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REPORT OF THE VISITING COMMITTEE

for the

BROOKHAVEN NATIONAL LABORATORY

DEPARTMENT OF MEDICINE

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REPORT OF VISITING COMMITTEE FOR THE MEDICAL DEPARTMENT

BROOKHAVEN NATIONAL LABORATORY

June 25-26, 1981

The Visiting Committee would like to express its appreciation to Dr. Borg and the scientific and administrative staff for the frankness and freedom with which the operation of the Division was discussed. Again this year individual areas were visited by teams from the Advisory Committee, leaving more time for general discussions by the entire group concerning problems besetting the Laboratory. The following four paragraphs contain the general comments of the Advisory Committee concerning the program of the Medical Department at Brookhaven National Laboratory.

Over the past few years there has been a progressive change in orientation of the medical program as the institution has attempted to respond to the needs of DOE and EPA. More and more, the scientific program has been fragmented with negotiation on the basis of single projects rather than a coordinated program. This reorientation has been particularly difficult for the clinical program and hospital operation. The situation has become much more critical during the past year, with further curtailment of EPA/DOE funds and a marked increase in local energy costs, and frequent adjustments in the scientific program as required to meet changing emphasis by DOE. Rigid allocation of funds to specific projects has further compromised the potential of the whole program. These various factors have created insecurity among personnel and must inevitably affect the program's productivity. While we have confidence that the unique resources and outstanding personnel of the unit will continue to be recognized and supported, the present situation is critical and requires more than a "piece-meal" remedy.

On the positive side, the Brookhaven scientific program has been reoriented along the lines required by DOE. The medical physics group is a leader in the development of methodology for measuring metals in vivo and their work will be important to industrial toxicology. The nuclear medical program is developing isotopic tests for disturbances in pulmonary function and for a variety of other diagnostic and therapeutic approaches which utilize the unique facilities of Brookhaven. In the area of inhalation toxicology, unique animal exposure facilities have been developed and staff capabilities have been increased. Other studies involving oxidant damage to the lung and the immune response of that tissue provide further scope to the program. The hematology group has developed a remarkably sensitive method of determining penetration of substances into the cells and for the evaluation of hematopoietic stem cell damage. It would seem to the Committee that these program components, created largely by DOE's expressed needs, should now be organized and supported in a manner which would permit optimal involvement in scientific objectives by staff. For maximal productivity, we would underline the importance of long-term commitment of support by DOE in one or two program areas. This would permit better integration between the component parts of the program and allay the present insecurity of staff. Without this it will be difficult to procure or hold outstanding scientists and to create an environment in which scientific inquiry will prosper.

There are two potential areas which deserve consideration for such support. The primary area is pulmonary function and the effect of environmental pollutants on the lung. However an urgent need for the success of such a program is the recruitment of an outstanding pulmonary scientist who can function as the clinical director of the program. The second program to be considered relates to hematopoietic cells. Brookhaven has had a distinguished program in hematology and outstanding research continues. Current measurements of stem cell behavior are highly relevant to the detection and understanding of environmental damage to proliferating cells. Studies of monocyte behavior and immune response involving the pulmonary program could be greatly facilitated by the hematology group.

The Advisory Committee wishes to stress the following: (1) that every effort be made to develop with the DOE an integrated, long-term program for the study of environmental pollutants; (2) that an outstanding scientist in pulmonary disease be recruited who can develop the clinical program; (3) that the clinical patient facility be continued to be regarded as essential, but that plans for its use take into consideration the limitations which will exist for intensive care; (4) that the procurement of funds from NIH and other outside sources continue to be encouraged to the extent that they enrich the scientific environment and permit certain outstanding investigators to pursue more directly their major interests.

REVIEW OF SPECIFIC PROJECT AREAS

The rest of this report contains comments of teams of two members of the Advisory Committee who reviewed with staff the four individual program areas.

