'Revolution In Cancer Research' Stalled By Gov't Grant Cuts

The U.S. government, through the Department of Labor and the National Institute of Health, is taking money away from serious cancer research and devoting it to funding a scavenger hunt for potentially dangerous substances in the environment and particularly the workplace.

As a result, a diagnostic technique that could totally revolutionize cancer treatment, eliminating thousands of cancer deaths each year, is not being funded because 75 percent of all cancer research funds have been diverted into testing for carcinogenic industrial substances.

Consequently, a large magnetic scanning FONAR (Field Focusing Nuclear Magnetic Resonance) device, recently tested on healthy humans and ready to scan suspected cancer patients, now sits idle in the State University of New York's Downstate Medical Center laboratory of Raymond Damadian, M.D., Lawrence Minkoff, M.D., and Michael Goldsmith for want of the $250 a day needed to operate it. The prototype FONAR device, which provides more information than is available from x-ray techniques at only a fraction of the radiation risk, has already shown tremendous potential for early detection of cancer and could be further developed with either radiofrequency irradiation, neutron beam, or laser focusing techniques as a treatment, to eliminate cancer as a major human killer.

The technique is "potentially a revolution immediately," said Michael Goldsmith. "Many labs around the world are working on this. Whether or not the federal government continues to fund this, this revolution will not be stopped."

The Revolution in Clinical Medicine

Cancer, as a diseased state has always posed a difficult problem for medical research because it involves first, a breakdown in the normal process of cell division and differentiation on the tissue level, and second, often also a failure of the immune system to contain the malignant tissue. Neither aspect is well understood. Normally in the process of development or wound healing, when dividing cells come in contact with appropiate cells they cease to wander aimlessly, and begin to differentiate collectively as a tissue — with a corresponding decrease in the rate of cell division. However, cancer cells often lack this capacity for organized differentiation — frequently they continue to crawl and spread through normal healthy cell tissue, remaining undifferentiated, and with a continued rapid rate of cell division. Internally, the nuclei of cancerous cells often divide so fast that the cells are multinucleated with additional chromosomal aberrations that are not understood. The cancerous cell as a whole is in a highly disordered state, and contains far more water (up to 90 percent) than the normal cell (66 percent). In addition, the normal (mitochondrial oxidative) respiration system does not function, and the cancerous cells rely on the highly inefficient system of fermentation to acquire energy.

Despite the interaction of changes associated with the disease, cancer is generally still diagnosed anatomically, using a microscope to confirm the malignancy of the tumor during a biopsy at the beginning of surgery. Most of the time the tumorous tissue does not produce biochemical changes that are readily detected in the urine or blood

By contrast, the FONAR scanner being developed at the Downstate labs as a prototype for hospital use can scan a patient quickly and generate a tremendous wealth of information about his internal biochemistry without disrupting it. This holds the promise of a total revolution in clinical medicine, since it could enable cancer, and other clinical abnormalities, to be detected long before they become anatomically obvious, through a routine, harmless FONAR scanning allowing any necessary treatment to begin while the condition is still in an early, easily treatable stage.

In the experimentation thus far, the prototype FONAR scanner can distinquish between most malignant tumors, benign tumors, infected tissue, and normal healthy tissue. Even the most skeptical in the medical profession agree that the FONAR scanner can distinquish normal tissue from tumors with a very high degree of certainty, but preliminary experimentation indicates that it has the capacity to do much more.

In three out of four cases, FONAR has distinguished between benign and malignant tumors with a high degree of certainty — including some benign tumors that pathologists often confuse with malignant tumors. In two out of three cases edema (a condition in which the tissue retains water) can be distinguished from tumors. Local infections have been picked up by FONAR scanning long before they became clinically obvious. The rate of energy production (measured as adenosine triphosphate) in living tissue has been monitored by FONAR, in order to study the degeneration of a transplanted kidney. Since FONAR is still in its infancy, it can readily be assumed that the wealth of information concerning the internal living biochemistry of tissues generated by FONAR scanning could be applied to additional clinical testing — if the technique is developed.

