Environment

STS: How to gauge the noise problem

Driven by the growing threat of litigation over noise-induced hearing loss, employers have been scrambling to find ways to identify workers at high risk of hearing loss before any impairment they suffer becomes permanent — and potentially compensable. At a recent meeting of the American Speech-Language-Hearing Association in Toronto, Julia Doswell Royster of Environmental Noise Consultants in Cary, N.C., and Larry Royster of North Carolina State University reported on research they performed for the Occupational Safety and Health Administration. They compared the relative "protectiveness" of five alternative criteria that might be used to identify workers having a "significant threshold shift" (STS). According to OSHA, STS denotes in decibels — for one or more selected test frequencies — small but genuine changes in hearing ability.

The regulatory definition of STS is important. In its hearing-conservation amendment (SN: 5/22/82, p. 347), OSHA requires employers to issue special hearing protectors to workers with a demonstrated STS. These workers must also be notified of their STS (as measured by tests which must be conducted now at least once a year) and be retrained in hearing-conservation measures. Explains OSHA's John Martonik, the agency hopes to prevent material impairment to workers' hearing by requiring that action be taken when an STS is first noted. In many cases, he said, this will occur well before damage is sustained that is serious enough to warrant compensation. However, forensic audiologists point out (SN: 5/22/82, p. 348), when material impairment has been sustained, OSHA's definition of what constitutes an STS should prove instrumental in establishing a yardstick by which compensation can be calculated.

For all its importance, the operational definition of what is an STS has still not been established by OSHA. Martonik notes that the much-argued and long-overdue criteria should be proposed within the month and that data provided by the Roysters "will be considered."

"The ideal STS criterion would achieve a balanced trade-off between optimum employee protection and minimum unnecessary follow up for false-positive tags," Julia Royster told SCIENCE NEWS. "Some false-positives [identification of workers whose hearing loss is not truly significant] are inevitable," she added, "and are actually desirable to be sure that you catch some workers while the threshold shift they exhibit is temporary." However, having to follow up too many false-positives would be needlessly costly and burdensome for employers, she says.

Based on their comparisons of audiometric data obtained from four hearing-conservation programs (involving 7 tests per worker over 6 years), the Roysters found a 15 dB shift at any test frequency missed the fewest affected workers. Roughly 40 percent of the total, however, were false-positives. Judged almost equivalent in protectiveness were: a 20 dB shift averaged from readings between 1 kilohertz and 6 kHz; a mean 10 dB shift in either ear computed from tests at .5 kHz, 1 kHz and 2 kHz or at 3 kHz, 4 kHz and 6 kHz; and a 15 dB shift in either ear, recorded in successive years, at any frequency from 1 kHz to 6 kHz. Only the last criterion had a false-positive rate much below 40 percent: it was 17 percent. Least protective of all evaluated criteria was a mean 10 dB shift in tests at 2 kHz, 3 kHz and 4 kHz.

Mental tasks reduce loud-noise effects

College students exposed to 10-minute sessions of 100 decibel "white" (broadband) noise exhibited slightly smaller (2 dB) temporary drops in hearing sensitivity if they were working on math problems (in their head) throughout the noise instead of sitting passively. According to William Ickes and Karan Finlayson of Texas Tech University, their study "reaffirms the presence of some kind of inhibiting or suppression mechanism at 100 dB" called into play by concentration on difficult mental tasks.

Biomedicine

Ammonia indicted in Reye's syndrome

Aspirin intake during flu or chickenpox has been linked with a rare but often fatal childhood disease called Reye's syndrome (SN: 6/19/82, p. 406). Now another factor seems to contribute to the syndrome as well — ammonia. This finding, from Devendra R. Deshmukh and colleagues at the University of Michigan, is reported in the December PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES (No. 23).

The possible link between aspirin and viral infection with other causes for Reye's syndrome has not been examined in patients because infection and aspirin ingestion occur well before the syndrome is diagnosed. However, excess amounts of ammonia have been noted in the bloodstream of Reye's victims, suggesting that it might help aspirin and viral infection to trigger the syndrome. Deshmukh and colleagues decided to test this hypothesis in 56 young ferrets.

The ferrets were divided into eight groups: controls; animals infected with flu virus; animals given aspirin; animals infected with influenza and given aspirin; animals given a diet free of the amino acid arginine, producing high levels of ammonia in the bloodstream; animals given the diet and infected with flu; animals given the diet plus aspirin; animals given the diet plus aspirin and infected with flu. None of the animals in groups one through four became sick, the researchers found. However, animals in groups five through seven did, showing signs of Reye's such as seizures and coma. Animals in group eight showed the most pronounced signs of Reye's; 12 of 16 in the group died.

How excess ammonia accumulates in Reye's victims is not known, Deshmukh told SCIENCE NEWS. But he suspects it may result from viral infection of the liver because liver damage is known to occur in Reye's patients and liver damage could interfere with the liver's ability to turn ammonia into urea.

A novel flu vaccine

Currently, flu vaccines are made from killed flu viruses. Such vaccines are safe, but not completely protective. Scientists would like to develop a flu vaccine that is still safe but more effective. One may now have been found, Brian R. Murphy of the National Institute of Allergy and Infectious Diseases in Bethesda, Md., and colleagues report in the Dec. 24 SCIENCE.

They mated a human flu virus with a bird flu virus and, by selective culturing and reculturing of progeny viruses, ended up with what they call a "reassortant virus." The reassortant virus consisted of human flu virus genes and proteins that provoke immunity in a human. The virus also contains bird flu virus genes that slow the rate of virus replication in a human. They injected the reassortant virus into monkeys. As they hoped, the virus induced significant immune protection against human flu virus, yet replicated only modestly — that is, it was attenuated.

$1 million for a cancer cure

Industrialist Armand Hammer, who has promised $1 million to the scientist who comes up with a cancer cure, is meanwhile giving $100,000 annually for 10 years to investigators deemed to be making the most progress toward a cure. The first $100,000 has now been awarded. It is being shared by George T. Stevenson of Tenovus Research Laboratories in Southampton, England, and by Ronald Levy of Stanford University School of Medicine.

Stevenson received the award for identifying an antigenic substance peculiar to leukemia cells, making antibodies to the substance and showing that the antibodies selectively killed leukemia cells. Levy has been honored for making mass-produced, highly targeted monoclonal antibodies to antigenic substances on leukemia and lymphoma cells, injecting the antibodies into patients with leukemia or lymphoma and finding that the antibodies made the patients' tumors regress.