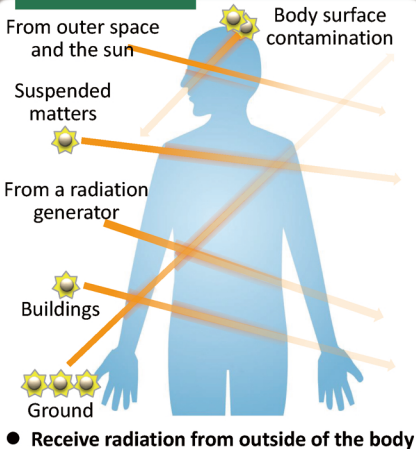
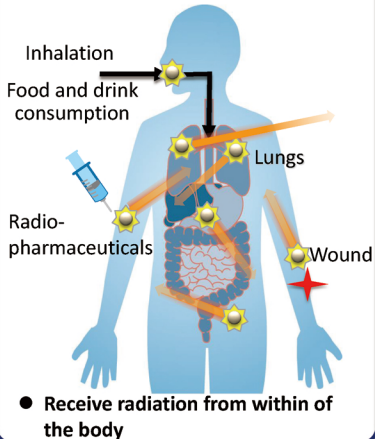


# Internal and External Exposure

## External exposure



## Internal exposure



The body is equally exposed to radiation in both cases.

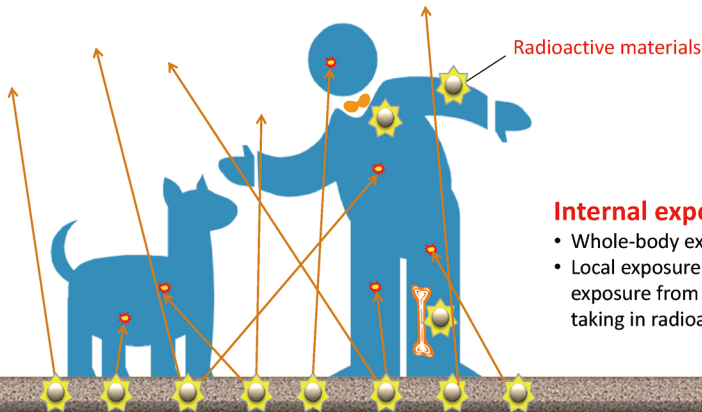


Radioactive materials

# Various Forms of Exposure

## External exposure

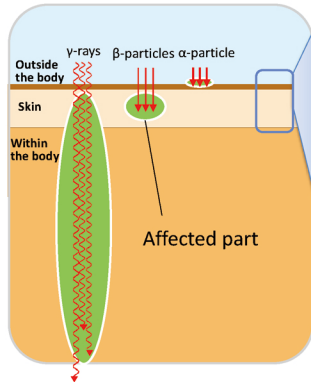
- Whole-body exposure
- Local exposure (e.g. exposure by X-ray examination or local body surface contamination)



## Internal exposure

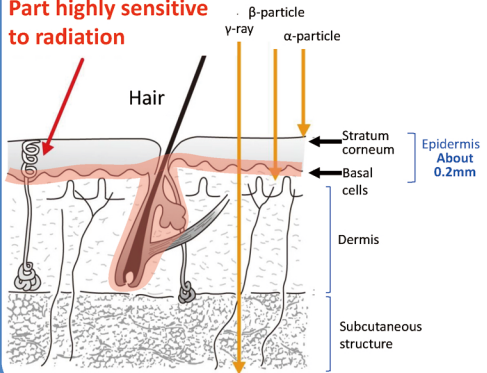
- Whole-body exposure
- Local exposure (e.g. exposure from the thyroid taking in radioactive iodine)

# External Exposure and Skin



## Skin structure

Part highly sensitive  
to radiation



# Internal Exposure

## (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

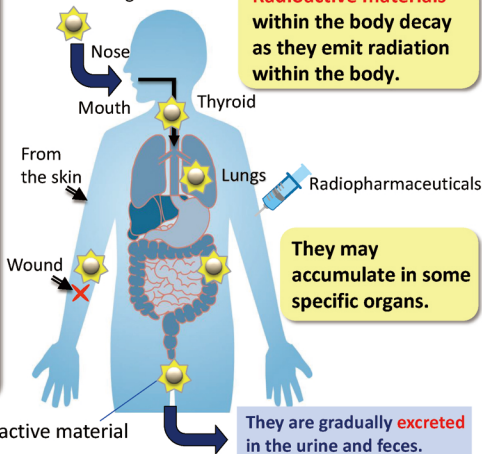
## (iv) Wound contamination

Contamination from a wound

## (v) Intake of radiopharmaceuticals

Injection, oral administration (→ (i))  
Inhalation of gas (→ (ii))

Inhalation or ingestion



## 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

Radioactive materials

