

VETERANS ADMINISTRATION MEDICAL CENTER  
NEW ORLEANS, LOUISIANA

RADIATION SAFETY MANUAL

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by

RADIOISOTOPES AND RADIATION SAFETY

COMMITTEE

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### INTRODUCTION

The Veterans Administration Hospital, New Orleans, is authorized to procure and use radioactive materials under a "specific license of broad scope" issued by the United States Nuclear Regulatory Commission (NRC). This license is contingent upon the existence of a Radioisotope and Radiation Safety Committee and a Radiation Safety Organization which, among other requirements must:

1. Assure that any investigator using radioactive materials is qualified by training and experience, has the facilities to handle the materials safely, and proposes a use which is safe to all concerned.
2. Assure observance of all safety standards established by the U. S. Nuclear Regulatory Commission, the National Council on Radiation Protection and Measurements and all regulatory or standard setting agencies.
3. Keep records of the receipt, storage, use, transfer and ultimate disposal of all radionuclides.
4. Keep records of the monitoring of personnel and areas involved in the use of radionuclides and other sources of ionizing radiation.

The Veterans Administration Hospital, New Orleans, is subject to periodic inspection by the Nuclear Regulatory Commission to insure that all requirements of the license are being met. These inspections are very thorough, including monitoring checks of laboratory areas, inspection of

procurement and disposition records, records of the qualifications of individual users and records of administrations to patients. Violations of license requirements can result in loss of the license.

This Guide describes rules and procedures required of the New Orleans Veterans Administration Hospital under the terms of licensure.

Four stages of group and individual responsibility are involved in the radiation safety program. All are equally important:

1. Radioisotope and Radiation Safety Committee:

A high level group of physicians and scientists appointed by the Hospital Director to establish policies and regulations governing the use of ionizing radiation at the Veterans Administration Hospital, New Orleans, Louisiana.

2. Radiation Safety Office:

An operating unit of especially trained health physicists and technicians which is responsible for the New Orleans Veterans Administration Hospital compliance with these policies and regulations; it also provides a variety of technical services necessary to achieving such compliance.

3. Individual Users:

Physicians, scientists, other professionals and technical and other workers engaged in patient care, clinical and laboratory research, and research support activities which involve actual use and handling of materials and devices producing ionizing radiation. These personnel usually work under the immediate supervision of Authorized Users.

4. Authorized Users:

Physicians and laboratory scientists whose training and experience are such that they have been authorized by the Radioisotope and Radiation Safety Committee to use ionizing radiation in their clinical care, clinical research, and laboratory research activities.

In the following pages detailed descriptions are given of the responsibilities of each of these four categories. Information is also provided on policies, rules and procedures for various particular aspects of ionizing radiation source procurement and usage. Careful observations of responsibilities, rules and procedures set forth in this Guide will insure more than adequate protection against unnecessary exposure to ionizing radiation.

I. RADIOISOTOPE AND RADIATION SAFETY COMMITTEE RESPONSIBILITY:

The control of radionuclides and radiation safety at the New Orleans Veterans Administration Hospital is the responsibility of the Radioisotope and Radiation Safety Committee. Following the Rules and Regulations set forth by the U. S. Nuclear Regulatory Commission (Title 10, Code of Federal Regulations, codified and reissued, May, 1975), the Committee will review and grant permission for, or disapprove, the use of radioactive material for all uses within the institution from the standpoint of radiological health and safety of patients or working personnel and will prescribe special conditions that will be required during a proposed use of radioactive material, such as requirements for bioassays and physical examinations of users, minimum level of training and experience of users. The Committee will receive and review records and reports from the Radiation Safety Officer. The Committee will recommend remedial action to correct safety infractions. The Committee will formulate and review the institutional training programs for the safe use of radionuclides. The Committee will maintain written records of actions taken by the Committee. The Committee will meet quarterly. Members of the Radioisotope and Radiation Safety Committee are listed in Appendix A.

II. RADIATION SAFETY OFFICE RESPONSIBILITY:

The Radiation Safety Office, under the direction of the Radiation Safety Officer, is responsible for assuring compliance with the

rules and regulations of the Nuclear Regulatory Commission as placed in the Code of Federal Regulations (CFR) Title 10, Chapter 1, Part 20, "Standards for Protection Against Radiation", from the individual users of nuclear material. The duties include:

- a. General surveillance of all health physics activities, including both personnel and environmental monitoring.
- b. Furnishing consulting services to personnel at all levels of responsibility on all aspects of radiation protection.
- c. Receiving records of shipment of radioactive materials coming to or leaving the New Orleans Veterans Administration Hospital.
- d. Distribution and processing of personnel monitoring equipment including keeping of records of internal and external personnel exposure and notifying individuals and their supervisors of exposures approaching the maximum permissible amounts and recommending appropriate remedial action.
- e. Instructing personnel in proper procedures for the use of radioactive materials.
- f. Supervision and coordination of the waste disposal program, including the keeping of waste storage and disposal records.
- g. Performing leak tests on all sealed sources.

- h. Maintaining a periodic inventory of all radioactive material at the New Orleans Veterans Administration Hospital.
- i. Supervising decontamination in cases of contaminating accidents.
- j. Maintaining a continuous program of environmental radiation hazard evaluation and hazard elimination.

### III. INDIVIDUAL USER RESPONSIBILITY:

Each individual at the New Orleans Veterans Administration Hospital who has any contact with radiation sources is responsible for:

- a. Keeping his exposure to radiation as low as reasonably possible, and specifically below the maximum permissible exposure recommended by the Nuclear Regulatory Commission of CFR, Title 10, Chapter 1, Part 20, "Standards for Protection Against Radiation" (20.101) and summarized in the following table:

Rems per calendar quarter; whole body,	
head and trunk; active blood-forming	
organs; lens of eyes or gonads...	1 1/4
hands and forearms; feet	
and ankles .....	18 3/4
skin of whole body .....	7 1/2



Laboratory air and water concentrations shall be maintained below the levels listed in CFR, Title 10, Appendix B, as a part of the CFR, which dictates our operating procedure, this table is filed in the Radiation Safety Office and the office of the Chief of Nuclear Medicine Service.

- b. Wearing the prescribed monitoring equipment such as film badges and pocket dosimeters in radiation areas.

Personnel who work only with pure alpha emitters or only with pure beta emitters having a maximum energy of less than 0.2 meV will not be required to wear film badges.

- c. Surveying his hands, shoes and body for radioactivity, and removing all loose contamination before leaving the laboratory to smoke, eat, etc.

- d. Utilizing all appropriate protective measures such as:

1. Wearing protective clothing whenever contamination is possible and not wearing such clothing outside of the laboratory area.
2. Wearing gloves and respiratory protection when necessary.
3. Using protective barriers and other shields whenever possible.
4. Using mechanical devices whenever their aid will assist in reducing exposures.

5. Using pipette filling devices. Never pipetting radioactive solutions by mouth.
6. Performing radioactive work within confines of an approved hood or glove box unless serious consideration has indicated the safety of working in the open.
- e. Smoking or eating in isotope laboratories is prohibited. Refrigerators shall not be used jointly for foods and radioactive materials.
- f. Maintaining good personal hygiene by:
  1. Keeping fingernails short and clean.
  2. Not working with radioactive materials if there is a break in the skin below the wrist.
  3. Washing hands and arms thoroughly before handling any object which goes to the mouth, nose or eyes.
- g. Checking the immediate areas, e.g., hoods, benches, etc., in which radioactive materials are being used, at least once weekly for contamination. A log record should be maintained of these surveys including results even if they are negative. Any contamination observed should be clearly marked and the Radiation Safety Office notified.
- h. Keeping the laboratory neat and clean. The work area should be free from equipment and materials not required for the immediate procedure. Keep or transport materials in such a manner as to prevent breakage or spillage (double container),



and to insure adequate shielding. Where ever practical, keep work surfaces covered with absorbent material, preferably in a stainless steel tray or pan, to limit and collect spillage in case of accident.

- i. Labelling and isolating radioactive waste and equipment, such as glassware, used in laboratories for radioactive materials. Once used for radioactive substances, equipment should not be used for other work, and shall not be sent from the area to central cleaning facilities, repair shops or to surplus until demonstrated to be free of contamination.
- j. Requesting Radiation Safety Office supervision of any emergency repair of contaminated equipment in the laboratory by shop personnel or by commercial service contractors. At no time shall servicing personnel be permitted to work on equipment in radiation areas without the presence of a member of the laboratory staff to provide specific information.
- k. Reporting accidental inhalation, ingestion or injury involving radioactive materials to his supervisor and the Radiation Safety Office, and carrying out their recommended corrective measures. The individual shall cooperate in any and all attempts to evaluate his exposure.
- l. Carrying out decontamination procedures when necessary and for taking the necessary steps to prevent the spread of contamination to other areas.

- m. Complying with requests from the Radiation Safety Office for body burden measurements and the submission of urine samples for radioassay. Requests for these tests will be made in the case of workers using significant quantities of both alpha and beta emitters.

#### IV. AUTHORIZED USER RESPONSIBILITY:

Authorized users are responsible for insuring that the preceding individual responsibilities are discharged by those under their control and are further responsible for:

- a. Adequate planning. Before an experiment is performed, the supervisor should determine the types and amount of radiation or radioactive material to be used. This will generally give a good indication of the protection required. The procedures must be well outlined. In many cases, before the procedure is actually performed with radiation, it should be rehearsed so as to preclude slip-ups or unexpected circumstances. In any situation where there is appreciable radiation hazard, the Radiation Safety Office shall be consulted before proceeding.
- b. Instructing those employees for whom they are responsible in the use of safe techniques and in the application of approved radiation safety practices.
- c. Furnishing the Radiation Safety Office with information concerning individuals and activities in

their areas, particularly, pertinent changes in their personnel rosters.

- d. Contacting the Radiation Safety Office whenever major changes in operational procedures, new techniques, alterations in physical plant (e.g. the removal of radiochemical fume hood), or when new operations which might lead to personnel exposure are anticipated.
- e. Complying with the regulations governing the use of radioactive materials as established by the Radioisotope and Radiation Safety Committee for:
  1. Correct procedure for the procurement of radioactive materials by purchase or transfer. (See procedure for "Procurement of Radiation Sources", Section VI.c).
  2. Posting areas where radionuclides are kept or used, or where radiation fields may exist.
  3. Seeing that each sign carries the name of the personnel currently responsible for the associated area.
  4. Recording the receipt, transfer and disposal of radioactive materials in his area. This includes sealed sources such as ion sources in gas chromatographs and static eliminators. The authorized user must be prepared to submit quarterly the required inventory data upon request.

5. Assuring that all radioactive waste materials are consigned to the Radiation Safety Office for disposal.
6. Taking steps to prevent the transfer of radioactive materials to unauthorized individuals. This includes the proper disposition of radioactive materials possessed by workers terminating their tour of duty at the New Orleans Veterans Administration Medical Center prior to leaving.
- f. Keeping stocks of stored radioactive materials to a minimum within laboratory areas. Authorized users should employ the storage facilities of the Radiation Safety Office for shipments not needed in current research.
- g. Complying with proper procedure for termination of employment or termination of any experiment using radioactive materials. The authorized user is reminded that under the terms and conditions of the radioactive materials license, he must return to the Radiation Safety Office all radioactive materials, including waste, assigned to him under the license. Particular care should also be exercised to see that specialized equipment such as personnel monitoring devices (e.g. film badges), survey instruments and shielding materials are returned to the Radiation Safety Office. A final termination survey should also be requested by memorandum.

V. EXPERIENCE AND TRAINING OF APPLICANTS:

In carrying out the responsibilities and duties assigned it by the U. S. Nuclear Regulatory Commission under the broad license, the Radioisotope and Radiation Safety Committee is bound by the requirements of the Commission for training and experience of scientists and physicians in the use of radioactive materials.

Section 35.11 (d) of 10 CFR 35 provides that the Commission will approve a license application by an institution for medical use of byproduct material if it determines, among other things, that the physician designated as the individual user is adequately trained and experienced in (a) basic radioisotope handling techniques and (b) the clinical use of byproduct material proposed in the application. Similar criteria are established in Section 35.12 (c) of 10 CFR 35 for approval of licenses for medical use of radiopharmaceuticals by individual physicians. Outlined below are training and experience criteria that the Commission, with the assistance of its Advisory Committee on the Medical Uses of Isotopes, has found acceptable for physicians who use radiopharmaceuticals. Each physician's training and experience are examined on a case-by-case basis. If a physician wishes to use radiopharmaceuticals but does not have the training and experience described, he may submit an application listing his specific qualifications and this will be reviewed by the Commission with the assistance of the Medical Advisory Committee.

a. General Training:

To qualify as adequately trained to use or directly supervise the use of byproduct materials listed in Group I, II and/or III, Section 35.100 of 10 CFR, Part 35, a physician should have:

1. Training in basic radioisotope handling techniques including:
  - (a) Radiation physics and instrumentation.
  - (b) Radiation protection.
  - (c) Mathematics pertaining to the use and measurement of radioactivity.
  - (d) Radiation biology.
  - (e) Radiopharmaceutical chemistry.
2. Experience with the types and quantities of byproduct material for which the application is being made, or equivalent.
3. Clinical training in a supervised institutional nuclear medicine program. The clinical training should cover all appropriate types of diagnostic procedures and include:
  - (a) Supervised examination of patients to determine the suitability for radioisotope diagnosis and recommendation on dosage to be prescribed.
  - (b) Collaboration in calibration of the dose and the actual administration of the dose to the patient, including calculation of the radiation dose, related measurements and plotting data.

- (c) Follow-up of patients when required.
- (d) Study and discussion with his/her preceptor of case histories to establish the most appropriate diagnostic procedures, limitations and contraindications.

b. Training Requirements for Specific Diagnostic Procedures:

A physician who wishes to be authorized for only one or two specific diagnostic procedures should have training in basic radioisotope handling techniques and clinical procedures commensurate with the procedures and quantities of by-product material being requested. Such requests will be examined on a case-by-case basis by the Commission with the assistance of the Advisory Committee on Medical Uses of Isotopes.

c. Training Requirements for Therapy Procedures Involving Radiopharmaceuticals:

To qualify as adequately trained to use or directly supervise the use of byproduct material listed in Groups IV and/or V, Section 35.100 of 10 CFR, Part 35, a physician should have:

1. Training in basic radioisotope handling techniques including:
  - (a) Radiation physics and instrumentation.
  - (b) Radiation protection.
  - (c) Mathematics pertaining to the use and measurement of radioactivity.



- (d) Radiation biology.
- (e) Clinical experience in the diagnosis and treatment of the disease for which radio-pharmaceutical therapy is recommended.

d. Training Requirements for Therapy Procedures  
Involving Sealed Sources:

To qualify as adequately trained to use or directly supervise the use of byproduct material listed in Group VI, Section 35.100 of 10 CFR, Part 35, a physician should have:

1. Training in basic radioisotope handling techniques.
2. Clinical training in specific therapy procedures:
  - (a) Radiation sources for interstitial, intra-cavitary, or surface treatment of cancer.
    - Active practice in therapeutic radiology with a minimum of three years experience.
  - (b) Beta ray applicators for the treatment of superficial eye disease.
    - Active practice in therapeutic radiology or ophthalmology and experience in the therapeutic use of beta rays or soft x-rays.

With the first application from each investigator, a complete description of his training and experience, stating periods, location and supervision in the use of radio-nuclides shall be submitted.



VI. PROCEDURES FOR MAKING APPLICATION TO THE RADIOISOTOPE  
AND RADIATION SAFETY COMMITTEE:

a. Applications:

A separate application is required for each project which contemplates the use of radioactive materials. This includes In Vivo and In Vitro Human, Animal and Classroom use. Application is to be made on VA-Form 10-1153, "Radioisotope User's Statement of Experience". (A self-explanatory form available from the Chairman, Radioisotope and Radiation Safety Committee). Upon completion, the application should be forwarded to the Chairman of the Radioisotope and Radiation Safety Committee. Action of the Committee will be returned to the applicant and copies will be forwarded to the Radiation Safety Officer. The signed approved original will constitute the investigator's authorization under the broad license to procure and use the materials. Physicians may obtain information on current approved investigators and specific medical uses at the New Orleans Veterans Administration Hospital from the Radioisotope and Radiation Safety Committee. Should questions arise in the Committee regarding details of an application, the investigator will be invited to meet with the Committee and discuss the details of his proposal. Should the Committee finally disapprove the application on the basis of conflict with restrictions of the U. S. Nuclear Regulatory Commission or Committee policies, the application, nevertheless, will be

forwarded to the Director, Nuclear Medicine Service, Veterans Administration Central Office, Washington, D. C., for his review and action upon further recommendation of the investigator and the Hospital Director.

b. Expiration:

Each authorization will expire the last day of the month, one year after the month of the approval. Authorized investigators should anticipate the expiration of their approvals by at least one month and apply for renewal of the authorization. The investigator should clearly state that this is an application for renewal of the authorization. The investigator should clearly state that this is an application for renewal of the previous authorization without modification and should include the number of the original authorization and date.

If an investigator has no positive plans for the use of a given authorization during the coming year, he should consider its retirement in order to save on bookkeeping in the Radioisotope and Radiation Safety Committee Office. Such a retired authorization can usually be reactivated by the Chairman, Radioisotope and Radiation Safety Committee, in one day, should need for it develop.

An authorization which is being considered for renewal and which reflects frequent patient use may be retained and established as a service to be provided to the clinician and

patient by the Nuclear Medicine Service. Decision to provide this service will reside with the Chief, Nuclear Medicine Service. This service consideration would also be applied in the situation where several similar authorizations by separate applicants reflect an overall need for patient service from various areas of the New Orleans Veterans Administration Hospital.

c. Radionuclide Purchase, Receiving and Distribution:

Purchase requisitions initiated for radioactive materials to be used by the Nuclear Medicine Service will require the approval of the Chief, Nuclear Medicine Service only. Purchase requisitions for radioactive materials initiated by an authorized investigator must have the approval of the Radiation Safety Officer, or in his absence, a member of the Radioisotope and Radiation Safety Committee. Such requisitions submitted to the Supply Service, Purchasing Section, without the proper endorsement will be rejected.

All radionuclide shipments are to arrive at the Supply Service Warehouse (Receiving Section) during business hours. The shipment will be delivered to the Nuclear Medicine Service without delay. Radionuclides to be used by the Research Service will be picked up by the responsible investigator in the Nuclear Medicine Service.. The radioisotope material will then be taken to the Research Service radionuclide hood for inspection and removal.

When radionuclides arrive after business hours, they will be delivered to the Hospital Police Section. The Hospital Police have been instructed to take the shipment immediately to the refrigerator used for radionuclide storage located in the Nuclear Medicine Service.

Each individual radionuclide user must keep a record of the receipt of all radioactive material. Upon receipt of radioactive material, the assay information should be recorded on the "Radioactive Shipment Receipt Report", Appendix B. This record must be maintained by the investigator for the entire amount of radioactive material. A copy of this record must be forwarded to the Radiation Safety Officer or be available for monthly review.

d. Terminating Procedures:

The procedures listed below are primarily intended to assure the appropriate disposition of radioactive materials when an application is discontinued. It is the investigator's responsibility to initiate appropriate action to satisfy the procedures outlined prior to the time of his departure. Whenever an approved application for use of radioactive material is to be discontinued, the responsible person for its use must:

1. Notify the Radiation Safety Officer of his intention to discontinue the use of the radioactive material.

2. Inventory all radioactive material on hand including all unused material and material considered as waste.

The Radiation Safety Officer upon receipt of such a notice will:

1. Conduct a survey of all laboratory areas in which the radioactive material has been used or stored.
2. Assist the investigator in making final disposition of all radioactive materials on hand.

VII. RADIONUCLIDE SURVEY, STORAGE AND PROTECTION MEASURES;  
POLICY AND PROCEDURES:

a. Package Survey:

Immediately upon receipt of the radionuclide, a survey should be made of the package to ensure that the contents have not been spilled during transport. This survey should be performed with a GM type survey meter. If the package is contaminated, the Radiation Safety Officer must be informed so that he, or his designee, can take appropriate measures to determine the hazard present and decontaminate.

b. Storage of Radionuclides:

1. Liquid and solids:

It is important that all stored radioactive samples be clearly labelled at all times, giving pertinent and accurate information about the contents, such as, the radionuclide, its chemical form, the quantity of material as well as the name of the person who is responsible. Storage sites

for large amounts of radioactive materials should be as remote from occupied areas as is practical. The background radiation in unrestricted areas shall be such that individuals continuously present in the areas will not receive a dose in excess of 2 millirems in any one hour, or will not receive a dose in excess of 100 millirems in any seven consecutive days. The whole body exposure in unrestricted areas shall be such that any individual will not receive a dose in excess of 0.5 Rem in any period of one calendar year. The storage site should be chosen as to minimize risk for fire. Any radionuclide that is in a combustible or inflammable solution and requires refrigeration, must be stored in an explosion proof refrigerator. The storage areas shall be well marked with a "Caution Radioactive Materials" sign, and, if necessary, entrance requirements posted.

2. Gases:

The general storage requirement listed above apply as well as the following considerations:

Radioactive solutions that emit gases should be labelled and kept in approved hoods which are provided with filters and have adequate ventilation. In general, only such amounts



of material as is necessary for immediate experiments should be store in the laboratory.

c. External Radiation Protection Measures:

The basic protective measures to reduce external radiation are time, distance and shielding. In every situation these three factors must be considered jointly. While shielding is desirable in reducing exposure, it must not be overlooked that doing the job in one-half the time is just as effective as halving the radiation flux with shielding. Continuous use of monitoring equipment is the best method of evaluating the hazard and reducing the exposure. Every user of radionuclides should have at hand adequate survey instruments to keep check on his operations.

d. Internal Radiation Protection Measures:

The prevention of internal exposure is more exacting and less easily performed. The maximum permissible levels of radioactive contamination in the air or on laboratory surfaces is of such a low level that they cannot be detected with ordinary survey instruments. If low level contamination is suspected, contact the Radiation Safety Officer for a survey. The general policy in the use of radionuclides is to use such equipment and procedures which will most reduce the probability of getting radionuclides into the body. Outlined below

are rules and procedures for this purpose:

1. Protective clothing:

A laboratory coat should be worn when working with radioactive materials. Where necessary, rubber gloves, safety glasses and shoe covers should be worn. These items should not be worn outside the laboratory, e.g., offices, counting rooms, etc. Never wear laboratory coats to the cafeteria. Monitor all clothing before it is returned to the laundry.

2. Laboratory equipment and design:

The experiment should be designed with recognition of radiation hazards involved. The design should be such that if an accident occurs, contamination will be minimal and remain localized. When contemplating radioactive work, attention must be given to hoods, drains, ventilation, traffic, etc.

3. Handling procedures:

- (a) Always wear rubber or plastic gloves when working with radioactive material.
- (b) Use remote handling equipment when necessary.
- (c) Use double containers for radionuclides.
- (d) Use protective covering and lids.
- (e) Use unbreakable containers to store radionuclides.



- (f) Use extreme caution in transfers. Try a dummy run to test the procedure.
- (g) DO NOT PIPETTE BY MOUTH. Use remote pipetting devices.
- (h) Always plan the procedure to be used. Know what you are going to do before you do it.
- (i) Use absorbent paper to cover the working area to absorb the radioactive material in the event of a spill.
- (j) Deposit liquid waste in labelled containers in a decay or storage area.
- (k) Deposit dry waste in labelled step-on cans.

4. Good housekeeping habits:

Much of the job of preventing the spread of contamination is a matter of good housekeeping.

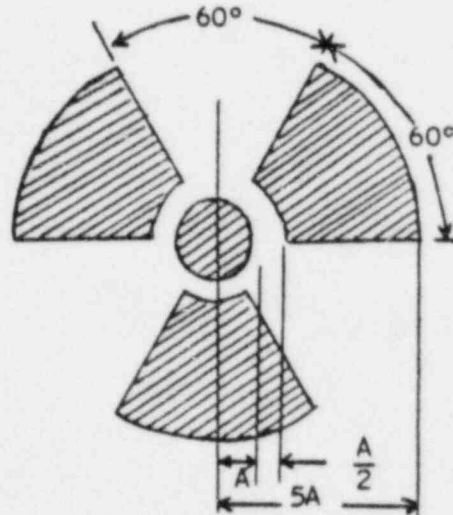
- (a) Keep the laboratory neat and clean. Keep the work area free of equipment and materials not required for the immediate procedure.
- (b) Wash hands and arms thoroughly before handling any object which goes to the mouth, nose or eyes. Monitor the hands whenever contamination is suspected and decontaminate immediately.

(c) Keep fingernails short and clean. Do not work with radioactive materials if there is a break in the skin below the wrist unless the wound is so protected that radioactive materials cannot gain access to the body. Cover the break with tape (plastic or adhesive) and wear rubber gloves.

(d) No smoking or eating is allowed in the laboratories. This includes gum, candy and beverages. Food containers are not permitted in laboratories. Refrigerators shall not be used jointly for foods and radioactive materials.

e. Restriction and Labelling of Radiation Areas:

All radiation areas are to be properly labelled; and as such, are to be restricted from entrance by unauthorized personnel. All radiation signs, labels and signals shall use the conventional radiation caution colors (magenta or purple on yellow background). The symbol is the conventional three-bladed design.



RADIATION SYMBOL

1. Cross-hatched area is to be magenta or purple.
2. Background is to be yellow.

A sign bearing the radiation caution symbol and the words

CAUTION  
HIGH RADIATION AREA

will be posted when the radiation level in such an area is such that a major portion of the body could receive in any one hour a dose in excess of 100 millirem.

A sign bearing the radiation caution symbol and the words

CAUTION  
RADIATION AREA

will be posted when the radiation level in an area is such that a major portion of the body could receive in any one hour a dose in excess of 5 millirems, or in any five consecutive days a dose in excess of 100 millirems.

A sign bearing the radiation symbol and the words

CAUTION  
AIRBORNE RADIOACTIVITY AREA

will be posted when any room enclosure or operating area in which airborne radioactive materials exist in concentrations in excess of amounts specified in Appendix B, 10 CFR, Part 20.

A sign bearing the radiation symbol and the words

CAUTION  
RADIOACTIVE MATERIALS

will be posted in each area or room in which radioactive material is used or stored and which contains any radioactive material in any amount exceeding 10 times the quantity specified in Appendix C, 10 CFR, Part 20.

This sign will also be displayed on each container in which transported, stored or used

a quantity of any licensed material greater than the quantity of such material specified in 10 CFR, Part 20, Appendix C.

All equipment contaminated with radioactive material shall be marked with signs, decals or other conspicuous means. Labelling shall not be required for laboratory containers such as beakers, flasks and test tubes, used transiently in laboratory procedures during the presence of the user.

The Form, NRC-3, 10 CFR, Part 19 and Part 20, entitled:

#### NOTICE TO EMPLOYEES

will be posted in a sufficient number of places in every areas where employees are employed in activities licensed by the Nuclear Regulatory Commission to permit them to observe a copy on the way to and from their place of employment.

f. Personnel Monitoring and Survey:

Every person is responsible for monitoring his personal clothing, shoes and laboratory equipment. Monitoring shall be mandatory before leaving work areas for lunch or at the end of the day.

1. Film Badges:

Any person who has a probability of being exposed to significant amounts of external radiation should be issued a film badge. The

Secretary, Nuclear Medicine Service, should be contacted for ordering film badges.

2. Pocket dosimeters:

Personnel working with any sources of radiation where a daily exposure of more than 10 mRem is possible, must wear a pocket dosimeter. As a rule of thumb, if the radiation levels exceed 20 mR/hr at any point, pocket dosimeters are called for.

3. Survey meters:

Every laboratory using radioactive material should have a working survey meter. This will usually be of the Geiger-Mueller type. This instrument is for the use of personnel to check for contamination and is suitable for such routine use of:

- (a) Checking laboratory surfaces, glassware and tools for beta-gamma contamination.
- (b) Checking hands, shoes and clothings.
- (c) Measuring radiation levels from low-level sources (less than 20 mR/hr).

Arrangements may be made with the Radiation Safety Officer for surveys.

g. Laboratory Monitoring and Survey:

Periodic monitoring of the radioisotope laboratories will be conducted by the Radiation Safety Officer. This should in no way detract from the routine weekly monitoring by the personnel working in the laboratory. The Radiation Safety Officer will have a floor plan of each laboratory that uses radionuclides. During the periodic checkup, the Radiation Safety Officer will record on this floor plan dose rates at various points, such as, sinks, lab tables, hoods and handling equipment, using the appropriate survey meter. Also recorded on this floor plan will be a wipe test of the most frequently used lab table. This wipe test will be made with a piece of moistened filter paper and depending on the type of source present, counted for either/or all alpha, beta and gamma radiations. Each sealed source containing byproduct material with a half-life greater than 30 days shall be tested for leakage and/or contamination. This test shall be performed on the sealed source or on the accessible surfaces of the device in which such a source is permanently or semi-permanently mounted. The tests will be performed using moistened cotton applicators or filter paper. Wipes will be counted with appropriate



instrumentation (e.g., alpha-gas flow, beta-thin window G.M. or liquid scintillation, gamma-crystal scintillation) to determine radioactivity. Records of leak test results will be maintained by the Radiation Safety Officer. Servicing, maintenance and repair of sources will be performed by the source supplier.

Sampling of air will be performed by the Radiation Safety Officer in various areas in which radionuclides are being used. There will be monitoring for tritium concentration in the air near tritium-labelled experimental setups.

h. Urinary Monitoring of Personnel Involved in Tritium Labelling:

All potentially exposed personnel involved in tritium labelling procedures will be subjected to a regular program of urinary monitoring as follows:

1. No assay required if amount is less than 1000 uCi in any one experiment and experiment is not repeated in 12 days.
2. In amounts of 1000 uCi to 100 mCi, bioassays will be performed every 6 months.
3. In amounts of 100 mCi to 8 Ci, bioassays will be submitted weekly.
4. In amounts greater than 8 Ci, bioassays will be submitted daily.

Records will be kept by the Radiation Safety Officer.

i. Animal Room Monitoring:

If radioactive material is administered to animals, the rooms in which the animals are housed must be labelled with a "Caution Radiation Area" sign. A periodic monitoring of the animals will be made by the personnel working in the area. Dose rates are to be measured and recorded at a distance of one foot from the animals at the initiation of each new experiment.

A chart should be conspicuously posted indicating the dose rates. If the dose rate at one foot is greater than 2 mR/hr, contact the Radiation Safety Officer.

j. Radioactive Materials in Gas Chromatograph Equipment:

All gas chromatograph units in which radioactive materials are to be used are regulated as follows:

1. As is true with other radioactive shipments, radioactive foils to be used in gas chromatograph cells must be shipped to Supply Service, Receiving Section, Veterans Administration Hospital, New Orleans. Each foil must be registered by number with the Radiation Safety Office.

2. In addition, each cell containing a radioactive foil must have a label showing the radiation caution symbol with the words "Caution Radioactive Material" and the identity and activity of the radioactive material. The radioactive foil shall not be removed from its identifying cell except for cleaning and shall not be transferred to other cells.
3. The following notice shall appear in a conspicuous location on the outside of each gas chromatograph unit: "This equipment contains a radioactive source registered with the Radiation Safety Office as required by the license from the U. S. Nuclear Regulatory Commission. Notify the Radiation Safety Office before removing the source from this room or area or upon any change in custodial responsibility." The notification tags are available from the Radiation Safety Office.
4. Individuals using radioactive components in gas chromatograph equipment must vent the cells exhaust through plastic tubing into a hood, room exhaust or radiation safety approved trap, to avoid contamination of work areas from the release of radioactive tagged samples introduced into the

system or from the accidental overheating of radioactive foils in the cells.

5. The Radiation Safety Officer will perform leak tests, store radioactive foils when not in use and maintain the necessary records on such tests and storage.

k. Calibration of Survey Meters:

All survey meters used routinely by each laboratory must be calibrated once every 6 months. The calibration will be performed by the Radiation Safety Officer. Each laboratory is responsible for bringing the survey meter for calibration to the Radiation Safety Office. Upon completion of the calibration, an instrument calibration record will be posted on the survey meter indicating the date of calibration. The user will be responsible for maintaining the calibration at intervals not exceeding 6 months.

l. Permissible Exposures (see page 3):

The maximum permissible external exposure for personnel occupationally exposed is 100 millirems per week. The maximum permissible average body burden of radionuclides for persons outside of the controlled area and attributable to the operations within the controlled area shall not exceed 1/10 of that for a radiation worker, i.e., 10 millirems per week.

m. Contaminated Equipment:

Radioactive contamination is defined as the deposition of radioactive material in any place where it is not desired and particularly in any place where its presence may be harmful. Under no circumstances shall contaminated equipment be stored in a laboratory or be returned to a stock room. Equipment that may be reused should be decontaminated (see Section XI for decontamination procedure). Disposal of contaminated equipment which is no longer of any use will be done with the supervision of the Radiation Safety Officer. Equipment to be repaired by shop and maintenance personnel or by commercial contractors shall be demonstrated to be free of contamination prior to servicing. If it becomes necessary to make emergency repairs on contaminated equipment, the work will be supervised by a member of the Radiation Safety Office, who will assure that the necessary safeguards are taken. It is the responsibility of the laboratory personnel to request this supervision from the Radiation Safety Office.

n. Instruction for Visitors:

All protection measures pertinent to personnel safety mentioned above apply to all visitors. No visitors are permitted in any laboratory using a

radiation source unless accompanied by a qualified individual familiar with the hazards involved. All visitors shall be issued a personal monitoring device when they enter an area in which radioactive materials are located in such amounts that they constitute a potential personal hazard or increase the possibility for spread of contamination. Accumulated doses shall be recorded for the visitor along with the individual's name, age and address and this information sent in a written memorandum to the Radiation Safety Officer to be kept on file.

#### VIII. RADIONUCLIDE DISPOSAL:

Records of the amounts, in microcuries, of all radionuclide disposal must be maintained on the "Radioisotope Disposal Form", Appendix F. No radioactive waste shall be disposed of by conventional methods. This means, particularly, that solid waste may not be collected by housekeeping personnel and that liquid waste may not be discharged into the sewer. Animals must not be incinerated.

Radionuclides that are received in pre-assayed unit dose syringes, remaining activity in syringe is to be returned to the radiopharmacy. Contaminated needles are to be stored in appropriate labelled containers for decay to background levels before disposal.

##### a. Liquid and Solid Wastes with Half-Lives Less Than 10 Days:

Liquid and solid wastes with half-lives less than 10 days must be deposited in labelled waste containers.

Contents of containers should be removed daily by the user and delivered to the Radiation Safety Office. The Radiation Safety Office will store these materials for decay to background level and make final disposal. (See Item "c" for packing and handling instructions).

b. Liquid and Solid Wastes With Half-Lives Greater Than 10 Days:

Liquid and solid wastes with half-lives greater than 10 days must be deposited in a labelled waste container. Contents of container should be removed daily by the user and delivered to the Radiation Safety Office. The Radiation Safety Office will pack these materials for shipment to an approved burial site via outside vendor. (See Item "c" for packing and handling instructions). If the shipment container is stored near the areas which use this service, the waste may be placed, in bags, directly into the container following approval and instructions from the Radiation Safety Officer.

c. Packing and Handling Instructions:

1. Liquid and solid wastes, such as paper cups, tissues, partially full or empty radionuclide containers, absorbent paper, vials, gloves, etc., may be containerized in plastic bags so as to prevent spillage of waste. Judgment must be



used not to fill bags too full or overweigh them. Double and triple bagging is recommended when disposing of glassware.

2. All waste must be properly labelled. New Federal, State and waste disposal company regulations require that all items on the waste disposal tag (Appendix C) be filled out properly. A waste disposal tag must be attached to each bag of waste. Waste disposal tags may be obtained from the Radiation Safety Office.
3. Waste may be delivered to the Radiation Safety Office during the hours of 8:00 a.m. to 5:00 p.m., Monday through Friday. Radioactive waste pick-up service is not available.

Payment to the disposal company is conducted on a re-charge basis to the department generating radioactive waste. Departments are charged by volume consumed in each 55-gallon barrel. Disposal company regulations limit weight and volume per barrel. Contact the Radiation Safety Office for information on these limits.

If a solid radionuclide is water soluble, it may be flushed down the drain providing the activity is below the maximum permissible levels. An assay must be made to determine the exact amount of activity present and

the dilution necessary. (Appendix B, 10 CFR, Part 20 entitled "Concentrations in Air and Water Above Natural Background" sets forth the maximum permissible discharge of material into a sanitary sewerage system).

d. Animal House:

No one is allowed to use radioisotopes in the Animal House facilities unless the project has been approved by the Radioisotope and Radiation Safety Committee. Projects pending approval by the Research and Development Committee will not be approved without this approval. Cleaning and decontamination of cages by the animal caretakers will be under the supervision of the approved investigators. The caretakers will wear gloves, aprons and boots when performing these tasks. All contaminated waste materials will be disposed of in the designated drain for this purpose followed by ample flushing. "Caution Radioactive Material" signs will be posted near cages housing animals containing radioisotopes. Experimental animal carcasses which contain radioisotopes will be disposed of in a manner designated by the Radiation Safety Officer. The method of disposal will be determined by this officer and the investigator before the experiment is performed. Under no conditions are such carcasses to be sent to the incinerator for disposal. (See Appendix L, Form IV).

e. Liquid Scintillation Vials:

All liquid scintillation vials must be disposed of as radioactive waste. Liquid scintillation vials

must be tightly capped and placed in double plastic bags that are tightly sealed. Each plastic bag shall be conspicuously marked with a "Caution Radioactive Material" tag and the radionuclide and activity shall be posted on the bag label. The bags will then be placed in the disposal barrel.

f. Unusual Waste Disposal Problems:

Plans for proper disposal of infectious agents or highly toxic or hazardous substances shall be made early in the design stage of the experiment. Proposed procedures involving unusual waste disposal problems including animal carcasses will be considered individually by the Radioisotope and Radiation Safety Committee or the Radiation Safety Officer.

g. Excreta From Patients Receiving I-131 and P-32:

Excreta from individuals undergoing medical diagnosis or therapy with radioactive material shall be exempt from any limitation in this section.

IX. PROCEDURES FOR NURSING AND PATIENT CARE STAFF:

a. Diagnostic Procedures:

Since there is minimal external hazard to others from routine diagnostic doses of radionuclides, there is no restrictions on the patient's activities

or his contacts with other people. Nursing personnel are not required to wear personnel monitoring devices.

