

Shifting teeth faster electrically

Wearing braces to move and straighten teeth can be a lengthy, painful experience. Now, two University of Pennsylvania researchers believe electrical stimulation of the gums may cut in half the time braces must be worn. The researchers are just beginning a three-year clinical study with 60 female patients to test the method.

Orthodontist Zeev Davidovitch, who began the work in 1975 with materials scientist Edward Korostoff, says orthodontists have conventionally used mechanical force to shift teeth. Mechanical devices that push or pull a tooth apply force to a tooth's crown. The force is transmitted downward to the root and into the tissues, including bone, that surround the root. There the bone tends to dissolve or resorb ahead of the moving tooth's root where the pressure is high and to build up behind the root where the pressure is low. The problem, says Davidovitch, is that tissue remodeling doesn't happen overnight. "What we're doing with electricity is simply enhancing the rate of tissue remodeling," he says. Although braces are still necessary, they are needed for a shorter time.

The electricity source is approximately the size and shape of two nickels stuck together. It consists of a transistor and several resistors and batteries, encased in epoxy and dental acrylic plastic. The device provides a constant current of between 15 and 20 microamperes at about 1.5 volts. Korostoff says the easily removable circular unit attaches to the bracket already installed for orthodontic wires and lies against the gum, between the gum and the cheek. One major effort during the first year of the clinical trials will be to reduce the size of the device, Korostoff says. A graduate student researcher, who has worn the device for a short time, says its presence is noticeable, but it is not uncomfortable compared with the normal discomfort people suffer when they wear orthodontic braces. He says he did not feel the electric current at all.

Although the method was tested successfully on cats, Davidovitch admits that testing it on humans is a new field. "We don't know what will happen," he says. "There are many questions we haven't answered yet." Initially, patients will wear the device for about 8 to 10 hours at night. "We may find that it's not sufficient," says Davidovitch, "but this is why we plan to conduct these experiments, to get the bugs out of the system."

Both Korostoff and Davidovitch are optimistic that their method will work on humans as well as it did on cats, and they are very excited about their work. Through the University of Pennsylvania, they hold a patent on the method and device now being tested at the university's School of Dental Medicine.

A buzz around the solar house

In some homes that use solar cells to provide household current, an AM radio listener may hear only a steady buzz instead of music. John W. Adams of the National Bureau of Standards in Boulder, Colo., measured electromagnetic field interference from prototype homes in Las Cruces, N.M., and found that some inverters, devices that convert DC current from the solar cells to AC current, emit electromagnetic radiation over a broad frequency range, including the AM broadcast band.

Adams says that inverters are notorious for being strong sources of electromagnetic radiation, but usually they are found in isolated places where the interference is unlikely to bother anyone. He says the manufacturers of inverters for homes powered by photovoltaic cells should be made aware of the problem and should properly shield the devices. The problem is not yet widespread because there are very few photovoltaic solar homes. Adams told SCIENCE NEWS, "All I've done is to identify a potential problem."

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Most potent tumor promoter yet

Tumor promoters are chemicals that make carcinogens much more capable of causing cancer than they otherwise would be. The most potent tumor promoter yet discovered is reported in the April 30 SCIENCE by Tadashi Hirakawa and Takeo Kakunaga of the National Cancer Institute's Laboratory of Molecular Carcinogenesis in Bethesda, Md., and by Hirota Fujiki and Takashi Sugimura of the National Cancer Center Research Institute in Tokyo. The chemical is dihydroteleocidin B (DHTB), which is a breakdown product of teleocidin, a chemical made by the bacterium *Streptomyces*.

Hirakawa and his colleagues tested the ability of DHTB to enhance the cancer-causing abilities of a compound called 3-methylcholanthrene or of ultraviolet radiation in a culture of mouse cells. They compared this ability to that of 12-O-tetradecanoyl phorbol-13-acetate (TPA) to do the same thing. TPA was the strongest tumor promoter known. They found DHTB 100 times more effective than TPA. So environmental promoting agents like teleocidin, the researchers conclude, may "strongly influence the development of human cancer. . . ." But how common is teleocidin in the human environment? No one really knows, Kakunaga told SCIENCE NEWS, but Sugimura will now try to answer the question.

Another important aspect of this research, Harry Gelboin, chief of NCI's Laboratory of Molecular Carcinogenesis, explained to SCIENCE NEWS, is that when teleocidin and TPA have been compared for their tumor-promoting abilities in the past, on the skin of mice, they have been found to have similar abilities. So the mouse cell culture assay that Hirakawa and his colleagues used, Gelboin believes, "may be an extraordinarily new sensitive method for detecting promoting activity."

Oral therapy for infant diarrhea

American pediatricians generally contend that intravenous replacement of fluids is the most effective treatment for acute diarrhea among American children. The validity of this position has now been called into question by study results reported in the May 6 NEW ENGLAND JOURNAL OF MEDICINE by Mathuram Santosham of the Baltimore City Hospitals and colleagues.

In their investigation, one-third of 146 well-nourished children ages three months to two years who had been hospitalized for acute diarrhea received standard intravenous therapy. The other two-thirds received oral fluid replacement, which is common treatment for acute diarrhea among children in developing countries. The youngsters getting oral treatment were just as successful as the youngsters getting intravenous treatment in recovering, the researchers found.

MS: Another viral link

Research to date suggests that multiple sclerosis results from a viral infection that precipitates autoimmune disease, in which the body's own immune defenses attack myelin, a fatty sheath that insulates nerve fibers in the brain and spinal cord (SN: 1/30/82, p. 76). Yet attempts over the years to pinpoint the virus (or viruses) that trigger the disease haven't been very fruitful since 10 different viruses have been identified sporadically, rather than consistently, in MS patients.

Thus, it is with "considerable caution" that J. L. Melnick of Baylor College of Medicine in Houston and colleagues report in the April 10 LANCET that they have isolated yet another virus from the cerebrospinal fluid of three MS patients (and also of a patient with amyotrophic lateral sclerosis). It is similar (but not identical) to a virus that causes a nervous system disease called subacute myelo-optico-neuropathy.

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