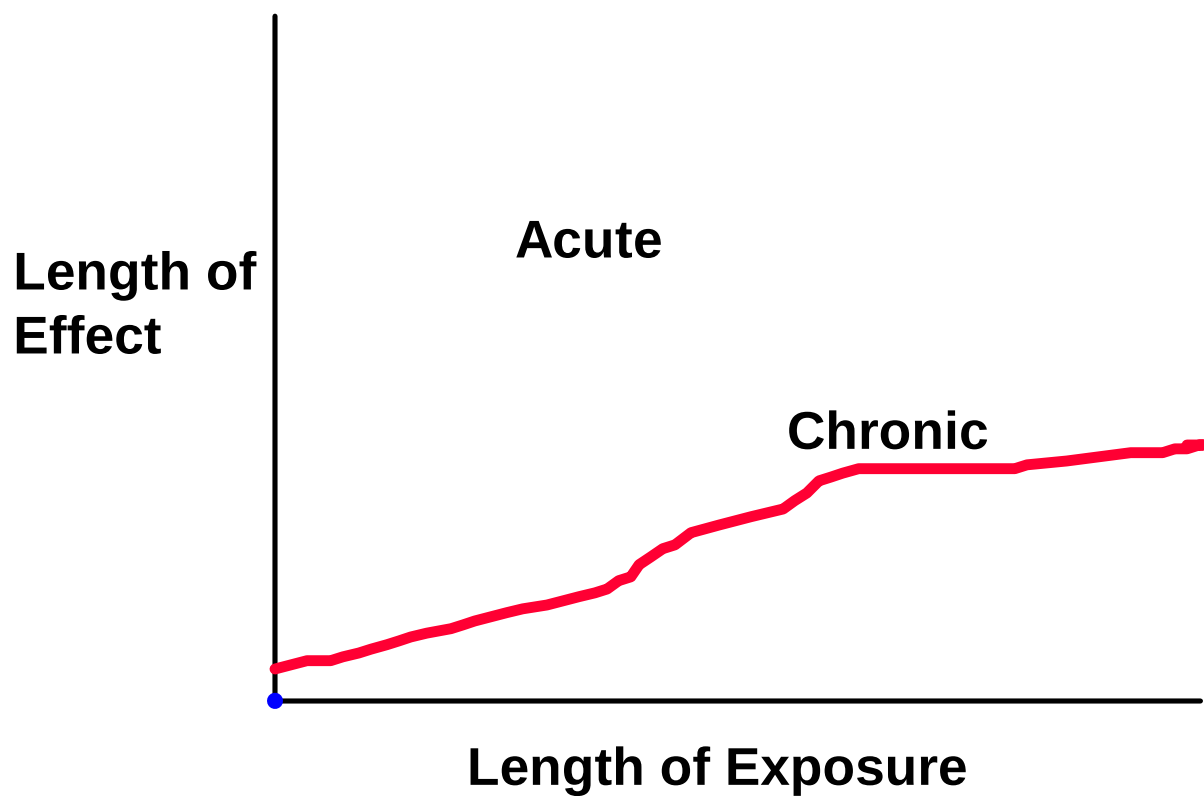


Acute vs. Chronic Effects



Routes of Exposure: Direct Contact

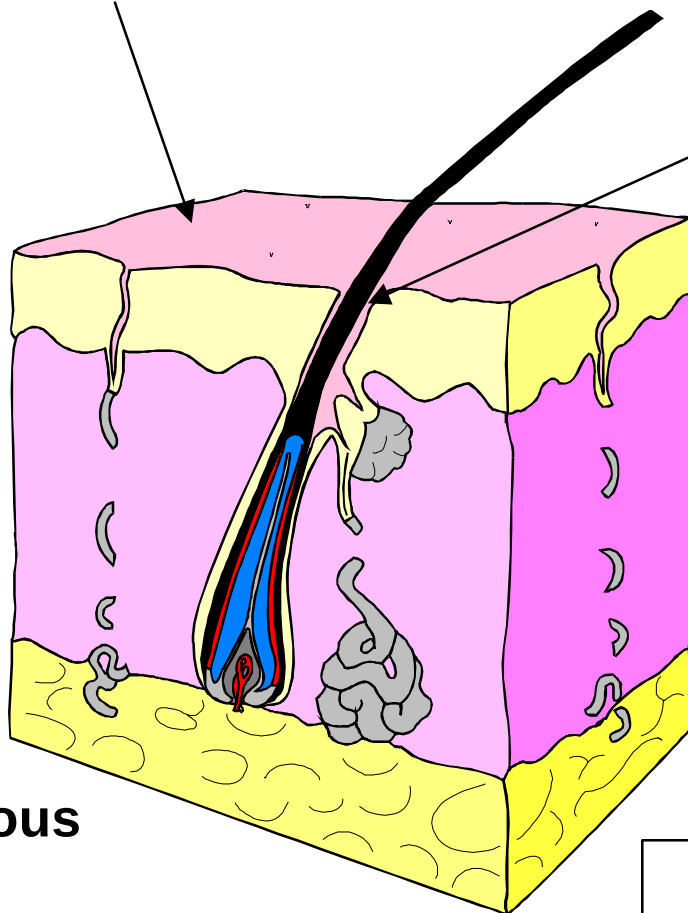
Chemicals can enter directly
through the skin...