1. The Experimental Oncology Group (Drs. Shellabarger, Holtzman and Stone) and the Genetics Cluster (Drs. Bender, Carsten, Benz and Wyland):

The work of these two groups was reviewed by Drs. Miller and Schull. Dr. Shellabarger and his colleagues continue their studies of the interaction of carcinogens as revealed by the occurrence of mammary tumors in several mouse and rat strains. Past studies have revealed a linear dose response relationship insofar as ionizing radiation is concerned, an acceleration in the onset of tumors and an apparently abscopal effect of ionizing radiation. These earlier studies failed to disclose any non-additivity in the effects of neutrons and methyl-cholantherene. More recent studies which have examined the interaction of radiation and chemical carcinogens, primarily DMBA, PCX and X-ray, or combinations thereof, continue to suggest additivity. It does not appear that the physiological state of the mammary gland is a major factor in the occurrence of radiation-related tumors in the response to chemical carcinogens. These more recent studies have also looked at the relationship of various adenoviruses, particularly adenovirus 9, to the occurrence of fibroadenomas. Differences in response among strains and differences in carcinogenic effect of different viruses within strains have been seen. Drs. Stone and Holtzman are exploring specific aspects of the interrelationships between carcinogens such as the physiological status of the target organs to which reference has already been made. In addition, they have examined strain differences in response to DES and the effect of differences in the timing of the administration of DES.

As implied at the outset, these studies seek an understanding of the origin of mammary tumors through the exploitation of an animal model. Obviously their ultimate worth will be proportional to the relevance of the specific model to the human situation. There are differences between these experimental findings and those on radiation-related breast cancer which have emerged in Hiroshima and Nagasaki. Overall, however, this is a sound program, one which seems to be well supported with small animal care facilities and adequate help and equipment.

Dr. Bender's studies of the last decade or so have been directed primarily toward an elucidation of the mechanisms involved in sister chromatid exchange (SCE) and chromosome aberrations. This interest has prompted him to develop a rodent SCE test system to assess the impact of ionizing radiation on these phenomena as well as the role of radiomimetic drugs. Three years ago his support for most of these studies was changed from the Department of Energy to the Environmental Protection Agency. It was then thought this would ensure more constant funding but this has not proven true. Prompted partly by the specific, "practical" needs of the EPA he began studies at that time of exposure to cadmium and the relationship of that exposure to chromosomal phenomena. These studies have been recently dropped, however, for financial support for them has virtually vanished. Attention has been focussed instead on the completion of the cytogenetic studies of ataxia telangiectasia and the actions of several clastogens such as cytosine arabinoside have been under scrutiny. Of interest has been the synergistic relationship (after radiation) of these drugs in the production of chromatid aberrations. Bender and a young colleague, Judy Wyland, have been developing a system to permit them to study genetic transformation in mammalian cells. Of particular interest to them has been the issue of whether agents which cause SCEs increase the efficiency of integration of "outside" genes. This work has used the Columbia-Cold Spring Harbor thymidine kinase deficiency system, but there are now no funds to support these activities. Bender is understandably fearful that this work may have to be seriously curtailed or possibly even dropped. To ensure continuity in his program, he has sought and continues to seek collaborations with other members in the Medical Department as well as the Department of Biology. Currently he participates in the Photoactivation Project with Ralph Fairchild, and a study of DNA repair variability in radiosensitive individuals with Richard Setlow. Bender has also sought funds from the National Toxicological Program and has recently responded to a Request for Proposals aimed at an understanding of the role of DNA repair in cancer-prone families issued by the National Cancer Institute. If these sources of funds materialize, his laboratory will be in less desperate straits than is presently true. But even given this additional funding, some substantial change in orientation may be inevitable.

Dr. Carsten and his colleague, Dr. Benz, have been involved in two study areas, namely, the toxicology of tritium and the genetic, toxic effect of a variety of chemicals. Both programs have involved the use of the dominant lethal test system, assessment of SCEs and chromosome aberrations cytologically, and the increasing use of diffusion chamber techniques. The latter entails the study of the growth of isolated cells *in vivo* in semipermeable containers with differing wall materials. It is an ingenious system which promises much.

Although studies of the toxic effects of tritium have been a major concern of Carsten and his associates in the recent past, and although some

work of a biochemical and microdosimetric nature remains to be done, their research interests have moved increasingly toward genetic toxicology. It is here where the use of millipore filter chambers looms large. Benz is particularly interested in the toxic effects which accrue from short-term exposures to potentially harmful substances using human cells in diffusion chambers. It appears that much of his recent work has dealt with the validation of this approach. This group of investigators, like the others, continues to be productive despite financial vicissitudes and the quality of their work compares favorably with that from academic institutions with similar research interests.

Dr. Carsten and his colleagues, like Dr. Bender, have been much concerned by the unstable funding and the seemingly capricious manner in which changes in funding occur. Often these latter changes have been precipitate and have been profound,with deleterious effects upon the activities of their laboratories as well as staff morale. Some assurance of continuity of programs and support is essential if these counterproductive effects are to be offset.

