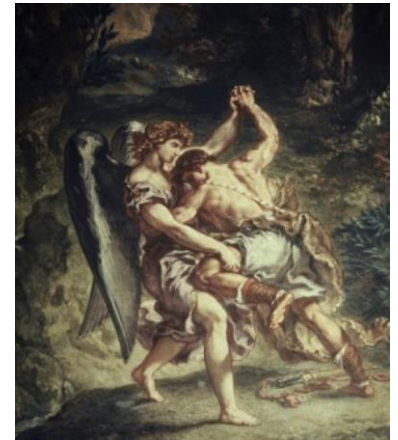


# Grappling with the question “What is an occupational disease?”



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## Only partly a “science” question

1. Legal question – statutory and common law
2. Professional ethical question
3. Political question

*So the answer depends on who's asking*

# Occupational medicine/health practitioners?

Management of *individual employee*

- Work deployment
- Workers' compensation
- Specific medical treatment (e.g. lead, pesticide toxicity).
- Impairment and disability assessment

*Preventive purposes* - exposes a causal factor at work which is potentially modifiable.

- Employer action needed
- Regulatory authority informed.

*Ethical discharge of duties* – reporting and prevention

# Regulators?

- Is there enough evidence of a causal association (epidemiology, toxicology)
- Will the benefit to society of ‘listing’ the disease as occupational and compensatable exceed the costs to the industry or economy? (Political will)

## Unions, NGOs, political interest groups?

- Are workers being harmed and if so what is being done about it?
  -
- Is justice being done – e.g. are affected workers and their families receiving fair compensation?
  - E.g. asbestos workers; gold miners

## Litigation lawyers?

- Given all the above, will it be possible to convince a judge or jury that my client(s) is the victim of negligence and therefore deserving of common law damages?
- Or convince the defending employer that a settlement is in their best interests?

# Why do we need to get the answer right (or avoid getting it wrong?)

Diagnosis of an occupational disease imposes *responsibilities and/or costs* on the various workplace players:

- Employer - workers' compensation, redeployment or even retrenchment of employee
- Employee - threat to job security, unrealised workers' compensation benefits
- Regulatory authority - inspection and enforcement
- Compensation Fund
- Litigation

# The road to occupational disease recognition: history





## 16<sup>th</sup> century

Dr. George Bauer (Georgius Agricola), 1554, metal miners:

- *The dust .... penetrates into the windpipes and lungs and produces difficulty in breathing ..... If the dust has corrosive qualities, it eats away the lungs, and implants consumption in the body ...”*
- *“... there is no compensation which should be thought great enough to equalize the extreme dangers to safety and life.”*
- Lead, carbon monoxide



# Bernardino Ramazzini (1700)



- 50 occupations and their diseases
- *“Let us now invite the doctors, lovers of elegance and cleanliness, to leave the apothecaries’ shops so full of the aroma of cinnamon and where they feel at home, and take them down to the latrines. There is no doubt that, as the saying goes, they would turn up their noses. Nevertheless since one of a doctor’s tasks is to examine the stool and urine to check the organism’s internal functions every day, the very same doctors should not avoid such places.*
- *In doing so, they would become aware of the illnesses that afflict latrine workers who clean out sewers. “For a doctor must inspect the unseemly and handle the horrible” says Hippocrates”*

## 18th, 19th centuries

Pott, 1775: *Scrotal cancer* in chimney sweeps.

St. Peterburg 1829: *Etherism* (psychoneurological symptoms) in hatters due to mercury



*Potter's colic*: Abdominal cramps due to lead poisoning from lead glazes used in the pottery industry.



Vienna, 1839: *Phossy jaw*: necrosis of the bones of the jaw due to white phosphorus originally used in the manufacture of matches



## Modern era

- 1970s – 2000s: *specific toxins*: asbestos, lead, silica, vinyl chloride; physical conditions: noise, heat
- 1980s -- > “Ergonomic stresses” - musculoskeletal disorders
- “Class effects”: organic solvents
- Psychosocial stresses (via *job strain*): cardiovascular disease
- Shift work (chronobiology): breast cancer

# Trending

➤ Climate change:

Heat related disease – e.g. “Mesoamerican nephropathy”

➤ Novel technologies – e.g. nanoparticles

➤ Change in nature of work - psychosocial

“Physician burnout” US

→ Blurring of boundaries between occupational disease, public health, and change in economic status - gig economy, casualisation disappearance of fixed working hours and family/work division

# The road to occupational disease recognition: research



## Definition of occupational disease?

- Disease closely associated *primarily* with specific occupation or exposure.
- Higher frequency among those with that occupation or exposure than *appropriate* control group.
- Distinguished from *work-related disease* which multifactorial causation of which work is not primary one.
- *Work-aggravated* disease – “pre-existing” or clearly non-occupational condition aggravated work exposure or conditions.

