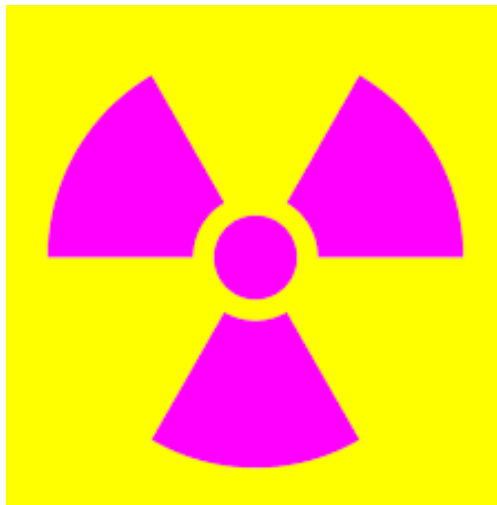


# UNIVERSITY OF ARKANSAS FOR MEDICAL SCIENCES

## Radiation Protection Guidance for Nursing Staff



Rev. January 2021

# NURSING PROCEDURES FOR RADIATION PATIENTS

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## I. Introduction

During the last 100 years, the beneficial as well as the destructive potential of ionizing radiation has become an integral tool in the prevention, diagnosis and treatment of disease. Radiation therapy (sealed and unsealed) utilizes the cell-killing abilities of high dose radiation primarily to treat malignant conditions. Diagnostic radionuclides and radiation-producing devices (x-ray machines) are mainly used to investigate and diagnose potential health issues. Despite the benefits that radiation provides to health care, radiation exposure may pose some health risk to both patient and worker. An understanding of the sources of medically applied radiation and appropriate protective measures allows nursing personnel to work safely with or near radiation. In addition, the Arkansas Department of Health requires nursing personnel to have radiation safety instruction prior to caring for patients being treated with radiation. This orientation material provides basic background information and nursing procedures for specific types of treatment; they should be reviewed prior to patient care.

## II. Sources of Radiation Exposure

### A. Background Radiation

Many hospital employees may be exposed on a daily basis to radiation from radioactive material or radiation-producing devices. Other employees may be exposed occasionally. Everyone however is exposed at all times to naturally occurring radiation in the environment. Man has virtually no control over this environmental radiation, which is termed natural background radiation. There are small amounts of naturally occurring radioactive substances in soil, rocks, plants, animals, and in our own bodies, all of which give off radiation. Large amounts of radiation are also present in outer space and a small portion of this radiation penetrates the atmosphere. In the United States, the annual radiation dose from background sources is about 300 millirem (mrem) or 3 millisieverts (mSv).

### B. Medical Radiation

Other than radiation from natural background, the majority of radiation exposure to the U.S. population results from medical/dental radiographic studies, diagnostic nuclear medicine studies and radiation therapy procedures. These differ from background radiation in that exposure is normally restricted to a portion of the body and takes place over a limited time. The most likely places to find radiation sources at UAMS are in radiology, nuclear medicine, nuclear cardiology, and radiation oncology. However, mobile radiographic and fluoroscopic units are used frequently throughout the hospital, and many nuclear medicine patients retain radiopharmaceuticals for days or weeks after their procedures are complete. It has also become more common for specialty departments (such as GI Procedures, Urology, OR, etc.) to possess and operate their own diagnostic X-ray equipment. Thus, radiation may be encountered virtually anywhere within the health care system.

### C. Occupational Exposures

#### 1. Occupationally Exposed Worker (Radiation Worker)- Definition

Some employees (e.g., x-ray technologists, nuclear medicine technologists, and nursing staff caring for radiation patients) may be exposed to additional radiation because their occupation routinely requires working with or near sources of radiation. These employees, known as occupationally exposed workers or “Radiation Workers”, knowingly work in this environment, having considered the small degree of risk relative to the benefits of employment in their chosen field. They are required to have some understanding of the properties of radiation and of appropriate protective measures.

#### 2. Occupational Exposure Limits

The Radiation Safety Officer (RSO), along with radiation workers, is responsible for ensuring that exposures remain as low as reasonably achievable (ALARA). Knowledge and implementation of protective measures should aid in occupational exposures being well below the limits allowed by the Arkansas Department of Health Radiation Control Program. Occupational exposure limits are as follows:

<b>Radiation Worker (Whole Body):</b>	<b>5000 mrem/year (50 mSv)</b>
<b>Radiation Worker (Skin/Extremity):</b>	<b>50,000 mrem/year (500 mSv)</b>
<b>Radiation Worker (Lens of Eye):</b>	<b>15, 000 mrem/year (150 mSv)</b>
<b>Non-Radiation Worker (Whole Body):</b>	<b>100 mrem (1 mSv).</b>

**Declared Pregnant Radiation Worker (Whole body): 500 mrem/gestation (5mSv)** *(Recommendation is less than 50 mrem (0.5 mSv) per month)*

### III. Biological Effects of Radiation

#### A. Study Populations

Experimental animal studies and retrospective studies of humans have established that sufficient radiation can cause unfavorable biological effects. Following the atomic bombings in Japan, studies were initiated to investigate the effects of radiation on the Japanese populations of Hiroshima and Nagasaki. These studies continue into the present. Other groups continue to be studied and compared with the Japanese population. These groups include individuals who received exposure to radiation in their occupations as well as patients who were treated with radiation for a variety of conditions and diseases.

#### B. Uncertainties at Low Dose Levels

Despite the large amount of data accumulated, uncertainties remain regarding the effects of radiation, particularly at low dose rate. The consensus is that risks at low doses are small; the uncertainty lies in how small the risks really are. It has been demonstrated that a significant amount of damage from low doses of x- rays is repaired at the cellular level.

### C. Increased Risk of Cancer

The most significant possible effect following low level radiation exposure is increased risk of cancer. However, it is impossible to distinguish radiation-induced cancers from those that arise spontaneously. The prevalence of cancer in the U.S. population from all causes is estimated to be about 25 percent. This means that one of every 4 people will develop a cancer at some point during their lifetime. It is thought that the total risk from radiation is accumulated from all sources of exposure including medical exposures. This, occupational, medical and other exposures all add to the risk. In general however, exposures to radiation, including background, contribute very little to the total risk of cancer from natural or spontaneous causes. It is estimated that an exposure of 1000 mrem/year over a lifetime (excluding background) may increase the risk of cancer from approximately 25% to 26%.

### D. Possible Genetic Effects

A genetic effect of radiation is an effect transmitted to the offspring of the individual exposed. Radiation can impart energy to the germ cell nucleus; thereby causing breakage or alteration of molecular bonds that may result in chromosome abnormalities if there is no spontaneous repair. Radiation induced mutations do not differ from spontaneously induced mutations. At exposures typically received in today's medical setting, the incidence of radiation induced genetic effects is predicted to be quite small when compared to those that occur spontaneously. In fact, no significant genetic effects have been documented among Japanese born to irradiated parents 3-8 years following the bombings.

### E. In-Utero Radiation

#### 1. Influencing Factors

There is some concern for increased radiation of the embryo or early fetus. The embryo comprises a relatively small number of rapidly dividing cells more vulnerable to the effects of DNA injury. The amount and type of damage, which may be induced by radiation, is largely a function of the stage of development at which the fetus is irradiated, and the absorbed dose.

#### 2. Small Head Circumference

Sufficient radiation received during the pre-implantation period can result in spontaneous abortion or resorption of the embryo, although this is inferred from animal studies only. Radiation injury during the period of major organogenesis (2-8 weeks) can result in developmental abnormalities, primarily small head circumference and growth retardation.

#### 3. Mental Retardation

Radiation to the fetus delivered between 8 and 15 weeks after conception appears to increase the risk of severe mental retardation, at least at doses >20,000 mrem; there may be a dose dependent adverse impact on intelligence even among those not diagnosed as mentally retarded. This particular risk (severe mental retardation) does not exist prior to 8 weeks and decreases during the subsequent

period of fetal growth and development (16-25 weeks); during the third trimester, the risk is thought to be no greater than that of non-radiated fetuses. It may be stated, the expected increase in prevalence of either of these abnormalities at typical medical or occupational exposures is very small in comparison with the natural occurrence rate of birth defects which is thought to be 3 - 10%, depending on the definition.