The following procedures apply when a patient receives radioactive material for diagnostic purposes:

1. Patient care personnel should use disposable gloves to handle items suspected of contamination. Particular care should be exercised in the handling of vomitus and excreta during the first 24 hours following administration of the radio-nuclide. Use the Geiger counter to check for contamination. Contaminated linen should be placed in a separate laundry bag which is to be kept in the patient's room. Other contaminated items should be placed in a radioactive waste can. The Radiation Safety Officer should be called for removal of contaminated linen and waste.
2. Laboratory samples taken during the first 24 hours post-administration should be labelled "Radioactive".
3. Special diagnostic procedures will be evaluated on an individual basis and appropriate written instructions will be issued.

4. Should questions arise concerning the use of radionuclides on a unit, call the Radiation Safety Office for assistance.

b. Therapy Procedures:

The following procedures apply when patients receive radionuclides other than sealed sources or colloidal suspensions, in millicurie amounts for therapeutic purposes:

1. Special Radiation Safety Procedures (Appendix D) will be issued to the Chief Nurse of the unit at the time the radionuclide is given or at the time the patient is returned from the operating room. This form will indicate precautions to be taken on a daily basis and will be reviewed each day by the Radiation Safety Officer.
2. A "Radioactivity Precautions" sign shall be placed at the patient's door. Radiation safety personnel will indicate when it may be removed.
3. The patient should be put in a room by himself. For patient's receiving gamma-emitting nuclides, this room should be as distant from the nursing station as feasible. EXCEPTION: Patient receiving radiation source implants (radium or iridium needles) or colloidal suspensions may be placed in a room with another.

providing this second patient is receiving external beam therapy.

4. Handling of Patients:

- (a) When indicated, the patient-care staff should wear disposable gloves while handling the patient. Used gloves should be placed in the radioactive waste can for disposal.
- (b) Wash hands thoroughly with soap and running water after gloves are removed.
- (c) After handling the patient, patient-care personnel should monitor themselves thoroughly with an appropriate survey meter.

5. Food Service:

If feasible, paper plates and disposable utensils should be used by the patient during therapy precautions. If found contaminated after use, they should be placed in the waste container provided for this purpose.

6. Patient's Linen:

All linen, i.e., bedclothes, pajamas, towels, etc., used during the period of therapy precautions must be placed in a yellow laundry bag to be kept in the patient's room and must not be sent to the laundry until monitored by the Radiation safety personnel.

7. Removal of Objects and Materials From The Patients Room:

All objects or materials to be removed from the therapy precautions area shall be checked for contami-

nation. It may be necessary to remove these articles temporarily to the utility room for monitoring due to radiation levels in the vicinity of the patient.

8. Disposal of Radioactive Excreta:

- (a) Feces should be passed in the toilet whenever possible. If a bedpan is used, it must be handled with disposable gloves. The same bedpan should be used until treatment is completed and its use restricted to that particular patient.
- (b) Urine shall be saved in stoppered bottles and, if the isotope is a gamma-emitter, the bottles shall be kept in a shielded storage container provided by the Radiation Safety staff. Urine containers, urinals, specimen bottles, etc., should be handled only by the patient if at all possible.

9. Housekeeping Personnel:

Housekeeping personnel shall not enter the room until indicated by the Radiation Safety personnel.

10. Accidents:

In case of an accident which might produce a radiation hazard (e.g., the spillage of contaminated urine on the floor), CALL AT ONCE: During Regular



Working Hours:

The Physician-in-Charge,  
Radiation Safety Officer,  
and

Chief of Nursing Service.

Outside of Regular Working Hours:

Nursing Supervisor-in-Charge,  
Physician-in-Charge,  
and

Telephone Operator for names of  
Radiation Safety Office personnel  
on-call.

c. Colloidal Suspensions and Sealed Sources:

The following apply when patients receive therapy utilizing colloidal suspensions or sealed sources, such as needles, tubes and plaques containing Iridium-192, Cobalt-60, Radium, Radon, etc.:

1. All dressings, bedclothes, sanitary napkins, bedpans, etc., or any material removed from the vicinity of the treatment site shall be carefully monitored to assure that the source has not been removed or displaced.
2. Special Radiation Safety Procedures (Appendix D) will be issued to the Chief Nurse of the unit at the time the radionuclide is given or at the time

the patient is returned from the operating room. This form will indicate precautions to be taken on a daily basis and will be reviewed each day by the Radiation Safety personnel.

3. A "Radiotherapy Precautions" sign shall be placed at the patient's door. Radiation safety personnel will indicate when it may be removed.
4. The patient should be put in a room by himself. For patients receiving gamma-emitting nuclides, this room should be as distant from the nursing station as feasible. EXCEPTION: Patients receiving radiation source implants (radium or iridium needles) or colloidal suspensions may be placed in a room with another patient providing this second patient is receiving external beam therapy.
5. Housekeeping Personnel:

Housekeeping personnel shall not enter the room until indicated by Radiation safety personnel.

6. The nursing staff should be alert to any sealed sources which may have moved from their original positions. Should an implanted source become separated from the patient, CALL AT ONCE:

During Regular Working Hours:

The Physician-in-Charge,  
Radiation Safety Officer,

and

Chief of Nursing Service.

Outside of Regular Working Hours:

Nursing Supervisor in Charge,

Physician in Charge,

and

Telephone Operators for the names of

Radiation Safety Office personnel on-call.

X. EMERGENCY PROCEDURES:

Emergencies resulting from accidents in laboratories working with radioactive materials will range from simple spills of small amounts of radioactive materials where no serious contamination problems result to major disasters occurring from explosives, fires or natural phenomena. Correspondingly, the hazards resulting from such accidents will cover the range of situations involving extreme radiation hazards and bodily injury or both. In view of the complicating factors that may arise during such emergencies, simple rules of procedure cannot be set down covering all situations of radiation danger. However, in an emergency, primary concern must always be the protection of laboratory personnel from radiation hazards. Second should be the confinement of the contamination to the local areas of the accident, if possible.

a. Storage in Anticipation of Natural Catastrophy:

In the event of hurricane, flooding or other disaster, all radioactive materials should be returned to the storage site. Individual amounts of radioactive material should be stored in double containers and sealed as well as possible to prevent leakage. Each container should be labelled giving the radionuclide, its chemical form and activity present at a specific date. The storage safe or cabinet should be locked and sealed with waterproof tape. If time permits, a list of the radionuclides placed in the storage area should be posted with the date and activity present.

If a suitable storage area does not exist, contact the Radiation Safety Officer.

b. Whom to Call:

In the event of an emergency, e.g., spills, bodily injury, fire, etc., the Radiation Safety Office should be notified immediately. In addition, each particular laboratory area should have posted the location of the nearest fire alarm or phone number of the fire department.

c. Loss of Sources:

In the event of a loss of a radioactive source, notify all personnel in the laboratory area or building, if necessary. Evacuate the area if necessary and

take, where applicable, the appropriate steps listed below:

Contact the Radiation Safety Office and request a survey.

d. Minor Spills Involving No Radiation Hazard to Personnel:

1. Notify all other persons in the room at once and retain them nearby.
2. Turn off air conditioners and seal area.
3. Permit only the minimum number of persons necessary to deal with the spill into the area.
4. Confine the spill immediately.
  - (a) Liquid spills:
    - (1) Don protective gloves.
    - (2) Drop absorbent paper on spill.
  - (b) Dry spills:
    - (1) Don protective gloves.
    - (2) Vacuum clean the contaminated area. Use a filter having a pre size of 0.2 micron on the exhaust opening of the vacuum cleaner. Central vacuum systems may not be used.
5. Notify the Radiation Safety Officer.
6. Decontaminate.
7. Monitor all persons involved in the spill and cleaning.

8. Permit no persons to resume work in the area until a survey is performed and approved by the Radiation Safety Officer.
  9. Prepare a complete history of the accident and subsequent activity related thereto for the laboratory records.
- e. Major Spills Involving Radiation Hazard to Personnel:
1. Notify all persons not involved in the spill to vacate the room at once.
  2. If the spill is liquid, and the hands are protected, right the container.
  3. If the spills on the skin, flush thoroughly.
  4. If the spill is on clothing, discard outer or protective clothing at once.
  5. Switch off all fans and air conditioners.
  6. Vacate the room.
  7. Notify the Radiation Safety Officer.
  8. Take immediate steps to decontaminate personnel involved as necessary.
  9. Decontaminate the area. (Personnel involved in decontamination must be protected).
  10. Monitor all persons involved in the spill and cleaning to determine adequacy of decontamination.

11. Permit no person to resume work in the area until a survey is made and approval of the Radiation Safety Officer is secured.
  12. Prepare a complete history of the accident and subsequent activity related thereto for the Radiation Safety Office records.
- f. Accidents Involving Radioactive Dusts, Mists, Fumes, Organic Vapor and Gases:
1. Notify all other persons to vacate the room immediately.
  2. Hold breath and close escape valves, switch off air circulating devices, etc., if time permits.
  3. Vacate the room.
  4. Notify the Radiation Safety Office at once.
  5. Ascertain that all doors giving access to the room are closed and post conspicuous warnings or guards to prevent accidental opening of doors.
  6. Report at once all known or suspected inhalation of radioactive materials.
  7. Evaluate the hazard and the necessary safety devices for safe re-entry.
  8. Determine the cause of contamination and rectify the conditions.
  9. Decontaminate the area.
  10. Perform air survey of the area before permitting work to be resumed.



11. Monitor all persons suspected of contamination.
12. Prepare a complete history of the accident and subsequent activity related thereto for the Radiation Safety Officer's records.

g. Injuries to Personnel Involving Radiation Hazard:

1. Wash minor wounds immediately under running water while spreading the edges of the wound.
2. Report all radiation accidents to personnel (wounds, over-exposure, ingestion, inhalation) to the Radiation Safety Officer as soon as possible.
3. Call a physician qualified to treat radiation injuries at once.
4. Permit no person involved in a radiation injury to return to work without approval of the Radiation Safety Officer and the attendant physician.
5. Prepare a complete history of the accident and subsequent activity related thereto for the Radiation Safety Officer's records.

h. Fires or Other Major Emergencies:

1. Notify all other persons in the room and building at once.
2. Attempt to put out fires if radiation hazard is not immediately present.
3. Notify the Radiation Safety Office.
4. Notify the fire department and other local plant safety personnel.

5. Govern the fire-fighting or other emergency activities by the restrictions of the Radiation Safety Officer.
6. Following the emergency, monitor the area and determine the protective devices necessary for safe decontamination.
7. Decontaminate.
8. Permit no person to resume work without approval of the Radiation Safety Officer.
9. Monitor all persons involved in combating the emergency.
10. Prepare a complete history of the emergency and subsequent activity related thereto for the Radiation Safety Officer's records.

XI. DECONTAMINATION PROCEDURES:

a. General Considerations:

1. Prevent the spread of contamination. The Radiation Safety Officer should be called for assistance as soon as possible whenever a spill occurs. The first consideration, including tracking by persons, movement of air currents (hoods, fans, etc.), water, dusting, mopping and other physical actions. To confine it, decontaminate the spill from the outside toward the center.
2. Make a plan. Successful decontamination calls for planned action. A spur of the moment action or

attempt at decontamination can cause more harm than good. Perhaps the best thing to do after a spill is to go sit in front of the laboratory door and make a thorough plan of the steps to be taken in the decontamination procedure.

3. Monitoring. Make full use of instruments and available assistance. Each step of the decontamination should be monitored. One person should be kept clean to operate the instruments and do other monitoring. When instruments become contaminated, any progress is hopeless. Protective clothing, footwear, gloves and masks should be used as needed.
4. Records. Complete records should be made of each action. Copies should be sent to the Radiation Safety Office. In most cases the Radiation Safety Officer will be involved, so a joint report can be filed.
5. Waste Disposal. Provisions must be made for disposal of cleaning solutions and contaminated articles. In some instances, it may be judged better to dispose of a contaminated article than to attempt to decontaminate it.

b. Specific Procedures:

Listed below are specific decontamination procedures. Where possible, the preferred decontaminating agent is listed first:

Contaminated Area	Decontaminating Agent	Remarks	Maximum Permissible Levels of Contamination
Skin & Hands	Mild soap & water or detergent & water.	Wash 2-3mins. & monitor. Do not wash over 3-4 times.	ALPHA 150 dpm/100 cm <sup>2</sup>
	If necessary, follow by soft brush, heavy lather & tepid water.	Use light pressure with heavy lather. Wash for 2mins. 3 times. Rinse & monitor. Use care not to scratch or erode skin.	This is approximately $\frac{1}{2}$ the inhalation level in terms of total dpm/day. This assumes not more than 1/5 of this material will be inhaled. Additional exposure by ingestion is also considered.
	Mild soap & water	Apply lanolin or hand cream to prevent chapping.	
	OTHER PROCEDURES		BETA - GAMMA
	A mixture of 50% Tide & 50% corn meal.	Make into paste, use with additional water with a mild scrubbing action. Use care not to scratch or erode skin.	Average less than 0.3 mR/hr for each hand surface or 100 cm <sup>2</sup> of skin surface, using Geiger-Mueller instrument calibrated with 226Ra.
	A 5% water solution of a mixture of 30% Tide, 65% Calgon & 5% Carbose (Carboxymethyl Cellulose)	Use with water. Rub for a min. and rinse.	
	A preparation of 8% Carbose, 3% Tide, 1% Versene & 88% water homogenized into a cream.	Use without any additional water. Rub for 1 min. & wipe off. Follow with lanolin or hand cream.	
	CHEMICAL PROCEDURES	(As a last resort)	
	Titanium dioxide paste. Prepare by mixing.	Work paste in affected area for 2 mins.	

Contaminated Area	Decontaminating Agent	Remarks	Maximum Permissible Levels of Contamination
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precipitated titanium dioxide (a very thick slurry never permitted to dry) with a small amount of lanolin.

Rinse & wash with soap, brush & warm water. Monitor.

Mix equal volumes of a saturated solution of potassium permanganate & 0.2 N sulfuric acid. Continue with next step also. (Saturated solution  $\text{KMnO}_4$  is 6.4gms/100ml water.

Pour over wet hands, rubbing the surface & using hand brush for not more than 2 mins. (NOTE: Will remove layer of skin if in contact for more than 2 mins). Rinse with water.

Apply a freshly prepared 5% solution of sodium acid sulfite. ( $\text{NaHSO}_3$ )

Apply in same manner as above not more than 2 mins. The above procedure may be repeated. Use lanolin or hand cream.

Wounds (cuts & breaks in skin)

Running tap water. Report to Medical Officer & Radiation Safety Officer as soon as possible.

Wash wound with large volumes of running water immediately (within 15 sec.). Spread wound to permit flushing action by water.

Keep wound contamination as low as possible.

Ingestion by swallowing

Immediately induce vomiting. Drink large quantities of liquids to dilute activity.

Urine & feces analysis will be necessary to determine amount of radionuclides in body.

Contaminated Area	Decontaminating Agent	Remarks	Maximum Permissible Levels of Contamination
			ALPHA
Clothing	Wash - if levels permits.	Use standard laundering procedures, 3% Versene or citric acid may be added to wash water.	150 dpm/100 cm <sup>2</sup>
			BETA - GAMMA
		Wash water must be below MPL for sewer disposal.	No area to average more than 0.1 mR/hr. G-M meter calibrated with <sup>226</sup> Ra.
See rubber & leather under specific materials.	Store	To allow for decay if contamination is short lived.	(If clothing is worn 100 hr/wk, this will give 1/10 of maximum external dose).
	Disposal	Treat as solid waste if necessary.	
Glassware	Soap or detergent with water	Monitor wash water & plan disposal of it.	The maximum permissible levels for glassware that is handled with bare hands is same as for hands & skin.
	Chromic acid cleaning solution or concentrated nitric acid.	Monitor wash water & plan disposal of it.	
	SUGGESTED AGENTS	ELEMENTS REMOVED.	
	Oxalic acid, 5% (Caution poison)	Zr, Nb, Hf	
	Versene (EDTA) 5% Concentration	Alkaline Earth Metals: Be, Mg, Ca, Sr, Ba, Ra, P as PO <sub>4</sub> .	
	NH <sub>4</sub> OH 3%	Alkali Metals: Na, K, Rb, Cs, & strongly absorbed metals like Po.	
	HCl 10% by volume.	Concentrated solution of NaCl will remove by exchange Na, I, etc.	
	To make, dissolve in order:	Trivalent Metals: Al, Sc, Y, La, Ce, Pr, Nd, Pm, Sm, Eu.	
	1. Versene(EDTA) 5%		

Contaminated Area	Decontaminating Agent	Remarks	Maximum Permissible Levels of Contamination
	2. Conc. $\text{NH}_4\text{OH}$ , 3% by volume. 3. Glacial Acetic acid 5% by volume.	Rare Earths: Ac, Ga, In, Ti, B. Transition Metals: Cu, Zn, Fe, Co, Ni, Cd, Sn, Hg, Pb, Th, U, Ag. (Always consider the radioactivity of the cleaning solution when disposing of it).	
Laboratory Tools	Detergents & water, steam cleaning.	Use mechanical scrubbing action.	The maximum permissible levels for tools that are handled with bare hands are the same as for hands and skin.
Metal Tools	Dilute nitric acid 10% sol. of sodium citrate or ammonium bifluoride. Metal polish, sandblasting, other abrasives.	As a last resort, use HCl on stainless steel.  Such as brass polish on brass. Use caution as these procedures may spread contamination.	
Plastic Tools	Ammonium citrates, dilute acids, organic solvents.		
Glass Tools	The same as above section on glassware.		
Walls, Floors, & Benches	Detergents & water with mechanical action. Vacuum cleaning	The exhaust of cleaner must be filtered to prevent escape of contamination.	



Contaminated Area	Decontaminating Agent	Remarks	Maximum Permissible Levels of Contamination
SPECIFIC MATERIALS	Water from high pressure source. Steam cleaning.	This may spread contamination.	
	Rubber	Washing or dilute $\text{NH}_4\text{OH}$	(Short lived contamination may be covered up to await decay).
	Glass, plastic, leather	See above. Very difficult to decontaminate.	
	Linoleum	$\text{CCl}_4$ , kerosene, ammonium citrate, dilute mineral acids.	
	Ceramic Tile	Mineral acids, ammonium citrate, trisodium phosphate.	Scrub hot 10% sol. into surface & flush thoroughly with hot water.
	Paint	$\text{CCl}_4$ , 10% $\text{HCl}$ acid.	Usually best to remove paint & repaint.
	Brick & Concrete	32% $\text{HCl}$ acid	If this is not successful, concrete must be removed.
	Wood	Hot citric acid, remove wood with plane or floor chippers & grinder.	
	Traps & Drains	1. Flush with water. 2. Scour with rust remover. 3. Soak in solution of citric acid. 4. Flush again.	Follow all 4 steps.

XII. RADIUM AND OTHER SEALED SOURCES:

A permanent radium supply is not possessed by the Veterans Administration Hospital, New Orleans. Radium therapy is provided by approved radiation therapy consultants. The Radiation Safety Committee advises the hospital administration of those radiation therapists that are approved for use of radium or other sealed sources and will use the following criteria for evaluation of radiation therapists:

- a. All rules and regulations of the medical staff relative to record keeping are observed.
- b. Written verification of leak tests of sealed sources must be maintained at six month intervals.
- c. Radium that is transported to the hospital must be transferred in containers which will limit the radiation level at 1 meter from the center of the container to 2 mR/hr or less.
- d. A log book must be kept in the Nuclear Medicine Service to indicate the number, loading and type of radium or other sealed source that has been transferred to the hospital and the location of the sealed source (name of patient) to which the radionuclide was transferred. The time of source insertion and removal should also be indicated.
- e. At least two days prior notification must be given to the Operating Room Supervisor.

- f. The form entitled "Nursing Care, Patients Receiving Radium-226, Radon-222, Cesium-137, Iridium-192, Tantalum-182, Iodine-125", Appendix U, Form 1), is to be filled out completely to become a part of the patient's chart.
- g. The label "Caution, Patient Contains Radioactive Material", Appendix O-2, is filled out completely and attached to the patient's chart.

XIII. SHIPMENT AND TRANSFER OF RADIONUCLIDES:

Since outgoing shipments of radioactive materials are infrequent, and the regulations concerned are numerous and complicated, the individual shall consult the Radiation Safety Office when a shipment is contemplated.

The investigator is responsible for packaging the radionuclide as prescribed by the regulations. The

Radiation Safety Office will furnish packaging specifications, shipping labels meeting the Interstate Commerce Commission and Department of Transportation requirements and perform the necessary monitoring. The Investigator must name the radionuclide present, the amount in microcuries and the intended mode of transportation.

The means of transportation by which radionuclides may be shipped will depend upon the quantities involved. Shipping of radionuclides to "iron curtain" countries is prohibited by the Department of Commerce. Shipping or taking radionuclides to friendly foreign countries requires the investigator to ascertain and comply with all foreign requirements. Customs inspectors may require a copy of the Veterans Administration Hospital's license for either incoming or outgoing shipments.

Transportation on Veterans Administration Hospital property of any material (owned, controlled or used by agreement) which constitutes a hazard shall first be approved by the Radiation Safety Officer. The vehicle transporting the material shall be properly marked and security provided. Any movement of materials by vehicle is a source of potential contamination both to the vehicle and surrounding areas in the event of an accident. Any vial transported by vehicle shall be tightly sealed and

containers shall be secured so as to prevent spillage contamination. If spillage occurs, the individual concerned shall immediately notify the Radiation Safety Office.

a. Transfer Within Veterans Administration Hospital

All radioactive materials at the Veterans Administration Hospital are recorded for use and/or storage against a specific application for a specific investigator.

If an individual wishes to obtain materials from an investigator already having the radionuclide by gift, purchase or otherwise, the individual must have an approved radionuclide application for the use intended.

An individual having material on hand may not transfer it to another individual without first ascertaining by actual inspection that the proposed recipient has an approved application listing the material requested and the amount desired. All transfers shall require a Transfer Slip., Appendix E, which shall be completed and forwarded as per instructions.

b. Transfer From Veterans Administration Hospital:

1. All off-site use of radionuclides, domestic or foreign, under "generally licensed quantities"

(10 CFR 31.100) or individual NRC or agreement state license should be subject to the same scientific review and approval by the Radioisotope and Radiation Safety Committee as prevails for in-house use.

2. Off-site domestic use under various forms of NRC or agreement state license of Veterans Administration Hospital scientists may be permitted. This requires approval of the same type of application as is required for Veterans Administration Hospital use, plus approval of the application form as submitted to the NRC or the agreement state, including specific data with respect to proposed methods of compliance with 10 CFR 20 or similar agreement state regulations. The Veterans Administration Hospital's Radiation Safety Office will provide assistance with these applications and requires copies of all relevant correspondence, of the final licenses, of renewals and of subsequent amendments to the licenses.
3. Off-site foreign use may be authorized following compliance with paragraph (1) and receipt by the Radioisotope and Radiation Safety Committee of an acceptable statement

indicating the full knowledge and agreement of an appropriate authority in the host country.

4. All Veterans Administration Hospital scientists using radionuclides under any circumstances in off-site locations, domestic or foreign, must use Veterans Administration Hospital personnel monitoring devices when indicated or be under an equivalent monitoring program acceptable to and reporting to the Veterans Administration Hospital Radiation Safety Office.
5. The Veterans Administration Hospital Radioisotopes and Radiation Safety Committee and Radiation Safety Office are authorized to intervene and apply applicable Veterans Administration Hospital regulations to off-site uses of other sources of ionizing radiation employed by Veterans Administration Hospital personnel.
6. Users of radionuclides authorized and procured under the broad license are reminded that this license is specific for the Veterans Administration Hospital, New Orleans, Louisiana. This means that the transfer of radionuclides from this location



to off-site premises requires clearance through the Radiation Safety Office.

Transfers of radionuclides from off-site locations to the Veterans Administration Hospital must be made in accordance with the requirements of "Procurement of Radiation Sources"

APPENDIX A

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APPENDIX A

# APPENDIX B

## RADIOACTIVE SHIPMENT RECEIPT REPORT

1. P.O.# \_\_\_\_\_ SURVEY DATE: \_\_\_\_\_ TIME: \_\_\_\_\_  
SURVEYOR: \_\_\_\_\_
2. CONDITION OF PACKAGE:  
\_\_\_\_\_ O.K. \_\_\_\_\_ PUNCTURED \_\_\_\_\_ STATUS \_\_\_\_\_ WET  
\_\_\_\_\_ CRUSHED \_\_\_\_\_ OTHER \_\_\_\_\_
3. RADIATION UNITS OF LABEL: \_\_\_\_\_ UNITS (mR/hr)
4. MEASURED RADIATION LEVELS: a. Package surface \_\_\_\_\_ mR/hr  
b. 3 feet from surface \_\_\_\_\_ mR/hr
5. DO PACKING SLIP AND VIAL CONTENTS AGREE?  
a. Radionuclide \_\_\_\_\_ yes \_\_\_\_\_ no difference - \_\_\_\_\_  
b. Amount \_\_\_\_\_ yes \_\_\_\_\_ no difference \_\_\_\_\_  
c. Chemical Form \_\_\_\_\_ yes \_\_\_\_\_ no difference \_\_\_\_\_
6. WIPE RESULTS FROM: a. Outer \_\_\_\_\_ CPM = \_\_\_\_\_ DPM  
eff = ( )  
b. Final source container \_\_\_\_\_ CPM = \_\_\_\_\_ DPM  
eff = ( )
7. SURVEY RESULTS OF PACKING MATERIAL AND CARTONS \_\_\_\_\_ mR/hr, CPM
8. DISPOSITION OF PACKAGE AFTER INSPECTION \_\_\_\_\_  
\_\_\_\_\_
9. IF NRC/CARRIER NOTIFICATION REQUIRED, GIVE TIME, DATE AND PERSONS NOTIFIED.

APPENDIX C

WASTE DISPOSAL TAGS



## APPENDIX D

### SPECIAL RADIATION SAFETY PROCEDURES

#### a. Therapeutic Use of Radiopharmaceuticals :

##### 1. Procedures, Precautions and Personnel Instructions:

- (a) All patients treated with Iodine-131 or Gold-198 will be placed in a private room with toilet.
- (b) The patient's room will be properly posted in accordance with Section 20.203, 10 CFR, Part 20.
- (c) Surveys of the patient's room and surrounding areas will be conducted as soon as practicable after administration of the treatment dose. Exposure rates will be measured at the patient's bedside, three feet away and the entrance to the room. The Radiation Safety Officer or his designee will then determine how long a person may remain at these positions and will post these times in the patient's chart and on his door. The results of daily surveys will be used to recalculate permitted times which will be posted on the patient's chart and on his door.
- (d) The forms, "Nursing Instructions for Patients Treated with Phosphorus-32, Gold-198 or Iodine-131", will be completed immediately after administration of the treatment dose. A copy will be posted in the patient's chart.
- (e) Radiation levels in unrestricted areas will be maintained less than the limits specified in Section 20.105(b), 10 CFR, Part 20.
- (f) All linens will be surveyed for contamination before being removed from the patient's room and will, if necessary, be held for decay.



- (g) Disposable plates, cups, eating utensils, tissue, surgical dressing, and other similar waste items will be placed in a specially designated container. The material will be collected daily by the Radiation Safety Officer (or his designee), checked for contamination, and disposed of as normal or radioactive waste, as appropriate.
- (h) Non-disposable items used for these patients will be held in plastic bags in the patient's room, and checked for contamination by the Radiation Safety Officer or his designee. Items may be returned for normal use, held for decay or decontaminated, as appropriate.
- (i) Urine and vomitus, from Iodine-131 therapy patients will be stored for decay in our radioactive waste storage area. When it has reached background levels as measured with a low-level survey meter, it will be released to the sanitary sewer system.
- (j) Before a therapy patient's room is reassigned to another patient, the room will be surveyed for contamination (and decontaminated if necessary) and **all** radioactive waste and waste containers will be removed.
- (k) Nursing Instructions:
  - (1) Nurses should spend only that amount of time near the patient required for ordinary nursing care. Special restrictions may be noted on the precaution sheet in

the patient's chart. Nurses should read these instructions before administering to the patients.

Call the Nuclear Medicine Service if you have any questions about the care of these patients.

- (2) Visitors will be limited to those 18 years of age or over, unless other instructions are noted on the precautions sheet in the patient's chart.
- (3) Patients must remain in bed while visitors are in the room and visitors should remain at least three feet from the patient.
- (4) Radioactive patients are to be confined to their rooms except for special medical or nursing purposes approved by the Nuclear Medicine Service.
- (5) No nurse, visitor or attendant who is pregnant should be permitted in the room of a patient who has received a therapeutic amount of radioactivity until the patient no longer presents a radiation hazard. Female visitors should be asked whether they are pregnant.
- (6) Attending personnel must wear rubber or disposable plastic gloves when handling urinals, bedpans, emesis basins or other containers having any material obtained from the body of the patients. Wash gloves before removing and then wash hands. The gloves must be left in the patient's room in the designated container. These gloves need not be sterile or surgical in type.

- (7) Disposable items should be used in the care of these patients, whenever possible. These items should be placed in the designated waste container. Contact the Nuclear Medicine Service for proper disposal of the contents of the designated waste container.
- (8) All clothes and bed linens used by the patient should be placed in the laundry bag provided and left in the patient's room to be checked by a member of the Nuclear Medicine Service.
- (9) All non-disposable items should be placed in a plastic bag and left in the patient's room to be checked by a member of the Nuclear Medicine Service.
- (10) Surgical dressings should be changed only as directed by physician. Gold-198 leaking from a puncture wound will stain the dressings dark red or purple. Such dressings should not be discarded but should be collected in plastic bags and turned over to the Nuclear Medicine Service. Handle these dressings only with tongs or tweezers. Wear disposable gloves.
- (11) For Iodine-131 Patients:
- a) Urine from Iodine-131 patients will be collected in special containers provided by the Nuclear Medicine Service. The patient should be encouraged to collect his own urine in the container. If the patient is bedridden, a separate

urinal or bedpan should be provided. The urinal or bedpan should be flushed several times with hot soapy water after use.

- b) If the nurse helps to collect the excreta, she should wear disposable gloves. Afterwards she should wash her hands with the gloves on and again after the gloves are removed. The gloves should be placed in the designated waste container for disposal by the Nuclear Medicine Service.
- c) Disposable plates, cups, and eating utensils will be used by patients who are treated with Iodine-131.
- d) Vomiting within 24 hours after oral administration, urinary incontinence, or excessive sweating within the first 48 hours may result in contamination of linen and/or floor. In any such situations, or if radioactive urine and/or feces is spilled during collection, call the Nuclear Medicine Service, Extension 5297, 5098 or 5099. Meanwhile, handle all contaminated material with disposable gloves and avoid spreading contamination.
- e) All vomitus must also be kept in the patient's room for disposal by the Nuclear Medicine Service. Feces need not be routinely saved, unless ordered on the chart. The same toilet should be used by the patient at all times and it should be well flushed (3 times).

- (l) Utmost precautions must be taken to see that no urine or vomitus is spilled on the floor or the bed. If any of the patient's room is suspected to be contaminated, notify the Nuclear Medicine Service.
- (m) If a nurse, attendant or anyone else knows or suspects that his skin, or clothing, including shoes, is contaminated, notify the Nuclear Medicine Service immediately. This person should remain in the patient's room and not walk about the hospital. If the hands become contaminated, wash immediately with soap and water.
- (n) If a therapy patient should need emergency surgery or should die, notify the Nuclear Medicine Service immediately.
- (o) When the patient is discharged call the Nuclear Medicine Service and request that the room be surveyed for contamination before remaking the room.

b. Therapeutic Use of Sealed Sources:

1. Procedures for Use of Group VI Sources for Treatment or Patients, Precautions and Personnel Instructions:

- (a) All patients treated with brachytherapy sources will be placed in a private room with toilet.
- (b) The patient's room and door will be properly posted in accordance with Section 20.203, 10 CFR, Part 20.
- (c) Surveys of the patient's room and surrounding areas will be conducted as soon as practicable after sources are implanted. Exposure rate measurements will be taken at

the patient's bedside, three feet away and at the entrance to the room. The Radiation Safety Officer or his designee will then determine how long a person may remain at these positions and will post these times in the patient's chart.

- (d) The form, "Nursing Instructions For Patients Treated With Brachytherapy Sources", will be completed immediately after the sources are implanted and placed in the patient's chart.
- (e) Radiation levels in unrestricted areas will be maintained less than the limits specified in Section 20.105(b), 10 CFR, Part 20.
- (f) Nurses caring for brachytherapy patients will be assigned film badges. TLD finger badges will also be assigned to nurses who must provide extended personal care to the patient.
- (g) At the conclusion of treatment, a survey will be performed to ensure that all sources have been removed from the patient and that no sources remain in the patient's room or any other area occupied by the patient. At the time, all radiation signs will be removed and all film and TLD badges assigned to nurses will be collected.
- (h) Instructions to Nurses:
  - (1) Special restrictions may be noted on the precaution sheet in the patient's chart. Nurses



should read these instructions before administering to the patient. Call the Nuclear Medicine Service if you have ~~any~~ questions about the care of these patients.

- (2) Nurses should spend only the minimum necessary time near a patient for routine nursing care, but must obtain and wear a film badge.
- (3) When a nurse receives an assignment to a therapy patient, a film or TLD badge should be obtained immediately from the Nuclear Medicine Service. The badge shall be worn only by the nurse to whom it is issued and shall not be exchanged between nurses.
- (4) Pregnant nurses should not be assigned to the personal care of these patients.
- (5) Never touch needles, capsules or containers holding brachytherapy sources. If a source become dislodged use long forceps and put it in the corner of the room or in the shielded container provided; contact the Nuclear Medicine Service at once.
- (6) Bed bath given by the nurse should be omitted whild the sources are in place.
- (7) Perineal care is not given during gynecologic treatment; the perineal pad may be changed when necessary, unless orders to the contrary have been written.



- (8) Surgical dressings and bandages used to cover the area of needle insertion may be changed only by the attending physician or radiotherapist, and MAY NOT BE DISCARDED until directed by the radiotherapist. Dressings should be kept in a basin until checked by the radiotherapist or a member of the Nuclear Medicine Service or Radiation Safety Office. Special orders will be written for oral hygiene for patients with oral implants.
- (9) No special precautions are needed for sputum, urine, vomitus, stools, dishes, instruments, utensils or bedding unless specifically ordered.
- (10) These patients must stay in bed unless orders to the contrary are written.
- (11) Visitors will be limited to those 18 years of age or over, unless other instructions are noted on the patient's chart.
- (12) Visitors should sit at least three feet from the patient and should remain no longer than the times specified on the form posted on the patient's door and in his chart.
- (13) No nurse, visitor or attendant who is pregnant should be permitted in the room of the patient while brachytherapy sources are implanted in the patient. Female visitors should be asked whether they are pregnant.

(14) Emergency Procedures:

- a) If an implanted sources become loose or separated from the patient, or
- b) If the patient dies, or
- c) If the patient requires emergency surgery, immediately call \_\_\_\_\_

\_\_\_\_\_  
Phone (days) \_\_\_\_\_,  
(nights) \_\_\_\_\_

- (15) At the conclusion of treatment, call the Radiation Safety Officer and request that the patient and room be surveyed to be sure all radioactive sources have been removed.

NURSING INSTRUCTIONS FOR PATIENTS TREATED WITH  
PHOSPHORUS-32, GOLD-198 or IODINE-131

Patient's Name: \_\_\_\_\_

Room No.: \_\_\_\_\_ Physician's Name: \_\_\_\_\_

Radioisotope Administered: \_\_\_\_\_

DATE and TIME of Administration: \_\_\_\_\_

Dose Received: \_\_\_\_\_ Method of Administration: \_\_\_\_\_

Exposure Rates in Mr/Hr

Date \_\_\_\_\_ 3 feet from bed \_\_\_\_\_ 10 feet from bed \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

(Comply with all Check Items)

- \_\_\_\_\_ 1. Visiting time permitted: \_\_\_\_\_
- \_\_\_\_\_ 2. Visitors must remain \_\_\_\_\_ from patient.
- \_\_\_\_\_ 3. Patient may not leave room.
- \_\_\_\_\_ 4. Visitors under 18 not permitted.
- \_\_\_\_\_ 5. Pregnant visitors not permitted.
- \_\_\_\_\_ 6. Film badges must be worn.
- \_\_\_\_\_ 7. Use and complete the following tags:
- \_\_\_\_\_ door
- \_\_\_\_\_ bed
- \_\_\_\_\_ chart
- \_\_\_\_\_ wrist

- \_\_\_\_\_ 8. Gloves must be worn while attending patient.
- \_\_\_\_\_ 9. Patient must use disposable utensils.
- \_\_\_\_\_ 10. All items must remain in room until OK'd by Radiation Safety Officer.
- \_\_\_\_\_ 11. Smoking is not permitted.
- \_\_\_\_\_ 12. Do not release room to admitting until OK'd by Radiation Safety Officer.
- \_\_\_\_\_ 13. Other instructions.

In case of an emergency contact Radiation Safety Officer or  
Radiation Safety Office designee:

ROBERT DIXON MC AFEE, Ph.D.  
Radiation Safety Officer

Duty Phone: Ext. 5074  
Home Phone: 242-6427

EARL L. GASTON, Supr. Chemist  
Designee

Duty Phone: Ext. 5297, 5098, 5099  
Home Phone: 288-5139

CARL L. GASPARD, Nuc Med Tech  
Designee

Duty Phone: Ext. 5297, 5098, 5099  
Home Phone: 271-3350

NURSING INSTRUCTIONS FOR PATIENTS TREATED  
WITH BRACHYTHERAPY SOURCES

Patient's Name: \_\_\_\_\_

Room Number: \_\_\_\_\_ Physician's Name: \_\_\_\_\_

Isotope Activity: \_\_\_\_\_

Date and Time of Administration: \_\_\_\_\_

Date and Time Sources are to be removed: \_\_\_\_\_

Isotope: \_\_\_\_\_

Exposure Rates in mR/Hr

Bedside	3 feet from bed	10 feet from bed
---------	-----------------	------------------

(Comply with all Checked Items)

- \_\_\_\_\_ 1. Wear film badge.
- \_\_\_\_\_ 2. Wear rubber gloves.
- \_\_\_\_\_ 3. Place laundry in linen bag and save.
- \_\_\_\_\_ 4. Housekeeping may not enter the room.
- \_\_\_\_\_ 5. Patient may not have visitors.
- \_\_\_\_\_ 6. No pregnant visitors.
- \_\_\_\_\_ 7. No visitors under 18 years of age.
- \_\_\_\_\_ 8. A dismissal survey must be performed before patient is discharged.

- \_\_\_\_\_ 9. Patient must have a private room.
- \_\_\_\_\_ 10. Other instructions.

