

# **Epidemiology, Staging and Treatment of Lung Cancer**

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# Lung Cancer

## A Public Health Problem

- In 2006
  - 168,000 cases
  - 156,000 deaths
- Symptomatic disease associated with >90% mortality
- Chest X-ray: leading detection tool but >67% of new cases already advanced
- Median survival of metastatic disease is about 1 year
- Average loss of life: 14.7 years

# Lung Cancer in the U.S. in 2005: Incidence and Mortality<sup>1</sup>

- New cases: 172,570  
93,010 males  
79,560 females  
Rank  
#2  
#2
- Annual deaths: 163,510  
90,490 males  
73,020 females  
#1  
#1
- Risk for developing lung cancer  
1:13 males      1:18 females
- 5-year survival rate (all stages): 15%

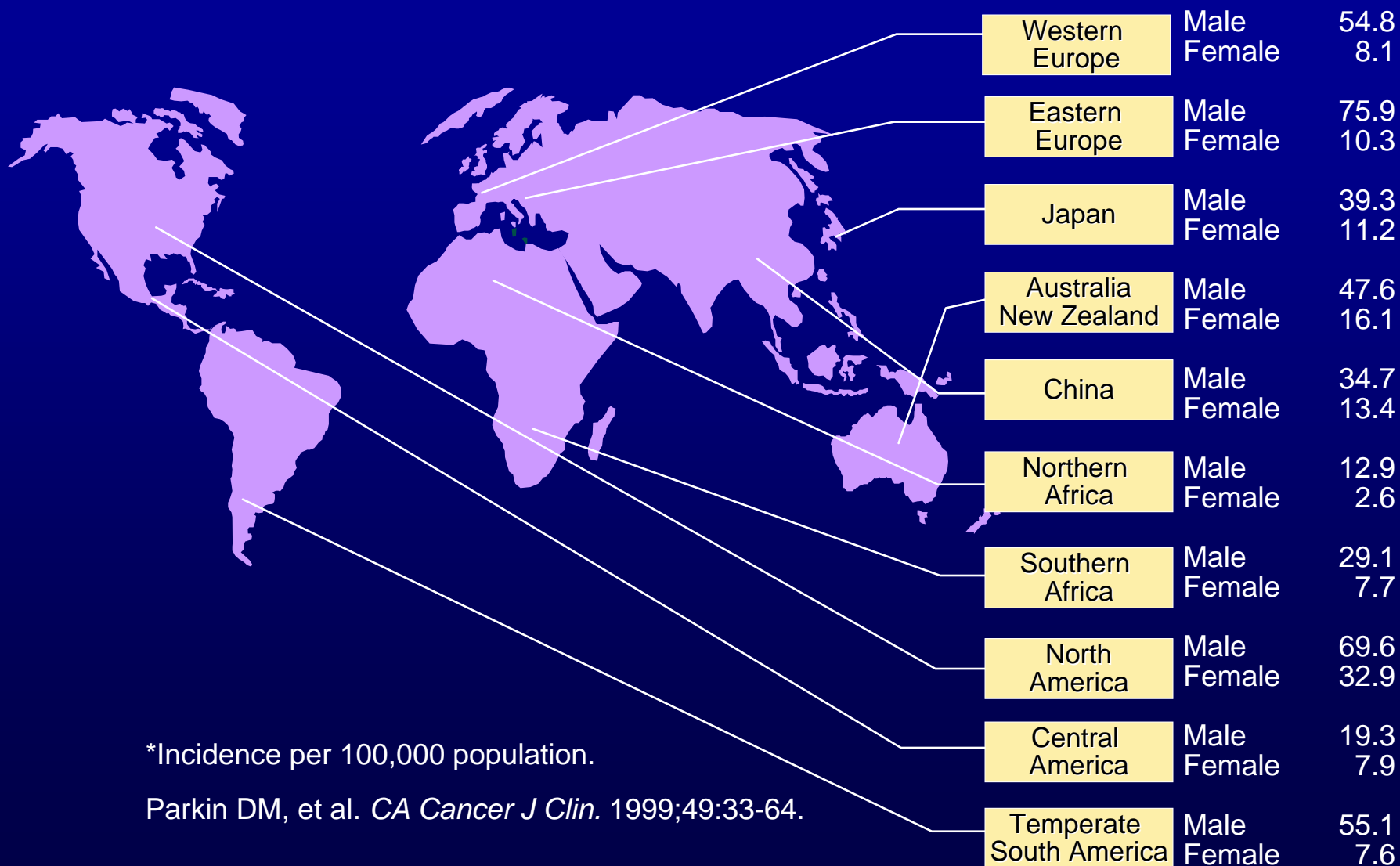
# Magnitude of the Lung Cancer problem

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- Number of deaths from lung cancer exceeds the number of deaths from breast, prostate, and colon cancers
- 31% of cancer deaths in men; 25% in women
- Number of deaths in women still rising annually
- Screening remains controversial- it would change the adverse stage distribution at diagnosis but will it improve survival remains the question
- ~22% of U.S. population continues to smoke

