Epilepsy no defense for violent crime

Bursts of scrambled electrical activity in the brain might be enough to produce nondirected aggression in a few epileptics, but the chances that a seizure could drive a sufferer to violent crime are slim, according to an international panel of epilepsy experts.

"It's nearly impossible to commit directed acts of violence during an epileptic attack," says Antonio V. Delgado-Escueta, a neurologist from the University of California at Los Angeles who chaired the review panel. The Epilepsy Foundation of America and the National Institute of Neurological Disorders and Stroke sponsored the panel.

"In 1979 alone, five cases of murder went to court with epilepsy as the defense," the researchers point out in their report in the Sept. 17 New England Journal of Medicine. "Because these criminal cases have had undue attention in the lay press, some members of the public and in the legal and medical professions believe that crimes of violence can be committed during epileptic attacks."

In an editorial published in the same issue of the Journal, however, a Yale University physician criticized the study and suggested that some epileptics might be more violence-prone than the results indicate.

After reviewing the files of 5,400 persons with epilepsy from around the world, the researchers found only 13 patients who exhibited aggressive behavior during seizures. Evaluations of the videotaped seizures and accompanying electroencephalograph (EEG) tracings of brain activity showed that six of thirteen patients "had minimal or no aggression" during recorded seizures. Of the seven others who flailed, kicked, spat or threw objects during epileptic attacks, the investigators found only one who "had aggressive acts that could have resulted in serious harm to another person. Aggressive acts were stereotyped, simple, unsustained and never supported by a consecutive series of purposeful movements," the researchers report.

The relatively new practice of videotaping the seizures of epileptic patients lent a special credibility to the researchers' findings, Delgado-Escueta asserts. While in past years reviewing researchers would have had to rely on one another's judgment when diagnosing and comparing the behavior of epileptic patients, an increased use of videomonitoring, with its split screen imaging and instant replay capability, permits a direct evaluation of patients by several experts.

During a typical several-hour taping session, closed-circuit television cameras monitor even the tiniest movement of an epileptic person's face and body, while EEG tracings simultaneously record the person's brain activity. (Often a person with epilepsy shows characteristic EEG abnormalities, and the diagnostic tool is valuable in helping scientists learn when and where an epileptic discharge starts, its intensity, and how it spreads from one part of the brain to another.)

By critically viewing each inch of tape of seizures recorded during multiple sessions with each patient, the scientists could ascertain which behaviors might be linked to neuronal misfirings. While no epidemiological studies have been done to document aggression in epileptics, the fact that a world-wide call could produce only 13 persons for evaluation from the thousands of persons with epilepsy reflects the rarity of such cases, according to the researchers.

In an editorial in the same journal, Jonathan H. Pincus of Yale University agrees that violence is rare among epileptics, but cautions that the scope of violence caused by seizures and its frequency in the epileptic population "may have been seriously underestimated in this study." Even 24-hour video monitoring might not document aggression in seizures that occur less frequently, he says, adding that a hospital environment devoid of knives, guns or clubs might not realistically reflect the world in which a sociopath with epilepsy might find himself when a seizure strikes.

Pincus says the panel's most important finding was that violent behavior during an epileptic seizure is possible, even if extremely rare. Both Pincus and members of the review panel agree that videotapes and electroencephalograms of accused criminals with epilepsy could provide important information about the nature of aggression during seizures, but admitted that gaining permission to conduct such studies might prove difficult.

Bill McLin, executive director of the Epilepsy Foundation of America, says he is encouraged that the results of the review may stop the myth that there is "some kind of threat" associated with epilepsy. Other studies have shown that the social stigma of the myth can itself lower self-esteem and spark antisocial problems that can lead to criminal behavior in persons who have seizures (SN: 8/12/78, p. 101).

"We hope this study will have the effect of reducing — even eliminating — the inappropriate use of epilepsy as a defense in murder trials," McLin says. □

Powerful X-ray eases arteriography

Synchrotron radiation, an extremely intense form of X-ray, provides a new noninvasive approach to photographing the cerebral and coronary arteries, say scientists at Stanford University. The technique has had widespread use in basic physics research ever since its development in the early 1960s. But until the recent completion of animal testing, it showed little medical potential.

The wedding of synchrotron radiation and arteriography may represent one of the most important advances in X-ray diagnosis since Wilhelm C. Roentgen's discovery of the X-ray tube in 1895, according to researchers E. Barrie Hughes, Edward Rubenstein, and Robert Hofstadter. The conventional X-ray beam scatters as it penetrates the body. As a result, contrast agents must be administered in extremely high concentrations by catheterization, an uncomfortable, expensive, and often dangerous technique.

The byproduct of electrons as they whirl through a circular racetrack, synchrotron radiation is 100,000 times more intense than the radiation emitted from the largest X-ray tube. A simple injection of contrast agent into a peripheral vein, although only a fraction of its original concentration by the time it reaches its destination, is sufficient to project an image. And arterial motion, which would be blurred in conventional X-rays, is frozen in clear, crisp focus.

Whereas conventional X-rays originate as a wide cone of energy emitted when electrons accelerate down a linear trail, synchrotron radiation is a thin but high-energy halo around a storage ring of racing electrons. Wigglers, which resemble magnetic "buggy whips" around the storage ring, cause the electrons to zig-zag frantically, moving ever faster. Tangents of radiation — called beam lines — shoot off of the electrons with enormous energy.

It is the recent development of wigglers, with their resultant beam lines, that has made the medical application of synchrotron radiation possible.

Because of the intensity of this emitted radiation, scientists can filter out what they don't want. Special crystals called monochromators intercept the radiation as it shoots from the storage ring, screening out everything except the desired X-ray frequency.

When examining the arteries, scientists set the monochromators at 33.16 KeV, the X-ray frequency most sensitive to iodine. The resulting photograph portrays both the iodine-carrying arteries and surrounding tissues. A second photograph, set at a slightly lower frequency, records everything *except* the iodine. The difference between the two photographs — the iodine within the vessels — gives clinicians a clear view of arterial structure.

Human application must wait until mid-1982, when scientists hope to have developed wider beam lines of radiation. Even then, accessibility may be a problem; giant ring accelerators are currently available in only seven U.S. medical centers and remain outside the budget of most others. □