#### 4. Risk of Childhood Cancer

Some studies have indicated that low dose radiation (especially during 3<sup>rd</sup> trimester) may increase slightly the risk of childhood cancer. Cause and effect have not been established but the findings give impetus to minimizing fetal exposures whenever reasonable.

#### F. Dose Limits for Embryo/Fetus

The occupational exposure of pregnant women is an area of special concern. The federal and state regulatory dose limit for the fetus of a declared pregnant radiation worker is 500 mrem (5 mSv) throughout the pregnancy. Once the pregnancy is declared, exposure should not be greater than 50 mrem (0.5 mSv)/month. Female radiation workers must be informed of the risks to which the fetus is exposed and the methods available for reducing exposure. If a nurse declares her pregnancy in writing to the RSO, it is the employee and RSO's responsibility to ensure that the fetus receives less than 50 mrem/month. At UAMS, pregnant nurses and aides are categorically precluded from caring for internal radiation therapy inpatients.

### IV. Basic Principles of Radiation Protection

#### A. Radioactive Decay Process

In order to have an understanding of the safety procedures relating to radioactive materials, some comprehension of the basic principles of radioactivity is essential. The naturally occurring atoms of most elements have stable nuclei. However, many elements have isotopes with unstable nuclei, and will eventually undergo radioactive transformation. This instability is due to the fact that their nuclei have a slightly different internal structure. Radioactive forms of all elements are referred to variously as radioactive isotopes, radioisotopes, radioactive nuclides or radionuclides.

#### B. Types of Radiation Emissions

Atoms with unstable nuclei spontaneously transform (decay) and release energy in the process until reaching a stable form. This energy may be in the form of a high-speed particle (as in beta or alpha particles) ejected from the nucleus, an electromagnetic wave (as in x-ray or gamma emission), or both.

Alpha radiation is non-penetrating through skin but is rarely used in medicine. Beta radiation can pass through thin-walled containers and some high-energy beta particles can penetrate a few millimeters into living tissues. Gamma radiation is emitted from the nucleus and has properties that are identical to those of x-rays. Gamma rays are found with a wide range of energies and penetrating ability. Some



radionuclides that are used in medicine produce both gamma rays and beta particles. Cesium-137, Iridium-192, and Iodine-131 all emit gamma and beta radiation.

### C. Half-Life

A half-life is the time it takes to reduce the radioactivity of a substance by half. Each radionuclide has its own specific half-life. Those that are used for medical purposes, whether for diagnosis or therapy, have half-lives ranging from a few minutes to many years; generally short-lived radionuclides are used. When used properly, radioactive materials can provide significant diagnostic and therapeutic benefits to the patient. Protection against radiation requires an understanding of the particular characteristics of the radiation involved. Measurement and identification of both the source and type of the radiation involved are necessary before determining appropriate safety precautions.

## V. Protective Measures

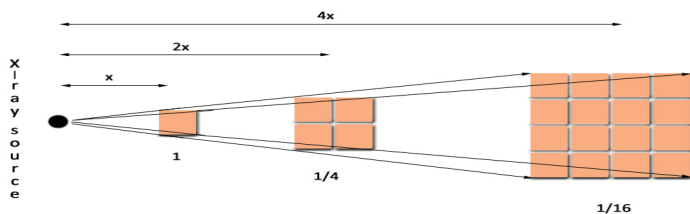
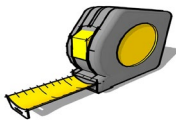
Protective procedures for personnel are based on the following cardinal rules for radiation protection:

### A. Time



A direct relationship exists between the time one is exposed to a source of radiation and the amount of exposure received. If one is exposed to radiation at a given rate, then the total radiation received depends on the length of time exposed. In many instances, nursing staff is restricted as to the amount of time they should spend in close contact with the patient.

### B. Distance



Maximizing the distance between nurse and patient provides an excellent way to decrease personal exposure. As one moves away from the bedside to 4 feet away, the exposure level is 1/16<sup>th</sup> as great; this follows the inverse square law.

### C. Shielding



Radiation interacts with any type of material; however, some materials (e.g., lead or concrete) make more efficient shields than others do. Generally, in choosing shielding one must consider the type and energy of radiation involved. Lead aprons are efficient shields at typical diagnostic x-ray energies; however, they do not work well for the higher energy x-ray or gamma emissions often used in radiation therapy.

### D. Use of Survey Meters (Radiation Detector)



Correct use of properly calibrated and maintained survey instruments is essential for detection and measurement of radiation in the workplace. Individuals who are involved in the handling of radioactive materials should be familiar with meters and appreciate their usefulness in estimating potential doses to the care providers.

### E. Personnel Radiation Monitoring Devices



Personnel radiation monitors (badges or electronic dosimeters) are small devices that can be worn by an individual for the purpose of estimating exposure to radiation. One of these should be worn whenever caring for the radioactive patient; they should not be shared or taken home; badges are changed monthly, electronic dosimeters can be reset after every shift. A badge report is available from the Radiation Safety Office (Appendix A). Dose recorded on the electronic dosimeter should be documented by the individual wearing the dosimeter at the end of each shift. To obtain a badge or an electronic dosimeter, please contact the Radiation Safety Office.

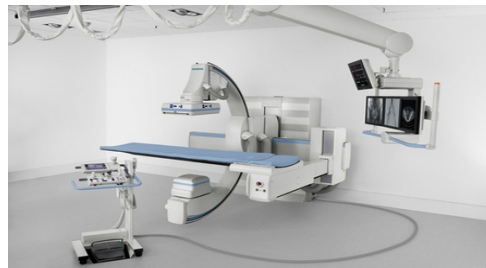
## VI. Non-therapeutic Medical Sources of Radiation

### A. Diagnostic Radiography



In diagnostic radiography X-rays are produced when high-energy electrons collide with a metal target in an X-ray tube. X-rays can be done in a dedicated room as through the use of portable X-Ray machines. X-rays are produced only when the machine is activated. The patient is irradiated when exposed to the primary beam of the machine, but following the procedure, there is no residual radiation. No radiation precautions are needed during subsequent nursing care and they may remain in close contact with family members.

### B. Diagnostic Fluoroscopy



In diagnostic fluoroscopy, X-ray images are viewed on a video monitor rather than on film. Fluoroscopy procedures are one of the largest sources of occupational radiation exposure in medicine. Fluoroscopy is used to study moving structures, and to assess positioning during surgical procedures. The portable fluoroscopy unit is often referred to as a "C-arm." As with diagnostic radiography, X-rays are produced only when the machine is activated. The patient is irradiated when exposed to the primary beam of the machine, but following the procedure, there is no residual radiation. No radiation precautions are needed during subsequent nursing care and they may remain in close contact with family members.

### C. Diagnostic Nuclear Medicine

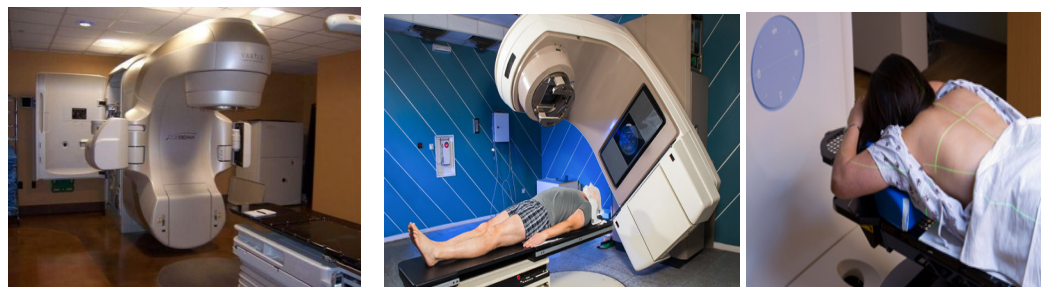


The most commonly used diagnostic radiopharmaceutical in nuclear medicine studies is technetium-99m ( $^{99m}\text{Tc}$ ). Technetium-99m emits gamma rays, which are a penetrating radiation much like X-rays. In many diagnostic studies, especially bone and renal studies, the radioactive compounds are removed from the body mainly through the urine. Some radionuclides will remain in the patient for a certain amount of time after the study is over, however, due to the short half-life, exposure to the patient and the people around them will be minimal. Diagnostic radiopharmaceuticals have half-lives anywhere from 2 hours to 8 days. After about 10 half-lives, the radioactivity is reduced to near background levels. Although the patient is radioactive following the procedure, in general there is no radiation hazard to nursing staff from patients who have received diagnostic or tracer doses of radioactive materials. The probability for nursing staff receiving doses higher than dose limits for the public in a single session or working day is negligible. To exceed the limits would require being in close contact with the radioactive patient for several hours following each administration.