In case of an emergency contact Radiation Safety Officer  
or Radiation Safety Office designee:

ROBERT DIXON MC AFEE, Ph.D.  
Radiation Safety Officer

Duty Phone: Ext. 5074  
Home Phone: 242-6427

EARL L. GASTON, Supervisory Chemist  
Designee

Duty Phone: Ext. 5297, 5098, 5099  
Home Phone: 288-5139

CARL L. GASPARD, Nuc. Med. Tech.  
Designee

Duty Phone: Ext. 5297, 5098, 5099  
Home Phone: 271-3350

APPENDIX E

TRANSFER OF RADIOACTIVE MATERIAL

DATE OF TRANSFER: \_\_\_\_\_

1. Radionuclide transferred (e.g.,  $^{32}$ ): \_\_\_\_\_

2. Chemical Form (and/or position of label): \_\_\_\_\_

3. Amount ( $\mu$ Ci or mCi): \_\_\_\_\_

4. Source (Application Number under which the material was purchased  
and Transferer's Name): \_\_\_\_\_  
\_\_\_\_\_

5. Delivery to (Radioactive Materials License Number and Name of  
Recipient): \_\_\_\_\_  
\_\_\_\_\_

6. Received by: \_\_\_\_\_  
(Signature)

7. Location to be used: \_\_\_\_\_

Room No.: \_\_\_\_\_

Send original to Radiation Safety Officer, 2nd copy retained by transferer  
and 3rd copy to recipient.



## APPENDIX F

## RESEARCH RADIOISOTOPE DISPOSAL FORM

[illegible]

## APPENDIX G

### AUTHORIZATION OF TECHNICIANS, TECHNOLOGISTS AND PARAMEDICAL PERSONNEL TO ADMINISTER RADIOACTIVE MATERIALS TO PATIENTS

The Chief, Nuclear Medicine Service may authorize technicians, technologists or other paramedical personnel to perform the following activities:

1. Preparation and quality control testing of radiopharmaceuticals and sources of radiation.
2. Measurement of radiopharmaceutical doses prior to administration.
3. Use of appropriate instrumentation for the collection of data to be used by the physician.
4. Administration of radiopharmaceuticals and radiation from radioisotopic sources to patients, within limits otherwise permitted under applicable Federal, State or local laws.

Prior to such authorization, the Chief, Nuclear Medicine Service shall determine that such technicians, technologists or paramedical personnel have been properly trained to perform such duties. This training shall include training in the following subjects, as applicable to the duties assigned:

1. General characteristics of radiation and radioactive materials.
2. Physical, chemical and pharmaceutical characteristics of each radiopharmaceutical to be used.
3. Mathematics and calculations basic to the use and measurement of radioactivity, including units of quantity of radioactivity

(curies, millicuries and microcuries) and units of radiation dose and radiation exposure.

4. Use of radiation instrumentation for measurements and monitoring including operating procedures, calibration of instruments and limitations of instruments.
5. Principles and practices of radiation protection.
6. Proficiency in sterile venipuncture techniques.
7. Additional training in the above subjects, as appropriate, when new duties are added.

The Chief, Nuclear Medicine Service will assure that such technicians, technologists and other paramedical personnel receive appropriate retraining in the subjects listed above to maintain proficiency and to keep abreast of developments in the field of nuclear medicine technology. Keep records showing the bases for such determination or proper training and retain responsibility as licensee or authorized user for the satisfactory performance of such activities.

Certification in nuclear medicine technology by the American Registry of Radiologic Technologists or the Registry of Medical Technologists of the American Society of Clinical Pathologists will be deemed to satisfy the training requirements.

I certify that technicians/technologists of the Nuclear Medicine Service attend pertinent training as offered by Regional Medical Education Centers and other intra-VA and extra-VA symposiums and conferences and that each increment of training is documented and maintained on file.

## APPENDIX H

### MANAGEMENT OF VICTIMS OF RADIOACTIVE CONTAMINATION

#### I. DETERMINATION OF THE EXISTENCE OF RADIATION INJURY:

Occasionally a physician may be consulted by an individual who believes that he has been exposed to hazardous levels of ionizing radiation from fallout, accidentally or during work. Such amounts would probably be claimed to be in excess of the limits recommended by the National Committee on Radiation Protection and Measurements. There are basically two possible types of accidents which might occur: (1) exposure to radiation from an external source and (2) contamination with radionuclides. The accidental exposure can, of course, be mixed.

For this purpose, the minimum dose of radiation possibly considered to be harmful is 25 Rads or more. With doses of 50 Rads or less there will be no detectable symptoms or signs of radiation injury, nor are there laboratory tests which demonstrate changes following doses of these magnitudes.

At doses of 50-150 Rads there are usually no significant symptoms or signs. It is possible that there will be a fall in lymphocytes and total white cells. Blood counts should be obtained on days 1, 3, 6, 9, 12, 15, 18, 21, 24, 27 and 30 in order to detect the minimal changes which might follow those doses.

If a patient presents himself with nausea, vomiting, anorexia, weakness and prostration, it often will be difficult to exclude radiation as a causative factor. In a suggestible or apprehensive patient these manifestations can be created easily. If their symptoms

are due to radiation in doses below 500 Rads, they will subside in 24-48 hours. Lymphopenia will be detected within the first few days. Table E should be consulted for an exact timetable for performance of applicable laboratory tests.

## II. EXPOSURE TO EXTERNAL RADIATION:

The exposure may involve only part of the body, particularly when exposure has been to various types of x-radiation and sealed sources containing radionuclides. The lower the radiation quality (KV for x-ray, KeV or MeV for radionuclides) the sooner will erythema of the skin or mucous membranes appear. These erythematous reactions will be produced with lower doses with softer radiation. An experienced radiologist or dermatologist can give valuable consultation in determination of the degree and extent of such injuries and the appropriate treatment. For medicolegal purposes frequent color photographs are suggested to follow the course and resolution of these skin changes. Increased pigmentation may persist for weeks or even months after the production of erythema. There may be tanning, desquamation, vesiculation with a moist exudative surface, and even ulceration. For a given dose of radiation, the greater the area involved, the more severe is the reaction. If only a small portion of the body is involved, e.g., an extremity, it is unlikely that changes in blood count will occur. If over a third of the body is exposed, particularly in the regions of functioning bone marrow, blood cell depression can be anticipated. Blood counts should be obtained regularly for medicolegal reasons as well as for the care of the patient.

TABLE A

## SUMMARY OF EFFECTS RESULTING FROM ACUTE WHOLE BODY EXTERNAL EXPOSURE OF RADIATION TO MAN

0-25 Rems	25-100 Rems	100-200 Rems	200-300 Rems	300-600 Rems	600 or More
No detectable clinical effects.	Slight transient reductions in lymphocytes and neutrophils.	Nausea & fatigue with possible vomiting above 125 Rems.	Nausea & vomiting on first day.	Nausea, vomiting & diarrhea in first few hours.	Nausea, vomiting, diarrhea in first few hours.
Delayed effects may occur.	Disabling sickness not common, exposed individuals should be able to proceed with usual duties.	Reduction in lymphocytes and neutrophils with delayed recovery.	Latent period up to 2 weeks or perhaps longer.	Latent period with no definite symptoms perhaps as long as 1 week.	Short latent period with no definite in some cases during first week.
	Delayed effects possible but serious effects on average individual very improbable.	Delayed effects may shorten life expectancy in the order of 1%.	Following latent period symptoms appear but are not severe: loss of appetite, general malaise, sore throat, pallor, petechiae, diarrhea and emaciation in 3rd wk.	Epilation, loss of appetite, general malaise, fever 2nd wk., followed by hemorrhage, purpura petechiae, inflammation of mouth & throat diarrhea and emaciation in 3rd wk.	Diarrhea, hemorrhage, purpura, inflammation of mouth & throat fever toward end of 1st wk.
			Recovery likely in about 3 mos. unless complicated by poor previous health, superimposed injuries or infection.	Some deaths in 2-6 wks. possible eventual death to 50% of exposed individuals for about 450 Rems.	Rapid emaciation & death as early as 2nd wk with possible eventual death up to 100% of exposed individuals.



An occasional malingerer or patient with radiation "hysteria" or "neurosis" may be encountered. Often there may be a wealth of symptoms presented, some of which may be quite bizarre and not commonly associated with exposure to radiation. Such an individual often may present a shocking history of negligence by the operator of the offending installation. Rigorous laboratory studies, as well as repeated physical examination and adequate color photographs, should be performed. Expert consultation both with qualified physicians and physicists is strongly recommended. The physician should be especially cautious if the patient refuses to cooperate in physical examination or laboratory tests. The physician should also be alerted if the patient or his attorney refuses access to pertinent medical records.

### III. RADIONUCLIDE CONTAMINATION:

The possibility that a physician may see a patient contaminated by radioactive de novo is unlikely. If such exposure has occurred, it is usually suspected either by the individual involved or by the management of the installation concerned. It is, however, possible that a contaminated individual might enter a hospital or office with such a complaint. If such a patient has had no decontamination, the procedures of Section A should be carried out at once.

More likely, the patient will have undergone some preliminary decontamination and will have changed his clothing. The physician should contact the Radiation Safety Officer of the installation in question immediately, and also the local health authorities, if necessary, to ascertain what might have happened. The physician and/or physicist in charge of local radioisotope laboratories may be of aid.



The physician will probably not possess suitable detection instruments to identify the type and amount of radioactivity. The consultants suggested above will be able to give proper help and direction.

If several days have elapsed between the alleged exposure and the patient's first visit, it then becomes necessary to collect samples of urine and stool. Swabs of the nose and ear canals should be obtained. Specimens of hair may be helpful. The physician must make suitable arrangements for radioassay of specimens since counting technique are often highly specialized.

The reporting of accidental release of radionuclides except for certain naturally occurring ones, such as radium and thorium, is strictly regulated by the state. The state authorities should be consulted for guidance and aid.

Such patients usually will not suffer from the effect of the Acute Radiation Syndrome. They might, however, have retained sufficient radionuclides to produce deleterious effects at some later date because of retention of these materials. The skin surfaces should be examined for erythems, vesiculation, pigmentation and wounds. Symptoms noted in the Acute Radiation Syndrome will most likely be due to anxiety. Periodic blood counts should be obtained for the patient's protection and for medicolegal purposes over a 4-6 week period or until the situation is clarified.

The physician should be cautious in his statements and obtain appropriate consultation in dealing with this type of accident. He should also be alerted if the patient or others associated with the problem seem to withhold pertinent information. In this latter

situation, the problem of classified information affecting national security might occasionally arise. The physician should request clarification directly from the U.S. Nuclear Regulatory Commission in this eventuality.

a. Preliminary Decontamination and First Aid:

First aid is needed if life endangering injuries (e.g., extensive burns, fractures, wounds, electric shock, etc.) have been sustained by any humans. Prompt attention to these specific needs is the first responsibility of the physician and others who attend the scene of the accident after the patients have been surveyed for contamination. If there is no possibility of radioactive contamination in the accident, no particular precautions are needed by the physician and other member of the team. If radioactive contamination is a problem, the physician should don a gown, coveralls, respirator or other suitable body cover and use rubber gloves during the time of emergency first aid.

b. Surgical Techniques - First Aid Level:

At this point the individual has been removed to the dispensary area or other temporary area so designated. He has had his clothing removed and, if physically able, has taken a shower and covered himself with radiologically non-contaminated covering. He should then be critically surveyed with a sensitive radiation detector determined by the needs of the particular accident. Depending on the type of radionuclide encountered, wounds should be sought.

The physician will have to make a rather rapid decision as to whether any of these wounds should be excised and, if so, proceed with this emergency excision immediately. It is doubtful, except under the most unusual instances, that such needs should occur outside of large U.S. Nuclear Regulatory Commission facilities or other specifically designated laboratories where such emergency plans are available.

The excision of such tissues should be guided by appropriate detection instrumentation and all excised material placed in suitably labelled and sealed test tubes for immediate assay of their radioactivity. It will probably be helpful to save for counting all sponges containing blood, some of the sponges used in washing the area, and the instruments used in this procedure so that as careful a determination as is possible can be made of the deposit of radioactivity.

c. Triage:

In situations where the radiation injury is complicated by thermal burns, fractures, etc., the usual concept of triage, as employed in military medicine or in large-scale catastrophes, must be employed. Within the first few hours of an accident it is possible that an estimate of the radiation dose received by the individual cannot be obtained. It would be important in the history to get from the worker his location at the time of the accident and some estimate of his scram time. At this point the non-radiation injury should be treated in a suitable manner.

Cleanup technique should be planned with the same care as is used in quantitative chemical analysis or in bacteriological handling of extremely virulent organisms. Fans or ventilating apparatus should not be turned on in an attempt to blow away the radionuclide or its decay products; such a maneuver will only disseminate the radioactivity throughout the area. If the nuclide is blown out of a building, air currents may carry the finely divided material into nearby windows or air intake ducts. Proper precautions taken immediately will protect human life and minimize financial losses.

#### IV. EMERGENCY CARE FOR POSSIBLE CONTAMINATED PERSONS:

- a. All suspected persons should be surveyed for radioactive contamination.
- b. If no monitoring instrument is available, all possibly exposed persons should be regarded as contaminated. Wipes from various parts of the bodies of these persons and their clothing should be made with some type of disposable tissue, filter paper or blotting paper, and the samples placed in separate labelled envelopes for future study.
- c. Contaminated clothing should be removed carefully and placed in some type of disposable container or bag. If this is not available, clothing should be put on sheets of paper to prevent contamination of floor and furniture. The clothing and paper can be monitored later to determine the possibility of contamination or the need for disposal.
- d. If necessary, contaminated persons should be taken to a shower area for bathing.

- e. Bathing should be done under showers and commercially available detergents and soaps can be used. Several separate washings should be performed. Highly alkaline soaps, abrasives, organic solvents or cleaners that tend to increase permeability of the skin should not be used. Special emphasis should be given to cleaning the fingernails, toenails, nostrils, scalp, ears and body folds.
- f. Scrub brushes should be used, but care should be taken that the skin surface do not become abraded.
- g. After the body is well washed, the person should be surveyed with a suitable monitoring instrument and additional smears taken with disposable tissues, cotton tipped applicators or filter paper. The ear canals and nostrils should be swabbed for contamination. Smear tests are especially important if alpha survey instruments are not available. Clothing known not to be contaminated should be put on.
- h. Small cuts and other breaks in the skin surface should be sought for carefully since absorption of radionuclides can occur by this route. Such lesions should be decontaminated after the above washes by repeated 5 minute scrubs after removal of scabs and crusts.
- i. Suitable syringes, curved basins and appropriate irrigating solutions should be readily available for conjunctival irrigation. The used solutions should be saved for counting, preferably in separate labelled bottles marked as to order of collection.

- j. If there is a possibility of alpha contamination, it will be necessary to use circular filter paper discs or other suitable type of filter paper in order that it can be counted in the available type alpha counter. This detail should be prepared in advance by consultation with the lab which carry out the counting of these wipes.
- k. A physician should immediately carry out the following steps:
1. Complete medical history and physical examination with special emphasis on previous occupational history and possible exposure to radiation and chest roentgenogram.
  2. Complete blood count, including hematocrit reading, and routine urinalysis.
  3. Quantitative collection of urine for the first 72 hours for assay of the radionuclide. Each day's specimens should be put in a separate container. These specimens may be collected in bottles containing 10 ml diluted nitric acid (approximately 10 ml concentrated nitric acid per liter of water) for each 24 hour specimen. An additional 10 ml concentrated nitric acid should be added to the specimens after the collection is complete. Nitric acid prevents absorption of radium on vessel walls.
  4. Feces collected for the first 72 hours for determination of radioactivity. Each day's specimen should be put in a separate container. These can be collected in round, 1 quart (1 liter) ice cream containers.



5. Breath samples for radon, if the accident involves radium.
6. Arrangement for surveys of the total body gamma radiation with a sensitive measuring device.
7. Samples of blood within 72 hours for determination of radioactivity.
8. The specimens of urine, feces and blood should be refrigerated and kept until arrangements can be made for analysis at a qualified lab. Proper collection and storage of these samples will be of great value to the contaminated person and also in obtaining further data concerning the metabolism of the nuclide involved.

#### V. CLINICAL PROCEDURES:

There is no substitute for careful daily history and physical examination. Only physicians, nurses and technicians with pertinent duties should be permitted access to such patients. The Acute Radiation Syndrome is conveniently divided into four stages as follows:

1. Initial or prodromal: 1-4 days duration
2. Latent period: 2-3 weeks
3. Manifest illness: 2-6 weeks
4. Recovery stage

The most important findings to be sought during the prodromal stage are listed in Table B. For each item, the time of onset, severity, change and duration should be charted. This list should be reviewed and observations recorded at least daily or oftener as needed. Concomitant trauma, infection or attendant anxiety may



confuse the expected clinical course.

During the latent stage, symptoms and signs will be essentially non-existent, but the patient must be seen daily to determine the onset of the stage of manifest illness.

The findings in the stage of manifest illness are tabulated in Table C. They may be altered by trauma, superimposed infection or therapy; again, at least careful daily study of the patients as described above is most important.

a. Laboratory Studies:

Because of the relative rarity, confusing symptomatology and potential seriousness of radiation injury, a great variety of laboratory tests have been utilized in patients previously studies. The recommendations in this section have been formulated with two criteria in mind:

1. That most of the tests are sufficiently routine to be performed satisfactorily in any clinical laboratory.
2. That the patient not be exsanguinated by the diagnostic and investigative zeal of attending and visiting physicians and allied scientists. Vein punctures and other procedures causing breaks in the intact skin should be kept to a minimum. Blood should be drawn only once daily according to careful plans.

The recommended diagnostic procedures for the clinical management of radiation injury are given in Table E. The tests are divided into three types: A, B and C. Type A procedures are of particular applicability in the early

diagnostic and prognostic appraisal of the patient. Type B procedures are of more help in confirming the earlier estimations of injury and in recognizing and managing the development of complication. Type C procedures are of possible, but not yet verified, value for their future use in either of the previous two categories.

Many variations in frequency of these tests may be desirable for various reasons. Because of the many tests which may seem useful, it is suggested that the routine given in Table E be followed to insure that important data are collected at regular intervals, particularly in respect to Type A procedures. A schedule for each patient should be made at least weekly for the guidance of both physicians and technicians.

Collection of body fluids other than blood is often of considerable importance although the value of such specimens is not always apparent during the early period following an accident. Urine, stool, vomitus and respiration air samples are of considerable importance in contamination accidents in helping to arrive at estimates of type of contamination and level of body burden. Even when radiation is only of the external type, such specimens are often of value, particularly if there is a neutron component. Immediate provisions for specimen collection should be instituted. Urine can be collected in  $\frac{1}{2}$  or 1 gallon jugs.

Vomitus and stool are conveniently collected in 1 pint or 1 quart ice cream containers. Each container should be immediately

labelled with the patient's name, time, date and type of specimen. Detailed instruction for collection of such specimens and their proper preservation are below:

1. Urine:

Some radionuclides occur as complexes in urine and there is need to insure that a chemical analytical method completely release the radionuclide from the complexes. Checking the method of assay with the chemical form of the metabolized radionuclide is essential. Because of the tendency of some radionuclides to be absorbed on sample vessel walls, the need for prior addition of a non-radioactive carrier (if desirable) or the need for acidification of samples containing these nuclides must be considered. Also there may be a variation in the excretion rate during any 24 hour period. Care in sampling and subsequent correlation of excreta data with time are essential.

If the metabolic scheme is well known, a pooled 24 hour collection is often adequate. Another technique of value is to collect the urine in individual containers at the time of spot voiding, marking the time and date on each individual bottle. For long term studies it is often tedious to collect 24 hour urine specimens over a period of many days or weeks. Several useful techniques are as follows:

- a. Collection of the specimens from  $\frac{1}{2}$  hour before bed time until  $\frac{1}{2}$  hour after arising in the morning for

2 successive days with pooling of these samples.

- b. Collection of a morning specimen.
- c. Collection of a specimen over the weekend. Various times can be chosen for this technique. Scheduling has the advantage of minimizing external contamination of clothing, skin and hair from a work area.

Particularly in the event of an accident with external contamination, great care should be taken that all contaminated clothing is removed and that the body, especially the hands and genitals, are washed carefully to remove all external contamination.

Plastic bottles are unbreakable and withstand handling much better than glass. They have less tendency to absorb traces of the elements sought in analysis and any absorbed material is readily removed with a single acid wash. Polystyrene and polyethylene are suitable plastics. If the time between sampling and analysis is greater than a few hours, a preservative should be added to prevent losses due to the sample becoming alkaline on standing. The addition of 1% by volume of hydrochloric or nitric acid is adequate for storing samples up to one month. If such addition is undesirable because it interferes with the analysis, the sample should be refrigerated or frozen. Characteristics which may change with time, such as pH or specific gravity, must be measured at the time of sampling if they are needed.

If large quantities of plastic containers are not immediately available at the time of an emergency, glass containers and paper cartons may be utilized initially for the collection of urine and feces. More refined methods for storage of specimens can be used when the situation is under more adequate control and specimens can be transferred.

## 2. Feces:

The feces, although sometimes of less importance than the urine, may be of definite value in estimating the body burden. Often insoluble compounds of various radionuclides are ingested and pass through the gastroenteric tract without absorption. Inhaled insoluble particulates may be coughed up and swallowed. Some radionuclides are excreted into the gastroenteric tract through saliva, bile and intestinal juices.

Feces are conveniently collected in 1 pint ice cream containers. If there is need for long term storage without refrigeration, a sheet of plastic may be placed over the container opening before putting on the lid. All such containers must be labelled with the patient's name, date and time of sample collection.

A second method of collecting feces is in large polyethylene bags taped to a standard toilet seat. The bag is closed with tape or a rubber band for removal to the

lab. It is desirable to collect urine and feces separately and the patient should be so instructed.

3. Blood:

Blood is occasionally of value in estimating internal contamination with radionuclides. In general, studies of urine and feces are of greater importance. One should use discretion in removing large amounts of blood from a patient until the external radiation dose has been determined to be minimal. In general an amount of 10 ml of blood is adequate for determination of radionuclides if they are present in a significant quantity.

4. Breath:

Measurement of breath is of value in radium accidents provided the radium is in the form of the chloride or bromide. If the radium is incorporated into body as the sulphate, no significant radon is released from the crystal matrix of this insoluble compound. Radium sulphate is the commonest form of radium used for medical applicators and industrial radium sources.

TABLE E  
SYMPTOMS AND SIGNS FOUND IN PRODROMAL STAGE OF  
ACUTE RADIATION SYNDROME

Anorexia	Prostration
Nausea	Diarrhea
Vomiting	Abdominal Pain
Weakness & Fatigue	
Conjunctivitis	Sweating
Erythema	Oliguria
Fever	
Hypersensitivity	Paresthesia
Ataxia	Coma
Disorientation	Death
Shock	



TABLE C  
SYMPTOMS AND SIGNS FOUND IN MANIFEST ILLNESS STAGE OF  
ACUTE RADIATION SYNDROME

Anorexia	Sweating
Nausea	Oliguria
Vomiting	Weakness & Fatigue
Diarrhea	Prostration
Abdominal Pain	Weight Loss
Abdominal Distention	Hyperesthesia
Conjunctivitis	Paresthesia
Erythema	Ataxia
Jaundice	Disorientation
Fever	Shock
Infection	Epilation
Purpura	Coma
Hemorrhage	Death
Scalp Pain	

TABLE D  
CLINICAL RADIATION INJURY GROUPS

GROUP NO.	CLINICAL MANIFESTATIONS	DOSE CLASSIFICATION BY -	
		THOMA & WALD*	GERSTNER**
I	Mostly asymptomatic. Occasional minimal prodromal symptoms.	10-100 rad -----	51-100 r 101-150r
II	Mild form of Acute Radiation Syndrome. Transient prodromal nausea and vomiting. Mild laboratory and clinical evidence of hematopoietic derangement.	200-400 rad -----	150-400r Hematopoietic
III	A serious course. Hematopoietic complications severe, and some evidence of gastroenteric damage present in upper portion of group.	400-600 rad ----- (297+)	401-600r Hematopoietic
IV	An accelerated version of Acute Radiation Syndrome. Gastroenteric complications dominate clinical picture. Severity of hematopoietic complications is related to survival time after exposure.	600-1400 rad	Gastrointestine
V	A fulminating course with marked central nervous system impairment.	10,000 rad ±	Cerebral

\*Doses in rad according to approximate ranges of table III of Thoma & Wald (1)

\*\*Approximate doses in r from table III and section of Dependency of Acute Radiation Syndrome on Air Dose of Gerstner's (2). These doses are expressed as air dose, i.e., exposure dose and are thus in terms of roentgens.

APPENDIX I

NUCLEAR MEDICINE PREMEDICATION INSTRUCTIONS

Attention Dr.: \_\_\_\_\_ Ward: \_\_\_\_\_

Preparations are being made to administer radioactive material to  
Patient \_\_\_\_\_ on \_\_\_\_\_  
to perform \_\_\_\_\_ as requested by you.

Before the radioactive material can be given to this patient, it is necessary  
to block his thyroid uptake of iodine by administering Lugol's solution  
several days prior to and after the procedure.

To insure minimum radiation exposure to the patient's thyroid gland,  
it is requested that the patient's doctor sign this form verifying admini-  
stration of the Lugol's solution.

DOCTOR'S SIGNATURE: \_\_\_\_\_

DATE ADMINISTERED: \_\_\_\_\_

Note: This form is to be returned to the Nuclear Medicine Service  
Laboratory before dose can be administered.

## APPENDIX J

### INSTRUCTIONS TO CHILDBEARING FEMALE EMPLOYEES

All female employees of this hospital of childbearing age who work with any form of ionizing radiation, x-ray or radionuclides, shall be informed by their supervisors of the risks to which they may be exposing their unborn children should they be exposed to radiation. The International Commission on Radiological Protection (ICRP) recommends that the embryo's exposure should not exceed 1 REM and the National Council on Radiation Protection and Measurements (NCRP) recommends that the embryo's exposure should not exceed 0.5 REM during the entire gestation period. There is reason to believe that greater exposures increases the risks of a child developing leukemia before the age of 10. It is recommended that a female employee whose normal work routinely exposes her to some ionizing radiation notify her supervisor without delay if she should become pregnant so that steps may be taken to reduce her radiation exposure to safer limits for her child's sake.

Every female employee of childbearing age will be asked to sign a statement (Appendix K) that she has been informed of the risks to her unborn child due to prenatal radiation exposure and given a copy of these instructions.

APPENDIX K

FEMALE EMPLOYEES OF CHILDBEARING AGE ACKNOWLEDGEMENT

DATE: \_\_\_\_\_

This is to acknowledge that I have been informed and understand the risks to which prenatal ionizing radiation may subject a fetus. I have also received a copy of Instructions to Childbearing Female Employees.

\_\_\_\_\_  
SIGNATURE

APPENDIX L

Form I

RADIOISOTOPE & RADIATION SAFETY COMMITTEE

REQUEST FOR RADIOACTIVE MATERIAL

DEPARTMENT: \_\_\_\_\_ INDIVIDUAL: \_\_\_\_\_

1 . Radioisotope: Element \_\_\_\_\_ Mass Number \_\_\_\_\_

2 . Chemical Form: \_\_\_\_\_ and/or Physical Form: \_\_\_\_\_

3 . Maximum Activity Desired: \_\_\_\_\_

4 . Supplier: \_\_\_\_\_ Catalog # \_\_\_\_\_ Price: \_\_\_\_\_

5 . Calibrated (Yes or No): \_\_\_\_\_ Sterile: \_\_\_\_\_

6 . Method of Handling Isotope: \_\_\_\_\_  
\_\_\_\_\_

7 . Method of Storing Isotope: \_\_\_\_\_

8 . Where Stored (Room No. of appropriate location): \_\_\_\_\_

9 . Method of Monitoring Isotope: \_\_\_\_\_

10. Method of Disposal of Isotope: \_\_\_\_\_

11. Instrumentation Available: \_\_\_\_\_

12. Animal Population Studies: \_\_\_\_\_

13. Is Radioisotope Requested for a Routine Procedure in Humans?

(Yes or No): \_\_\_\_\_

If yes answer 14-15; if no complete Form II.

14. Treatment, purpose or diagnosed disease: \_\_\_\_\_  
\_\_\_\_\_

15. Chemical Form Administered: \_\_\_\_\_

FOR COMMITTEE USE:

16. Comments: \_\_\_\_\_

17. Committee Approval On: \_\_\_\_\_

18. Radiation Safety Officer Approval On: \_\_\_\_\_

BRIEF SUMMARY OF PROTOCOL:



APPENDIX L

Form II

RADIOISOTOPE & RADIATION SAFETY COMMITTEE

EXPERIMENTAL OR NON-ROUTINE USE

OF RADIOACTIVE MATERIAL IN HUMANS

DEPARTMENT: \_\_\_\_\_ INDIVIDUAL: \_\_\_\_\_

1. Title of Study: \_\_\_\_\_  
\_\_\_\_\_

2. Brief Statement of Proposed Plan: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

3. Rationale and justification for the study, including information  
available from other laboratories and/or in lower animals or in  
vitro systems: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

4. Complimentary drugs or radioactive material will be used in the study.  
(Yes or No): \_\_\_\_\_ Source: \_\_\_\_\_

5. Number and type of subjects to be studied:

a. Persons without manifest disease (number, method of selection,  
age range): \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

b. Persons with manifest disease (number, nature of pathology, method of selection, age range): \_\_\_\_\_

c. Pregnant women shall ordinarily be excluded from any test not involving the condition of pregnancy itself. Specify whether or not pregnant women will be tested and, if so, explain why:

6. Dose, route and rate of administration, specific activity and chemical form of radionuclide: \_\_\_\_\_

7. Calculations of expected radiation dose to critical organs or parts of organs and the whole body: \_\_\_\_\_

8. Method of handling any special problems such as disposal of excreta, hospitalization, radionuclide contamination, spillage, monitoring, etc.: \_\_\_\_\_

9. Instrumentation available for making measurements: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
10. List of personnel (with titles) assisting the investigator:  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
11. Complete Form III (FD Form 1573, "Statement of Investigator"):  
This form is a record of the training and experience of the investigator and assisting personnel which pertains to the use of radioactive materials. Specify that training which was (1) basic (pre-clinical) training in the facts of radioactivity and the techniques of using radioactive isotopes and (2) general clinical training in uses the same as, or closely related to, the uses proposed by the applicant. In listing experience with this or equivalent radioisotope applications, indicate the number of such procedures performed and the number of patients studied or treated. Dates, institutions, and preceptors should be given, where appropriate. If these data are more conveniently supplied by preceptorial statements or certificates, copies may be attached. Include, also, any current or previous radioisotope licenses or authorizations. This information need be filled only once and will be consulted by the Committee in evaluating subsequent applications.
12. A statement must be given the subjects or responsible relatives which indicates that they are well-informed of the nature and purpose of the study. Enclose a sample consent form: \_\_\_\_\_  
\_\_\_\_\_

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE  
PUBLIC HEALTH SERVICE  
FOOD AND DRUG ADMINISTRATION  
5600 FISHERS LANE  
ROCKVILLE, MARYLAND 20852

## STATEMENT OF INVESTIGATOR

Form Approved  
OMB No. 57-R0029

TO: SUPPLIER OF DRUG (Name and address, include Zip Code)

NAME OF INVESTIGATOR (Print or Type)

DATE

NAME OF DRUG

Dear Sir:

The undersigned, \_\_\_\_\_, submits this statement as required by section 505(i) of the Federal Food, Drug, and Cosmetic Act and §130.3 of Title 21 of the Code of Federal Regulations as a condition for receiving and conducting clinical investigations with a new drug limited by Federal (or United States) law to investigational use.

1. STATEMENT OF EDUCATION AND EXPERIENCE

a. COLLEGES, UNIVERSITIES, AND MEDICAL OR OTHER PROFESSIONAL SCHOOLS ATTENDED, WITH DATES OF ATTENDANCE, DEGREES, AND DATES DEGREES WERE AWARDED

b. POSTGRADUATE MEDICAL OR OTHER PROFESSIONAL TRAINING (Indicate dates, names of institutions, and nature of training)

c. TEACHING OR RESEARCH EXPERIENCE (Indicate dates, institutions, and brief description of experience)

d. EXPERIENCE IN MEDICAL PRACTICE OR OTHER PROFESSIONAL EXPERIENCE (Indicate dates, institutional affiliations, nature of practice, or other professional experience)

e. REPRESENTATIVE LIST OF PERTINENT MEDICAL OR OTHER SCIENTIFIC PUBLICATIONS (Indicate titles of articles, names of publications and volume, page number, and date)

2a. If the investigation is to be conducted on institutionalized subjects or is conducted by an individual affiliated with an institution which agrees to assume responsibility for the study, assurance must be given that an institutional review committee is responsible for initial and continuing review and approval of the proposed clinical study. The membership must be comprised of sufficient members of varying background, that is, lawyers, clergymen, or laymen as well as scientists, to assure complete and adequate review of the research project. The membership must possess not only broad competence to comprehend the nature of the project, but also other competencies necessary to judge the acceptability of the project or activity in terms of institutional regulations, relevant law, standards of professional practice and community acceptance. Assurance must be presented that the investigator has not participated in the selection of committee members; that the review committee does not allow participation in its review and conclusions by any individual involved in the conduct of the research activity under review (except to provide information to the committee) that the investigator will report to the committee for review any emergent problems, serious adverse reactions, or proposed procedural changes which may affect the status of the investigation and that no such change will be made without committee approval except where necessary to eliminate apparent immediate hazards; that reviews of the study will be conducted by the review committee at intervals appropriate to the degree of risk, but not exceeding 1 year, to assure that the research project is being conducted in compliance with the committee's understanding and recommendation; that the review committee is provided all the information on the research project necessary for its complete review of the project; and that the review committee maintains adequate documentation of its activities and develops adequate procedures for reporting its findings to the institution. The documents maintained by the committee are to include the names and qualifications of committee members, records of information provided to subjects in ob-

taining informed consent, committee discussion on substantive issues and their resolution, committee recommendations, and dated reports of successive reviews as they are performed. Copies of all documents are to be retained for a period of 3 years past the completion or discontinuance of the study and are to be made available upon request to duly authorized representatives of the Food and Drug Administration. (Favorable recommendations by the committee are subject to further appropriate review and rejection by institution officials. Unfavorable recommendations, restrictions, or conditions may not be overruled by the institution officials.) Procedures for the organization and operation of institutional review committees are contained in guidelines issued pursuant to Chapter 1-40 of the Grants Administration Manual of the U.S. Department of Health, Education, and Welfare, available from the U.S. Government Printing Office. It is recommended that these guidelines be followed in establishing institutional review committees and that the committees function according to the procedures described therein. A signing of the Form FD-1573 will be regarded as providing the above necessary assurances; however, if the institution has on file with the Department of Health, Education, and Welfare, Division of Research Grants, National Institutes of Health, an "accepted general assurance," and the same committee is to review the proposed study using the same procedures, this is acceptable in lieu of the above assurances and a statement to this effect should be provided with the signed FD-1573. (In addition to sponsor's continuing responsibility to monitor the study, the Food and Drug Administration will undertake investigations in institutions periodically to determine whether the committees are operating in accord with the assurances given by the sponsor.)

b. A description of any clinical laboratory facilities that will be used. (If this information has been submitted to the sponsor and reported by him on Form FD-1571, reference to the previous submission will be adequate.)

3. OUTLINE THE PLAN OF INVESTIGATION (Include approximation of the number of subjects to be treated with the drug and the number to be employed as controls, if any; clinical uses to be investigated; characteristics of subjects by age, sex and condition; the kind of clinical observations and laboratory tests to be undertaken prior to, during, and after administration of the drug; the estimated duration of the investigation, and a description or copies of report forms to be used to maintain an accurate record of the observations and tests results obtained. This plan may include reasonable alternates and variations and should be supplemented or amended when any significant change in direction or scope of the investigation is undertaken.)

4. THE UNDERSIGNED UNDERSTANDS THAT THE FOLLOWING CONDITIONS, GENERALLY APPLICABLE TO NEW DRUGS FOR INVESTIGATIONAL USE, GOVERN HIS RECEIPT AND USE OF THIS INVESTIGATIONAL DRUG

- a. The sponsor is required to supply the investigator with full information concerning the preclinical investigations that justify clinical trials, together with fully informative material describing any prior investigations and experience and any possible hazards, contraindications, side-effects, and precautions to be taken into account in the course of the investigation.
- b. The investigator is required to maintain adequate records of the disposition of all receipts of the drug, including dates, quantities, and use by subjects, and if the investigation is terminated to return to the sponsor any unused supply of the drug.
- c. The investigator is required to prepare and maintain adequate and accurate case histories designed to record all observations and other data pertinent to the investigation on each individual treated with the drug or employed as a control in the investigation.
- d. The investigator is required to furnish his reports to the sponsor of the drug who is responsible for collecting and evaluating the results obtained by various investigators. The sponsor is required to present progress reports to the Food and Drug Administration at appropriate intervals not exceeding 1 year. Any adverse effect that may reasonably be regarded as caused by, or probably caused by, the new drug shall be reported to the sponsor promptly, and if the adverse effect is alarming, it shall be reported immediately. An adequate report of the investigation should be furnished to the sponsor shortly after completion of the investigation.
- e. The investigator shall maintain the records of disposition of the drug and the case histories described above for a period of 2 years following the date a new drug application is approved for the drug; or if the application is not approved, until 2 years after the investigation

is discontinued. Upon the request of a scientifically trained and properly authorized employee of the Department, at reasonable times, the investigator will make such records available for inspection and copying. The subjects' names need not be divulged unless the records of particular individuals require a more detailed study of the cases, or unless there is reason to believe that the records do not represent actual cases studied, or do not represent actual results obtained.

- f. The investigator certifies that the drug will be administered only to subjects under his personal supervision or under the supervision of the following investigators responsible to him:

\_\_\_\_\_  
\_\_\_\_\_  
and that the drug will not be supplied to any other investigator or to any clinic for administration to subjects.

- g. The investigator certifies that he will inform any subjects, including subjects used as controls, or their representatives, that drugs are being used for investigational purposes, and will obtain the consent of the subjects, or their representatives, except where this is not feasible or, in the investigator's professional judgment, is contrary to the best interests of the subjects.
- h. The investigator is required to assure the sponsor that for investigations involving institutionalized subjects, the studies will not be initiated until the institutional review committee has reviewed and approved the study. (The organization and procedure requirements for such a committee should be explained to the investigator by the sponsor as set forth in form FD 1571, Division 10, unit c.)

