Lung Cancer

A Case Study of Genetics and Environment

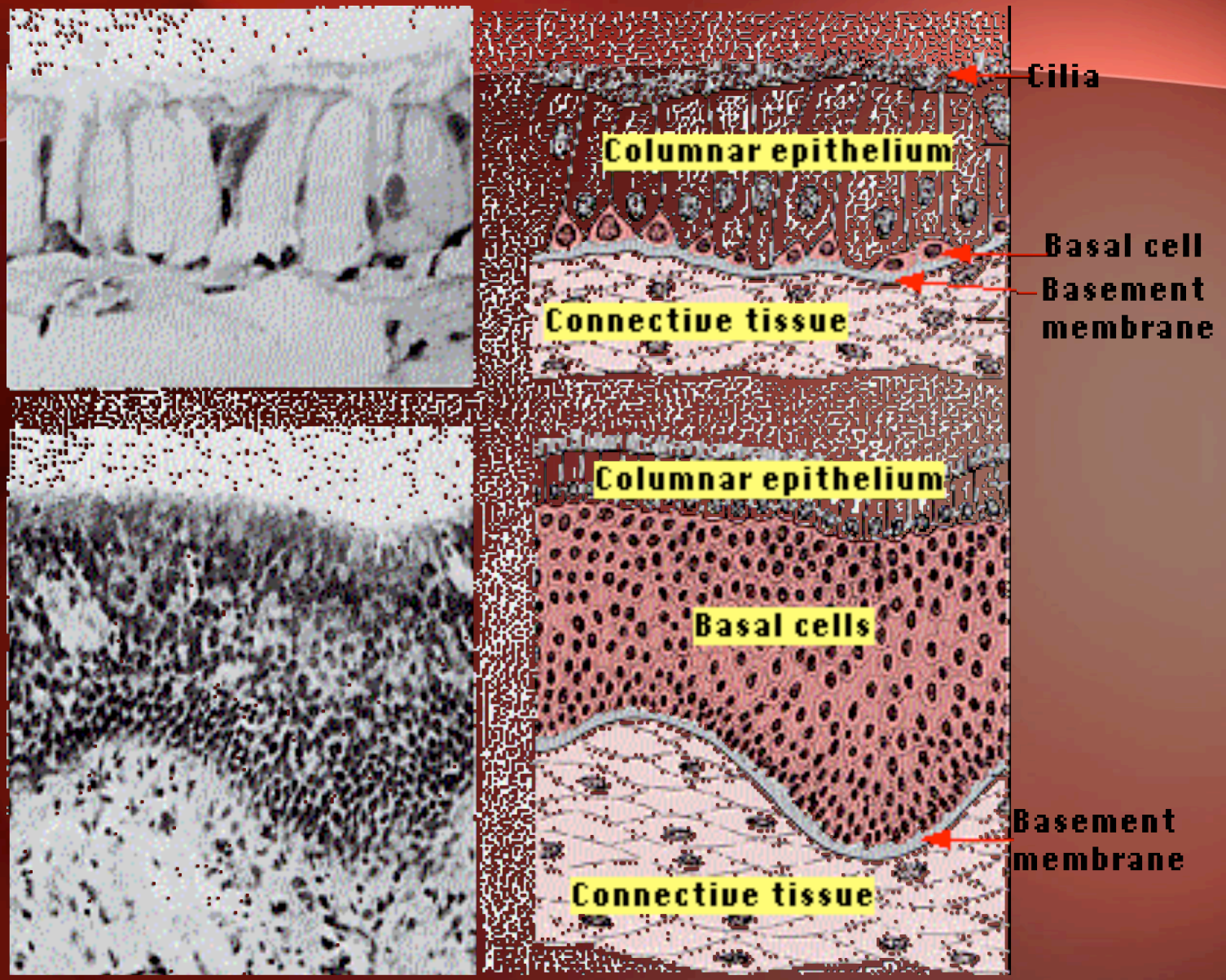
James Nguyen
Biochemistry 118Q
Doug Brutlag