*Fuzzy boundaries!*

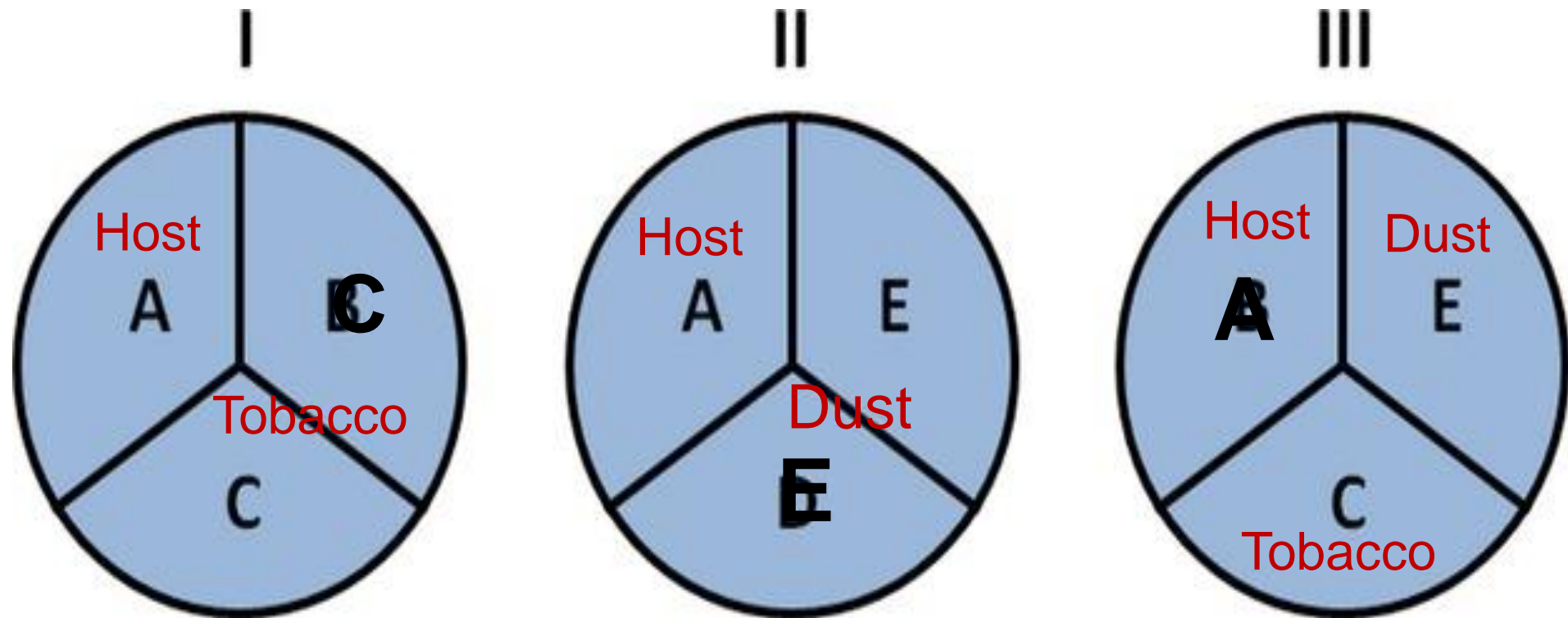
# Bradford Hill guidelines for causality in epi studies

- Consistency
- Temporality (issue of latency)
- Strength of the *relative* association (*excess* risk)
- Exposure-response relationship
- Biological plausibility
- Specificity
- Analogy



# How does epidemiology deal with multifactorial diseases: “causal pies”, e.g. COPD

## Component causes and complete(d) causes



## Sources of data

- Clinical observation; concentration of cases (particularly rare diseases, = “outbreaks”);
- Modern *epidemiology*: case-control study: and cohort studies - able to deal with common diseases, multifactorial diseases, long latency diseases (cancer)
- *Laboratory* production or replication of a toxic effect
  - Animal models
  - Mechanistic: genotoxicity; oxidative stress; immunological
  - “Predictive” - structure-effect relationships

# The road to occupational disease recognition: politics and law



# Modern sources of authority

## Statutory

1. Worker compensation laws - Schedule 3 of COIDA
2. International Labour Organisation (Kim et al, Ann Occup Environ Med 2003)

## Advisory

1. International Agency for Research into Cancer (IARC)
2. NIOSH

# Politico-legal process to occupational disease

- Different countries have different statutory (regulation, compensation)
- UK 1895: first country to list occupational diseases
- Delays between recognition and research e.g. mesothelioma in South Africa – Wagner 1961; mesothelioma listed (COIDA) in 1992.
- Listings contested – because of the costs mentioned earlier:
  - TB in miners
  - TB in health workers
- ILO list since 2002– “Recommendation”