Very truly yours,

\_\_\_\_\_  
(Name of Investigator)

\_\_\_\_\_  
(Address)

(This form should be supplemented or amended from time to time if new subjects are added or if significant changes are made in the plan of investigation.)

APPENDIX L

Form IV

Investigation # \_\_\_\_\_, conducted by the undersigned principle investigator does\*, does not, require the use of radionuclides in the animal house facility of this Medical Center.

---

PRINCIPLE INVESTIGATOR & DATE

\*This investigation is approved by the Radioisotopes and Radiation Safety Committee, Associate Chief of Staff (Research) and Research and Development Committee

---

OLGA A. CORREA, M. D., Chairman  
Radioisotopes & Radiation Safety  
Committee

---

ROBERT DIXON MC AFEE, Ph.D.  
Radiation Safety Officer

---

ROBERT E. BURCH, M. D.  
Associate Chief of Staff/Research

---

CHAIRMAN  
Research & Development Committee



APPENDIX M

NUCLEAR MEDICINE SERVICE  
RECEIPT OF RADIOPHARMACEUTICAL  
(RADIOPHARMACY)  
AND  
RADIONUCLIDE LOG & DISPOSAL

RADIONUCLIDE \_\_\_\_\_ UNIT DOSE \_\_\_\_\_  
NO. OF DOSES \_\_\_\_\_ DATE \_\_\_\_\_  
TECHNOLOGIST \_\_\_\_\_

RADIONUCLIDE LOG & DISPOSAL

VIAL# \_\_\_\_\_ RADIONUCLIDE \_\_\_\_\_  
DATE RCVD OR PREPARED \_\_\_\_\_  
TIME \_\_\_\_\_  
DECAY - STORAGE AREA: DATE \_\_\_\_\_ ACTIVITY \_\_\_\_\_  
DISPOSAL: DATE \_\_\_\_\_ ACTIVITY \_\_\_\_\_  
DISCARDED: SEWERAGE \_\_\_\_\_ TRASH \_\_\_\_\_

## APPENDIX N

### INSTRUCTIONS REGARDING CADAVERS

Cadavers containing radioisotopes administered shortly before death may present a radiation hazard to the pathologist and the undertaker. Most often, enough time will have elapsed between administration of the dose and death to assure reduction of the radioisotope content to relatively innocuous levels. In general, no autopsy should be commenced on a body containing appreciably more than 5 millicuries of any radioactive isotope without obtaining the advice of the Radiation Safety Officer. When such an autopsy is to be performed, the permissible time for the pathologist to use his hands in the contaminated cavity depends on the isotope, the number of millicuries remaining and the type of gloves worn. Table 1 and 2 give detailed data on the number of minutes exposure for 1.5 rads for various amounts of several isotopes.

Table 1<sup>c</sup>: Radiation Dose in Rads Per Millicurie Per Hour to Hands in Peritoneal Cavity

Isotope	No Gloves	Single Surgical Gloves	Double Autopsy Gloves
	<u>Rads/mCi/hr</u>	<u>Rads/mCi/hr</u>	<u>Rads/mCi/hr</u>
a. Au-198	0.7	0.4	0.1
b. P-32	0.8	0.5	0.3

- a. The Au-198 values include a factor for the gamma rays.
- b. The same values are given for P-32 and for Y-90. These values would also be good for any other beta-gamma emitter whose radiation energies were 1.5 MeV or greater. For beta radiation of less than these, doses will be markedly less, especially when gloves are used.
- c. Reprinted from NBS Handbook 65, "Safe Handling of Bodies Containing Radioisotopes (A Guide for Surgeons, Pathologists and Funeral Directors)", May, 1968.

Table 2<sup>c</sup>: Approximate Time<sup>a</sup> for Hands in Peritoneal Cavity to  
Receive 1.5 Rads<sup>b</sup>

Total Activity on Surface	Au-198		P-32 or Y-90	
	Single Surgical Gloves	Double Autopsy Gloves	Single Surgical Gloves	Double Autopsy Gloves
	<u>min</u>	<u>min</u>	<u>min</u>	<u>min</u>
10	21	64	17	27
20	11	32	8	17
30	7	21	6	11
40	5	16	4	8
50	4	13	3	6
60	4	11	3	5
70	3	9	2	5
80	3	8	2	4
90	2	7	2	4
100	2	6	2	3

- Times in this table are given to the nearest minute.
- Twenty-five Rads is permissible if the procedure is not expected to occur oftener than once in any 13 consecutive weeks, and no other exposure is to be received in this period.
- Reprinted from NBS Handbook 65, Safe Handling of Bodies Containing Radioactive Isotopes (A Guide for Surgeons, Pathologists, and Funeral Directors)", May, 1958.

## APPENDIX N

### AUTOPSY PRECAUTIONS

Following are the main precautions required for autopsies on bodies containing large doses of radioisotopes.

#### 1. General:

- a. Surgical or heavier rubber gloves must always be worn to prevent contamination of skin and nails with material difficult to remove.
- b. If the combined beta and gamma dose rate is high enough to deliver more than the permissible dose to hands or whole body, the autopsy should be performed by a team of pathologists, working in relay.
- c. Tissue and organs removed should be handled with long handled forceps and scissors. Specimens should be refrigerated in jars or other containers, or fixed, and suitably labelled to indicate when they can safely be worked on and studied.

#### 2. Special Precautions for Au-198, Intracavitary:

- a. Cavity fluid should be removed by suction, and stored or disposed of under the supervision of the Radiation Safety Officer.
- b. The abdominal cavity and abdominal organs should be surveyed by a protection officer to determine the permissible working time in the cavity and the precautions needed in dissecting organs.
- c. Tissue specimens held 3 weeks can be considered inactive.

3. Special Precautions for I-131:

- a. All tissues and body fluids should be surveyed by the Radiation Safety Officer and handled according to his recommendations. Urine and blood should be removed and handled in the same way as cavitory fluid containing Au-198.
- b. Tissue specimens held 2 months can be considered inactive.

4. Special Precautions for P-32, Intracavitary:

- a. The abdominal cavity should be surveyed by the Radiation Safety Officer, as should the abdominal organs as they are removed.
- b. Since the half-life of P-32 (14.3 days) is much longer than that of Au-198 (2.7 days), or of I-131 (8 days) nearly 4 months must elapse before the activity will have fallen to less than 0.4% of its initial value. In these cases, it is desirable to remove small specimens for study. Such specimens should be reviewed by the Radiation Safety Officer who should describe limits in working time and special handling techniques required.

# APPENDIX N

## PROBABLE RADIOACTIVE CONTENT OF BODY AT VARIOUS TIMES AFTER VARIOUS DOSES

The pathologist can determine from Table 3<sup>a</sup> whether to begin the autopsy or to obtain counsel from the Radiation Safety Officer.

Table 3<sup>a</sup>:

A guide for consideration before autopsy or surgery. For values below heavy lines, no precautions are necessary, except wearing surgical rubber gloves. For values above lines, consultation with the Radiation Safety Officer is indicated.

Millicuries Administered	Days elapsed since administration											
	1	2	3	4	6	8	10	15	20	25	30	
Au-198 or Y-90	Millicuries of isotope remaining in injected cavity or injected tissues, assuming no physiological elimination.											
150	115	90	69	52	32	20	12	3				
125	96	75	58	44	27	16	10	3				
100	77	60	46	35	21	13	8	2				
75	58	45	35	26	16	10	6	2				
50	38	30	23	18	11	7	4	1				
40	31	24	18	14	9	5	3	1				
30	23	18	14	10	6	4	2	1				
20	16	12	9	7	5	3	2	1				
I-131	Millicuries of isotope remaining in functioning thyroid tissue or metastases following administration for thyroid ablation or cancer treatment. Assumed 50% uptake and 6 day effective half-life. (These doses are maximal; usually residuals will be smaller).											
200	89	78	71	63	50	40	32	18	10	6	3	
150	67	58	53	47	38	30	24	14	8	5	3	
125	56	49	44	39	31	25	20	11	6	3	2	
100	45	39	36	32	25	20	16	9	5	3	2	
80	36	31	28	25	20	16	13	7	4	2	1	
60	27	23	21	19	15	12	10	5	3	2	1	
50	22	20	18	16	13	10	8	4	2	1		
40	18	16		13	10	8	6	3	2			
30	13	12	11	9	8	6	5	3	2			
20	9	8	7	6	5	4	3	2	1			
10	5	4	4	3	3	2	2	1	1			

Table 3<sup>a</sup>:

Millicuries Administered	Days elapsed since administration											
	1	2	3	4	6	8	10	15	20	25	30	
P-32	Millicuries of isotope remaining in injected cavity or injected tissues, assuming no physiological elimination.											
30	29	27	26	25	22	20	18	15	11	10	7	
25	24	23	22	21	19	17	15	12	9	8	6	
20	19	18	17	16	15	14	12	10	8	7	5	
16	15	15	14	13	12	11	10	8	6	5	4	
12	11	11	10	10	9	8	7	6	5	4	3	
10	10	9	9	8	7	7	6	5	4	3	2	
8	8	7	7	7	6	5	5	4	3	3	2	
6	6	5	5	5	4	4	4	3	2	2	1	
4	4	4	3	3	3	3	2	2	2	1	1	

<sup>a</sup> Reprinted From NBS Handbook 65, "Safe Handling of Bodies Containing Radioactive Isotopes (A Guide for Surgeons, Pathologists and Funeral Directors)", dated May, 1958.



APPENDIX N

INSTRUCTIONS FOR MORTICIANS & FUNERAL DIRECTORS  
FOR EMBALMING OF BODY CONTAINING RADIOACTIVE MATERIAL

Name of Patient: \_\_\_\_\_

Date of Death: \_\_\_\_\_ Isotope Used: \_\_\_\_\_

Half-Life: \_\_\_\_\_ Radiation \_\_\_\_\_ Chemical Form: \_\_\_\_\_

Estimated Amount Remaining in Body at Time of Death: \_\_\_\_\_

Critical Organs or Sites: \_\_\_\_\_

This is to certify that the remains of \_\_\_\_\_ have

been examined on \_\_\_\_\_ by \_\_\_\_\_  
(Deputy) Radiation Safety Officer

Radiation levels at \_\_\_\_\_ (in. cm) from the surface of the body  
as determined by a calibrated survey meter is \_\_\_\_\_ mR/hr. If  
the body is embalmed by a standard injection procedure the above rate  
will not permit any hazard if not more than \_\_\_\_\_ hours per week are  
spent in embalming such bodies.

Rubber gloves must be worn during embalming. Further precautions are  
as checked or listed:

1. Do not use a trocar in abdomen and thorax.
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_
6. \_\_\_\_\_

\_\_\_\_\_  
(Deputy) Radiation Safety Officer  
Nuclear Medicine Service

This entire problem is discussed in Handbook 65, "Safe Handling of Bodies  
Containing Radioactive Isotopes", U. S. Department of Commerce, National  
Bureau of Standards. For sale by the Superintendent of Documents,  
Washington, D. C.

APPENDIX C

RADIOACTIVITY PRECAUTIONS TAG

NEW ORLEANS VA HOSPITAL

RADIOACTIVITY



P R E C A U T I O N S

RADIONUCLIDE \_\_\_\_\_

mCi \_\_\_\_\_ DATE \_\_\_\_\_

See Nursing Station For  
Instructions.

Tag is not to be removed until:

1. Radioactive material is removed  
from patient, or
2. Authorization is received from the  
Radiation Safety Officer.

SIGNATURE: \_\_\_\_\_  
Radiation Safety Officer

The above tag should be placed on the foot  
of the patient's bed or attached to the door of  
his room.



RADIOACTIVITY PRECAUTIONS

This tag may be placed in a wristband on  
patient.

APPENDIX O

INSERT FOR PATIENT'S CHART

NEW ORLEANS VA HOSPITAL

PATIENT'S NAME: \_\_\_\_\_

WARD: \_\_\_\_\_

CAUTION



PATIENT CONTAINS RADIOACTIVE MATERIAL

DO NOT REMOVE THIS LABEL UNTIL:

1. Radioactive material is removed from patient, or
2. Removal is authorized by the Radiation Safety Officer (Ext. \_\_\_\_\_)

VISITORS MUST CHECK WITH NURSING STATION  
BEFORE GOING TO PATIENT

DATE: \_\_\_\_\_

SIGNATURE: \_\_\_\_\_  
Radiation Safety Officer

This should be on an instruction sheet to be inserted into patient's chart. A simpler label or warning sticker may be used on the cover of the chart which reads, "Caution Radioactive Material", as follows:

CAUTION  
RADIOACTIVE  
MATERIAL



APPENDIX O

INSERT FOR PATIENT'S CHART  
FOR TEMPORARY IMPLANT

NEW ORLEANS VA HOSPITAL

PATIENT: \_\_\_\_\_

WARD: \_\_\_\_\_

C A U T I O N

RADIOACTIVE MATERIAL



TEMPORARY IMPLANT

RADIONUCLIDE: \_\_\_\_\_

mCi: \_\_\_\_\_ DATE INSERTED: \_\_\_\_\_

INITIAL EXPOSURE RATE @ 1 METER: \_\_\_\_\_ mR/hr

\_\_\_\_\_  
(Signature)

TO BE REMOVED (DATE): \_\_\_\_\_

INSTRUCTIONS:

Patient must remain in hospital until implant is removed. When implant is removed, "Radioactivity Precautions Tags" may also be removed.

For further information call Radiation Safety Officer (Ext. \_\_\_\_\_). In case of emergency, the telephone operator has a call list for use when the Radiation Safety Office is not open.

DATE: \_\_\_\_\_

SIGNATURE: \_\_\_\_\_  
Radiation Safety Officer

This should be on an instruction sheet to be inserted into patient's chart. A simpler warning sticker may be used on the cover of the chart which reads, "Caution Radioactive Material".

APPENDIX O

INSERT FOR PATIENT'S CHART  
FOR PERMANENT IMPLANT OR INTERNAL DOSE

NEW ORLEANS VA HOSPITAL

PATIENT: \_\_\_\_\_

WARD: \_\_\_\_\_

C A U T I O N

RADIOACTIVE MATERIAL



PERMANENT IMPLANT OR INTERNAL DOSE

RADIONUCLIDE: \_\_\_\_\_

mCi: \_\_\_\_\_ DATE ADMINISTERED: \_\_\_\_\_

INITIAL EXPOSURE RATE @ 1 METER: \_\_\_\_\_ mR/hr

SIGNATURE: \_\_\_\_\_

INSTRUCTIONS:

Patient must remain in hospital until  
(Date): \_\_\_\_\_

"Radioactivity Precautions Tags may be re-  
moved (Date): \_\_\_\_\_

The Radiation Safety Officer (Ext. \_\_\_\_\_)  
must be notified before discharge or removal  
of patient.

For further information call the Radiation  
Safety Officer. In case of an emergency, the  
telephone operator has a call list for use when  
the Radiation Safety Office is not open.

DATE: \_\_\_\_\_

SIGNATURE: \_\_\_\_\_

Radiation Safety Officer

This should be on an instruction sheet to be  
inserted into patient's chart. A simpler warn-  
ing sticker may be used on the cover of the chart  
which reads, "Caution Radioactive Material".

APPENDIX P  
DISPOSAL CALCULATIONS

To calculate the maximum daily disposal limits of radionuclides into a sanitary sewer system and still comply with the Nuclear Regulatory Commission regulations concerning this matter, one must first determine the average daily sewerage disposal from this location. It has been determined that the average daily water consumption at this hospital is  $3.48 \times 10^3$  ml per day and this quantity is also equal to the average daily sewerage disposal. If this daily volume is multiplied by the figures listed in Appendix B, Table I, Column 2 of Part 20, Standards for Protection Against Radiation, the maximum daily permissible quantity of each radioisotope which can be disposed of in the sewerage can be calculated. These figures must be modified when the disposal of a combination of radioisotopes is being considered as we are in this case, and we must also restrict the total disposal to less than 1 curie per year. To meet all of these requirements, the daily disposal rate will be limited to those quantities listed in Column 4 in the following table. Individual investigators will be further restricted in their daily disposal limits so that the sum of the ratios of the proposed quantities of each radioisotope disposed to the maximum quantity permitted will be less than 1 (in our case, less than 0.5). To control the maximum total amount of activity which will be disposed in one year, investigators will be further restricted in the total quantity of radionuclides which they may purchase in any one month.

Table of disposal calculations follows:

TABLE OF DISPOSAL CALCULATIONS

<u>Radioisotope</u>	<u>Maximum Concentration in Sewer Effluent uCi/ml</u>	<u>Maximum Single Radionuclide Daily Disposal mCi</u>	<u>Maximum Daily Disposal at This Hospital uCi</u>
Au-198	$2 \times 10^{-3}$	1,700	25
C-14	$2 \times 10^{-2}$	17,000	1,000
Cl-36	$2 \times 10^{-3}$	1,700	50
Co-57	$2 \times 10^{-2}$	17,000	50
Co-60	$1 \times 10^{-3}$	850	50
Cr-51	$5 \times 10^{-2}$	42,000	50
Fe-59	$2 \times 10^{-3}$	1,700	10
H-3	$1 \times 10^{-1}$	85,000	1,000
Hg-197	$9 \times 10^{-3}$	7,600	50
Hg-203	$5 \times 10^{-4}$	420	100
I-125	$4 \times 10^{-5}$	34	15,000
I-131	$6 \times 10^{-5}$	51	200
K-42	$9 \times 10^{-3}$	7,600	50
Na-22	$1 \times 10^{-3}$	850	50
Na-24	$6 \times 10^{-3}$	5,110	10
P-32	$5 \times 10^{-4}$	420	50
S-35	$2 \times 10^{-3}$	1,700	50
Se-75	$9 \times 10^{-3}$	7,600	50
Sr-85	$3 \times 10^{-3}$	2,500	100
Tc99m	$2 \times 10^{-1}$	170,000	50



## APPENDIX Q

### GUIDELINES FOR MAXIMUM PERMISSIBLE DOSES FOR MONITORED PERSONNEL

Organ	Year	Dose in mRem		
		Quarter	Month	Week
Whole Body (Including Gonads, Lens of Eye, Red Bone Marrow)	5,000	1,250	400	100
Forearms, Hands, Feet, Ankles	75,000	18,750	6,250	1,500
Skin of Whole Body	30,000	7,500	2,500	650
Pregnant Women or Employees Under 18 Years of Age	500	125	40	10

For information on specific organs or tissues not listed, consult with the Radiation Safety Officer or the Radioisotope & Radiation Safety Committee.

### DOSAGE CONSIDERATIONS FOR NORMAL VOLUNTEERS

As a general guide to the maximum permissible dose for normal volunteers and for patients, the Radioisotope & Radiation Safety Committee follows the recommendations of the National Council on Radiation Protection and Measurements Report No. 39, "Basic Radiation Protection Criteria" and 10 CFR, Part 20, "Standards for Protection Against Radiation". Insofar as is practical, the Committee considers that exposure of normal subjects and patients should be limited to these values when diagnostic and experimental purposes permit. When it is necessary to exceed this dosage for the purposes of research or diagnosis because instrumentation of the required sensitivity is not available, the applicant will be required to provide justification for exposures higher than 3.0 Rads to any tissue within a 13 week

period, and if such exposure occurs in a single dose, assurance that the human subject or patient will not receive further radiation for a subsequent period of at least one year. For all normal subjects and patients under the age of 18 years and all pregnant women, this limit is reduced to 0.30 Rads.

# APPENDIX R

## GUIDELINES FOR MAXIMUM ACTIVITIES IN LABORATORIES

<u>RADIOTOXICITY OF ISOTOPES</u>	<u>MINIMUM SIGNIFICANT QUANTITY UTILIZED</u>	<u>TYPICAL LABORATORY</u>
Very High	0.1 uCi	10 uCi or less
High	1.0 uCi	100 uCi or less
Moderate	10.0 uCi	1 mCi or less
Slight	100.0 uCi	10 mCi or less

Modifying factors should be applied to the quantities indicated in the last 2 columns of the above table, according to the complexity of the procedures to be followed. The following factors are suggested but due regard should be paid to the circumstances affecting individual cases.

<u>PROCEDURE</u>	<u>MODIFYING FACTOR</u>
Storage (stock solutions).....	X 100
Very simple wet operations.....	X 10
Normal chemical operations.....	X 1
Complex wet operations with risk of spills..	X 0.1
Simple dry operations.....	X 0.1
Dry and dusty operations.....	X 0.01

## APPENDIX S

### NUCLEAR MEDICINE SERVICE INFECTION CONTROL POLICIES

General purpose of this program is to prevent the spread of infection or the initiation of infection while performing the duties of Nuclear Medicine Service personnel:

#### I. General Infection Control Procedures:

##### a. Equipment:

1. Stretchers cleaned weekly with phenolic germicidal detergent.\*
2. Wheelchairs cleaned once a month by lab personnel with Amphil 2%.
3. Waiting room chairs cleaned weekly by personnel with Santimaster II.
4. Syringe holder cleaned for at least five (5) minutes in a 1:50 (500 ppm) bleach solution every evening and whenever splattered with blood. This solution should be made up fresh daily.\*\*
5. Collimator face cleaned as needed with 70% alcohol and dried.

##### b. Linen:

1. Clean linen is kept in a cabinet in Room 2A10.
2. Stretchers have clean linen after each patient.

\*We suggest using an EPA approved, hospital phenolic germicidal detergent. LPH by Vestal Labs is one product we highly recommend. It can be diluted according to label instructions and kept in squeeze bottle.

\*\*Phenolics are not generally virucidal; therefore, anything involved with blood should be disinfected with bleach.

3. Dirty linen should be carefully removed so as not to loosely shake in the atmosphere. It should be placed in a linen receptacle which has been lined with a plastic bag. Then linen receptacle must be marked with bio-hazard or contaminated sign if linen from hepatitis or infectious diarrhea patient is handled (according to Infection Control Isolation check-off sheet).

c. Waste (Dry):

1. All trash receptacles are lined with plastic bags.
2. They are emptied by Building Management personnel daily.

d. Waste (Wet):

1. All contaminated urine specimens are emptied in commode and flushed well.
2. Solid uncontaminated waste is flushed in commode.
3. Hands are washed after this procedure.

e. Waste (Radioactive):

Specified contaminated material container (lead shielded, 6 x 9", Room 2A10) for used needles and syringes in decay area.

f. Departmental Cleaning:

1. Physical plant area cleaned by personnel:
  - a) Cabinets are wiped daily with phenolic germicidal detergent.
  - b) Counter tops are scrubbed with Decon soap once a week and monitored for radiation contamination.

- c) Waiting area furniture is wiped with Santimaster II once a week.
- d) Machines are wiped off at least once a week with damp sponge with phenolic germicidal detergent and dried.
- e) Filters are vacuumed once a month on all machines.
- 2. Areas cleaned by Building Management Service personnel:
  - a) Floors in entire Service mopped daily.
  - b) Floors waxed as needed.
  - c) Waste uncontaminated by radiation emptied daily.

## II. Aseptic Procedures:

### a. Kit Preparation (General Rules):

- 1. Wash hands carefully.
- 2. Stoppers on all vials are thoroughly cleaned with alcohol prep prior to adding or withdrawing any substance.
- 3. A fresh needle and syringe is used for each addition or withdrawal and placed carefully in proper contaminated material container.
- 4. No saline vial without preservative will be re-entered but rather will be thrown promptly away after it has been entered. Multidose saline vials are discarded at the end of the day.

### b. Venipuncture:

- 1. Wash hands carefully before and after procedure.
- 2. Area is cleansed well with alcohol prep

3. After puncture is complete and material injected or blood withdrawn, clean gauze is placed on top of area before withdrawing needle.
4. Band-aid is applied to venipuncture site if necessary.
- c. Lumbar puncture or thoracentesis is performed by physician using aseptic technique and antiseptic agents as supplied in the individual tray.

### III. Waste Contaminated with Radiation:

#### a. Needles and Syringes (disposable):

1. Specified container (lead shielded, 6 x 9", Room 2A10) for used needles and syringes in decay area.
2. Container, when full, is emptied into receptacle labelled "Caution", needles and syringes.
3. When this receptacle is full, it is monitored to determine radiation level of contents. When radiation level is acceptable, contents are disposed by Building Management personnel.

#### b. Glassware:

##### 1. Reusable:

- a) Glassware is soaked in clear water and detergent for several days.
- b) Glassware is then washed and put on drying rack.
- c) Glassware is monitored with spectrascaler to insure it is no longer contaminated with activity and returned to shelf for future use.



2. Disposable:

- a) Contaminated material container for used glass-ware in decay area.
- b) When container is full, it is emptied into heavy duty cardboard box.
- c) Box is then monitored to determine safe radiation level.
- d) Box is sealed and labelled "Warning, Broken Glass".
- e) Container is disposed by Building Management personnel.

IV. Isolation Procedure:

- a. Patient in isolation is brought to the Service only when other patients are not present.
- b. Control Measures Taken:
  - 1. Certain patients from ward areas and all patients from closed care areas should be handled in accordance with the Infection Control Isolation Check Sheet found on each chart.
  - 2. If any patient has no check sheet and it is felt that isolation is required, the office of the Environmental Health Officer should be contacted, Extension 5492.
  - 3. Collimator and all other pieces of equipment covered that might come in contact with the patient.
  - 4. If necessary, one technologist will gown, mask and don gloves to handle patient.
  - 5. Another technologist will perform the study and manipulation of machine to avoid contamination.

6. All contaminated linen, gowns, masks, gloves and covering are sent with patient to be discarded in appropriate impervious (plastic lined) receptacle.
7. Area, machine, stretcher, etc. will be washed down with phenolic germicidal detergent.
8. For visible blood, see attachment.

V. Employee Infection Control:

- a. No eating, drinking or smoking in patient areas.
- b. Washes hands prior to and following each patient procedure.
- c. Observes isolation techniques when indicated.
- d. No pipetting by mouth.
- e. Use gloves for cleaning and washing glassware.
- f. If any needle sticks occur or accidents in which patient blood might have contacted broken skin, hospital accident reporting policy as outlined in Hospital Memorandum 05-16, Attachment 6, will be followed. The Personnel Physician will initiate the appropriate measures for possible hepatitis prophylaxis and syphilis monitoring.

VI. Employee Health: (As outlined in Hospital Memorandum 05-16, Attachment 1):

- a. Pre-employment physical required.
- b. Annual TB skin test or x-ray.
- c. All cuts or other open wounds must be covered by an appropriate bandage.

VII. Orientation of New Employees:

- a. Supervisory Technologist specifies duties of position to new employees.
- b. Disaster Manual and Infection Control Policies required reading.
- c. Procedure Manual of Service available for reference in specified situations.
- d. Initially all procedures undertaken with direct supervision.

VIII. Inservice Education:

- a. As needed, the Chief Technologist reviews already established policy and procedure of infection control program.
- b. Chief Technologist supervises initiation of all new procedures; maintaining proper technique to prevent possible infection.
- c. Chief Technologist updates infection control policies as needed.

IX. Procedure for Blood Spills (at present) Should Include:

- a. Clean up all visible blood, wearing gloves and dispose of paper towels carefully in contaminated material container.
- b. Disinfect surface with 500 ppm solution of bleach (1:50 ratio) for approximately two minutes. Wipe off or rinse.
- c. If broken glass is involved, apply bleach before attempting cleaning in any way. After visible blood is cleaned, reapply bleach and wipe.
- d. If bleach is unavailable, iodophor is considered as second choice for HBV action at 50 ppm available iodine. This would be 360 cc Wescodyne per gallon of water.

# ISOLATION PROCEDURE

DATE: \_\_\_\_\_

PATIENT: \_\_\_\_\_ ROOM: \_\_\_\_\_

HOSPITAL NUMBER: \_\_\_\_\_

INFECTION: \_\_\_\_\_

ORGANISM(S): \_\_\_\_\_

REQUIRES SPECIAL HANDLING AND ISOLATION TO PREVENT TRANSMISSION TO OTHER  
PATIENTS AND HOSPITAL PERSONNEL. ITEMS #: \_\_\_\_\_

\_\_\_\_\_ SHOULD BE EFFECTED.

- \_\_\_\_\_ 1. CAREFUL HANDWASHING SHOULD BE DONE BEFORE AND AFTER CONTACT WITH THIS PATIENT WHETHER OR NOT GLOVES HAVE BEEN WORN.
- \_\_\_\_\_ 2. PLACE PATIENT IN ISOLATION ROOM.
- \_\_\_\_\_ 3. MOVE PATIENT'S BED TO WARD AREA NEAREST A SINK.
- \_\_\_\_\_ 4. DRAW SIDE CURTAINS ON EACH SIDE OF PATIENT'S BED.
- \_\_\_\_\_ 5. PLACE NO PATIENT IN BEDS LOCATED ON EACH SIDE OF PATIENT.
- \_\_\_\_\_ 6. TRANSFER PATIENT TO CLOSED CARE UNIT.
- \_\_\_\_\_ 7. EACH PERSON AT BEDSIDE REQUIRING CLOSE PATIENT CONTACT NEEDS TO WEAR CLEAN OVERGOWN OR WRAP-AROUND TO BE DISCARDED BEFORE LEAVING PATIENT AREA.
- \_\_\_\_\_ 8. SURGICAL TYPE MASK SHOULD BE WORN BY ALL PERSONS TENDING THIS PATIENT TO BE DISCARDED BEFORE LEAVING PATIENT AREA.
- \_\_\_\_\_ 9. GLOVES SHOULD BE WORN BY ALL PERSONS TENDING THIS PATIENT TO BE DISCARDED BEFORE LEAVING PATIENT AREA.
- \_\_\_\_\_ 10. DISPOSE OF ALL NEEDLES, SYRINGES, BLADES IN CONTAMINATED MATERIAL CONTAINER ("NEEDLE BOX").
- \_\_\_\_\_ 11. **ALL** DRESSINGS AND TISSUE SHOULD BE PLACED IN IMPERVIOUS PLASTIC BAG PROVIDED BY NURSE OR FOUND IN INDIVIDUAL DRESSING TRAY
- \_\_\_\_\_ 12. MEDICAL EQUIPMENT SUCH AS SPHYGMOMANOMETER CUFFS, STETHOSCOPES, TRANSDUCERS, ETC. SHOULD BE PLACED IN MARKED PLASTIC BAGS AND SENT TO SPD SECTION FOR STERILIZATION.

- \_\_\_\_\_ 12. USE ONLY INDIVIDUALIZED, DISPOSABLE URINALS AND BEDPANS. URINE AND FECES FROM BEDPANS AND URINALS SHOULD BE EMPTIED IN THE HOPPER AND BEDPANS OR URINALS CLEANED WITH ILOPHOR-ALCOHOL DETERGENT (e.g. WESCODYNE). GLOVES AND WRAP-AROUND SHOULD BE WORN DURING THIS PROCEDURE AND THEN PROMPTLY DISCARDED.
- \_\_\_\_\_ 14. BEDPAN BRUSH MUST BE PUT IN IMPERVIOUS PLASTIC BAG AND DISCARDED WITH TRASH. IT IS NOT BE USED FOR OTHER PATIENTS.
- \_\_\_\_\_ 15. LINEN SHOULD BE CAREFULLY CHANGED TO AVOID VIGOROUS MOVEMENTS. SOILED LINEN SHOULD BE PLACED IN IMPERVIOUS PLASTIC BAG AND THAT PLACED IN CANVAS BAG MARKED FOR CONTAMINATION.
- \_\_\_\_\_ 16. EXCESS FOOD AND DRINK FROM PATIENT'S TRAY SHOULD BE DISCARDED IN HOPPER. TRAY WITH DISHES AND UTENSILS SHOULD BE PLACED IN IMPERVIOUS PLASTIC BAG FOR REGULAR DIETARY PICK-UP.
- \_\_\_\_\_ 17. ALL SPUTUM, FECES, URINE, BLOOD, PUS, CULTURE SWAB SPECIMENS DESTINED FOR PATHOLOGY DEPARTMENT SHOULD BE PLACED IN PLASTIC BAG AND IDENTIFICATION MADE AS HEPATITIS IN ACCORDANCE WITH PATHOLOGY DEPARTMENT POLICY.
- \_\_\_\_\_ 18. PATIENT SHOULD BE INSTRUCTED TO COUGH INTO PAPER TISSUE COVERING BOTH NOSE AND MOUTH AND TURN FACE AWAY WHEN COUGHING.
- \_\_\_\_\_ 19. PATIENT SHOULD WEAR MASK WHILE BEING TRANSPORTED TO OTHER AREAS.
- \_\_\_\_\_ 20. PATIENT SHOULD BE SEEN ON A PRIORITY BASIS IN SPECIAL AREAS WHERE DIAGNOSTIC TESTS OR TREATMENTS ARE BEING GIVEN.
- \_\_\_\_\_ 21. DISPOSABLE ITEMS, e.g., URINE COLLECTION BAGS, GU CATHETERS, SHOULD BE PLACED IN IMPERVIOUS PLASTIC BAGS FOR DISPOSAL.
- \_\_\_\_\_ 22. PATIENT'S PERSONAL THROW-AWAY TRASH (FACIAL TISSUES, ETC.) SHOULD BE COLLECTED IN IMPERVIOUS PLASTIC BAG AND DISCARDED.
- \_\_\_\_\_ 23. NO COMMON CONTAINERS TO COLLECT URINE FROM CATHETER COLLECTION BAG CAN BE USED.
- \_\_\_\_\_ 24. WEAR DISPOSABLE GLOVES WHEN CHANGING IV TUBING AND WHEN DRAWING BLOOD.
- \_\_\_\_\_ 25. DISINFECT HYDROTHERAPY TUBES, ELECTRODES, RESPIRATORY THERAPY EQUIPMENT, EXAMINATION TABLES AFTER USAGE BY THIS PATIENT IN ACCORDANCE WITH HOSPITAL POLICIES APPROVED BY INFECTION CONTROL.
- \_\_\_\_\_ 26. TERMINAL CLEANING SHOULD BE DONE WITH INFECTION CONTROL APPROVED PHENOL GERMICIDAL DETERGENT. WATER AND MOP HEADS SHOULD BE CHANGED AFTER CLEANING PATIENT AREA. PERSONNEL SHOULD WEAR WRAP-AROUND AND GLOVES DURING THIS PROCESS AND DISCARD THEM WHEN THROUGH CLEANING.

## APPENDIX T

### REPORTING EMPLOYEE RADIATION OVEREXPOSURE TO OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA)

1. The OSHA Standard 29 CFR 1910.96 defines limits for radiation exposure and reporting requirements for cases of radiation overexposure.
2. The OSHA Standard indicates that incidents of radiation overexposure shall be reported to the Department of Labor. However, because Executive Order #11807 requires the VA to be responsible for its own OSHA Program, for reporting purposes within the VA, such incidents will be reported by telephone to the Safety, Occupational Health and Fire Protection Division (138E), telephone number FTS 389-2761, within 24 hours, or the first workday after a weekend or holiday. The District Safety and Fire Protection Engineer will also be notified. This will satisfy the requirement of OSHA Standard 29 CFR 1910.96.
3. The telephone report should be followed up with a Report of Accident, Injury, Occupational Illness, or Fire, VA Form 2162, a CA-1 and CA-2 including a narrative report of investigation by the Radiation Safety Officer. These should be sent to the Associate Deputy Chief, Medical Director for Operations (133E). Copies should also be forwarded to the District Safety and Fire Protection Engineer.
4. The employee should be given a physical examination to establish a baseline reference in the event that the employee develops adverse side effects from the overexposure in the future.
5. All pertinent records are to be maintained and be made available to an employee when requested within 10 workdays from the date of request, in accordance with the Privacy Act. The records shall include the information as specified in 29 CFR 1910.96(o).



## APPENDIX U

### OPERATING ROOM CARE OF PATIENT FOR APPLICATION OF RADIUM-226, RADON-222, CESIUM-137, IRIDIUM-192, TANTALUM-182, IODINE-125

#### Methods of Implantation:

Temporary: Usually an intracavitary (vaginal) implantation of Radium-226 or Cesium-137. Implantation may be delayed if an afterloading technique is employed. This involves insertion of an applicator before the radioactive sources are inserted.

Permanent: An interstitial implantation that may be superficial, intra-abdominal or intrathoracic. Permanent implants usually require only a single, simple surgical procedure. Many implants are performed under local anesthesia.

#### Danger to Personnel:

All radioactive sources emit radiation that is dangerous. Afterloading techniques present less hazard as sources of radioactivity are kept in shielded containers until applicator is in place. PREGNANT FEMALES ARE NCT TO ASSIST IN THE O.R.

#### Precautions in O.R.:

The physician will handle the radioactive sources. The circulator will open container so that physician can remove radioactive sources. The container is to be closed immediately.

Sterilization : Temporary implant; intracavitary Radium-226, Cesium-137, (Afterloading Technique):  
No sterilization required. Applicators will be contained in sterile packaging.

Temporary implant; intracavitary Radium-226, Cesium-137, (Afterloading Technique not employed):  
Radioactive sources should be soaked a minimum of 10 minutes in 70% ethanol. This is a disinfection procedure; sources shall not be steam sterilized.



Temporary implant; interstitial Radium-226,  
Cesium-137:

Radioactive sources should be soaked a minimum of 10 hours in 2% solution gluteraldehyde. Date of activation of gluteraldehyde shall be indicated and solution not used 14 days after activation. Sources shall be carefully removed with sterile technique and adequately rinsed with sterile water to remove all gluteraldehyde residue before implantation. Sources shall not be steam sterilized.

Permanent implant; interstitial Iodine-125, Iridium-192:  
Sources may be steam sterilized (121°C); follow physician's instructions.

Permanent implant; interstitial Radon-222, Tantalum-182:  
Radioactive sources should be soaked a minimum of 10 hours in 2% solution gluteraldehyde. Date of activation of gluteraldehyde shall be indicated and solution not used 14 days after activation. Sources shall be carefully removed with sterile technique and adequately rinsed with sterile water to remove all gluteraldehyde residue before implantation. Source shall not be steam sterilized.

Note: Patient's chart: "Caution, Radioactive Material, Temporary  
Implant" label

OR

"Caution, Radioactive Material, Permanent  
Implant" label

Patient's bed : Radioactivity Precautions Label

Physician is to complete attached form "Nursing Care" to be placed in patient's chart.

