

Occupational bladder cancer: Sheffield study

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Case analysis study of bladder cancer in Sheffield

Stage 1:

- 5 Sheffield GP practices, 30,000 total list
- All men under 80 years of age with bladder cancer
- 26/31 interviewed, audit for benefit entitlement

Stage 2:

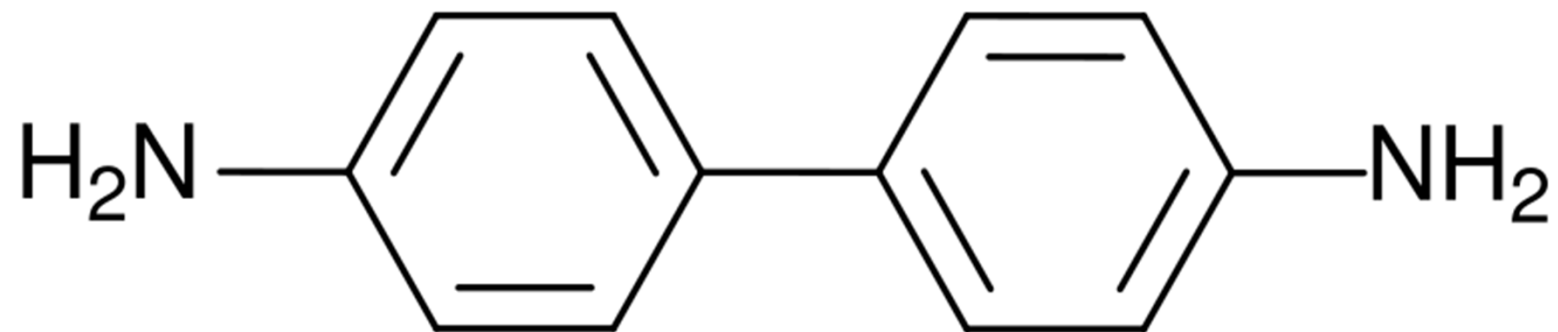
- 1250 patients with bladder cancer diagnosis in urology department

Summary of findings

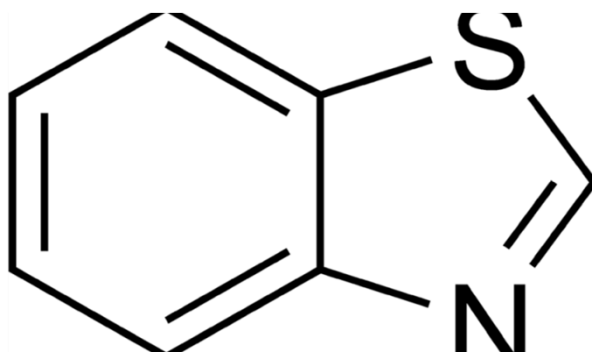
	Criterion	Stage 1	Stage 2
1	Presumption	Coking plants, foundry, oil refinery operative	similar
2	Environmental	Smoking, fishing	smoking
3	Dose-related inference	PAHs in driving, forging, heat treatment	similar
4	Genetic factors	first order relatives	
5	Inference rules	Cadmium exposure, dye penetrants	Cytologists, photographic processing, paper-processing, plastic processing,

Recognised bladder carcinogens for state compensation

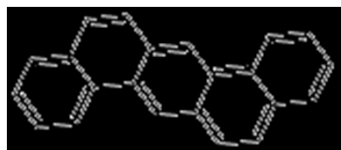
Substance	Occupations covered
methylene-bisortho-chloroaniline (also called MBOCA)	Manufacturing of
orthotoluidine, 4-chloro-2-methylaniline or salts of those compounds	Any exposure to
Coal-tar pitch volatiles	Aluminium-smelting
1-naphthylamine, 2-naphthylamine , benzidine , auramine, magenta or 4-aminobiphenyl (also called biphenyl-4-ylamine)	Production of, or any exposure to
Entitlement to Disablement Benefit from DWP requires exposure to one of the above and disablement amounting to 14% or more	



Benzidine



Benzothiazole



Class 3: require information on dose and risk

Epidemiological/toxicological evidence that
occupations or exposures have excess risk

