Brain cells born again after alcoholism

Chronic alcoholism has long been thought to cause permanent brain damage, primarily by somehow killing off cerebral tissue. Even if an alcoholic withdraws from liquor and abstains for life, whatever such "cerebral atrophy" has occurred does not reverse itself, according to most current scientific belief.

However, University of Toronto researchers noticed recently that certain patients at the nearby Addiction Research Foundation Clinic Institute were displaying "remarkable clinical and psychological improvement." The patients were getting no special treatment but were simply "in a hospital setting, not drinking," says D. A. Wilkinson of the institute.

Previous research with rats and one study in 1977 involving protein-deficient children hinted that certain types of brain atrophy might be reversible. University of Toronto neurologist Peter L. Carlen, along with Wilkinson, also noted the vast improvement among alcoholic patients and undertook a study using computed tomography (CT) brain scans.

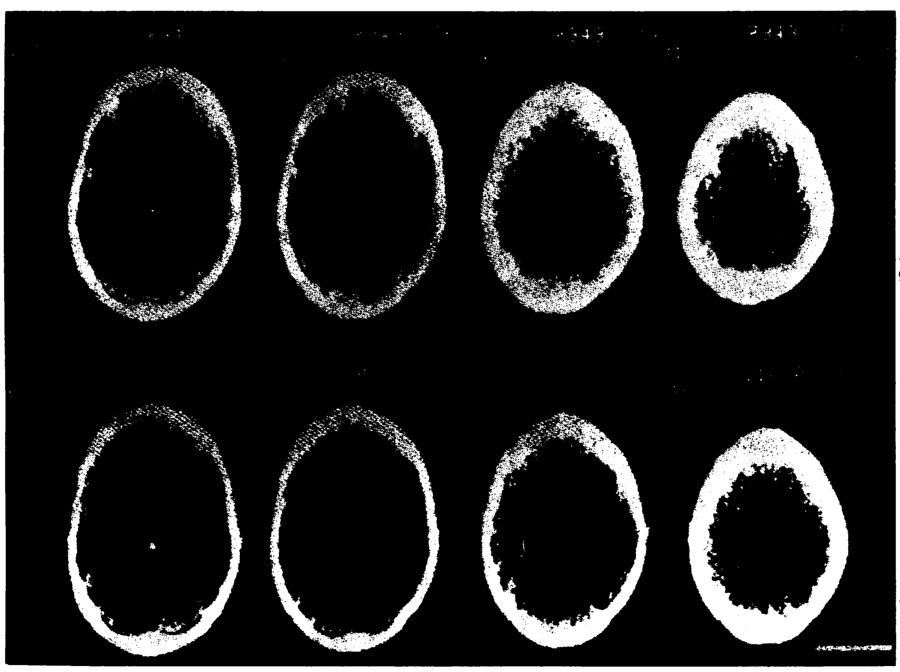
The scientists report in the June 2 SCIENCE "a measurable decrease in the degree of cerebral atrophy in repeated CT scans on four of eight chronic alcoholics.... Reversible atrophy was noted only in those patients who abstained from alcohol, showed clinical improvement and had their initial CT scan before demonstrable clinical improvement was complete." Two of the patients who improved psychologically but not on brain scans underwent their first CTs comparatively late after drying out, and may have already undergone some brain damage reversal, the researchers speculate. The other two patients both returned to drinking and showed no change in either CT scans or behavior.

The results represent "the first demonstration of reversible [brain damage] change in alcoholics," Wilkinson told SCIENCE NEWS. "It is generally thought that neuronal regeneration does not occur in adults," say the researchers. "These studies indicate a time course of weeks to months of reinnervation of partially [destroyed] neurons."

While "we're not suggesting that [entire] neurons regenerate," Wilkinson says, the investigators do hypothesize that at least one portion of the nerve cells — the dendrites — do appear to grow back after what was thought previously to be permanent damage from alcohol. Heavy drinking is believed to kill off some dendrites, tiny filaments that lead into nerve cells. But the CT scans indicate that dendrites may actually regenerate, and along with that occurs a growth in axons (the central core of nerve fiber) and the glia (the supporting structure of nervous tissue).

In the study of apparent atrophy reversal in the brains of children — presented last year at the American Society of Neuroradiologists meeting — it was suggested that the atrophy resulted from a type of brain "dehydration" and that reversal was facilitated by changes in brain water and electrolytes. Carlen and his colleagues, however, suggest that in alcoholism "some neurons are only partially damaged." The prime targets of this damage, they say, are the "secondary and supporting" structures of neurons, such as dendrites, axons and glia.

The cell rebuilding — visible in sequenced CT scans of cerebral cortex and, to a lesser extent, the brain ventricular system — demonstrates what the investigators call "a form of morphological plasticity in the central nervous system." As to why some neurons appear to regenerate, at least partially, and others do not, Wilkinson says, "We have no idea." But the results and implications are intriguing enough to warrant further CT scan investigation, say Wilkinson, Carlen and fellow investigators R. C. Holgate and George Wortzman of the University of Toronto radiology department and J. G. Rankin of the university's department of medicine and the clinical institute. □



Peter L. Carlen, U. of Toronto, Department of Medicine/Science

Looking down from above the head of a 35-year-old alcoholism patient, CT brain scans move from the midbrain region (left) up to the top of the skull (right). In upper row, taken four weeks after the man's last drink: The darkened lines indicate enlarged ventricles in the two left sections; the smaller, dark squiggles in the two right sections depict enlarged cortical sulci, or furrows in brain tissue. The bottom row of scans, taken eight months later, indicate a dramatic reversal of brain damage, particularly in the cortical areas, where the enlarged sulci have almost disappeared.

University will fight research secrecy order

Making and breaking secrets is a task the federal government takes seriously. And it apparently doesn't appreciate civilian interest if the secrecy order imposed on research at the University of Wisconsin at Milwaukee is any gauge.

The secrecy order, issued April 21 by the Commerce Department's patent and trademark office on behalf of a federal defense agency, claims that a study by George Davida contains "subject matter, the unauthorized disclosure of which might be detrimental to the national security." It followed a request by a university-related foundation to patent techniques Davida had developed under a National Science Foundation grant. The research involved preventing unauthorized access to computer data files.

As computers become the trustees of ever increasing quantities of important data, secret access codes and procedures must be developed to ensure this data doesn't fall into the wrong hands. Davida, an associate professor of electrical engineering and computer sciences, is an expert on safeguarding computer data.

The university at Milwaukee, which does not permit classified research to be conducted on its campus, was never informed that Davida's research was "sensitive," nor that he would be restrained from publishing findings, according to its assistant chancellor, Frank Cassell. The secrecy order "establishes a precedent which has a chilling effect on academic freedom," said Werner A. Baum, the university chancellor, in a letter to NSF director Richard Atkinson. The letter asked NSF to join in protesting the order. □