II. Nuclear Medicine Group

A. Medical Physics - Dr. Stanton Cohn and his colleagues reviewed four of the major programs that are of primary importance to the medical physics group. This program was reviewed by Dr. Adelstein.

(1) Nitrogen, Potassium and Calcium Measurements in vivo (Investigators Cohn and Vaswani).

This group has been studying total body calcium and osteoporosis, and more recently, total body nitrogen and potassium in cancer patients. In the past year they have perfected their methods for measuring total body nitrogen and potassium by prompt gamma ray analysis from neutron activation and have developed a model for distinguishing muscle from non-muscle mass of the body. Their collaborators in this project are the Long Island Jewish Hospital and more recently the Sloan Kettering Memorial Hospital. Some measurements require the use of hospital beds at the Brookhaven National Laboratory and Medical Department for long-term nutritional studies.

(2) Renal and Kidney Cadmium Measurements in Industrial Workers (Ellis).

The mobile unit constructed to measure kidney and liver cadmium on site has not travelled out of Brookhaven because of lack of funding. Nonetheless, progress continues to be made with the redesign of the neutron source, substituting plutonium for californium which will allow the van to pass safely through urban areas. The group has evidence that the critical cadmium for the kidney is about 30 mg, somewhat higher than that presupposed by previous studies. It is a matter of great concern that means have not been found to put the mobile van into the service of measuring cadmium levels in exposed workers. Funding needs to be obtained from federal, industrial, or labor union sources in order for this work to continue.

(3) Nuclear resonance scattering methods for the analysis of iron has been developed further and a collaborative study with the Children's Hospital Medical Center in Boston to examine iron overload patients with thalassemic disorders has been initiated. In this method, iron-56 (the stable isotope of iron) is excited by gamma photons from manganese-56. A new oven has been designed for the containment of the manganese-56 and the collimation of its gamma photons. With the present methodology, a dose of one RAD yields a limit of detection of approximately 1 mg per gram. Experimental protocols have been designed for iron overloaded patients who are on chelation therapy. The investigators point out that nuclear resonance scattering can also be used for other elements including magnesium and lithium. In addition to collaboration with the Boston group, some work with the Hematology Division of the New York University School of Medicine is also under way. Funding for this project is split: the DOE supporting the physical side and the NIH supporting the clinical part.

(4) X-ray fluorescence measurements of lead in vivo (Wielopolski).

The depository of body lead is in the bone; those who wish to measure lead toxicity need therefore to measure bone lead. Blood and urine levels generally relate to recent exposure but not directly to total body burden. Methods have been developed for measuring bone lead using iodine-125 or cadmium-109 x-rays as an excitation source. This permits measurements to be made of bone lead, bone strontium and bone zinc. During the past year, measurements have been made on cadaver tibia and good correlation has been found with chemical measurements after chemical analysis. In addition, polarized x-ray sources are being designed. Clinical collaboration has been developed with the environmental group at Mt. Sinai Medical Center and with the pediatric group at the Montefiore Hospital. Proposal for funding the clinical studies has been submitted.

Overall this group seems to be making steady and important progress. It appears to be reasonably well funded, both internally and from external sources. About 75% of this support comes from the NIH. Under ideal circumstances, Cohn would like to add another research physician and a physicist to the group and to update the whole body counter to improve the sensitivity and energy resolution. Additional personnel and equipment would allow them to pursue some other projects such as measuring pulmonary levels of silicon. Their interdepartmental relationships with the physics and instrumentation group are good; there have been some difficulties in obtaining isotopes through the cyclotron. The group has found that purchasing bromine-77 from an external vendor is cheaper than obtaining the material in-house. Although this group uses the inpatient facility, if there will be a trade-off between the support of the inpatient facility and the maintenance of research funds, they would prefer the research funds.

A review of the group's papers published in 1980 is impressive. There is no question that this group is among the leading, if not the leading one, in activation analysis for elemental measurements

in vivo in humans. Their unique instrumentation benefits immeasurably from its relationship to other aspects of nuclear science at the Brookhaven National Laboratory, and they have formed excellent clinical collaborations with investigators in medical centers within the associated university community. A better balance between applications research and development research has been achieved during the past year.

B. Nuclear Medicine - The general thrust of the nuclear medicine program was discussed with Dr. Brill and some of the individual projects reviewed.

(1) Pulmonary studies in coworkers (H. Susskind).

