ENVIRONMENT

Loud music hurts even musicians

When audiologists deliver diatribes against deafeningly loud music, they tend to focus their attacks on youth with a penchant for rock and roll. Lest that lull afficianados of classical music into a false sense of security, Alf Axelsson and Fredrik Lindgren report that even Beethoven can do damage.

Employed by the Department of Audiology and Occupational Medicine at Sahlgrenska Hospital, Gothenburg, Sweden, the pair found that 59 of the 139 orchestral musicians they studied exhibited worse than average hearings losses, according to WORKING ENVIRONMENT 1982 (published in Sweden).

The researchers noted that half of the concerts they monitored in Gothenburg's Concert Hall and Lyric Theatre exceeded 85 decibels (dB_A), Sweden's eight-hour workplace-exposure standard. Though concerts were not long, the musicians who they studied performed a total of roughly 40 hours each week (including practice sessions).

Among brass players, a group found to be at high risk, trombone and French horn players exhibited the greatest high-frequency hearing loss. Of the woodwinds, bassoonists were most affected. This pattern of high-pitch loss is a consistent with symptoms characterizing noise-related hearing loss (SN: 5/22/82, p. 347).

"A somewhat surprising finding," according to WORKING ENVIRONMENT, "was that the trained ear was able to elevate the discomfort level of loud sounds." Along this line, David Lipscomb, director of the University of Tennessee's Noise Research Laboratory. points out the existence of what he calls "a pleasure principle. That is, if you're enjoying a noise exposure, then you probably aren't as susceptible [to hearing damage] as when it's driving you bananas."

Noise is a stressor (SN: 6/5/82, p. 380), and one of the physiological changes it produces is a constricting of the veins and arteries. "When you are given a high-level noise exposure," Lipscomb says, "there is a reduction in the delivery of blood to the ear. So when the ear needs oxygen and nutrients more, it actually is starved. The more an individual reacts to that stressing agent, the more sensitive that individual will make himself or herself to the effects of noise." He suspects that's why the rock musicians that he has seen exhibited less hearing impairment than would have been expected.

Noise—any fetal hazards?

In the past, an elevated incidence of low-birthweight babies had been correlated with residential areas near airports. And as early as 1934, noise was demonstrated to induce sharp body movements and to accelerate the heart rate in a fetus. A new National Academy of Sciences report, *Prenatal Effects of Exposure to High-Level Noise,* reviewed such studies — especially human studies — but found "no conclusive evidence of detrimental effects of high-intensity sound in higher mammals."

Regarding fetal heart rate, the report says there do appear to be noise-induced changes, but that they do not appear "injurious in themselves" or likely to indirectly foster fetal injury. However, owing to the limited number and nature of experiments conducted to date, the report suggests it would be "prudent" for pregnant women to avoid exposures of "several hours per day" to sounds 90 decibels or above.

Interestingly, "noise *can* damage the hearing of guinea pigs *in utero,*" according to Reginald Cook at the National Institute of Environmental Health Sciences. His research, published in DEVELOPMENTAL PSYCHOBIOLOGY (Vol. 15, 1982), is notable because exposure occurred as the animals' inner ears developed. Guinea pigs are one of the few lower mammals who—like humans—are born fully able to hear.

BIOMEDICINE

Open-heart surgery and brain injury

Open-heart surgery with heart-lung bypass "often induces slight brain injury," Torkel Åberg and colleagues at University Hospital, Uppsala, Sweden claim. Since 1974 they have been compiling psychological evidence that this is the case. Now they report biochemical ammunition that further bolsters their hypothesis in the May 22 LANCET.

Adenylate kinase is an enzyme that helps lead to the formation of cells' vital energy molecule ATP. The researchers found elevated levels of this enzyme in the cerebrospinal fluid of 33 out of 36 patients after open-heart surgery with heart-lung bypass compared to the patients' levels before surgery. What's more, 18 of the 36 patients were given psychological tests before and after their operations, and patient change in intellectual performance was significantly related to release of adenylate kinase into the cerebrospinal fluid after surgery. So adenylate kinase appears to have leaked from the brain into the cerebrospinal fluid of most of the patients studied, and in a number of them the leakage probably deprived their brain cells of needed energy and led to intellectual deterioration.

A probe for Down's syndrome genes

Although Down's syndrome (mongolism) is due to an extra number 21 chromosome or an extra portion of this chromosome, scientists don't know how the extra chromosome actually causes the mental retardation and physical abnormalities associated with the syndrome. They suspect that it contains genes that code for normal protein products, and that it's an excess, or imbalance, of such genes and gene products that causes the syndrome. Judy Lieman-Hurwitz and colleagues at the Weizmann Institute of Science in Rehovot, Israel have used recombinant DNA technology to manufacture molecular probes that they hope will help identify the genes responsible for Down's.

Specifically, the gene that codes for the enzyme superoxide dismutase is located in or near the region of chromosome 21 known to contain the genes responsible for Down's. Lieman-Hurwitz and her co-workers isolated messenger RNA coding for this enzyme, used the mRNA to make the DNA (gene) coding for the enzyme, then inserted the DNA into bacterial plasmids. The plasmids made copies of the DNA. These copies, the researchers write in the May PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES, can now be used as molecular probes to learn more about neighboring genes on chromosome 21 and possibly those responsible for Down's.

Dismantling kidney stones

Good news for kidney stone victims emerged this spring — stones could be removed nonsurgically with ultrasound shock waves (SN: 4/17/82, p.261). Now more good news has arrived — that stones can also be removed with a minor surgical technique called percutaneous stone manipulation. This procedure consists of inserting a catheter through a patient's side directly into the kidney, then using forceps and graspers to remove stones through a telescopic tube inserted in the catheter tract.

Robert I. Kahn, a urologist with the University of California at San Francisco, performed PCSM on eight kidney stone patients and reports that the procedure removed all of the stones in six of the patients, and most of the stones in the other two. What's more, hospital stays and recovery times were shorter than if the stones were removed by conventional open kidney surgery.

Kahn is also using ultrasound to remove kidney stones. He has found it particularly useful for getting rid of large stones, and PCSM especially effective for small ones.