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SOLVENTS ON THEIR WAY OUT

Trichloroethylene and methylene chloride may soon be completely banned in Sweden.

Most chlorinated solvents and 90 per cent of nonyl phenols will be phased out during the 1990s. From January 1, 1992, chlorinated hydrocarbons will no longer be legally used in households. The deadline for industry is three years later.

How to phase out?

It is suggested that a high fee be placed on the price of the product, so as to make it too expensive to use.

Methyl chloride is used for degreasing, spot removal and cleaning. Trichloroethylene is a common degreaser.

The aim is to force people to start using water-based degreasing agents.

Other substances to be phased out include leaded petrol, lead shotgun pellets and chloroparaffins.

The schedule is currently awaiting a final go-ahead from the European Community.



Source: Eva Ekelof, Arbetsmiljo 11/1990

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ENGINE OIL

Handling used engine oil may increase the chances of skin cancer, concludes a study commissioned by the Ford Motor Company.

Used engine oil contains carcinogens — cancer-producing substances — and the longer the oil has been used, the more carcinogens it contains.

The problem of used engine oil has become worse as the period between oil changes has increased with improvements in modern automotive engines.

The Ford study reports that there is "a clear relationship between the yield of tumours and the distance run by the engine under standard conditions."

This means great care should be taken by everyone coming into contact with the used oil.

Researchers are not certain what particular substance causes the cancer, but they sus-

pect it is the polycyclic aromatic hydrocarbons.

The hydrocarbons are a by-product of combustion and accumulate between oil changes. The result is that mechanics today are handling used engine oil with much higher concentrations of the suspect substance than previously.

To minimise the risk when working with used engine oil certain precautions should be taken:

- **Use protective cream on hands and other skin areas that may come into contact with the oil.**
- **When the job is finished, carefully wash all of the oil from the skin.**
- **avoid prolonged contact between skin areas and oil-soaked overalls or other clothing.**

Although the Ford research does not pinpoint the exact extent of the risk of skin cancer in those working with used engine oil, enough information is available to show that there is a danger and that care should be taken.



Source: Health & Safety at Work, May 1988, Croydon, England

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NOISE vs NOISE

Noise may be successfully eliminated by using more noise. The method is called "active noise control", and utilises the fact that two sound waves can neutralise each other. Silence will prevail at the point where the sound waves meet.

The noise equalising factor has been known since the 1930s.

A healthy human ear can detect noise of frequencies spanning from a low 16 periods per second to a high-pitched 20,000 periods. When two sound waves in exact counter-phase meet, they negate each other, causing a nil sound pressure at the meeting point.

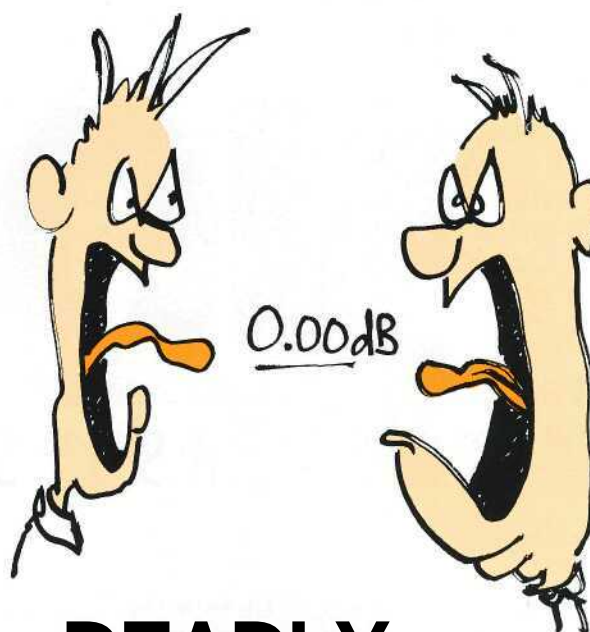
Per Sjosten, a researcher at Chalmers' technical institute in Gothenburg explains: "By producing a noise field with a loudspeaker, you can neutralise the noise in a particular area without using any other noise control. The method is most effective for low frequency noise."

Mr Sjosten is currently working on noise control in small confined spaces, such as inside vehicles and in control booths.

In some cases, active noise control is the only feasible way to eliminate the problem: in small spaces where there is no room for thick insulation and in operator booths where an uninterrupted field of vision must be provided.

Lunch and rest areas on the production floor are also suitable for the technique. Scientists are also trying to create active noise control for large scale air conditioning systems.

"You cannot and you should not eliminate all the noise", says Mr Sjosten. "You must be able to hear the 'useful' sounds, such as human speech and warning signals. The counterphase method can change the character of the noise, so that it becomes less disturbing."



DEADLY FUMES

More factory mechanics and welders die from lung disease (but not from cancer) than the rest of the population.

Farmers, plastic workers, bakers and saw mill workers constitute other groups that are more susceptible to respiratory disease, according to a recent report compiled by Per Malmberg of the Swedish Working Environment Institute. The report was commissioned by the work environment directorate.

The most common occupational lung diseases are pleuraplaque, asthma, bronchitis and hayfever. Silicosis and asbestosis are nowadays very rare in Sweden. Occupational asthma is usually caused by allergies or by reactive substances such as isocyanates. Welding fumes and organic dust are common contributors to lung disease.

The study is called "Occupations/work environments with high incidents of disease in the respiratory organs", and is published in the work environment directorate's scientific document series.



Source: Nora Weintraub, Arbetarskydd, 10/1990



Source: Arbetarskydd, 6/1990

NOISE ASSESSMENT

Excessive noise levels in the workplace can be a major hazard for employees, leading to permanent damage and increased stress.

Reducing noise levels will lead to long term benefits for both employer and employees.

A comprehensive hearing conservation program will not only prevent expensive claims from employees with noise induced deafness, but can create a better working environment and produce increased efficiency.

Although an effective hearing conservation program should be individually tailored to each workplace it will certainly include:

- **Initial Assessment**
measuring sound levels, utilisation of hearing protectors and other factors at the workplace, in order to estimate the probable level of any hearing damage to employees. An estimate of the cost of possible hearing loss claims can also be made.
- **Noise Survey Report**
a detailed report measuring noise levels at each worker's position. It will also include recommendations for individual hearing protectors, noise reduction and warning signs.
- **Noise Reduction Program**
a long term plan for noise reduction, including cost/benefit analysis of control measures such as air silencers, damping treatment, checking seals and fittings.
- **Education and Training**
information should be provided to both management and workforce on problems arising from excessive noise, as well as methods of noise control and hearing protection.
- **Formal Reporting and Auditing Systems**
keeping records of all elements of the program, which will provide written evidence of action taken, inspections made and any disciplinary procedures. If a claim for hearing loss is made, a full set of records is valuable, if not essential.



