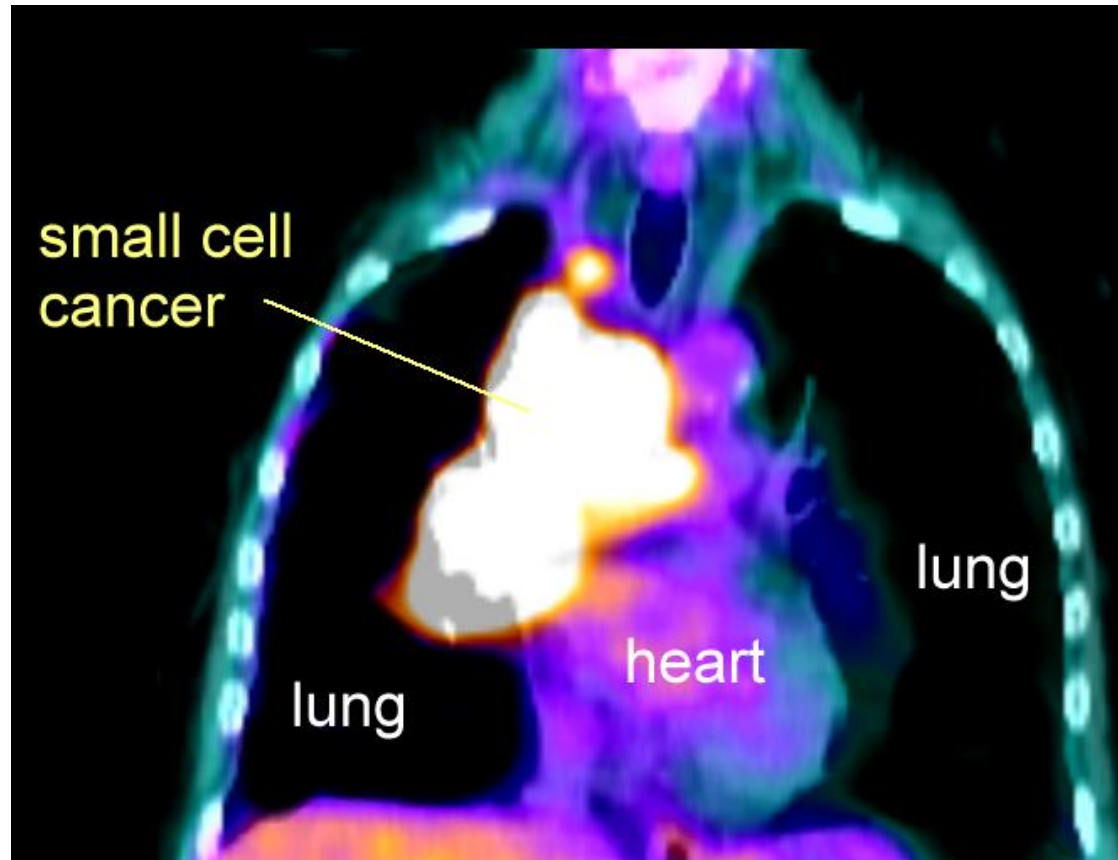
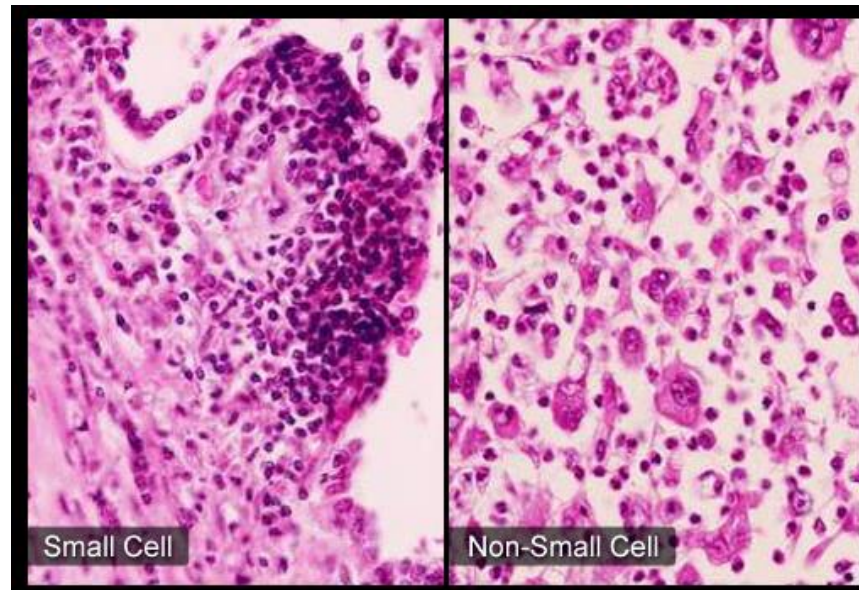


# Small Cell Lung Cancer



# Types of Lung Cancer

- Non-small cell carcinoma (NSCC) (87%)
  - Adenocarcinoma (38%)
  - Squamous cell (20%)
  - Large cell (5%)
- Small cell carcinoma (13%)



Small cell lung cancer is virtually always caused by **smoking** and as smoking has decreased the incidence of this cancer has declined

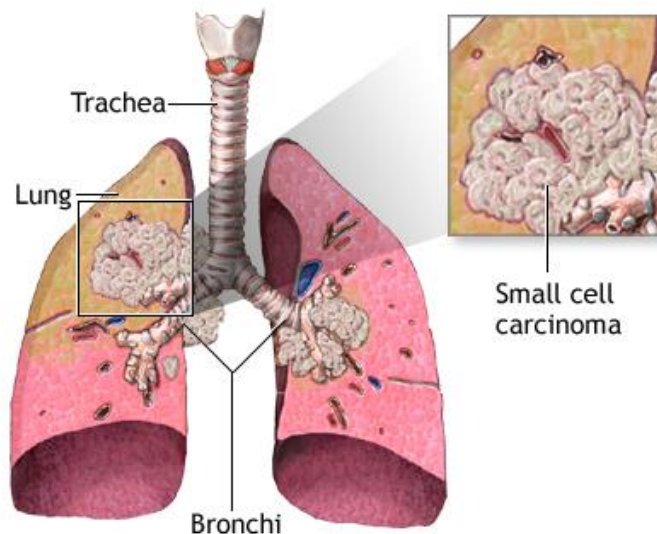
## **Percent of Lung Cancers that were Small Cell:**

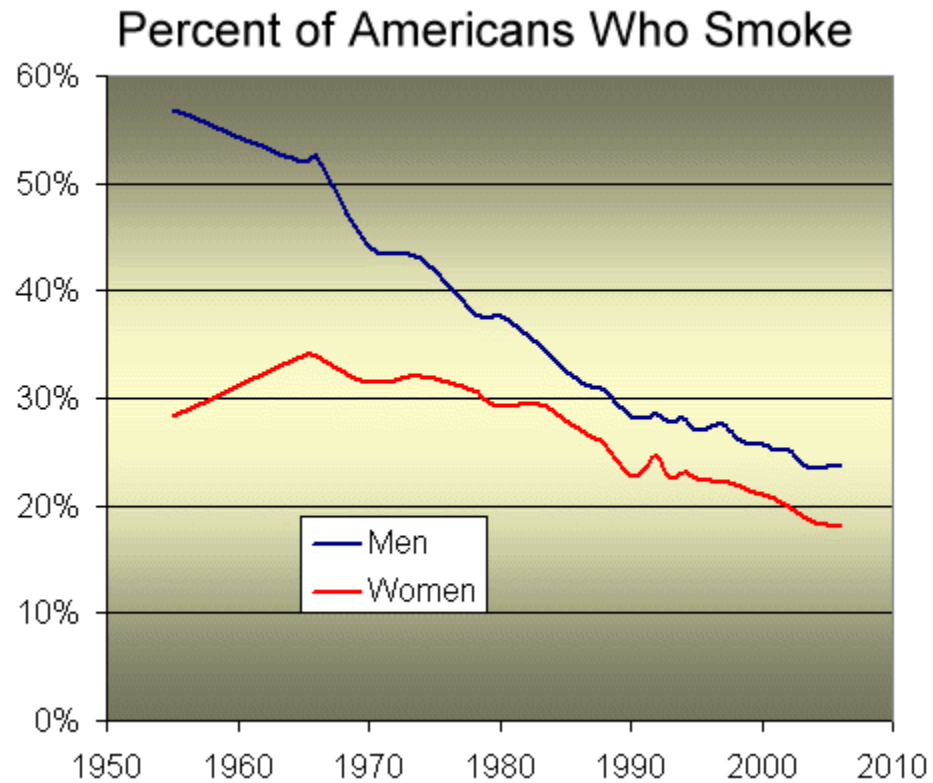
1978: 20-25%,

1986: 17%,

2002: 13%

NCDB Data for 2000-2010 small cell was 15%

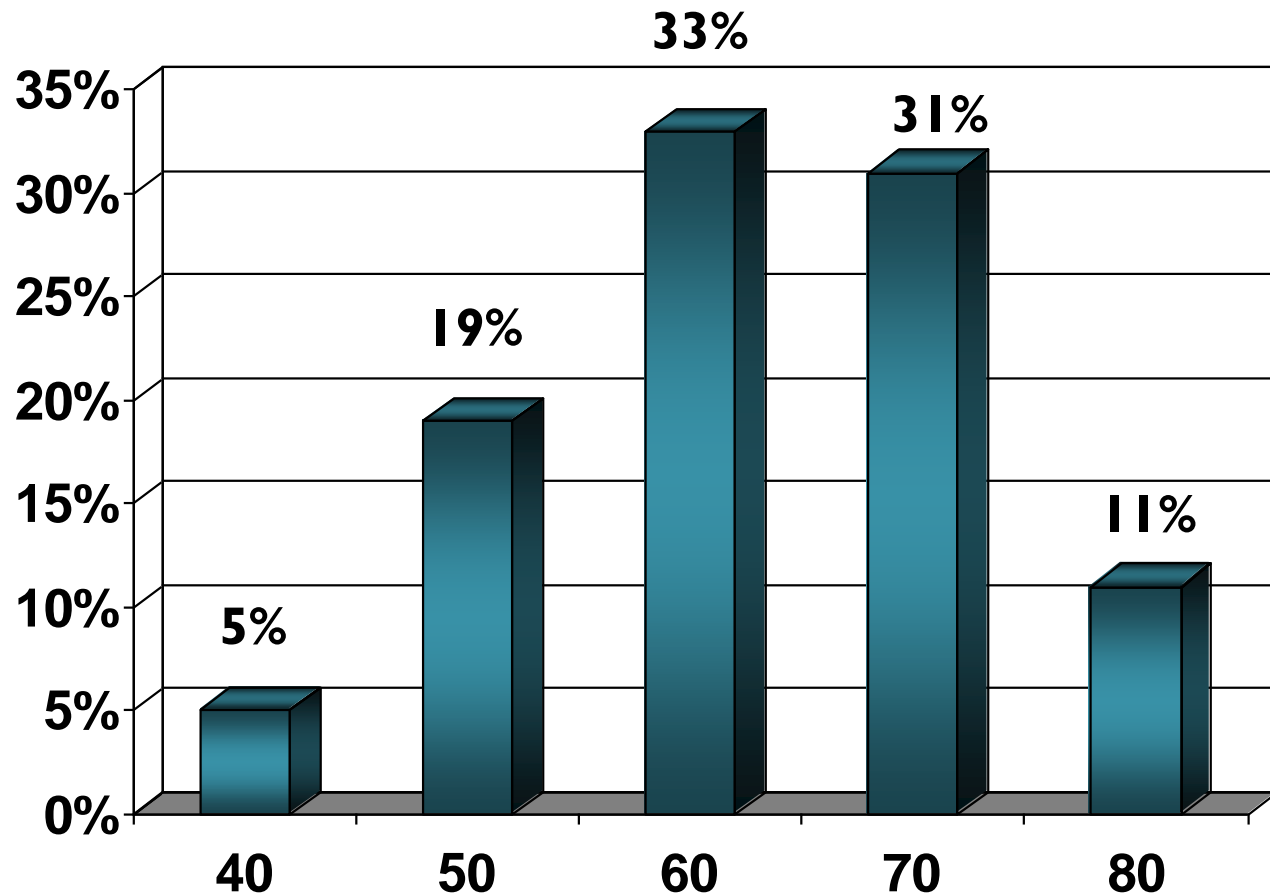




Since women have not cut back on smoking as much as men, the frequency of small cell in women has increased