How the FONAR Scanner Works

Cancer is a breakdown in the fundamental process of cell differentiation and development, and the FONAR scanner uses the properties of cancer to detect it.

The patient is placed inside a superconducting magnet which also contains a radiowave frequency transmitter and pickup coil. The magnet produces a magnetic field, and when the radio frequency pulse is applied to the patient, the reemitted signal gives an indication of the local ordering in a limited area of the patient's tissues. The pickup coil receives this signal, and translates it visually into a color image on a television screen. Since cancer cells are less ordered than healthy tissue they will show up differently — specifically, the reemission time is longer because of this lack of ordering. A glass of water would show up differently as well; it is even less ordered than cancerous tissue and hence the reemission time would be even longer. And the magnetic field and radiofrequency involved in the FONAR scanner create far less risk of damage to the patient than do x-rays.

Once a tumorous area is located, FONAR can focus on that area and provide an even more detailed and accurate picture of the tumor. Then it can be treated with focused x-ray radiation therapy or laser beam or neutron beam surgery, which would eliminate much of the tissue damage and trauma associated with today's surgical procedures. FONAR in combination with focused x-ray radiation surgery has already developed the capacity to locate and eliminate tumors as small as 1 centimeter in diameter.

According to experimentation that is still being confirmed, FONAR itself may possibly be developed to destroy the cancer by irradiation with radiofrequency radiation which the malignant tumor absorbs, but which normal tissue does not. It is already known that malignant tumors absorb in radiofrequency spectral areas which are not absorbed by normal tissues, but it is not yet clear whether the energy thus absorbed by the tumor would be sufficient to totally destroy it. Even if such treatment proves to destroy only a sizable percentage of the malignant tissue, it would still have an advantage over all current radiation therapy, chemotherapy, and surgical therappy in that it destroys only malignant tissue, and therefore could be used repeatedly with less damage to the health of the patient than any other method.

More immediately, the use of FONAR, whether to detect cancer with no side effects to the patient, or as a research tool in studying a tiny embryo undergoing rapid multiple phase transitions in differentiation, will revolutionize clinical medicine. Cutting the budget on research of such clear scientific and medical importance could cost much to U.S. science, and thousands upon thousands of human lives.

—Carol Cleary

Some Differences in T_1 Relaxations in Normal and Malignant Human Tissues

High Probability of Statistical Significance			*Tumor Samples Too Small for Evaluation of Statistical Significance*		
Tissue	*T_1 Tumor*	*T_1 Normal*	*Tissue*	*T_1 Tumor*	*T_1 Normal*
Breast	1.080 (13)	0.367 (5)	Esophagus	1.04 (1)	0.804 (5)
Skin	1.047 (4)	0.616 (9)	Liver	0.832 (2)	0.570 (14)
Muscle			Spleen	1.113 (2)	0.701 (17)
(malignant)	1.413 (7)	1.023 (17)	Thyroid	1.072 (1)	0.882 (7)
(benign)	1.307 (2)	—	Nerve	1.204 (1)	0.557 (2)
Stomach	1.238 (3)	0.765 (8)	Adipose	2.047 (1)	0.279 (5)
Intestinal tract	1.122 (15)		Ovary	1.282 (2)	0.989 (5)
(small bowel)		0.641 (8)	Uterus		
(colon)		0.641 (12)	(malignant)	1.393 (2)	0.924 (4)
Lung	1.110 (12)	0.788 (5)	(benign)	0.973 (1)	—
Lymphatic	1.004 (14)	0.720 (6)	Cervix	1.101 (1)	0.827 (4)
Bone	1.027 (6)	0.554 (10)	Testes	1.223 (1)	1.200 (4)
Bladder	1.241 (3)	0.891 (4)	Prostate	1.110 (1)	0.803 (2)

Number of cases indicated in parentheses

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