Hearing tests

Detailed hearing tests (audiometry) are an integral part of a hearing conservation program.

The tests provide a quick and non-invasive assessment of hearing and should be done at the pre-employment stage. This will often uncover cases of hearing loss that is already present, and prevent subsequent disputes.

Audiometry also gives the opportunity to educate staff on the risks of noise and the correct way to use hearing protection.

The professional conducting the test can also advise on hearing protection for those workers who have hobbies that might endanger their hearing, such as shooting.

Regular testing will not only catch workers who are beginning to have problems with their hearing, but will check the effectiveness of the hearing conservation program.

The importance of preventing hearing loss caused by excessive noise in the workplace is highlighted by a recent directive issued by the European Community. All member nations of the Community were required to have in place by January 1, 1990, legislation to protect workers from noise.

The regulations require employers to assess the noise exposure of their employees. The assessment should be carried out by a

person competent in the field and should involve the employees who are actually working in the noisy conditions, as well as their safety representatives.

The results of the assessment should be used to plan what action should be taken to reduce the noise problem. This may involve the use of hearing protectors, setting up ear protection zones, placing warning signs on individual machines and even major changes in plant and machinery.

How can you tell if you need a noise assessment in your workplace?

Try answering the following questions.

- Do workers find it difficult to hear while they are working?
- Do they have to shout to each other when separated by only one or two metres?
- Has anyone complained of head noises or ringing in the ears after working in the noise for several hours?
- Have workers exposed to high noise levels for short periods experienced temporary deafness that was severe enough to seek medical advice?
- Have workers exposed to the noise for longer periods complained of problems with their hearing, such as muffled speech?
- Have their families told them they seem to be going deaf?
- Has there been a higher labour turnover in workshops or areas where there is a lot of noise?
- Do managers think that noise is affecting production?

If the answer to any of these questions is "yes", then there is almost certainly a problem with noise in your workplace that requires action.



Source: Health & Safety at Work, May 1988, April 1990, Croydon, England.

Handy Hints



Wear your ear muffs ALL THE TIME! Example: You have a 20dB pair of muffs. Take them off for 6 minutes every hour, and you've got a 9 dB pair! Take them off for 30 seconds every hour, and they still give you only 15 dB protection!

Solvents and their effects:

MM

REACTION

Brain damage occurring through an injury or blow to the head is quick and obvious but damage to the brain caused by substances such as solvents or heavy metals can be slow and subtle.

Such damage happens through prolonged exposure to organic solvents or certain heavy metals, which are absorbed into the blood stream through the lungs or the skin.

Among the solvents that can prove a danger are acetone, benzene, toluene, styrene, chloroform, ether, carbon tetrachloride, trichloroethylene, methylene and chlorine. Metals that affect the nervous system include lead, mercury and manganese.

The brain is a highly sophisticated bundle of integrated nerve cells, about 20 billion in all, yet it constitutes only about 2% of an adult's body weight,

Oxygen and glucose are the fuel for these nerve cells and the brain consumes massive amounts. It uses 20% of the body's supply of oxygen. Twenty percent of the blood pumped by the heart goes to the brain, bringing with it the vital supplies of oxygen and glucose.

Anything that affects that supply can damage the brain. Solvents and heavy metals have been shown to have such an effect on all major brain functions: muscle coordination, sense integration (messages from eyes, ears and skin), emotions, thinking and memory.

"We are well aware of the effects of solvents on humans, but we do not know the exact mechanism by which they affect the individual nerve cells, nor how they damage or interfere with their functions," says Professor

Arne Wennberg, of the Research Department of the Swedish National Board of Occupational Safety and Health.

Apart from the glue sniffers and petrol sniffers, massive exposure to solvents is generally accidental and of brief duration. The effects — tiredness, a sensation of intoxication, dizziness and even unconsciousness — will eventually wear off.

Long exposure to low concentration — more dangerous than glue sniffing

Prolonged exposure to low concentrations may be more dangerous and may cause permanent damage.

It can be difficult to pinpoint these effects but when you have them, you know they are there. You just don't feel well.

There are, however, specific tests that show problems in brain function that may be caused by solvents, such as difficulties with precise movement and impaired memory.

Solvents have a particular effect on the peripheral nervous system, which links the organs of the different parts of the body with the central nervous system, the brain and spinal cord.

The nerve cells — the neurons — are attached to receptors that are located in sense organs like the eyes, ears, skin and muscles. The receptors convert information into nerve impulses that go back to the brain and tell it that you feel pain or hot or cold, hear sounds or see something.

Information goes back and forth, from the body to the brain or spinal cord, or from

the brain to the muscles and glands, at extraordinary speeds.

Brain messages at 360 kph

The speed varies in different nerves but some impulses travel more than 100 metres per second, that is, 360 kilometres per hour.

The effect of solvents on the peripheral nervous system reduces the speed of the nerve impulses and reduces sensitivity in sensory nerves.

Solvents also seem to have an effect on the emotions. In one experiment spray painters were asked specific questions on how they felt: whether they felt pleased, hilarious, harmonious, active, optimistic, spontaneous, carefree, sociable, etc.

The results were compared to a control group that had not been exposed to solvents and showed that spray painters felt less happy, outgoing and active.

Exactly how solvents affect the nervous system may be uncertain, but the results are not.

A research team studying a group of auto spray painters found that nerve cells swell when exposed to solvents, causing a constriction of the blood in the fine vessels that supply the nerve cells with oxygen and glucose.

A few minutes is all it takes

Nerves that are deprived of oxygen for more than a few minutes can be irreparably damaged.

A shortage of oxygen particularly affects the areas of the brain that regulate body movements and long-term memory (cerebral cortex), short-term memory (hippocampus) and the coordination of movement (cerebellum). Even moderate exposure to solvents will affect these functions.

Researchers also believe that when the blood stream is reduced, waste products and toxins accumulate in and around the nerve cells, instead of being swept away.

It is also likely that the nerve cell membrane may be damaged by solvents. If the solvents enter the brain cells and damage the part of the cell that produces an enzyme that transforms glucose into energy, the cell itself is in danger.

It is uncertain what levels of exposure to solvents leads to damage that is reparable,

and at what point the damage becomes irreversible.

Symptoms

Awareness of the major symptoms of solvent damage to the nervous system is important. Symptoms include difficulty in concentration, tiredness, forgetfulness, headaches, irritability, insensitivity, personality disorders, mental instability and suicidal thoughts.

Obviously there are many other reasons for all of these symptoms, but those working with solvents should be aware that it may be the solvents that are causing the problem.



Source: Your Body at Work: Human physiology and the working environment. Based on articles from Arbetsmiljö magazine, Sweden. Distributed by the National Occupational Health and Safety Commission, Canberra.

Handy Hints



/ GLOVE YOU!