## VII. Therapeutic Medical Sources of Radiation

Radiation is a common treatment, mostly for malignant diseases. There are four main modes of therapeutic treatment: (1) external beam radiation (e.g., high energy x-rays from linear accelerators), stereotactic radiosurgery (Gamma Knife) (3) sealed sources (implants -temporary or permanent) and (4) unsealed radionuclides as pills, solutions or colloidal suspensions.

### A. External Beam Radiation Therapy



Linear accelerators are basically powerful electron and X-ray beam machines used for the treatment of cancer. The energy of the X-ray radiation produced by these units is 10 to 100 times that of a diagnostic X-ray machine. Linear accelerators may treat with either X-rays or electrons. Patients receiving external beam radiation therapy do not become a source of radiation exposure to persons or staff around

them. They themselves are irradiated when exposed to the primary beam of the machine, but following treatment, there is no residual radiation. No radiation precautions are needed during subsequent nursing care and they may remain in close contact with family members.

#### B. Stereotactic Radiosurgery (Gamma Knife)



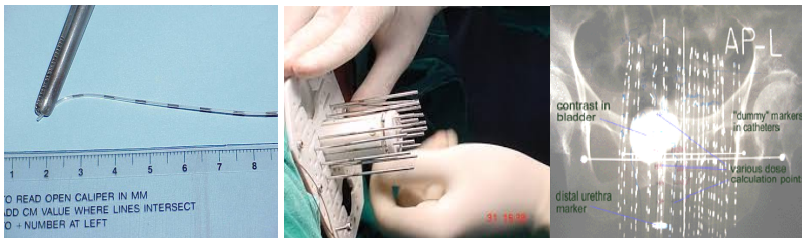
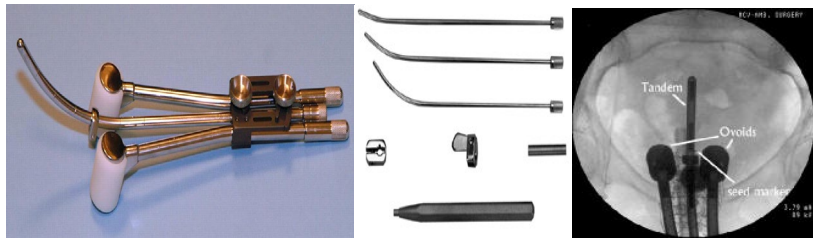
Stereotactic radiosurgery was developed by neurosurgeons as a technique for the destruction of intracranial targets without opening the skull, using single, high doses of ionizing radiation in stereotactically directed narrow beams. The radiation is delivered using multiple beam directions and a high degree of collimation. Patients undergoing Gamma Knife procedures do not become a source of radiation exposure to persons or staff around them. They themselves are irradiated when exposed to the primary beam of the machine, but following treatment, there is no residual radiation. No radiation precautions are needed during subsequent nursing care and they may remain in close contact with family members.

#### C. Sealed Sources Therapy (Implants - temporary or permanent)

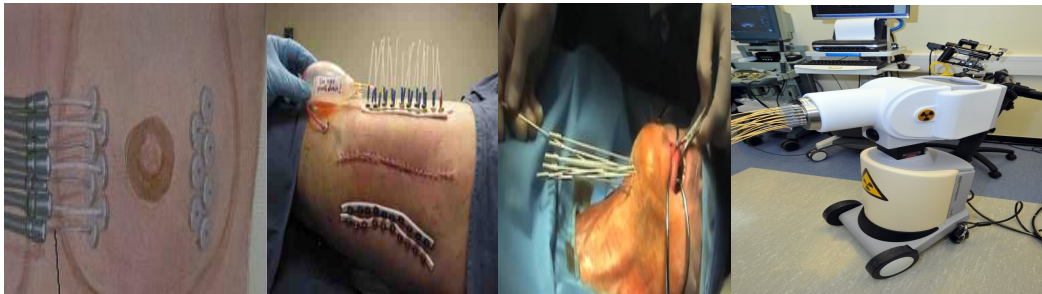
Sealed source therapy includes the use of Cesium-137, Iridium-192, Iodine-125, Palladium-103 and Yttrium-90. Because these therapy procedures use sealed sources only, there are no added contamination control measures that need to be followed for these patients. All sealed source therapy patients are the responsibility of the Radiation Safety Office, Radiation Oncology and Radiology.

##### 1. Temporary Implants:

- a. Cesium-137 and Iridium-192 sources can both be utilized for temporary implants and are generally removed after 20-60 hours. Cesium-137 and Iridium-192 are generally used separately for Low Dose Rate Brachytherapy (LDR). During LDR procedures the delivery devices are placed during surgery and the sealed radioactive sources are placed after the patient is brought to the room; both the delivery devices and the sources remain in the patient and the patient will remain hospitalized. Time, distance, shielding and badging precautions are required for Cesium-137 and Iridium-192 patients due to the potential for exposure to nursing staff.



- b. Iridium-192 can also be utilized for High Dose Rate Brachytherapy (HDR). HDR treatments can last anywhere from 10-20 minutes and occurs over the course of several days. The delivery device or a place holder may remain in the patient over the course of the treatment. Delivery devices can vary from certain internal applicators to needles and catheters. The Iridium-192 source however does not remain in the patient and is removed and returned to the HDR machine at the completion of every single treatment. Patients undergoing HDR treatment will generally not be hospitalized. Should hospitalization be necessary, no special nursing or radiation safety precautions will have to be implemented. The patient will not contain any radioactive sealed sources while located on the floor.

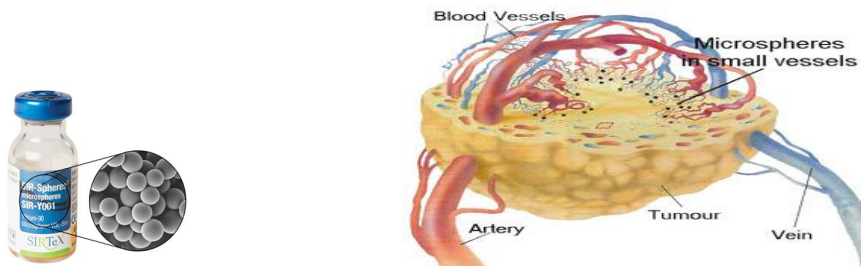


## 2. Permanent Implants:

- a. Patients are sometimes treated with low activity Iodine-125 or Palladium-103 seeds. Most commonly they are used for prostate tumors, but could be implanted in other tumors or cavities. Iodine-125 and Palladium-103 seeds are permanently implanted into the patient and treatments are generally performed on an outpatient basis. Because the seeds are such low energy, there is minimal exposure associated with these patients and no special nursing or radiation safety precautions, other than universal precautions, have to be implemented. Nursing personnel are not required to wear radiation monitoring badges. No special precautions are needed for dishes, instruments, or linen.

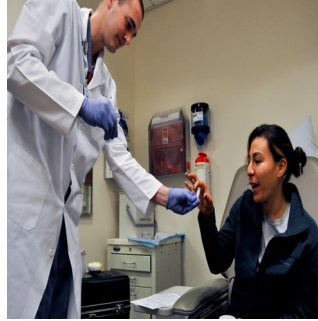


- b. Patients may also be treated with Yttrium-90 microspheres. Treatment with Yttrium-90 (TheraSpheres or SIR-Spheres) is mainly used for tumors of the liver and most are performed on an outpatient basis. The radiation emissions from the tumor are confined to a tissue depth of 2-3 centimeters and are contained within the patient's body. No special nursing or radiation safety precautions are required when working with patients treated with Yttrium-90 except using universal precautions. Nursing personnel are not required to wear radiation monitoring badges. No special precautions are needed for dishes, instruments, or linen.



