EMERGENCY TREATMENT OF RADIATION ACCIDENTS

I. General

Emergency treatment of radiation accidents may have to be given before contact with or arrival of specialists having expertise in evaluation and management of these accidents. In this case the management of the patient should take place in the following order:

Resuscitation and Stabilization

Initial Decontamination

Evaluation of Radiation Status

Initial Treatment of Radiation Injury

A. RESUSCITATION AND STABILIZATION

Since radiation injury is not immediately life-threatening primary attention should always be directed to traumatic life-threatening injuries---maintenance of airway, arrest of bleeding, treatment of shock and control of pain.

B. DECONTAMINATION

Concomitantly with the procedure above, or as soon as possible, the patient should be decontaminated. In the initial decontamination:

1. Remove all clothing---save in container;
2. Obtain samples of contamination (skin smears, tissue, fluids, etc.) --- keep segregated in separate containers;
3. Survey with a G-M tube and note levels of contamination on Patient Data Sheet (see sample on page 48);
4. Remove obvious dirt and debris; bathe if necessary while protecting wounds;
5. Repeat surveying and sampling as necessary;
6. Collect liquids in containers and save;
7. Flush wounds with copious amounts or sterile water and/or saline;
8. Flush orifices with water or saline. Do not allow patient to swallow;

9. Stop with initial decontamination when activity levels are measured in the few thousand counts/minute;

10. See section for details on "Procedures for Decontamination and Sample Taking".

C. EVALUATION OF RADIATION EXPOSURE STATUS

Clinical Picture:

A good estimation of the severity of the patient's external total body exposure can be obtained by observing the following clinical symptoms and signs:

1. Nausea and vomiting ... 100R*

Beginning within 2 hours - 400R
Beginning after 4 hours - 200R
None within 24 hours - 75R

2. Erythema ... 300R (total body); 600R (surface contact).

3. Diarrhea ... 400R

4. CNS symptoms ... 200R to the head

5. Serial lymphocyte count within 48 hours ...

1200/mm^3	good prognosis
300-1200/mm^3	guarded prognosis
300/mm^3	poor prognosis

* Roentgens, air exposure

D. INITIAL TREATMENT OF RADIATION INJURY

1. Detailed Decontamination:

It is particularly important at this stage to remove high level contamination caused by penetrating missiles or splinters in wounds.

2. Overexposure:

Since overexposure to radiation results in a slowly unfolding course over a long period of time, there is little in the way of specific treatment in the initial stage of the disease. Treatment is symptomatic and consists of making the patient comfortable and allaying his fears. He may require antiemetics, fluids, sedatives and analgesics

Order CBC with differential stat, at 4, 8 and 12 hours. Obtain blood sample (10cc sterile, heparinized blood) for chromosome analysis. Keep sample chilled in ice water.

3. Internal Contamination:

Except in a few instances, there is also little to offer in the way of specific treatment in the initial stages. Generally, specific treatment to eliminate any absorbed radioactivity requires rather detailed and complex analyses, including bioassay of excreta and blood, and whole body counting. Begin 24 hour urine collections and 72 hour fecal collections. Arrange for whole body count as soon as patient's condition warrants. Arrange for thyroid uptake study for I-131.

If it has been determined that an appreciable amount of radioactivity has been ingested (which is seldom the case), a stomach lavage, emetics ($ZnSO_4$) or cathartics (10% $MgSO_4$) may be indicated.

If it has been determined that the patient absorbed considerable amounts of:

Tritium (^3H) .... force fluids
Radioiodine .... give Lugol's solution or other thyroid-blocking agent immediately.

II. Principles of Radiation Protection

Certain precautions to minimize exposure to attendants are necessary when dealing with a patient who has external contamination specifically:

A. Always wear surgical scrub suits, masks, caps and gloves.

B. As few attendants as necessary should be in the same room with patient.

C. Only in the performance of emergency treatment and initial decontamination should attendants be next to patients. At all other times, e.g., while evaluating the patient, attendants should stand at least five to eight feet from the patient and observe him from a distance.

D. Rope off and control the area in which the patient is being treated. ALL persons, equipment and supplies that enter this area MUST stay there until Radiation Emergency Teams arrive to assist in the monitoring and decontamination of people and equipment.

Suggested permissible levels of attendant exposure in the course of treating a patient are:

to 5R .....routine treatment and decontamination
to 25R .....emergency treatment and decontamination
to 100R .....lifesaving treatment and decontamination

To estimate attendant exposure, pass the probe of the G-M survey meter with the beta window closed 6" above the patient. If the reading is 5R/hour, an estimate of attendant exposure would be 5R; treatment should take one hour, if performed with a shield.

Experience shows that it is extremely unlikely that an accident would be so severe that an attendant would receive an exposure of even 5R. In high radiation fields personnel may be rotated in order to minimize the exposure to any single individual. It is also suggested that anticipated exposures over 5R should be on a voluntary basis.

III. Initial Bioassay Samples

Each of the following bioassay samples should be obtained as soon as possible and labeled with name, date, time and type of specimen. Avoid cross-contamination of samples from external sources of contamination or from other samples.

A. Blood

1. 10 cc for radiobioassay

2. 5 cc (sterile, heparinized) for chromosomes - keep samples chilled in a glass of ice;

3. 10 cc oxylated for hemogram and differential*

4. 10 cc for:

   a. chemistries
   b. electrolytes

* differential - repeat t.i.d. for three days or more frequently if clinical condition warrants.

B. Hair, nails, metals from neutron-exposed patient

C. Urine

1. first urine

2. 24 hour urine for several succeeding days

D. Feces, total sample for several succeeding days

E. Sputum

F. Vomitus

G. Tissue and tissue exudates (note location)

H. Irrigation fluids (note location)

I. Filter paper or cotton smears of orifices, wounds, skin areas (note locations)