By applying a good quality, suitable skin creme before putting on your gloves, you'll feel more comfortable, and you'll have less chafing from the gloves.

IF THIS ISN'T QUALITY CONTROL, WHAT IS?



A company required manufacturing of a certain piece of machinery at a fault rate of 3 "duds" in every 10,000.

A Japanese company got the tender, and supplied the products right on deadline.

The order was fulfilled to the very last specification: with every 10,000 parts was a small plastic bag with three faulty parts.

A note said: "We can't imagine why on earth you require three faulty parts for every 10,000 supplied, but here they are anyway".

Something up your nose

The aroma of freshly brewed coffee, the scent of flowers in bloom, the fragrance of after shave and perfume may go unnoticed past many a painter's nose. A recent survey shows that one painter in ten suffers a significantly reduced sense of smell.

The Occupational Health Clinic in Umeå, Sweden, has found that 9.7% of the consulted painters had a reduced olfactory capacity. The sense of smell had not disappeared altogether, but subtle odours, such as flowers, perfumes and coffee, proved difficult or impossible to detect.

The examinations were done through a so-called "odour book" test. Further physical tests showed that many painters had changes in the mucous membranes of their nose and



throat. The researchers could not establish conclusively whether these changes had been caused by occupational factors, such as solvents and putties.

The survey paper places strong emphasis on recommending respiratory protection for painters when handling solvents, when using sealants, and when polishing and sanding.

The paper will be presented shortly at a medical convention in Sweden.



Source: Nora Weintraub, Arbetarskydd, 10/1990.

SOLVENTS

AT HOME AND AT WORK

Some of the most common chemicals used in the workplace and at home are organic solvents. Such solvents dissolve, clean and mix with other substances and can be found in everything from paint to pre-wash stain removers for the laundry.

Although solvents can be useful, they may also be dangerous to health, so any substance containing a solvent should be handled with caution.

The effect of working with solvents is still the subject of much scientific and medical research, and opinions differ. A recent segment on the ABC program "The 7.30 Report" demonstrated that the opinions differ only in degree.

"I think there is a potential for a whole range of chemicals, particularly solvents, to pose a very, very big issue, possibly as big as asbestos. It's difficult to say because we don't know the extent of the exposure," said Dr. Kate Short, a consultant in toxic chemicals, during the program. "I believe it is a very, very widespread occupational health problem throughout Australia."

Dr. Neil Stacey, Principal Research Scientist for Worksafe Australia and Senior Lecturer at the University of Sydney, was much more cautious. "At this stage I wouldn't put the exposure to solvents in the same sort of category as I would exposure to asbestos. The link with asbestos to mesothelioma is well drawn. It is a fatal disease. I'm not really aware of any links that have been drawn with currently used solvents to that degree of seriousness," he told the ABC.



Dr. Stacey is conducting research into the long term effects of solvents but is not yet certain just how much damage they do. Meanwhile, he says, "the general philosophy is to avoid exposure when you can."

Widely differing professions

People working in spray painting, wood-working, building, metal trades, the plastics and petrochemical industries, dry cleaning, chemical and hospital labs and even offices will invariably spend time handling substances that contain solvents.

"Some people even wash their hands in solvents," says Dr. Stacey.

Everyone working with solvents should be aware of the possible dangers. "They have to accept that the industry they are working in is hazardous," says Dr. Short. "They have a responsibility to themselves to find out about the risks."

Just what are the risks in working with solvents? The answer depends on the extent and the length of the exposure.

Exposure to high concentrations of certain solvents, even when the exposure is brief, can lead to severe problems and even death.

Smaller concentrations over a long period can produce more subtle effects but may also be life threatening. Problems range from dermatitis all the way to psychiatric disorders, brain damage, cancer and blindness.

The problem is not confined just to the workplace or to unintended exposure to solvents. Petrol sniffers and glue sniffers show the kind of damage that can occur.

Workers suffering from early symptoms of the toxic effects may not even realise that solvents are the cause.

Difficult to ascertain causes

Headaches, irritability or muscle cramps will sometimes be blamed on lack of sleep, drinking or too much exercise, but they can be a sign that toxic poisoning may be present.

"One of the first symptoms may be mood change or feeling out of sorts," says Dr. Short, who believes doctors may not associate such symptoms with solvents. "Many doctors were trained when information on these chemicals was virtually non-existent," she says.

This puts the responsibility on someone working with solvents to let the doctor know exactly what chemicals they are exposed to in the workplace.

Dr. Chris Winder, Senior Lecturer in Toxicology for Worksafe, agrees. "The training of GPs in this area is very poor. If somebody comes in with dermatitis, the GP will treat the dermatitis, not look for the cause. Most GPs won't ask what kind of work their patient does," he says.

It's not only the doctors who are unaware of the symptoms someone working with solvents can display. Dr. Winder, who is working on a Worksafe-TAFE solvent study on the health effects in apprentice spray painters, finds people working with substances containing solvents usually don't understand the potential problems.

Poor awareness

"The awareness is certainly not there," he says. "Apprentices are not being trained in the dangers of solvents. The bosses think they are getting the training at tech, and the people at tech think they are getting it in the workplace.

The apprentices need to learn the correct behaviour to reduce risks. They need to be given the facts."

Dr. Kate Short believes the responsibility belongs to the employers. "Employers have a duty to provide a safe working place," she says.

That is also the attitude of the ACTU, as shown in its Occupational Health and Safety Policy. "Employers have an obligation to provide a work environment that is healthy, safe and free of the adverse effects of stress," declares one of its principles.

An essential ingredient in the prevention of problems with solvents is information. "It is essential that workers be made aware of the type of solvents in use at a particular workplace, the existing standards (if any) that may apply, and the practices which should be included to ensure minimum exposure," says the ACTU's Health and Safety Bulletin, No. 48.

But even information may not be the answer. Despite the knowledge of the dangers of smoking, many people accept the risk and continue to smoke.

Dr. Short believes dissemination of information on solvents will lead to change. "Smoking is a voluntary risk," she says. "The risk is greater with solvents because you don't know the extent of your exposure. People must become aware of the involuntary risk they are taking."



Sources: Interviews with Dr. Neil Stacey, Worksafe Australia, Dr. Chris Winder, Worksafe Australia, and Dr. Kate Short, consultant in toxic chemicals; Health and Safety Bulletin, No. 48, "Guidelines on Working With Solvents," ACTU-VTHC. Occupational Health and Safety Unit; The 7.30 Report, ABC.

*A big-honkered man in fitt Close
Couldn't rely on his nose:
He caused a shemozzle
When he lowered his schnozzle
In a bucket o' lye, and said Rose!*



STYRENE

can the hazard be eliminated?

Megetan, a new plastic material, could be the ideal, environment-friendly substitute for polyester plastic. If the product is as benign as hoped, thousands of workers in the plastics industry could have a much better work environment.