Regional annhilation perfusion studies using krypton-81m, xenon-127 and technetium-99m have now been initiated with normal individuals and those who have chronically been exposed to dust in coal mines. Pixel-to-pixel variance determination seems to be a sensitive method of detecting early abnormalities in ventilation and more sensitive than x-ray studies. This work is being carried on with collaborators from the University of West Virginia. More recently, studies on pulmonary embolism using positron-labelled fibrin precursors have been started. These appear promising and are the first in a series of experiments planned eventually to examine metabolically active elements in lung physiology. These studies will be carried out in collaboration with the pediatric-pulmonary group at the College of Physicians and Surgeons and with a group in nuclear medicine at that same institution.

(2) Radiopharmaceutical development (Oster, Son).

A number of new traces have been evaluated during the past year including a number of rutheneum-97 compounds, manganese-52m for myocardial studies and technetium-99m heat-labelled red blood cells for GI bleeding and spleen scanning.

In addition, a model for inflammatory lung disease similar to chronic idiopathic fibrosis has been made available and radiotracer studies have been correlated with fiberoptic biopsy findings.

Some interesting observations have been made with regard to the use of agents for reducing radiation load by removal of the radiopharmaceutical after deferoxamine mesylate for the elimination of gallium-67 and Prussian blue, given by mouth, for the elimination of thallium-201 by way of the gastrointestinal tract.

(3) Whole body radioautography for studying glucose metabolism (Yanakura, Myers)

An LKB whole body microtome has been used to good advantage for producing radioautographs in rodents. A particular elegant application has been through the distribution of fluorine-18-labelled fluorodeoxyglucose and carbon-11 in labelled 2-deoxyglucose. Particularly impressive are pharmacological methods for modifying the distribution of these tracers relative to the tumor's metabolism. Clinical material for studying glucose metabolism by positron analysis in humans is being obtained in collaboration with the groups from the Sloan Kettering Institute.

(4) Design of a new fundus camera

A new fundus camera has been developed using a charged couple device for examining patients with ocular melanomas. The use of iodine-125 plaques has also been extended, but recently hyperthermia has been added to the radionuclide therapy using a new plaque design. The potential of using neutron capture therapy is being explored and an alternative to iodine-125 samarium-145 used for iodeoxyuridate photoactivation is also being investigated.

(5) The use of proton beams for therapy (Bennett)

The possibility of using the accelerator for proton beam therapy has been extended further by adding a patient treatment area. Relationships have been worked out with New York University Medical Center for treating benign intracranial disease, including AV malformations and pituitary adenomas and also for the treatment of malignant endocranial tumors. Hopefully, arrangements can also be made with the newly appointed Head of Radiation Therapy at SUNY at Stony Brook. Unfortunately, further progress in this field will await funding, presumably from clinical sources.

(6) Boron-Neutron Capture Therapy (Fairchild)

The NIH has provided funding for an extension of the second generation of boron compounds synthesized first in Japan. Work has also begun on a third generation of boron compound cooling boron labelled Chlorpromazine which is selectively concentrated by melanoma tissues. Plans are being developed for on site brain tumor radiation using such compounds. The objective of achieving enhanced tumor dosages is an attractive one. However the committee could not be assured from the data presented that the program was ready for clinical application at this time.

(7) Instrument Development (Bennett, Rowe)

A new instrument which would combine single photon emission computerized tomography, positron emission computerized tomography, orthogonal scanning, and dual isotope scanning is being developed under the name UNICON. The instrument is being built in the laboratory and the software being developed simultaneously. Of particular importance is the potential for measuring distributions from single photon emitting radionuclides and comparing them with radio-pharmaceuticals labelled with positron emitters. The laboratory is in a unique position to do this and this project should be encouraged.

In addition, a prototype of a multiwire proportional chamber is being built in collaboration with the instrumentation division under Dr. Walenta. This should be an advance over the multi-wire proportional chambers currently being designed for very special purposes.

The group, under the new leadership of Dr. Brill, has made some advances during the past year and seems to be developing a reasonable sense of direction. In addition, the new cooperative ventures with outside universities, including the College of Physicians and Surgeons for pulmonary studies, the Sloan Kettering Institute for tumor and metabolism studies, and the potential for proton therapy with a number of radiotherapy centers are in the proper direction.

It is extremely important that the various groups, both inside the medical department and outside the medical department, especially those in nuclear medicine, isotope production and chemistry, optimize their complementary strengths to make maximum use of the scarce and unique resources that are to be found at the Brookhaven National Laboratory. In particular, some way should be encouraged so that the strengths that nuclear medicine has in its analysis and quantitation can complement the great ingenuity and chemical syntheses to be found in the chemistry department. Nothing would have a greater impact on the medical community than concerted efforts by these three groups.