Women accounted for 28% in 1973 and in 2002 it was 50%

# Age Distribution: NCDB 2000-2010 for Small Cell Lung Cancer

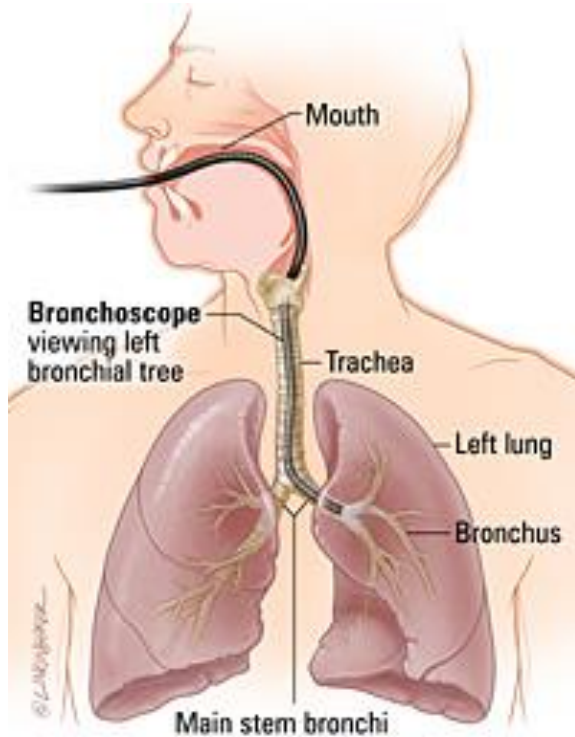


# Small Cell Lung Cancer

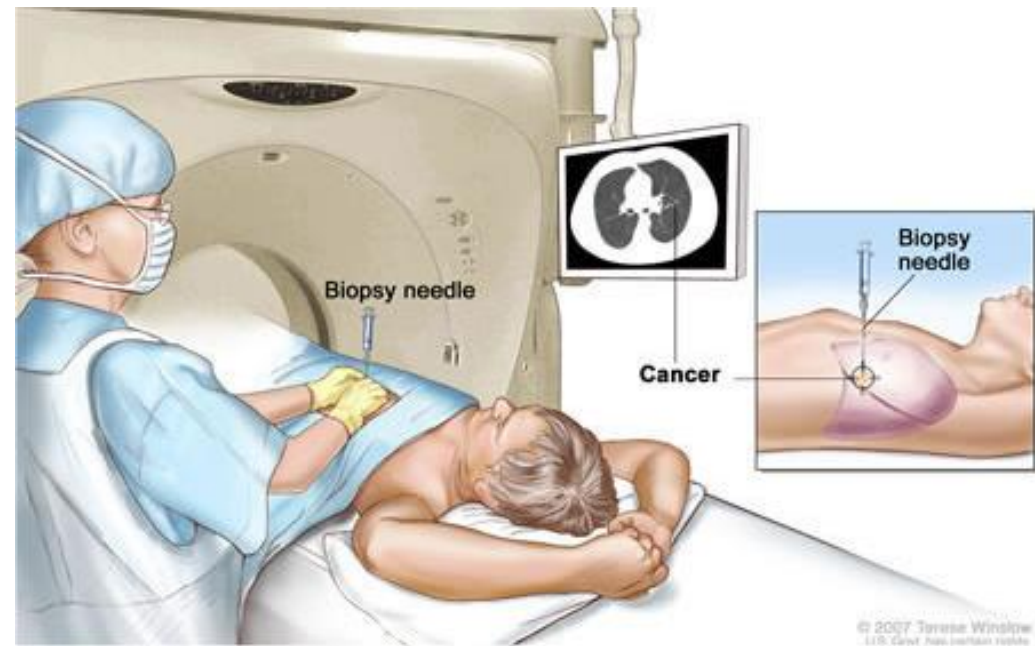
- These are classified as a neuroendocrine cancer
- These are **fast growing** cancers and only 1/3 are still confined to the chest
- Most patients are treated with chemotherapy and radiation but a small number (2- 5%) with early stage I may benefit from surgical resection
- 95% of small cell cancers start in the lung but 5% arise from outside the lung (e.g. Nasopharynx, gastrointestinal or genitourinary sites)



# Biopsy - confirm the cancer and determine the type



**Bronchoscopy**

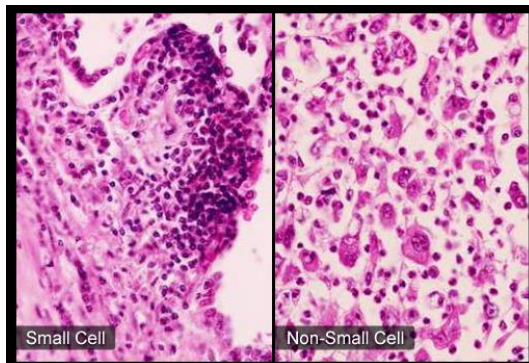


**CT directed biopsy**

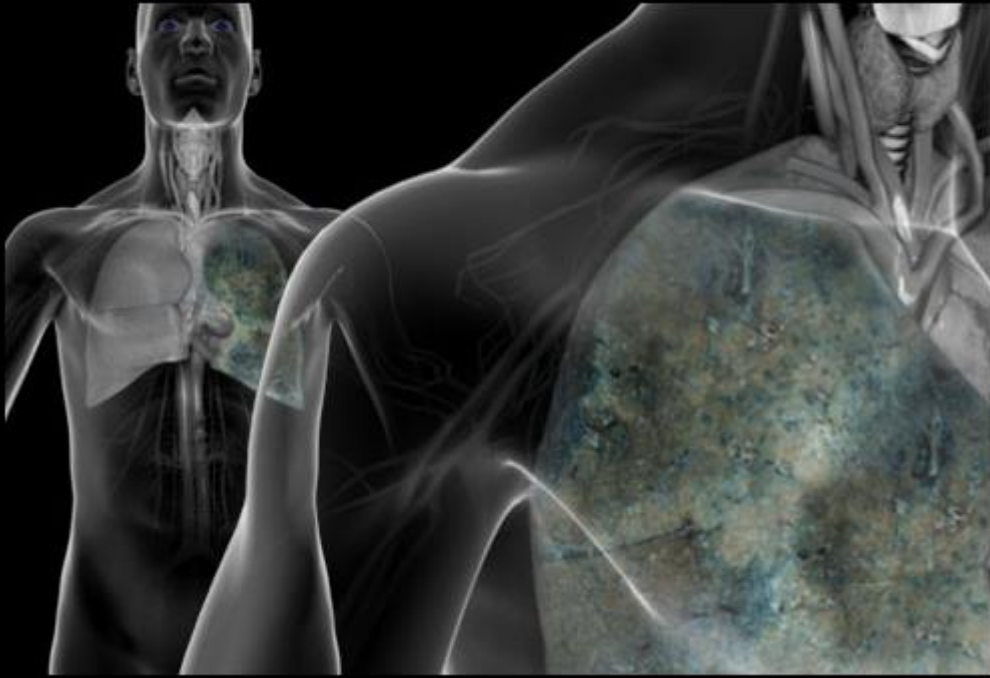
# Pathology

## “special stains”

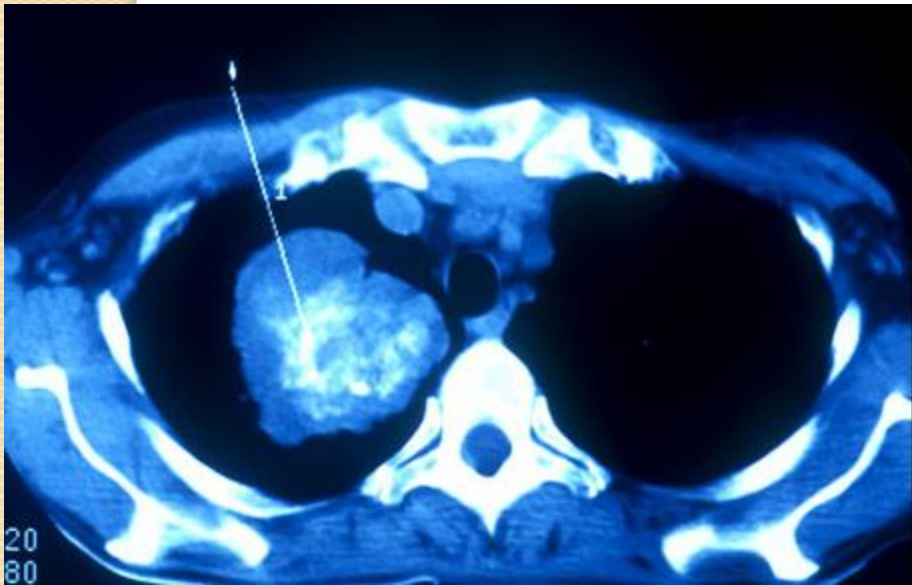
- Cancer cells should stain positive for keratin, epithelial membrane antigen and TTF- I
- Since they are neuroendocrine they should also stain for: chromogranin A, neuron specific enolase, NCAM and synaptophysin