Plastic is a young material. Plastics weren't produced on a large scale until the fifties. New plastic materials are developed continuously.

But many compounds contain environmentally unsound products, such as styrene, which causes nerve damage and changes in the genetic code according to scientific research.

Nerve damage

A report published in an earlier issue of PPM showed that workers at a plastic boat building factory were unusually tired, irritable and forgetful.

Those workers who had been exposed to most of the styrene in the factory has nerve damage, although the concentration of styrene was within the normal safety standards.

The plastics industry is now attempting to minimise styrene exposure to workers. Some methods even involve bacteria that "eat" styrene molecules.

New kid on the block

Styrene is an ingredient in hard plastics, such as polyester, used in the production of pipes, boats, frames etc.

Now there is a chance that styrene will be replaced by another material: Megetan.

This new plastic has been used in Germany and Switzerland since 1988, where it has been used for floor tiles, among other things.

The material is also being tried on boats, car parts and bath tubs. The market for mege-

tan is said to be considerable, and new applications are found daily.

Better environment

To put it simply, plastics are made from two main parts: resin and hardener. The basic resin in megetan is derived from biological raw materials such as potato starch, castor oil, rape oil and other materials harvested in agricultural fields. Specialised refining and processing result in the final resin.

Plastic hardeners often contain allergens, such as isocyanates. Megetan contains the same substances, but the process binds them, effectively preventing them from appearing in free form.

The new plastic material is odourless, and does not contain any solvents. There is no styrene.

Safety at a price

At the moment, megetan commands about three times the price of polyester. However, the savings in workers compensation, improved working conditions and minimised safety & health costs should quickly make the new material a viable and attractive proposition.

Certain aspects of the new material will still have to be worked out. For example hardening times, viscosity. Several field tests are currently underway in Europe. If the new plastic proves to be as good as is hoped, polyester manufacturers will have the opportunity to improve working conditions and workers' health significantly.



Source: Patrik Gronberg, Arbetarskydd 12/1990

SMELLY BUSINESS

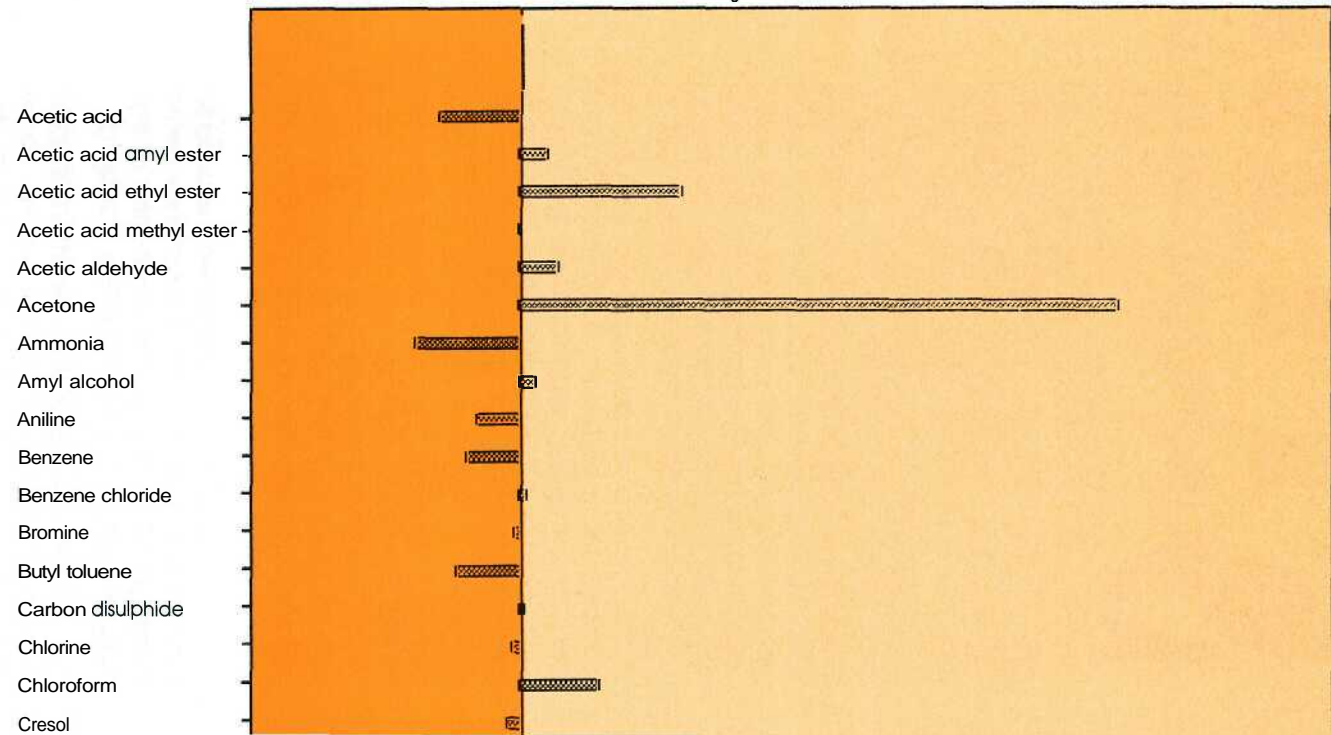
SMELL DEFECTS IN HUMANS

Here are a few conditions that may occur in people:

- **Parosmia**
Perverted sense of smell; everything smells unpleasant.
- **Allotriosmia**
Not being able to recognise common odours; making "smell mistakes".
- **Kakosmia**
Unpleasant smell perception without any explanation.
- **Autosmia**
Hallucinating smells; smelling odours that aren't there.
- **Hyposmia**
Diminution of smell acuity; lowered smell sensitivity.
- **Anosmia**
Inability to smell anything.
- **Hyperosmia (oxyosmia)**
Augmented smell acuity in

DANGER ZONE!