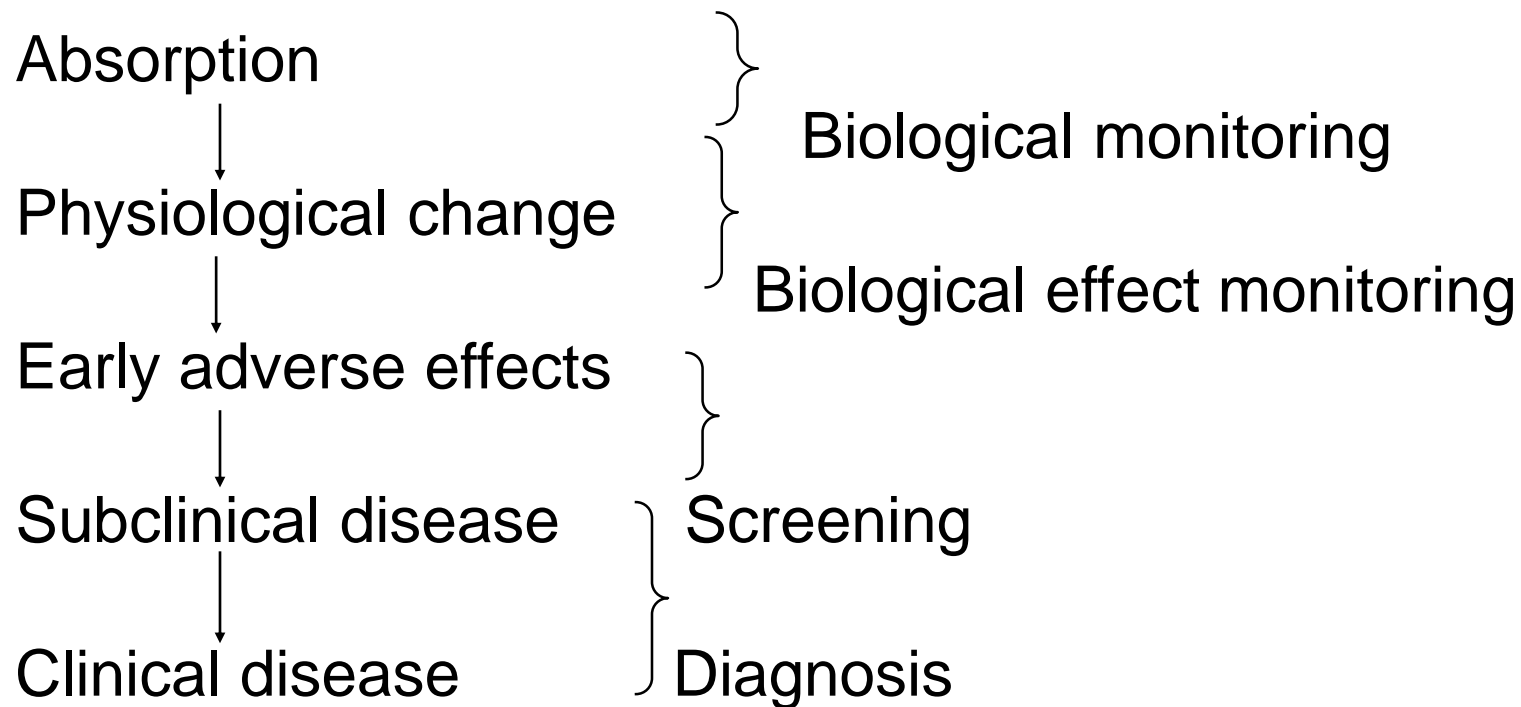
## Legal definitions – burden of proof

- “More likely than not” - translated as  $> 50\%$  probability .
- In epidemiologic terms, work attributable fraction  $> 50\%$ ; relative risk  $> 2$ .
- *Rule of presumption* - Schedule 3 of COIDA, ILO list
  - Condition plus exposure

# Ethical issues – deciding in the face of uncertainty or resistance

- Medical surveillance – asking questions where one doesn't know what to do with the answer.
- Handling resistance to reporting occupational disease
- Weighing the costs of a false positive (overdiagnosis) against a false negative (underdiagnosis)

# Medical surveillance – what is the threshold for an occupational disease?





# Our role as occupational medicine practitioners in answering the question

- Understand the toxicology and exposure-response relationships of hazardous agents in the workers'/patient's workplace.
- Understand the burden of proof in our medicolegal system and the meaning of presumption
- Acceptance of the ethical burden of a precautionary responsibility

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