TIME TRAVELLING TO THE ORIGINS OF LUNG CANCER

Anthony A. Gal, M.D.
Professor Emeritus
Emory University School of Medicine, Atlanta, Georgia

LUNG CANCER IN THE EARLY 21st C

- Global epidemic
- Most common cause of cancer-related death in M & F
- Survival stage and histology dependent
- Majority (~80%) related to cigarette smoking
TIME TRAVELING
• Charles Dickens: A Christmas Carol (1843)
• H.G. Wells: The Time Machine (1895)
• Star Trek (1966–1969)

30 Episodes (1966–7)
Irwin Allen, Producer

Project Tic-Toc
“Two American scientists are lost in the swirling maze of past and future ages, during the first experiments on America's greatest and most secret project, the Time Tunnel. Tony Newman and Doug Phillips now tumble helplessly toward a new fantastic adventure, somewhere along the infinite corridors of time.”

MID 20th C
52% men and 35% women cigarette smokers

Targeted markets: Virginia Slims (1970’s) & Menthols (1960’s)
Oscar Auerbach’s “Smoking Beagles” (1967-1970)

HISTOLOGIC CHANGES IN BRONCHIAL TUBES OF CIGARETTE-SMOKING DOGS
Oscar Auerbach, MD,* E. Ceylex Hammond, S.C.D.,* David Kunman, BS Lawrence Carpenter, MA,* and Archie Pust Stou, MD,*

Epidemiological studies linking smoking to lung cancer (1950's)

Tobacco smoking as a possible etiologic factor in bronchogenic carcinoma
A Study of Six Hundred and Eighty-Four Proved Cases
Ernest L. Wynder
and
Evarts A. Graham, M.D.
St. Louis

British Medical Journal
London Saturday September 30 1950

Smoking and Carcinoma of the Lung
Preliminary Report

US Surgeon General Smoking and Health (1964)

Luther Terry, M.D.

WW II

• Highest consumption of cigarettes
• Mass marketing, advertising, sponsorship
• Cigarette smoking & lung cancer [Oshner/Debakey (1939)]
INTERWAR YEARS

• Increasing tobacco consumption
• Cigarette advertising and sponsorship
• German autopsies: more cases of lung cancer
• Small cell carcinoma [Barnard (1926)]
• 1st histological classification [Marchesani (1924)]

ETIOLOGIES OF LUNG CANCER IN EARLY 20th C.

Industrial and occupational exposure
  - Air pollution
  - Benzene
  - Arsenic
  - Nickel
  - Chromium
  - Asbestos

Automobile related:
  - Motor vehicle exhaust
  - Asphalt
  - Tarred-roads

Latent exposure from toxic gas injury during WW I
Chronic irritation following 1918-9 influenza pandemic
WW I
• “Doughboys” tobacco rations
• Cigarettes given by philanthropic organizations

Seductive and Romantic Advertising

ISAAC ADLER, M.D. (1849-1918)
• Primary Malignant Growths of the Lungs: a Pathological and Clinical Study (1912)
• First book dedicated to lung cancer
• “Among the rarest form of disease”
• Suggested a link between cigarette smoking & lung ca
TURN OF THE CENTURY

- Extremely rare: 140 cases [M. Kaminsky (1898)]
- “Polite smoking”
- Decline in pipe smoking

Radiography (Roentgen 1895)

Rigid bronchoscopy (Killian 1895)
Bonsack Cigarette Rolling Machine (1880)

American Tobacco Company (1890-1994)

• James B. Duke (1859-1924)
• 90% of cigarettes
• 1911: Dissolved into 4 companies

MID 19th C

• Johannes Müller / Carl von Rokitansky / Rudolf Virchov
• TB vs. lung cancer: very difficult to separate
• “Growth” arose in lymph nodes
  • Invaded into bronchi
  • Cicatric, sclerosing, ulcerating
  • Encephaloid, lymphosarcoma, sarcoma primitif
Goya: La merienda en el Manzanares

1831 « petit cylindre de tabac haché roulé dans du papier très fin » (Balzac, Œuvres diverses.)
18th C

• Percival Pott (1714 -1788): scrotal cancer in chimney sweeps (1775)

• Giovanni Morgagni (1682 -1771): *Ulcus cancrosum* (1761)

• Bernardino Ramazini (1633 - 1714): *De Morbis Artificum Diatriba* [Diseases of Workers] (1700, 1713)

16th C

• “Everything comes from the mine” (Alles kommt vom Bergwerk her)

• Ore Mountains (Erzgebirge / Krušné hory)

• Rich in ores
  • Silver
  • Iron
  • Pitchblende
Fatal pulmonary disease in miners

Mountain Disease

Bergsucht

Schneeberger Bergkrankheit

“Marry early & leave when they die in their early 40’s a large number of children”

GEORGIUS AGRICOLA (1494—1555)

• “Father of mineralogy”
• Town physician in St. Joachimsthal /Jáchymov (1527-1533)
  • Joachimsthaler coins → taler → dollar
• Observed numerous diseases in miners

DE RE RE METALLICA (1556)

• 12 volumes: mining and metallurgy
• 270 woodcut images
• Described many diseases of the miners (Vol VI)
  • “Death pits”
  • “An angel choking old miners to death”
  • “If the dust has corrosive qualities, it eats away the lungs”
  • “Women have married 7 husbands….carried off to a premature death”
WHAT IS THIS MINERS’ DISEASE?

- Lung Cancer
- Tuberculosis
- Silicosis
- Mesothelioma
- Toxic fume-related injury
- Others / Combinations

ORE MINERS & LUNG CANCER

Friedrich Hugo Härting
Walther Hesse (1846-1911)

Der Lungenkrebs, die Bergkrankheit in den Schneeberger Gruben.
Von
Bergarzt Dr. F. H. Härting in Schneeberg
und
Beschulz Dr. W. Hesse in Schwarzenberg.

Vierteiljahresschrift für gerichtliche Medizin und öffentliches Sanitätswesen
Neue Folge 30 (1879) 296-309, 31 (1879) 102-132, 31 (1879) 312-337

Fasten your seat belts, it’s going to be a bumpy night!
(Bette Davis)
ORE MINERS & LUNG CANCER

• Autopsies of miners & pathology reviewed at Pathological-Anatomical Institute @ Leipzig University
• “Lymphosarcoma” & “endothelial” carcinoma
• The endemic lung disease is lung cancer
• Responsible for 75% of deaths in miners

RADIATION CONNECTION

• Radioactivity: Henri Becquerel (1896)
• Erzgebirge pitchblende ore rich in uranium, polonium, and radium
  • Pierre and Marie Curie (1898)
• Radon gas: Friedrich Ernst Dorn (1900)
• Radioactive decay: $^{238}\text{U} \rightarrow ^{226}\text{Ra} \rightarrow ^{222}\text{Rn}$
• Connection between radon and lung ca [Rajewsky (1939)]

CONCLUSIONS

• Lung cancer has been part of humanity
• Masked by other diseases
• Clues to pathogenesis in 16th C, but not until past 100 years
• 19th-21st C tobacco consumption
• Lung cancers in non-smokers

IN THE FUTURE
“Mission Possible”

• Next generation of pathologists and other time travelers