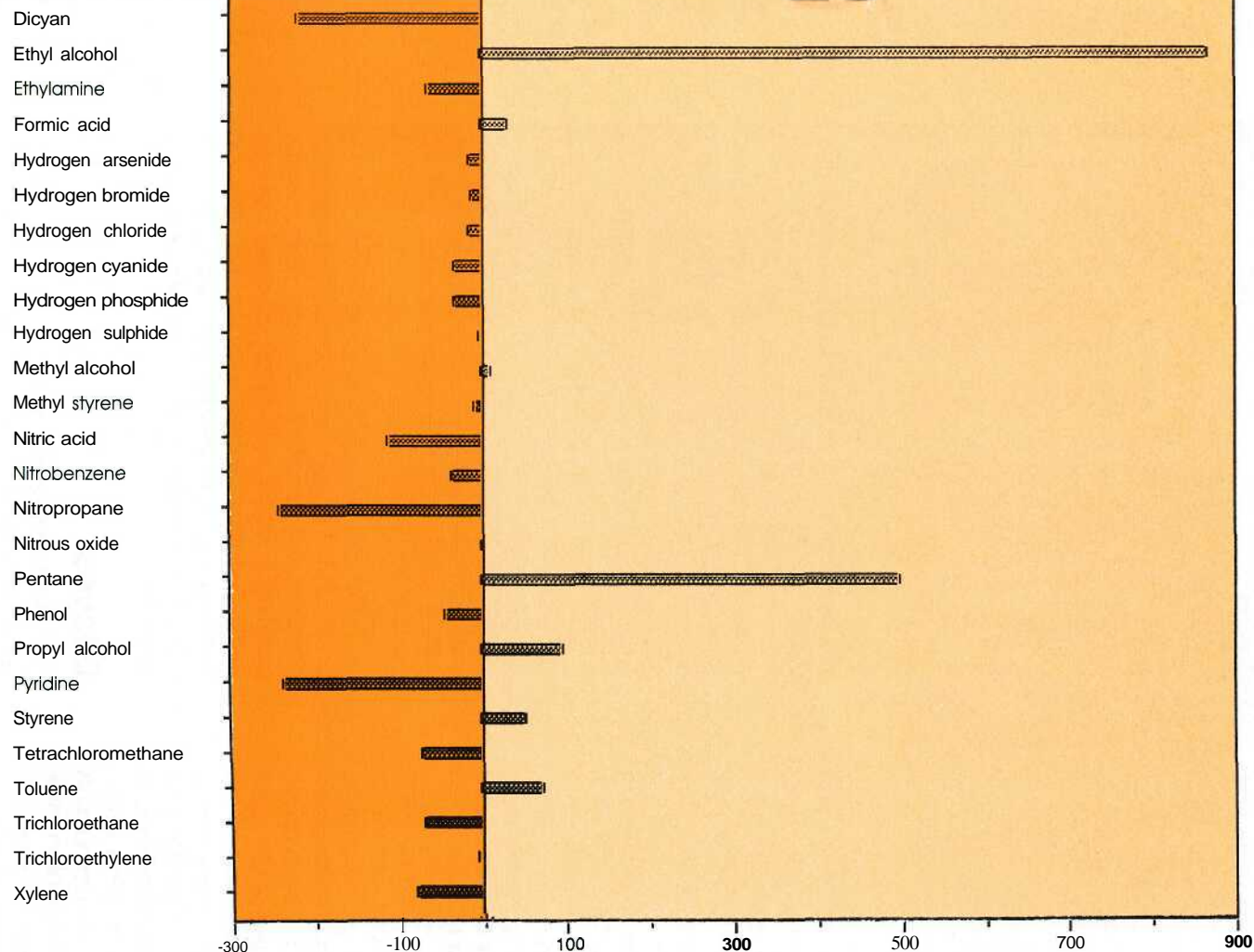
Detection of chemicals by smell
Recognition in ambient air



SENSITIVITY FACTORS

Factors which can affect the sensitivity to smell in a (permanent or temporary way) include:

- **Functional factors**
Adapting to smell; getting used to odours; smell fatigue due to strong, longterm exposure,
- **Toxic factors**
The sense of smell has been diminished or destroyed by chemicals, such as lead, mercury, cadmium, chromium, chlorine,
- **Respiratory factors**
Following inhalation of dust etc.
- **Inflammatory factors**
Nose colds, pneumonia etc.
- **Post-infectious or post-traumatic factors**
While recovering from disease or injury



Smell level in PPM above TLV Smell level in PPM below TLV

HOW TO READ THE CHART:

Bars to the right of the centre line signify substances with a smell level lower than TLV. Take care with all substances whose bars show values to the left of the centre line: their smell detection levels are higher than TLV. Also be careful with all substances close to the line: they have smell levels very near the TLV.



SPRAY BOOTHS

Proper use of safety equipment can help eliminate the dangers of chest problems and skin irritations in workers who spray paint in auto repair shops using two-pack polyurethane paints.

Two-pack paints contain isocyanates that provide a long wearing surface with minimum discolouration. However, exposure to isocyanates can produce asthma and bronchitis symptoms such as coughing and wheezing and lead to breathlessness or tightness in the chest if precautions are not taken.

A study by Dino Pisaniello and Luciano Muriale, from the Department of Community Medicine at the University of Adelaide, showed increased chest difficulties and skin irritation for those using two-pack isocyanate paints. Their research compared a group of auto spray painters with industrial painters and mechanics, who did not use two-pack paints. The groups were matched in age and in incidence of smoking and previous asthma and bronchitis. Users of paints containing isocyanates showed significantly more complaints of coughing, shortness of breath and skin irritation. The two essential safeguards in preventing such problems are enclosed spray booths with sufficient airflow and positive pressure air-supplied respirators.

Spray painting should only take place in an enclosed spray booth that provides a minimum of two fresh air changes each minute. In some shops automobiles are sometimes sprayed outside a booth, when there is a lot of work to be done and only a single booth is available. This can lead to increased health risks and should be avoided if possible.

Respirators

Several types of respirators are used by auto spray painters but the most effective is

the positive pressure air-supplied respirator. Cartridge type respirators, while very common, provide less protection, and are a particular problem for people with beards or large amounts of other facial hair. The seal between the face and the respirator is incomplete, and can lead to the inhalation of isocyanates. Inhaling isocyanates is not only a problem during spraying.

Power tools used for dry abrasion of recently sprayed surfaces will usually cause a cloud of isocyanate-laden particles. Working with a respirator and using power tools fitted with a dust-extraction system will prevent this problem.

The dangers of isocyanates can be a health risk not just for those who are spray painting but for others as well. When spray painting is done outside an enclosed booth, workers several metres away can be affected by the spray. The cloud of dust arising from dry abrasion can also reach other workers if care is not taken.

Gloves

A few other simple procedures will ensure a minimum of problems in working with isocyanate paints. For example, wearing proper gloves, particularly when cleaning spray guns, can help eliminate skin irritation on the hands. Ordinary natural rubber gloves made for dishwashing do not give enough protection because of the solvents used in isocyanate paint products or the thinner used in cleaning them. The solvents can dissolve right into the rubber and come in contact with the skin.

