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UNIVERSITY OF CALIFORNIA
LOS ALAMOS SCIENTIFIC LABORATORY
(CONTRACT W-7405-ENG-36)
P. O. Box 1663
Los Alamos, New Mexico 87544

IN REPLY REFER TO: T-2-L-533

April 3, 1973

MES-200

Dr. H. R. Blieden
Program Manager
Advanced Technology Applications
National Science Foundation
1800 G Street, NW
Washington, D. C. 20550

Dear Dick,

We have reviewed the statement prepared by R. G. Alsmiller and R. Katz with regard to the relationship between the analytical efforts being supported by NSF/RANN and other national cancer radiotherapy programs. Our views on this matter were brought forth most recently during the visit of C. R. Weisbin (3/10/73) to NSF and are described briefly in the summary "Pion Calculations in Support of Radiotherapy." These thoughts will herein be amplified with particular attention paid to the required tasks and the most effective means for calculations to guide the advanced instrumentation program and the clinical procedure program.

The analytical efforts being supported at Oak Ridge National Laboratory and the University of Nebraska are of high caliber and are a necessary complement to the Instrumentation Program. However, as their letter points out "... to be most useful the analytic programs must be closely correlated with the experimental preclinical radiotherapy programs ... ." The calculations must be performed within the context of treating a patient. Our instrumentation program encounters problems on a daily basis; each time the experimentalist goes to the beam site, new and important practical therapeutic questions arise. Solutions to such problems are most effectively provided by an on-site, applications-oriented, theoretical support program.

It is not obvious what materials and shapes are required in the design of collimators, wedges, and degraders. We need calculational guidance to minimize the dose to normal tissue using bolus and wedges that are appropriate for the irradiation of different neoplasms at different anatomical sites.

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from R. [illegible]

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There are therapeutical complications associated with the inhomogeneities of bone and lung. This general problem was addressed in the letter of Alsmiller and Katz. However, the complications encountered in almost every treatment plan will be different for each patient. As the television commercial tries to stress, "There's nobody else exactly like you, nobody else but you." This lighthearted analogy should really be taken most seriously in this context; each patient is a special case.

Studies are required to determine how to interpret doses in silicon and germanium detectors as well as ionization chambers. From these studies, one would hope to be able to assess the effect of the physical presence of the detector in a phantom or patient. P. Soran of our group will be visiting Stanford on Friday, April 6, to discuss exactly this problem.

The LET distributions for different configurations and source geometry should be better understood. Determination of the LET distribution is a requirement in addition to the total dosage delivered to the neoplasm.

Of course, there are many more problems which are involved and which could benefit directly from calculational guidance. However, rather than belabor each of these difficulties in turn, we wish to urge consideration be given to a "problem oriented" point of view with the analytical program providing direct calculational support to the radiotherapist. This can be accomplished most effectively if the analytic support program is located at the experimental site.

Sincerely,

Chaim Richman

Chaim Richman

Charles R. Weisbin

Charles R. Weisbin

Patrick D. Soran

Patrick D. Soran

D. R. Harris

Donald R. Harris

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