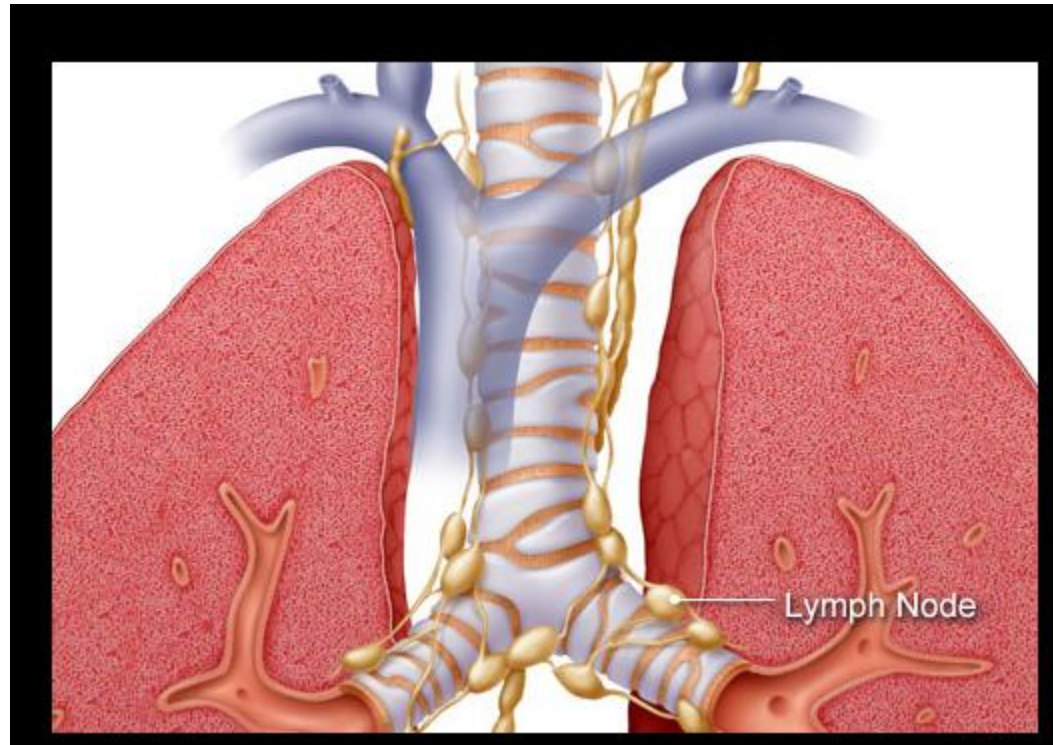




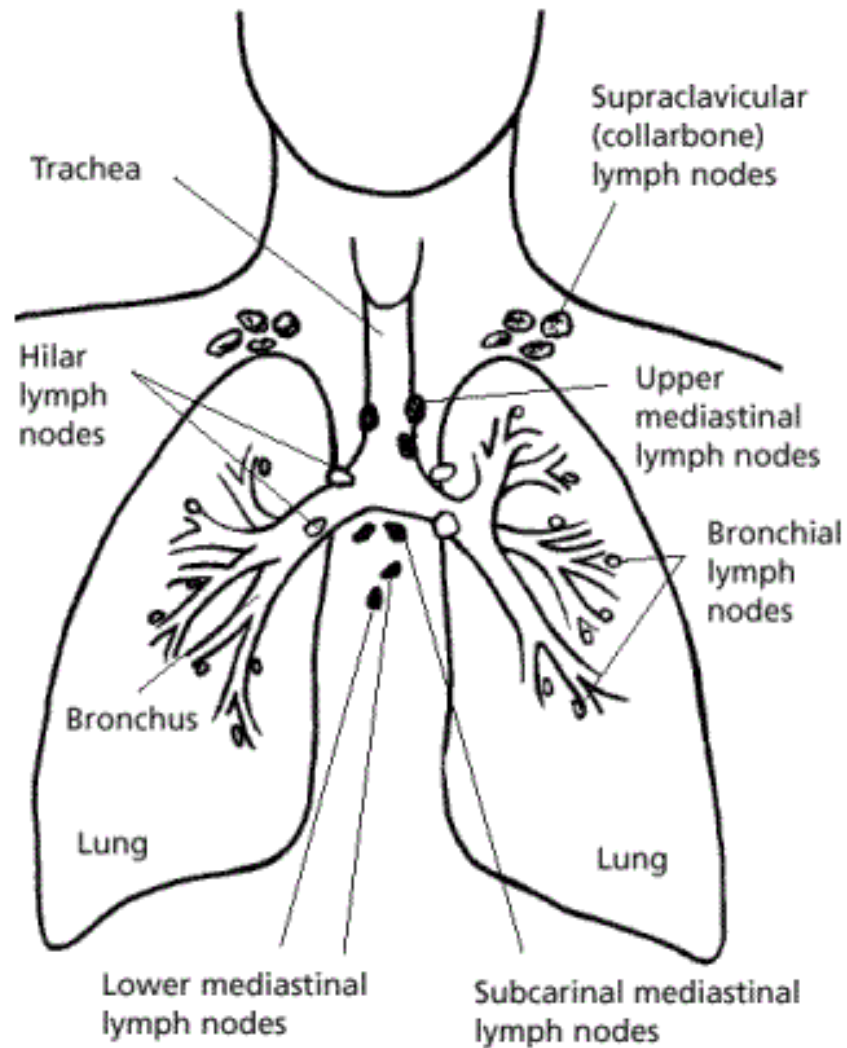
# Lung Imaging



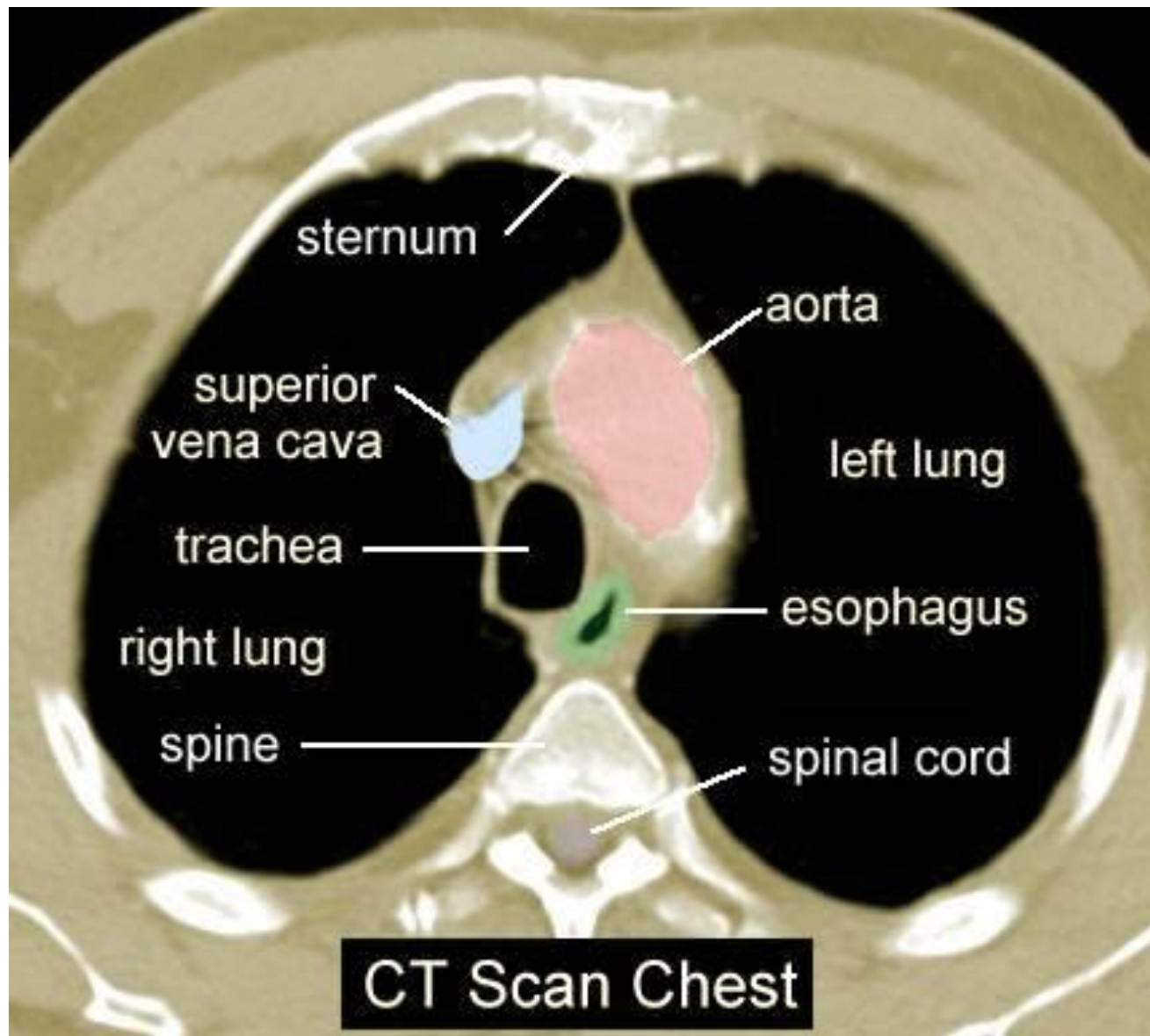
# Lymph Nodes and Lung Cancer



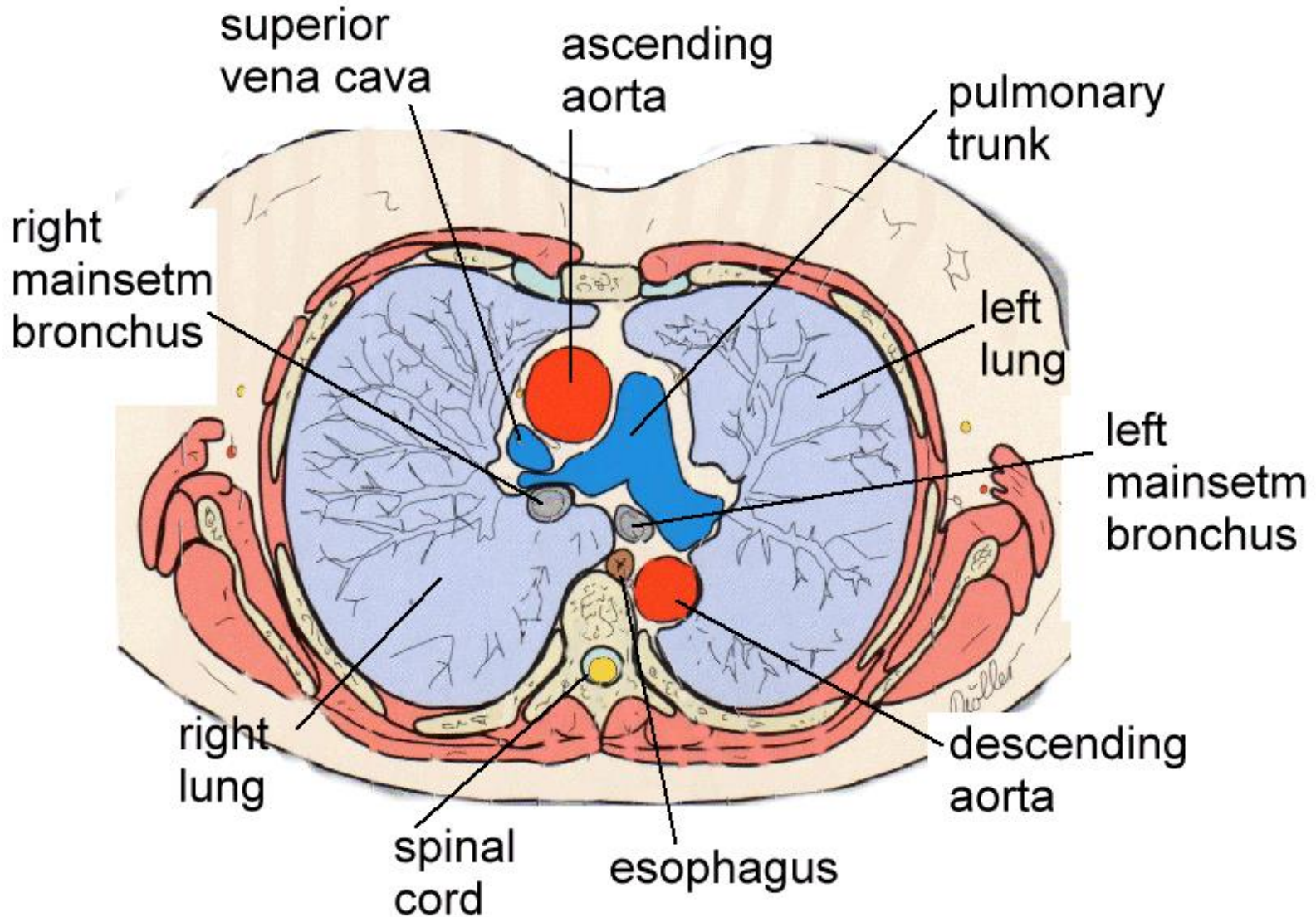
# Lymph Nodes in the Lung



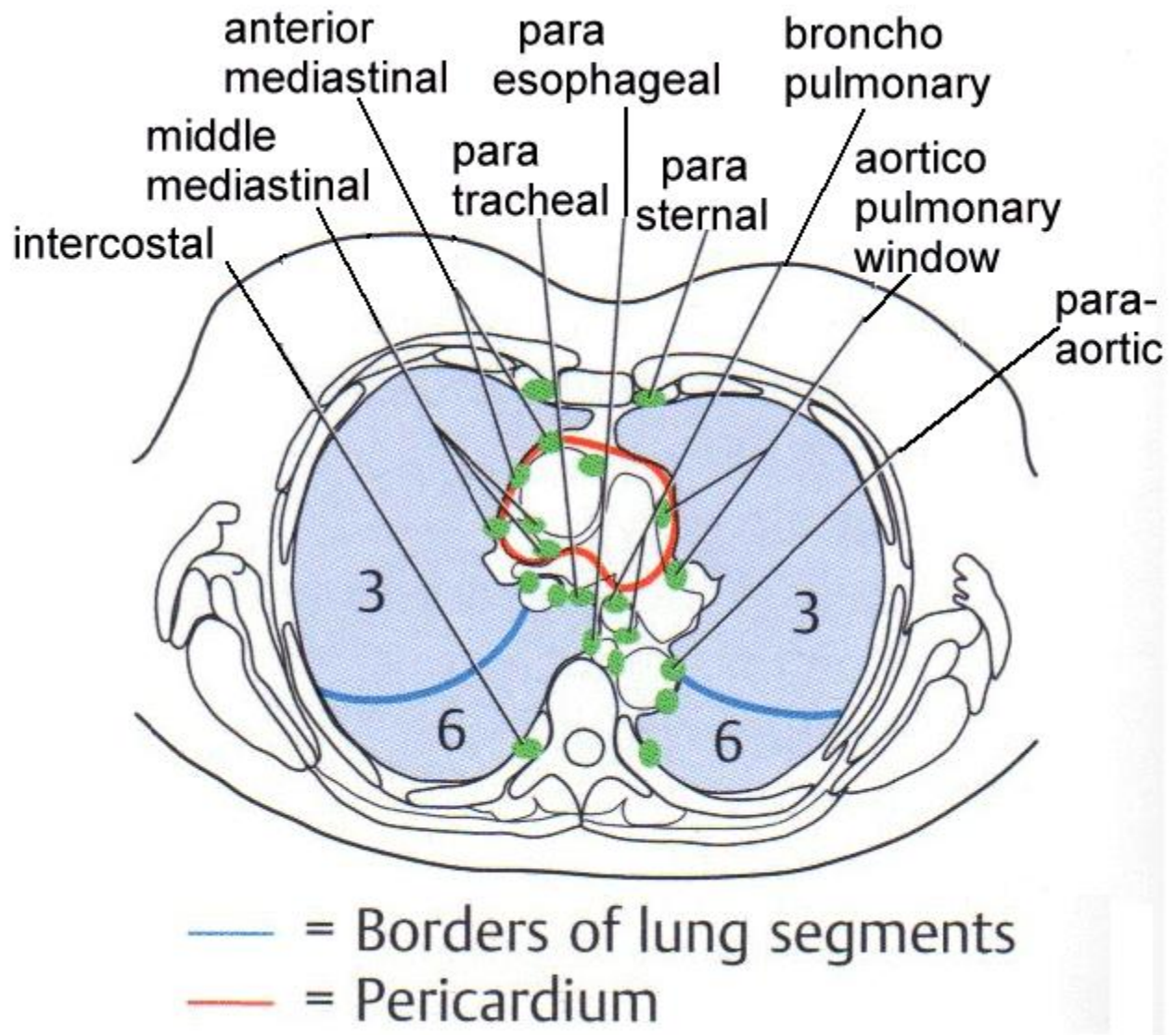
# Reading a CT Scan



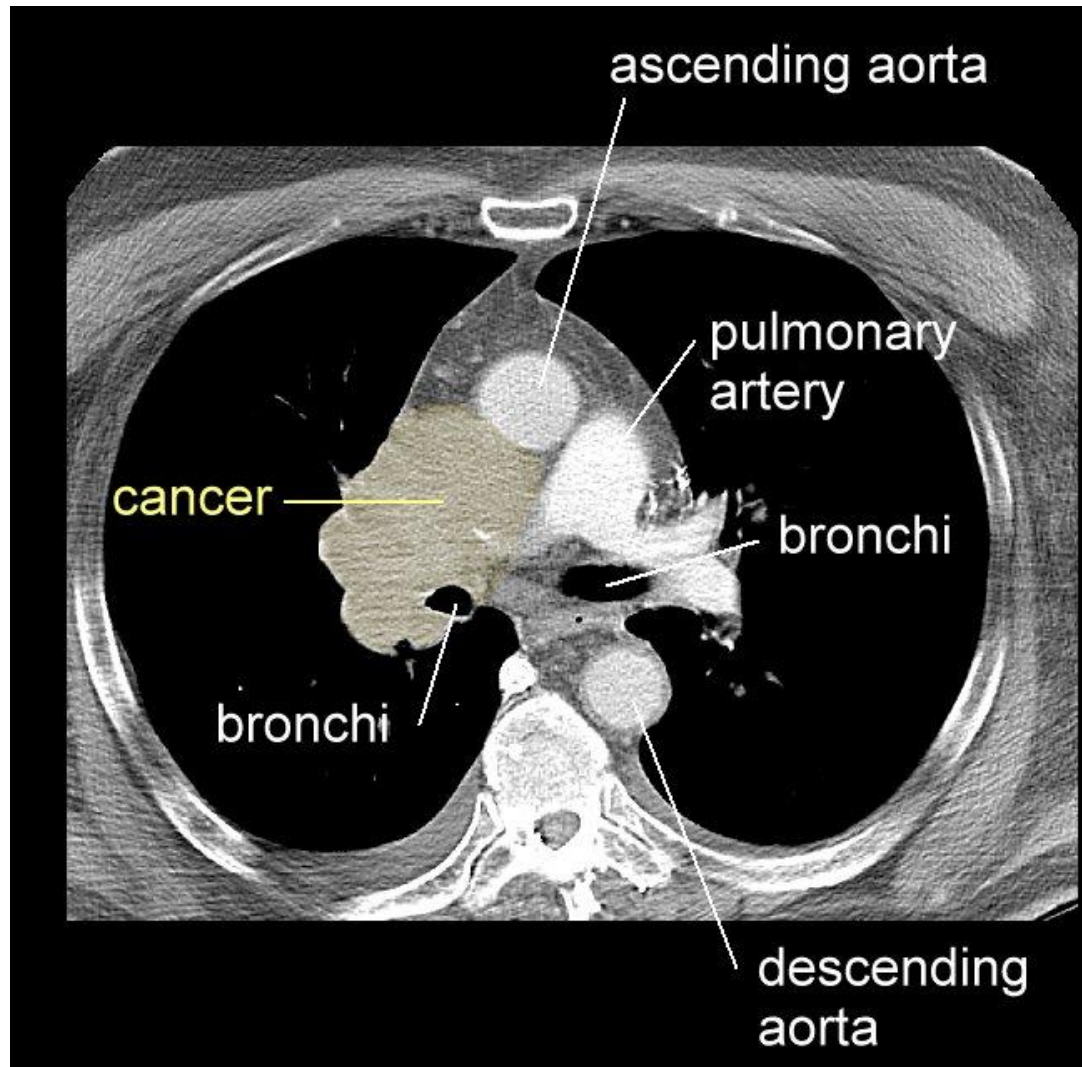
# Cross Section Anatomy of the Chest



# Nodes on cross section



# CT Small Cell



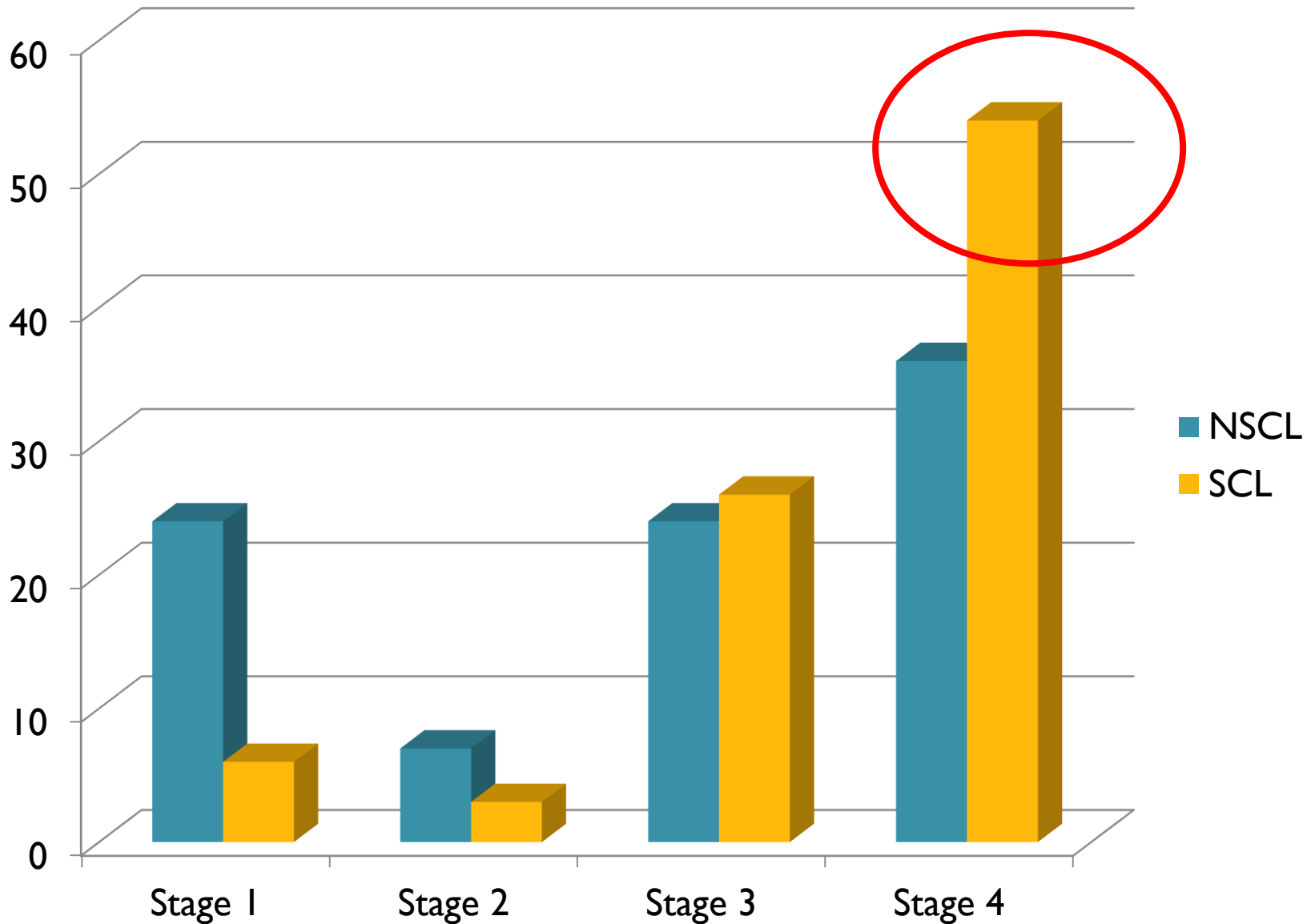
Usually large mass in the mediastinal lymph nodes and may compress the superior vena cava

# Stages of Lung Cancer

- Stage I – small spot no nodes
