D.PHARM • SECOND YEAR

Hospital & Clinical Pharmacy

CHAPTER 6

Radiopharmaceuticals



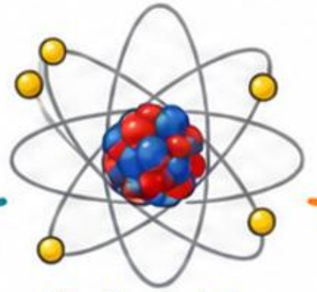
ENGLISH CHAPTER NOTES

DIPLOMA IN PHARMACY

RADIOPHARMACEUTICALS AND ALARA

RADIOPHARMACEUTICAL

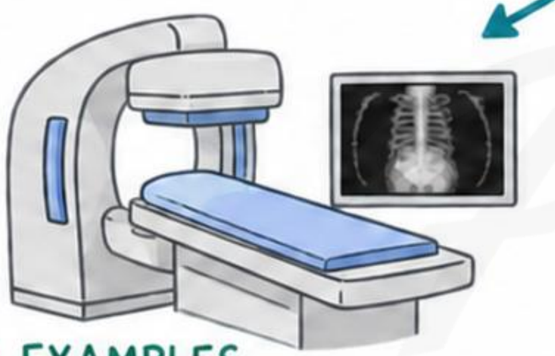
A medicinal preparation containing a radionuclide, used mainly in nuclear medicine for diagnosis or therapy.



Radionuclide (in radiopharmaceutical)

For diagnosis

For therapy



Gamma camera (imaging)

DIAGNOSTIC EXAMPLES

- Technetium-**99m** compounds
- Fluorine-**18** fluorodeoxyglucose (**18F-FDG**).

They emit radiation detected by imaging equipment to study organ function or disease.

MAIN RISKS

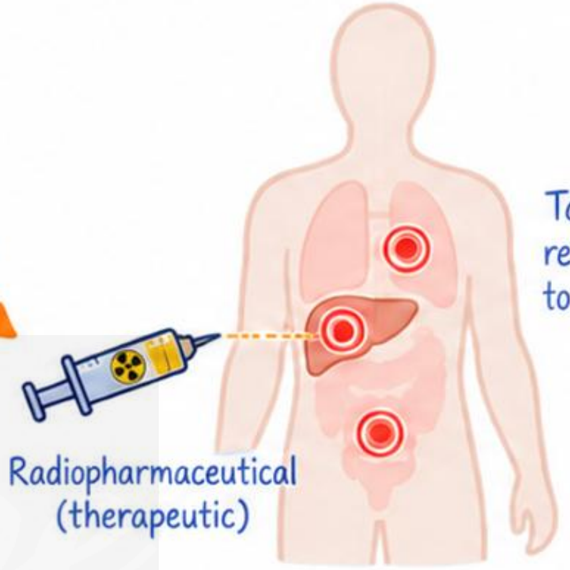
- External exposure
- contamination
- incorrect activity or patient
- loss of sterility for injectable products
- security failure.

TIME — minimize handling time.

ALARA — AS LOW AS REASONABLY ACHIEVABLE

DISTANCE — maximize safe distance using tools and workflow.

SHIELDING — use material and thickness suited to the radiation type.



Radiopharmaceutical (therapeutic)

Target tissue receives radiation to treat disease.

THERAPEUTIC EXAMPLES

- Iodine-**131**
- Lutetium-**177** compounds.

They deliver radiation to a selected tissue or molecular target.

In India, nuclear-medicine facilities and practices must follow AERB authorization, approved procedures and Radiation Safety Officer oversight.