# LUNG CANCER

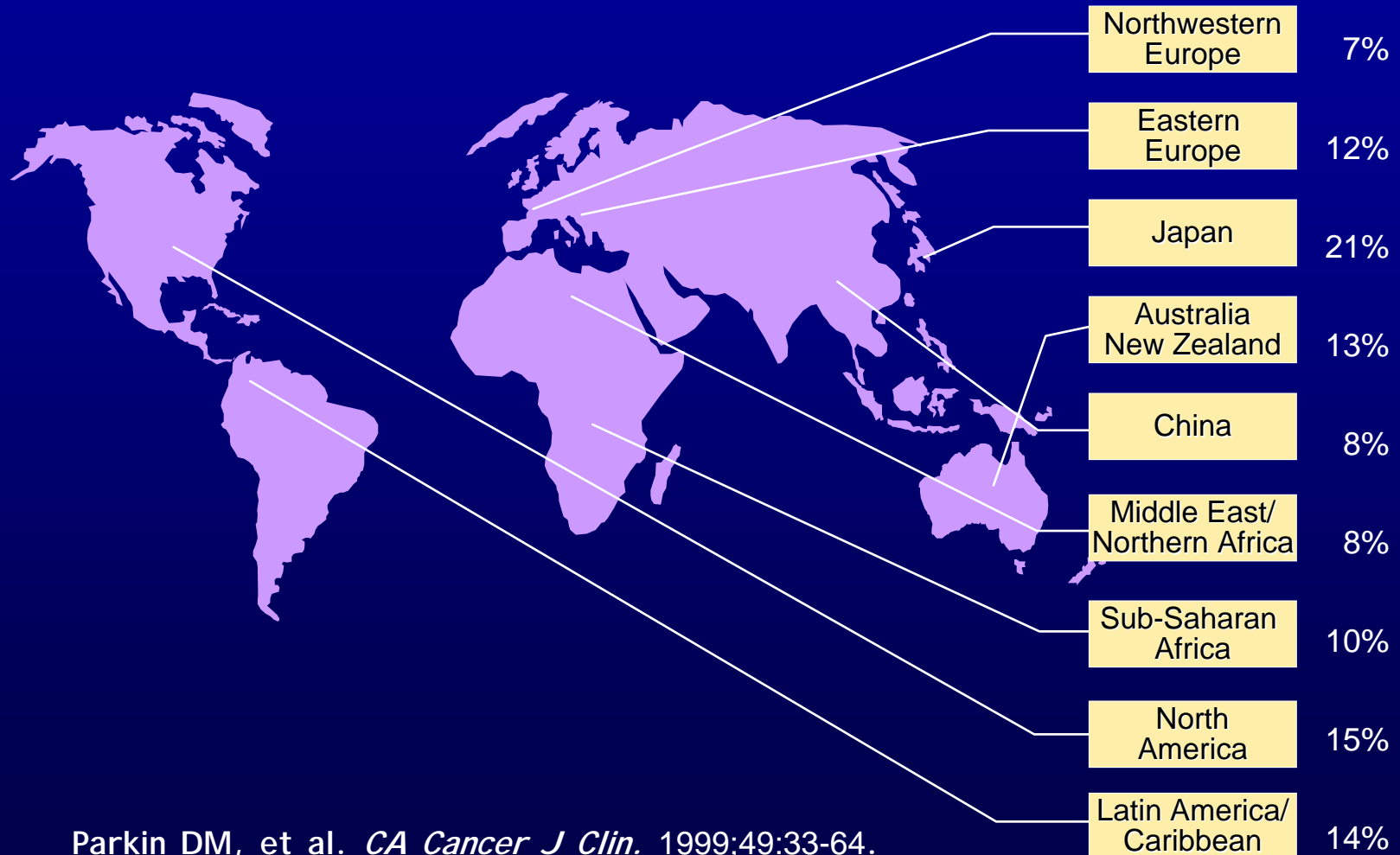
## Worldwide Incidence\*



\*Incidence per 100,000 population.

Parkin DM, et al. *CA Cancer J Clin.* 1999;49:33-64.

# LUNG CANCER 5-Year Survival Rates



Parkin DM, et al. *CA Cancer J Clin.* 1999;49:33-64.

# LUNG CANCER

## Risk Factors: Smoking

- Majority of new lung CA (60–65%) diagnosed in **Never or Former Smokers (N/FS)**
- Lung cancer deaths in US women are the highest in the world
  - 27.2/100K: ACS F&F 2003
- Lung cancer is the leading cause of cancer death in both men and women

*Cancer Facts & Figures-1999.*

Ginsberg RJ, et al. *Cancer: Principles & Practice of Oncology*. 5th ed. 1997;858-911.

# LUNG CANCER

## Risk Factors — Smoking

Smoking causes:

- 80% of lung cancer deaths in men
- 75% of lung cancer deaths in women
- 28% of all cancer deaths

35-year old male who smokes  $\geq 25$  cigarettes per day:

- 13% risk of dying from lung cancer before age 75