- Stage II – larger or nodes on the side of the lung (hilar or N1 nodes)
- Stage III – very large tumor or lymph nodes in the middles of the chest (mediastinum or N2 nodes)
- Stage IV – metastases to other organs



# Stage from NCDB



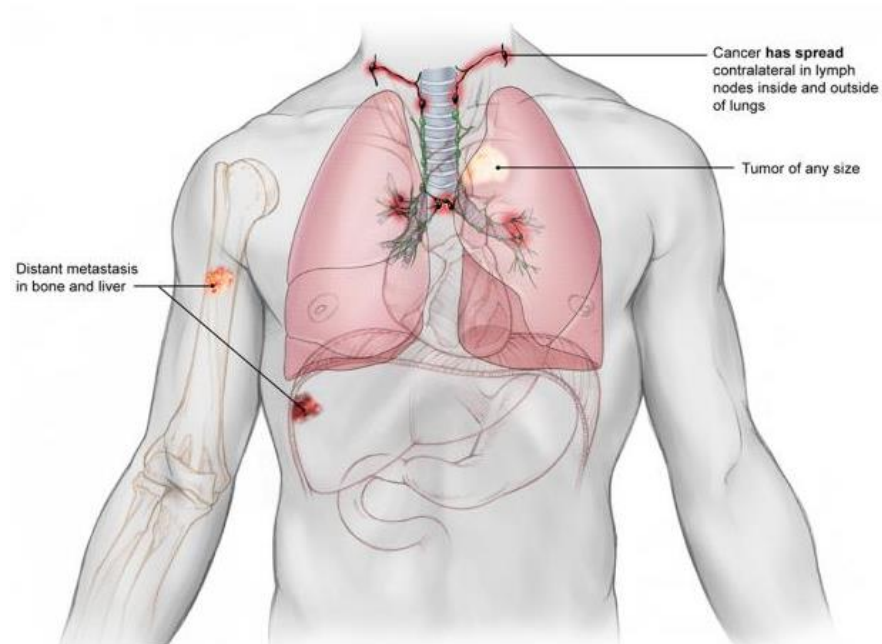
# Stages for Small Cell

Veterans Affairs Lung Study Group defined **limited stage (LS disease)** as that confined to the ipsilateral hemithorax which could be safely encompassed within a tolerable radiation field and **extensive stage (ES disease)** as disease beyond the ipsilateral hemithorax, including malignant pleural or pericardial effusion or hematogenous metastases.