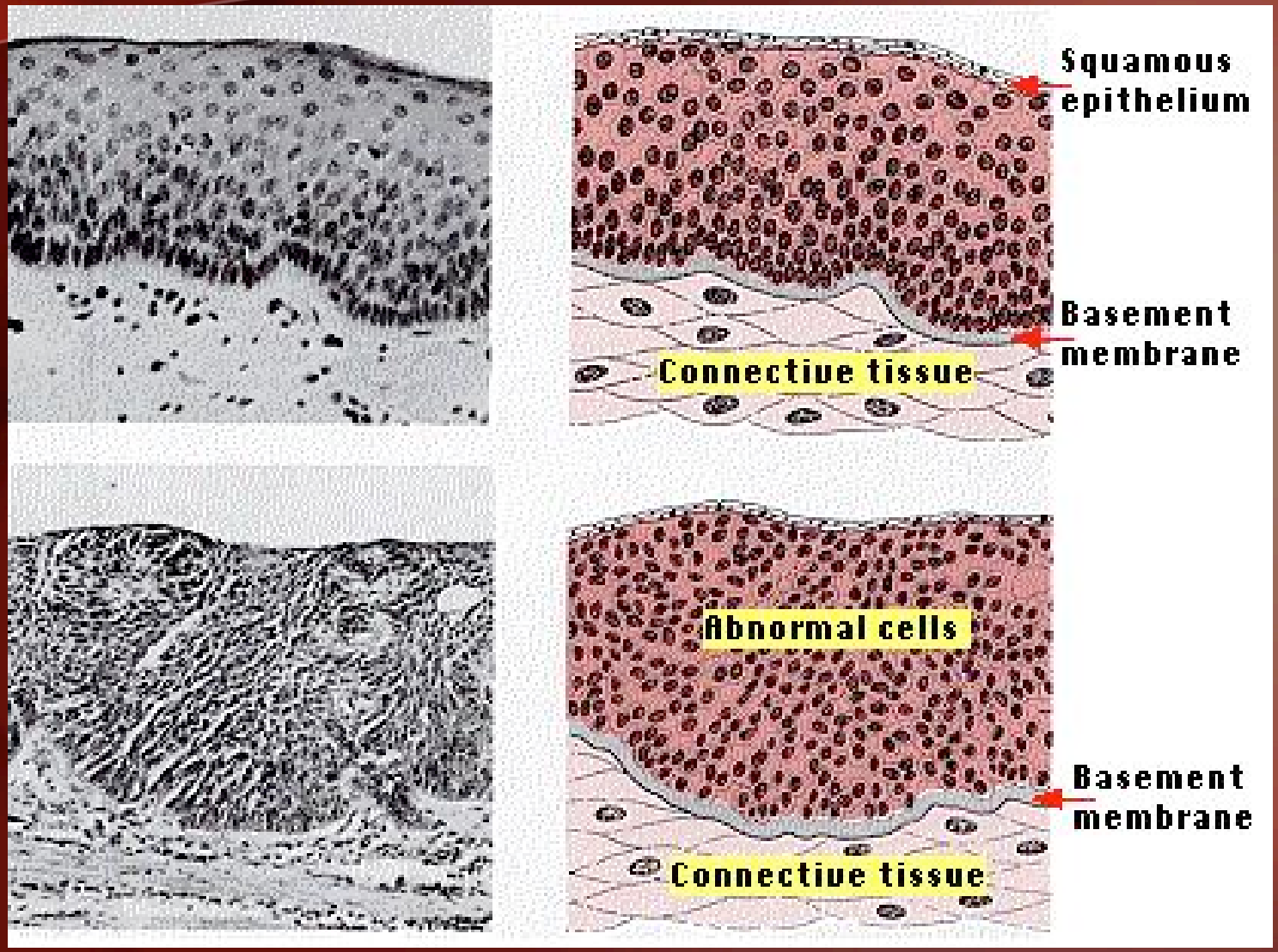
Lung Cancer

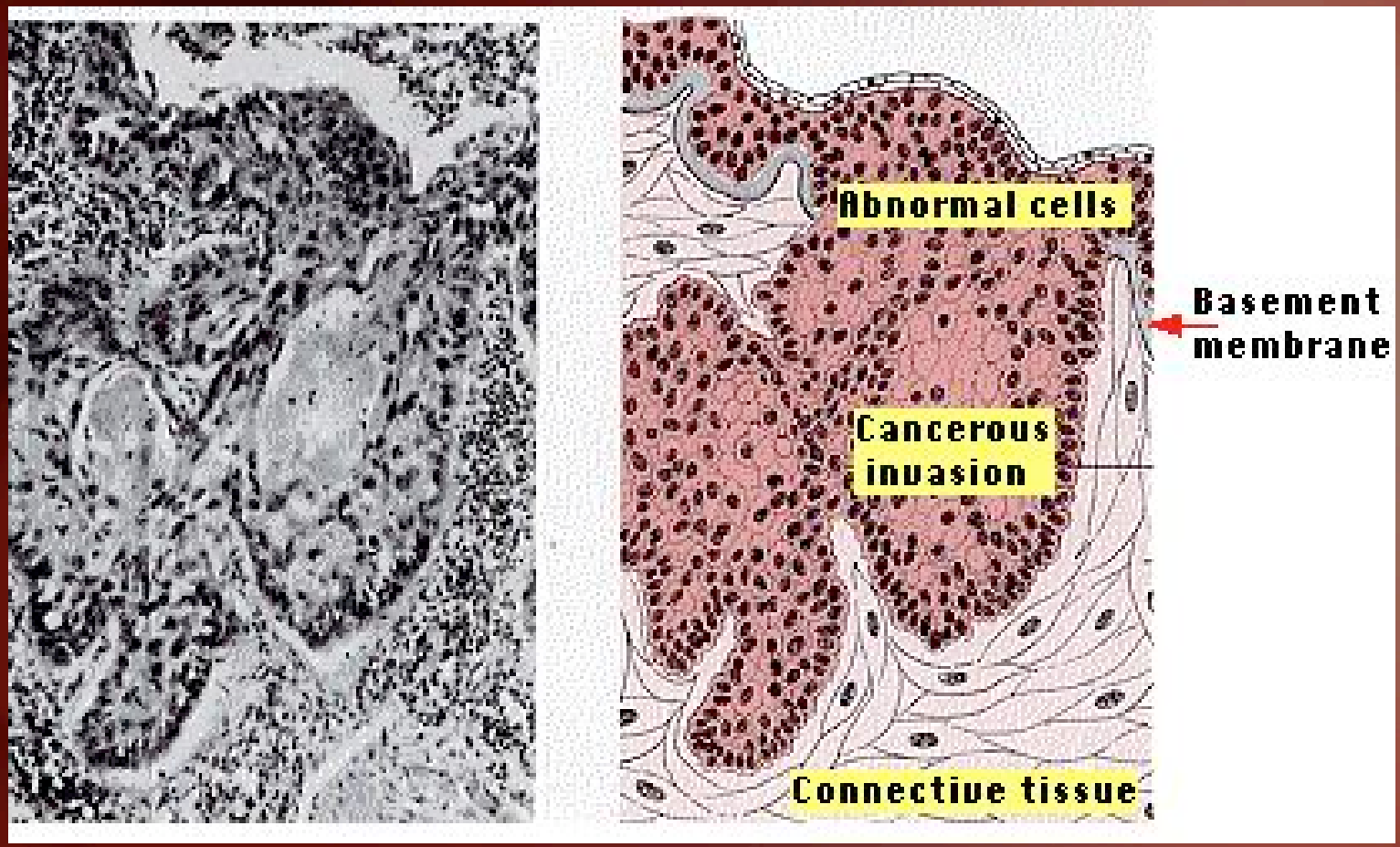
- Leading cause of cancer for men and women in United States
- Every year, about 164,000 new cases are diagnosed in the US, with an estimated 157,000 deaths.
- Leading cause of cancer death