A much better glove to use when cleaning spray guns is made of nitrile rubber. It will protect the hands for periods of about 15 minutes, which is generally enough time to complete the task of cleaning the spray gun. Strangely, less protection is needed for the

	Isocyanate painters (N = 99)	Mechanics* (N = 48)	Industrial painters (N = 50)
Symptoms			
Usually cough first thing in the morning?	0.28	0.23	0.20
Usually cough during the day or at night?	0.44	0.15 [†]	0.32
Usually bring up phlegm first thing in the morning?	0.19	0.19	0.24
Usually bring up phlegm during the day or at night?	0.30	0.13 [†]	0.26
Period of increased cough and phlegm lasting for 3 weeks or more in the past 3 years?	0.27	0.13 [†]	0.14
Short of breath when hurrying on level ground or walking up a slight hill?	0.26	0.02 [†]	0.22
Do you ever get short of breath at rest?	0.08	0.02	0.02
Wake up in the night (or day) short of breath?	0.08	0	0
Chest ever sound wheezing or whistling?	0.34	0.19	0.32
Ever had attacks of shortness of breath with wheezing?	0.19	0.15	0.06 [†]
Chest ever feel tight or breathing become difficult?	0.39	0.15 [†]	0.16 [†]
Eye irritation due to work in the past year?	0.36	0.43	0.42
Conjunctivitis due to work in past year?	0.09	0.05	0.04
Dermatitis or skin irritation due to work in past year?	0.37	0.19 [†]	0.24
Other data			
Current smoker?	0.44	0.52	0.56
Average age (years)	28.2	29.0	23.9
Ever had bronchial asthma?	0.10	0.08	0.12
More severe reaction than other people to insect bites?	0.06	0.02	0.04
Sometimes spray two-pack paints outside the booth?	0.59		
Shown how to use respirators properly?	0.67		
Informed of respiratory hazards of two-pack paints?	0.75		

*All data, except for age, refer to the proportion of interviewees giving a positive response.
[†]Indicates that the proportion is statistically different (95% confidence) from that for car spray painters using isocyanates.

© British Occupational Hygiene Society

hands when actually spraying. Natural rubber gloves provide enough protection during this process.

Cleaning the booth

Another area to watch is cleaning down the spray booth. Paint builds up over time and must be removed. The preferred method in cleaning the booth is washing it down with water. Sweeping may cause dust particles containing isocyanates to be inhaled or reach the eyes. Overalls used during spray painting also need special care. Don't use compressed air to remove the surface dust or attempt to brush it off with your hands. Vacuum cleaning will remove the dust safely and keep it from contact with the eyes or nose.

Eye protection

While working with isocyanates does not lead to an increase in eye irritation compared to other workers, paint spray reaching the eyes

will certainly cause problems. An air-fed mask with visor can offer protection when spraying, and ordinary goggles or safety glasses will work when dry rubbing with a power tool. Facilities should be available to flush the eyes immediately after an accidental spray to the eyes, followed by a quick trip to the doctor to see that no damage has been done. Working with isocyanate paints need not be a worry if proper precautions are taken. The use of safety equipment, coupled with special awareness and common sense, will offer protection for everyone working in the auto spray industry.



Source: D Pisaniello B Sc (Hons), Ph D; L Muriale, B App Sc; "Hazards associated with the use of isocyanates in auto refinishing", Dept of Community Medicine, University of Adelaide, March 1989. Various papers (Annual Occupational Hygiene Vol33 No4, UK 1989; Journal of Occupational Safety, Australia/New Zealand 5(4) 1989)

Can you smell a rat...or not?

Many industrial workers rely on their nose to tell them when toxic chemicals are present, or to alert them when the gas cartridge filter runs out. But in many cases, smell is a highly unreliable — and dangerous — detection method.

The sense of smell is located in the olfactory organ in the upper part of the nose. The organ itself covers 5-10 cm², or about the size of a postage stamp. However, the actual surface absorption area is an entire square metre - as big as a beach towel.

Two factors play a major role in the way we perceive smells: volatility and solubility. A very "smelly" substance can be hard to detect unless it's in very high concentrations if its volatility is low. On the other hand, a volatile substance with a very faint smell can be readily detected at low levels.

What does this mean? It means you can't trust your nose. And you certainly shouldn't rely on your smell in order to determine whether your workplace contains dangerous substances.

"I change my filters as soon as I can smell the paint"

Wrong! Your sense of smell can be influenced by a host of factors: humidity, temperature, breathing rate all affect the acuity of smell. The olfactory organ may also get "used" to certain odours (such as formaldehyde and ammonia). Moreover, certain substances (such as cadmium and chromium) may affect the sense of smell in a significant way.

The odour characteristics of chemicals are quite complicated. Scientists use the following terms to describe the way we experience smell: Comfortable, neutral, molesting, irritating, barely tolerable, repulsive and unbearable.

Taking the subjective effects of smell further, smells can be described as sweet, acid, bitter etc., and the irritation can be designated as tickling, burning, sharp, painful, cool and so on. The quality of the smell can then be described as pleasant, indefinite, unpleasant, repulsive, disgusting, offensive, stifling, and so

on. All this shows that the "language" of odour is nebulous, vague and highly subjective. It is impossible to describe a smell to another person if that person has never experienced it first hand.

These terms have nothing to do with the concentration of the chemical. There are many substances that don't have any smell and that are extremely toxic to humans. This is one of the ground rules: ***There is no relation between toxicity and smell.***

Three-way effects

There are at least three ways that commonly used chemicals can affect the smell sense: dusts and chromium attack the surface of the smell organ; trichloroethylene, lead and mercury are central irritants; and benzene can affect the olfactory nerve itself.

Most occupational smell problems are of a temporary nature, and usually disappear before the next work shift. Nevertheless, work places with strong odour, or where the chemicals mentioned before are used, should try to counteract the odour by forcing clean air through the room, neutralising or masking with additives, combustion, air filtration, etc.

Gases with a high smell threshold could be mixed with highly odorous substances, such as some organic sulphur compound, in order to achieve a strong warning device in case of leakage or excessive concentration.

Mask users

The most important thing to remember is that the smell sense cannot be relied upon to tell workers when to change their respirator filters. Many substances have a smell threshold that is much greater than the TLV. Once you smell the chemical, the concentration is already far above the safe level. The wall chart in this issue of PPM may be of assistance.



Source: A Naus, "Olfactory properties of industrial substances", Encyclopaedia of Occupational Health & Safety, International Labour Office, Geneva 1985; Kuhn-Birett, "Merkblätter Gefährliche Arbeitsstoffe", Germany 1986; Black's Medical Dictionary, London 1987

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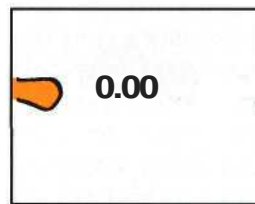
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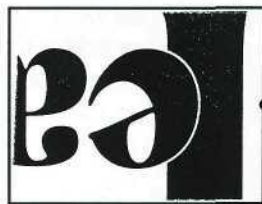
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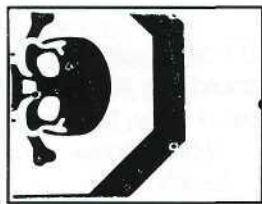
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TINNITUS

the silent ringer

It's not just the punch-drunk fighter who walks around with ringing in his ears. Industrial noise is a major cause of tinnitus — a loud noise in the ears.

