



Do video display terminals pose a health hazard?

By MELISSA HENDRICKS



Two years ago, Virginia Wheaton was transcribing notes onto her video display terminal (VDT) when cramps began shooting through her arm. "It felt like my forearm was a set of gears and someone had stripped the gears," she recalls. The next day the pain was so intense she stopped typing. Two days later she couldn't even write with a pencil. Doctors diagnosed repetition strain injury — inflammation resulting from constantly moving a finger, limb or other body part. A tendon in Wheaton's elbow had become inflamed and pressed on a nerve, they said. During a seven-month leave of absence with worker's compensation from her job as an editor and reporter at the Bureau of National Affairs in Washington, D.C., she had surgery to move the injured nerve away from the irritating tendon. Today, her arm still cramps at times.

Wheaton is not alone. Many VDT workers have experienced illnesses or injuries that some researchers link to VDTs, says industrial engineer Michael J. Smith of the University of Wisconsin-Madison, who has surveyed VDT users throughout the United States and reviewed dozens of similar surveys. Researchers like Smith cannot explain entirely why the VDT, a labor-saving machine, should cause more harm than does an electric typewriter, but they have some possible answers. By obviating the need to change typing paper, dab on correction fluid or walk to the file cabinet, they say, VDTs prompt immobility and rigid postures that stress muscles and tendons and possibly lead to

repetition strain injuries.

And repetition strain injury is only one complaint leveled against the terminals. Other accusations include backaches, facial rashes (SN: 9/5/81, p.150), eyestrain (SN: 8/29/81, p.137), heart disease (SN: 2/2/85, p.78), stress, even miscarriages (SN: 12/12/81, p.377), and are increasing with the growing numbers of people using VDTs several hours or more daily. According to Beth O'Neil of the Center for Office Technology in Washington, D.C., 28 million people in the United States and Canada operate VDTs in their jobs and three-quarters of all jobs will involve VDTs by the end of the century.

While doctors have found VDTs responsible for certain repetition strain injuries, they often have hesitated to indict them for other medical conditions. One unproved yet emotion-charged claim is that VDT work leads to reproductive disorders. Reports of at least a dozen "clusters" of miscarriages and birth defects in VDT users have prompted several epidemiologists to study this potential link. Most of these investigations, however, have come up with inconclusive results.

Recently, researchers at the Northern California Kaiser Permanente Medical Care Program in Oakland reported a statistically significant association between VDTs and miscarriage. In a survey of 1,583 women, published in the June AMERICAN JOURNAL OF INDUSTRIAL MEDICINE, Marilyn Goldhaber, Michael Polen and Robert Hiatt found that women using VDTs more than 20 hours per week during the first three months of pregnancy had nearly twice as many miscarriages as

women in similar jobs who were not using VDTs.

The researchers acknowledge their study leaves too many questions unanswered to condemn VDTs altogether. For example, they note that clerical workers had more miscarriages than professional women. Says Hiatt, "This difference indicates that very likely something besides the VDT — physical environment, attitude toward the job or stress — is causing the miscarriages." He calls for further investigation.

At least three research teams plan on or are already doing just that. Teresa Schnorr of the National Institute of Occupational Safety and Health in Cincinnati is conducting a retrospective study of 4,000 married female AT&T telephone operators. Researchers at the School of Hygiene and Tropical Medicine in London, England, are recording VDT work histories of patients hospitalized for miscarriage. Meanwhile, Irving Selikoff and his colleagues at the Mt. Sinai School of Medicine in New York City are seeking a federal grant for a prospective study of 10,000 women belonging to various worker's organizations.



Radiation emitted by VDTs lies behind the concerns about possible reproductive hazards. Though VDTs produce radiation with frequencies spanning the electromagnetic spectrum (from X-rays to radio frequency waves), protective shielding in the equipment prevents most

of it from escaping. For example, lead in the glass screen traps X-rays. Like all forms of radiation, VDT radiation creates electric and magnetic fields. In measurements of hundreds of VDTs, scientists have shown that the electric and magnetic fields at working distances from VDTs are well below occupational exposure limits recommended by the American Conference of Governmental and Industrial Hygienists, the National Electric Code and other government and industry safety standards. Arthur Guy, who has headed such studies at the Bioelectromagnetics Research Laboratory at the University of Washington in Seattle, notes only one exception: Touching the screen or sides of a terminal may expose VDT operators to electric fields higher than the standards recommend, he says.

Scientists agree that the small amount of middle- and high-frequency VDT radiation escaping despite the protective shielding does not pose a hazard. But controversy exists over the effects of the radio frequencies. Laboratory experiments have demonstrated that electromagnetic fields generated by extremely low-frequency radiation can alter fetal development in chickens, rabbits and swine. In the recent "henhouse project," six laboratories in four countries exposed chicken eggs to low-frequency pulsed magnetic fields (PMFs) and observed embryo development. One laboratory found a four-fold increase, and a second found a doubling in the numbers of abnormal embryos, according to a preliminary report in the March/April MICROWAVE NEWS. Noting that VDTs emit a sawtooth-shaped wave of a much higher frequency than the square-shaped waves used in the henhouse project, one of the study's researchers says, "I'd be reluctant to draw any conclusions about VDTs on the basis of our research." But because the low-level fields were associated with some damage, the investigator notes, "it's important that research be done on the similar radiation from VDTs."