APPENDIX U

FORM 1

NURSING CARE  
PATIENTS RECEIVING RADIUM-226, RADON-222, CESIUM-137,  
IRIDIUM-192, TANTALUM-182, IODINE-125

Patient: \_\_\_\_\_

Radionuclide: \_\_\_\_\_ mCi: \_\_\_\_\_

Administered: \_\_\_\_\_ / \_\_\_\_\_ by: \_\_\_\_\_ M.D.  
Date Time

1. Both ambulatory and bed patients should be segregated during treatment. Private rooms are mandatory. Under no circumstances should a patient containing radioactive material for therapeutic purposes be placed in the same room with a pregnant female or child.
2. No adjacent patient or visitor shall be placed within six (6) feet of this patient.
3. Pregnant women or children shall not be allowed to visit this patient.
4. Nurses or other attendants shall not remain in the immediate proximity (2 feet) of the patient for more than a total of:

15 minutes per day for RADIUM-226,  
15 minutes per day for RADON-222,  
15 minutes per day for TANTALUM-182,  
25 minutes per day for IRIDIUM-192,  
25 minutes per day for CESIUM-137,  
2 hours per day for IODINE-125.

Nurses and other attendants should take full advantage of time and distance as protection measures. It must not be overlooked that doing the job in half the time is just as effective as halving the radiation shielding and that working twice as far from the source is also as effective as halving the radiation with shielding.

5. Pregnant nurses and attendants should not be responsible for the routine care of patients containing radioactive material.

6. No special precautions need be taken with regard to food utensils, bedding or excreta except to be sure that no source is lost via these routes by accidental removal.
7. Surgical bandages and dressings should be changed only by the physician in charge or another individual designated by him and trained in techniques applicable to such cases.
8. For gynecological patients, perineal care is not ordinarily given during the treatment, but the perineal pad may be changed when necessary.
9. No sources (needles or tubes) are to be removed by anyone other than the physician (physicians) named above.
10. If a source should get free, it shall immediately be picked up with forceps and placed in a container which is to be left in the patient's room until the arrival of the physician and/or the Radiation Safety Officer, both of whom shall be notified at once.

Immediately contact Doctor \_\_\_\_\_ Phone No: \_\_\_\_\_

Radiation Safety Officer, Extension 5074

11. No patient is to be released from the hospital until all radioactive material is removed or decayed to safe levels.
12. In the event of death, immediately notify Doctor \_\_\_\_\_  
Phone No. \_\_\_\_\_ and Radiation Safety Officer,  
Extension 5074. Do not remove the body from the room.
13. Check patient's chart and bed for proper identification as a radioactive patient.

Patient's chart: Caution, Radioactive Material, Temporary  
Implant Label

OR

Caution, Radioactive Material, Permanent  
Implant or Internal Dose Label

Patient's bed: Radioactivity Precautions Label

## APPENDIX V

### INSTRUMENT QUALITY CONTROL PROCEDURES

(Time Intervals for Performance of Tests  
and Checks Will Be Found in Table 1)

#### 1. One Minute Test Count:

Most instruments have a test position, on which the count-rate should equal to the frequency of AC mains, i.e. 60 Hz or 3600 counts per minute. A change in this number indicates failure of timer or scaler function.

#### 2. Background:

A knowledge of background counts is vital where the background counts are more than 1% of the sample counts, as the samples need to be corrected for background contribution. An unusual increase in background suggests that one should look for contamination in the detector or room.

#### 3. Calibration of Pulse Height Analyzer:

This calibration involves the relationship between high voltage setting and photon energies of radionuclides, in terms of divisions on energy and discriminator dials. The most common calibration on these dials is 1 Kev per division. The total number of divisions is 1000 over 10 potentiometer turns. This means the calibration can be done from 0-1000 Kev with 1 Kev intervals. The general procedures of such a calibration are the following:

- a. Position the check source. The most common check source is  $\text{Cs}^{137}$  or  $\text{Co}^{57}$ .
- b. Set the pulse height analyzer window from 652 to 672 divisions with  $\text{Cs}^{137}$  as the check source. This ensures a 20 division window width with the photopeak energy of  $\text{Cs}^{137}$  (662 Kev) at the center of the energy window. For  $\text{Co}^{57}$  a division window width should be used with the photopeak energy of this radionuclide.
- c. Starting at zero, increase the high voltage potentiometer until the counts begin to be received by the read-out system. Record the setting at which the counts are initially received; then record the counts per minute versus voltage in increments of two to five units. Continue until count-rate reaches a maximum and then decreases to 50% of the maximum counts.
- d. Plot counts per minute versus voltage on graph paper and determine the voltage potentiometer setting that gives the maximum photopeak count rate. Usually this value corresponds to the photopeak energy of the radionuclide used in the calibration.
- e. As  $\text{I}^{125}$  is commonly used and counted in these instruments, it is suggested that an additional calibration of the pulse-height analyzer with the long-lived isotope,  $\text{I}^{129}$ , be performed. The mean energy of conversion x-rays

from  $I^{129}$  is 30.44 Kev, which is similar to the mean energy 28.3 Kev of conversion x-rays of  $I^{125}$ . It is recommended that this be done daily. It is not necessary to plot the count-rate. The peak should be sharp and clean. If the maximum count-rate is small and one does not get a sharp peak, malfunction is indicated, possibly in the discriminator.

#### 4. Resolution Check:

Resolution is usually defined as the relative full width (in Kev) of the photopeak measured at half of the maximum height of the peak. It is to be performed initially and then once every month. It is usually expressed as a percentage of photopeak energy and is called the percentage of FWHM.  $Cs^{137}$  is normally used to measure the percentage of FWHM. General procedures are:

- a. Position the check source ( $Cs^{137}$ ) on the crystal.  
(Be sure the pulse-height analyzer has been calibrated).
- b. Record 1-minute counts at 10 Kev intervals from approximately 550-700 Kev using a 20 Kev window.
- c. Plot the results on graph paper, keeping the count-rate on the vertical scale (ordinate) and the energy in Kev on the horizontal scale (abscissa). The plot will show the  $Cs^{137}$  photopeak spectrum.
- d. From the curve, obtain the full-width at half the maximum height. I.e. find the lower-half Kev at the position of half the maximum count-rate. The percentage of FWHM can be calculated from the following relationship:

$$\% \text{ FWHM} = \text{window width in Kev} / \text{photopeak in Kev} \times 100$$

For  $\text{Cs}^{137}$ , a resolution of 8-9% should be achieved with cylindrical crystals such as are found in uptake probes and scanners; and a resolution of 10-11% with well-type crystals. Percentages greater than this should be investigated for the cause. It may reflect a malfunction at several points of the spectrometer, such as problems in the integral line assembly, or cracked or yellowed crystals. The same procedure for the spectral analysis of the other radionuclides is employed.

5. Energy Window Settings:

Proper window placement will decrease the contribution of Compton scattered photons and minimize the effect of non-uniform sensitivity in individual photomultiplier tubes. Procedures of window settings are:

- a. Use the flood source on the surface of the collimator or with the collimator removed, place a point source at least four feet from the detector.
- b. The window setting should be performed according to the instrument operating manual. The 2-pulse monitor (energy display) oscilloscope allows the operator to quickly adjust the pulse height selector to the photo-peak of the radionuclide.
- c. Photograph the spectrum and record the gain settings that provide window adjustment. Compare these settings with previous ones. Change in window calibration settings may indicate: (1) instability in high voltage power supply; (2) threshold instability in the spectrometer; or (3) problems in the energy-summing pulse amplifiers.



6. Gamma Camera Characteristics:

Characteristics such as image spatial resolution, image linearity (distortion) and image size of a gamma camera can be checked by using either Hine's Reference Phantom or just a line phantom constructed of lucite with an array of lead bars of different widths and spaces between them. Procedures to study these characteristics are:

- a. Fill the phantom with  $^{99m}\text{Tc}$  pertechnetate having a total activity of about 2-3 mCi.
- b. Position the phantom on the face of the collimator.
- c. Using an energy setting of 140 and a 25-30 Kev window, record 400,000 count images.
- d. If instead of the line phantom, a study of the absorption pattern of the bars is desired, place them at the surface of the detector and locate a point source of activity at a distance of at least four feet on the axis of the detector. Record a 400,000 count image. However, if in the bar phantom, the lines are arrayed in one direction, record two images; one with lines parallel to the Y-axis and one parallel to the X-axis of the camera head.
- e. Compare the images with the initially tuned ones. Retain these images in sequence for future comparison. Record the instrument settings with the corresponding images. The camera should produce images without distortion. The linear sources should appear as parallel straight lines.

There is no fixed value for resolution. The following resolutions are claimed by the respective instrument manufacturers:

Searle Radiographics HP.....intrinsic resolution  
of 3/16 inch

Picker-Nuclear.....intrinsic resolution  
of 5/32 inch

Ohio-Nuclear.....intrinsic resolution  
of 1/8 inch

The system resolution is always less than the intrinsic resolution and decreases with depth. Weekly evaluation of the image size ensures the constant spatial registry of camera images. A symmetry of 5% is acceptable.

7. Uniformity of Response:

Uniformity test can be performed using either a point source or a flat field phantom. The procedures are:

PROCEDURES USING A POINT SOURCE

- a. Remove the collimator from the detector head and raise detector to its highest position. Place source on floor.
- b. Detector should be aimed at source. Check spectrum and peak.
- c. Accumulate about 400,000 counts and adjust intensity settings according to counts.
- d. Set camera for three exposures. One 5 points below optimum intensity setting; the other at 5 points above optimum intensity settings.

### PROCEDURES WITH FLAT FIELD PHANTOM

- a. Use high sensitivity collimator.
- b. Turn detector to face ceiling and place source on the detector with absorbent paper underneath. The source should be uniformly distributed.
- c. Proceed as in steps three and four of the procedure when using a point source for evaluation of uniformity of response.

The routine flood pictures should be comparable in uniformity to initial flood pictures. While using a point source, see that the radioactive strength of the source is not too high and that the source is not too close to the detector to avoid coincidence counting. This should always be performed after setting the proper energy window.

#### 8. Sensitivity Calibration:

Sensitivity is defined as count rate per unit of activity. It mainly depends upon the geometric efficiency of collimator and intrinsic peak efficiency of the crystal. Sensitivity should be checked every day. A flood is made with a known activity in the flat field phantom. The time to accumulate a fixed number of counts is recorded. The count rate per unit of activity is determined and a record is maintained. The same collimator should be used for the calibration.

#### 9. Ionization Chamber Calibration:

The well-type ionization chambers and radiation survey meters are essential instruments of a nuclear medicine laboratory. The

ionization chambers which are used for finding the activity of a radionuclide need to be checked for their calibration daily using one standard source. A check of the linearity response of the chamber with the dose rate once a month is also recommended.

Procedure to check the linearity response is:

- a. Prepare a  $^{99m}\text{Tc}$  sample of about 20 mCi strength.
- b. Measure the activity of the sample in the well-type ionization chamber.
- c. Repeat the measurements after six hours, 24 hours and 30 hours. If the response of the chamber is linear with the dose rate, one would expect the readings to be 50%, 6.25% and 3.125% respectively of the initial reading.

Each radiation survey instrument should be calibrated initially, then at intervals of three months and after each instrument servicing.

A Gamma source such as  $\text{Ra}^{226}$ ,  $\text{Co}^{60}$  or  $\text{Cs}^{137}$  will be adequate for routine calibration of a survey meter. Procedures of calibration of survey meter are:

- a. Check the batteries of the meter and adjust its zero setting, if required.
- b. Place a standard radioactive standard of known activity on a styrofoam block on the table with the source at one end and the survey meter at the other.
- c. Record the intensity readings in mR/h varying the distance between source and survey meter from 50 cm

with increments of 10 cm.

- d. Calculate the intensity of each setting from the following formula:

Intensity (mR/h) =

$$\frac{\text{Activity in mCi} \times \text{Gamma constant (mR/h/mCi at 1 cm)}}{(\text{Distance in cm})^2}$$

- e. Plot the actual indicated readings versus the calculated ones on a graph with the calculated intensity on the horizontal axis (abscissa) and the observed intensity on the vertical axis (ordinate).
- f. Repeat the procedure for as many ranges as possible.

## APPENDIX V

TABLE 1

TESTS AND CHECKS FOR PROPER EQUIPMENT PERFORMANCE

INSTRUMENTS	TESTS	INITIAL	FREQUENCY		
			DAILY	WEEKLY	MONTHLY
Counting Instruments	1-Min Test Count	X	X		
	Background Count	X	X		
	Calibration of Pulse-Height Analyzer	X	X		
	Resolution Check	X			X
	Chi-Square Test				X
Rectilinear Scanners	Density Calibration	X		X	
	Cs <sup>137</sup> Calibration	X	X		
Gamma Cameras	1-Min Test Count	X	X		
	Energy Window Setting	X	X		
	Image Resolution, Size & Distortion	X		X	
	Uniformity of Response	X	X		
	Sensitivity	X	X		
	Calibration of Pulse-Height Analyzer	X	X		
Dosimeters & Survey Meters	Calibration of Direct Read-Out				
	Ionization Chamber	X	X		
	Calibration of Survey Meter	X (to be re-calibrated every 3 months)			

# TRAINING AND EXPERIENCE AUTHORIZED USER OR RADIATION PROTECTION OFFICER

1. NAME OF AUTHORIZED USER OR RADIATION PROTECTION OFFICER  OLGA A. CORREA, M.D.		2. STATE OR TERRITORY IN WHICH LICENSED TO PRACTICE MEDICINE W. VIRGINIA & IN	
3. CERTIFICATION			
SPECIALITY BOARD A	CATEGORY B	MONTH AND YEAR CERTIFIED C	
American Board of Nuclear Medicine (ABNM)  Argentinian Board of Nuclear Medicine and Internal Medicine		September 18, 1976	
4. TRAINING RECEIVED IN BASIC RADIOISOTOPE HANDLING TECHNIQUES			
FIELD OF TRAINING A	LOCATION AND DATE(S) OF TRAINING B	TYPE AND LENGTH OF TRAINING	
		LECTURE/ LABORATORY COURSES (Hours) C	SUPERVISED LABORATORY EXPERIENCE (Hours) D
Rad. Physics I & II a. RADIATION PHYSICS AND INSTRUMENTATION	Harvard University (I) Harvard University (II)	32 32	
b. RADIATION PROTECTION	SAME AS ABOVE	"	
c. MATHEMATICS PERTAINING TO THE USE AND MEASUREMENT OF RADIOACTIVITY	SAME AS ABOVE	"	
d. RADIATION BIOLOGY	SAME AS ABOVE	"	
e. RADIOPHARMACEUTICAL CHEMISTRY	SAME AS ABOVE	"	



PRECEPTOR STATEMENT

Supplement B must be completed by the applicant physician's preceptor. If more than one preceptor is necessary to document experience, obtain a separate statement from each.

1. APPLICANT PHYSICIAN'S NAME AND ADDRESS		<p>KEY TO COLUMN C</p> <p>PERSONAL PARTICIPATION SHOULD CONSIST OF:</p> <p>1-Supervised examination of patients to determine the suitability for radioisotope diagnosis and/or treatment and recommendation for prescribed dosage.</p> <p>2-Collaboration in dose calibration and actual administration of dose to the patient including calculation of the radiation dose, related measurements and plotting of data.</p> <p>3-Adequate period of training to enable physician to manage radioactive patients and follow patients through diagnosis and/or course of treatment.</p>
FULL NAME		
OLGA A. CORREA, M.D.		
STREET ADDRESS		
VA Hospital		
1601 Perdido Street		
CITY	STATE	ZIP CODE
New Orleans,	La.	70146

2. CLINICAL TRAINING AND EXPERIENCE OF ABOVE NAMED PHYSICIAN

ISOTOPE A	CONDITIONS DIAGNOSED OR TREATED B	NUMBER OF CASES INVOLVING PERSONAL PARTICIPATION C	COMMENTS (Additional information or comments may be submitted in duplicate on separate sheets.) D
I-131 or I-125	DIAGNOSIS OF THYROID FUNCTION	1036	See reverse.
	DETERMINATION OF BLOOD AND BLOOD PLASMA VOLUME	60	
	LIVER FUNCTION STUDIES	-	
	FAT ABSORPTION STUDIES	15	
	KIDNEY FUNCTION STUDIES	240	
	IN VITRO STUDIES	1300	
OTHER			
I-125	DETECTION OF THROMBOSIS		
I-131	THYROID IMAGING	720	
P-32	EYE TUMOR LOCALIZATION		
Sr-75	PANCREAS IMAGING	6	
Yb-169	CISTERNOGRAPHY	120	
Xe-133	BLOOD FLOW STUDIES AND PULMONARY FUNCTION STUDIES	150	
OTHER			
Tc-99m	BRAIN IMAGING	960	
	CARDIAC IMAGING	550	
	THYROID IMAGING	140	
	SALIVARY GLAND IMAGING	12	
	BLOOD POOL IMAGING	180	
	PLACENTA LOCALIZATION	30	
	LIVER AND SPLEEN IMAGING	420	
	LUNG IMAGING	320	
	BONE IMAGING	168	
OTHER			

Actual experience with radiation:

<u>Isotope</u>	<u>Max. Amount</u>	<u>Where Gained</u>	<u>Duration</u>	<u>Use</u>
I-131 (Iodide)	200 mCi	VAH, New Orleans	1 yr.	Therapeutic
I-131/I-125 HSA	15 mCi	as above	1 yr.	Diagnostic
I-131 (labelled renal compounds)	15 mCi	as above	1 yr.	Diagnostic
I-131 (Triolein or Oleic Acid)	3 mCi	as above	1 yr.	Diagnostic
I-131 (Iodinated tolpovidone)	3 mCi	as above	1 yr.	Diagnostic
I-131/I-125 triiodothyronine or thyroxine)	3 mCi	as above	1 yr.	Diagnostic
I-131/I-125 triiodothyronine or thyroxine		Boston U. Med. Ctr.	1 yr.	Diagnostic
I-131		Parana Reg. Hosp., Argentina	7 yrs.	Diagnostic
Au-197	150 mCi	VAH, New Orleans	1 yr.	Diagnostic
Hg-203/197	10 mCi	VAH, New Orleans	1 yr.	Diagnostic
Sr-85	1 mCi	VAH, New Orleans	1 yr.	Diagnostic
Se-75	20 mCi	VAH, New Orleans	1 yr.	Diagnostic
Co-57/60	1 uCi	as above, Boston U.	1 yr.	diagnostic
Cr-51	5 mCi	VAH NOLA	1 yr.	diagnostic
Tc99m	1500 mCi	VAH NOLA	1 yr.	diagnostic
In-111 Chloride or DTPA		Boston U.		
In-113		VAH NOLA	1 yr.	diagnostic
		Parana Reg. Hosp., Argentina	5 yrs.	Diagnostic

NOTE: Dr. O. Correa has been licensed to use all of the above mentioned isotopes since December, 1967 by the AEC in Argentina.

# PRECEPTOR STATEMENT (Continued)

## 2. CLINICAL TRAINING AND EXPERIENCE OF ABOVE NAMED PHYSICIAN (Continued)

ISOTOPE A	CONDITIONS DIAGNOSED OR TREATED B	NUMBER OF CASES INVOLVING PERSONAL PARTICIPATION C	COMMENTS (Additional information or comments may be submitted in duplicate on separate sheets.) D
P-32 (Soluble)	TREATMENT OF POLYCYTHEMIA VERA, LEUKEMIA, AND BONE METASTASES		
P-32 (Colloidal)	INTRACAVITARY TREATMENT		
I-131	TREATMENT OF THYROID CARCINOMA	5	
	TREATMENT OF HYPERTHYROIDISM AND CARDIAC CONDITION	15	
Au-198	INTRACAVITARY TREATMENT		
Co-60 or Cs-137	INTERSTITIAL TREATMENT		
	INTRACAVITARY TREATMENT		
I-125 or Ir-192	INTERSTITIAL TREATMENT		
	TELETHERAPY TREATMENT		
Sr-90	TREATMENT OF EYE DISEASE		
	RADIOPHARMACEUTICAL PREPARATION		
Mo-99/ Tc-99m	GENERATOR		
Sn-113/ In-113m	GENERATOR		
Tc-99m	REAGENT KITS		
Other	Spleen imaging	10	
Cr	Gastrointestinal protein loss	6	
	RCB volume & RGS	36	
K-42	Potassium space determination with whole body counter	20	
I-131	Cisternography	20	
	Lung imaging	45	
	Placenta localization	5	

3. DATES AND TOTAL NUMBER OF HOURS RECEIVED IN CLINICAL RADIOISOTOPE TRAINING  
July, 1965 thru July, 1966 - 800 hours.

4. THE TRAINING AND EXPERIENCE INDICATED ABOVE WAS OBTAINED UNDER THE SUPERVISION OF:		5. PRECEPTOR'S SIGNATURE
a. NAME OF SUPERVISOR MELVIN FARMECANT, M.D. IAN TYSON, M.D., BELTON BURROWS, M.D.		7. PRECEPTOR'S NAME (Please type or print)  IAN TYSON, M.D.
b. NAME OF INSTITUTION Radioisotope Laboratory		
c. MAILING ADDRESS University Hospital, Boston University		
d. CITY Boston, Massachusetts		8. DATE
9. MATERIALS LICENSE NUMBER(S)		

# CURRICULUM VITAE

NAME : Olga Almeida Correa, M. D.

PLACE OF BIRTH : Cordoba, Argentina  
October 12, 1937

RELIGION : Roman Catholic

PRESENT ADDRESS : 7131 Lake Willow Drive  
New Orleans, Louisiana 70126

PRIMARY EDUCATION : Escuela Normal  
Salta, Argentina (1945-1950)

SECONDARY EDUCATION : Escuela Normal de Maestros  
Salta, Argentina (1951-1955)

DEGREE RECEIVED : Grammar School Teacher

MEDICAL EDUCATION : Medical School  
National University of Cordoba (1956-1963)  
Degree obtained - Medical Doctor

Degree Validation  
E.C.F.M.G., standard  
certificate #59624

F.L.E.X. Test processing  
#35670

STATE LICENSURE : West Virginia - License #10145  
  
Louisiana - License #LO3685R

INTERNSHIP : Internal Medicine  
San Roque University Hospital  
National University of Cordoba, Argentina - 1963

Medicine Externship  
DeGoesbriand Memorial Hospital  
University of Vermont Medical Center  
Burlington, Vermont, 1965

Streigh Medicine; U. S. Public Health Hospital  
New Orleans, Louisiana 1973-1974

RESIDENCY-FELLOWSHIP: Nuclear Medicine Division  
Dept. of Internal Medicine  
University Hospital  
Boston University  
Boston, Mass.  
1966-1968

Radiation Physics I  
Harvard University  
1966 (1 scholastic year)

Radiation Physics II  
Harvard University  
1967 (1 scholastic year)

BOARD CERTIFICATION :

Diplomate by the Argentinian Board of Nuclear Medicine  
and Internal Medicine

Board Eligible Internal Medicine

Diplomate by the American Board of Nuclear Medicine

TEACHING APPOINTMENTS:

Instructor Internal Medicine  
National University of Cordoba  
Jan. - Dec. 1964

Director and Instructor  
Training course for Nuclear Medicine Technologist  
Dept. of Nuclear Medicine  
Parana, Argentina  
1971-1973

Guest Lecturer in Nuclear Medicine  
National University of Cordoba, Argentina  
1970-1973

PREVIOUS HOSPITAL APPOINTMENTS:

Chief, Nuclear Medicine Department  
Centro de Investigaciones Neurológicas  
Santa Fe, Argentina  
1970-1973

Chief, Nuclear Medicine Department  
San Martin Regional Hospital  
Parana, Argentina  
1971-1973

Consultant Nuclear Medicine  
British Hospital  
Rosario, Argentina  
1971-1973

Senior Staff Physician  
Dept. of Nuclear Medicine  
Veterans Administration Hospital  
New Orleans, Louisiana  
March 1976 to August 1977

PRESENT HOSPITAL APPOINTMENTS:

Acting Chief, Nuclear Medicine Service  
Veterans Administration Hospital  
New Orleans, Louisiana  
August 1977 to 7/13/79  
Chief of Nuclear Medicine Service 7/14/79 to present

MEMBERSHIP MEDICAL SOCIETIES:

Society of Nuclear Medicine 1969  
Asociacion Argentina de Neurocirugia 1970  
Asociacion Argentina de Biologia y Medicina Nuclear 1970  
Latin American Association of Nuclear Medicine 1970  
American College of Nuclear Physicians, 1977  
World Federation of Nuclear Medicine 1971  
American College of Nuclear Medicine  
Sociedad de Radiologia Medicina Nuclear y Radioterapia  
Santa, Fe, Argentina  
1972 (charter member)  
Secretary, Nuclear Medicine Section  
Latin American Society of Gastroenterology  
Professional Staff of Veterans Administration Hospital  
New Orleans, Louisiana

PUBLICATIONS

- : The Reliability of Brain Scanning  
(Presented at III European Congress of Neurosurgery,  
Madrid, 1967)
- Gammagrafia Cerebral, Official Relator  
42nd Congress, Pan American Medical Association  
Buenos Aires, Argentina  
1968
- Gammagrafia Cerebral, Su Evaluacion Matematica  
Boletin Asociacion Argentina de Neurocirugia,  
August 1969
- Control Radioisotopico de les Derivaciones Ven  
Triculo Yugulares  
Boletin Asociacion Argentina de Neurocirugia, 1971
- Craniorrinorrea, Control Radioisotopico, II Congreso  
Latino Americano de Enfermedades Neurovasculares  
Carlos Paz, Argentina  
June 1973

Use of CAT Scan and Conventional Brain Scan in Differential  
Diagnosis of Brain Tumor and Cerebral Infarcts  
(Presented at 5th Congress of Neurological Surgery)  
Matzatlán, Mexico  
March 1977

CONTINUING MEDICAL EDUCATION:

AMA Award 1977

International Pediatric Neurosurgery Course  
Würzburg, Germany  
September 1976

European Pediatric Neurosurgery Symposium  
Stresa, Italy  
September - October 1976

Ultrasound Review  
Pensacola, Florida  
August 1977

Advanced Ultrasound of the Abdomen  
Lake Buena Vista, Florida  
August 1977

Special Course on Neuro CAT and Nuclear Medicine  
San Francisco, California  
October 1977

Ultrasound Quality Control Workshop  
New York, New York  
October 1977



CONTINUING MEDICAL EDUCATION, CONT'D:

Nuclear Radiology  
New York, New York  
May 29-30, 1978

Diagnostic Ultrasound Instruments and Update  
on Emission Computed Tomography  
Los Angeles, California  
August 28-31, 1978

RIA Conference  
Bronx, New York  
September 14, 1978

International Congress, "World Federation of  
Nuclear Medicine and Biology  
Washington, D. C.  
September 16-21, 1978

Symposia: "Update on Nuclear Medicine"  
New Orleans, La. -  
November 19, 1978

Nuclear Medicine Conference: "The Study of Alcoholism:  
Problems, Diagnosis and Research"  
Washington, D. C.  
November 29, 1978

ACNP Nuclear Medicine Review Course  
San Juan, Puerto Rico  
February 28 thru March 3, 1979

26th Annual Meeting, Society of Nuclear Medicine  
Atlanta, Georgia  
June 25-29, 1979

VII Congress of the Latin American Association of  
Biology and Nuclear Medicine  
Punta del Estes, Uruguay  
November 30 thru December 7, 1979

American College of Nuclear Physicians Meeting  
Washington, D. C.  
March 10-12, 1980

3rd Annual Meeting, Mississippi Society of Nuclear  
Medicine - "Cardiovascular Nuclear Medicine"  
Jackson, Mississippi  
May 3-4, 1980

CONTINUING MEDICAL EDUCATION, CONT'D:

Educational Venture to the Peoples Republic  
of China  
June 20 thru July 10, 1980

Educational Symposium: "Practical Advances in Nuclear  
Medicine"  
St Petersburg, Florida  
August 28-30, 1980

Management Workshop on Managing Stress  
New Orleans, La.  
November 19, 1980

4th Annual SCTNI  
Dorado Beach, Puerto, Rico  
January 26-29, 1981

ACNP Nuclear Medicine Educational Seminar (7th Annual)  
New Orleans, La.  
February 11-14, 1981

Computed Tomography International Symposium and Course  
New Orleans, Louisiana  
April 13-17, 1981

Visiting Fellowship, Department of Radiology,  
Division of Nuclear Medicine  
UCLA School of Medicine  
Torrance, California  
October 19-23, 1981

International Symposium & Course on Computed Tomography  
and Other Computer Assisted Imaging Techniques  
New Orleans, LA  
April 12-16, 1982

ACNP 9th Annual Meeting  
Dorado, Puerto Rico  
March 9-13, 1983

SNM 30th Annual Meeting and Speaker's Seminar  
St Louis, Mo.  
June 4-7, 1983

Principles of Clinical NMR Imaging  
University of California School of Medicine  
June 23-26, 1983

CURRICULUM VITAE - OLGA A. CORREA cont'd

CONTINUING MEDICAL EDUCATION, cont'd

LATEST DEVELOPMENTS IN IMAGING TECHNIQUES  
Academy of General Practitioner's Meeting  
(Guest Speaker)  
Biloxi, Mississippi  
June, 1983

FORM NRC-313M-SUPPLEMENT A  
(7-77)  
10 CFR 30

U.S. NUCLEAR REGULATORY COMMISSION

TRAINING AND EXPERIENCE  
AUTHORIZED USER OR RADIATION PROTECTION OFFICER

1. NAME OF AUTHORIZED USER OR RADIATION PROTECTION OFFICER  OLGA M. GARCIA, M.D.	2. STATE OR TERRITORY WHICH LICENSED TO PRACTICE MEDICINE Illinois & Louisiana
--	---

3. CERTIFICATION

SPECIALITY BOARD A	CATEGORY B	MONTH AND YEAR CERTI C

4. TRAINING RECEIVED IN BASIC RADIOISOTOPE HANDLING TECHNIQUES

FIELD OF TRAINING A	LOCATION AND DATE(S) OF TRAINING B	TYPE AND LENGTH OF TRAINING C	
		LECTURE/ LABORATORY COURSES (Hours) C	SUP LAB EXT D
a. RADIATION PHYSICS AND INSTRUMENTATION	Touro Infirmary Hospital New Orleans, La. July, 1976 to January, 1977	50	
b. RADIATION PROTECTION	Touro Infirmary Hospital	25	
c. MATHEMATICS PERTAINING TO THE USE AND MEASUREMENT OF RADIOACTIVITY	Touro Infirmary Hospital	25	
d. RADIATION BIOLOGY	Touro Infirmary Hospital	20	

APPLICATION FOR BYPRODUCT MATERIAL LICENSE—MEDICAL

SUPPLEMENT A—PRECEPTOR STATEMENT

This page is to be completed by the applicant physician's preceptor. If more than one preceptor is necessary to document experience, obtain separate statement from each. Page 2 may be used for comments and additional information.

10. NAME AND ADDRESS OF APPLICANT PHYSICIAN (Include ZIP Code)

OLGA M. GARCIA, M.D.  
Nuclear Medicine Service  
VA Medical Center  
1601 Perdido Street  
New Orleans, La. 70146

11. CLINICAL TRAINING AND EXPERIENCE OF PHYSICIAN NAMED IN ITEM 10 ABOVE

(A) ISOTOPE	(B) CONDITIONS DIAGNOSED OR TREATED	(C) No. Cases Observed (See 1 in key below)	(D) No. Cases Involving Part icipation (See 2 in key)
I-131 or I-125	Diagnosis of thyroid function	2000	200
	Determination of blood and blood plasma volume	25	10
	Liver function studies	150	50
	Fat absorption studies	2	1
	Kidney function studies	5	2
	In vitro studies		
Cr-51	Gastrointestinal protein loss studies	0	0
	Determination of red blood cell volume and studies of red blood cell survival	6	2
Fe-59	Iron turn over studies	3	0
Co-58 or Co-60	Intestinal absorption studies	25	10
K-42	Potassium space determinations	0	0
I-131	Thyroid imaging	20	5
	Brain tumor localization and cardiac imaging	0	0
	Cisternography	0	0
	Lung imaging	0	0
	Liver imaging	30	20
	Kidney imaging	150	100
	Placenta localization	0	0
Cr-51	Placenta localization	0	0
	Spleen imaging	10	0
Au-198	Liver imaging	0	0
Hg-197	Brain imaging	0	0
	Kidney imaging	0	0
Hg-203	Brain imaging	0	0
Sr-85	Bone imaging	0	0
Tc-99m	Brain imaging	2000	1000
	Thyroid imaging	250	170
	Salivary gland imaging	3	3
	Blood pool imaging	150	75

# APPLICATION FOR BYPRODUCT MATERIAL LICENSE—MEDICAL

## SUPPLEMENT A—HUMAN USE

(A) OTOPE	(B) CONDITIONS DIAGNOSED OR TREATED	(C) No. Cases Observed (See 1 in key below)	(D) No. Cases Involving Personal Participation (See 2 in key below)
c-99m	Placenta localization	0	0
	Liver and spleen imaging	800	600
	Lung imaging	600	500
	Bone imaging	2000	1500
-133	Blood flow studies and pulmonary function studies	250	150
-75	Pancreas imaging	25	15
32	Treatment of polycythemia, leukemia, and Bone metastases	0	0
	Intracavitary treatment	0	0
31	Treatment of thyroid carcinoma	1	0
	Treatment of hyperthyroidism and cardiac condition	15	10
198	Intracavitary treatment	0	0
60 or -137	Interstitial treatment	0	0
	Intracavitary treatment	0	0
192	Interstitial treatment	0	0
60			
137	Teletherapy treatment	0	0
90	Treatment of eye disease	0	0

a. Column (C) and (D) above

1. Observation should consist of observing radioisotope administration techniques and discussion with preceptor the case histories to establish most appropriate diagnostic and/or therapeutic procedure, limitation, contraindications, etc.
2. Personal participation should consist of (a) supervised examination of patients to determine the suitability for radioisotope diagnosis and/or treatment and recommendation on dosage to be prescribed; (b) collaboration in calibration of the dose and the actual administration of the dose to the patient, including calculation of the radiation dose, related measurements and plotting of data, and (c) adequate period of training to enable the physician to manage radioactive patients and to follow patients through diagnosis and/or the course of treatment.

DATES AND TOTAL NUMBER OF HOURS OF CLINICAL RADIOISOTOPE TRAINING 7/1/76-6/30/78 - 2 yrs.

THE TRAINING AND EXPERIENCE INDICATED ABOVE WAS OBTAINED UNDER THE SUPERVISION OF ROY T. STAUB, M.D.

Touro Infirmary, 1401 Foucher, NOLA - L1198L01

(Institution Name and Address)

(Byproduct Material License Number)

(Signature of Preceptor)

*Roy T. Staub, M.D.*

# CURRICULUM VITAE

NAME : Olga M. Garcia, M.D.

PLACE OF BIRTH : Tegucigalpa, Honduras C.A.

DATE OF BIRTH : July 15, 1944

RELIGION : Catholic

PRESENT ADDRESS : 4716 Gary Mikel Ave.  
Metairie, La 70002

PRIMARY EDUCATION : Tegucigalpa's Institute (Feb. 1956-Nov. 1960)

MEDICAL EDUCATION : Autonomous National University of  
Honduras C.A. (March 1961-Feb. 1968)

DEGREE RECEIVED : M.D. Honduras C.A. (March 1970)

SOCIAL SERVICE : Honduras C.A. (1969-1970)

INTERNSHIP : San Felipe's General Hospital,  
Honduras C.A. (March 1968-Feb. 1969)

ECFMG CERTIFICATION : Sept. 1970 #118-936-4

RESIDENCY-FELLOWSHIP: Anatomic Pathology  
Cook County Hospital  
Chicago, Illinois (1971-1976)

Anatomic and Clinical Pathology  
Hines V.A. Hospital  
Hines, Illinois (1972-1976)

Nuclear Medicine  
Touro Infirmary Hospital  
New Orleans, La (1976-1978)

BOARD CERTIFICATION : In Anatomic Pathology (1979)

BOARD ELIGIBILITY : Nuclear Medicine

PROFESSIONAL SOCIETIES : Society of Nuclear Medicine (Sept. 1977)  
Medical College of Honduras (March 1970)

PRESENTATIONS : "Cerebral Cysticercosis"  
Illinois Registry of Pathology  
Chicago, Illinois (Nov. 1974)

LICENSURE : Illinois & Louisiana



(7-77)  
10 CFR 30TRAINING AND EXPERIENCE  
AUTHORIZED USER OR RADIATION PROTECTION OFFICER

1. NAME OF AUTHORIZED USER OR RADIATION PROTECTION OFFICER

SALVADOR VELAZQUEZ, M. D.

2. STATE OR TERRITORY IN  
WHICH LICENSED TO  
PRACTICE MEDICINE  
Louisiana

## 3. CERTIFICATION

SPECIALITY BOARD A	CATEGORY B	MONTH AND YEAR CERTIFIED C
American Board of Internal Medicine		September, 1980
American Board of Nuclear Medicine	Eligible - exam taken Sept., '83	
American Board of Cardiology	Eligible - exam to be taken Nov., '83	

## 4. TRAINING RECEIVED IN BASIC RADIOISOTOPE HANDLING TECHNIQUES

FIELD OF TRAINING A	LOCATION AND DATE(S) OF TRAINING B	TYPE AND LENGTH OF TRAINING	
		LECTURE/ LABORATORY COURSES (Hours) C	SUPERVISED LABORATORY EXPERIENCE (Hours) D
a. RADIATION PHYSICS AND INSTRUMENTATION	Touro Infirmary Hospital 7/79 - 6/81		
b. RADIATION PROTECTION	Same as 4B.a.		
c. MATHEMATICS PERTAINING TO THE USE AND MEASUREMENT OF RADIOACTIVITY	Same as 4.B.a.		
d. RADIATION BIOLOGY	Same as 4.B.a.		
e. RADIOPHARMACEUTICAL CHEMISTRY	Same as 4.B.a.		

**APPLICATION FOR BYPRODUCT MATERIAL LICENSE—MEDICAL**

**SUPPLEMENT A—PRECEPTOR STATEMENT**

This page is to be completed by the applicant physician's preceptor. If more than one preceptor is necessary to document experience, obtain a separate statement from each. Page 2 may be used for comments and additional information.

