



PRINTING, BLADDER CANCER AND C23 BENEFIT

INTRODUCTION

Bladder Cancer is described as Prescribed Disease C23, and as such is one that has been officially accepted as a special risk of certain specified occupations, or of exposure to specified substances.

Most occupational Bladder Cancers have been linked to work in the manufacture of dyestuffs, in the rubber and cable industries and in the retort houses of gasworks producing coal gas. However, it is widely accepted that the incidence of Bladder Cancer may be raised in certain other industries, including the printing industry. This has been recognised by many articles on Bladder Cancer, but in particular by the Industrial Injuries Advisory Council in their 1983 report on Neoplasm of the Bladder, where they stated that:

"There is some evidence that certain industries, in addition to the chemical and rubber and cablemaking industries, notably leatherwork and printing..... have a raised incidence of Neoplasm of the Bladder, but it has not yet been established why this is so".

In fact, since then a number of medical tribunals have awarded prescribed disease benefit to printers with Bladder Cancer, and more evidence now exists to suggest that currently prescribed substances have been the cause of such cancers amongst printers.

In the case of Bladder Cancer, the prescription refers to work involving certain substances, rather than specific occupations. The recognised carcinogens most relevant to Prescribed Disease C23 are alpha-naphthylamine, beta-naphthylamine, benzidine, 4-aminodiphenyl (4-ADP), dichlorobenzidine, orthodianisidine, orthotolodine and methylene-bis-orthochloroaniline.

PRINTERS AND BLADDER CANCER

There is a large body of medical evidence which implicates work in the printing industry with an increased risk of developing Bladder Cancer.

Lynge et al (1995) reporting on a study of cancer incidence in printing workers in Denmark, identified a 1.5 increased risk of bladder cancer amongst typographers in printing works. Other studies include Hendry et al (1988) which identifies security printing as a suspect industry. Claude et al (1988) determined an odds

ratio exceeding two for printers developing Bladder Cancer. An Argentinian study by Iscovich et al (1987) of 117 patients with Bladder Cancer concluded that seven subjects working as printers had substantial risk. Brownson et al (1987) in a matched study identified occupations with the greatest relative risks for Bladder Cancer as janitors and cleaners, mechanics, mining machine operators and printing machine operators. A Swedish study by Malker et al (1987) found significantly increased cumulative incidence ratios for Bladder Cancer in pigment and print manufacture, referring to known bladder carcinogens being used in the manufacture of inks. Baxter and McDowell (1986) refer to consistently raised relative risk ratios for printers.

Various other studies over the years have identified an association between Bladder Cancer and printing, and as long ago as 1969, a Department of Employment Technical Data Note referred to security printing as presenting a Bladder Cancer hazard.

Hours et al (1994) concluded that for bladder cancer victims with exposure to inks the excess incidence increased with the duration of exposure, with the risk being highest among subjects first exposed before the age of 20 years.

THE BASIS OF THE ARGUMENT

It is our intention to establish a link between Bladder Cancer and workers in the printing industry, based upon evidence from the medical literature and upon the likelihood of exposure to certain prescribed chemicals contained in products and materials used by printers.

It must be noted that the interval between first exposure to a carcinogen and the development of an occupational cancer averages roughly 20 years and can be anything from 5-45 years. Therefore, it is necessary to look into the past use of chemicals, if necessary, up to 45 years ago.

This can be a difficult task, as many companies and suppliers of products have long since ceased to exist. It also means that those substances which the particular person involved is currently handling may have little or no relevance to their disease.

It must also be said that there are inevitable difficulties in proving conclusively that an individual was exposed to a particular substance on a particular occasion, possibly many years ago.

The arguments presented here will therefore rest on the principle of a balance of probabilities. It is our aim to establish that in light of the evidence presented it is more likely than not that the cause of the individual's Bladder Cancer was their occupational exposure to specified substances which they used as printers. It should also be noted that there is no minimum percentage of the substance that needs to be present before prescription can be allowed.

