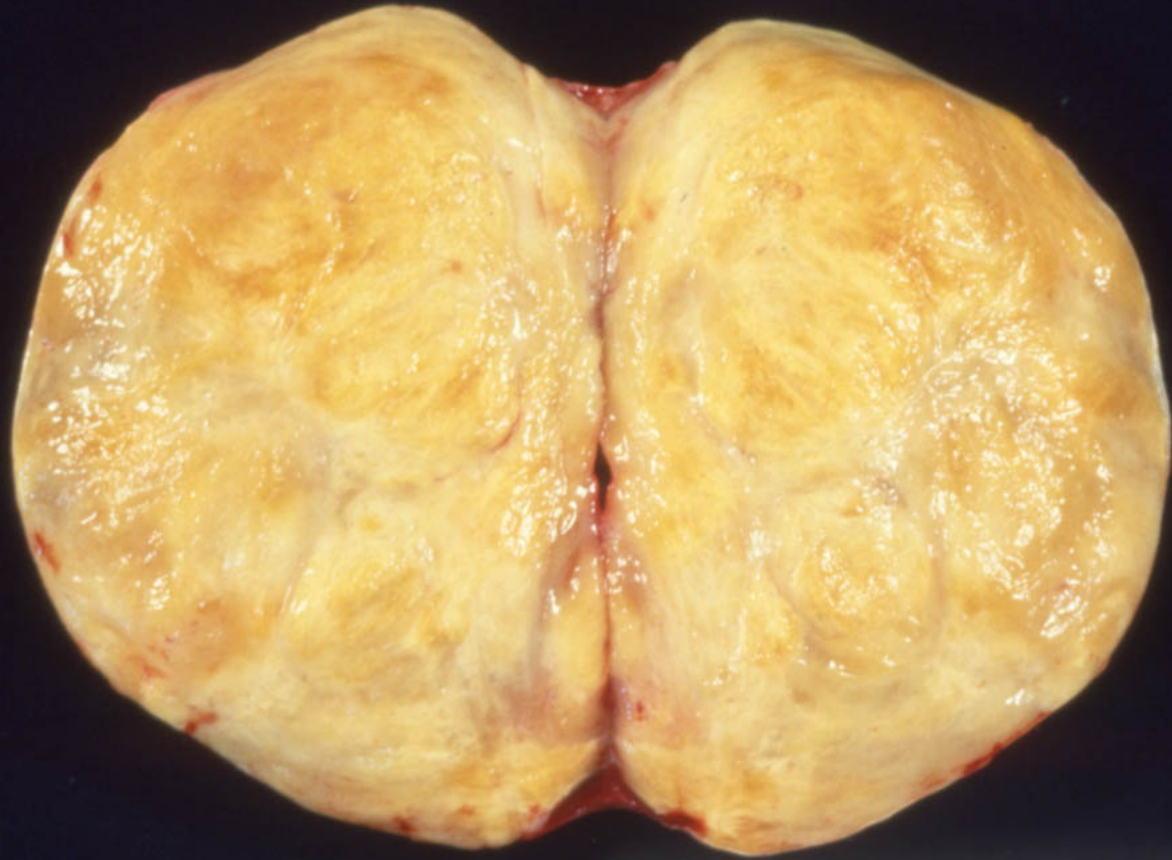
# Posterior Mediastinal Mass

- **Neurogenic tumors**
  - From peripheral nerves
  - From sympathetic ganglia
  - From paraganglionic tissue
- **Meningocele**
- **Esophageal lesions**
- **Throacic spine lesion**



# Neurilemoma





# Neurogenic Tumors

## Peripheral nerve tumor

- Neurilemmomas
- Neurofibroma
- Malignant tumors of nerve sheath origin

## Sympathetic ganglia tumors

- Ganglioneuroma
- Ganglioneuroblastoma
- Neuroblastoma

## Paragangliomas

# Neurogenic Tumors of Mediastinum

Cell origin of tumors	Cases (no.)
Nerve sheath	122
Schwannoma	
Benign	121
Malignant	1
Nerve cell	71
Ganglioneuroma	60
Ganglioneuroblastoma	3
Neuroblastoma	8
All nerve elements	19
Plexiform	
Benign	7
Malignant	1
Nonplexiform	
Benign	10
Malignant	1
<b>Total</b>	<b>212</b>

# Summary

- The differential of tumors of the mediastinum is largely based upon the location in which they are found
- Both benign and malignant entities are common though benign disorders are much more common (4:1)
- Tumor markers can help identify germ cell tumors and can be followed for recurrence
- Paraneoplastic syndromes can accompany these disorders
- Surgery is often curative