- 10% risk of dying from coronary disease
- 28% risk of dying from smoking-related disease

*Cancer Facts & Figures-1999.*

Ginsberg RJ, et al. *Cancer: Principles & Practice of Oncology*. 5th ed. 1997;858-911.

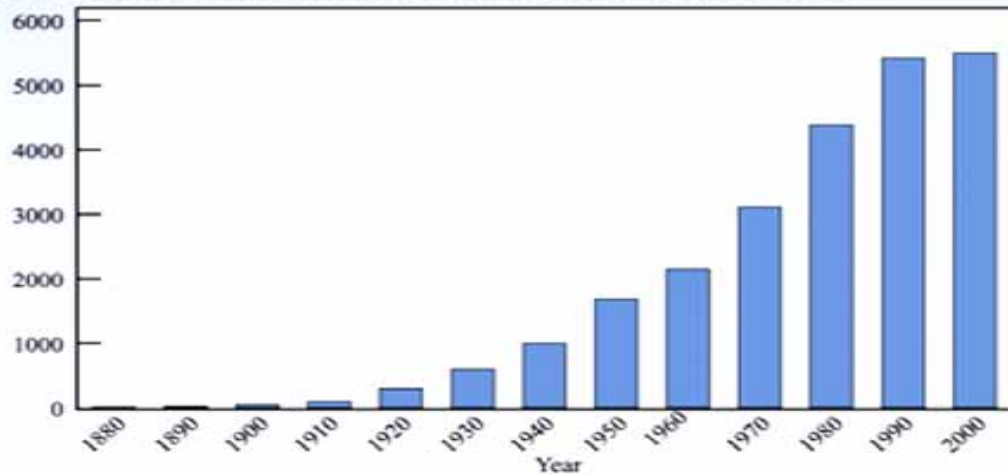
# Stemming the Tobacco Marketing Tide

Stat Bite  
Stat Bite

## Global Cigarette Consumption, 1880–2000

Although cigarette consumption is leveling off and even decreasing in some countries, smokers are smoking more cigarettes and the number of smokers is increasing, mainly as a result of the expanding world population. In addition, male smoking prevalence is decreasing, but the decrease is offset by an increase in female smoking rates, especially in developing countries. According to the World Health Organization, in 1998 China consumed the most cigarettes (1,643 billion) followed by the United States (451 billion), Japan (328 billion), Russia (258 billion), and Indonesia (215 billion).