Industry officials emphasize that the henhouse and Kaiser results are inconclusive. Charlotte LeGates of the Computer and Business Equipment Manufacturers Association, a Washington, D.C.-based trade group, contends the Kaiser research and other epidemiologic studies were not well controlled. "Those women could have been doing loop-de-loops at the amusement park before they miscarried," she says. "I would have no hesitation of sitting in front of a VDT if I were pregnant."

Researchers conducting the studies are generally more cautious. "I would advise pregnant women not to be alarmed, because the studies are not definitive," Goldhaber says. However, she adds, "they should try to minimize their exposure, if possible, and to take breaks every two to three hours."



A range of more prevalent health complaints is also associated with VDT use. About half the VDT users Smith surveyed said they suffered pain in the neck, shoulders or back at some period during their VDT work, and nearly as many felt stress, anxiety or other mental distress.

One of the most common complaints was vision disorder. According to Smith, approximately 90 percent of VDT users experience eyestrain and about 75 percent have eye-focusing difficulties at least occasionally during their work. Organizations such as the American Academy of Ophthalmology and the National Research Council have concluded these problems probably do not result from the VDT permanently injuring the eye. They recommend VDT users install anti-glare filters on overhead lighting or terminal screens, and rest their eyes by periodically closing them, looking out a window or dimming the screen image. Those who wear glasses should purchase lenses designed for the distance to the VDT screen, they suggest.

Still, recent clinical observations by optometrist James Sheedy leave open the possibility that VDT work can lead to permanent eye damage. Sheedy evaluated 153 VDT workers at the Video Display Terminal Eye Clinic, run by the University of California School of Optometry in Berkeley. He found that more than a third of the 113 workers younger than age 40 had eye-focusing disorders. "This is a most surprising finding," he says, because such difficulties usually occur only in people over 40. Cautioning that the study's participants first came to the clinic because they had eye complaints, Sheedy says the results may indicate that the VDT screen fatigues the eye-focusing mechanism or that staring at a VDT screen for several hours, day after day, aggravates already existing, but hidden, eye weaknesses. "Conclusions are hypothetical at this point," he says.



Whether the worker, the VDT itself or the work environment is the cause of health hazards, many ergonomics engineers and occupational health specialists are not waiting for a unanimous answer. To prevent pain and injury, they advise companies to purchase chairs and tables with adjustable heights, VDT screens that can be positioned at various angles, keyboards that are detachable and comfortably sloped, and padded wrist- and elbow-rests. In addition, they suggest office workers share and rotate tasks, thereby reducing the risk of repetition strain injury, and take frequent breaks.

But lunchtime exercise, periodic rest breaks and specially designed chairs will not suffice, contends Nathan Edelson,

director of the Center for Office Health and Productivity Enhancement, a workplace research organization in Silver Spring, Md. "Chairs *are* the problem," and constant sitting in any type of chair impairs circulation, increases lactic acid buildup in the muscles and leads to fatigue, he says. As an alternative, Edelson has designed a desk that allows workers to walk while typing at the computer.



As research into VDT hazards proceeds, workers are increasingly demanding compensation for a variety of injuries. At least 125 members of the Communications Workers of America employed by Mountain Bell in Denver have filed claims for worker's compensation over the past five years for repetition strain injury cases medically diagnosed as VDT-related. In another case, a former AT&T employee won an out-of-court settlement in February 1987 for a skin rash disability her physician says arose from VDT radiation.

Last June, the Suffolk County, N.Y., legislature enacted the first U.S. law regulating VDT safety in industry. The law requires companies to provide furniture engineered for VDT work, 15-minute rest breaks every three hours and payment of 80 percent of the fee for eye exams and eyeglasses.

The Suffolk law has its opponents. New office furniture, eye exams and rest breaks cost money that many companies may refuse to pay. Valerie Scibilia of the Long Island Association, an organization representing Suffolk County businesses, estimates companies will have to spend \$2,500 to \$3,500 per workstation to adopt the changes mandated by this law. Four Suffolk firms have filed suits challenging the law's constitutionality.

But David LeGrande, director of occupational safety and health for the Communications Workers of America in Washington, D.C., responds that "money spent in the short term will, in the long term, save money lost to sick days, inefficient and fatigued workers, insurance claims and a high employee turnover rate." According to Edelson, this rate was 38 percent for the federal government's support staff last year and as high as 75 percent in some other offices.

While scientists, union officials and industry representatives continue to debate the VDT safety issue, workers like Virginia Wheaton await the verdict. Wheaton says she would like to see computer companies invest money toward finding the best seating arrangements, computer design and overall work conditions for VDT use. "I can no longer do reporting, which was my job," but further research, she says, may help others. □