D. Unsealed Source Therapy

The predominant unsealed therapy is Iodine-131, given to patient's post thyroidectomy for thyroid cancer. Iodine-131 is usually administered orally to the patient. The iodine concentrates in the patient's thyroid. However, iodine will also be eliminated from the patient's body via urine (most radioactive), perspiration and other body excreta within the first 48 hours. Radioactivity remaining in the body after 48 hours is located primarily in the patient's thyroid. Fluids from the patient's body will contaminate linen, bed clothes, and much of what the patient touches. In addition to universal precautions, strict contamination control is an added requirement for these patients. (See specific instruction for unsealed sources)



## VIII. Key Concepts and Safety Procedures for Diagnostic X-Ray and Fluoroscopy

### A. Key Concepts:

1. The first key to safety is *distance*. Stay out of the area, if possible — but at least six feet away.
2. The second key to safety is *shielding*. Wear a lead apron if you are participating in an x-ray procedure.

### B. Safety Procedures

1. Do not enter a surgery, recovery room, or emergency room during x-ray exposures unless you are needed there, and are wearing an apron.
2. If holding or restraining a patient, wear a lead apron. Wear lead gloves if your hands may be in the beam (for example, when you must hold the film cassette in position). The beam path is indicated by the visible “locator” light used to position the equipment. This light, of course, is *not* an x-ray beam and *does not* contain any ionizing radiation.
3. If your duties require you to turn your back to the radiation source, wear a wraparound apron that will protect your sides and back.
4. If not holding the patient or *required* for nearby patients, *leave* the room until the x-ray procedure has been completed.
5. If you *must* remain in the room for some reason, step back at least six feet from the beam.



6. During fluoroscopic exposures, step back and stand on the side of the image receptor if a C-arm is used or leave the room if possible.
7. If portable shielding is available, use it.
8. When working with mobile units, stand behind the remote control console when procedures are performed (if practical).
9. If you have been assigned a badge, wear it at collar level *outside* the lead apron.

## IX. Key Concepts and Safety Procedures for Diagnostic Nuclear Medicine

### A. Key Concepts

1. The overall hazard from radiation is very small because of the low quantities and short half-lives of the radioactive materials used.
2. Patient wastes may possibly pose a hazard if not dealt with appropriately.

### B. Safety Procedures

1. Radiation exposure is not significant. Minor contamination is possible from patient body wastes and fluids, mainly urine.
2. When cleaning up patient wastes or body fluids that may be contaminated soon after a nuclear medicine examination:
  - a. Wear disposable exam gloves.
  - b. Flush patient wastes and body fluids down the nearest toilet. Avoid splashing. Flush twice to ensure complete disposal.
  - c. Wash bedpans or urinals thoroughly before reusing.
3. No personnel badge or lead apron is necessary
4. Provide patient care according to universal precautions, and any instructions in the chart.

## X. General Instructions Regarding Patients Undergoing Therapeutic Radiation (sealed and unsealed)

The Radiation Safety Officer administers the responsibilities of the campus Radiation Safety Committee in promoting safe handling of radioisotopes within the hospital setting. As part of this responsibility, the RSO has developed some general and specific instructions regarding patients receiving therapeutic radiation and the nursing staff caring associated with those patients. Please be aware that no nurse (or assistant) may care for a radiation therapy patient unless they have reviewed both the general and specific instructions in this manual.

### A. Managing Nursing Staff Exposure

Special procedures must be followed to keep nursing staff exposure as low as reasonably achievable (ALARA). Generally, nursing staff should limit their time of close patient contact to 30 minutes per shift (exception, Iodine-125, Palladium-103 and Yttrium-90 therapy). This will ensure that personnel doses remain well below maximum limits for occupationally exposed workers (5000 mrem/yr (*50mSv/year*)). Please note that no nurse (or assistant) may care for a radiation therapy patient unless they have been assigned a badge or electronic dosimeter.

Nursing staff can minimize their exposure by limiting their time with the radioactive patient and by maximizing their distance from the patient. Radiation exposure decreases very rapidly as you move away (even an arm's length) from the patient. In some instances (except for I-131 therapy), radiation safety personnel may position a movable lead shield near the patient's bed to reduce exposure at the doorway or in the adjacent rooms. Exposure will be less if you stand behind the shield.

#### B. Patient Cooperation

Prior to treatment it is important that the physician caring for the patient give the patient a careful explanation as to the nature of the treatment and the procedures involved. Nursing personnel are responsible for reinforcing this information through the use of patient teaching materials. Patient cooperation is very important in minimizing unnecessary incidents and exposure. The need for restricting close contact time and limitations for visitors should be explained. Patients may feel very isolated with limited nursing care and restriction to their room; it is important to be caring and supportive of them, even if it is from the doorway.

#### C. Visitor Restrictions

Visitor restrictions are determined by the RSO and may be limited to 30 minutes/day. Visitors may be allowed a few moments at the bedside for those patients treated with sealed sources (Cesium-137, Iridium-192), but they should sit at least six feet from the patient and preferably at the doorway. Pregnant women and children under 18 years of age are not allowed to visit these patients without special permission. No visitors are allowed to enter the room of a patient treated with unsealed sources (Iodine-131) due to the potential for contamination.

#### D. Required Signage

It is essential that the patient being treated with radionuclides (sealed or unsealed) be identified as a source of radiation. There **must** be a "Caution Radioactive Material" placard taped to the patient's door (Appendix C). Other hospital personnel (e.g., dietary aides, housekeeping, physical plant, students) generally are not allowed to enter the room while the sign is in place

#### E. Emergency Procedures

Nursing staff may need to respond to emergencies with patients who have received therapeutic amounts of radioactive materials. Life-saving procedures should always begin as soon as possible without concern for exposure to radiation. The attending physician, radiation oncologist and RSO should be notified as soon as possible. For emergencies which are not immediately life threatening, the advice of the RSO should be sought on methods of reducing exposure. It is highly unlikely that a

patient would contain a source of sufficient strength as to be a significant health hazard to staff offering close emergency care.

F. Procedure in the Event of Patient Death

In the event a patient dies shortly after receiving treatment with unsealed radionuclides or implants, the RSO should be notified. Temporary implants must be removed by the radiation oncologist prior to transfer of the body off the floor. They must be placed immediately in the lead container that is left in the room whenever temporary implants are being used. The patient should not leave the floor until the RSO surveys the area. For patients being treated with unsealed sources (e.g. Iodine-131) or permanent implants, a tag must be affixed to the patient identifying him/her as being radioactive. The form, "Report of Radioactivity to Funeral Director" should be completed by the RSO before the patient is removed (Appendix G).

XI. Specific Instructions Regarding Nursing Care of Patients undergoing Sealed Source Therapy Using Cesium-137 and Iridium-192

During the use of sealed therapeutic sources the patient can become a significant source of radiation exposure to nursing staff, family and visitors. Due to this fact, these procedures require strict adherence to protective measures (with the exception of Iodine-125, Palladium-103 and Yttrium therapies) (Appendix D)

A. Patient Room/Shielding

Patients should be assigned a private room and usually are restricted to their bed according to orders given by the radiation oncologist. Patients should be placed on a floor of the Hospital where the patient can be at the end of a row, as secluded as possible.

Lead shields are available and may be positioned next to the patient by the RSO to reduce exposure.

B. Signage

When radiation therapy with sealed sources is in progress, a "Caution- Radioactive Materials" sign is to be placed on the patient room door (Appendix C). A sticker must be put in the patient's chart indicating the isotopes, activity, and exposure at one meter.

C. Written Directive

A written directive must be filled out by the radiation oncologist at the time of treatment and a copy placed in the patient's chart

D. Visitors

1. Generally, a visitor may stay in the room for no longer than 30 minutes per 24 hour period, and must stay at least 6 feet, preferably more, from the bed.

2. Visitors under the age of 18 or pregnant females are not permitted in the room.

#### E. Nursing Regulations

1. No nurse or nursing assistant should care for more than one patient with therapeutic quantities of radioactivity at a time. No more than two patients should be assigned to a floor at one time.
2. Pregnant nurses shall not be assigned to the care of these patients.
3. If special nursing care is required, this shall be brought to the attention of the radiation oncologist and the RSO.
4. Each nurse or nursing assistant in attendance shall wear a badge or electronic dosimeter. The Radiation Safety Office will provide these as needed.