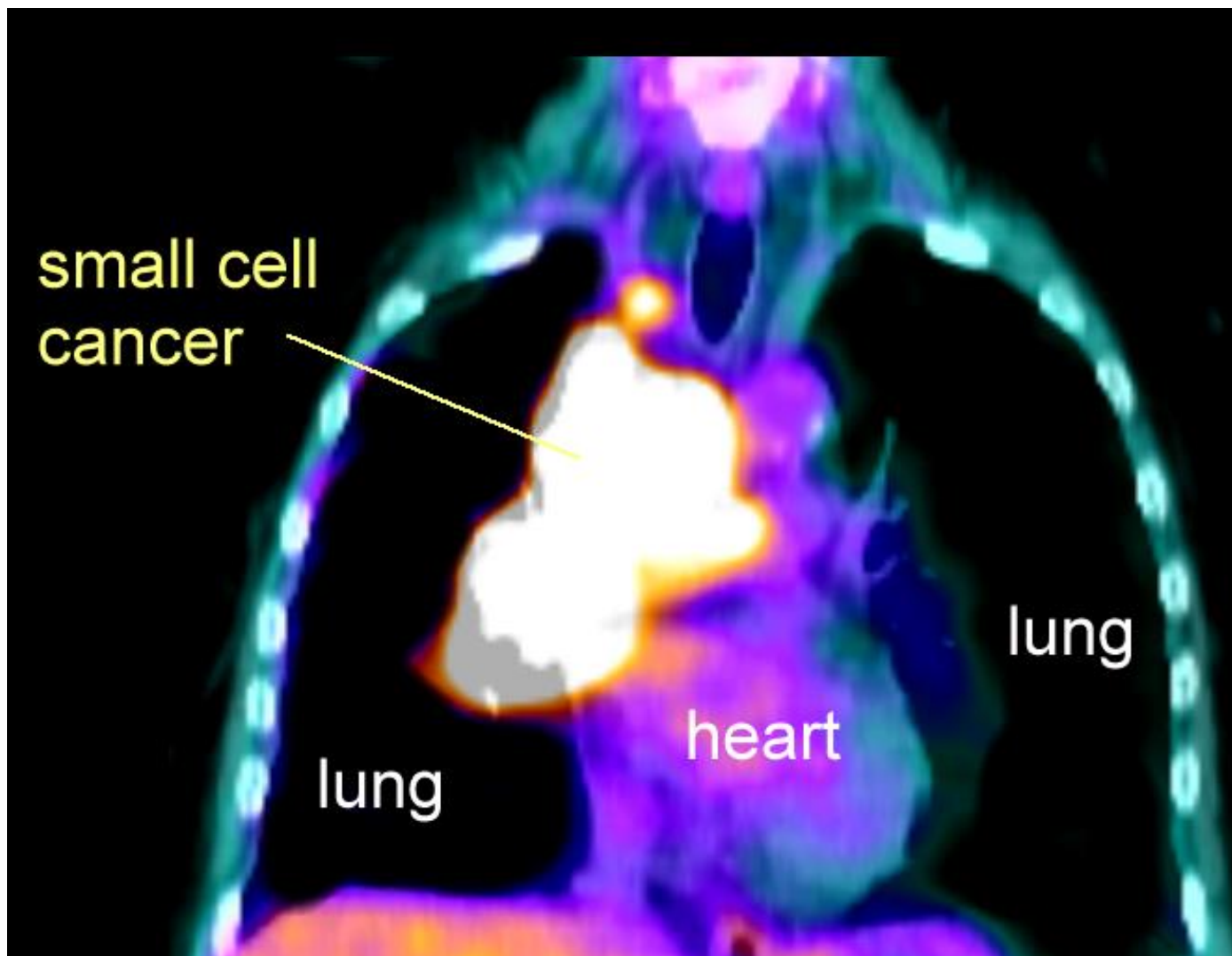
Patients with contralateral hilar or supraclavicular lymph nodes were excluded from some studies of LS disease, even though modern RT techniques can allow for high-dose RT to be delivered in selected cases.

# Small Cell Stages

- **Limited Stage:** confined to the chest and regional nodes (1/3)
- **Extensive Stage:** distant metastases (2/3)



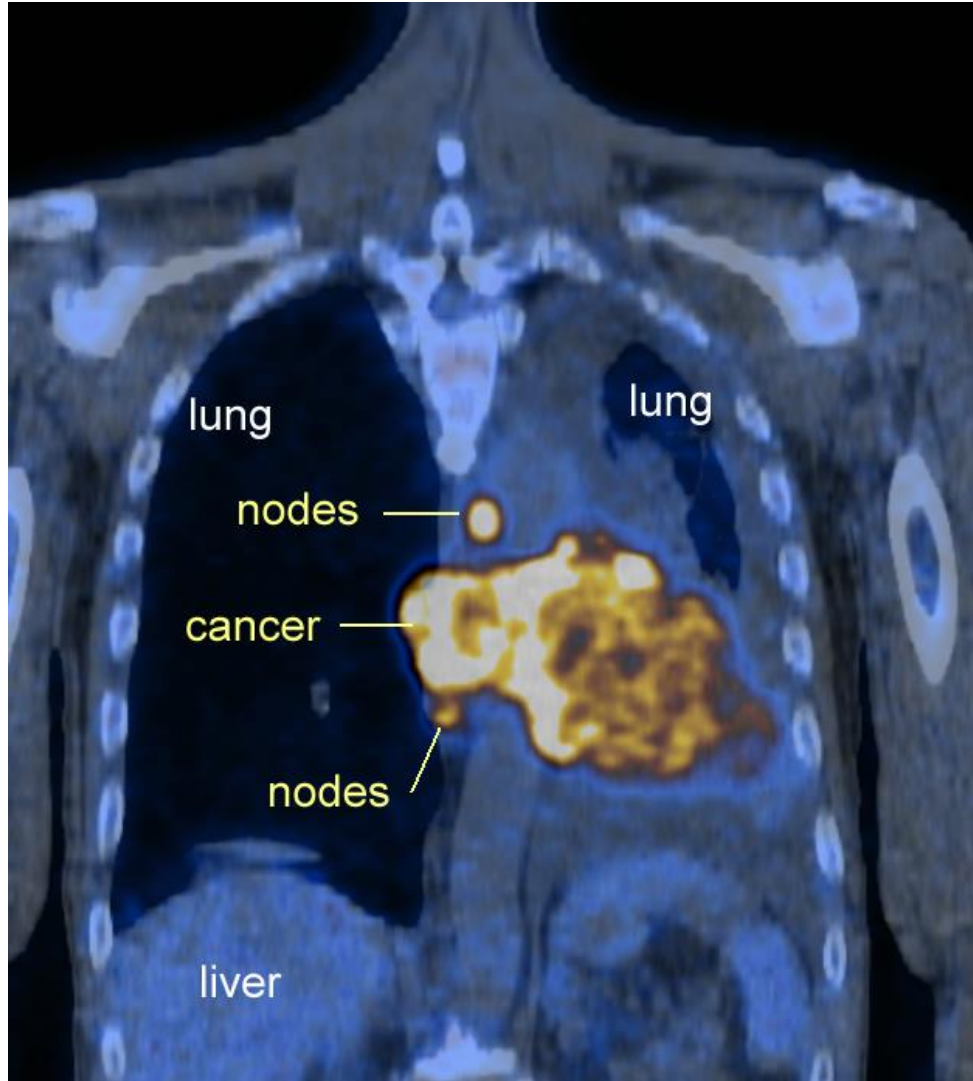
**Small Cell Carcinoma** of the Lung usually presents with a large central tumor (hilar/mediastinal lymph node mass)



# Symptoms of Small Cell

- Because of the **large lymph node** swelling in the chest the patient may have shortness of breath, trouble swallowing, hoarseness, facial swelling (superior vena cava syndrome)
- Many present with symptoms of spread or **metastases**: headaches (brain met) bone pain (bone mets) or eating problems (liver mets)
- Some present with neurologic or endocrine **paraneoplastic** syndrome (e.g. low sodium or elevated calcium)

# Small Cell Lung Cancer



PET scan showing a typical small cell cancer with a large mediastinal mass making it hard to even see the heart on the left side

# National Comprehensive Cancer Network

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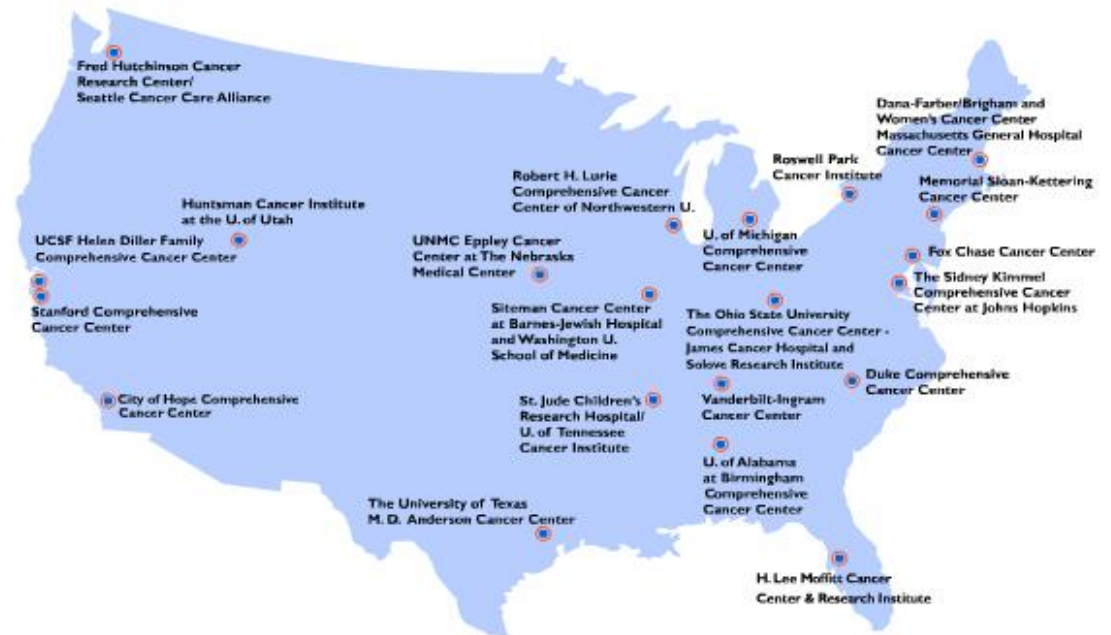
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Click on any of the network locations to get more information about the cancer center and to find links to the NCCN Member Institution's web site.