Types of Cancer

- Squamous cell carcinoma
- Adenocarcinomas
- Large cell carcinomas
- Small cell carcinomas

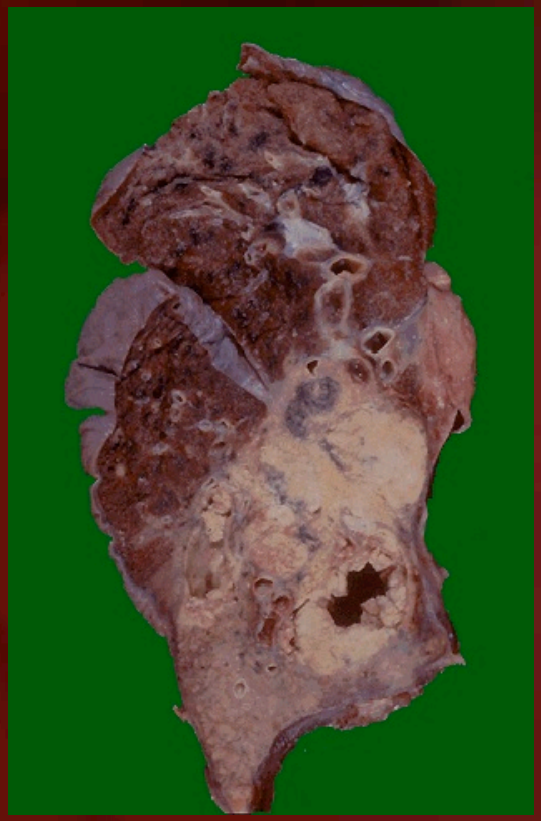

Cilia
Columnar epithelium
Basal cell
Basement membrane
Connective tissue
Columnar epithelium
Basal cells
Basement membrane
Connective tissue