Global cigarette consumption (in billions of cigarettes), 1880–2000:



Source: *The Tobacco Atlas* (World Health Organization 2002); access at <http://www.who.int>



Almost 90% of all adult smokers began smoking when they were 18 or younger

# LUNG CANCER

## Impact of Smoking on Risk

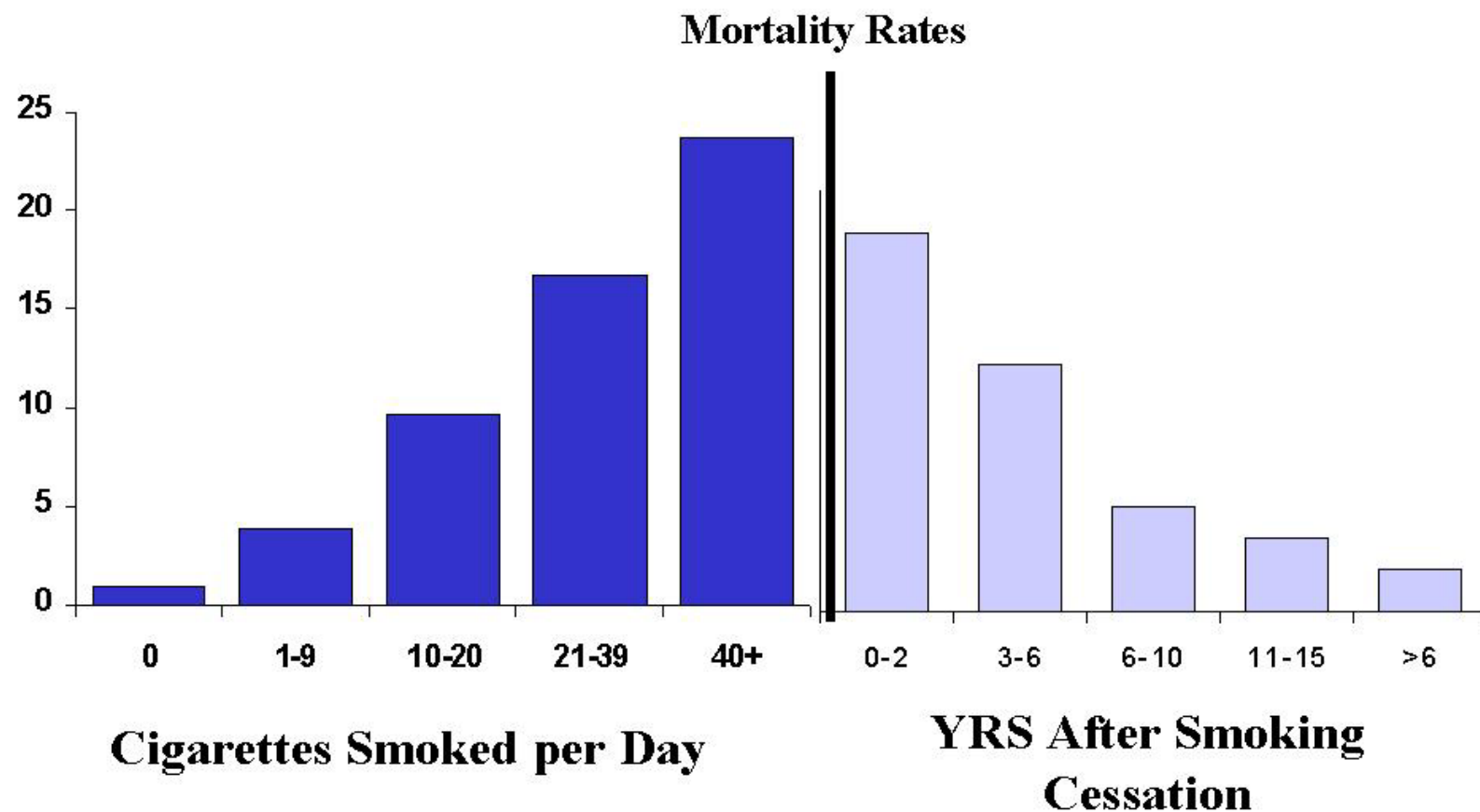
Cigarettes smoked/day	Risk of developing lung cancer*	Risk after $\geq 16$ years of smoking cessation*
1–20	10.3-fold	1.6-fold
$\geq 20$	21.2-fold	4.0-fold