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Non-Small Cell  
**Lung Cancer**

## NCCN Guidelines for Patients<sup>®</sup>

In honor and memory of Dana Reeve



# Treatment for Small Cell Lung Cancer

**Limited Stage:** consider surgery resection for early stage followed by chemotherapy +/- radiation, otherwise most patients get chemotherapy plus radiation

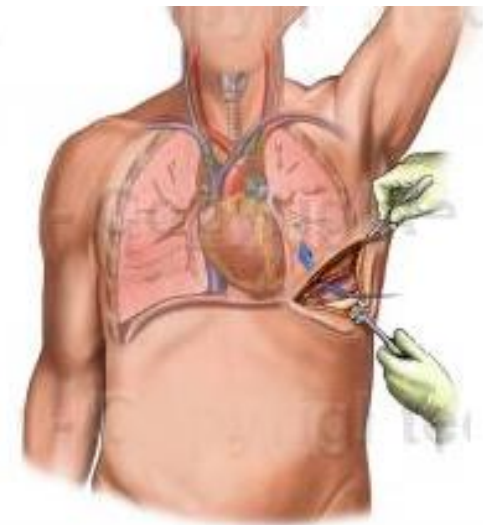
**Extensive Stage:** unless very weak consider chemotherapy +/- radiation

# The role of surgery in the treatment of limited disease small cell lung cancer: time to reevaluate.

J Thorac Oncol. 2008 Nov;3(11):1267-71.

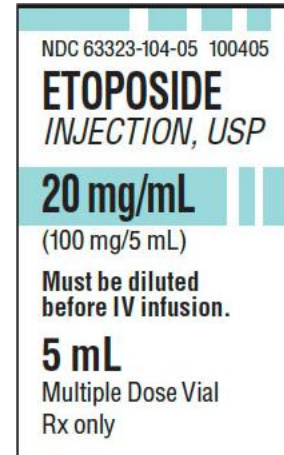
We identified 59 patients who underwent complete resection with nodal dissection for SCLC.

overall survival at 1 year of 76%  
and 5 years 52%



*Only 2 to 5% are candidates for surgery*

Various chemotherapy schemes have been evaluated for SCLC; however, **Cisplatin** and **Etoposide** is widely considered as the standard, with observed response rates of 80–85% and approximately 25% of patients obtaining a complete response



However, most patients experience disease relapse. Attempts to improve the outcome using different or more dose-intensive chemotherapy regimens or maintenance chemotherapy have not led to improved outcomes.



# Chemotherapy for Small Cell

NDC 63323-104-05 100405

**ETOPOSIDE**  
INJECTION, USP

**20 mg/mL**

(100 mg/5 mL)

Must be diluted  
before IV infusion.

**5 mL**

Multiple Dose Vial  
Rx only

## PRINCIPLES OF CHEMOTHERAPY\*

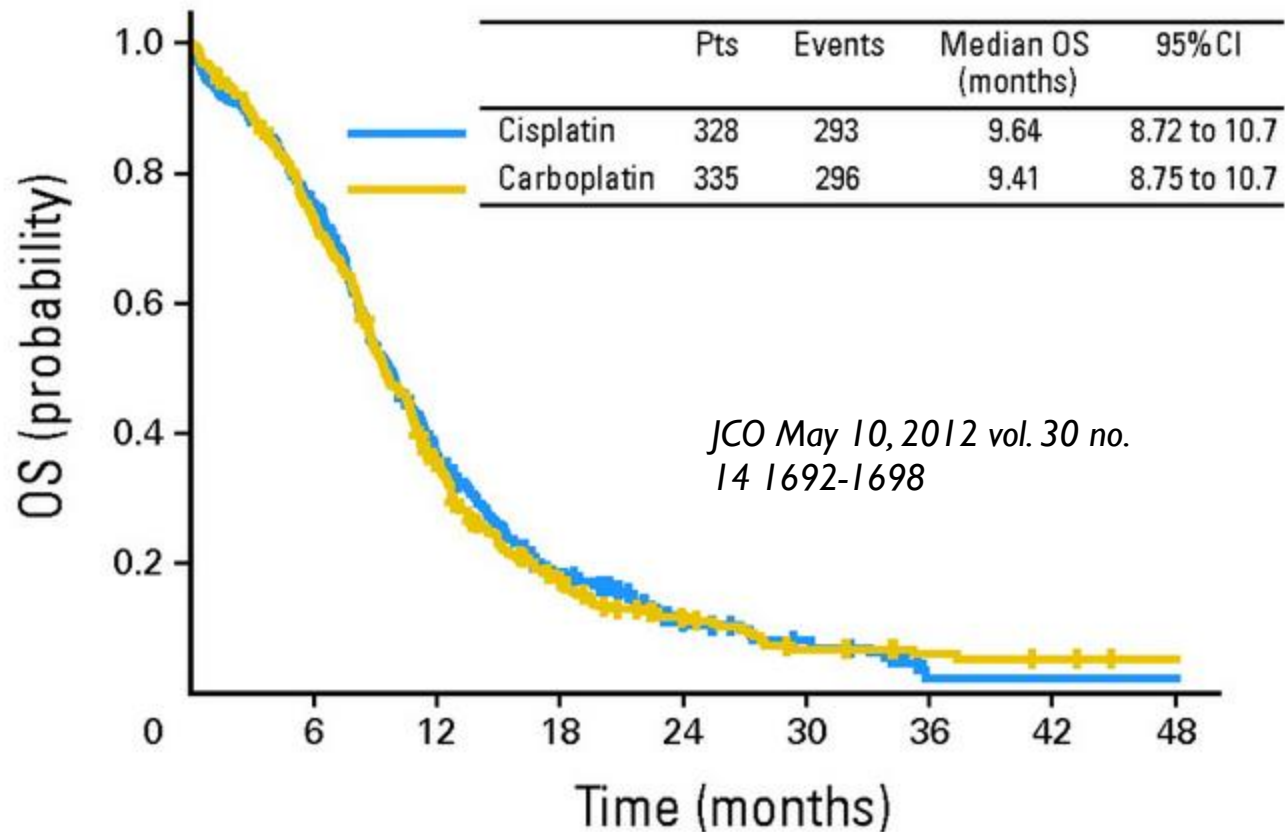
### Chemotherapy as primary therapy:

- Limited stage (maximum of 4-6 cycles):
  - ▶ Cisplatin 60 mg/m<sup>2</sup> day 1 and etoposide 120 mg/m<sup>2</sup> days 1, 2, 3<sup>1</sup>
  - ▶ Cisplatin 80 mg/m<sup>2</sup> day 1 and etoposide 100 mg/m<sup>2</sup> days 1, 2, 3<sup>2</sup>
  - ▶ Carboplatin AUC 5-6 day 1 and etoposide 100 mg/m<sup>2</sup> days 1, 2, 3<sup>3</sup>
  - ▶ During chemotherapy + RT, cisplatin/etoposide is recommended (category 1).
  - ▶ The use of myeloid growth factors is not recommended during concurrent chemotherapy plus radiotherapy.
- Extensive stage (maximum of 4-6 cycles):
  - ▶ Cisplatin 75 mg/m<sup>2</sup> day 1 and etoposide 100 mg/m<sup>2</sup> days 1, 2, 3<sup>4</sup>
  - ▶ Cisplatin 80 mg/m<sup>2</sup> day 1 and etoposide 80 mg/m<sup>2</sup> days 1, 2, 3<sup>5</sup>
  - ▶ Cisplatin 25 mg/m<sup>2</sup> days 1, 2, 3 and etoposide 100 mg/m<sup>2</sup> days 1, 2, 3<sup>6</sup>
  - ▶ Carboplatin AUC 5-6 day 1 and etoposide 100 mg/m<sup>2</sup> days 1, 2, 3<sup>7</sup>
  - ▶ Cisplatin 60 mg/m<sup>2</sup> day 1 and irinotecan 60 mg/m<sup>2</sup> days 1, 8, 15<sup>8</sup>
  - ▶ Cisplatin 30 mg/m<sup>2</sup> and irinotecan 65 mg/m<sup>2</sup> days 1, 8 every 21 days<sup>9</sup>
  - ▶ Carboplatin AUC 5 day 1 and Irinotecan 50 mg/m<sup>2</sup> days 1, 8, and 15<sup>10</sup>

### Subsequent chemotherapy:

- Clinical trial preferred.
- Relapse < 2-3 mo, PS 0-2:
  - ▶ paclitaxel<sup>11,12</sup>
  - ▶ docetaxel<sup>13</sup>
  - ▶ topotecan<sup>14,15</sup>
  - ▶ irinotecan<sup>16</sup>
  - ▶ temozolomide 75 mg/m<sup>2</sup>/day x 21 days<sup>17</sup>
  - ▶ gemcitabine<sup>18,19</sup>
  - ▶ ifosfamide<sup>20</sup>
- Relapse > 2-3 mo up to 6 mo:
  - ▶ topotecan PO or IV (category 1)<sup>14,15, 21</sup>
  - ▶ paclitaxel<sup>11,12</sup>
  - ▶ docetaxel<sup>13</sup>
  - ▶ irinotecan<sup>16</sup>
  - ▶ gemcitabine<sup>18,19</sup>
  - ▶ vinorelbine<sup>22,23</sup>
  - ▶ oral etoposide<sup>24,25</sup>
  - ▶ temozolomide 75 mg/m<sup>2</sup>/day x 21 days<sup>17</sup>
  - ▶ cyclophosphamide/doxorubicin/vincristine (CAV)<sup>14</sup>

# Carboplatin- or Cisplatin-Based Chemotherapy in First-Line Treatment of Small-Cell Lung Cancer: The COCIS Meta-Analysis of Individual Patient Data

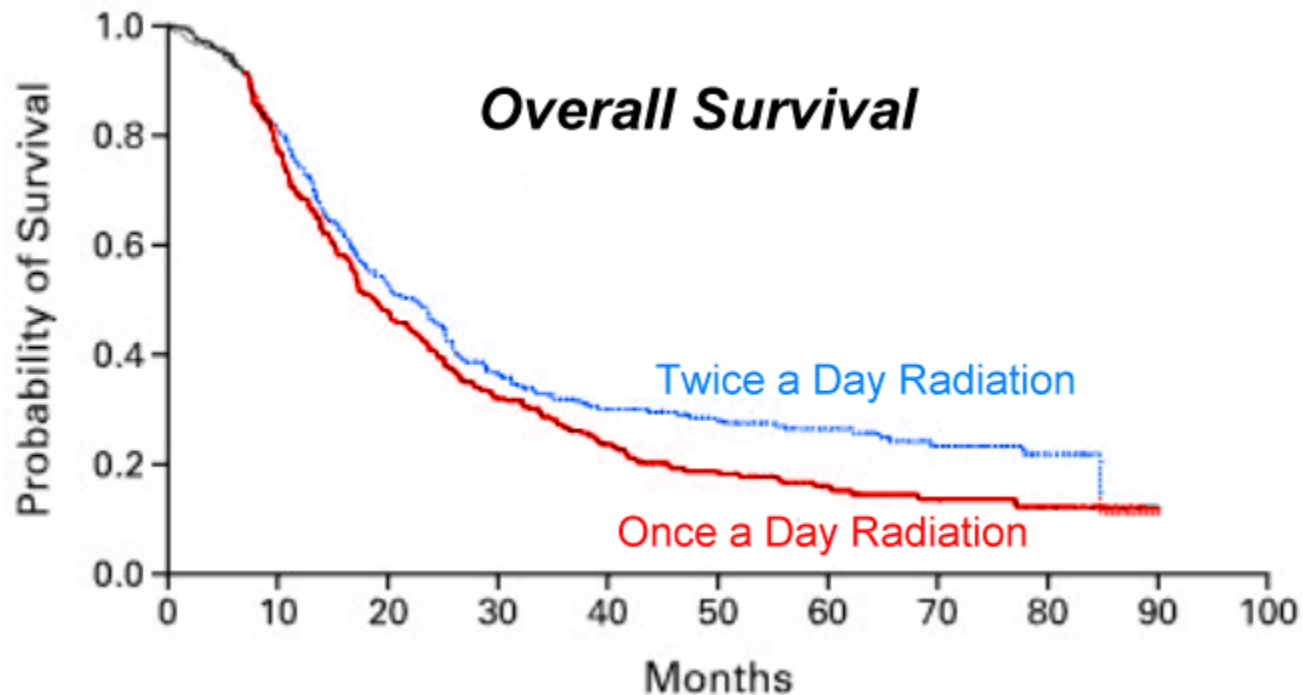


# Radiation for Small Cell

- Adding radiation to chemotherapy will lower the risk of lung relapse by 25 to 30% and increase the survival by 5 to 7%
- Radiation dose to the lung can be twice a day to 45Gy or daily to 60 – 70 Gy