C. Radionuclide and Radiopharmaceutical Research Program
(This program reviewed by Drs. Stone and Finch)

Dr. Richards described the continued use of the Blipp facility for production of radionuclides and collaborative studies which were in progress with various institutes in the application of radiopharmaceuticals. One current study dealt with optimizing the position of targets within the Blipp facility to achieve maximum production of isotopes. One difficulty encountered was the interruption of the operation of the Blipp facility and the question has been raised as to whether other installations might collectively be able to achieve a more continuous isotope production program. This operation has made important contributions in the past and is certainly in the strategic position to do so in the future. However, present activities are limited, certainly in part related to the limited personnel assigned to this program. Perhaps the best solution involves extensive collaboration between this group and neighboring universities interested in their products.

III. Inhalation Toxicology and Pulmonary Science
(This area was visited by Drs. Crystal and Kuschner)

Dr. Drew and his colleagues

This group has continued its activities in evaluating the health effects of atmospheric pollutants related to energy production and industrial products. Dr. Drew reviewed for the committee the status of the studies concerning exposure of animals to ozone, acrolein, benzene, SO_2 and CO. One of the impressive aspects of this group is that they have a broad armamentarium of technology (inhalation toxicology, pulmonary physiology, pulmonary morphology, and biochemistry) to apply to their studies.

One of the interesting findings to emerge from the ozone study is that the sophisticated small animal lung function studies (designed by Dr. Costa) can be a more sensitive monitor of inhalation injury than conventional light microscopic analysis. This group also completed a detailed study of the effects of glass fiber inhalation.

The committee continues to be impressed by this group and the national resource represented by this facility. The health effects of atmospheric pollutants will continue to be a major health question. Dr. Drew is one of the leading experts in the country and has expertise to design and execute exposure studies of this nature.

Drs. Chanana and Joel

In the past year, these investigators have directed their attention toward utilizing the sheep as an experimental model in which the immune function of the lung can be evaluated. In this regard, the sheep have several positive features including the fact that appropriate catheters can be placed to chronically-sample blood, bronchoalveolar epithelial fluid (via bronchoalveolar lavage) and lung insterstitial fluid (via afferent lymph) for a variety of inflammatory and immune parameters. While past studies have concentrated on evaluating normal immune effective processes in this model, these investigators plan to evaluate models of lung injury by including inhalation pollutants. In addition to evaluating the immune aspect of this model, the investigators are planning to evaluate these animals using scintigraphic and physiologic methods.

Progress has been made in this area since last year's evaluation and Drs. Chanana and Joel should be praised for their diligence and hard work in moving this area ahead. There is some concern as to whether they are working in a bit of a vacuum as manifested by an apparent lack of sophistication in both immunologic and pulmonary science. In this context, the group and its sheep model represents a resource to the Department of Medicine, but this resource, to come to maximum fruition, would be greatly assisted by the presence in the Department of Medicine of an individual (preferably an M.D.) with sophistication and experience in the lung biopsy, immunology, inflammation in the context of human disease (this is discussed in more detail below).

Drs. Schaich and Borg and colleagues

This group was under Dr. Borg's immediate direction until he became Department Chairman. He still maintains a major interest in the area but his administrative duties have kept him away from active work in the laboratory. This group represents an internationally respected laboratory in the evaluation of free radicals, lipid oxidation, and cellular cytotoxicity mediated by oxidative mechanisms. One of the interesting new approaches of this group is to utilize their expertise in oxidants to evaluate oxidants produced by alveolar macrophages, since the macrophage is thought to be at the center of the mechanisms involved in lung injury. This is an exciting area that is at the cutting edge of research concerned with lung inflammation.

The committee was impressed by the expertise of the group and recognized its importance as a basic research strength of the department. In a broader context, however, this group also represents an excellent example of the application of sophisticated basic methodology to complex biologic systems concerned with host response to atmospheric pollutants.

The committee also recognized that this group is working under difficult conditions in which there are three investigators working without technical assistance. It is strongly recommended, therefore, that support be generated to provide adequate technical support in this area.

IV. Hematology Program

Drs. Nathan and Finch spent the afternoon with Dr. Cronkite and his associates and were impressed that the activities of the hematology program remain productive, imaginative and relevant to the DOE mission.