STORAGE OF RADIOPHARMACEUTICALS

STORAGE OBJECTIVES

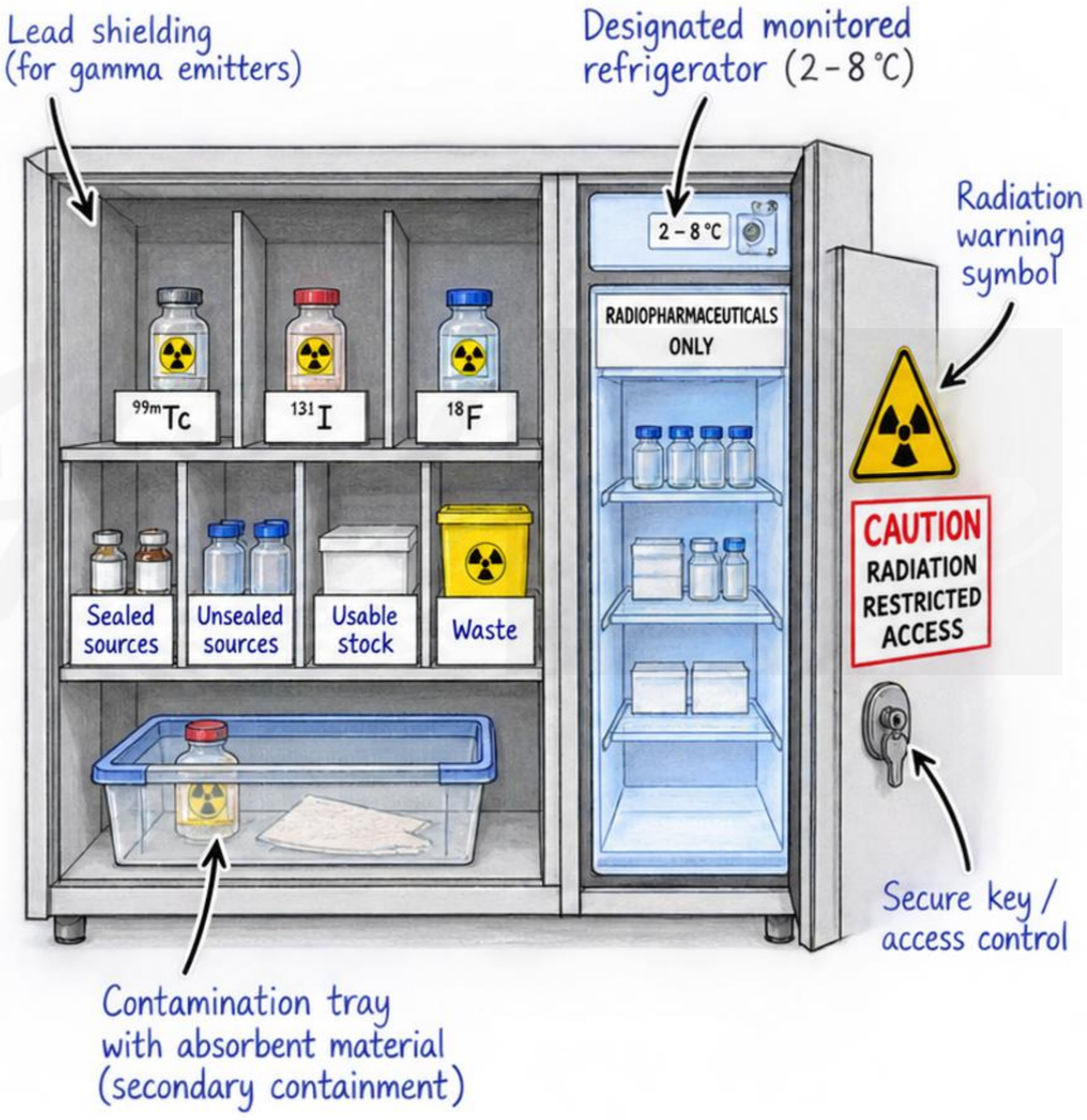
- Protect workers and public • preserve product quality • prevent contamination, mix-up, theft and loss of activity.