\*Data in women; risk compared to nonsmokers

Humphrey EW, et al. *The American Cancer Society Textbook of Clinical Oncology*. 1995;220-235

# LUNG CANCER RISK IN SMOKERS BEFORE AND AFTER SMOKING CESSATION

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# Lung Cancer Control

- Health policy
  - Smoke-free environments
  - Restricted advertising
  - Educational curriculum
- Economic incentives
  - Cigarette tax
  - Health insurance discount for nonsmokers
- Media coverage/advocacy
- Societal stigma associated with smoking

Bal DG, et al. *The American Cancer Society Textbook of Clinical Oncology*. 1995;40-63  
Ginsberg RJ, et al. *Cancer: Principles & Practice of Oncology*. 5th ed. 1997;858-911

# Status of CT Lung Cancer Screening Trials

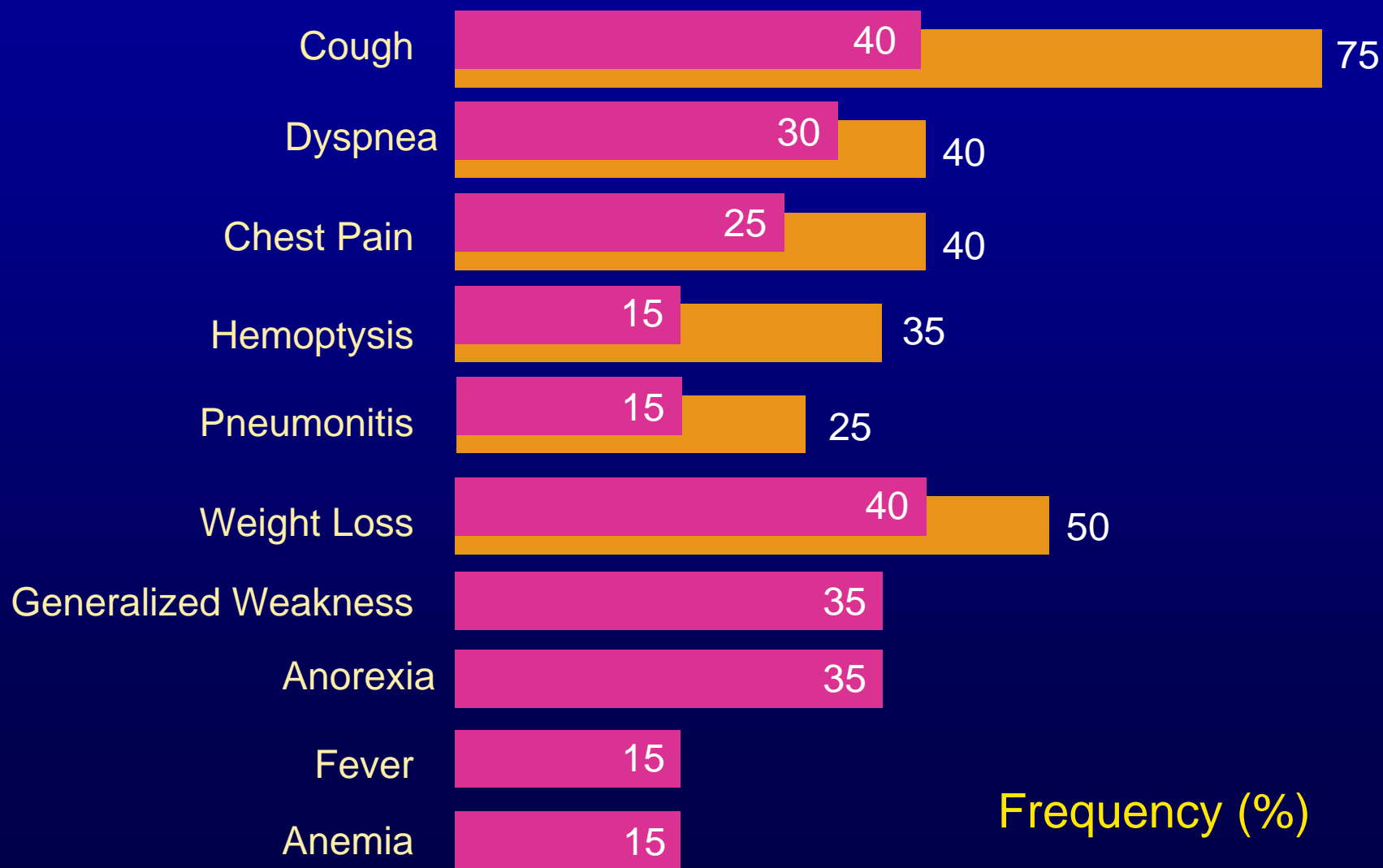
- Major NCI trial launched
  - NLST with 50,000 subjects RCT
- NY-ELCAP trial has completed Accrual
  - 10,000 subjects
- Smaller cohorts being studied, including:
  - Mayo Clinic, Moffitt, U. Colorado, Milan, I-ELCAP sites, PLuSS
- Over 12 national European studies being developed including mostly RCT
  - France, Italy, Netherlands/Denmark started
- Major Japanese trials in progress