10. NAME AND ADDRESS OF APPLICANT PHYSICIAN (Include ZIP Code)

SALVADOR VELAZQUEZ, M. D.  
VA Medical Center #629  
1601 Perdido St., New Orleans, LA 70146

11. CLINICAL TRAINING AND EXPERIENCE OF PHYSICIAN NAMED IN ITEM 10 ABOVE

(A) ISOTOPE	(B) CONDITIONS DIAGNOSED OR TREATED	(C) No. Cases Observed (See 1 in key below)	(D) No. Cases Involving Personal Participation (See 2 in key below)
I-131 or I-125	Diagnosis of thyroid function	260	720
	Determination of blood and blood plasma volume	—	—
	Liver function studies	—	—
	Fat absorption studies	—	—
	Kidney function studies	520	1500
	In vitro studies	1000	3000
Cr-51	Gastrointestinal protein loss studies	—	—
	Determination of red blood cell volume and studies of red blood cell survival	24	72
Fe-59	Iron turn over studies	—	—
Co-58 or Co-60	Intestinal absorption studies	—	—
K-42	Potassium space determinations	—	—
I-131	Thyroid imaging	4	10
	Brain tumor localization and cardiac imaging	—	—
	Cisternography	—	—
	Lung imaging	—	—
	Liver imaging	—	—
	Kidney imaging	—	—
	Placenta localization	—	—
Cr-51	Placenta localization	—	—
	Spleen imaging	—	—
Au-198	Liver imaging	—	—
Hg-197	Brain imaging	—	—
	Kidney imaging	—	—
Hg-203	Brain imaging	—	—
Sr-85	Bone imaging	—	—
Tc-99m	Brain imaging	312	900
	Thyroid imaging	520	1500
	Salivary gland imaging	2	—
	Blood pool imaging	300	2000

# **APPLICATION FOR BYPRODUCT MATERIAL LICENSE—MEDICAL** SUPPLEMENT A—HUMAN USE

(A) ISOTOPE	(B) CONDITIONS DIAGNOSED OR TREATED	(C) No. Cases Observed (See 1 in key below)	(D) No. Cases Involving Personal Participation (See 2 in key below)
Tc-99m	Placenta localization	—	—
	Liver and spleen imaging	780	2340
	Lung imaging	780	2340
	Bone imaging	1040	3020
Xe-133	Blood flow studies and pulmonary function studies	260	720
Se-75	Pancreas imaging	—	—
P-32	Treatment of polycythemia, leukemia, and Bone metastases	4	6
	Intracavitary treatment	1	1
I-131	Treatment of thyroid carcinoma	3	4
	Treatment of hyperthyroidism and cardiac condition	36	102
Au-198	Intracavitary treatment	—	—
Co-60 or CO-137	Interstitial treatment	—	—
	Intracavitary treatment	—	—
Ir-192	Interstitial treatment	—	—
Co-60 CO-137	Teletherapy treatment	—	—
Sr-90	Treatment of eye disease	—	—

## Key to Column (C) and (D) above

1. Observation should consist of observing radioisotope administration techniques and discussion with preceptor the case histories to establish most appropriate diagnostic and/or therapeutic procedure, limitation, contraindications, etc.
2. Personal participation should consist of (a) supervised examination of patients to determine the suitability for radioisotope diagnosis and/or treatment and recommendation on dosage to be prescribed; (b) collaboration in calibration of the dose and the actual administration of the dose to the patient, including calculation of the radiation dose, related measurements, and plotting of data, and (c) adequate period of training to enable the physician to manage radioactive patients and to follow patients through diagnosis and/or the course of treatment.

12. DATES AND TOTAL NUMBER OF HOURS OF CLINICAL RADIOISOTOPE TRAINING 7/79-6/83 - 50 hrs/week/4 yrs.

13. THE TRAINING AND EXPERIENCE INDICATED ABOVE WAS OBTAINED UNDER THE SUPERVISION OF ROY T. STAUB, M. D.

Touro Infirmary  
AT 1401 Foucher St., New Orleans, LA  
(Institution) Name and Address

(Byproduct Material License Number)

*Roy T. Staub*  
x 01-05-84  
(Signature of Preceptor)

CURRICULUM VITAE

NAME : SALVADOR VELAZQUEZ, M. D.

ADDRESS : 4067 South Inwood  
New Orleans, Louisiana 70114

TELEPHONE NUMBER : (504) 393-9181

DATE OF BIRTH : March 17, 1947

PLACE OF BIRTH : Chinandega, Nicaragua

CITIZENSHIP : Nicaragua

SOCIAL SECURITY NUMBER : 438-13-4806

EDUCATION :

ELEMENTARY : St. Joseph College, Chinandega, Nicaragua, 1953-56  
Miguel Larrenynaga School, Chinandega, Nicaragua,  
1956-58

HIGH SCHOOL : Centro America College, Granada, Nicaragua, 1959-64  
Degree - Bachelor of Science and Arts

MEDICAL SCHOOL : Federal University of Parana, Curitiba, Brazil,  
1965-70  
Degree - M.D., December 9, 1970

MEDICAL TRAINING : Rotating Internship, Hospital das Clinicas, Curitiba,  
Parana, Brazil, January 1 - November 30, 1970

Medical Degree obtained December 9, 1970

Social Service at St. Vincent Hospital, Chinandega,  
Nicaragua, February 15 - May 30, 1972

Straight Internal Medicine Internship, Touro  
Infirmary/Tulane University, New Orleans, Louisiana,  
July 1, 1973 - June 30, 1974

Internal Medicine Residency (First Year), Touro  
Infirmary/Tulane University, New Orleans, Louisiana  
July 1, 1974 - June 30, 1975

Internal Medicine Residency (Second Year), Touro  
Infirmary/Tulane University, New Orleans, Louisiana  
July 1, 1975 - June 30, 1976

CURRICULUM VITAE  
SALVADOR VELAZQUEZ, M. D., cont'd

MEDICAL TRAINING cont'd : Fellowship in Cardiology, Touro Infirmary/Tulane University, New Orleans, Louisiana  
July 1, 1976 - June 30, 1978

Private Practice, Chinandega, Nicaragua  
July 15, 1978 - May 30, 1979  
St. Vincent Hospital Medical Staff  
Private Hospital Medical Staff

Fellowship in Nuclear Medicine - Nuclear Cardiology,  
Touro Infirmary, New Orleans, Louisiana  
July 1979 - May, 1983

BOARD CERTIFICATION : American Board of Internal Medicine  
Candidate #055287  
September, 1980

ECFMG #179-841-1  
February 16, 1972

VISA Qualifying Examination  
Applicant #170-841-1  
September, 1982

American Board of Nuclear Medicine - eligible  
(exam taken September, 1983)

American Board of Cardiology - eligible  
(exam taken November, 1983)

LICENSURE : Louisiana - F.L.E.X. #15438  
R#E01204 - L#015438

HOSPITAL STAFF APPOINT-  
MENTS : Active Staff, Department of Nuclear Medicine  
Touro Infirmary, New Orleans, Louisiana  
June, 1983 - September, 1983

Active Staff, Nuclear Medicine Service  
VA Medical Center, New Orleans, Louisiana  
October, 1983 - present

HOSPITAL MEDICAL STAFF  
PRIVILEGES : Active Staff, Department of Radiology/Nuclear Medicine  
Methodist Hospital, New Orleans, Louisiana  
September, 1983 - present

CURRICULUM VITAE  
SALVADOR VELAZQUEZ, M. D., cont'd

HOSPITAL MEDICAL STAFF  
PRIVILEGES, cont'd : Active Staff, Department of Internal Medicine  
Touro Infirmary, New Orleans, Louisiana  
June, 1983 - present

MEDICAL SOCIETY MEMBER-  
SHIP : Southern Medical Association  
1983 -

(7-77)  
10 CFR 30TRAINING AND EXPERIENCE  
AUTHORIZED USER OR RADIATION PROTECTION OFFICER

1. NAME OF AUTHORIZED USER OR RADIATION PROTECTION OFFICER

TOMMIE REDDING

2. STATE OR TERRITORY IN  
WHICH LICENSE IS  
PRACTICE MEDICINE

## 3. CERTIFICATION

SPECIALITY BOARD A	CATEGORY B	MONTH AND YEAR CERTIFIED C

## 4. TRAINING RECEIVED IN BASIC RADIOISOTOPE HANDLING TECHNIQUES

FIELD OF TRAINING A	LOCATION AND DATE(S) OF TRAINING B	TYPE AND LENGTH OF TRAINING	
		LECTURE/ LABORATORY COURSES (Hours) C	SUPERVISED LABORATORY EXPERIENCE (Hours) D
a. RADIATION PHYSICS AND INSTRUMENTATION	Tulane Univ., NOLA	30	
b. RADIATION PROTECTION	Tulane Univ., NOLA	30	
c. MATHEMATICS PERTAINING TO THE USE AND MEASUREMENT OF RADIOACTIVITY			
d. RADIATION BIOLOGY	Tulane Univ., NOLA	12 hrs	
e. RADIOPHARMACEUTICAL CHEMISTRY			



## PRECEPTOR STATEMENT

Supplement B must be completed by the applicant physician's preceptor. If more than one preceptor is necessary to document experience, attach a separate statement from each.

## 1. APPLICANT PHYSICIAN'S NAME AND ADDRESS

FULL NAME

TOMMIE REDDING

STREET ADDRESS

VA Hospital, 1601 Perdido Street

CITY

New Orleans,

STATE

La.

ZIP CODE

70146

## KEY TO COLUMNS

## PERSONAL PARTICIPATION SHOULD INCLUDE ONE OF:

- 1-Supervised examination of patients to determine the suitability of radioisotope diagnosis and/or treatment and the administration of prescribed dosage.
- 2-Collaboration in dose calibration and actual administration of dose to the patient including calculation of the radiation dose, related measurements and plotting of data.
- 3-Adequate period of training to enable physician to manage radioisotope patients and follow patients through diagnosis and/or course of treatment.

## 2. CLINICAL TRAINING AND EXPERIENCE OF ABOVE NAMED PHYSICIAN

ISOTOPE A	CONDITIONS DIAGNOSED OR TREATED B	NUMBER OF CASES INVOLVING PERSONAL PARTICIPATION C	COMMENTS (Additional information or comments may be submitted in duplicate on separate sheets.) D
I-131 or I-125	DIAGNOSIS OF THYROID FUNCTION		See Reverse and also attach curriculum vitae.
	DETERMINATION OF BLOOD AND BLOOD PLASMA VOLUME		
	LIVER FUNCTION STUDIES		
	FAT ABSORPTION STUDIES		
	KIDNEY FUNCTION STUDIES		
	IN VITRO STUDIES		
OTHER			
I-125	DETECTION OF THROMBOSIS		
I-131	THYROID IMAGING		
P-32	EYE TUMOR LOCALIZATION		
Sr-75	PANCREAS IMAGING		
Yb-169	CISTERNOGRAPHY		
Xe-133	BLOOD FLOW STUDIES AND PULMONARY FUNCTION STUDIES		
OTHER			
Tc-99m	BRAIN IMAGING		
	CARDIAC IMAGING		
	THYROID IMAGING		
	SALIVARY GLAND IMAGING		
	BLOOD POOL IMAGING		
	PLACENTA LOCALIZATION		
	LIVER AND SPLEEN IMAGING		
	LUNG IMAGING		
	BONE IMAGING		
OTHER			

experience with radiation:

<u>Max. Amt.</u>	<u>Where Gained</u>	<u>Duration</u>	<u>Use</u>
50 mCi	Baylor College of Med., Houston, Tx.	2 yrs.	Cancer therapy & liver blood flow
10 mCi	VAH, NOLA; VAH, Oklahoma Methodist Hosp., Houston, Tx.	16 yrs. 2 yrs. 1½ yrs.	Thyroid uptake thyroid ablation renal blood flow
50 mCi	VAH, Oklahoma Methodist Hosp., Baylor College of Med., Houston, Tx.	2 yrs. 1½ yrs.	Cancer therapy
1 mCi	VAH, Oklahoma Methodist Hosp. Baylor College of Med., Houston, Tx.	2 yrs. 1½ yrs.	Diagnosis of pernicious anemia and research studies
3 mCi	VAH, Oklahoma, Methodist Hosp. & Baylor College of Med., Houston, Tx.	2 yrs. 1½ yrs.	Red cell survival & red cell mass
1 mCi	VAH, Oklahoma Methodist Hosp. & Baylor College of Med, Houston, Tx.	2 yrs. 2 yrs.	Iron turnover studies
-3 1-25mCi	VAH, Oklahoma, Methodist Hosp., & Baylor College of Med., Houston, Tx.		Intermediate metabolism studies Total body water
5 mCi	VAH, New Orleans,	16 yrs.	Radioactive Iodine uptake studies in thyroid gland of animals
20 mCi	VAH, New Orleans		Thyroid studies, Iodination of anterior pituitary hormones for ACTH, GH, Prolactin, FSH, LH, GF - Radioimmunoassay procedures.

CURRICULUM VITAE

TOMMIE WALLACE REDDING

Born: July 17, 1933, Sapulpa, Oklahoma

Citizenship: United States Citizen

Single

- A. Research Chemist, Veterans Administration Hospital, 1601 Perdido Street, New Orleans, Louisiana, Grade GS-12, 1963 to present.

Research Chemist, Tulane University School of Medicine, Department of Medicine, 1430 Tulane Avenue, New Orleans, Louisiana, 1953 - 1969.

- B. Education:

Sapulpa High School (High School Certificate) Sapulpa, Oklahoma, June 1951.

University of Oklahoma, B.S. Degree, June 1956, Zoology.

University of Oklahoma Graduate School, June 1957 - 1958, Zoology.

Tulane University School of Medicine, Physiology Department, 1965.

- C. Member of the following scientific societies:

Phi Sigma Scholastic Biological Society

American Association of University Professors

Society of Nuclear Medicine.

American Chemical Society- Medicinal Chemistry.

Endocrine Society

1. Mennes, A.R., and Redding, T.W., Defective Synthesis of Triglycerides from 1-C-14 acetate in Well Controlled Stable Adult Diabetics., *Diabetes Journal*. 10:85, 1961.
2. Redding, T.W., and P.C. Johnson, Thyroid State and Glucose Oxidation by Blood., *Proc. Soc. Exptl. Biol & Med.*, 109: 153, 1962.
3. Schally, A.V., C.Y. Bowers, T. Kuroshima, Y. Ishida, T.W. Redding, W.H. Carter and H.S. Mayerson. Biological properties of lysine vasopressin dimers. *Federation Proc.* 23: #630, 206, 1964.
4. Bowers, C.Y., T.W. Redding and A.V. Schally. Effect of  $\alpha$ - and  $\beta$ -melanocyte stimulating hormones and other peptides on the thyroid in mice. *Endocrinology* 74: 559, 1964.
5. Schally, A.V., C.Y. Bowers, T.W. Redding, A. Kuroshima and Y. Ishida. Hypophysiotropic releasing factors of beef hypothalamus. Abstracts of the 46th Endocrine Society Meeting, San Francisco #56, p. 50, June, 1964.
6. Redding, T.W., C.Y. Bowers, and A.V. Schally. The effects of morphine and other narcotics on the thyrotropin (TSH) secretion in mice. Abstracts of the 46th Meeting of the Endocrine Society, San Francisco, #226, June, 1964.
7. Redding, T.W., C.Y. Bowers and A.V. Schally. The effects of reserpine, chlorpromazine and alderlin on thyroid function in mice. Abstract of the 46th Meeting of the Endocrine Society, San Francisco, #227, p. 135, 1964.
8. Schally, A.V., C.Y. Bowers, A. Kuroshima, Y. Ishida, W.H. Carter and T.W. Redding. Effect of lysine vasopressin dimers on blood pressure and some endocrine functions. *Am. J. of Physiol.* 207: 378, 1964.
9. Redding, T.W., C.Y. Bowers and A.V. Schally. The effects of morphine and other narcotics on thyroid function in mice. *Acta Endocr.* 51: 391, 1966.
10. Bowers, C.Y., T.W. Redding and A.V. Schally. Effect of thyrotropin releasing factors of ovine, bovine, porcine, and human origin on thyrotropin secretion. *Clinical Research XIII*, 42, 1965.
11. Redding, T.W., C.Y. Bowers and A.V. Schally. A *in vivo* assay for thyrotropin releasing factor. *Endocrinology* 79: 229, 1966.
12. Bowers, C.Y., T.W. Redding and A.V. Schally. Effect of thyrotropin-releasing factor (TRF) of ovine, bovine, porcine and human origin on thyrotropin release *in vitro* and *in vivo*. *Endocrinology* 77: 609, 1965.

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14. Schally, A.V., C.Y. Bowers, and T.W. Redding. Presence of thyrotropic hormone-releasing factor (TRF) in porcine hypothalamus. Proc. Soc. Exp. Biol. Med. 121: 718, 1966.
15. Schally, A.V., A. Kuroshima, Y. Ishida, T.W. Redding, and C.Y. Bowers. The presence of prolactin inhibiting factor (PIF) in extracts of beef, sheep and pig hypothalami. Proc. Soc. Exp. Biol. Med. 118: 350, 1965.
16. Schally, A.V., C.Y. Bowers, A. Kuroshima, Y. Ishida, T.W. Redding and A.J. Kastin. Hormonal activities of beef and pig hypothalamus. Excerpta Medica International Congress Series No. 87, p. 275, Proc. of the 23rd Int. Congress of Physiological Sciences, Tokyo, 1965.
17. Schally, A.V., T.W. Redding and C.Y. Bowers. Purification of thyrotropic hormone releasing factor (TRF). Fed. Proc. 24: 191, #355, 1965.
18. Redding, T.W., C.Y. Bowers and A.V. Schally. In vivo assay for thyrotropic hormone-releasing factor (TRF). Abstract 47th Endocrine Society Meeting, p. 120, #199, New York, 1965.
19. Schally, A.V., C.Y. Bowers, T.W. Redding, A. Kuroshima, Y. Ishida. Neurohumoral factors in pig hypothalamic extracts. Abstract 47th Endocrine Society Meeting, p. 125, New York, #210, 1965.
20. Schally, A.V., C.Y. Bowers, A. Kuroshima, Y. Ishida, T.W. Redding and A.J. Kastin. Hormonal Activities of Beef and Pig Hypothalamus. Abstract XXIII International Congress of Physiological Sciences, Tokyo, #58, pg. 41, 1965.
21. Kuroshima, A., Y. Ishida, T.W. Redding, C.Y. Bowers, and A.V. Schally. Studies on Hypothalamic Growth Hormone Releasing Factor. Abstract XXIII International Congress of Physiological Sciences, Tokyo, #560, p. 248, 1965.
22. Bowers, C.Y., T.W. Redding and A.V. Schally. Peptide-like materials from the diencephalon of animals and humans which stimulate thyrotropin release in vitro and in vivo. Abstract from the VIth Pan American Congress of Endocrinology, Mexico, #159, p. 75, 1965.
23. Schally, A.V., C.Y. Bowers, A. Kuroshima, Y. Ishida, T.W. Redding and A.J. Kastin. Hypothalamic factors affecting the release of six anterior pituitary hormones. Abstract from the VIth Pan American Congress of Endocrinology, #229, pg. 104, Mexico, 1965.

24. Redding, T.W., C.Y. Bowers and A.V. Schally. The effect of hypophysectomy on hypothalamic obesity in mice. Abstract from the VIII Pan American Congress of Endocrinology, #260, p. 117, Mexico, 1965.
25. Schally, A.V., T.W. Redding, and C.Y. Bowers. Thyrotropic Hormone Releasing Factor (TRF). Its Chemistry and Physiology. Third Gunma Symposium on Endocrinology, Maebashi, Japan 3: 15-37, 1966.
26. Schally, A.V., A.J. Kastin, T.W. Redding, C.Y. Bowers, H. Yajima, and K. Kubo. Pigmentary and Thyroid Stimulating Effects of Synthetic MSH-ACTH Peptides. Abstract from III International Pharmacological Congress, Sao Paulo, Brazil, #356, p. 141, 1966.
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28. Redding, T.W., C.Y. Bowers and A.V. Schally. An *in vivo* assay for Thyrotropin Releasing Factor (TRF). Fed. Proc. 25: 380, #1077, 1966.
29. Redding, T.W., C.Y. Bowers and A.V. Schally. Effect of hypophysectomy on hypothalamic obesity in CBA mice. Proc. Soc. Exp. Biol. Med. 121: 726, 1966.
30. Bowers, C.Y., T.W. Redding and A.V. Schally. Evidence for the presence of thyrotropin releasing factors activity in domestic animals and humans. Clinical Research 14: 97, 1968.
31. Schally, A.V., E.E. Muller, A. Arimura, C.Y. Bowers, T. Saito, T.W. Redding, S. Sawano and P. Pizzolato. Releasing factors in human hypothalamic and neurohypophysial extracts. J. Clin. Endocr. Metab. 27: 755, 1967.
32. Kastin, A.J., T.W. Redding and A.V. Schally. Elevation of rat pituitary MSH levels after pinealectomy. Clinical Research 15: 32, 1967.
33. Kastin, A.J., T.W. Redding and A.V. Schally. MSH activity in rat pituitaries after pinealectomy. Proc. Soc. Exp. Biol. Med. 124: 1275, 1967.
34. Redding, T.W. and A.V. Schally. Composition of plasma triglyceride fatty acids and free fatty acids in hypothalamic obese mice. Proc. Soc. Exp. Biol. Med. 124: 243, 1967.
35. Schally, A.V., C.Y. Bowers, T.W. Redding and J.F. Barrett. Isolation of thyrotropin releasing factor (TRF) from porcine hypothalamus. Biochem. Biophys. Res. Comm. 25: 165, 1966.



36. Schally, A.V., E.E. Muller, S. Sawano, T. Saito, T.W. Redding and C.Y. Bowers. In vitro studies with hypothalamic releasing factors. Fed. Proc. 26: 365, 1967.
37. Schally, A.V., A. Arimura, C.Y. Bowers, S. Sawano, A.J. Kastin, T.W. Redding and T. Saito. Physiological and biochemical studies on some highly purified hypothalamic releasing factors. Pharmacology of Hormonal Polypeptides and Proteins (Back, R., Paoletti, R., and Martini, L., eds.) Plenum Corporation, New York, p. 158, 1968.
38. Schally, A.V., A. Arimura, C.Y. Bowers, A.J. Kastin, S. Sawano, and T.W. Redding. Hypothalamic Neurohormones Regulating Anterior Pituitary Function. In: Recent Progress in Hormone Research (E.B. Astwood, ed.) 24: 497, 1968, Academic Press, New York.
39. Redding, T.W. and A.V. Schally. Depletion of pituitary thyrotropic hormone by thyrotropin releasing factor. Endocrinology 81: 918, 1967.
40. Schally, A.V., A.J. Kastin, T.W. Redding, C.Y. Bowers, H. Yajima and K. Kubo. Thyroid stimulating and pigmentary effects of synthetic peptides related to  $\alpha$ -MSH and ACTH. Metabolism 16: 824, 1967.
41. Schally, A.V., T.W. Redding, C.Y. Bowers, and J.F. Barrett. Isolation and Properties of porcine Thyrotropin Releasing Hormone. J. Biol. Chem. 244: 4077, 1969.
42. Redding, T.W., and A.V. Schally. Studies on thyrotropin-releasing hormone (TRH) activity in peripheral blood. Proc. Soc. Exp. Biol. Med. 131: 420, 1969.
43. Redding, T.W. and A.V. Schally. Studies on the inactivation of thyrotropin-releasing hormone (TRH). Proc. Soc. Exp. Biol. Med. 131: 415, 1969.
44. Mittler, J.C., T.W. Redding and A.V. Schally. Stimulation of Thyrotropin (TSH) Secretion by TSH Releasing Factor (TRF) in Organ Cultures of Anterior Pituitary. Proc. Soc. Exp. Biol. Med. 130: 406, 1969.
45. Bowers, C.Y., A.V. Schally, W.H. Carter, T.W. Redding and M. Saito. Effect of Actinomycin D (Act D) on the Inhibitory Response of Estrogen on LH Release. Fed. Proc. 28: #696, page 381, 1969.
46. Redding, T.W., Z. Itoh and A.V. Schally. Effect of Thyrotropin (TSH) Releasing Factor (TRF) on Plasma TSH levels in Nutria (*Myocastor coypus*). Gen. Comp. Endocr. 12: 391, 1969.
47. Schally, A.V., A. Arimura, C.Y. Bowers, A.J. Kastin, T.W. Redding, J.C. Mittler, R.M.G. Nair, A.J. Segal and P. Pizzolato. Purification of Hypothalamic Releasing Hormones of Human Origin. J. Clin. Endocr. Metab. 31: 291, Sept., 1970.



48. Redding, T.W. and A.V. Schally. Preparation of Tritiated Thyrotropin Releasing Hormone (TRH) by the Wilzbach Method. International J. of Applied Radiation and Isotopes 21: 742, 1970.
49. Redding, T.W. and A.V. Schally. A Lipid Factor from the hypothalamus. Metabolism 19: 641, 1970.
50. Mittler, J.C., S. Sawano, I. Wakabayashi, T.W. Redding and A.V. Schally. Stimulation of release and synthesis of Growth Hormone (GH) in Tissue Cultures of Anterior Pituitaries in Response to GH-Releasing Hormone (GH-RH). Proc. Soc. Exp. Biol. Med. 133: 890, March, 1970.
51. Schally, A.V., T.W. Redding, H.W. Lucien and J. Mayer. Enterogastrone inhibits eating by fasted mice. Science 157: 210, 1967.
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68. Schally, A.V., A. Arimura, I. Wakabayashi, S. Sawano, J.F. Barrett, C.Y. Bowers, T.W. Redding, J.C. Mittler and M. Saito. Chemistry of Hypothalamic Growth Hormone-Releasing Hormone (GH-RH). In: Hypophysiotropic Hormones of the Hypothalamus: Assay and Chemistry (J. Meites, ed.) The Williams and Wilkins Co., Baltimore, Md., pg. 208, 1970.
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99. Tommie W. Redding and Andrew V. Schally. Effect of hypothalamic preparations of human omental adipose tissue in vitro. Metabolism 21: #6, 499-506 (1972).
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110. Redding, T.W., and E.J. Coy,, The Disappearance, Distribution, and Excretion of <sup>125</sup>I-Labeled Tyrosine-1-Growth Hormone Release-Inhibiting Factor (<sup>125</sup>I-Tyr-1-GIF ) In Mice, Rats and Man., The Endocrine Society Meeting, Atlanta, Ga., June 1974.
111. Schally, A.V., Redding, T.W., Takahara, J., Coy, D.H., and A. Arimura., Lack of Growth Hormone-Releasing Activity of (Pyro)Glu-Ser-Gly-NH<sub>2</sub>. Biochem. Biophys. Res. Comm. 55: 556, 1973.
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1. Clinical Tests Performed

1. Schilling Test a. Vitamina B<sub>12</sub> (Co-60) absorption  
b. Co-60 B<sub>12</sub> Liver uptake
2. Fat Absorption a. I-131 Triglyceride  
b. I-131 Fatty Acid
3. Protein Absorption  
a. I-131 albumin
4. Iron-59 Turnover  
a. Disappearance  
b. Return
5. Serum Triiodothyronine (I-131) Binding Capacity  
a. Red Cell Adsorption  
b. Resin Binding  
c. Sephadex Chromatography
6. Thyroid I-131 Uptakes
7. Thyroid I-131 Scans
8. Rose Bengal I-131 Liver Scans
9. Renal Scans I-131 and Hg-203
10. Renal Blood Flow (I-131 Diodrast)
11. Liver Blood Flow (Au -198)
12. Red Cell Survival (Cr-51)
13. Blood Volume - Plasma Volume (I-131 albumin)
14. Total Body Water (H<sub>2</sub><sup>18</sup>O)
15. Extracellular Fluid (S-35)
16. Myocardial Blood Flow and Cardiac Output
17. Other Clinical Tests eg., Cholesterol  
Enzymes  
Glucose  
BSP
18. Radioimmunoassay for LH, FSH, GH, TSH, Prolactin and  
LH-RH, ACTH, INSULIN,



TRAINING AND EXPERIENCE  
AUTHORIZED USER OR RADIATION PROTECTION OFFICER

1. NAME OF AUTHORIZED USER OR RADIATION PROTECTION OFFICER

ABDA KASTIN, M.D.

2. STATE OR TERRITORY IN  
WHICH LICENSED TO  
PRACTICE MEDICINE

## 3. CERTIFICATION

SPECIALITY BOARD  
ACATEGORY  
BMONTH AND YEAR CERTIFIED  
C

## 4. TRAINING RECEIVED IN BASIC RADIOISOTOPE HANDLING TECHNIQUES

FIELD OF TRAINING A	LOCATION AND DATE(S) OF TRAINING B	TYPE AND LENGTH OF TRAINING	
		LECTURE/ LABORATORY COUNCIL C	SUPERVISED LABORATORY EXPERIENCE (month) D
a. RADIATION PHYSICS AND INSTRUMENTATION	VA Hospital, Nashville, Tenn. (1961)	30	
b. RADIATION PROTECTION	Same as Item a. above		
c. MATHEMATICS PERTAINING TO THE USE AND MEASUREMENT OF RADIOACTIVITY	Same as Item a. above		
d. RADIATION BIOLOGY	Same as Item a. above		
e. RADIOPHARMACEUTICAL CHEMISTRY	Same as Item a. above		

## PRECEPTOR STATEMENT

Supplement B must be completed by a precepting physician's preceptor. If more than one preceptor is necessary to document experience, each is to complete this statement from each.

## 1. APPLICANT PHYSICIAN'S NAME AND ADDRESS

FULL NAME

ABBA KASTIN, M. D.

STREET ADDRESS

VA Hospital

CITY

New Orleans

STATE

La.

ZIP CODE

70146

## KEY TO COLUMN C

PERSONAL PARTICIPATION SHOULD CONSIST OF:

1-Consulting examination of patients to determine the suitability for radioisotope diagnosis and/or treatment and recommendation for prescribed dosage.

2-Collaboration in dose calibration and actual administration of dose to the patient including calculation of the radiation dose, related measurements and plotting of data.

3-Extensive period of training to enable physician to manage radioactive patients and follow patients through diagnosis and/or course of treatment.

## 2. CLINICAL TRAINING AND EXPERIENCE OF ABOVE NAMED PHYSICIAN

ISOTOPE	CONDITIONS DIAGNOSED OR TREATED	NUMBER OF CASES INVOLVING PERSONAL PARTICIPATION	COMMENTS
A	B	C	D
I-131 or I-125	DIAGNOSIS OF THYROID FUNCTION		See reverse. Also attached curriculum vitae
	DETERMINATION OF BLOOD AND BLOOD PLASMA VOLUME		
	LIVER FUNCTION STUDIES		
	FAT ABSORPTION STUDIES		
	KIDNEY FUNCTION STUDIES		
	IN VITRO STUDIES		
OTHER			
I-125	DETECTION OF THROMBOSES		
I-131	THYROID IMAGING		
P-32	EYE TUMOR LOCALIZATION		
Sr-75	PANCREAS IMAGING		
Yb-102	CISTERNOGRAPHY		
Xe-133	BLOOD FLOW STUDIES AND PULMONARY FUNCTION STUDIES		
OTHER			
Tc-99m	BRAIN IMAGING		
	CARDIAC IMAGING		
	THYROID IMAGING		
	SALIVARY GLAND IMAGING		
	BLOOD POOL IMAGING		
	PLACENTA LOCALIZATION		
	LIVER AND GALLBLADDER IMAGING		
	LUNG IMAGING		
	BONE IMAGING		
OTHER			

<u>Isotope</u>	<u>Max. Amount=</u>	<u>Where Trnd.</u>	<u>Duration of Trng.</u>	<u>Use</u>
I-125	25 mCi	VAH, New Orleans	7 yrs.	Radioimmunoassay
I-131	5 mCi	VAH, New Orleans	1 yr.	Radioimmunoassay
C-14	2 mCi	VAH, New Orleans	1 yr.	T <sub>1/2</sub> & metabolism study in rats
H-3	10 mCi	VAH, New Orleans	5 yrs.	T <sub>1/2</sub> localization identification in rats

Total isotope use experience at the VAH, New Orleans - 14 years

ABBA J. KASTIN, M.D.

Born: December 24, 1934 - Cleveland, Ohio

Education:

A.B. Harvard College, 1956

M.D. Harvard Medical School, 1960

Training:

6/58 - 9/58 Research Assistant, Dr. George Sayers, Western Reserve University School of Medicine

7/59 - 7/60 Student Project, Drs. Harry Lipscomb and Don H. Nelson, Harvard Medical School

7/60 - 7/61 Medical Intern, Vanderbilt University Hospital

7/61 - 7/62 Assistant Resident, Medicine, Vanderbilt University Hospital

7/62 - 9/64 Clinical Associate, Endocrinology Branch, National Cancer Institute, National Institutes of Health

9/64 - 1/65 Special Postdoctoral Fellow, NCI, NIH

Academic Appointments:

7/61 - 7/62 Assistant, Department of Medicine, Vanderbilt University

9/64 - 1/65 Assistant, Department of Medicine, Tulane University

1/65 - 7/66 Instructor, Department of Medicine, Tulane University

7/66 - 7/71 Assistant Professor, Department of Medicine, Tulane University

7/71 - 7/74 Associate Professor, Department of Medicine, Tulane University

1/76 - present Associate Member of Graduate Faculty (Department of Psychology) University of New Orleans

7/74 - present Professor, Department of Medicine, Tulane University

Hospital Appointments:

Veterans Administration Hospital:

9/64 - 1/65 Medical Research Fellow, VA Hospital, New Orleans

1/65 - 1/68 Clinical Investigator, VA Hospital, New Orleans

7/66 - 1/68 Clinical Consultant in Endocrinology, VA Hospital, New Orleans

1/68 - present Chief, Endocrinology Section, VA Hospital, New Orleans

## Charity Hospital

- 7/66 - 7/69 Assistant Visiting Physician, Charity Hospital, New Orleans, La.  
7/69 - present Visiting Physician, Charity Hospital, New Orleans, La.

## Grants:

- 7/65 - 7/66 Senior Research Grant, Louisiana Heart Association  
1/65 - 1/68 Clinical Investigator Grants; VA Central Office  
1/68 - present NINDS, NIH, PHS - NS 07664  
6/68 - 7/68 NIH Travel Fellow of the Endocrine Society (to Third International Congress of Endocrinology, Mexico City where Chairman, MSH Section).  
1/70 - present Part I Grants, VA Central Office

## Awards:

- 1975 Federal Business Association "Eagle" Award and Key to the City of New Orleans  
1975 Recipient (with Dr. A.V. Schally), Edward T. Tyler Fertility Award

## Special Studies:

- 9/66 - 1/67 Visiting Scientist, Karolinska Hospital (Dr. Egon Diezfelusy, Stockholm, Sweden; and special studies, Malmo General Hospital (Dr. Stig Kullander) and University of Copenhagen (Dr. Barker Jorgensen).  
2/72 Visiting Professor, Clinical Research Institute of Montreal (University of Montreal)

## Teaching:

- 1972 Cited by Tulane Medical students (Owl Club) for outstanding teaching (honorable mention).  
1976-77 Distinguished Scientist Lecturer, Department of Anatomy, Tulane University School of Medicine  
1977 Outstanding Teacher Award, Tulane Medical students (Owl Club)

## Societies:

- 1964 American Federation for Clinical Research  
1965 The Endocrine Society  
1965 American Association for the Advancement of Science  
1966 The American Physiological Society  
1967 Society for Experimental Biology and Medicine

- 1969 Society for Neuroscience
- 1970 Southern Society for Clinical Investigation
- 1970 International Society of Psychoneuroendocrinology
- 1972 International Society of Neuroendocrinology (Charter Member)

Societies (Honorary Membership):

- 1966 La Société de Dermo-Chimie
- 1970 Chilean Society of Endocrinology
- 1976 Philippine Society of Endocrinology and Metabolism

Advisory Boards:

- 7/74 - 7/77 Medical Advisory Board, National Pituitary Agency
- 1/76 - 1/81 Editorial Board, Journal of Clinical Endocrinology and Metabolism
- 1/76 - present Editorial Board, Brain Research Bulletin (Regional Editor)
- 1/77 - present Editorial Board, Biobehavioral Reviews (Regional Editor)

## Bibliography:

### A. Papers

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2. Kastin, A.J. and R.F. Gittes. Skin Graft Challenge to Pituitary Transplants in the Rat. *Endocrinology* 75: 457, 1964.
3. Kastin, A.J. and G.T. Ross. Modified In Vivo Assay for MSH. *Experientia* 20: 461, 1964.
4. Gittes, R.F., A.J. Kastin, D.B. Groff, and A.F. Ketcham. Deficiency of Effective Histocompatibility Antigens in Pituitary and Parathyroid Tissue. *Surgical Forum* 15: 164, 1964.
5. Kastin, A.J., M.B. Lipsett, A.K. Ommaya, and J.M. Moser. Asymptomatic Hypernatremia; Physiological and Clinical Study. *Am. J. Med.* 38: 306, 1965.
6. Douglas, G.W., A.J. Kastin, and R.W. Huntington. Carcinoma Arising in a Retroperitoneal Mullerian Cyst, with Widespread Metastasis during Pregnancy. *Am. J. Ob. Gyn.* 91: 210, 1965.
7. Paul, W.E., A.J. Kastin, and W.D. Odell. The Effect of Ionizing Radiation on Melanocyte-Stimulating and Steroidogenic Activities of Corticotropin. *Biochem. Biophys. Acta* 100: 263, 1965.
8. Kastin, A.J. and G.T. Ross. MSH and ACTH Activities in Pituitaries of Frogs with Hypothalamic Lesions. *Endocrinology* 77: 45, 1965.
9. Schally, A.V., C.Y. Bowers, A. Kuroshima, Y. Ishida, T.W. Redding, and A.J. Kastin. Hormonal Activities of Beef and Pig Hypothalamus. *Proc. XXIII International Congress of Physiological Sciences*, p. 275, 1965.
10. Kastin, A.J., A.V. Schally, H. Yajima, and K. Kubo. Melanocyte Stimulating Hormone Activity of Synthetic MSH and ACTH Peptides In Vivo and In Vitro. *Nature* 207: 976, 1965.
11. Kastin, A.J., A. Arimura, and A.V. Schally. Topical Absorption of Polypeptide Hormones with Dimethylsulfoxide. *Arch. Dermatol.* 93: 471, 1966.
12. Gittes, R.F. and A.J. Kastin. Effects of Increasing Numbers of Pituitary Transplants in Hypophysectomized Rats. *Endocrinology* 78: 1023, 1966.
13. Kastin, A.J. and A.V. Schally. In Vivo Assay for Melanocyte Lightening Substances. *Experientia* 22: 389, 1966.