- Collaborative for Health and the Environment

<http://www.healthandenvironment.org/tddb>

- OCCAM

www.occam.it

Class 3

ID	Age	Exposure duration	Latency range	
3.1	44	4 years 23	18, <2	Spring maker: oil-quenching fumes 6 months (Father worked in same job and also had a bladder tumour) Incident of 'powder form of tar chemical on face'
3.2	67	36	2-38	Bus driver: exhaust fumes
		3 years	46-49	Forge labourer
3.3	58	6	34-44	Blast furnaceman: coke fumes
		6	28-34	Train driver: diesel skin contact and exhaust fumes
		4	24-28	Slag-recycling: furnace dust
3.4	74	20	38-58	Engineer, mineral oil
		17	21-38	<i>Cutting steel ingots dry</i>
3.5	72	29 years	22-51	<i>Rolling mill: metal fumes, oil fumes.</i>
3.6	70	18	26-47	<i>Drop-stamper. Quenching fumes – heavy ingestion</i>

Occupations with unknown carcinogens

- Sales occupations
- Protective service occupations
- Police
- Building finishers
- Cleaners
- Health professionals
- Welders
- Sheet metal workers
- Plumbers
- Electrical and electronic trades
- Forestry workers
- Many agricultural operations

Class 5: homologous site

ID	Age diagnosed	Exposure duration	Latency range	
5.1	45	25	0-25	Electrical installation engineer Soldering: Cadmium solder, contact cleaner (siloxane coating)
5.2	62	2 years	39-41	TV Retail: 'Recycling' TV tubes: Cadmium phosphors inhaled
		30 years	7-36	Electrical repairs: Solder fumes (potential Cadmium exposure), Contact cleaner (siloxane coating)

Individual inference

In the individual case the likelihood of the case being occupational depends on

- the pre-test odds, and
- the relative likelihood of a case occurring amongst exposed compared with unexposed individuals.

This gives the post-test odds

This is not news to clinicians !

Inference in individual cases

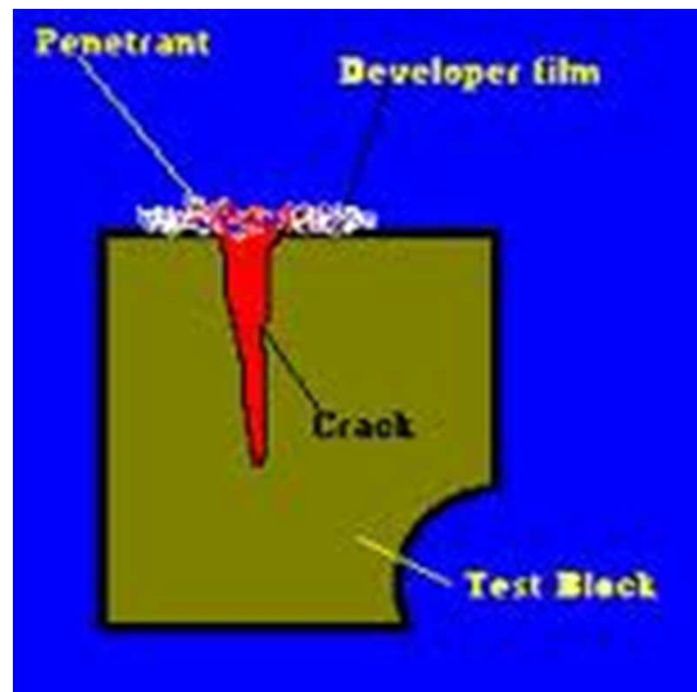
- What are the pretest odds of a case being occupational ?
- What is the likelihood of an occupational case having the observed plausible exposure ?
 - The most problematic element
- What is the likelihood of the observed exposure in non-cases (reference population) ?
- Derive the post-test odds using LR

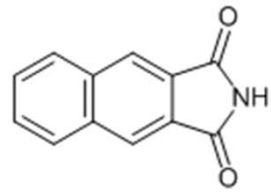
In practice this can be at best only a semi-quantitative approach because the LR is only approximatable.

