Occupational risks to hearing reviewed

A review of CONCAWE's work programme and the European Directives on noise at work

With the publication of CONCAWE report 5/05 an extensive work programme on the factors potentially affecting the hearing of petroleum industry workers has recently been completed by the CONCAWE Health Management Group. It was initiated some seven years ago when it became clear that the 1986 European Directive on noise at work would be revised. Noise at work legislation has been in place for many years in most countries with the principal aim of protecting workers' hearing. The legislation in most EU Member States is directly based on Directive 86/1898/EEC which contained an undertaking to review its provisions in the light of experience and developments in scientific and technical knowledge about the effects of noise exposure on health. In February 2003 a new Directive (2003/10/EC) was issued with lowered noise exposure limits. Member States are required to transpose the provisions of the Directive by 15 February 2006.

In the past decade researchers have reported effects from some organic solvents on the hearing function of exposed workers, and similar findings have been reported in experimental toxicology studies. Several of these so-called ototoxic solvents are also constituents of gasoline. Ototoxic solvents interact, after inhalation and distribution in the body via the blood, with sensory cells in the inner ear or with the auditory nerves involved in transmission of the signals to the brain. Toluene, in particular, has been implicated as having the potential to cause effects on hearing. Directive 2003/10/EC requires that attention be given to ototoxic substances as part of workplace health risk assessment for noise exposure, but offers no further guidance on how this should be achieved.

The CONCAWE work programme comprised:

- A recommendation for a health-based limit value for noise exposure to protect hearing, by the University of Southampton, UK (CONCAWE Report 01/52).
- An inventory of typical noise exposure ranges in a variety of European downstream oil industry operations using exposure data from CONCAWE member companies (CONCAWE Report 01/56).
- An analysis of hearing test results of refinery workers, by the Catholic University of Louvain (UCL) in Brussels, using data collected by the medical departments of CONCAWE member company refineries. These reported no general detectable hearing loss attributable to refinery noise exposure since the introduction of national legislation based on the 1986 Directive or, for that matter, to chemical exposures over the same period (CONCAWE Report 00/55).
- A review of the scientific evidence on ototoxic effects of gasoline constituents, by the UCL in collaboration with the University of Milan (CONCAWE Report 5/05).

Report 5/05 presents a full review of all risk factors that may affect a worker's hearing, including noise exposure (occupational and leisure), disease, some therapeutic drugs, smoking and alcohol consumption. The report addresses human and experimental studies of presumed ototoxic chemical exposures. It concludes that, in the only reported study on petroleum refinery workers, the evidence is unconvincing. Well-conducted studies of workers from other industries, where exposures to toluene and other solvents occur within current limits, do not report hearing losses. Exposures to potential ototoxic constituents of gasoline in modern European operations are usually well below these chemical exposure limits (see CONCAWE report 9/02).

Report 5/05 concludes that the scientific understanding of potential interactions between chemicals and noise is limited and it is not possible to make specific recommendations on health risk assessment or to set a limit value for the combined exposure to noise and to certain hydrocarbons that may cause ototoxic effects at high exposure levels. It does recognise, however, the irreversible nature of hearing loss and recommends remaining alert in occupational health surveillance programmes to the possibility of a combined effect of noise and solvent exposure.