14. Schally, A.V., A.J. Kastin, J.F. Barrett, W.H. Carter, C.Y. Bowers and W.F. White. On Vasodepressor Activity in the Hypothalamus. *Biochem. Pharm.* 15: 1805, 1966.
15. Kastin, A.J. and A.V. Schally. MSH Activity in Pituitaries of Rats Treated with Hypothalamic Extracts. *Gen. Comp. Endocrinol.* 7: 452, 1966.
16. Schally, A.V. and A.J. Kastin. Purification of a Bovine Hypothalamic Factor which Elevates Pituitary MSH Levels in Rats. *Endocrinology* 79: 768, 1966.
17. Kastin, A.J. and A.V. Schally. MSH Activity in Pituitary Glands of Rats Treated with Tranquilizing Drugs. *Endocrinology* 79: 1018, 1966.
18. Kastin, A.J., G.T. Ross, and A.V. Schally. Controle Hypothalamique de la Secretion de MSH. *Arch. Biochim. Cosmet.* 9: 9, 1966.
19. Kastin, A.J. and A.V. Schally. Autoregulation of Release of Melanocyte Stimulating Hormone from the Rat Pituitary. *Nature* 213: 1238, 1967.
20. Kastin, A.J. and A.V. Schally. MSH Activity in Pituitaries of Rats Treated with Hypothalamic Extracts from Various Animals. *Gen. Comp. Endocrinol.* 8: 344, 1967.
21. Kastin, A.J., T.W. Redding, and A.V. Schally. MSH Activity in Rat Pituitaries after Pinealectomy. *Proc. Soc. Exp. Biol. Med.* 124: 1275, 1967.
22. Schally, A.V., A.J. Kastin, T.W. Redding, C.Y. Bowers, H. Yajima, and K. Kubo. Thyrotropin-Like and Pigmentary Effects of Synthetic Peptides Related to MSH and ACTH. *Metabolism* 16: 824, 1967.
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29. Kastin, A.J., M.C. Miller and A.V. Schally. MSH Activity in the Rat Pituitary after Treatment with Nembutal and Morphine: A New Bioassay for MSH-Release Inhibiting Factor (MIF). *Endocrinology* 83: 137, 1968.
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32. Schally, A.V. and A.J. Kastin. The Present Concept of the Nature of Hypothalamic Hormones Stimulating and Inhibiting the Release of Pituitary Hormones. *Triangle* 9: 15, 1969.
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10 CFR 30TRAINING AND EXPERIENCE  
AUTHORIZED USER OR RADIATION PROTECTION OFFICER

1. NAME OF AUTHORIZED USER OR RADIATION PROTECTION OFFICER

THOMAS J. WEATHERALL, M. D.

2. STATE OR TERRITORY IN  
WHICH LICENSED TO  
PRACTICE MEDICINE

Miss., Tenn., La. &amp; Fla.

## 3. CERTIFICATION

SPECIALITY BOARD  
ACATEGORY  
BMONTH AND YEAR CERTIFIED  
C

American Board of Radiology

1961

## 4. TRAINING RECEIVED IN BASIC RADIOISOTOPE HANDLING TECHNIQUES

FIELD OF TRAINING A	LOCATION AND DATE(S) OF TRAINING B	TYPE AND LENGTH OF TRAINING	
		LECTURE/ LABORATORY COURSES (Hours) C	SUPERVISED LABORATORY EXPERIENCE (Hours) D
a. RADIATION PHYSICS AND INSTRUMENTATION			
b. RADIATION PROTECTION			
c. MATHEMATICS PERTAINING TO THE USE AND MEASUREMENT OF RADIOACTIVITY			
d. RADIATION BIOLOGY			
e. RADIOPHARMACEUTICAL CHEMISTRY			



## Actual experience with radiation:

<u>Isotope</u>	<u>Max. Amount</u>	<u>Where Gained</u>	<u>Duration</u>	<u>Use</u>
Co-60 (wire alloy)	400 mCi	Gulf South Rad. Ctr.		Interstitial Treatment of cancer
Sr-90 (eye applicator)	100 mCi	Gulf S. Rad. Ctr.		Treatment of eye disease & superficial skin disease and cancer
I-125 (seeds)	150 mCi	Gulf S. Rad. Ctr.		Interstitial treatment of cancer
Cs-137 (sealed source)	250 mCi	Seroni Tumor Instit. Houma Med. Surg. Clinic		Intracavitary treatment of cancer
Ir-192 (seeds)	800 mCi	Gulf S. Rad. Ctr.		Interstitial treatment of cancer
Au-198 (seeds)	200 mCi	Ochsner Hospital & Houma Med Surg. Clinic		Interstitial treatment of cancer
Rn-222 (seeds)	150 mCi	Univ. of Miss., Seroni Tumor Institute, Royal Marsden Hosp., Ochsner Hosp., Gulf S. Rad. Ctr. <del>xxGulf S. Rad. Ctr. Houma Med. Surg. Clinic</del>		Intracavitary & Interstitial treatment of cancer
Ra-226 (sealed source)	500 mCi	Same as above		Same as above

# PRECEPTOR STATEMENT

Supplement B must be completed by the applicant physician's preceptor. If more than one preceptor is necessary to document experience, obtain a separate statement from each.

1. PHYSICIAN'S NAME AND ADDRESS		<b>KEY TO COLUMN C</b> <b>PERSONAL PARTICIPATION SHOULD CONSIST OF:</b> 1-Supervised examination of patients to determine the suitability for radioisotope diagnosis and/or treatment and recommendation for prescribed dosage. 2-Collaboration in dose calibration and actual administration of dose to the patient including calculation of the radiation dose, related measurements and plotting of data. 3-Adequate period of training to enable physician to manage radioactive patients and follow patients through diagnosis and/or course of treatment.
FULL NAME		
THOMAS J. WEATHERALL, JR., M.D.		
STREET ADDRESS		
1601 Perdido Street		
CITY	STATE	ZIP CODE
New Orleans, La.		70146

## 2. CLINICAL TRAINING AND EXPERIENCE OF ABOVE NAMED PHYSICIAN

ISOTOPE A	CONDITIONS DIAGNOSED OR TREATED B	NUMBER OF CASES INVOLVING PERSONAL PARTICIPATION C	COMMENTS (Additional information or comments may be submitted in duplicate on separate sheets.) D
I-131 or I-125	DIAGNOSIS OF THYROID FUNCTION		See reverse.
	DETERMINATION OF BLOOD AND BLOOD PLASMA VOLUME		
	LIVER FUNCTION STUDIES		
	FAT ABSORPTION STUDIES		
	KIDNEY FUNCTION STUDIES		
	IN VITRO STUDIES		
OTHER			
I-125	DETECTION OF THROMBOSIS		
I-131	THYROID IMAGING		
P-32	EYE TUMOR LOCALIZATION		
Se-75	PANCREAS IMAGING		
Yb-169	CISTERNOGRAPHY		
Xe-133	BLOOD FLOW STUDIES AND PULMONARY FUNCTION STUDIES		
OTHER			
Tc-99m	BRAIN IMAGING		
	CARDIAC IMAGING		
	THYROID IMAGING		
	SALIVARY GLAND IMAGING		
	BLOOD POOL IMAGING		
	PLACENTA LOCALIZATION		
	LIVER AND SPLEEN IMAGING		
	LUNG IMAGING		
	BONE IMAGING		
OTHER			

# PRECEPTOR STATEMENT (Continued)

## 2. CLINICAL TRAINING AND EXPERIENCE OF ABOVE NAMED PHYSICIAN (Continued)

ISOTOPE A	CONDITIONS DIAGNOSED OR TREATED B	NUMBER OF CASES INVOLVING PERSONAL PARTICIPATION C	COMMENTS (Additional information or comments may be submitted in duplicate on separate sheets.) D
P-32 (Soluble)	TREATMENT OF POLYCYTHEMIA VERA, LEUKEMIA, AND BONE METASTASES		
P-32 (Colloidal)	INTRACAVITARY TREATMENT		
I-131	TREATMENT OF THYROID CARCINOMA		
	TREATMENT OF HYPERTHYROIDISM AND CARDIAC CONDITION		
Au-198	INTRACAVITARY TREATMENT	6	
Co-60 or Cs-137	INTERSTITIAL TREATMENT		
	INTRACAVITARY TREATMENT	40	
I-125 or Ir-192	INTERSTITIAL TREATMENT	17	
	TELETHERAPY TREATMENT		
Sr-90	TREATMENT OF EYE DISEASE		
	RADIOPHARMACEUTICAL PREPARATION		
Mo-99/ Tc-99m	GENERATOR		
Sn-113/ In-113m	GENERATOR		
Tc-99m	REAGENT KITS		
Other  Rn-222	Interstitial Treatment	50	

## 3. DATES AND TOTAL NUMBER OF HOURS RECEIVED IN CLINICAL RADIOISOTOPE TRAINING

4. THE TRAINING AND EXPERIENCE INDICATED ABOVE WAS OBTAINED UNDER THE SUPERVISION OF:		6. PRECEPTOR'S SIGNATURE	
NAME OF SUPERVISOR Dr. B. T. Hickman Dr. Vincent Collins		7. PRECEPTOR'S NAME (Please type or print)	
NAME OF INSTITUTION Univ. of Miss. Med. Ctr. Rosewood Hosp., Dept. of Radiotherapy			
MAILING ADDRESS Jackson, Miss. Houston, Texas			
5. MATERIALS LICENSE NUMBER(S)		8. DATE	

## BIOGRAPHICAL DATA CARD

(Please type and do not fold)

Name in full (do not use initials) THOMAS JEFFERSON WEATHERALL, JR. 425-42-  
Social SecurityAddress 7307 HURST STREET, NEW ORLEANS, LA 70118 Phone 865-1Date of birth 4 10 29 Place of birth NEW YORK, NEW YORK  
Month Day YearU.S. citizen YES If not U.S. citizen, indicate country of citizenship \_\_\_\_\_ Sex M Religious preference PROTESTANT  
Yes NoMarital status MARRIED Spouse's full name JENNIFER CLAIRE VINCENT WEATHERALL Number of children 2Name and address of person to be notified in case of accident JENNIFER WEATHERALL, 7307 HURST ST. N.O.If you are related to any member of the present University staff, give name and indicate relationship NONE

Scholastic training: Give names of institutions attended, etc., as indicated below:

College, University, or Other Institutions and Location	Dates Attended	Dates of Graduation and or Certificate Obtained
<u>UNIVERSITY OF ALABAMA</u>	<u>1947-1949</u>	<u>1950 - BS</u>
<u>VANDERBILT UNIVERSITY</u>	<u>1949-53</u>	<u>1953 - M.D.</u>
<u>BROOKE ARMY HOSPITAL ( INTERNSHIP )</u>	<u>1953-54</u>	
<u>UNIVERSITY OF MISSISSIPPI ( RESIDENCY )</u>	<u>1957-1960</u>	

Major subjects studied: (a) in undergraduate work PRE MED  
(b) in graduate work MEDICAL SCHOOLMembership in honorary societies; scholarships held, or other recognition received PHI BETA KAPPA  
Alpha Omega AlphaPresent membership in learned societies and professional organizations AMERICAN COLLEGE OF RADIOLOGY  
AMERICAN SOCIETY OF THERAPEUTIC RADIOLOGY, AMA, RADIOLOGICAL SOC. OF LA  
TERREBONNE PARRISH MED. SOC., LA. MED. SOC.,

Institution (employer)	Location	Dates of service	Radiation Rank or title
<u>Terrebonne Gen. Hosp</u>	<u>Houma, La.</u>	<u>1940 - 1977</u>	<u>Radiation Oncology</u>
<u>Ochsner Foundation Hosp</u>	<u>New Orleans, La.</u>	<u>1953 - 1956</u>	<u>" "</u>
<u>Acadia Med &amp; Surg Clinic</u>	<u>Houma, La.</u>	<u>1955 - 1977</u>	<u>Chief, " "</u>
<u>GSRTC</u>	<u>N.O., La.</u>	<u>1955 - 1977</u>	<u>" "</u>
<u>Seaveri Tumor Institute</u>	<u>San Francisco, Calif</u>	<u>1953</u>	<u>Post Graduate Train</u>
<u>Royal Marsden Hosp</u>	<u>London, England</u>	<u>1953</u>	<u>" "</u>

TRAINING AND EXPERIENCE  
AUTHORIZED USER OR RADIATION PROTECTION OFFICER

1. NAME OF AUTHORIZED USER OR RADIATION PROTECTION OFFICER

KARL TORNYOS, M.D.

2. STATE OR TERRITORY IN  
WHICH LICENSED TO  
PRACTICE MEDICINE

## 3. CERTIFICATION

SPECIALITY BOARD  
ACATEGORY  
BMONTH AND YEAR CERTIFIED  
CINTERNAL  
MEDICINE

15 yrs.

## 4. TRAINING RECEIVED IN BASIC RADIOISOTOPE HANDLING TECHNIQUES

FIELD OF TRAINING A	LOCATION AND DATE(S) OF TRAINING B	TYPE AND LENGTH OF TRAINING C	
		LECTURE/ LABORATORY COURSES (Hours) D	SUPERVISOR LABORATORY EXPERIENCE (Hours) E
a. RADIATION PHYSICS AND INSTRUMENTATION	Little Rock VA Hosp. VAH, Charleston, S.C.	2 weeks	4 yrs
b. RADIATION PROTECTION	- 11 -	- 11 -	- 11 -
c. MATHEMATICS PERTAINING TO THE USE AND MEASUREMENT OF RADIOACTIVITY	- 11 -	- 11 -	- 11 -
d. RADIATION BIOLOGY	- 11 -	- 11 -	- 11 -
e. RADIOPHARMACEUTICAL CHEMISTRY	- 11 -	- 11 -	- 11 -

17188

UNITED STATES ATOMIC ENERGY COMMISSION  
**APPLICATION FOR BYPRODUCT MATERIAL LICENSE—MEDICAL**  
SUPPLEMENT A—PRECEPTOR STATEMENT

This page is to be completed by the applicant physician's preceptor. If more than one preceptor is necessary to document experience, obtain a separate statement from each. Page 2 may be used for comments and additional information.

10. NAME AND ADDRESS OF APPLICANT PHYSICIAN (Include ZIP Code.) **KARL TORNYOS, M.D.**  
**1601 PERDIDO ST., New Orleans, LA., 70146**

11. CLINICAL TRAINING AND EXPERIENCE OF PHYSICIAN NAMED IN ITEM 10 ABOVE

(A) ISOTOPE	(B) CONDITIONS DIAGNOSED OR TREATED	(C) No. Cases Observed (See 1 in key below)	(D) No. Cases Involving Personal Participation (See 2 in key below)
I-131 or I-125	Diagnosis of thyroid function		100
	Determination of blood and blood plasma volume		500
	Liver function studies		500
	Fat absorption studies		15
	Kidney function studies		50
	In vitro studies		200
Cr-51	Gastrointestinal protein loss studies		5
	Determination of red blood cell volume and studies of red blood cell survival		200
Fe-59	Iron turn over studies		75
Co-58or Co-60	Intestinal absorption studies		75
K-42	Potassium space determinations		5
I-131	Thyroid imaging		50
	Brain tumor localization and cardiac imaging		200
	Cisternography		5
	Lung imaging		100
	Liver imaging		200
	Kidney imaging		100
	Placenta localization		—
Cr-51	Placenta localization		—
	Spleen imaging		100
Au-198	Liver imaging		10
Hg-197	Brain imaging		5
	Kidney imaging		10
Hg-203	Brain imaging		20
Sr-85	Bone imaging		20
Tc-99m	Brain imaging		200
	Thyroid imaging		15
	Salivary gland imaging		10



# APPLICATION FOR BYPRODUCT MATERIAL LICENSE—MEDICAL

## SUPPLEMENT A—HUMAN USE

(A) ISOTOPE	(B) CONDITIONS DIAGNOSED OR TREATED	(C) No. Cases Observed (See 1 in key below)	(D) No. Cases Involving Personal Participation (See 2 in key below)
Tc-99m	Placenta localization		—
	Liver and spleen imaging		200
	Lung imaging		50
	Bone imaging		5
Xe-133	Blood flow studies and pulmonary function studies		5
Se-75	Pancreas imaging		15
P-32	Treatment of polycythemia, leukemia, and Bone metastases		5
	Intracavitary treatment		—
I-131	Treatment of thyroid carcinoma		3
	Treatment of hyperthyroidism and cardiac condition	3	—
Au-198	Intracavitary treatment		—
Co-60 or CO-137	Interstitial treatment		—
	Intracavitary treatment		—
Ir-192	Interstitial treatment		—
Co-60 CO-137	Teletherapy treatment		—
Sr-90	Treatment of eye disease		—

## Key to Column (C) and (D) above

1. Observation should consist of observing radioisotope administration techniques and discussion with preceptor the case histories to establish most appropriate diagnostic and/or therapeutic procedure, limitation, contraindications, etc.
2. Personal participation should consist of (a) supervised examination of patients to determine the suitability for radioisotope diagnosis and/or treatment and recommendation on dosage to be prescribed; (b) collaboration in calibration of the dose and the actual administration of the dose to the patient, including calculation of the radiation dose, related measurements, and plotting of data; and (c) adequate period of training to enable the physician to manage radioactive patients and to follow patients through diagnosis and/or the course of treatment.

12. DATES AND TOTAL NUMBER OF HOURS OF CLINICAL RADIOISOTOPE TRAINING

4 years as Chief Nuclear  
Medicine Service, VAH, Charleston, S.C.

13. THE TRAINING AND EXPERIENCE INDICATED ABOVE WAS OBTAINED UNDER THE SUPERVISION OF

AT

(Institution) Name and Address

V. Myers



## CURRICULUM VITAE

KARL TORNOS, M.D.

DATE OF BIRTH : January 7, 1927

PLACE OF BIRTH : Salomvar, Hungary

HOME ADDRESS : 6422 Bertha Drive  
New Orleans, Louisiana 70122

BUSINESS ADDRESS: Veterans Administration Hospital  
1601 Perdido Street  
New Orleans, Louisiana 70140

MARITAL STATUS : Married, 2 children

EDUCATION : Gimnazium, Zalaegerszeg, Hungary, 1938-1946  
Medical School, University of Budapest,  
1946-1952, M.D. Degree

CITIZENSHIP : United States of America, Naturalized in 1963

LICENSURE : Virginia, 1960; South Carolina, 1967;  
Louisiana, 1973

INTERNSHIP : Salt Lake County General Hospital, 1958-1959

RESIDENCY : Salt Lake County General Hospital, 1957-1958  
(Pathology)  
Washington, D.C. General Hospital, Georgetown  
Service (Medicine), 1959-1961

FELLOWSHIP : U.S. Public Health Service Fellow in Hematology  
and Cancer Chemotherapy, Walter Reed Army  
Medical Center, Washington, D.C., 1961-1962

### ACADEMIC POSITIONS:

Instructor in Medicine, University Hospital, Budapest, Hungary, 1952-1955

Assistant Professor of Medicine, University Hospital, Budapest, 1955-1956

Clinical Instructor in Medicine, Medical College of Georgia, 1962-1963

Instructor in Medicine, Baylor University College of Medicine, 1963-1966

Assistant Professor of Medicine, Baylor University College of Medicine,  
1966- July 1967

Assistant Professor of Medicine, Medical College of South Carolina, July 1967-June 1970

Associate Professor of Medicine, Medical University of South Carolina, July 1, 1970-June 30, 1971

Clinical Associate Professor of Medicine, Tulane University School of Medicine, September 1, 1971-present.

HOSPITAL POSITION:

Staff Physician, Veterans Administration Hospital, Augusta, Georgia, 1962-1964

Staff Physician, Veterans Administration Hospital, Houston, Texas, 1964-July 1967

Chief, Hematology and Chief, Nuclear Medicine Service, Veterans Administration Hospital, Charleston, South Carolina, July 1967-June 30, 1971

Head, Leukemia-Lymphoma Clinic and Consultant in Cancer Chemotherapy, Medical College Hospital, Charleston, South Carolina, July 1967-June 30, 1971

Chief, Hematology-Oncology Section, Veterans Administration Hospital, New Orleans, Louisiana, July 1, 1971-present

CERTIFICATION:

Hungarian Board of Internal Medicine, 1956

American Board of Internal Medicine, February 6, 1964

PROFESSIONAL ORGANIZATIONS:

The American College of Physicians (F.A.C.P.)  
The Society of Nuclear Medicine  
American Society of Clinical Oncology  
The American Society of Hematology

COOPERATIVE STUDY GROUPS:

Southeastern Cancer Study Group (Member)

## BIBLIOGRAPHY

Karl Tornyos, M.D.

### PUBLICATIONS

1. Tornyos, K.: Marfan's Syndrome, Arachnodactylia (Case Report and Review of Literature). Magyar Belorvosi Archivm 8: (5) 1955.
2. Foldi, M. and Tornyos, K.: Wirkung des Veraenderungen des effectiven kreisenden blut volumens auf die renale salzausscheidung und diurese bei normaler menschen und decompensierten herz kranken. I. Acta Medica Hungarica 10 (1-2) 1956.
3. Foldi, M. and Tornyos, K.: Effect of changes in the effective circulating blood volume on renal salt excretion and diuresis in normal state and in decompensated heart disease. II. Magyar Belorvosi Archivm 9: (4) 1956.
4. Frank, W. and Tornyos, K.: The effectiveness of imidazolythioguanine (ITG) in metastatic squamous cell carcinoma of the oropharynx and larynx. Cancer Chemotherapy Reports 20:113, 1962.
5. Tornyos, K.: Phagocytic activity of cells of the inflammatory exudate in human leukemia. Cancer Research 27:1756-1760, 1967.
6. Tornyos, K., Macossay, C. and Gyorkey, F.: Chronic lymphocytic leukemia and Hodgkin's disease in the same patient. Cancer 20: 552, 1967.
7. Clark, R., Tornyos, K., Herbert, V., and Twomey, J.: Studies on two patients with concomitant pernicious anemia and immunoglobulin deficiency. Annals of Internal Medicine, 67:403-410, 1967.
8. Vogler, W., Kremer, W.B., Knospe, W.H., Omura, G.A., and Tornyos, K.: Synchronization with phase-specific agents in leukemia and correlation with clinical response to chemotherapy. Cancer Treatment Report 60:1845-1859, 1976.
9. Tornyos, K., Silberman, H. and Solomon, A.: Phase II study of oral Methyl-CCNU and Prednisone in previously treated alkylating agent resistant Multiple Myeloma. Cancer Treatment Report 61:785-787, 1977.
10. Tornyos, K. and Faust, H.: High-dose oral Methotrexate with citrovorum factor rescue in squamous cell cancer of the lung. Cancer 41 400-402, 1978.
11. KANADE A., RUIZ AE., TORNYOS, K., et al.: Panhypopituitarism and anemia secondary to traumatic fracture of the sella turcica. J. Endocrinol. Invest. 1: 263, 1978

#### ABSTRACTS

1. Tornyos, K.: Blood volume and ferrokinetic studies in patients with high hematocrit. Abstracts of the 9th Annual Meeting, South-eastern Chapter, the Society of Nuclear Medicine, Atlanta, October 10-12, 1968, page 27.
2. Tornyos, K.: Diagnosis and treatment of patients with high hematocrit (Abstract) *Annals of Internal Medicine*, 70:1086, 1969.
3. Clark, R., Tornyos, K., Herbert, V. and Twomey, J.: Studies of two patients with concomitant pernicious anemia and immunoglobulin deficiency. (Abstract) *Yearbook of Medicine*, pages 603-604, 1968.
4. J.J.L. Lertora, Y. Moriyama, K. Tornyos, D. Lindholm and J.W. Fisher: Inhibitory effects of serum from anemic uremic patients on heme synthesis in bone marrow cultures from normal and anemic uremic subjects. *Clinical res.* 22:66, 1974 (Abstract) Southern Society for Clinical Investigation.
5. Tornyos, K., Silberman, H., and Solomon, A.: Oral Methyl-CCNU and Prednisone in previously treated Multiple Myeloma. *Proc. Am. Soc. Clin. Oncol.* 17:257, 1976.
6. Fisher, J.W., Lertora, J.L., Lindholm, D.D., Tornyos, K., Moriyama, Y.: Erythropoietin Production and Inhibitors in the anemia of uremia. *Proc. Dialysis Transplant Forum* 3:22-32, 1973.
7. Tornyos, K. and Faust, H.: High-dose oral methotrexate with citrovorum factor rescue in squamous cell cancer of the lung. *Proc. of Am. Soc. Clin. Oncol.* 18:316 (c-199), 1977.
8. Krauss, S. and Tornyos, K.: Hexamethylmelamine and cis-platinum diammine dichloride in the treatment of non oat-cell lung cancer. *Proc. Am. Assoc. Cancer Res.* 18:33(130), 1977.

(2-77)  
10 CFR 30TRAINING AND EXPERIENCE  
AUTHORIZED USER OR RADIATION PROTECTION OFFICER

1. NAME OF AUTHORIZED USER OR RADIATION PROTECTION OFFICER

ROBERT DIXON MC AFEE, Ph.D.  
Radiation Safety Officer2. STATE OR TERRITORY IN  
WHICH THE ABOVE IS  
PRACTICE MEDICINE

## 3. CERTIFICATION

SPECIALITY BOARD  
ACATEGORY  
BMONTH AND YEAR CERTIFIED  
C

## 4. TRAINING RECEIVED IN BASIC RADIOISOTOPE HANDLING TECHNIQUES

FIELD OF TRAINING A	LOCATION AND DATE(S) OF TRAINING B	TYPE AND LENGTH OF TRAINING	
		LECTURE/ LABORATORY COURSES (Hours) C	SUPERVISED LABORATORY EXPERIENCE (Hours) D
a. RADIATION PHYSICS AND INSTRUMENTATION	Univ. of Tennessee, 1950-52 Tulane Univ., NOLA, 1952-54 Univ. of Copenhagen, 1955	32 256 -	96 2 yrs. 6 mos.
b. RADIATION PROTECTION	Univ. of Tenn., 1950-52	32	96
c. MATHEMATICS PERTAINING TO THE USE AND MEASUREMENT OF RADIOACTIVITY	Same as a. and b. above		
d. RADIATION BIOLOGY	Univ. of Tennessee	300	
e. RADIOPHARMACEUTICAL CHEMISTRY			

## PRECEPTOR STATEMENT

Supplement B must be completed by the applicant physician's preceptor. If more than one preceptor is necessary to document experience, submit a separate statement from each.

### 1. APPLICANT PHYSICIAN'S NAME AND ADDRESS

FULL NAME

ROBERT DIXON MC AFEE, Ph.D.

STREET ADDRESS

VA Hospital, 1601 Perdido Street

CITY

STATE

ZIP CODE

New Orleans, La.

70146

### KEY TO COLUMN C

PERSONAL PARTICIPATION SHOULD GET 1-3

1-Supervised examination of patients to determine the suitability for radioisotope diagnosis and/or treatment and recommendation for prescribed dosage.

2-Collaboration in dose calibration and actual administration of dose to the patient including calculation of the radiation dose, related measurements and plotting of data.

3-Adequate period of training to enable physician to manage radioactive patients and follow patients through diagnosis and/or course of treatment.

### 2. CLINICAL TRAINING AND EXPERIENCE OF ABOVE NAMED PHYSICIAN

ISOTOPE A	CONDITIONS DIAGNOSED OR TREATED B	NUMBER OF CASES INVOLVING PERSONAL PARTICIPATION C	COMMENTS (Additional information or comments may be added here or attached as separate sheets) D
I-131 or I-125	DIAGNOSIS OF THYROID FUNCTION		See reverse and also attached curriculum vitae.
	DETERMINATION OF BLOOD AND BLOOD PLASMA VOLUME		
	LIVER FUNCTION STUDIES		
	FAT ABSORPTION STUDIES		
	KIDNEY FUNCTION STUDIES		
	IN VITRO STUDIES		
OTHER			
I-125	DETECTION OF THROMBOSIS		
I-131	THYROID IMAGING		
P-32	EYE TUMOR LOCALIZATION		
Sr-75	PANCREAS IMAGING		
Yb-169	CISTERNOGRAPHY		
Xe-133	BLOOD FLOW STUDIES AND PULMONARY FUNCTION STUDIES		
OTHER			
Tc-99m	BRAIN IMAGING		
	CARDIAC IMAGING		
	THYROID IMAGING		
	SALIVARY GLAND IMAGING		
	BLOOD POOL IMAGING		
	PLACENTA LOCALIZATION		
	LIVER AND SPLEEN IMAGING		
	LUNG IMAGING		
	BONE IMAGING		
OTHER			



<u>Isotope</u>	<u>Max. Amt.</u>	<u>Where Gained</u>	<u>Duration</u>	<u>Use</u>
S-35	15 mCi	Biophysics Dept. Tulane Univ.	2 yrs	Metabolic tracer
C-14	5 mCi	Carregie Inst. of Terrestrial Magnetism (Biophysics Section) Wash., D.C., summer, 1954		Amino acid tracer studies
Na-22	150 mCi	Univ. of Copenhagen	6 mos.	Na transport study
Na-24	15 mCi	Univ. of Copenhagen	6 mos.	Na transport in isolated frog skins
Na-24	30 mCi	VAH, New Orleans, La.	20 yrs.	Na transport in iso- lated frog skins

Taught summer course in Radiation Biology and Instrumentation at Tulane University 1959-1964.



# PRECEPTOR STATEMENT (Continued)

## 2. CLINICAL TRAINING AND EXPERIENCE OF ABOVE NAMED PHYSICIAN (Continued)

ISC-FOPE	CONDITIONS DIAGNOSED OR TREATED	NUMBER OF CASES INVOLVING PERSONAL PARTICIPATION	COMMENTS (Additional information or comments may be submitted in duplicate on separate sheets.)
A	B	C	D
P-32 (Soluble)	TREATMENT OF POLYCYTHEMIA VERA, LEUKEMIA, AND BONE METASTASES		
P-32 (Colloidal)	INTRACAVITARY TREATMENT		
I-131	TREATMENT OF THYROID CARCINOMA		
	TREATMENT OF HYPERTHYROIDISM AND CARDIAC CONDITION		
Au-198	INTRACAVITARY TREATMENT		
Co-60 or Cs-137	INTERSTITIAL TREATMENT		
	INTRACAVITARY TREATMENT		
I-125 or Ir-192 Co-60 or Cs-137	INTERSTITIAL TREATMENT		
	TELETHERAPY TREATMENT		
Sr-90	TREATMENT OF EYE DISEASE		
	RADIOPHARMACEUTICAL PREPARATION		
Mo-99/ Tc-99m	GENERATOR		
Sn-113/ In-113m	GENERATOR		
Tc-99m	REAGENT KITS		
Other			

## 3. DATES AND TOTAL NUMBER OF HOURS RECEIVED IN CLINICAL RADIOISOTOPE TRAINING

4. THE TRAINING AND EXPERIENCE INDICATED ABOVE WAS OBTAINED UNDER THE SUPERVISION OF:		6. PRECEPTOR'S SIGNATURE	
a. NAME OF SUPERVISOR		7. PRECEPTOR'S NAME (Please type or print)	
b. NAME OF INSTITUTION			
c. MAILING ADDRESS			
d. CITY		8. DATE	
5. MATERIALS LICENSE NUMBER(S)			

CURRICULUM VITAE    / / /

1. ROBERT D. MCAFEE, Ph.D.

2. Education:

B.A., Central College, Fayette, Missouri, 1948.

M.S., University of Tennessee, 1951 (Cytology and Radiation Biology)

Ph.D., Tulane University School of Medicine, 1954 (Physiology and Biophysics)

3. Postgraduate Education:

Research on amino acid metabolism at Carnegie Institution of Washington, Department of Terrestrial Magnetism, Biophysics Section, 1954. Dr. Richard B. Roberts, Mentor.

Research on sodium ion transport, University of Copenhagen, Radioisotope Department, 1957. Dr. H. H. Ussing, Mentor.

Statistics, Experimental Design, Computer Theory and Applications, Biomedical Instrumentation and other short courses given by the Veterans Administration Research Support Facilities at various times throughout 1967-1975.

4. Positions Held:

Teaching Assistant, University of Tennessee, Knoxville, Zoology Department, 1949-1951.

Teaching Assistant, Tulane University School of Medicine, New Orleans, La., Physiology Department, 1951-1954.

Research Physiologist, Biophysics Program, Tulane University, 1954-1959.

Senior Scientist, Radioisotope Service, Veterans Administration Hospital, New Orleans, Louisiana, 1959 - present.

Member, Radiation and Radioisotope Safety Committee, Veterans Administration Hospital, New Orleans, Louisiana, 1965 - present.

5. Memberships:

The Biophysical Society

Society for Experimental Biology and Medicine

American Physiological Society

New Orleans Kidney Club

Southern Salt Water and Kidney Club

International Microwave Power Institute

Alliance for Engineering in Medicine and Biology

6. Academic Affiliations:

School of Engineering, University of New Orleans, Lake Front, New Orleans, Louisiana, Consulting Professor, 1972 - present.

Tulane University School of Medicine, Physiology Department, New Orleans, Louisiana, Associate, 1959 - present.

Ochsner Foundation, New Orleans, Louisiana. Consultant in Physiology, 1961 - present.

7. Teaching:

Lectures and laboratory instruction to zoology students at University of Tennessee, 1949-1950 and medical students at Tulane University School of Medicine, 1950-1953.

Faculty of Summer Institute in Radiation Biology, Tulane University, New Orleans, La., 1960-1965, presented 20 lectures each summer on nuclear physics, radioisotope techniques and radiation biology.

Lectures to Physiology, Biochemistry and Pharmacology students at Tulane University School of Medicine on sodium ion transport continuing from 1953 to the present time.

Lectures to students of Engineering, University of New Orleans, School of Engineering, 1972 - present.

8. Chairmanships:

Chairman, Section on Membrane Transport, Annual Meeting of the Federation of American Societies for Experimental Biology, Atlantic City, April, 1969.

Publicity Chairman, 28th Annual Conference on Engineering in Medicine and Biology, New Orleans, Louisiana, September 20-24, 1975.

9. Publications:

Nitrogen and Sulfur Equilibrium and Exchange Experiments on *Escherichia Coli*  
Robert D. McAfee, Tulane University Bulletin, p. 79-83, 1954.

Studies of Amino Acid Metabolism in *Escherichia coli* with <sup>15</sup>N. R. D. McAfee and Robert T. Nieset. *Biochem. et Biophysics Acta* 31: 365, 1959.

"The Neurophysiological Effect of Microwave Irradiation." R. D. McAfee. Proceedings of the Third Annual Tri-Service Conference on Biological Effects of Microwave Radiating Equipment, 1969. Rome Air Development Center Document TR-59-140, Griffis Air Base, Rome, New York, 1959.

Publications (continued)

Neurophysiological Effect of 3 cm. Microwave Radiation. R. D. McAfee. American J. Physiol. 200: 192, 1961.

Microwave Radiation in Relation to Biological Systems and Neural Activity. J. D. Fleming, Jr., L. Pinneo, R. Baus and R. D. McAfee. Biological Effects of Microwave Radiation, Vol. 1, Plenum Press. N.Y., 1961.

"Neurophysiological Effect of 3 cm. Microwave Irradiation." R. D. McAfee, C. Berger, P. Pizzolato. Fourth Annual Tri-Service Conference. Biological Effects of Microwave Radiation, Vol. 1, Plenum Press, N.Y., 1961.

"The Physiological Effects of Locally Applied 3 cm. Microwave Radiation." R. D. McAfee. Third Interamerican Conference on Occupational Medicine and Toxicology, University of Miami, 1961. Industrial Medicine and Surgery 30: 265, 1961.

Physiological Effects of Thermode and Microwave Stimulation of Peripheral Nerves. R. D. McAfee. American J. Physiol. 203: 374, 1962.

Effects of Certain Steroids on the Bioelectric Current of the Isolated Frog Skin. R. D. McAfee and William Locke. American J. Physiol. 200: 797, 1961.

"Microwave Stimulation of the Sympathetic Nervous System." R. D. McAfee. Proceedings of the First National Biomedical Sciences Instrumentation Symposium. Biomedical Sciences Instrumentation. Vol. 1, 167. Plenum Press. N.Y., N.Y., 1963.

Effect of Angiotensin Amide on Sodium Isotope Flux and Short Circuit Current in Isolated Frog Skin. R. D. McAfee and William Locke. Endocrinology 81: 1301, 1967.

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"The Neural and Hormonal Response to Microwave Stimulation of Peripheral Nerves." R. D. McAfee. Biological Effects and Health Implication of Microwave Radiation. Symposium Proceedings, Richmond, Virginia, September 17-19, 1969 (BRH/DBE 70-2) (PB 193 898).

The Action of Beta Adrenergic Site Stimulating Catecholamines on Isolated Frog Skin. R. D. McAfee. Biochem. Biophys. Acta 203: 104, 1970.

Analeptic Effect of Microwave Irradiation on Experimental Animals. R. D. McAfee. The Institute of Electrical and Electronic Engineers Special Issue on Microwave Theory and Techniques, Vol. MMT-19, p. 251, Feb., 1971.

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The Effect of 2450 MHz Microwave Irradiation on the Growth of Mice. R. D. McAfee, R. Baus, Jr., J. Fleming, Jr. J. of Microwave Power 8: 111, 1973.

Adrenegic Blocking Agents Modify Catecholamine Stimulation of Short-Circuit Current in Isolated Frog Skin. R. D. McAfee, E. Thurman, R. Mendez-Cordova, and William Locke. Proc. Soc. Exptl. Biol. and Med. 146: 276, 1974.

Thermistor Probe Error in an X-Band Microwave Field. R. D. McAfee, L. L. Cazenavette and H. A. Shubert. Journal of Microwave Power 9: 1974.

"Screening for Cataracts." R. D. McAfee, L. L. Cazenavette and M. G. Holland. Conference on the Biologic Effects of Nonionizing Radiation, Annals of the New York Academy of Sciences, Vol. 247, p. 135-141, 1975.

Selected Presentations and Abstracts:

Tissue Injury from Microwave Radiation. P. Pizzolato, C. Berger and R. D. McAfee. Digest of the 1961 International Conference on Medical Electronics 1: 196, N.Y.C., 1961.

The Effects of Aldosterone and Aldosterone-Inhibitor SC 8109 on Sodium Transport in the Isolated Frog Skin. D. E. Penney, R. D. McAfee and William Locke, Federation Proceedings 21: 413, 1961.

Bioelectric and Salt Active Steroid Substances in Frog Skin. R. D. McAfee, M. Hodges and William Locke. Federation Proceedings 21: 433, 1962.

Variability in Short Circuited Frog Skin Responses to Acetylcholine. R. D. McAfee. The Physiologist 7: 201, 1964.

Study of the Effect of Hypertension II, Ciba on Sodium Transport in Isolated Frog Skin. R. D. McAfee and William Locke. The Physiologist 8: 228, 1965.

Frog Skin Sodium Transport and Evidence for Vesicles or Other Reservoirs for  $\text{Na}^+$ . R. D. McAfee. Federation Proceedings 25: 568, 1966.

Sodium Transport in Frog Skin and a Kinetic Explanation of the Variable Response to Acetylcholine and Hypertension II. R. D. McAfee. Second International Biophysics Congress, Vienna, Austria, p. 307, 1966.

