EUROPEAN CAMPAIGN FOR THE SUBSTITUTION OF ORGANIC SOLVENTS

solvents

Do your brains in.

The US Government names 'chemical neurotoxicity' in its top ten list of workplace diseases.(1) Denmark pays affected workers state pensions for 'solvent dementia'(2). In the UK, the two million workers regularly using organic solvents are neither warned of the risk nor compensated.

The result? Up to 10,000 cases of solvent induced brain damage every year.

What's going on in your head?

Solvents attack the brain: they dissolve in the fatty sac containing the brain cell. In some cases this will actually kill the cell, in others, make it "leaky". These cells (like any battery) may not be able to cope with the electrical messages they are designed to receive.

Health effects

In 1985 working groups in both the USA(3) and Denmark(4) devised schemes to describe solvent induced central nervous system (CNS) disorders. The groups were in broad agreement on the stages of development of these disorders, from minimal and reversible changes, through to pronounced and irreversible.

- *Type 1.*
Organic affective syndrome.
Fatigue, memory impairment, irritability, difficulty in concentrating, mild mood disturbances.
- *Type 2.*
Mild chronic toxic encephalopathy.
Sustained personality or mood changes (eg emotional instability, diminished motivation). May also develop poor concentration, memory and learning capacity.
- Type 3.
Severe chronic toxic encephalopathy.
Overall deterioration in intellectual and memory functions (dementia) that may be irreversible, or at best, only poorly reversible.

It used to be thought that only "solvent abusers" developed the most severe Type 3 condition. Evidence now confirms, however, that occupational exposure can cause permanent brain damage: "This damage seems to resemble that of alcohol and may be described as a premature ageing of the brain", reported the authors of a major review on mixed solvent exposure and brain damage(5).

Pyschosis

Long term low exposures or short term high exposures to solvents can produce all the symptoms normally associated with psychosis (delusions. loss of touch with reality). Recovery is not guaranteed. even after exposure has stopped.

A 1989 study of 22 men with mixed solvent exposure concluded that the test results were almost identical in severity and symptomology to that of a group of former World War II prisoners of war and compared the symptoms to those of post traumatic stress disorder (6).

A study of women working in a US microelectronics factory found nervous system damage resulting from solvent exposure. The women who worked with solvents reported symptoms indicating neurological effects more frequently than those who were not exposed. The symptoms were depression, severe headaches, lightheadedness, feelings of the room spinning and tremors. The concentrations of solvents measured in the workplace were below the US exposure limits (7).

Typical symptoms

Memory loss; poor concentration; deterioration in brain power/speed; easily tired; loss of initiative; mood changes; anxiety; nervousness; emotional; irritable; after a time, print (books, papers, subtitles on TV) becomes blurred (cerebral asthenopia).

Accidents

Single, large solvent exposures can cause brain damage. A worker at SKF-Dormer, a large engineering firm in South Yorkshire, was overcome by fumes after a spill of trichloroethylene in 1985. The spill led to SKF being prosecuted and fined £1,500. The worker paid a heavier price, as his symptoms persisted. In 1988 he told Hazards: "I fall asleep at dinnertime. My memory is shocking, I have to write down anything I want to say at union meetings otherwise I panic" (Hazards 19, July 1988). Even now he is still not back to full health.

Other effects

Recent evidence suggests that solvents attack the active part of the brain. Dr David Ray of the Medical Research Council announced in July 1992 that his team had found "an interaction between noise exposure and the severity of brain lesions produced by exposure to chemicals." He warned that his findings "could have profound implications for protecting people working with neurotoxic chemicals since they suggest that noise exposure could increase sensitivity to chemicals" (8)

This is no more than you might expect - more blood is directed to the most active. working cells. If that blood is laced with solvents, then it will be these cells that suffer the worst damage.

Law

Control of Substances Hazardous to Health Regulations 1988.

- Assessments (Regulation 6): employers must assess the hazards arising from the use of substances - ensure the assessment contains details of neurotoxic effects.

- Control exposures (regulations 7,8.9): if safer alternative substances are available they should be used. The print union GPMU is following the lead of German and Danish trade unions, arguing nationally for the substitution of solvent based inks and washes with safer alternatives.

- Health surveillance (Regulation 10): employers should investigate possible causes of ill-health in the workplace. Have they taken account of the neurotoxic effects of solvents?

- Information (Regulation 12): not just which substances are used and how, but what alternatives were considered and why they were rejected.

Management of Health and Safety at Work Regulations 1992 (effective from 1 January 1993).

- Information should be provided to all employees in an understandable form on the results of risk assessments, the preventative and control measures to be taken, and on emergency procedures.

- Employees have the right to stop work and proceed to a place of safety if "exposed to serious, imminent and unavoidable danger."

Compensation

DSS: Solvent dementia is not recognised by the government as a prescribed disease, with the possible exception of "central nervous system dysfunction and associated gastrointestinal disorders" caused by exposure to chloromethane. There are possible routes to a DSS pension for other solvent exposures however. Poisoning by carbon disulphide, benzene, toluene, xylene or tetrachloroethane is covered. Toluene exposed shipyard worker Joe Watts won a disablement pension after his exposures left him with a 40% disability which included mental confusion (see *Hazards* 31 December 1990). Damage to the liver or kidneys caused by carbon tetrachloride or trichloromethane is covered. Peripheral neuropathy caused by n-hexane or methyl n-butyl ketone is also eligible for DSS benefit.

Common law

It's very difficult to get compensation for any condition that has a gradual onset. Ensure you keep detailed records of substances used, exposure levels, any accidents/incidents, and who was exposed. Also keep summaries of health surveillance findings (you can demand these at safety committee). The union should do its own surveys periodically to provide believable evidence.