On the question of burden of proof, there is a particular case which may be relevant, that of Gardiner versus Motherwell Machinery and Scrap Company Limited (1961-3 ALL E.R.) Lord Reed stated that in his opinion:

"When a man who has not previously suffered from a disease, contracts that disease after being subjected to conditions likely to cause it, and when it starts in a way typical of disease caused by such conditions, he establishes a prima facie presumption that his disease was caused by the conditions".

BENZIDINE IN BLACK INKS

A.E. Apps, "Printing Ink Technology" (Leonard Hill Limited 1961) discusses the use benzidine as a surface active agent in printing inks. Of crucial importance is Table 6, page 112, Printing Ink Surface Active Agents which refers to the use of benzidine in quantities of 2% and 5% in black inks.

PRINTING INK TECHNOLOGY
TABLE 6. PRINTING INK SURFACE-ACTIVE AGENTS

Pigment	Medium	Surface-Active Agent	Concentration in Ink per cent
Carbon black	Mineral oil	Benzidine	5
		Copper oleate	0.5
		Gilsonite	5
		Rosin oil	15-20
Carbon black (short ink)	Drying oil	Benzidine	2
Carbon black (long ink)	Drying oil	Zinc naphthenate	2
Bronze blue	Mineral oil	Lecithin	2
	Drying oil	Fatty acids	1
Ultramarine	Mineral oil	Soaps	1
		Zinc naphthenate	2
	Phenolic media	Alkyl aryl sulphonate	1
	Drying oil	Fatty acids	1
		Soaps	1
Titania	Drying oil	Zinc naphthenate	1
Zinc Oxide	Drying oil	Zinc naphthenate	1
Lithopone	Drying oil	Zinc naphthenate	1
Monastrals	Drying oil	Barium resinate	1
Organic toners	Most media	Resinates	0.5-2
	Aromatic hydrocarbon	Resinates	1

BENZIDINE IS A RECOGNISED CARCINOGEN RELEVANT TO C23 CLAIMS

INDULINE/NIGROSINE DYES

A potential source of exposure to recognised Bladder Carcinogens arises from induline dye and nigrosine dye. Bulletin No. 20 from the British Rubber Manufacturers Association, dated 21st September, 1977, refers to the presence of the bladder carcinogen 4-aminodiphenyl (4-ADP) in induline/nigrosine dyes.

"In May this year information was received from Williams (Hounslow) Limited, manufacturers and suppliers of dyestuffs chemicals, which indicated their intention to cease the manufacture of indulines and discontinue the marketing of the product. This decision had been taken because it was discovered that in the manufacturing process there was formation of a chemical impurity, which was identified as the aromatic amine 4-aminodiphenyl (also known as 4-aminobiphenyl or xenylamine). This amine is known to be one of the small group of aromatic amines which are recognised as being human bladder carcinogens, and within this group it is generally accepted that 4-aminodiphenyl has a high potency...

...Induline dyestuffs have, in fact, had very limited applications in the rubber industry. They have been more extensively used in printing and as leather dyes."

The two names induline and nigrosine appear to be used interchangeably and the dyes have been extensively used in printing inks.

Below there is an extract from page 246 of "The Printing Ink Manual", (Biset et al 1979) which refers to the hazards of induline and its use in toners for cheap letterpress, news and gravure inks in particular.

*Induline (Spirit soluble)
(C.I. Solvent Blue 7 C.I. No. 50400)*

Properties:

Reddish blue to reddish navy, fair lightfastness, heat stable to 100 °C, insoluble in water, soluble in ethanol, also paraffin wax, oleic and stearic acid.

Uses:

Recent policy in the U.K. is to exclude this material from printing inks because of its toxic impurities, such as 4-amino-dyphenyl. Used in stamping inks. Solutions of induline base in fatty acid were used as toners in cheap letterpress and gravure black inks.

The GPMU has several letters from manufacturers of printing inks which confirm the use of these materials.

In 1977 Usher-Walker Ltd confirmed that as a result of the information from Williams (Hounslow) Ltd they were stopping the use of induline dyes "which we have used in the News Ink departments for many years."

