News
The University of Texas Health Science Center at Dallas
5323 Harry Hines Boulevard Dallas, Texas 75235 (214)688-3404

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CONTACT: Bob Fenley
Office: 214/688-3404
Home: 214/352-2502

* * * UT Nuclear Medicine Center Gets Sophisticated Brain Scanner

DALLAS--There's now a machine that can look inside your brain and, by mapping blood flow, tell the difference when you are resting, are watching something or have suffered a stroke.

The device in operation at The University of Texas Health Science Center at Dallas, is the second of its kind in the world to use an inhaled radioactive gas as a non-invasive method of diagnosis.

The "Single Photon Dynamic Computer Assisted Tomographic Scanner" is being used in studies directed by Dr. Frederick Bonte, a pioneer in nuclear imaging who is director of the Nuclear Medicine Center at Southwestern Medical School.

As its name indicates, the new machine borrows the technology developed for the popular "CAT" scanners and adds the sophistication of nuclear imaging.

What excites scientists at the health science center is that it shows--in vivid, though artificial, color displays--the areas of the brain which are "working" hardest at the moment.

For instance, information received by the eyes is fed to a portion of the brain at the back of the head. Sure enough, this area "lights up" with higher blood flow when the person being scanned has his eyes open.

The machine also shows "cold" areas of the brain where strokes have deprived the tissue of blood flow.

Most dramatically, it shows the benefits of increased blood flow in patients who have had carotid endarterectomies--removal of life-threatening clots from a carotid artery, a main source of blood for the brain. The post-operative readouts of increased blood flow on the scanning screen often has been accompanied by increased intellectual activity in the patients.

Are there characteristic brain blood flow patterns peculiar to depression? To schizophrenia? To a host of other maladies? These are but a few of the questions which researchers hope to address in the next few years.

The Dallas machine is but one of a new spate of scanners which use nuclear emissions to "look" inside the body. Some of the more recent ones have used methods like glucose uptake to tag activities inside the brain. One requires an on-site cyclotron and a team of physicists, according to Bonte.

Many of the earlier scanning methods use arterial injection rather than inhalation to get the radioactive material into the blood.

Prototype of the xenon inhalation scanner was developed for Dr. Niels A. Lassen at Bispebjerg Hospital in Copenhagen. Working with Danish scientists on the project was Dr. Ernest M. Stokely of the Dallas health science center. Stokely, who took a career development leave in 1977 to work on the Copenhagen project, is an associate professor of Radiology and director of Biomedical Engineering Graduate Program at the health center.

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The original machine was used to map ischemic (low blood flow) areas of stroke and tumors in brains.

Operation of the new machine today begins with the patient inhaling xenon 133, a radioactive gas which gets into the blood and is pumped through the brain. A rapidly-rotating bank of 192 nuclear scintillation detectors then records the radioactive emissions, comparing areas of blood flow in the brain and how fast the different emissions fade. This data is fed directly into a computer which does a complicated analysis of "wash out" rates.

Finally, the computer displays the result as a color-coded picture of the brain with blue indicating little or no flow, progressing through shades of red, orange and finally white to indicate areas of high flow.

Current work in Dallas involves studying normal volunteers to establish healthy blood flow patterns; then comparing these with scans of patients with strokes, depression, epilepsy or brain artery blockage. The scientists also are investigating the effects of various "cognitive" activities on blood flow in normal patients.

An extensive series of studies is being done with persons who have suffered strokes and who are undergoing rehabilitation in an effort to learn if there are flow pattern changes in recovery.

"We can't even imagine its potential," says Bonte. "Not only are we being given an invaluable tool to work with in disease states, but we will be able to check out various theories we have held about the normal brain."

He feels one of the greatest values of the machine will be in investigation of neurological and/or psychiatric conditions.

"Animals can be used as models in a lot of research," he points out, "but not for studies of human behavior.

"Also, as the blood flow changes, the metabolism changes and this new method of looking at blood flow may offer a mirror of brain metabolism."

Bonte and other specialists at the health science center have been involved in nuclear imaging for the past 25 years. In 1973, he and associates received international attention for developing a method of "viewing" the location and extent of heart muscle damage caused by a heart attack.

Among the associates now involved with brain scan work besides Stokely are Drs. Robert Parkey, chairman of the Department of Radiology; Samuel Lewis, director of Nuclear Medicine; John Rush, associate professor, John Herman, assistant professor, and Michael Schlesser, assistant professor, all of the Psychiatry Department, and Dick Homan, assistant professor of Neurology.

The brain scan work is supported by Southwestern Medical Foundation and the Moss Heart Fund.

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