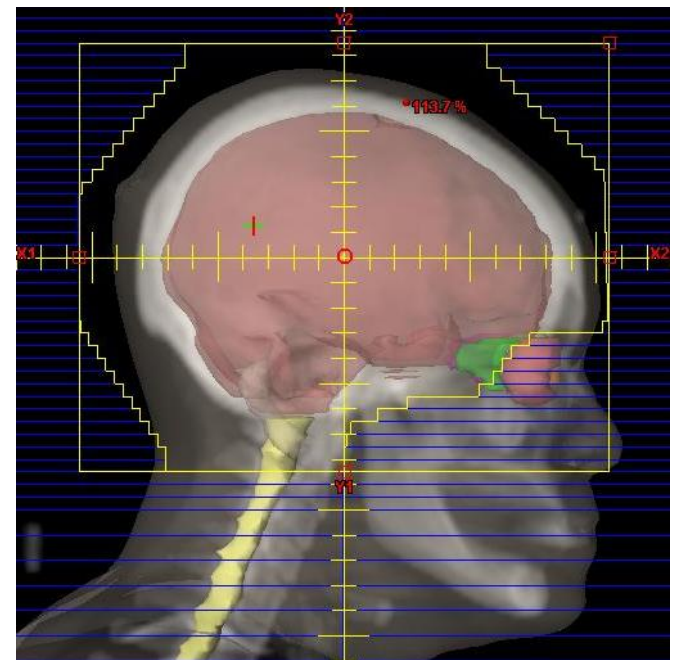
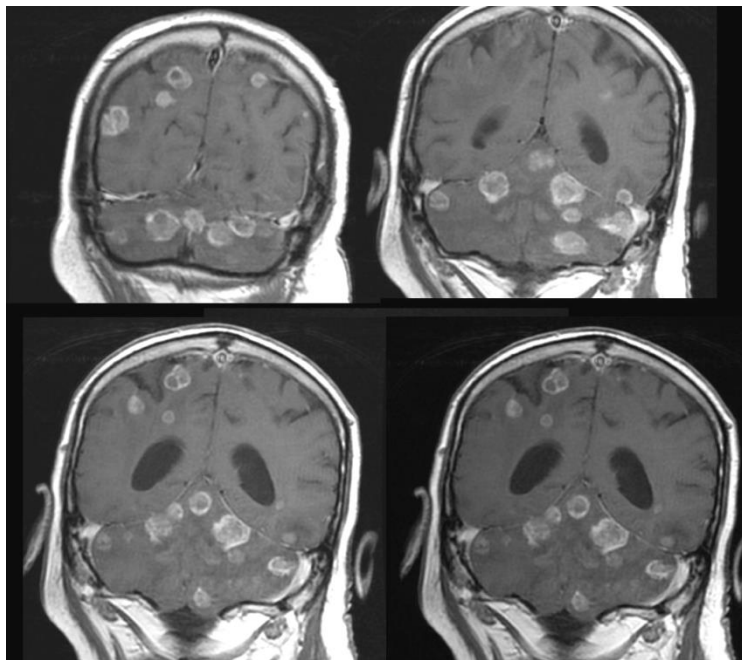
# Twice-Daily Compared with Once-Daily Thoracic Radiotherapy in Limited Small-Cell Lung Cancer Treated Concurrently with Cisplatin and Etoposide



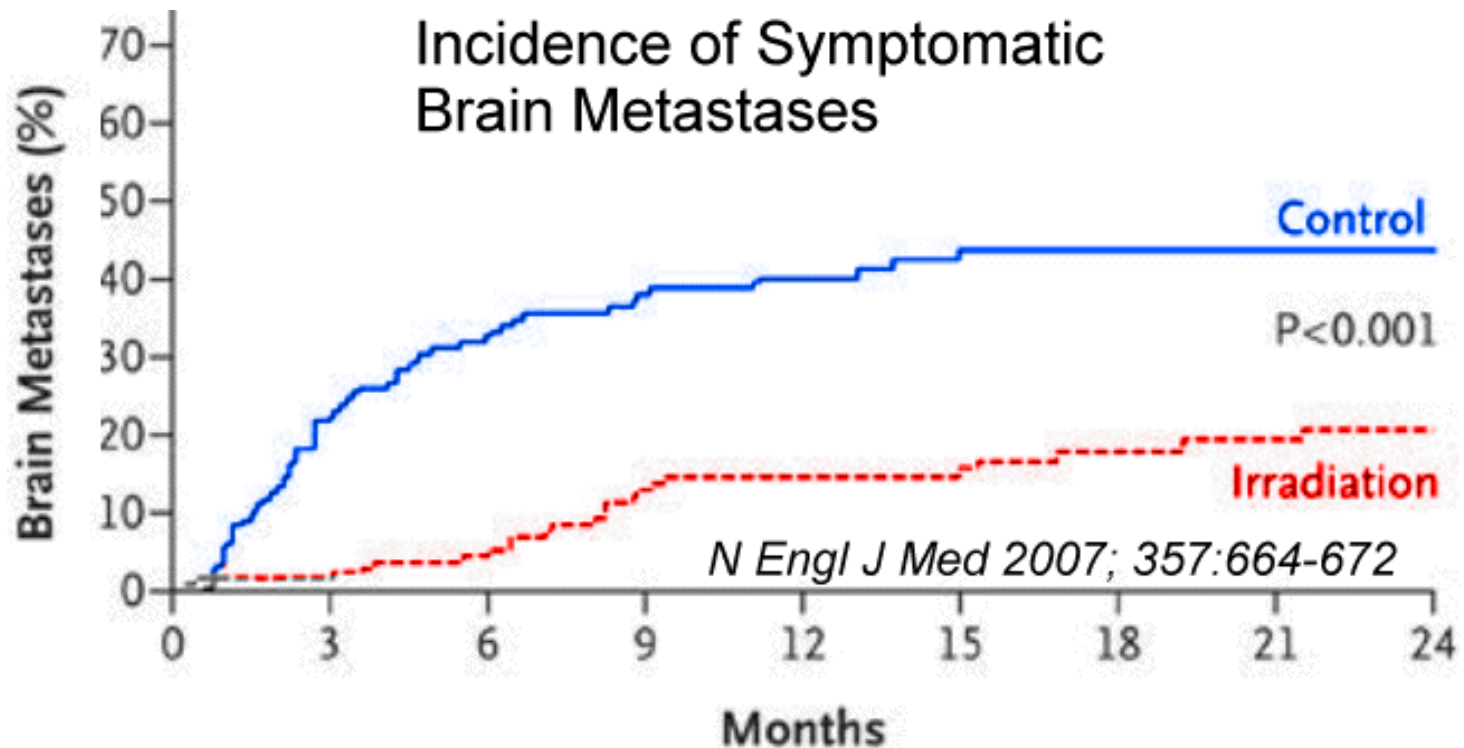
total dose of thoracic radiotherapy was 45 Gy for each patient, 1.8 Gy daily in 25 treatments over a period of five weeks or Accelerated twice-daily thoracic radiotherapy involved the administration of 1.5 Gy in 30 treatments over a period of three weeks.



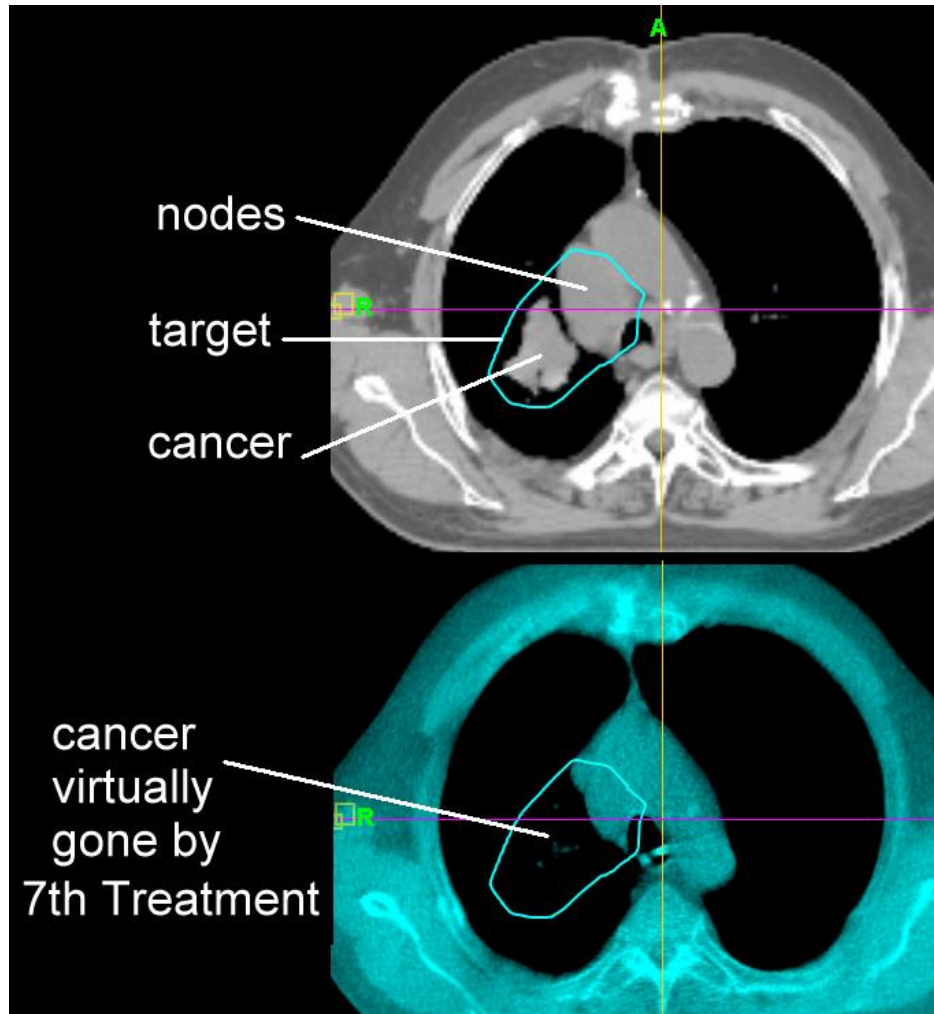
- Low dose **prophylactic cranial irradiation** (PCI) reduced the risk of brain mets from 58% to 33% and increased 2y survival from 15% to 21% and another study showed a decreased risk of brain mets from 49% down to 14% and improved 1 year survival from 13% up to 27%
- Brain dose of 24 to 30Gy



# Benefits of PCI (prophylactic cranial irradiation) of extensive stage small cell in lowering the risk of developing brain metastases