Warning signs

Workers should be vigilant for any symptoms of solvent exposure. Even if short term exposure doesn't kill you - and it can - it is an early warning of possible long term problems. Better still, get rid of the chemicals and both short and long term problems with them.

In June 1992 Camden Council was fined £3,500 after admitting three breaches of the COSHH Regs. Former carpenter Liam Teague, 25, suffered temporary blindness, hallucinations and headaches after exposure to glue solvents. Liam had been attaching plastic skirtings with adhesive for a day without effect. On the second day however, the symptoms forced him to stop work. "He had, in effect, been slowly sniffing glue for a day and a half", HSE inspector Matthew McNeal told the court. The Council admitted failing to carry out suitable and sufficient COSHH assessments, failing to provide adequate control measures and failing to adequately train staff in the use of hazardous substances.

Lessons from Denmark

Since 1976 the Danish Government has recognised "solvent dementia" as an industrial disease. To date their National Social Security Office has paid compensation to about 4,500 sufferers. Solvent usage has subsequently declined, with alternatives having been introduced in paints, printing, carpet manufacture, the health service and other sectors. This has led to a dramatic fall in the number of cases of solvent dementia, from over 500 in 1984 to about 100 in 1991.

Trade union action

It wasn't an act of inspired benevolence that led the Danish government to recognise solvent dementia as an industrial disease in 1976. The process started in the 1960s when the Danish Painters' Union first suspected a link between solvents and brain damage and demanded medicals for affected members.

In the UK, some unions have already started to build on the lessons of their European counterparts. The TGWU branch secretary at a Yorkshire confectionery firm was concerned when members complained of headaches and dizziness - solvent-based inks and thinners were used on the line that date stamped boxes of chocolates. She managed to obtain copies of papers on solvent substitution that Danish trade unionists had presented at the 1990 European Work Hazards Conference, together with details of alternative materials from trade unionists in Hamburg. The TGWU then obtained samples of a grape seed oil substitute and demanded that its use be investigated. It was tested by company scientists, found to be satisfactory and introduced shortly afterwards.

In Bolton, union members at a firms making cot bumpers negotiated the replacement of trichloroethylene (used to clean off grease) with soap and water.

Join the campaign!

European Campaign for Substitution of Organic Solvents
AAA Valby Langgade 55. DK-2500, Valby. Denmark. They are co-ordinating the European campaign. They have produced an enormous poster (see page 5) in each community language, an excellent video *Checkmate*, as well as a booklet *Substitution of organic solvents - the Danish experience* - all materials are available in English.

Solvents Campaign (UK group)
Andy Mills c/o SOHP/TUSC
Mudford's Building 37 Exchange St, Sheffield S2

Main types of solvent

Organic solvents is a term covering a number of different families of chemicals

- Aromatics: eg benzene, toluene, xylene and styrene
- Ketones and aldehydes: eg acetone, MEK, MIBK, formaldehyde.
- Glycol ethers: eg methoxyethanol, ethoxyethanol.
- Alcohols: eg methanol, ethanol, propanol and 'glycols'.
- Aliphatics: eg n-hexane, octane, nonane (also in fuels eg petrol/paraffin).
- Chlorinated hydrocarbons: eg methylene chloride, carbon tetrachloride, chloromethane, trichloroethane, trichloroethene, perchloroethylene. Also chlorofluorocarbons (CFCs).

WORKPLACE SYMPTOMS QUESTIONNAIRE

I) Do you feel that your memory has become poorer than it used to be? ☐

2) Do you use more notes than you used to, in order not to forget appointments. when shopping etc? ☐

3) Do you feel it has become more difficult for you to remember what you have seen on TV or read in newspapers or books? ☐

4) Do you feel that your ability to concentrate is poorer than it used to be? ☐

5) Do you get emotional more easily that you used to (eg when watching something sad on TV)? ☐

6) Have your workmates or relatives complained that you are more touchy or irritable than you used to be'? ☐

7) Do you feel that your way of thinking has become slower or less clear than it used to be? ☐

8) Do you feel that your ability to adapt yourself to new conditions has become poorer (eg new work, people)'? ☐

9) Do you engage in leisure-time activities and hobbies as you used to do? ☐

10) If you start doing something - do you then get tired and lose your concentration more quickly than you used to? ☐

11) Are you less tolerant of alcohol than you used to be? ☐

I2) Do you tolerate the smell or solvents or other air pollution less well than you used to? ☐

Useful information

Substitution of organic solvents.Technical University of Denmark 1991. Lists substitutes for organic solvents in many industrial processes. Available from Solvents Campaign.

Solvents on the attack
GMB 22-24 Worple Rd, London.
Solvents ICEF Health and Safety Guide 109, avenue Emile de Beco, B- 1050 Brussels. Belgium
Safer Alternatives Hazards 31.

References

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2) Gregersen and others Organic Solvents: documentation of' the neurotoxic effects in humans exposed fo solvents. Miljoprojekt No72. 1986.
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4) Baker and Seppalainen. (1986). Human aspects of solvent neurobehavioural effects. Neurotoxicology vol 7: 43-56.
5) Mikkelsen and others. Mixed solvent exposure and organic brain damage. Acta Neurologica Scandinavica. No II8. Vol 78. 1988.
6) Morrow and others. A distinct pattern of personality disturbance following exposure to mixtures of organic solvents. Journal of Occupational Medicine, vol 31 No 9: 743-746. 1989.
7) Parkinson and others. Health effects of long term solvent exposure among women in blue collar occupations. American Jounal of Industrial Medicine. 1990.
8) Noise exposure and chemically induced brain lesions. Medical Research Council press notice, 31 July 1992.