Similar indications have been given by other ink makers. In 1987 Ault & Wiborg referred to the fact that "induline oleate dyestuff used as a blue/violet toner in newspaper inks contained a small proportion (less than 1%) of amino diphenyl [4-ADP]". Manders stated in 1991 that "in common with other ink makers, Manders used small quantities of induline blue."

4-AMINODIPHENYL IS A RECOGNISED CARCINOGEN RELEVANT TO C23 CLAIMS

BENZIDINE-BASED DYES

E.A. Apps "Printing Ink Technology", page 160, refers to the use of benzidine-based dyes in ink pigments, in addition to dianisidine and alpha-naphthylamine-based pigments.

In August 1982 the Health and Safety Executive issued Guidance Note EH34, "Benzidine based dyes: health and safety precautions". This guidance note states that:

"Benzidine based dyes have been found to contain very small residues of benzidine, typically about 0.001-0.003% Benzidine can also be regenerated from the dyes on contact with reducing agents, and there are some indications that similar processes could occur in the body.

After a review of the available medical and scientific evidence, the employment Medical Advisory Service (EMAS) has concluded that the risk of the development of bladder cancer in workers exposed to benzidine-based dyes cannot be reduced to the lowest level that is reasonably practicable".

This provides further evidence that regular contact with printing inks could have led to exposure to benzidine, a bladder carcinogen.

Garrod and Manson (1986) refer to several aromatic amines implicated as carcinogens and which have been used in the manufacture of dyes and inks. These include benzidine, 1-naphthylamine, 2-naphthylamine and 4-aminodiphenyl, all of which are chemicals relevant to C23 prescription.

SUMMARY

There is overwhelming evidence to show that work in the printing industry is associated with an increased risk of developing bladder cancer.

It is also clear that a number of chemicals relevant to Prescribed Disease C23 have been used in the printing industry.

References

Baxter and McDowell (1986)

"Occupational cancer in London" - an investigation into nasal and bladder cancer using the Cancer Atlas.
Brit. J. Ind. Med., Vol 43, No. 1, 44-49

Brownson et al (1987)

"Occupation, smoking and alcohol in the epidemiology of bladder cancer"
Ann. J. Pub. Hlth., Vol 77, No. 10, 1298-1300

Cartwright (1983)

"Historical and modern epidemiological studies on populations exposed to n-substituted aryl compounds"
Env. Hlth. Perspectives, Vol 49, 13-19

Claude (1988)

"Occupation and risk of cancer of the lower urinary tract among men" - a case control study
Int. J. Cancer, Vol 41, No. 3, 371-379

Dept of Employment and Productivity (1969), H.M. Factory Inspectorate, Technical Data Note 3

"Occupational Cancer of the Renal Tract"

Frumin et al (1990)

"Occupational bladder cancer in textile dyeing and printing workers - six cases and their significance for screening programmes"
J. Occ Med., Vol 32, No. 9, 887-890

Gonzales et al (1988)

"Bladder cancer among workers in the textile industry - results of a Spanish case control study"
Ann. J. Ind. Med. Vol 14, No. 6, 673-689

Gorrod and Manson (1986)

"The metabolism of aromatic amines"
Xenobiotica, Vol 16, Nos. 10/11, 933-955

Hendry (1988)

"Occupational bladder cancer: a guide for clinicians"
Brit. J. Urology, Vol 61, No. 3, 183-191

Hours M et al (1994)

"Bladder Cancer and Occupational Exposures"
Sc. J. of Work, Environment and Health, Vol. 20, No. 5, 322-330

Iscovich (1987)

"Tobacco smoking, occupational exposure and bladder cancer in Argentina"
Int. J. Cancer, Vol 40, No. 6, 734-740

Lynge et al (1995)

"Cancer in printing workers in Denmark"
Occ. & Env. Medicine, Vol 52, 738-744

Malker (1987)

"Occupational risks for bladder cancer among men in Sweden"
Canc. Res., Vol 47, No. 24, 6763-6766

Veys (1972)

"Aromatic amines - the present state of the problem"
Ann. Occup. Hyg., Vol 15, 11-15