It may be a ringing noise, or sound like hissing, buzzing, thumping, roaring or rumbling, but for those who have to live with tinnitus, the sound can be devastating. And it is often accompanied by hearing loss.

Tinnitus interferes with sleep, causes difficulty in understanding conversations and detracts from the enjoyment of music, television or films. Sufferers can become very depressed when someone thinks they are stupid because they didn't understand a question or refuses to believe they are bothered by sounds nobody else can hear.

About 1-2% of the population suffers from severe tinnitus, a "constant unrelenting noise," says Dr. Peter Wilson, a Senior Lecturer in Psychology at the University of Sydney, who has been working with tinnitus sufferers since 1983.

He estimates that perhaps 6-7% of the population may have tinnitus at some time, which would mean that anywhere from 170,000 to more than a million Australians suffer from the problem.

"One estimate puts it at 17% of the population," Dr. Wilson says. "I don't

think that is an unreasonable figure."

Tinnitus is caused by damage to the nerve cells in the inner ear. The damage may occur because of loud noise over a period of time, acute noise like an explosion, Meniere's disease or a degenerative ear condition caused by age or disease. About one-third of tinnitus cases may be caused by noisy workplaces, Dr. Wilson estimates.

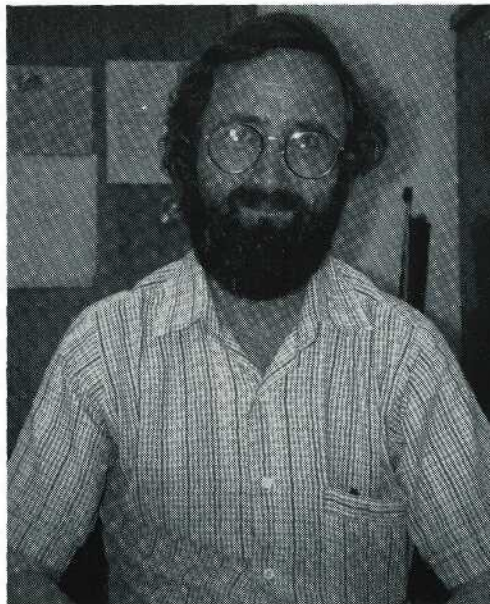
Elusive causes

The specific cause may be difficult to pinpoint because those who work in a noisy workplace may also be exposed to loud noise while attending a rock concert or a disco, take part in a sport such as shooting or engage in a do-it-yourself project using power tools.

Exposure to noise adds up. Those working in a noisy place should try to avoid loud noise during their non-working hours.

It's not only how loud the noise is, but also how long the exposure. You can work all day with noise levels below 85 decibels with little risk to your hearing, but above that level the risk increases as the noise gets louder and the exposure gets longer.

At 100 decibels the exposure should be limited to 15 minutes a day to avoid damage. Band saws produce noise levels of 101 decibels, with 92 for grinders and 93 for paper cutters,



Dr. Peter Wilson, University of Sydney

10,000 cases per year

It has been estimated that there are 10,000 new cases of occupational hearing loss, often accompanied by tinnitus, each year. A program to test hearing in the workplace, run by the Victorian government, found that in some factories more than half the workers had hearing impairment.

The problems of working in a noisy environment can be offset by wearing proper ear protection. Ear muffs or ear plugs can reduce the problem considerably.

Machinery that produces excessive noise should be identified with signs advising that hearing protectors should be worn, and noisy areas within a workplace should have similar warning signs displayed at the entrance.

A rough rule of thumb is that if conversation is difficult between two people standing one metre apart, then the area is considered noisy.

While workers using jackhammers are uncomfortably aware they are working in a noisy workplace and will usually wear ear protectors, people such as train drivers may not use protection because the noise is intermittent. This can lead to hearing impairment.

No cure

"By and large the damage is irreparable," says Dr. Wilson. While hearing aids may help the hearing loss, there is nothing that can be done if the damage leads to tinnitus as well. "There isn't any successful treatment for the problem," he says.

The major approach in treating tinnitus has been masking. A device is worn in the ear that produces a noise that "masks" the sounds coming from within the ear. "It doesn't remove the tinnitus. It just makes it harder to hear the internal noise," says Dr. Wilson.

Psychological help

The approach used by the research team at the University of Sydney is a psychological one, helping sufferers to cope with the problem. Dr. Wilson describes the approach as similar to the one used for dealing with chronic pain. "The aim is not so much to reduce the pain but to show people ways to cope with the pain and live a more normal and rewarding life," he explains.

There are three basic techniques used in combination. They are:

- **Cognitive Therapy**
learning ways to change "negative and unhelpful ways of thinking and to have a more positive approach," says Dr. Wilson.
- **Focussing Exercises**
learning to focus on outside sensations, in order to distract from the sound within.
- **Relaxation Training**
learning how to relax your body and mind.

The techniques have all proved useful, although some people find one or two might not work for them.

Until recently the tinnitus sufferers treated by Dr. Wilson and his research team have come to them through referrals from audiometry specialists.

"There's a lot of recognition of our work from the hearing specialists," says Dr. Wilson. "They can't do much about tinnitus so they refer people to us."

A small article that ran recently in a Sunday newspaper in Sydney asking for people with tinnitus to join the program tied up Dr. Wilson's phone for days. He had expected about 200 volunteers but received around 700 replies. He and his associate, Jane Henry, want to test the techniques on a large group of people.

Long wait for cure

He doesn't expect all of them to join the program, however. "People get a false idea of what can be done. We're not offering a cure for tinnitus, but a way to cope with it," he says.

Those who expect more are doomed to disappointment. "We're far from a cure," Dr. Wilson admits. "It will be a long time coming."



Sources: Dr. Peter Wilson, Department of Psychology, University of Sydney; Noise Management at Work: National Occupational Health and Safety Commission, August 1990

H

The psychological and social consequences of

Hearing loss

Reduced hearing is a very common condition among our working population. Work induced hearing loss is, of course, a kind of physical injury. But what about the psychological aspects?

To be slowly, steadily and irrevocably more and more isolated from the surrounding world is a nightmarish experience. No wonder the psychological effects of hearing loss can be just as traumatic as the physical condition.

Hearing: a cornerstone of human communication

Hearing is a prerequisite for natural, spontaneous development of speech. Hearing and speech are the natural links in the contact between people.

Therefore, reduced or lost hearing abilities bring about psychological stress that can be unbearable for the patient, and that can badly affect family, friends and acquaintances as well.

Many people don't want to talk about their hearing problem. Hearing loss is an invisible condition. Most sufferers try to live up to normal expectations from themselves and from their surroundings for as long as possible. This can lead to severe problems that may not be evident in visible handicap.