Marshall Island Survey

Dr. Williams Adams has been recruited to direct the long-term health surveillance studies in the Marshall Islands. The islanders are doing generally well from the point of radiation toxicity except that thyroid nodules and frank hypothyroidism are more frequent than expected, particularly in those who were less than 10 years old at the time of the exposure. There have been 2 pituitary tumors. There has been only one case of leukemia. Most of the disease in the islanders is now due to the ravages of the diseases of civilization such as dental caries, obesity and diabetes. The survey provides excellent medical care for the islanders.

Assay of Stem Cell Damage by Pollutants

Dr. G.E. Hubner has been recruited as a Fellow from the Nuclear Research Center in West Germany to adopt his very interesting assay of residual damage of murine hematopoietic stem cells to an in vivo estimate of pollutant effects on stem cell function. The assay depends on measurement of ^{125}I UDF uptake into spleen colonies generated by marrow cells exposed to toxins in vivo. It is interesting to speculate as to whether the assay may reveal specific damage to age-dependent cohorts of stem cells or whether it reflects broad damage to the stem cell population as a whole.

Dr. Cumerford's ingenious frozen storage cytocide technique is probably the most sensitive method of assay of uptake of pollutants into stem cells that has ever been devised. The assay can measure pollutants in stem cells present at parts per billion if the pollutant is labeled with tritium and even lower if ^{125}I is the label. He beautifully demonstrates and measures the shrinkage of frozen cells by the difference between $^{3}H_2O$ and ^{3}H antipyrine frozen cytocide. This assay is extraordinarily clever and provides definitive information regarding the uptake of trace concentrations of pollutants into a cell of interest. For some inexplicable reason, DOE has decided not to fund these measurements. The work is excellent and the lack of funding is difficult to understand.

Regulation of Amount of Poiesis

The studies of Drs. Cronkite and Miller provide an important base to the experimental work described here. In fact, the studies of pollutants are performed in their laboratories.

A. Leukocyte cell line

Dr. Cronkite has developed a murine cell line (presumably a pre-adipocyte or macrophage) which emits colony stimulating factor into its surrounding medium. This can contribute to the study of the regulation of granulopoiesis.

B. Dr. Miller's work on erythropoietin is addressing basic questions of mechanism and has clinical relevance to the understanding of disturbances of red cell production. Her studies of erythropoietin production utilize bio- and radioimmunoassays, the latter carried out in collaboration with Garcia. She has shown that in patients with chronic lung disease the only identifiable correlate with erythropoietin elevation is the carboxy hemoglobin concentration. In animal experiments the rate of removal of erythropoietin does not appear to be influenced by the rate of erythropoiesis. In addition, she has shown that erythropoietin is rapidly released into the blood in acute hepatitis. These are important and carefully performed studies.

The Radiation Emergency Center for the Northeast

Dr. Bond reviewed a program designed to provide training for medical, paramedical, and health physics personnel. A second component is a radiation assistance program which is designed to provide assistance to victims of radiation accidents within the Northeast. This is a responsibility of DOE but is somewhat difficult to achieve. Brookhaven staff has, by far, the most sophisticated radiation physicians in the Northeast and should establish this program for DOE. Patients exposed to chronic or acute effects of radiation requiring assessment would be seen in the Brookhaven Medical Department and care needed would be determined. Most would remain in Brookhaven where clean rooms and a low nosocomial infection rate should provide an appropriate environment. Facilities in the hospital for this purpose would need to be expanded somewhat.

A second phase of the Radiation Assistance Program might include assistance to the private medical sector in the growing requirement for clinical bone marrow transplantation in the Northeast. Adequate facilities for that procedure do not exist in the Long Island area at the present time. A very large increment in hospital resources would be required at Brookhaven. A less costly approach that might be effective would employ Brookhaven as a triage and study center for patients thought to require marrow transplantation. The Brookhaven staff would rapidly make that decision and then transfer the patient to an established hospital center in which DOE has purchased 2 or more beds to be committed to DOE (Brookhaven) patients to provide service to the community and to make the basic studies of stem cell recovery without undue cost. These alternatives need detailed study and recommendations could not be made at this time.

C. Extracorporeal Irradiation of Blood in Renal Transplantation

This program represents an important collaboration between Brookhaven and Stony Brook wherein patients on chronic dialysis and high levels of autoantibodies may receive ECIB during dialysis at Brookhaven to reduce antibody titers to low levels. The validity of this approach has already been documented in dog studies. The patients would then be transplanted at Stony Brook. This is a program of Dr. Bond, Drs. Cronkite and Rapapart (the latter at Stony Brook) and represents a very useful and relevant activity for the Brookhaven component. This will reduce the burden of chronic dialysis on the medical care budget if succesful.