Cf Vandentorren et al, Imputation of individual cancer cases to occupational causes. SJWEH 2006; 32: 32-40

Class 5: Inference rule

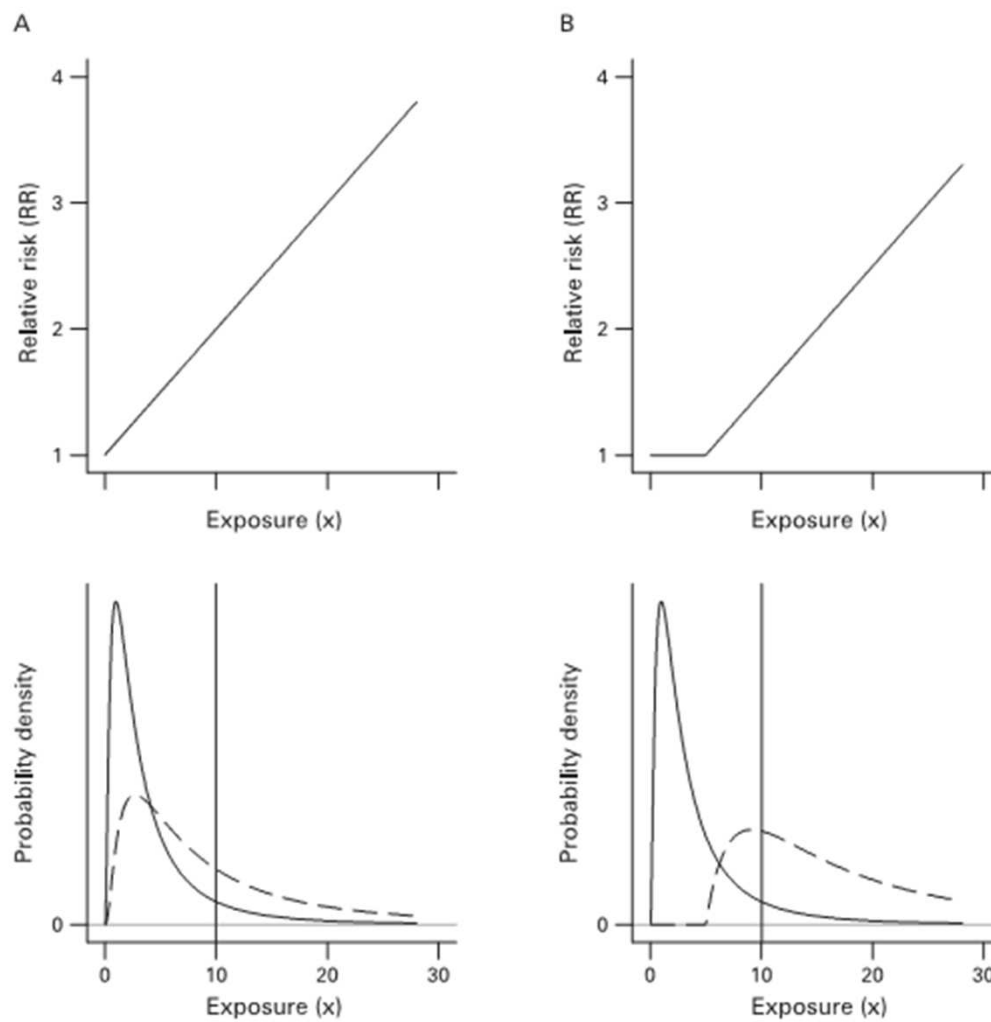
ID	Age	Exposure duration	Latency range	
5.3	59	25	0-25	Fettler, arc-air gouger; dye penetrants
		4	40-44	Furnaceman: producer gas waste
5.4	65	8	16-24	Bar-examiner: dye penetrants,
		8	24-32	Radiac saw operative: rustproofing oil, diesel.
		15	34-47	Heat treatment slinger: quenching oil and fumes





naphthalimide

Proportion of attributable cases with different levels of exposure (Armstrong and Darnton, 2008)



What do we mean by plausible ?

- External exposure
- Internal exposures
- Route of exposure
- Metabolic or physiological pathway in the body
- Site of cancer

Outcomes

- Azo dyes: HSE activity
- Cadmium as possible bladder carcinogen
- Industrial Injuries Scheme claims
- Public health/Cancer Registry interest
- Urologist involvement
 - Research
 - Routine recording of occupation
- *More generally (other occ cancer cases): IIAC involvement,*

A database

Because the risk distribution in the population is wide (cf mesothelioma) and short, high exposures are important, epidemiology tends to produce inconclusive evidence. Cases will often involve relatively uncommon occupations, tasks or exposures.

<http://octan.resounddesign.co.uk>

Recognised bladder carcinogens

<http://www.healthandenvironment.org/tddb/disease/?itemid=707>

Strong or good

- PAHs
- Aromatic amines
- Trihalomethanes
- Chlorinated hydrocarbon solvents, etc
- Arsenic
- Ionising radiation

Weak

- Lead
- Chromium
- Asbestos
- Various pesticides
- Nitrosamines