Internal and External Exposure

Exposure Routes

External exposure
- From outer space and the sun
- Suspended matters
- From a radiation generator
- Buildings
- Ground

Internal exposure
- Inhalation
- Food and drink consumption
- Radio-pharmaceuticals
- Lungs
- Wound

The body is equally exposed to radiation in both cases.
Various Forms of Exposure

**External exposure**
- Whole-body exposure
- Local exposure (e.g. exposure by X-ray examination or local body surface contamination)

**Internal exposure**
- Whole-body exposure
- Local exposure (e.g. exposure from the thyroid taking in radioactive iodine)
External Exposure and Skin

Exposure Routes

- External Exposure and Skin

Skin structure

Part highly sensitive to radiation

Outside the body

- γ-rays
- β-particles
- α-particle

Within the body

- Affected part

Skin structure:

- Hair
- Epidermis
- Stratum corneum
- Basal cells
- Dermis
- Subcutaneous structure

- About 0.2mm
(i) **Ingestion**
From the mouth (swallowing)
Absorption through the digestive tract

(ii) **Inhalation**
Incorporation from the respiratory airways
Absorption from the lungs and the surface of the airways

(iii) **Percutaneous absorption**
Absorption from the skin

(iv) **Wound contamination**
Contamination from a wound

Radioactive materials within the body decay as they emit radiation within the body.

They may accumulate in some specific organs.

They are gradually excreted in the urine and feces.
The characteristics of radioactive materials that especially cause problems in internal exposure

(i) $\alpha$-emitters > $\beta$-emitters or $\gamma$-emitters

(ii) Materials that enter easily but are difficult to excrete

(iii) Materials that are likely to accumulate in specific organs