#### F. Special Precautions

No special precautions are needed for sputum, vomitus, stools, or instruments. Foley catheters should be put in place during the surgical placement of the source holding devices. Foleys are not to be put in place while radioactive sources are in place.

#### G. Surgical Dressing/Bandage Disposal

Surgical dressings and bandages used to cover an area of source insertion are to be changed only by the radiation oncologist. They may not be discarded until specifically directed. Dressings should be kept in plastic containers for disposal.

#### H. GYN Therapy Perineal Care

For GYN therapy, perineal care is not given during gynecologic treatment unless the radiation oncologist has given specific orders to the contrary. In such a case, perineal pads are saved in plastic containers for radiation monitoring before disposal.

#### I. Bathing

No full bed baths should be given by the nurses or nursing assistants unless specifically ordered by the radiation oncologist.

#### J. Source Dislodgement

If the radioactive sources should become dislodged or fall out, call the RSO and radiation oncologist immediately; the telephone number is listed on instructions taped to the door. In an emergency situation, NEVER handle needles, capsules, or other solid source holders with hands. Use any long forceps, such as those available on the lead container (pig).

#### K. Room and Patient Survey

Bedding and room wastes should be saved until radioactive sources have been removed and checked. No patient is to leave the hospital without an exit survey by

radiation safety. A lead container (pig) and long forceps are kept in the patient's room to transport the source(s) after removal.

#### L. Cardiopulmonary Arrest and the Radioactive Patient

If such a patient suddenly requires intensive medical care (e.g., cardiopulmonary arrest), the RSO and radiation oncologist must be notified immediately. Personnel in attendance may be rotated if judged necessary by the RSO to minimize individual exposures. However, do not allow concern for radiation exposure to preclude immediate and sustained response to a code situation.

#### M. Emergency Situations:

The Radiation Safety Office must be informed immediately whenever it has been necessary for nursing or medical staff to remove radiation source(s) from brachytherapy applicators. The exact time of the source removal must be noted and reported. Please refer to Section XVI for emergency contact information.

### XII. Specific Instructions Regarding Nursing Care of Patients Undergoing Unsealed Iodine-131 Therapy

The Nuclear Medicine Staff from the Department of Radiology and the RSO are responsible for radiological aspects of Iodine-131 therapy. Radioiodine is administered orally as a capsule or liquid (unsealed) by the Nuclear Medicine Physician and is ingested by the patient. The UAMS Nuclear Medicine Written Directive Form (Appendix F) must be filled out by the physician at the time of treatment. All body fluids become contaminated (urine is highly contaminated). The floor of the patient's room is to be covered with plastic/paper; trash and linen containers are lined with blue plastic bags. Disposable dishes should be used during the patient's hospital stay. A private room and lavatory shall be provided. The patient must remain in the room until discharged. (Appendix E)

#### A. Patient Room/Shielding

Patients should be assigned a private room. Patients should be placed on a floor of the Hospital where the patient can be at the end of a row, as secluded as possible.

#### B. Signage

When radiation therapy with Iodine-131 is in progress, a "Caution- Radioactive Materials" sign is to be placed on the patient room door (Appendix C). A sticker must be put in the patient's chart indicating the isotopes, activity, and exposure at one meter.

#### C. Written Directive

A written directive must be filled out by the Nuclear Medicine Physician at the time of treatment and a copy placed in the patient's chart

#### D. Visitors

No visitors are allowed to enter the patient room during the treatment due to exposure and contamination concerns.

E. Nursing Regulations:

1. No nurse or nursing assistant should care for more than one patient with therapeutic quantities of radioactivity at a time. No more than two patients should be assigned to a floor at one time.
2. Pregnant nurses shall not be assigned to the care of these patients.
3. Each nurse or nursing assistant in attendance shall wear a badge or electronic dosimeter. The Radiation Safety Office will provide these as needed.

F. Special Precautions

1. Disposable gloves and shoe covers must be worn while attending this patient.
2. All food and drink must be served in disposable containers. Food services should NOT enter the room. Excess food should be flushed down the toilet in the patient room if possible.
3. Lab test samples (blood, urine, etc.) must be collected before treatment begins.
4. Urine should NOT be collected during treatment unless specifically ordered and the patient is permitted routine use of toilet facilities. When a bedpan is used, contents may be disposed of the toilet in the patient room, taking care not to spill.
5. Usually there is very little radioactivity in stools. They may be disposed of down the toilet in the patient room, unless retention is requested.
6. Should the patient vomit during the first 24 hours after the dose is administered, the vomitus (and sputum) should be disposed of via the toilet. If the vomitus is spilled it should be wiped up with towels by a nurse wearing rubber gloves. All linens soiled by vomitus and materials needing to be cleaned should be placed in a blue plastic bag and shall be collected by the Nuclear Medicine Personnel or RSO.
7. Separate containers (blue liner) will be provided for the linens and trash (paper, food trays). The containers must stay in the room until checked by Nuclear Medicine or the Radiation Safety Office
8. Nursing staff should not provide assistance in bathing the patient. However, patients should be encouraged to shower often and push liquids which will aid in removing excess Iodine from their system.
9. The patient must remain in the room until released by the Nuclear Medicine Department or the Radiation Safety Office.
10. Patient may only be discharged with Nuclear Medicine approval.

11. Room releases and reassignment requires approval of Nuclear Medicine staff and the Radiation Safety Office.
12. Patients containing radioactivity of less than 33 mCi Iodine-131 may be discharged from the hospital. The exposure rate at 1 meter shall be less than 7 mR/hr. This must be measured prior to patient discharge. Patients may be treated as outpatients if initial dose is less than 33 mCi, if their condition so allows. Nuclear Medicine/Radiology staff give instruction to minimize exposures to family and the public

#### G. Cardiopulmonary Arrest and the Radioactive Patient

If such a patient suddenly requires intensive medical care (e.g., cardiopulmonary arrest), the RSO and nuclear medicine physician must be notified immediately. Personnel in attendance may be rotated if judged necessary by the RSO to minimize individual exposures. However, do not allow concern for radiation exposure to preclude immediate and sustained response to a code situation.

#### H. Emergency Situations:

Inform the Radiation Safety Office immediately should any emergencies arise. Please refer to Section XVI for emergency contact information.

### XIII. Special Instruction for Spills involving Patients Undergoing Unsealed Iodine-131 Therapy

Gloves and shoe covers must be worn whenever managing any spill that could be radioactive.

#### A. Minor Spills

These are small volumes of patient blood, urine or vomitus. Cleaning should begin immediately.

1. While ensuring that you do not contaminate yourself, place an absorbent pad over the spill to absorb the free fluid.
2. Discard that absorbent pad in the radioactive waste and wipe the area thoroughly with a damp absorbent pad, being careful not to spread the contamination (wipe from the outside in). Discard all absorbent pads as radioactive waste.
3. Call the Nuclear Medicine Technologists or Radiation Safety Office to check the area. If after hours, cover the cleaned area with an absorbent pad and have it checked in the morning.
4. If linen or hospital gowns are contaminated, they should be changed and kept in the room in the soiled linen container.

#### B. Major Spills

1. Alert someone to contact the Nuclear Medicine Technologist (686-6661) or RSO immediately (686-7803 or cell (501) 231-7408).
2. Place absorbent pads over the spill and adjacent areas. Do not attempt to clean the spill.
3. If the spill is restricted to the linen, this may be changed provided special care is taken not to spread contamination or to contaminate yourself. Contaminated hospital gowns should be changed immediately.