Squamous epithelium
Basement membrane
Connective tissue
Abnormal cells
Basement membrane
Connective tissue

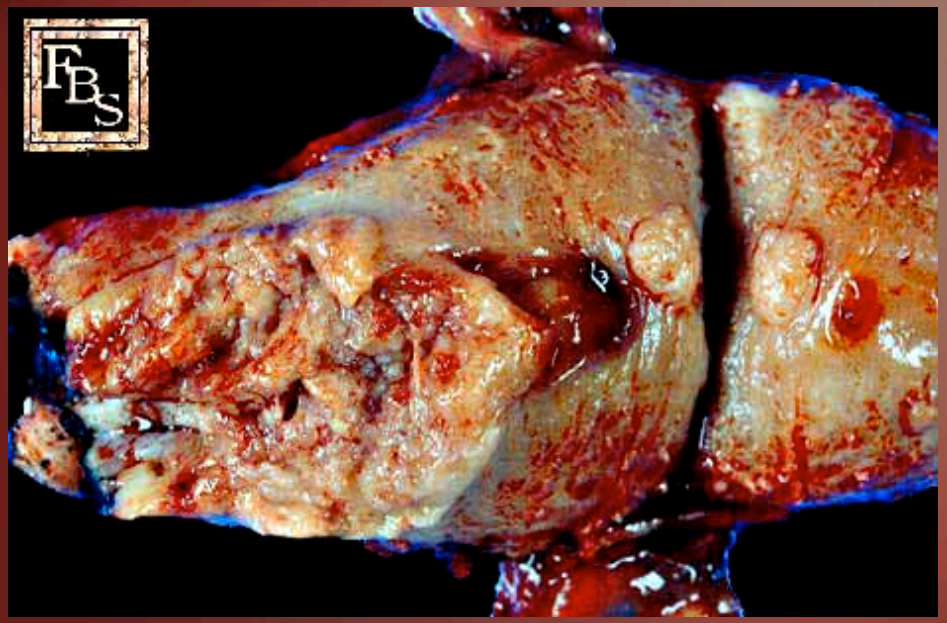

Abnormal cells
Basement membrane
Cancerous invasion
Connective tissue

- **Normal Lung**

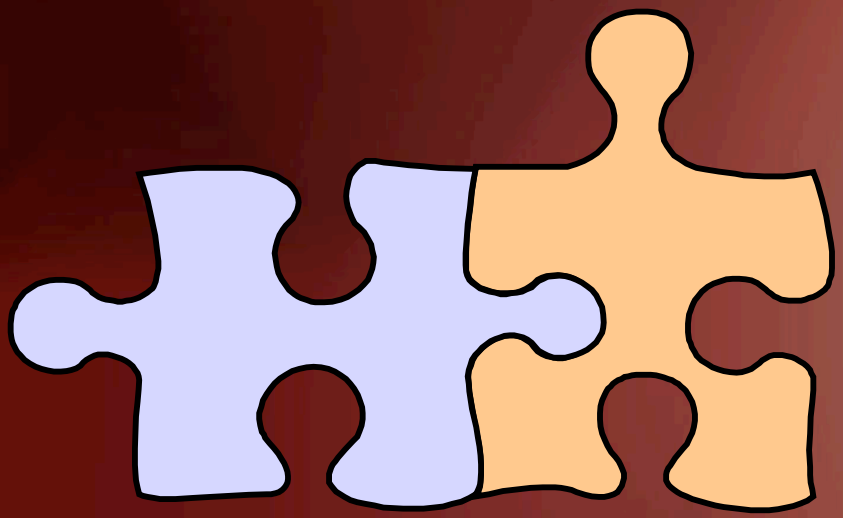
Squamous cell carcinoma



Adenocarcinomas



Causes of Cancer



Genetic Factors

Carcinogenic Substance Exposure

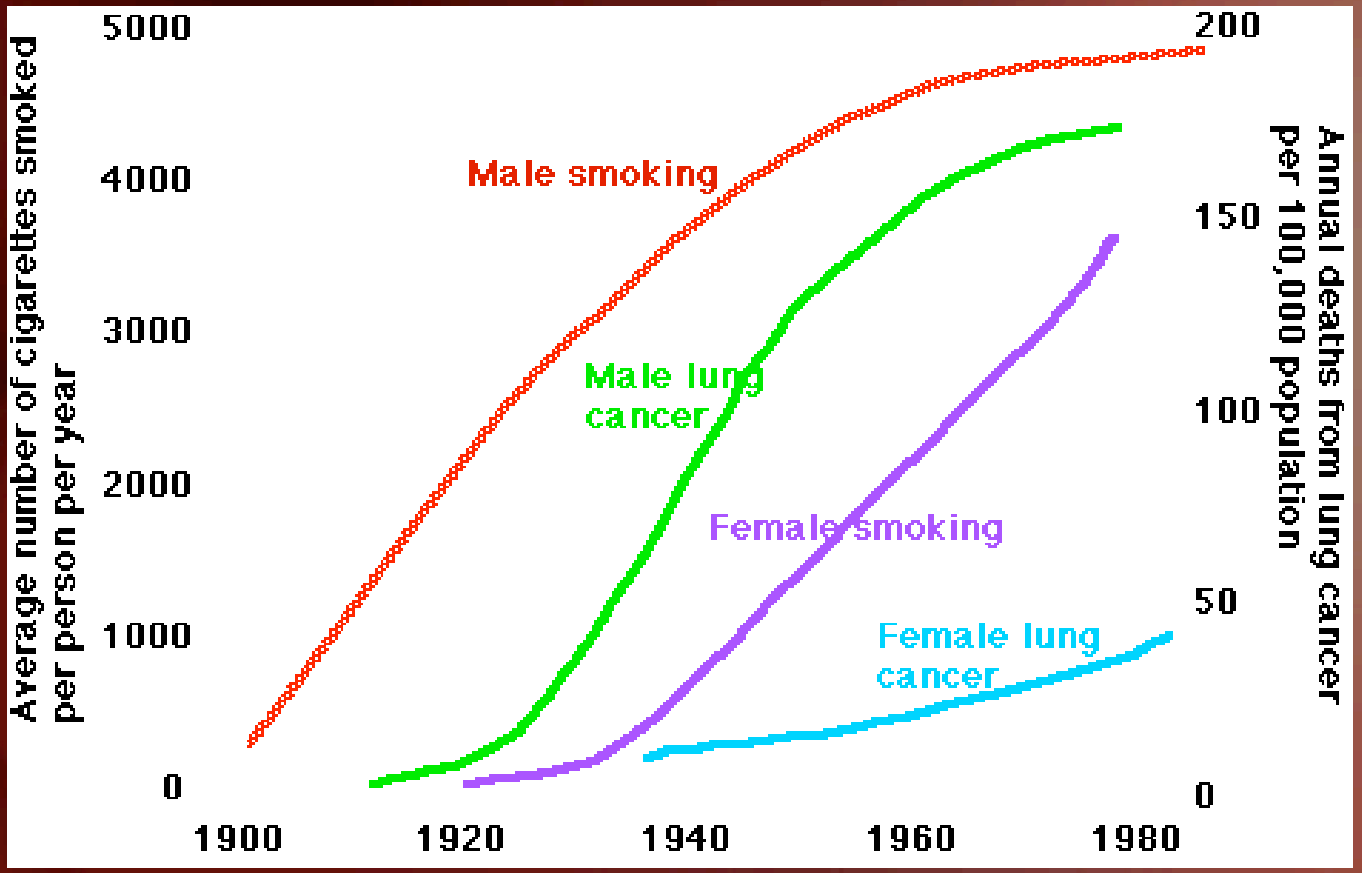
Carcinogens Substances

Environmental Factors and Exposure

Smoking and Secondhand Smoke

Cigarette Smoking

- Higher risk of lung cancer
- Higher cancer mortality rate
- 4,000 different chemicals, many carcinogens
- Roughly 90% percent of lung cancer deaths are rooted in smoking


Average number of cigarettes smoked per person per year
5000
4000
3000
2000
1000
0
1900
1920
1940
1960
1980
200
150
100
50
0
Annual deaths from lung cancer per 100,000 population
Male smoking
Male lung cancer
Female smoking
Female lung cancer

&

Genetic Factors

- Lung cancer free survival among old heavy smokers
- Extremely exposed, extremely resistant aged survivors
- Genetic resistance or susceptibility
- Family Heredity
- Women

Genetic Mutations

- FHIT
- GRPR
- SLC22A1L
- p53
- KRAS2
- BRAF
- Many, many more...

Genetic influence on Cancer

- Tumor-suppressor genes
- Oncogenes
- Chemotherapy resistance

Treatment

- Genetic screening to determine cancer type
- Varies with cancer type: Nonsmall Cell Lung Cancer (NSCLC) or Small Cell Lung Cancer (SCLC)
- NSCLC – Surgery and Radiation/Chemotherapy
- SCLC – Radiation/Chemotherapy, selected surgery situations

Main Thought

- **Inherited mutations in these genes seem to rarely cause lung cancer, but some people inherit a reduced ability to detoxify certain carcinogens, and environmental factors can be the deciding factor in cancer onset.**