# Current Status of Low Dose CT Screening

- Screening lung CT detects asymptomatic early stage primary lung cancer with apparently high sensitivity and high yield
  - Excellent for case finding but poor specificity
  - 98% false positive
- Whether earlier detection (increased lead times) improves clinical outcomes (cumulative lung cancer-specific mortality) is unknown
  - Limits potential for mass screening
- Refined risk stratification of screened populations is needed

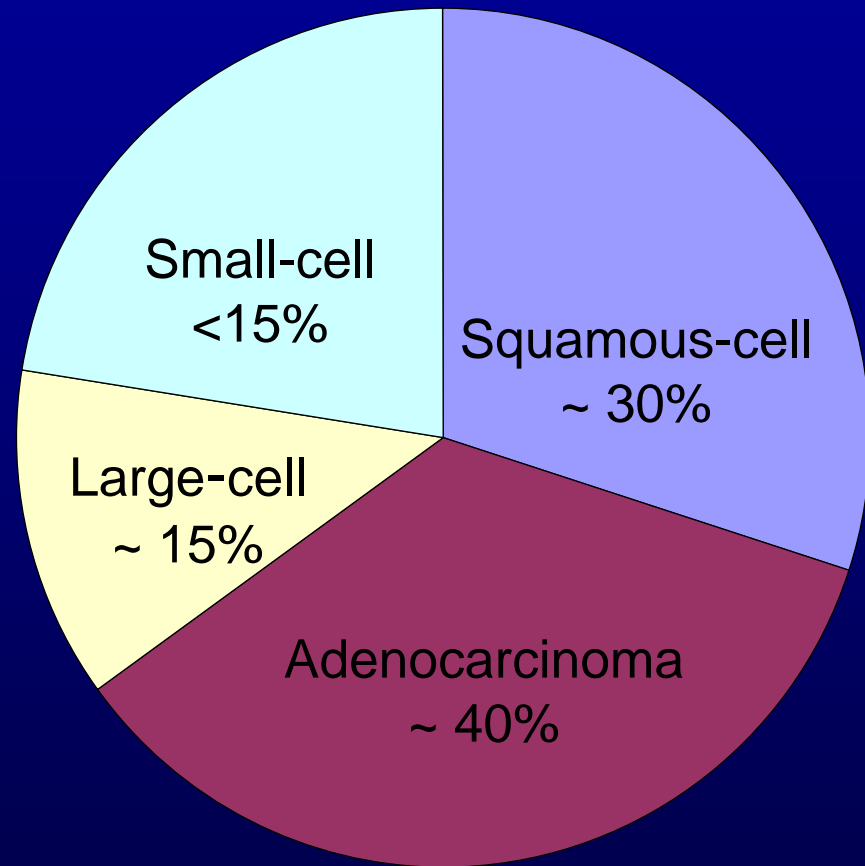
# NON-SMALL CELL LUNG CANCER

## Signs and Symptoms at Diagnosis



# Lung Cancer Histology<sup>2</sup>

- Non-small cell (NSCLC)
  - Squamous-cell (↓)
  - Adenocarcinoma (↑)
  - Large-cell
  - BAC (↑)
  - Other (NOS)
- Small-cell (SCLC)
  - Decreasing incidence
  - Now <15% of all lung cancers



# SMALL-CELL LUNG CANCER

- Accounts for approximately 15% of all lung cancers
- 60% of patients have ED, 40% have LD
- For limited-stage disease
  - Overall response rates, 85%–95%
  - Complete response rates, 50%–60%
  - Median survival, ~20 mo.
  - 2-yr DFS rates, ~40%
- For extensive-stage disease
  - Complete response rates, <20%
  - Median survival, ~8–10 mo.
  - Almost all patients dead within 2 yr.

# TNM\* Staging of NSCLC<sup>3</sup>

Stage IA	T1	N0	M0	
Stage IB	T2	N0	M0	
Stage IIA	T1	N1	M0	
Stage IIB	T2 T3	N1 N0	M0 M0	

\*T = primary tumor; N = nodal involvement; M = distant metastasis

# TNM\* Staging of NSCLC (cont)<sup>3</sup>

Stage IIIA	T1-3 T3	N2 N1	M0 M0	
Stage IIIB	T4 Any T	Any N N3	M0 M0	