#### XIV. Special Instructions for Responding to a Code for Patients undergoing Iodine-131 Therapy

- A. The individual initiating the code may begin CPR or other life-saving procedures without regard for radioactivity, although a one way valve should be used if possible.
- B. The medical team responding to the code should wear gloves; shoe covers and gowns upon entering the room to assist the individual performing CPR. All personnel involved should wait to be monitored by the Radiation Safety Office before leaving the area.
- C. All samples for blood gases or pathology labs shall be labeled "Caution Radioactive Material".
- D. Access to the room should be limited to only pertinent staff necessary to initiate the code.
- E. The head nurse/charge nurse shall ensure that the Radiation Safety Officer (686-7803 or (501) 231-7408) and primary physician have been contacted as soon as possible. If unable to make contact with the RSO, call the Nuclear Medicine Physician (686-6661 or 681-1812).
- F. Radiation Safety personnel shall take the names of all individuals entering the patient's room and they will be given follow-up bioassay by the Radiation Safety Office.
- G. If possible, any apparent contamination should be removed from the patient before he/she is transferred to the intensive care unit; e.g. contaminated dressing gowns/pajamas should be removed, dried blood washed off, etc. Ensure that chart has radioactive label on front cover.
- H. Should the patient expire, remove the sticker from the chart cover and attach it to the patient. Complete the form "Report of Radioactivity to Funeral Director" and send this form with the body.

#### XV. Nursing Care of Patients Undergoing Stereotactic Radiosurgery (Gamma Knife)

Stereotactic radiosurgery was developed by neurosurgeons as a technique for the destruction of intracranial targets without opening the skull, using single, high doses of



ionizing radiation in stereotactically directed narrow beams. The radiation is delivered using multiple beam directions and a high degree of collimation. Conditions currently treated include Arteriovenous malformations, Benign tumors (acoustic neuromas, meningiomas, and pituitary adenomas), Malignant tumors, and Metastases

A. Methods:

1. Uses a stereotactic apparatus (head frame) that securely attached with screws to the patient's skull. This reference frame allows for precise patient positioning and target determination.
2. After the head frame is in place, the patient is taken to MRI, CT, or angiography for imaging. Radiographic imaging defines the volume of interest and defines the treatment area.
3. Treatment time may vary and is dependent on the number of isocenters and the machine delivering the radiosurgery

B. Side Effects of Treatment:

Patients may experience effects of treatment depending on the location, size, dose, histology and modality. Acute effects may include nausea/vomiting, headache, seizures, pain, fatigue, and cerebral edema.

C. Radiation Safety Concerns for faculty and staff:

The Gamma Knife unit is a highly shielded machine that allows individuals to be present in the room when treatment is not taking place. No individual is to be present during the actual radiosurgery (gamma knife) treatment. Remote devices (video camera and audio contact) allow the nursing staff to monitor the patient during the treatment.

D. Emergency Situations

In the event of an emergency the Gamma Knife Treatment Team (Radiation Oncologist, Neurosurgeon, and Medical Physicist) will be present to assist the Nursing staff.

XVI. Emergency Contact Information

<b>Cesium-137/Iridium-192 Patients</b>	<b>Phone</b>
Radiation Safety Officer	(501) 686-7803 (Office)
	(870) 818-6998 (Cell)
Radiation Safety Office	(501) 686-5536

After hours or on weekends: Contact RSO directly by cell at (870) 818-6998 or call Campus Ops Call Center (501) 526-0000 and they will contact the Radiation Safety Officer.	
Division of Radiation Oncology	(501) 686-7100
After Hours or on weekends: To page Radiation Oncologist on call- Contact Hospital Operator and ask for Radiation Oncologist on call.	

<b>Iodine-131 Patients</b>	<b>Phone</b>
Radiation Safety Officer	(501) 686-7803 (Office) (870) 818-6998 (Cell)
Radiation Safety Office	(501) 686-5536
After hours or on weekends: Contact RSO directly by cell at (870) 818-6998 or call Campus Ops Call Center (501) 526-0000 and they will contact the Radiation Safety Officer.	
Nuclear Medicine Technologist/ Physician	(501) 686-6661
Nuclear Medicine Physician Pager	(501) 681-1812

## XV. Glossary

**ALARA**-acronym for “As Low As is Reasonably Achievable”; it refers to an operating philosophy in which every reasonable effort is taken to maintain occupational exposures to radiation as far below specified limits as is practical.

**BACKGROUND RADIATION**-the radiation always present in the environment; it comprises radiation from outer space, radiation emitted by naturally occurring radionuclides in the earth’s crust and radiation from radionuclides inside the body from food stuffs grown in the ground.

**BETA PARTICLE**-charged particle emitted from the nucleus of an atom, with a mass and charge equal in magnitude to that of the electron. Body tissue attenuates (shields) most beta particles; therefore, patients receiving treatment with a beta-emitting radionuclide can immediately be released from radiological controls

**BRACHYTHERAPY**-method of radiation therapy in which sealed sources are utilized to deliver a radiation dose at a distance of up to a few centimeters, by surface, intracavitary, or interstitial application.

**CONTAMINATION**-deposition of radioactive material in any place where it is not desired, and particularly where its presence might be harmful. Contamination may be fixed, removable (smearable) or airborne.

DECAY, RADIOACTIVE-disintegration of the nucleus of an unstable nuclide by spontaneous emission of charged particles and/or photons.

DECONTAMINATION-decontamination refers to the reduction or removal of radioactive contamination from any given surface (for example, floors, tools, clothing and skin).

DOSIMETER-instrument used to detect and measure accumulated radiation exposure. "Personal" or "personnel" dosimeters refer to those of small size worn by an individual to determine the exposure received during the time it is worn.

FLUOROSCOPY-imaging method that provides real-time X ray imaging that is especially useful for guiding a variety of diagnostic and interventional procedures.

GAMMA KNIFE-stereotactic radiosurgical device that non-invasively treats malignant and benign brain tumors, vascular malformations and trigeminal neuralgia using single, high doses of ionizing radiation in stereotactically directed narrow beams.

GAMMA RAY-high-energy, short wavelength electromagnetic radiation (a packet of energy) emitted from the nucleus of an atom. Gamma rays are very penetrating and are best stopped or shielded with a dense material, such as lead. Gamma rays are similar to x-rays.

HALF-LIFE, RADIOACTIVE-time required for a radioactive substance to lose 50 percent of its activity by decay. Each radionuclide has a unique half-life.

HIGH DOSE RATE BRACHYTHERAPY-radiation therapy treatment that involves the placement of a sealed source directly inside the body, in or near a tumor, for a specific amount of time and is then withdrawn. In HDR brachytherapy, a high dose of radiation is delivered to the tumor in a short burst, lasting only a few minutes. This treatment may be repeated several times in a day or a number of times over one or more weeks.

INVERSE SQUARE LAW-the radiation intensity of a radioactive source decreases inversely as the square of the distance between the source and the point of measurement, (e.g. doubling the distance from a source decreases the exposure to one fourth).

IONIZING RADIATION-any radiation capable of displacing electrons from atoms or molecules, thereby producing ions in matter.

LINEAR ACCELERATOR-machine that increases the energy of charged particles (e.g. electrons or x-rays). It is used to give external therapy either to the whole body or a small portion thereof.

LOW DOSE RATE BRACHYTHERAPY-radiation therapy treatment for cancer that involves the placement of a sealed source directly inside the body, in or near a tumor, for a specific amount of time and is then withdrawn. In LDR brachytherapy, the patient is treated with a low dose of radiation for hours or days at a time.

PERSONAL PROTECTIVE EQUIPMENT-personal protective equipment (also called PPE) is worn by individuals to prevent radioactive contamination of their bodies or personal clothing. PPE includes special coveralls, gloves, shoe covers, safety goggles, etc.

RAD- Special unit of absorbed dose. One rad is equal to an absorbed dose of 100 ergs/gram or 0.01 joule/kilogram. 100 rads equal 1 Gray.

**RADIATION-PRODUCING MACHINE**-any device capable of producing ionizing radiation when the associated control devices are operated, excluding devices that produce radiation only by the use of radioactive materials.

**RADIOACTIVITY**-radioactivity is a natural and spontaneous process by which the unstable atoms of an element emit or radiate excess energy from their nuclei as particles or photons and thus change (or decay) to atoms of a different element or to a lower energy state of the original element.

**RADIOISOTOPE/RADIONUCLIDE**-an unstable isotope of an element that decays or disintegrates spontaneously, emitting radiation.

**RADIOPHARMACEUTICAL**-a radiolabeled drug. A chemical compound tagged with a radionuclide and prepared in a form suitable for human-use.

**REM**-special unit of any of the quantities expressed as dose equivalent. The dose equivalent in rems is equal to the absorbed dose in rads multiplied by the quality factor. For most forms of radiation, one rem is numerically equal to one roentgen or one rad. One sievert equals 100 rems, 1 rem equals 1000 millirem, 1 sievert equals 1000 millisieverts.

