Dr. Donald Carlson

SWMS NEWS

THE UNIVERSITY OF TEXAS SOUTHWESTERN MEDICAL SCHOOL AT DALLAS

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DALLAS--Biological studies involving a new kind of radiation will be conducted by a University of Texas Southwestern Medical School researcher over the next three years.

Dr. Donald Carlson, assistant professor of radiology, will try to determine how living cells react to beams of negative pi mesons. Extremely difficult to obtain, these tiny nuclear particles hold promise of bettering x-rays and radiation from cobalt sources as a weapon against cancer.

Spawned in giant accelerators such as the one being built in Los Alamos, N.M., mesons have a quality of passing through material without much interaction until they slow down and are captured by an atomic nucleus which then proceeds to literally "blow up" in a burst of radioactive particles. If this blow up point is arranged to be inside an internal cancer, a great deal more radiation can be delivered without the damage to normal tissue that x-rays or cobalt sources cause.

Dr. Carlson will determine a number of effects of meson dosage on mouse cells. These calculations will be extremely valuable in preparing the way for human treatment.

Dr. Carlson is funded by the National Institutes of Health Cancer Institute at $36,761 for the first year of the study, $41,869 for the second year and $43,560 for the third year.

In his work, the Dallas researcher will journey to the $57 million Los Alamos Meson Physics Facility--one of the few places in the world where the elusive particles can be produced in any appreciable quantity. The facility is as yet unfinished.

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"In practice, they accelerate protons a half mile and they strike a beryllium target to produce mesons," explains Dr. Carlson. A treatment room already has been constructed there. Production of a usable beam of particles has been predicted by late 1973 or early 1974.

Dr. Carlson will actually be making complicated measurements involving a number of factors in his experiment. "I'll plot cell survival versus dose in terms of depth and compare this to cobalt radiation and whether there is an oxygen effect in the star region of meson capture. (Oxygen is known to enhance the effects of radiation in some cases.)

In practice, Dr. Carlson will obtain bone marrow stem cells from mice and put suspensions of the cells in a series of chambers through which pass the meson beam. After they are irradiated, the cells are injected into other mice. Cell survival is calculated from clumps they form on the spleen.

The researcher also will be looking at survival of antibody forming cells--those which are important in the body's immunity system.

All these factors are important in terms of dosage which may be given humans eventually. This is still some years away.

Dr. Carlson, whose grant was one earliest given in the biological study of mesons, will share beam time with a number of physical scientists engaged in studying the fundamental nature of matter and energy.

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