SHIELDING

Select shielding from radiation type and energy. Dense shielding may be used for gamma emitters; low-atomic-number material such as acrylic is often used first for high-energy beta emitters to reduce bremsstrahlung. Follow the Radiation Safety Officer's approved design.

SEGREGATION

Separate radionuclides, sealed / unsealed sources, usable stock, waste and returned material. Use secondary containment for liquids and clearly labelled work zones.



SECURITY AND RECORDS

- Restricted access • radiation warning symbol • inventory of radionuclide, activity, batch, receipt, use and balance • secure key / access control.

ENVIRONMENT

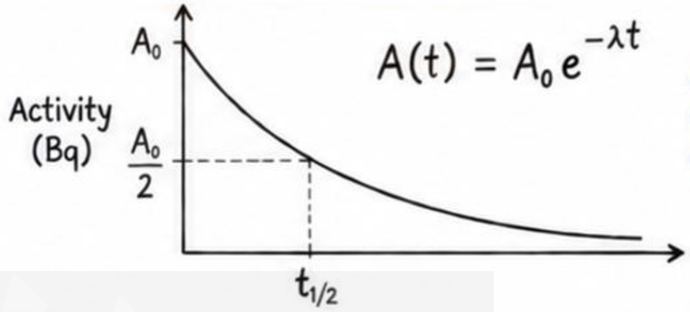
- Follow manufacturer-labelled temperature, light and storage conditions. Use a designated monitored refrigerator when required; never use a domestic food refrigerator.
- Keep short-lived products in an authorized hot lab near use, with survey instruments and spill supplies available.

DISPENSING OF RADIOPHARMACEUTICALS

AUTHORIZED WORK

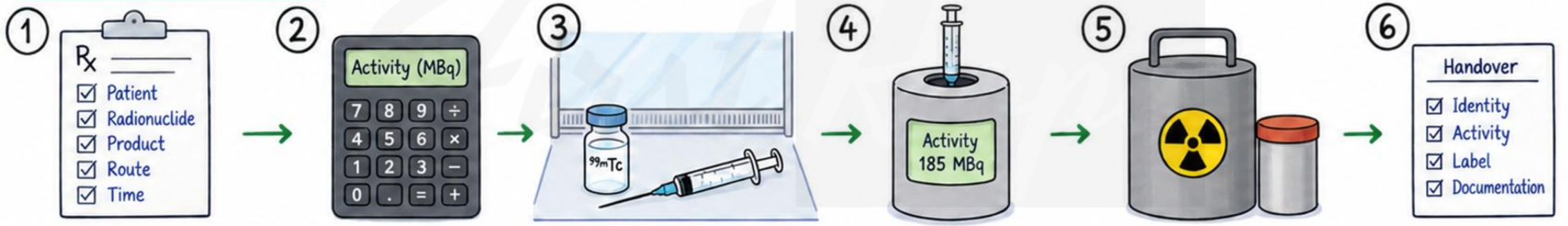
Only trained and authorized personnel work under the facility licence, Radiation Safety Officer program and written SOPs. Personal dosimetry, gloves, protective clothing and task-specific shielding are used according to risk—mot as a one-size-fits-all PPE list.

RADIOACTIVE DECAY



Activity decreases exponentially with time due to physical decay.

DISPENSING STEPS



1. Verify patient, prescription, radionuclide, product, route and scheduled administration time.
2. Calculate patient-specific activity and account for physical decay.
3. Prepare aseptically in the required controlled system for injectable products.
4. Measure activity with a calibrated dose calibrator.
5. Place vial / syringe in suitable shielding and leak-resistant transport container.
6. Perform final identity, activity and label check; document handover.

LABEL

Patient ID • radiopharmaceutical • activity in Bq / MBq • calibration date and time • expiry time • route when required • radiation symbol. Ci / mCi may also be encountered.

CONTAMINATION CONTROL

- Absorbent work surface • tray • routine surveys •
- immediate spill containment, monitoring and decontamination according to SOP.

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