**ROENTGEN (R)**-special unit of radiation exposure. The amount of exposure that liberates one esu of charge per cc of air. For most forms of radiation, one roentgen is numerically equal to one rem or one rad. Although considered obsolete, this term and its abbreviation are still commonly used.

**SEALED SOURCE**-any radioactive material that is permanently bonded or fixed in a capsule or matrix designed to prevent the release or dispersal of the material under the most severe conditions encountered in normal use or handling. Sealed sources may be used in research, training, and industrial applications, as well as for diagnostic and therapeutic medical use.

**SHIELDING**-any material or obstruction that absorbs radiation and thus tends to protect personnel from the effects of ionizing radiation.

**SIEVERT (S)**-SI unit of any of the quantities expressed as dose equivalent. The dose equivalent in sieverts is equal to the absorbed dose in Grays multiplied by the quality factor. 1 sievert equals 100 rems.

**SURVEY METER**-portable radiation detection instrument especially adapted for inspecting an area to establish the existence and amount of radioactive material present.

**SURVEY, RADIOLOGICAL**-evaluation of the radiological conditions and potential hazards incident to the use or presence of radioactive material or other sources of radiation.

**X-RAYS**-penetrating electromagnetic radiations (photons) that are usually produced mechanically by bombarding a metallic target with fast electrons. X-ray machines DO NOT contain radioactive material and no x-ray radiation is produced unless the device is activated

## Appendix A – Landauer Exposure Report Form

U OF ARK FOR MED SCI  
 ENVIR HEALTH & SAFETY  
 4301 W MARKHAM/SLOT 617  
 LITTLE ROCK AR 72205

### LANDAUER®

Landauer, Inc. 2 Science Road Glenwood, Illinois 60425-1586  
 Telephone: (708)755-7000 Facsimile: (708)755-7016  
 www.landauerinc.com



### RADIATION DOSIMETRY REPORT

ACCOUNT NO.	SERIES CODE	ANALYTICAL WORK ORDER	REPORT DATE	DOSIMETER RECEIVED	REPORT TIME IN WORK DAYS	PAGE NO.
10432	ENV	0001800142	01/24/00	01/18/00	4	1 OF 1

\*\* DUPLICATE \*\*

PARTICIPANT NUMBER	NAME			DOSIMETER	USE	RADIATION QUALITY	DOSE EQUIVALENT (MREM) FOR PERIODS SHOWN BELOW			QUARTERLY ACCUMULATED DOSE EQUIVALENT (MREM)			YEAR TO DATE DOSE EQUIVALENT (MREM)			LIFETIME DOSE EQUIVALENT (MREM)			RECORDS FOR YEAR	RECEPTION DATE (MM/YY)
	ID NUMBER	BIRTH DATE	SEX				DEEP DDE	EYE LOE	SHALLOW SDE	DEEP DDE	EYE LOE	SHALLOW SDE	DEEP DDE	EYE LOE	SHALLOW SDE	DEEP DDE	EYE LOE	SHALLOW SDE		
FOR MONITORING PERIOD:							12/01/99	12/31/99	QTR 4			1999								
00ENV	CONTROL			P	CNTRL		M	M	N										21	07/89
	CONTROL			P	CNTRL		M	M	N											07/89
	CONTROL			U	CNTRL				N											07/89
	CONTROL			U	CNTRL				N											07/89
00234	PRICE CAROL J			P	MHBODY	P	1	1	1	8	5	8	19	19	21	1388	1369	1391	15	07/89
				F	RFINGR				30			80			60			1520		07/91
02212	HART SONJA C			P	MHBODY	P	2	2	2	8	9	9	16	17	19	27	29	32	15	08/96
				F	RFINGR				N			M			M			M		08/96
02496	BRECKINRIDGE CHARLES E			P	MHBODY		UNUSED					M	1	1	3	7	7	10	15	12/97
				M	NOTE							M								12/97
				U	RFINGR				N			M			M			M		12/97

M: MINIMAL REPORTING SERVICE OF 1 MREM  
 ELECTRONIC MEDIA TO FOLLOW THIS REPORT

QUALITY CONTROL RELEASE: DEM      25 - PR 6893 - RPT130 - N1 C      - 02908

Accredited by the National Institute of Standards and Technology through

## Appendix B – Radiation Worker Registration Form

MM/YY: \_\_\_\_\_ **University of Arkansas for Medical Sciences**  
 G1: \_\_\_\_\_ **Department of Occupational Health and Safety**  
 G8: \_\_\_\_\_ **4301 West Markham Street - Slot 617**  
 U3: \_\_\_\_\_ **Little Rock, Arkansas 72205**  
 U3: S M L **Radiation Worker Registration Form**

In order to complete your occupational radiation exposure history and to comply with RH-1500(d)(1) of the "Arkansas Rules and Regulations for Control of Sources of Ionizing Radiation" we must request the following information about workers who are occupationally exposed to ionizing radiation. This information is protected from public disclosure under RH-1500(f)(4).

**I. Radiation Worker Identification Information**

Name: \_\_\_\_\_  
(Last) (First) (M.I.) (Maiden)

Social Security # \_\_\_\_\_ Supervisor's Name \_\_\_\_\_

Birth Date: \_\_\_\_\_ Sex: \_\_\_\_\_ Dept. at UAMS: \_\_\_\_\_ Badge Series: \_\_\_\_\_

Employment Status:  Permanent  Student  Temporary (< 6 mos.)

Room No.: \_\_\_\_\_ Extension No.: \_\_\_\_\_ Mail Slot: \_\_\_\_\_

UAMS Account Number for Film Badge Charges: \_\_\_\_\_

Type of radiation work you anticipate here at UAMS (X-ray, Radioisotope handling): \_\_\_\_\_

**II. Radiation Exposure Information**

Are you currently employed at another facility where you receive occupational exposure to radiation or radioactive materials?  YES  NO  
 (If yes, please provide name and address below.)

List all current and previous work locations where you have received radiation exposure or indicate **NOT APPLICABLE**.

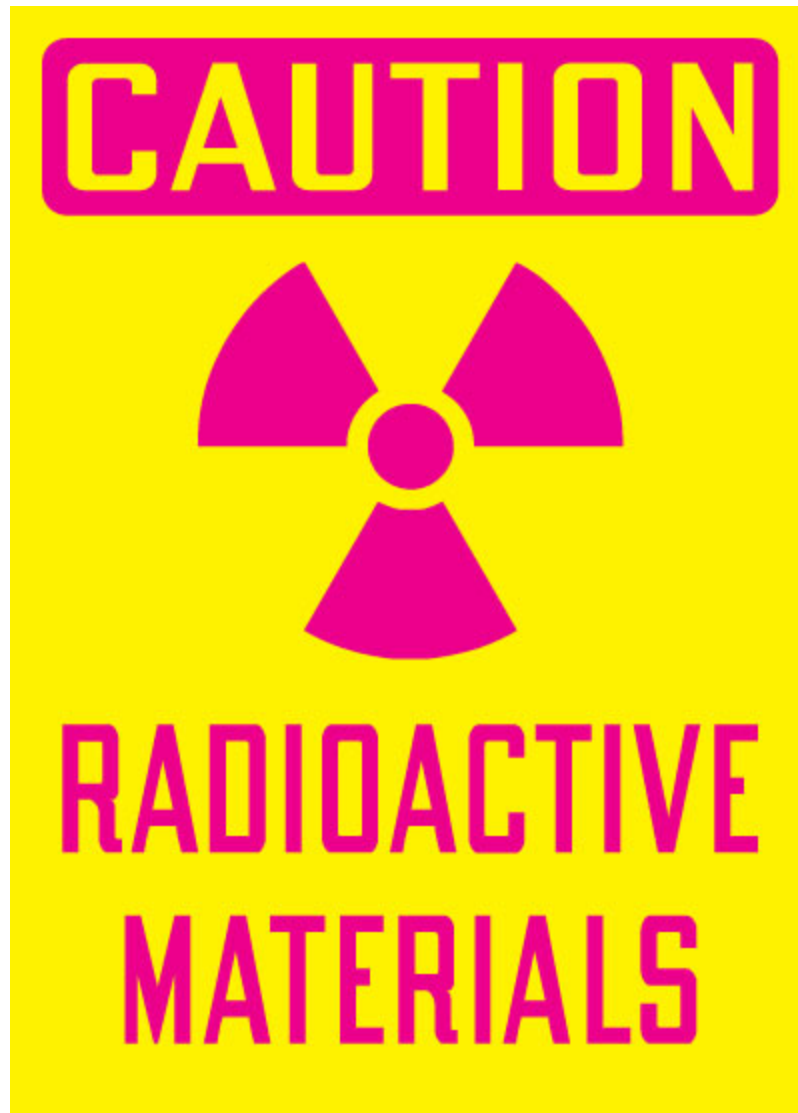
Occupational Exposure History			MHS Use Only		
Column 1	Column 2	Column 3			-
Employer, Supervisor, & Address	Were you badged?	Dates of Exposure	Dose mRem	R/C	Type Exp.