The Effect of Norepinephrine on Isolated Frog Skin. R. D. McAfee, and E. Thurman. Federation Proceedings 26: 767, 1967.

The Stimulation of Isolated Short Circuited Frog Skin Sodium Transport by Angiotensin II. A Direct or Indirect Action: R. D. McAfee and William Locke. International Symposium on Pharmacology of Hormone Polypeptides and Proteins. Milan, Italy, September 14-16, 1967.

Effect of Lipid Substance from Frog Skin on Sodium Transport in Isolated Frog Skin. R. D. McAfee. XXIV International Congress of Physiological Sciences, Proceedings. Washington, D. C., August 25-31, 1968.

Independence of  $\text{Na}$  outflux and influx in isolated frog skin treated with beta adrenergic stimulating catecholamine. R. D. McAfee. Federation Proceedings 28: 401, 1969.

Does  $\text{Na}^+$  outflux contribute to short circuit current in Isolated Frog Skin? R. D. McAfee. The Physiologist 12: 297, 1969.

Microwave and Infrared Radiation Effects on an Operant Response in Rhesus Monkeys, R. D. McAfee, S. T. Elder, R. J. Lipscomb, J. G. May and M. G. Holland. International Union of Radio Science, Annual Meeting, University of Colorado, Boulder, Colorado, October 20-23, 1975.

CURRICULUM VITAE  
OF  
GEORGE R. MECKSTROTH, PH.D.



GEORGE R. MECKSTROTH, PH.D.

Professor of Radiology, Department of Radiology, Tulane University School of Medicine, 1430 Tulane Avenue, New Orleans, Louisiana.

Associate Director, Division of Nuclear Medicine, Charity Hospital of Louisiana at New Orleans.

Certified Radiologic Physicist, American Board of Radiology.

Born: August 26, 1935; Cincinnati, Ohio. Marital Status: Married.

DEGREES:

University of Cincinnati; B.S. in Physics - 1958.

University of Cincinnati; M.S. in Physics - 1960.

University of Cincinnati; Ph.D. in Physics - 1963.

SCHOLARSHIPS AND FELLOWSHIPS HELD AS A STUDENT:

1. Fellowship in Radiologic Physics (NIH) - 1960, 61, 62, 63.
2. Ford Foundation Teaching Scholarship - 1960, 61, 62, 63.
3. Laws Fellowship in Pure Science - 1960, 61, 62, 63.
4. University Tuition Scholarship - 1960, 61, 62, 63.

PRESENT AND PAST APPOINTMENTS:

1. Acting Dean, Tulane University School of Medicine, New Orleans, Louisiana, February - June 1973.
2. Consultant in Radiological Physics, St. Charles General Hospital, New Orleans, Louisiana 1973 to present.
3. Consultant in Radiological Physics, East Jefferson General Hospital, New Orleans, Louisiana, 1970 to present.
4. Professor of Radiology, Tulane University School of Medicine, New Orleans, Louisiana, 1970 to present.
5. Associate Director, Division of Nuclear Medicine, Charity Hospital of Louisiana at New Orleans, 1969 to present.
6. Consultant in Radiological Physics, West Jefferson General Hospital, New Orleans, Louisiana, 1968 to present.

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7. Associate Director, Nuclear Medicine, Hotel Dieu Hospital, New Orleans, Louisiana, 1965 to present.
8. Consultant, Nuclear Medicine Service, Veterans Administration Hospital, New Orleans, Louisiana, 1964 to present.
9. Consultant in Radiological Physics, United States Public Health Service Hospital, New Orleans, Louisiana, 1964 to present.
10. Radiation Safety Officer, Tulane University School of Medicine, New Orleans, Louisiana, 1963 to 1973.
11. Deputy Radiation Safety Officer, University of Cincinnati, Cincinnati, Ohio, 1960 to 1963.
12. Lecturer on Physical Principles of Diagnostic Radiology, Cincinnati General Hospital, Cincinnati, Ohio, 1960 to 1963.
13. Lecturer on Physics and Mathematics, University of Cincinnati Evening College, Cincinnati, Ohio, 1960 to 1963.
14. Lecturer on Physics, University of Cincinnati Summer School, Cincinnati, Ohio, 1960 to 1963.

SPECIAL TRAINING:

On-the-job and, in part, formal course training in x-ray and isotope technology including:

1. Radiation protection and survey problems associated with various qualities and types of radiation.
2. Radiation treatment planning procedures to determine midline tissue dose or dose to areas of interest resulting from partial-body or total-body irradiation in humans.
3. Procedures for in vitro and in vivo detection of radiation for a wide range of radionuclides.

SOCIETY MEMBERSHIPS:

1. The American College of Radiology.
2. American Association of University Professors.
3. American Association of Physicists in Medicine.

George R. Meckstroth, Ph.D.

4. Health Physics Society.
5. Sigma Xi.
6. Society of Nuclear Medicine.
7. American Public Health Association.
8. International Radiation Protection Association.

MANUSCRIPTS:

1. University of Cincinnati Radiation Safety Manual, Editor.
2. Kereiakes, J.G. and Meckstroth, G.R.: Radiation Protection Aspects in a Diagnostic X-Ray Facility. Journal of Ohio State Medical Association, 59:8, August 1963.
3. Elder, S. Thomas, Meckstroth, George R., Nice, Charles M., Jr., Meyers, Philip H.: A Comparison of a Linear Program in Radiation Protection With Traditional Lecture Presentation of the Same Material. Journal of Medical Education, December 1964.
4. Meyers, Philip H., Nice, Charles M., Jr., Becker, Hal C., Nettleton, W.J., Sweeney, J.W. and Meckstroth, George R.: Automated Computer Analysis of Radiographic Images. Radiology 83:6, December 1964.
5. Kereiakes, J.G. and Meckstroth, George R.: Liquid Scintillation Counting Techniques. Paper read at the American Roentgen Ray Society, Sept. 1964.
6. Smith, R.K., Meckstroth, George R., Elder, S.T., Rye, M.D., and Stokes, S.K.: Factorial Comparison of the Effects of Pentobarbital Sodium and Whole Body X-Irradiation on VR-3 Food Reinforced Bar-Pressing. Psychological Reports, 1965, 16, 1245-1248.
7. Chapman, J.E., Elder, S.T., Meckstroth, George R.: The Influence of X-Radiation on Food Intake of the White Rat. Paper read to the Louisiana Psychological Association Meeting, New Orleans, Louisiana 1965.
8. Meckstroth, George R.: Scintillation Scan Image Conditioning Through the Use of Multiple Scanning and the Digital Computer. Paper read to the November 1965 Meeting of the Radiological Society of North America.
9. Meyers, Philip H., Nice, C.M., Mouton, R.A., Caldwell, T., Meckstroth, G.R., Elder, S.T., Moser, P.J.: Comparative Evaluation of a New Oral Cholecystographic Agent U-12,031 with Telepaque. American Journal of Roentgenology, 59:2, June 1965.

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10. Jacobs, S., Zemek, L., Meckstroth, George R., Urner, C.J.: Radioisotope Lung Scanning in Chronic Pulmonary Tuberculosis. Presented at the 78th International Tuberculosis Conference of the International Union Against Tuberculosis, Munich, Germany, October 1965.
11. Smith, R.K., Elder, S.T., Meckstroth, George R.: Food Reinforced Response Decrements as a Function of Amount of X-Irradiation. Psychological Reports, 17, 431-434, 1965.
12. Meckstroth, George R.: Computer Conditioned Images of Scintillation Scans. Symposium on Computers and Scanning, 1968. Society of Nuclear Medicine.
13. Meyers, P.H., Nice, C.M., Meckstroth, George R., Becker, H.C., Moser, P.J., Goldstein, M.: Pathologic Studies Following Magnetic Control of Metallic Iron Particles in the Lymphatic and Vascular System of Dogs as a Contrast and Isotopic Agent. American Journal of Roentgenology, KCVI:4, April 1966.
14. Meckstroth, George R., Garcia, M.M., Tujaque, L.: A Modified Fluoroscopy Table for Superimposition of Scan and Radiograph. Presented at the Fifty-Second Annual Meeting of the Radiological Society of North America, November 1966.
15. Meckstroth, George R.: Radiation Protection for Diagnostic X-Ray Facilities. Journal of Louisiana State Medical Society, 119:3, March 1967.
16. Meckstroth, George R. and Parker, Roy A.: Radiation Hazards and Public Health. Journal of Louisiana State Medical Society, 119:3, March 1967.
17. Meckstroth, George R.: The Sacred Cow: A Brief Look at the Radioisotope Generator. The Bulletin of the Tulane University Medical Faculty, 27:2, 111-116, May 1968.
18. Maxfield, W.S. and Meckstroth, George R.: Technetium-99m Superior Vena Cavograph. Radiology 92, 913-917, March 1969.
19. Meckstroth, George R.: The Complete Radioisotope Laboratory. Presented at the Southern Medical Association's 62nd Annual Meeting, November 18-22, 1968. Submitted for publication to The Journal of the Southern Medical Association.
20. Meckstroth, George R., Witherspoon, Lynn R., and Maxfield, W.S.: Dosimetry of <sup>131</sup>I Hippuran Camera Renogram in the Pediatric Patient. Presented at the 16th Annual Meeting of the Society of Nuclear Medicine, June 22-28, 1969. Submitted for publication.
21. Meckstroth, George R.: Nuclear Medicine and the Health Physicist. Presented at the Annual Meeting of the Alabama Chapter of the Health Physics Society, January 1970.

George R. Meckstroth, Ph.D.

22. Meckstroth, George R.: Do's and Don'ts, Tricks and Treats - The 1600 Word Memory System. Presented at the Symposium on Diagnostic Nuclear Medicine in the Modern Hospital, January 1970.
23. Shuler, S.E., Meckstroth, George R. and Maxfield, W.S.: Scintillation Camera in Pediatric Renal Disease. American J. Dis. Child, 120, August 1970.
24. Meckstroth, George R. and Staub, Roy T.: Techniques in Pancreas Imaging. Medical Radioisotope Scintigraphy, International Atomic Energy Agency, 1972.
25. Meckstroth, George R., Puyau, F.A. and Ho, R.D.: Radionuclide Total Body Opacification in Infants. Radiology, 110, 395, February 1974.
26. Puyau, F.A. and Meckstroth, George R.: Evaluation of Pulmonary Perfusion Patterns in Children with Tetralogy of Fallot. Presented at the 58th Scientific Assembly and Annual Meeting of the Radiological Society of North America, 26 November - 1 December 1972 and accepted for publication in the American Journal of Roentgenology.
27. Dalili, Hamid, Adriani, John, Meckstroth, George R. and Samuels, Monroe S.: Radiowave and Microwave Blood Warmers and Their Effect on Red Blood Cells. Presented at the 66th Annual Meeting of the Southern Medical Association, 14 November 1972.

#### CURRENT COMMITTEE ASSIGNMENTS:

1. Energy Conservation Committee, Chairman.
2. Committee On Use Of Human Subjects, Chairman.
3. Radioisotope and Radiation Safety Committee, Chairman.
4. Environmental Health & Safety Committee, Chairman.
5. Research Advisory Committee of the Cancer Association of Greater New Orleans, Member.
6. Medical Advisory Committee of the Louisiana Board of Nuclear Energy, Member.

#### BOOKS:

1. Meckstroth, George R.: Concepts in Radiation Protection In A Diagnostic X-Ray Facility, A Programmed Introduction. Tulane University, 1964.

George R. Meckstroth, Ph.D.

EXHIBITS:

1. Becker, H.C., Meyers, P.H., Nice, C.M., Meckstroth, George R.: Cardio-pulmonary X-Ray Synchronizer, Model 1. Exhibited to the Sixth International Conference on Medical Electronics and Biological Engineering, Tokyo, Japan, August 22-27, 1965.
2. Becker, H.C., Meyers, P.H., Nice, C.M., Meckstroth, George R.: Cardio-pulmonary X-Ray Synchronizer, Model 1. Exhibited to XI International Congress of Radiology, Rome, Italy, September 22-28, 1965.
3. Becker, H.C., Meyers, P.H., Nice, C.M., Meckstroth, George R.: Cardio-pulmonary X-Ray Synchronizer, Model 2 (miniaturized). Exhibited to The Annual Meeting of the Radiological Society of North America, Chicago, Illinois November 28 - December 3, 1965.
4. Nice, C.M., Meyers, P.H., Becker, H.C., Meckstroth, George R.: Programmed Instruction in Radiology at Tulane University School of Medicine, Presented to the Radiological Society of North America, Chicago, Illinois, December 1964
5. Nice, C.M., Meyers, P.H., Meckstroth, George R.: Programmed Instruction at Tulane University School of Medicine. Presented at The American Roentgen Ray Society in Washington, D.C., September 26 - October 1, 1965.



Curriculum Vitae: Sam A. Threefoot M.D.

1. Born April 10, 1921, in Meridian, Mississippi
2. EDUCATION:
  - Grades 1-6: Marion Park School, Meridian, Mississippi.
  - Grades 7-8: Junior High School, Meridian, Mississippi.
  - Grades 9-12: Selma High School, Selma, Alabama.
3. DEGREES:
  - B.S. Tulane University, College of Arts and Sciences, 1943
  - M.D. Tulane University School of Medicine, 1945
4. INTERNSHIP:
  - Michael Reese Hospital, Chicago, Illinois, October, 1945-  
January, 1947
5. LICENSURE:
  - Louisiana, August 18, 1945
  - Georgia, June 26, 1970
6. CERTIFICATION:
  - American Board of Internal Medicine, February 4, 1953
7. PAST POSITIONS:
  - Tulane University School of Medicine, New Orleans, La.
    - Fellow, Department of Medicine, 1947-49
    - Instructor, Department of Medicine, 1948-53
    - Assistant Professor, Department of Medicine, 1953-59
    - Associate Professor, Department of Medicine, 1959-63
    - Professor of Medicine, Tulane University, 1963-70
  - Charity Hospital of New Orleans, La.
    - Assistant Visiting Physician, 1947-50
    - Visiting Physician, 1950-57
    - Senior Visiting Physician, 1957-59
    - Consultant, Charity Hospital of New Orleans, 1959-70
  - Touro Infirmary, New Orleans, La.
    - Clinical Assistant, Department of Medicine, 1953-56
    - Junior, Department of Medicine, 1956-60
    - Senior Assistant, Department of Medicine, 1960-63
    - Director of Medical Education, 1953-63
    - Director of Research, Touro Research Institute (Touro Infirmary)  
1953-70
    - Senior, Department of Medicine, Touro Infirmary, 1963-70
  - Lallie Kemp Charity Hospital, Independence, Louisiana
    - Consultant Physician in Medicine, 1951-53
  - Medical College of Georgia, Augusta, Ga.
    - Assistant Dean, 1970---1976
    - Professor of Medicine, 1970---1976
  - Veterans Administration Hospital, Forest Hills Division, Augusta Ga.
    - Chief of Staff, 1970---1976
8. PRESENT POSITIONS:
  - Tulane University School of Medicine, New Orleans, La.
    - Professor of Medicine, Department of Medicine, 1976 ---
    - Coordinator, Integrated Medicine Residency Program, 1976 ---
  - Veterans Administration Hospital, New Orleans, La.
    - Associate Chief of Staff for Research, 1976 ---
9. HONORS:
  - National Honor Society, High School, 1938
  - Honor Scholarship, Tulane University, College Arts & Sciences, 1938-41
  - Beta Mu, Tulane Biological Society, 1940
  - Phi Beta Kappa, Tulane University, 1943
  - Honors Achievement Award, Angiology Research Foundation, 1968
  - Award of Merit, American Heart Association, 1976
  - Special recognition for meritorious voluntary service as a  
member of the Regional Advisory Group of the Louisiana Regional  
Medical Program, Inc. -- 1976



10. SOCIETIES:

Fellow, The American College of Physicians.  
Fellow, American College of Cardiology.  
Central Society for Clinical Research.  
Southern Society for Clinical Investigation.  
American Association for Advancement of Science.  
Fellow, Council on Circulation, American Heart Association.  
International Society of Lymphology.  
Society for Experimental Biology and Medicine.  
Society of Nuclear Medicine.  
Microcirculatory Society, Inc.  
New York Academy of Sciences, Fellow  
American Federation for Clinical Research.  
Sigma Xi, Active Membership.  
Louisiana Heart Association.  
Louisiana State Medical Society.  
Orleans Parish Medical Society.  
New Orleans Academy of Science.  
American Medical Association 1970-1976  
Richmond County Medical Society. 1970-76.  
Medical Association of Georgia. 1970-76.  
Musser Burch Society

11. BOARDS, COMMITTEES & OFFICES, STATE, REGIONAL, NATIONAL, INTERNATIONAL:

Southern Society for Clinical Investigation  
Nominating Committee, 1959.  
Secretary-Treasurer, 1962-65.  
Member Council, 1962-68.  
President Elect, 1965  
President, 1966  
Central Society for Clinical Research  
Nominating Committee, 1963  
International Society of Lymphology  
Founding member, 1966  
Executive Board, 1966-70  
Editorial Board, LYMPHOLOGY, 1967-1970; Chairman, 1968-1970; Board of Consultants, 1970---  
Louisiana Regional Medical Program  
Regional Advisory Group, 1965-70  
Heart Planning Committee, 1967-70  
American College of Cardiology  
Board of Governors (Governor for Louisiana), 1967-70  
Chairman, Exhibits Awards Committee, 1968  
Chairman, Scientific Exhibits Committee, 1970  
Young Investigators Award Committee, 1970-1971-1972  
Augusta Radiation Center  
Board of Directors, 1970---76.  
Planning Committee, 1974---76.  
Veterans Administration  
Regional Research Advisory Group, VA Central Office, Washington, D.C.  
1975-78.

11. BOARDS, COMMITTEES & OFFICES, STATE, REGIONAL, NATIONAL, INTERNATIONAL:  
(cont.)

Louisiana Heart Association

Research Committee, 1957-66. (Chairman, 1960-66)  
Chairman, Speakers' Bureau, New Orleans Area Heart Council, 1960-66  
Finance Committee, 1960-66  
Board of Directors, 1960-70  
Executive Committee, 1965-69  
President Elect, 1965-66  
President, 1966-67  
Nominating Committee, 1967-70 (Chairman, 1967-68)  
Chairman, Central Program Committee, 1967-68  
Long Range Planning Committee, 1967-70

Georgia Heart Association

Board of Directors, 1970---1976  
Research Committee, 1970-73  
Board of Directors, Richmond County Division of GHA, 1971--76.  
Board of Directors, Executive Committee, Richmond Co. Div. of GHA, 1972--76.  
Medical Advisory Panel for Augusta Area High Blood Pressure Project,  
Nov. 1972--76.

American Heart Association

Central Committee for Medical & Community Programs, 1965-68; 1973-75  
Board of Directors, 1966-70; 1972-75  
Executive Committee, 1969-70; 1973-75  
Management & Finance Committee, 1972-74  
Vice President Elect from Southern Region, 1968-69  
Vice President from Southern Region, 1969-70

Southern Regional Heart Committee

Executive Committee, Southern Regional Heart Committee, 1968-71  
Chairman, Nominating Committee, Southern Regional Heart Committee, 1971  
Professional Education Subcommittee, SRHC, 1971-72

Council on Circulation

Executive Committee, Council on Circulation, 1968--  
Chairman, Credentials Committee, March 1972-73  
Vice Chairman, Council on Circulation, Nov. 1971-73  
Chairman, Council on Circulation, Nov. 1973- Nov. 1975.

12. INSTITUTIONAL COMMITTEES:

Touro Infirmary (Medical Staff Committee)

Past:

- Clinic Committee
- Medical Records Committee
- Medical Education Committee (formerly Intern Committee)
- Research Committee
- Radiation Control Committee
- Clinic Coordinators' Committee

Tulane University School of Medicine

Past:

- Senior (student) Thesis Committee (Chairman)
- Senior (student) Scientific Sessions Committee (Chairman)
- Honors and Awards Committee for Student Research
- Faculty Research Committee
- Faculty Scientific Sessions Committee
- Radioisotopes and Radiation Safety Committee
- Electives Curriculum Sub-Committee
- Student Evaluation Committee
- General Faculty Constitution and By-Laws Committee
- Biomedical Communications Committee
- Graduate Medical Programs Sub-Committee of Postgraduate Medicine Committee
- Class Agent M'45 Tulane Medical Alumni

Medical College of Georgia

Past:

- Augusta Clinical Center Coordinating Committee, 1970---76.
- Administrative Council, 1970---76.
- Committee for Selection of a President, 1971-72
- Chairman, Committee on Research, 1971-73
- Faculty Senate, 1972-74
- Committee on Medical Education, 1973---76.  
(Chairman 1973-74)
- Coordinating Committee for Health Sciences Education, 1974---76.
- Phase I-II Curriculum Committee (Freshman-Sophomore), 1974---76.
- Search Committee for Chairman, Dept. of Medicine, 1974-76.

Veterans Administration Hospital, Augusta, Georgia

Past:

Chairman, VA Medical District IX (Ga.-S.C.), (formerly XII), Chief of Staff  
Council, July 1971-January 1973  
Chairman, Clinical Executive Board  
Chairman, Professional Standards Board  
Budget Advisory Committee  
Committee for Review of Hospital Space, Utilization, Alterations,  
Improvements  
Deans Committee (Ex-officio)  
Disaster Committee  
Hospital Equipment Committee  
Position Management Committee  
Medical Records, Utilization, Outpatient Review Committee (Ex-officio)  
Research & Education Committee (Ex-officio)  
VA Staff Advisory Committee on Voluntary Service  
Radiation Safety Committee  
Joint Conference Council (Health Services Review Organization)

Veterans Administration Hospital, New Orleans, La.

Present:

Clinical Executive Board  
Research and Development Committee (Chairman 1976-77)  
Space Utilization Committee

Tulane University

Present:

University Senate, 1977-1980

## BIBLIOGRAPHY

Sam A. Threefoot, M. D.

1. Threefoot, S., Gibbons, T., and Burch, G.E.: Relationship of Weight, Venous Pressure and Radiosodium ( $\text{Na}^{22}$ ) Excretion in Chronic Congestive Heart Failure, *Proc. Soc. for Exper. Biol. & Med.* 66: 369-372, Nov. 1947.
2. Burch, G., Threefoot, S., and Reaser, P.: Aspects of the Biologic Decay Periods of Sodium in Normal and Diseased Man, *Science* 107: 91-92, Jan. 1948.
3. Burch, G.E., Threefoot, S.A., and Reaser, P.B.: Some Aspects of Renal Excretion of  $\text{Na}^{24}$  by Normal Subjects and by Patients with Congestive Heart Failure, *Stanford Med. Bull.* 6: 81-87, Feb. 1948.
4. Burch, G.E., Threefoot, S.A., Cronvich, J.A. and Reaser, P.: Theoretic and Experimental Considerations of Biologic Decay Periods: Studies in Man with the Use of  $\text{Na}^{22}$ , *Cold Spring Harbor Symposia on Quantitative Biology*, 13: 63-74, Long Island, New York, The Biological Laboratory, Cold Spring Harbor, 1948.
5. Threefoot, S., Burch, G., and Reaser, P.: The Biologic Decay Periods of Sodium in Normal Man, in Patients with Congestive Heart Failure, and in Patients with the Nephrotic Syndrome as Determined by  $\text{Na}^{22}$  as the Tracer, *J. Lab. & Clin. Med.* 34: 1-13, Jan. 1949.
6. Burch, G.E., Threefoot, S.A., and Cronvich, J.A.: Theoretic Considerations of Biologic Decay Rates of Isotopes, *J. Lab. & Clin. Med.* 34: 14-30, Jan. 1949.
7. Reaser, P.B., Burch, G.E., Threefoot, S.A., and Ray, C.T.: Thermal Separation of Radiomercury from Radiosodium, *Science* 109: 198, Feb. 1949.
8. Ray, C.T., Threefoot, S.A., Burch, G.E., Cronvich, J.A., Milnor, J.B., Reaser, P.B., Overman, W.J. and Gordon, W.H.: Regression of a Radioactive Mercurial Diuretic from the Plasma of Man, *Nature* 163: 640, April 1949.
9. Burch, G.E., Cronvich, J.A., Ray, T., Reaser, P.B. and Threefoot, S.A.: Special Sample Tray for the Continuous Gas-Flow Type Counter Tube, *Science* 109: 516-517, May 1949.
10. Threefoot, S.A., Ray, C.T., Burch, G.E., Cronvich, J.A., Milnor, J.P., Overman, W. and Gordon, W.: Concentration-time Course in the Plasma of Man on Radiomercury Introduced as a Mercurial Diuretic, *J. Clin. Invest.* 28: 661-670, July 1949.
11. Threefoot, S.A.: Hypotension, *Am. J. Med. Sci.* 218: 86-100, July 1949.
12. Milnor, P., Burch, G., Ray, T., Threefoot, S., and Berenson, G.: Considerations of Renal, Hepatic, and Extremity Arteriovenous Differences in Concentration of Radiomercury of a Mercurial Diuretic, *J. Clin. Invest.* 29: 72-86, Jan. 1950.

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# ABSTRACTS AND PRESENTATIONS (P)

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77. Threefoot, Sam A.: Disordered Lymph Flow - An overview. Presented at Western Clinical Conference, American College of Angiology and Eighteenth Annual Meeting of International College of Angiology, Tucson, Ariz. October 20, 1976. (P).

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Internship: Royal Teaching Hospital, 1945-1946.  
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Baylor College of Medicine, Fellowship in Cardiovascular Surgery, July 1958 - December 1958

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Staff Appointments:

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Charity Hospital, New Orleans, La.,  
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Veterans Administration Hospital,  
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Professor of Surgery, Louisiana  
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Hospital Appointments :

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Academic Appointments : Western Reserve University  
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 Surgeons, Associate in Medicine, 1965-1969

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 Professor of Medicine, 1973-1977

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 Price-Goldsmith Professor of Medicine and Chief,  
 Section of Clinical Nutrition, 1980-

Societies : AAAS

Council on Arteriosclerosis of the American Heart  
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American Society of Clinical Nutrition

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Advisory Groups : Member, VA Central Office Regional Research  
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Serum selenium and other trace elements in various diseases. Clin. Res. 26: 586A, 1978.
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Zinc ingestion in cirrhotic patients. Clin. Res. 26: 586A, 1978.

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Enhanced lipid peroxidation in zinc deficient rats. Clin. Res. 26:  
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SPECIAL EDUCATION:

A. The Neutron Activation Analysis  
Oak Ridge Institute of Nuclear Studies  
Oak Ridge, Tenn. (May to June, 1966)

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HONORS & AWARDS:

International Scholarship, University of Iowa, 1957 - 1959

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Research Chemist, Research Service, VA Medical Center, Omaha,  
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Research Chemist, Tidy House Division, Pillsbury Company, Omaha,  
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# PUBLICATIONS:

1. Hahn, H. K. J.: Studies on the Beckman Rearrangement of 3 $\beta$ -Acetoxy-cholest-5-en-7-one Oxine: Synthesis of 3 $\beta$ -Acetoxy-7 $\alpha$ -Aza-B-Homocholest-5-en-7-one. Master's Dissertation, Creighton University, Omaha, Nebraska (1965).
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4. Hahn, H. K. J., Tuma, D. J., and Sullivan, J. L.: Rapid and simple continuous radiochemical separation of copper, magnesium, zinc, and manganese in biological materials. Anal. Chem. 40, 974 (1968).
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18. Hahn, H. K. J.: The effect of phenobarbital on lipid peroxidation in the liver, Doctor's Dissertation, University of Nebraska Medical Center, Omaha, Nebraska (1975).
19. Hahn, H. K. J., Tuma, D. J., Barak, A. J., and Sorrell, M. F.: The effect of phenobarbital on lipid peroxidation in the liver. Biochem. Param 25, 769 (1976).
20. Hahn, H. K. J., Barak, A. J., Tuma, D. J., and Sorrell, M. F.: Phenobarbital induced enzymatic and nonenzymatic lipid peroxidation in rat liver microsomes. Biochem. Pharm. 26, 164 (1977).
21. Connolly, J. F., Hahn, H. K. J., and Jardon, O. M.: The electrical enhancement of periosteal proliferation in normal and delayed fracture healing. Clin. Orthop. 124, 97 (1977).
22. Burch, R. E., Hahn, H. K. J., and Sullivan, J. F.: Other metals and the liver, with particular reference to zinc. In: Metals and the Liver, L. W. Powell, ed., Marcell Decker, Inc., New York, 1978, pp. 333-361.
23. Connolly, J. F., Hahn, H. K. J., and Davy, D. T.: Fracture healing in weight bearing bones and non-weight bearing bones, J. Trauma, 18, 766 (1978).
24. Hahn, H. K. J., Barak, A. J., Tuma, D. J., and Sorrell, M. F.: Effects of phenobarbital administration on levels of physiological antioxidants in rat liver, Pharmacology 17, 341 (1978).
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PRESENTATIONS AT NATIONAL MEETING

1. Hahn, H. K. J., Haven, M. C., Tuma, D. J., Ogborn, R. E., and Quaife, M. A.: The determination of manganese in tissue by neutron activation analysis. Am. Nucl. Soc., Denver, CO 1966
2. Hahn, H. K. J., Tuma, D. J., and Quaife, M. A.: Solvent extraction and determination of magnesium in biological materials: Comparative analysis by neutron activation, atomic absorption spectrophotometer and fluorometric techniques. Am. Nucl. Soc., San Diego, CA 1967
3. Hahn, H. K. J., Tuma, D. J., and Sullivan, J. L.: Rapid and simple continuous radiochemical separation of copper, magnesium, zinc, and manganese in biological materials. Combined Am. and Can. Nucl. Soc., Toronto, Canada 1968
4. Burch, R. E., Williams, R. V., Nayak, R. V., Hahn, H. K. J., and Sullivan, J. F.: Effect of zinc deficiency on trace element content and enzyme activity in the pig. Clin. Res. Soc., Chicago, IL 1973
5. Tobin, R. B., and Hahn, H. K. J.: Comparison of metabolic actions of D- and L-thyroxine. Atlantic City, N. J. 1974
6. Connolly, J. F., Hahn, H. K. J., and Davy, D. T.: A biomechanical and biochemical definition of fracture healing in canine ribs. Las Vegas, NEV 1977 Orthopedic Research Society
7. Hahn, H. K. J., and Burch, R. E.: Effect of Aging on rat tissue Trace Element Composition. Washington, D. C. 1979 American Aging Association
8. Hahn, H. K. J., and Burch, R. E.: Aging: rat tissue content of moisture, protein, zinc, copper and manganese with partial food deprivation. Anaheim, Calif. 1980 Federation of American Societies for Experimental Biology.



## RESUME

RICHARD A. DONLON  
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Ext. 524

PERSONAL DATA: Date of Birth: August 25, 1937  
Health: Excellent  
Married - Three Sons

EDUCATION: Rochester Institute of Technology, Rochester, New York,  
B.S. Degree in Business Administration, 1961.

Suffolk University, Boston, Massachusetts, M.S. Degree in  
Business Administration, June 1965

Trinity University, San Antonio, Texas, M.S. in Health Care  
Administration, May 1973.

Tulane University School of Public Health and Tropical Medicine,  
New Orleans, Louisiana, Masters in Public Health, May 1978.

EMPLOYMENT:  
April 1977-  
Present

Administrative Assistant to the Chief of Staff, Veterans  
Administration Hospital, 1601 Perdido Street, New Orleans,  
Louisiana 70146

Duties: Primary responsibilities relate to giving staff  
assistance to the Chief of Staff in administrative matters  
related to patient care, medical education, and research.  
Provide staff assistance and advice to the Chief of Staff to  
achieve a balanced operation within the professional services  
with maximum utilization of manpower, space, and funds. Moni-  
tor the quality assurance program, internal review management  
system, and Joint Commission on Accreditation of Hospitals  
program relative to the clinical services.

July 1975-  
April 1977

Management Analyst, Veterans Administration Hospital, New  
Orleans, Louisiana 70146  
Staff Assistant to Hospital Director. Responsible for the  
overall coordination of the hospital's internal systematic  
review of program operations. Conduct special studies and  
assist operating officials in developing program goals and  
evaluation standards. Monitor use of data processing equip-  
ment. Prepare charts and reports to facilitate analysis of  
station and hospital program's effectiveness. Responsible  
for a program of paperwork and directives management. Coordi-  
nate locally and with VA Central Office in Washington, D.C.



RICHARD A. DONLON

with ideas and projects of construction, equipment and/or personnel resources for planning of the future plans of hospital. Organizational reviews to determine verification or the need for change may be effectuated by the analyst's study and recommendations. Monitor the station Health Service Review Organization (HSRO) Program which equates to the Professional Services Review Organization in nongovernmental institutions. Serve on several hospital committees as a resource person, i.e., manpower management, disaster planning, accreditation, budget, and Joint Conference Council. Represent the Director or the hospital at meetings of local community health organization. The analyst is a resource person of management theory for all service chiefs in the effective management of resources and programs.

August 1971- Management Analyst, Veterans Administration Hospital, 2002  
June 1975 Holcombe Boulevard, Houston, Texas 77031  
Same duties as stated in the New Orleans position.

September 1970- Graduate Student at Trinity University, San Antonio, Texas in  
August 1971 Health Care Administration Course.

June 1967- Captain, U.S. Army 1968 - 1969 served in South Vietnam as a  
September 1970 Medical Advisor to the South Vietnamese 1st Infantry Division  
1969-1970, Fort Huachuca, Arizona - Company Commander and  
Personnel Officer for a 110 bed hospital.

March 1962- Captain, U.S. Air Force, 1962-1963, Personnel Officer,  
June 1967 Lackland AFB, Texas. 1964-1967, Officer Recruiter for the  
colleges in Boston, Massachusetts, and Providence, Rhode  
Island area.

PROFESSIONAL American College of Hospital Administrators - Member Status  
ORGANIZATIONS: Louisiana Army National Guard - Major, Medical Service Corps,  
159th Combat Support Hospital, New Orleans, Louisiana

REFERENCES: Will be furnished upon request.

## CURRICULUM VITAE

NAME: Patrick A. Rooney

DATE OF BIRTH: December 31, 1924

PLACE OF BIRTH: Valley, Nebraska

MARITAL STATUS: Married

SEX: Male

MILITARY EXPERIENCE: U.S. Army Air Force, 1943-1946  
U.S. Army Air Force Reserves, 1946-1953  
Rank: Lieutenant  
Honorable Discharge  
M.O.S.: Single Engine Pilot Instructor  
Fighter Gunnery Instructor  
Instrument Flight Instructor  
Air Force Trainee Instructor  
Publications Officer

### EDUCATIONAL BACKGROUND:

- 1943 - Graduate, Cedar Bluffs High School, Cedar Bluffs, Nebraska
- 1943-1944 - Centre College of Kentucky
- 1945 - Aircraft Pilot Instructors School, Waco, Texas
- 1946-1947 - Creighton University, Omaha, Nebraska
- 1947-1948 - Boyle's College, Omaha, Nebraska
- 1950-1951 - Immaculate Heart College, Los Angeles, California
- 1950-1953 - Queen of Angels College of Nursing, Los Angeles, California  
R.N. Diploma
- 1966-1968 - California State College, Long Beach, California - B.A. Degree  
in Sociology
- 1970-1971 - Boston University, Boston, Massachusetts - M.S. Degree,  
Administration of Nursing Service

### PROFESSIONAL EXPERIENCE:

- 1953 - Staff Nurse to Head Nurse to Supervisor, Medical Service,  
St. John of God Hospital, Los Angeles, California
- 1954-1961 - Director of Nursing Service, St. John of God Hospital, Los  
Angeles, California (Concomitant with preceding--1956-1961,  
Assistant Hospital Administrator; 1958-1961, Hospital Purchasing  
Agent; 1959-1961, Personnel Director)
- 1961-1962 - Director of Nursing Service, Assistant Hospital Administrator,  
St. John of God Hospital (Haines Memorial Hospital), Boston,  
Massachusetts
- 1962-1965 - Director of Nursing Service, St. John of God Hospital, Los  
Angeles, California
- 1965-1966 - Hospital Administrator, St. John of God Hospital, Los Angeles,  
California
- 1967-1970 - Clinical Supervisor, Medical Pulmonary Services, V.A. Hospital,  
Long Beach, California

- 1971-1972 - Chief Nurse Trainee, V.A. Hospital, Cleveland, Ohio
- 1972-1976 - Chief, Nursing Service, V.A. Hospital, Iowa City, Iowa
- 1976-1980 - Chief, Nursing Service, V.A. Medical Center, Indianapolis, Indiana
- 1980-1983 - Chief, Nursing Service, V.A. Medical Center, Allen Park, Michigan
- 1983 - Chief, Nursing Service, V.A. Medical Center, New Orleans, Louisiana

#### PROFESSIONAL MEMBERSHIP:

- Current - Registered Nurse, California, #90216
- Current - Registered Nurse, Massachusetts, #78061
- Current - Member, National League for Nursing
- 1954-1974 - California Nurses Association
- 1954-1978 - American Nurses Association
- 1963-1966 - Advisory Committee Member, L.V.N. Section, Los Angeles Trade and Technical College
- Current - Queen of Angels Alumni Association
- Current - Boston University School of Nursing Alumni Association
- 1973-1975 - Chairman, Nurse Education Program Advisory Committee, Kirkwood Community College
- 1972-1976 - Advisory Committee Member, Kirkwood Community College, O.R. Technician, A.D. Nurse, L.P.N., O.P.A. Programs
- 1972-1976 - Iowa League for Nursing
- 1972-1976 - Iowa Nurses Association
- 1973-1976 - University of Iowa College of Nursing Association Affiliate
- 1973-1979 - Systematic External Review Program Team Member, V.A. Region 3
- 1975-1976 - Member, Advisory Council of Illinois Veterans Home
- 1977-1979 - Member Indianapolis Vocational Tech. College Advisory Council of Indianapolis (Nurse Aide & Home Health Aid Program)
- 1976-1981 - Indiana Citizens League for Nursing
- 1976-1978 - Indiana Nurses Association
- 1976-1980 - Indiana Society for Nursing Service Administrators
- 1972 - American Society of Nursing Service Administrators of the American Hospital Association
- 1980-1983 - Greater Detroit Area Association of Nursing Administrators
- 1980-1983 - Michigan Association of Nursing Service Administrators
- 1980-1983 - Member, Wayne State University Community Advisory Committee, Office of Educational Services
- 1980-1983 - Michigan League for Nursing
- 1980-1983 - St. Colette Mens Club, Livonia, Michigan
- 1983 - Member American Nurses Association
- 1983 - Member Louisiana Hospital Association
- 1983 - Member New Orleans Nursing Administrators Organization
- 1983 - St. Andrew the Apostle Mens Club