Stage IV	Any T	Any N	M1	

\*T = primary tumor; N = nodal involvement; M = distant metastasis

# Staging of NSCLC following initial Staging Chest CT

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- Stage I/II – asymptomatic – no further W/U
- Stage I/II – symptomatic (specific or non-specific) – PET, Brain MRI/CT
- Stage III – with or without symptoms– PET, Brain MRI/CT
- Stage IV – symptom-directed staging
- PET superior to bone scan for bone mets
- PET detects stage IV disease in 10-20% of cases

# Staging of the Mediastinum following initial Staging Chest CT

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- CT alone has accuracy rate of 65% in determining the true status of the mediastinum
- PET with CT improves the overall accuracy
- PET has too many false-negatives and false-positives
- Mediastinoscopy remains the GOLD STANDARD
- Pathologic documentation is necessary and can also be achieved with the WANG needle or trans-esophageal/bronchial ultrasound-directed biopsies

# NSCLC: Therapeutic Options by Stage

Stage	Treatment Options	5-Year Survival
IA	Surgery	>70%
IB	Surgery $\pm$ Adjuvant CT	60%
IIA	Surgery + Adjuvant CT	50%
IIB	Surgery + Adjuvant CT	30-40%
IIIA (N2-) IIIA (N2+)	Surgery + Adjuvant CT CT $\pm$ XRT $\pm$ Surgery	25-40% 10-30%

# NSCLC: Therapeutic Options by Stage (cont)

Stage	Treatment Options	5-Year Survival
IIIB (N2-3)	CT/TRT $\pm$ CT	<10%
IIIB T4N0	CT/TRT $\pm$ Surgery	<5%
IIIB (with pleural effusion)	CT	<2%
IV	Palliative Radiation Symptom Management	