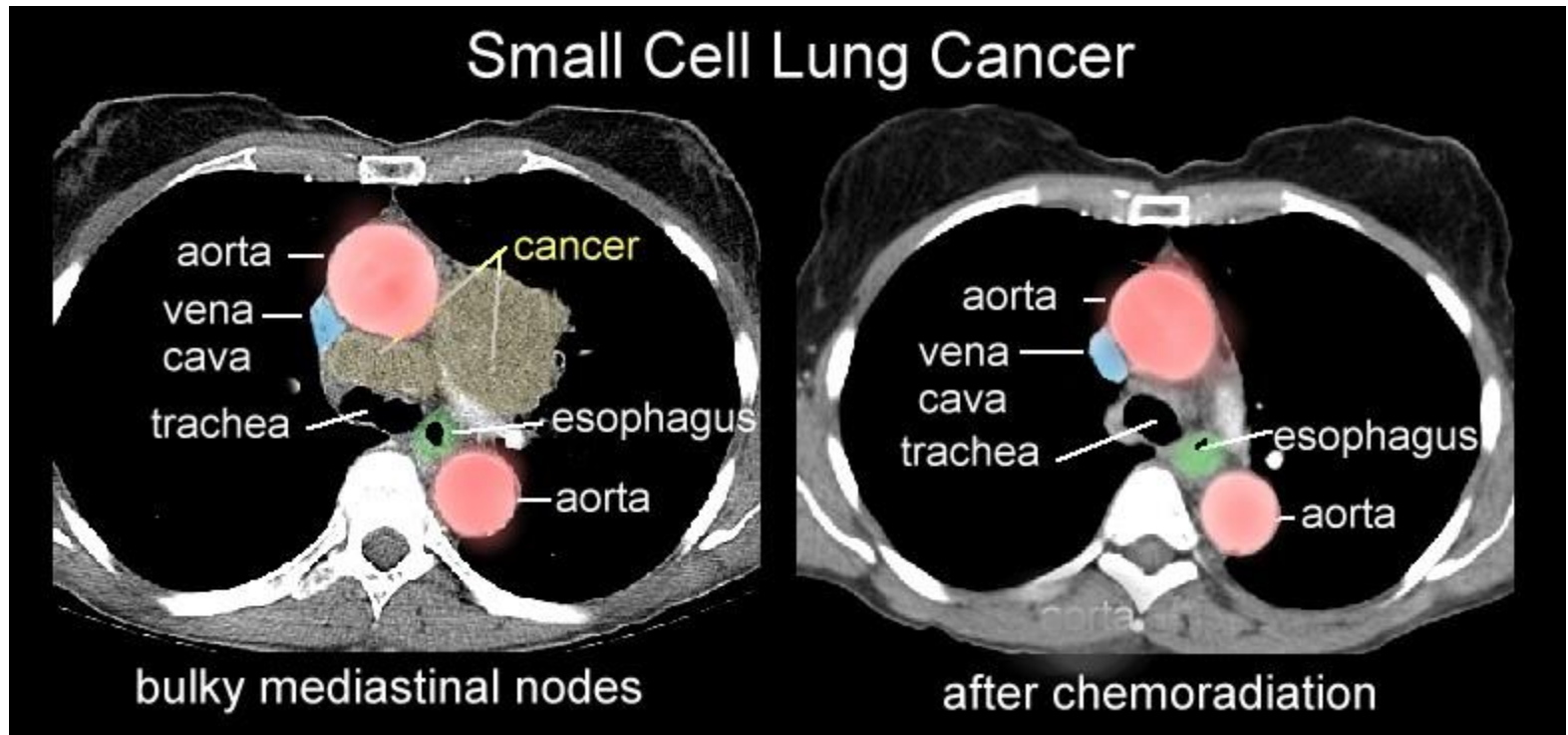


# Small cell cancer may shrink so quickly, it may be necessary to adjust the radiation target

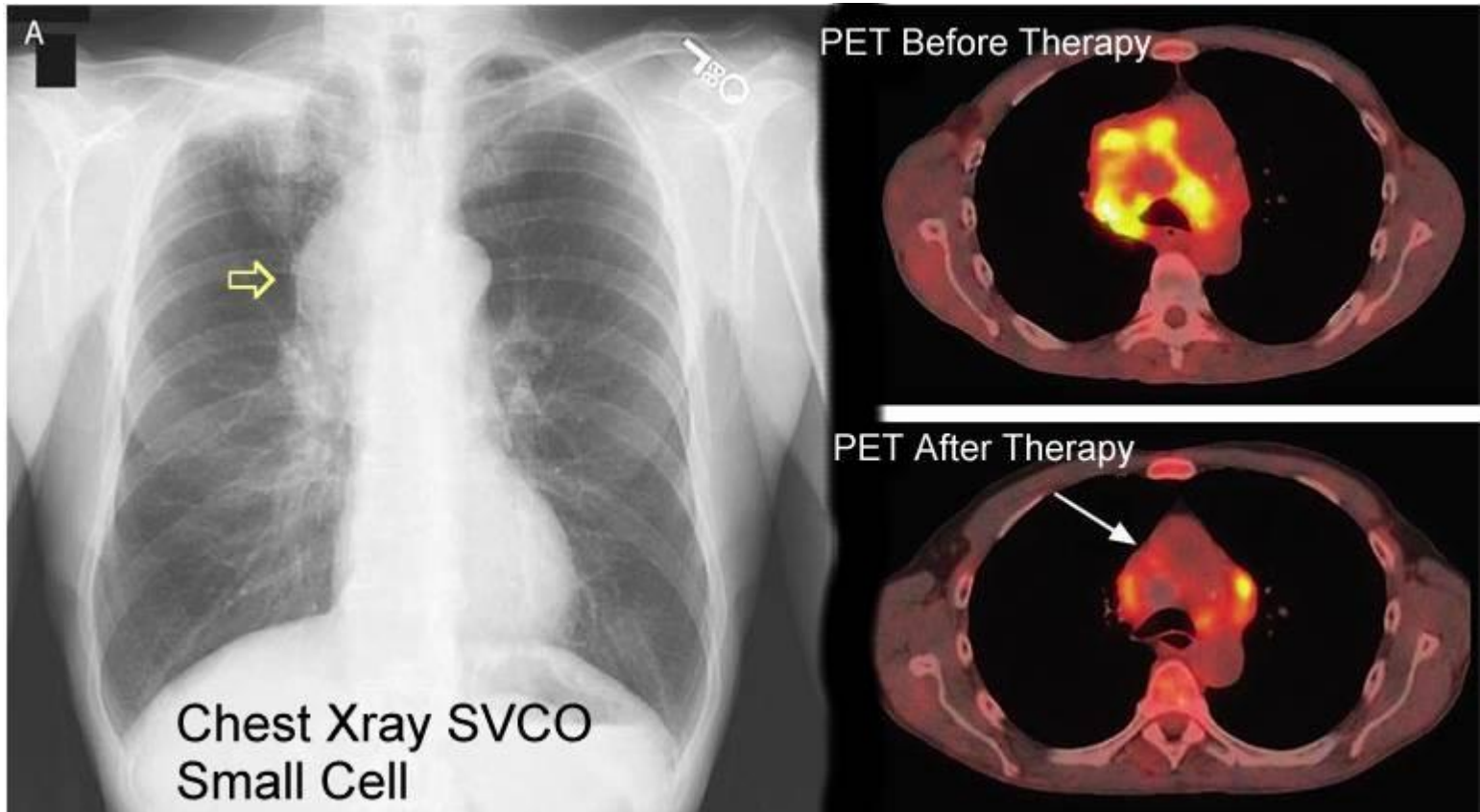


Daily CT images on Tomo will allow for the physician to adjust the radiation target if the cancer changes in size or position

# Typical CT Changes for Small Cell after Chemoradiation



# PET-CT Changes for Small Cell after Chemoradiation



# Results with Chemoradiation

Stage	Response	Survival	Survival
Limited Stage	70 – 90%	14 to 20 months	40%/2y
Extensive	60 – 70%	9 to 11 months	< 5%/2y

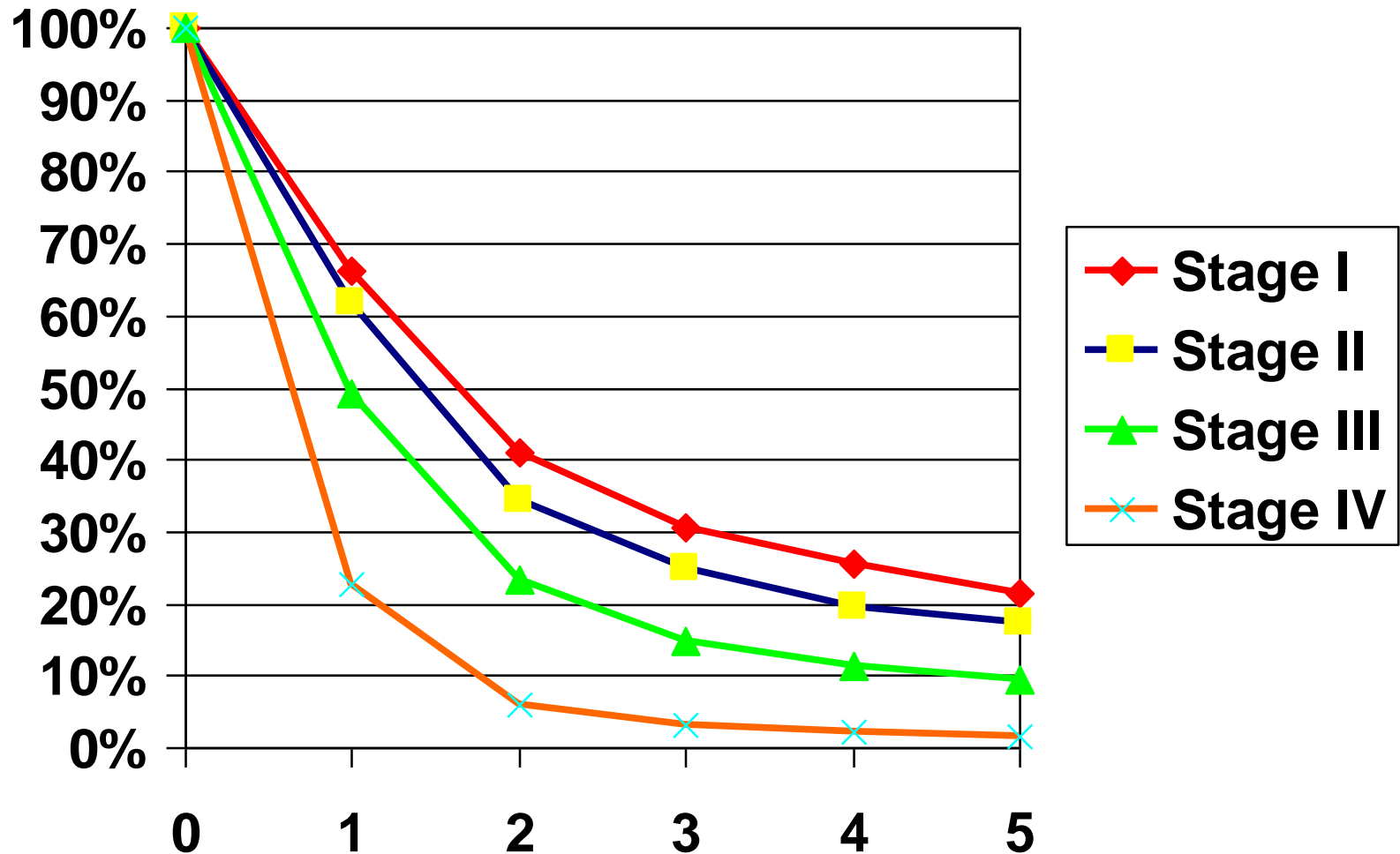
# Observed Survival for Small Cell Lung Cancer

NCDB Data (cases diagnosed in 2003 – 2005)

<b>Stage</b>	<b>2 Year</b>	<b>5 Year</b>
<b>I</b>	<b>41.1%</b>	<b>21.5%</b>
<b>II</b>	<b>34.4%</b>	<b>17.2%</b>
<b>III</b>	<b>23.4%</b>	<b>9.5%</b>
<b>IV</b>	<b>5.9%</b>	<b>1.6%</b>

# Observed Survival for Small Cell Lung Cancer

NCDB Data (cases diagnosed in 2003 – 2005)





# Small Cell Lung Cancer

Robert Miller MD

[www.aboutcancer.com](http://www.aboutcancer.com)