I certify that the exposure history information listed in columns 1, 2, and 3 is correct and complete to the best of my knowledge and belief. I authorize the employers listed above to provide the University of Arkansas for Medical Sciences with a copy of my occupational radiation exposure history.

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

(Return this form to EH&S at Slot 617 when completed.)

**Appendix C – Radioactive Materials Warning Sign**



## Appendix D – FACT SHEET FOR RADIATION IMPLANT PROCEDURES



### MAJOR POINTS TO REMEMBER:

- Patient is taken to surgery to have source holding devices (tandem, ovoids, needles) placed and is then brought to room. Radioactive sources are placed into source holding devices after the patient returns to the room. “Caution – Radioactive Material” signs will be placed on the patient door once the sources have been implanted.
- Foley catheters should be put in place during the surgical placement of the source holding devices. Foleys are not to be put in place while radioactive sources are in place.
- Patients should be placed on a floor of the Hospital where the patient can be at the end of a row, as secluded as possible.
- Patients are not bathed, beds changed (unless soiled), room cleaned or trash emptied while radioactive sources are in place. All dirty linens and trash must be surveyed by the Radiation Safety Office before being removed from the room.
- No patient is to leave the hospital without an exit survey by the Radiation Safety Office.
- No employee without a personal monitoring device is to enter the patient’s room for any reason.
- No pregnant workers will enter the room under any circumstances.
- Limit the time spent in the patient’s room to 30 minutes per shift. Stay behind the lead shield when possible.
- Visitors must remain behind the lead shield and limit total visit time to 30 minutes per 24-hour period. Visitors should remain at least 6 feet from the patient bed.
- Absolutely NO pregnant women or anyone under the age of 18 are allowed in the room under any circumstances once the radioactive sources have been placed.




## Appendix E – FACT SHEET FOR I-131 Therapy Procedures



### MAJOR POINTS TO REMEMBER:

- Patients will be administered the I-131 dose by the Nuclear Medicine Department once they are brought to the room prepared by the Nuclear Medicine Department / Radiation Safety Office. “Caution – Radioactive Material” signs and entry and exit instructions will be placed on the patient door once the I-131 has been administered.
- Patients will be placed on in a room of the Hospital as isolated as possible from other patients such as at the end of a row. Patients are not to be placed in any other location without prior approval of the Radiation Safety Office.
- Patients can move with the room, however they cannot exit the room.
- No patient is to leave the hospital without an exit survey by the Nuclear Medicine Department.
- Patients should not be assisted in bathing, however they should be encouraged to shower frequently if able to do so.
- Patients should be encouraged to push lots of fluids to aid in flushing excess Iodine from their system.
- Food services should be notified that disposable trays, plates, cups and utensils should be used. Food services should NOT enter the room.
- Room are not to be cleaned or trash emptied while the patient is present in the room. All dirty linens and trash must be surveyed by the Nuclear Medicine Department / Radiation Safety Office before being removed from the room.
- No employee without a personal monitoring device is to enter the patient’s room for any reason.
- No pregnant workers will enter the room under any circumstances.
- Limit the time spent in the patient’s room to 30 minutes per shift and make sure that you wear appropriate Personal Protective Equipment (PPE) to minimize the spread of contamination. PPE should be disposed of in the designated waste containers INSIDE the patient room.
- Visitors may not enter to room due to the possible spread of contamination.
- Absolutely NO pregnant women or anyone under the age of 18 are allowed in the room under any circumstances once the dose has been administered.

## Appendix F – Sample of Written Directive

 <p><b>UAMS</b> UNIVERSITY OF ARKANSAS FOR MEDICAL SCIENCES</p>	<p><b>UAMS Nuclear Medicine Division</b> <b>Written Directive &amp; Patient ID Protocol</b></p> <p><sup>131</sup>I NaI, PO, Therapy</p>	<p style="text-align: center;">PATIENT LABEL</p> <p>Name: _____</p> <p>MRN: _____</p> <p>DOB: _____</p>						
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">PRESCRIPTION</p>	<p>INDICATION: _____</p> <p>DOSE prescribed: _____ milli-Ci, PO.</p> <p>CONSENT SIGNED <input type="checkbox"/> Yes</p> <p>SERUM PREGNANCY TEST PERFORMED: <input type="checkbox"/> YES    <input type="checkbox"/> NOT APPLICABLE</p> <p style="padding-left: 40px;"><u>If PERFORMED</u> <input type="checkbox"/> NEGATIVE    <input type="checkbox"/> POSITIVE    [IF POSITIVE: <u>DO NOT PROCEED!</u>]</p> <p>Pregnancy Results VERIFIED by _____ (Physician)    _____ (Technologist)</p>							
	<p style="text-align: center;">_____, MD    _____</p> <p>Authorized User Signature    Date / Time</p>							
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">ADMINISTRATION</p>	<p>PATIENT IDENTIFICATION (Two methods required):</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <p><b>INFORMATION:</b></p> <p><input type="checkbox"/> DATE OF BIRTH</p> <p><input type="checkbox"/> ADDRESS</p> <p><input type="checkbox"/> SS#</p> </td> <td style="width: 50%; vertical-align: top;"> <p><b>SOURCE:</b></p> <p><input type="checkbox"/> PATIENT</p> <p><input type="checkbox"/> RELATIVE _____</p> <p><input type="checkbox"/> FRIEND _____</p> </td> </tr> </table> <p>DOSE ADMINISTERED: _____ mCi</p> <p>Rx # _____</p> <p>WITNESSES: _____</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; text-align: center;">Witness #1</td> <td style="width: 50%; text-align: center;">Date / Time</td> </tr> <tr> <td style="width: 50%; text-align: center;">Authorized User</td> <td style="width: 50%; text-align: center;">Date / Time</td> </tr> </table>		<p><b>INFORMATION:</b></p> <p><input type="checkbox"/> DATE OF BIRTH</p> <p><input type="checkbox"/> ADDRESS</p> <p><input type="checkbox"/> SS#</p>	<p><b>SOURCE:</b></p> <p><input type="checkbox"/> PATIENT</p> <p><input type="checkbox"/> RELATIVE _____</p> <p><input type="checkbox"/> FRIEND _____</p>	Witness #1	Date / Time	Authorized User	Date / Time
<p><b>INFORMATION:</b></p> <p><input type="checkbox"/> DATE OF BIRTH</p> <p><input type="checkbox"/> ADDRESS</p> <p><input type="checkbox"/> SS#</p>	<p><b>SOURCE:</b></p> <p><input type="checkbox"/> PATIENT</p> <p><input type="checkbox"/> RELATIVE _____</p> <p><input type="checkbox"/> FRIEND _____</p>							
Witness #1	Date / Time							
Authorized User	Date / Time							

**Appendix G – Report of Radioactivity to Funeral Director**

UNIVERSITY OF ARKANSAS FOR MEDICAL SCIENCES  
LITTLE ROCK, ARKANSAS

Report of Radioactivity to Funeral Director

It is hereby certified that the body of \_\_\_\_\_

has been examined this date with the following results:

(CHECK ONE)

( ) The body contains less than 33 mCi of radioactive material and requires no special precautions if standard embalming procedures are employed.

( ) The body contains more than 33 mCi of radioactive material, and the following precautions are recommended:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Signed \_\_\_\_\_

Title \_\_\_\_\_

Date \_\_\_\_\_