Three groups

Hearing experts talk about three different kinds of deafness:

- **Childhood deafness**
People who were born deaf, or who became deaf before learning to talk. People in this group rely almost completely on sign language. They have never heard their own voice, and never had the opportunity to control it.
- **Adulthood deafness**
People in this group suffer from severely impaired hearing or complete deafness. They have lost their hearing at an adult age, know how to speak, and have language comprehension. However, the hearing damage is so severe that modern hearing aids cannot improve the hearing. They are isolated from the surrounding hearing world, but also from childhood deafness sufferers, who communicate on a completely different basis.
- **Hearing impairment**
The hearing may be more or less reduced, but has occurred late in life: normal language development has not been affected. The hearing damage may have occurred at one specific point in time, or can be a gradually worsening condition.

Psychological ramifications

Many factors will affect a person who suffers from impaired hearing. The attitudes of the rest of the community, family and friends, and, of course, work environment are all important to the way the problem can be dealt with. If the sufferer is treated with understanding and respect, it becomes much easier to accept and cope with reduced hearing.

Other factors include the reason for the hearing loss, how suddenly it occurred, and how severe it is.

Anxiety and fear

Loss of sounds and distorted sounds mean a dramatic psychological change. Everyday background noises are gone. The result is often deep anxiety and fear of the new situation. The hearing impaired may appear suspicious, even paranoid. They think people talk behind their backs. This is only a natural reaction to hearing and comprehension difficulties.

A British survey shows that people with hearing loss are much more susceptible to depressive behaviour. There are strong connections between hearing loss and dissatisfaction with work, loneliness, domestic problems and a depressive outlook on life.

Lost self-esteem

When you can't hear, you feel that you're not in control; you can't perceive your surroundings with all senses. It is common to lose self-confidence as a result.

The constant straining to hear and understand can lead to stress and, often, psycho-somatic diseases. If tinnitus is present (see other article in this issue), the situation may become almost unendurable.

People who are having a hard time accepting their disability may use an array of defence mechanisms:

- **Exaggerated extrovert behaviour.** The person may tend to speak loudly and excessively rather than try to concentrate on what others are saying.
- **Denial of the handicap, or withdrawal from all social discourse.**
- **Diverting the attention to some other bodily problem.** It is common to exaggerate anything from heart conditions to eczema of the ear canal.
- **Exaggerating the hearing impairment to take advantage of it in widely differing circumstances.**
- **Attributing the cause of the problem to any other source than the real one.**
- **Suffering strain headaches after a tiresome working week. It takes all week-**

end to rest and recover. Family life and social engagements are sacrificed.

Attitude problems

Many research projects have been conducted to explore how often people use their hearing aid. It varies. One reason is that the invisible hearing problem suddenly becomes an obvious condition.

The hearing aid is inevitable: it's there. And it is important for others to help the sufferer to accept it.

One of the most important things to do is to eliminate the old irrational association between hearing impairment and intellectual disability.



A person with severe hearing loss, but who dares to use good technical aids, such as a microphone for people to communicate with, has a massive advantage even on a slightly affected person who doesn't want to use a miniature hearing aid.

Often, reduced hearing doesn't have to be a handicap at all.

Social consequences

Social problems may arise both for the hearing impaired and for people of normal hearing.

At work, difficulties often appear when there is no other choice than to transfer duties or change position. This relocation may be a stressful and uncomfortable experience.

- **New colleagues may have different voices and dialects. It takes time to get used to their voice patterns and lingual mannerisms. A period of excessive "Say-again?" is taxing on both parties.**
- **Large groups, conferences, group discussions may cause problems, espe-**

cially if there is background noise that muffles or masks the conversation.

- **Lip movements are important. People should remember to speak clearly and with their lips towards the person.**

Knowledge helps

Many difficulties can be avoided by better understanding among management and work colleagues. People with normal hearing should have patience, and should ascertain that the message really has been clearly re-

Here is a rundown of the psychological and social problems an adult may experience as a result of hearing damage:

TYPE OF PROBLEM	SOCIAL DIFFICULTIES	PSYCHOLOGICAL CHANGE
Slowly and gradually reduced hearing	Isolation, withdrawal from social interaction, reduced mobility, changed work duties and employment roles	Reticence as a consequence of inability to comprehend information and discern nuances in communication.
Severe hearing impairment	Complicated interaction with others. Fear of new situations.	Suspicion and depression as a result of partially lost control of surrounding noise environment.
Sudden hearing loss	Conflicts at work and at home. Anxiety about the future.	Irascible behaviour and anxiety as a result of sudden loss of hearing.
Progressive hearing loss due to age	Resignation, submission and defeatist behaviour in communication with others.	Feelings of being old and useless as a result of damage to an important organ.
Extreme hearing impairment	Avoidance of social situations. Stifled communication.	Feelings of alienation and personality changes as a result of distortion of the speech.
All hearing damage	Less ambition. "I am handicapped" syndrome.	Reduced self-esteem and self-confidence as a result of general hearing limitations.

Source: M Eriksson-Mangold, Erlandsson - G Liden (ed): "Audiologi" 1985 p 80



ceived. Here are a few simple rules that mean a world of difference:

- **Keep lighting in mind: don't stand in deep shade, or with a bright window behind you.**
- **Always talk with your face towards the person.**
- **Speak calmly and clearly.**
- **If in a group, adjust your voice level and speed to the person who can hear the least.**
- **Quiet surroundings and good lighting helps.**
- **Correct misunderstandings in a gentle and kind way.**
- **Repeat confused words and missed sentences.**
- **Use pen and paper to write down important points.**

Management considerations

Occupational health measures can help to establish even minute changes in the hearing of employees. The information can be used to remodel the work place to one where there is no concern for hearing injuries to workers.

However, the things management can do aren't limited to technical and engineering measures, but also include organisation and information.

Find the problems

Regular hearing tests should be a matter of course if there is the slightest suspicion of excessive noise.

The work premises should be "noise mapped" to establish potential problem areas.

There is often no need for exhaustive refurbishing or extensive changes to the work place: simple adjustments of lighting, sound sources, and the communication between personnel is often enough.

Information and support

If members of staff do suffer occupational hearing loss, it is important to look at the situation together. Only the person can express

possible changes that could make communication easier and work more comfortable.

Colleagues and management must also express what the hearing impaired person can do to facilitate better work conditions.

Managers will have to confront the grief and distress that accompanies hearing loss. They must also be able to revive and reinforce a lack of confidence and low self-esteem, and help to overcome stress and negative thinking.



Source: Swedish State Health/PREVAB 1989: "Horsel & Buller - psykosocial del"

Handy hints



KEEP IT UNDER WRAPS:

Respirators with gas filters and unused gas filters *must* be stored in a sealed plastic bag or an air-proof container.

The filter continues to absorb contaminants whether you're wearing the mask or not!

From all of us to all our readers:



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