...or through
hair follicles

Epidermis

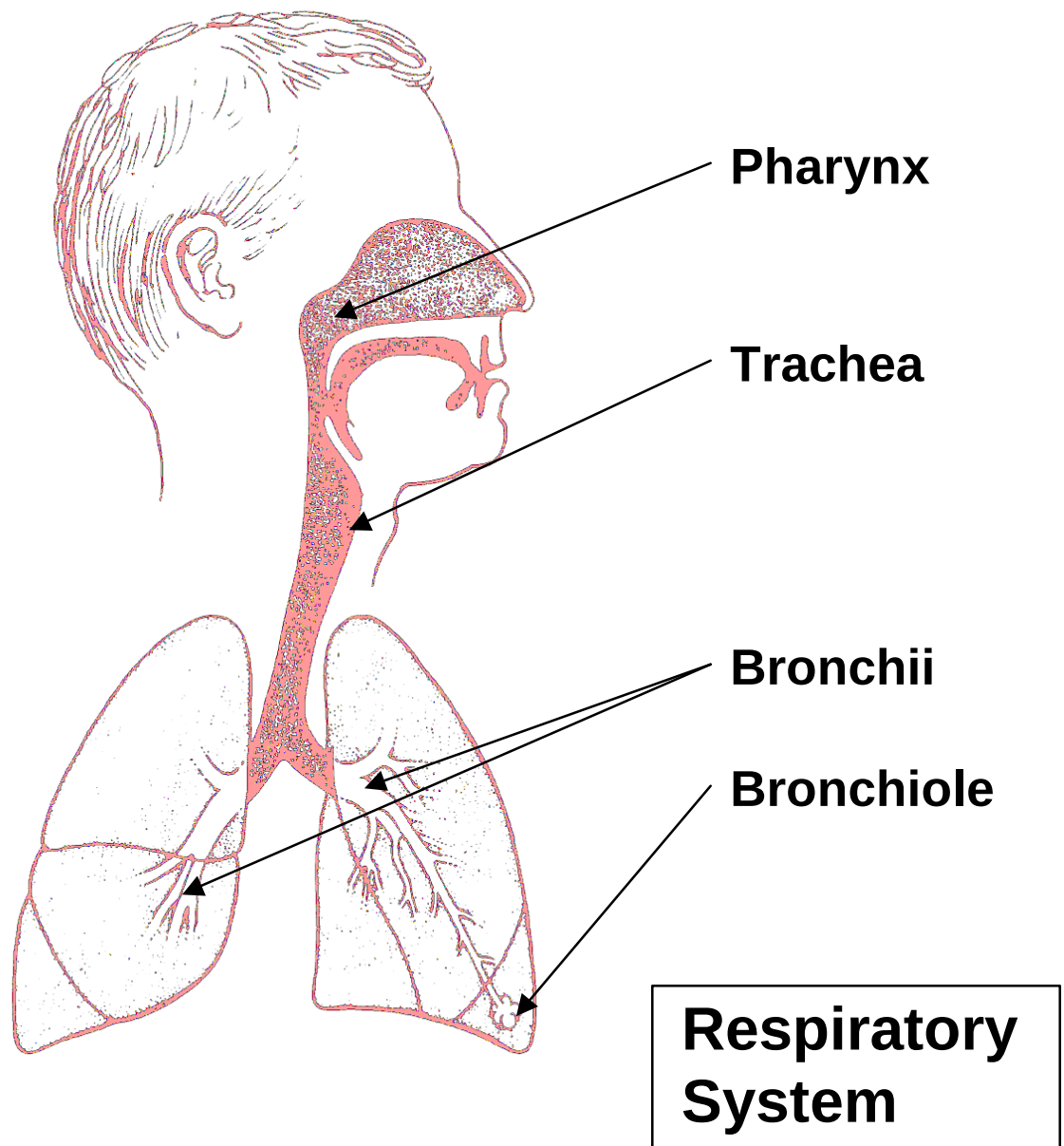
Dermis

Subcutaneous
Tissue

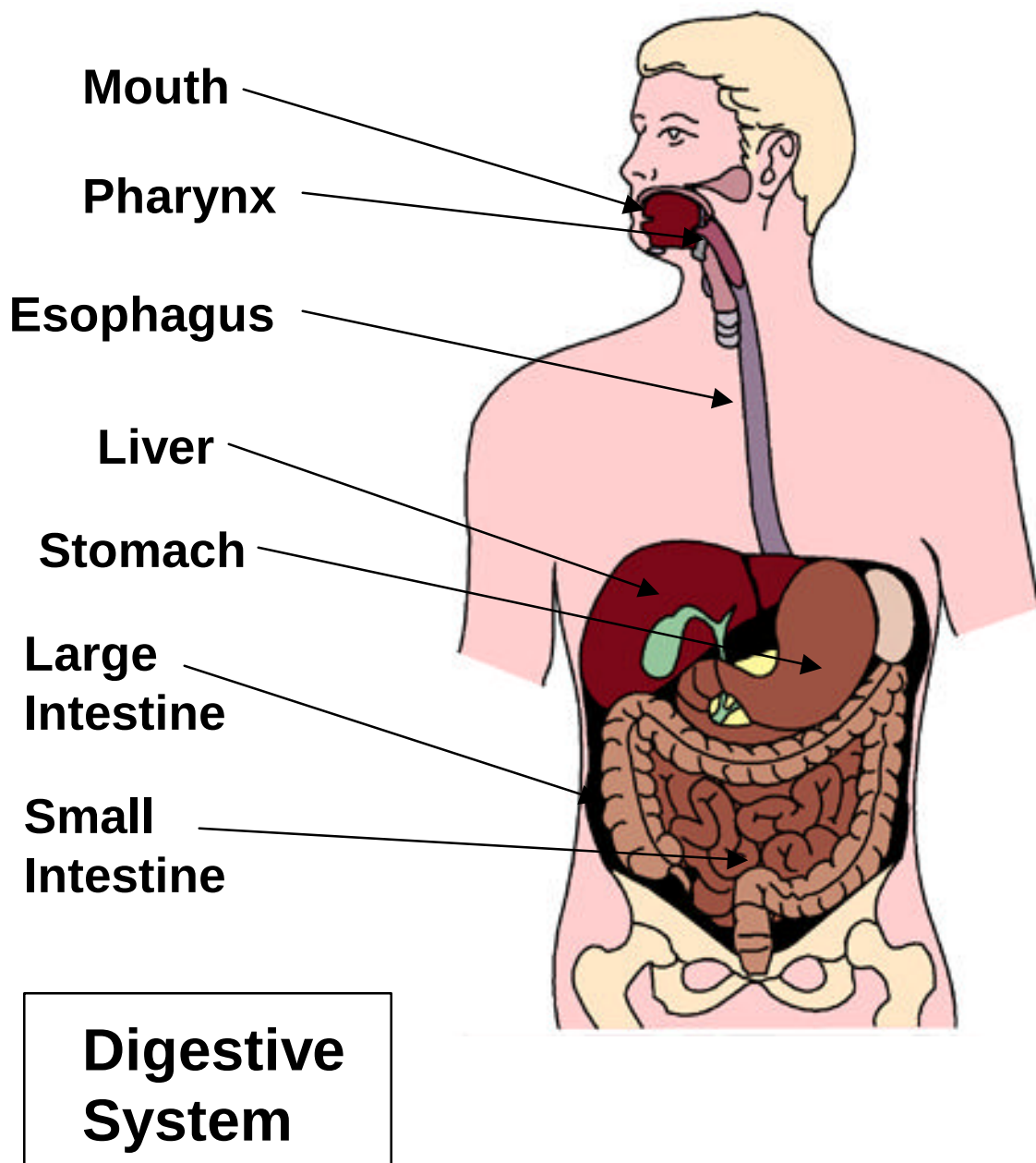


Skin

Routes of Exposure: Inhalation



Routes of Exposure: Ingestion



DOT Table 1 Materials

If material is classed as: It must be placarded as:

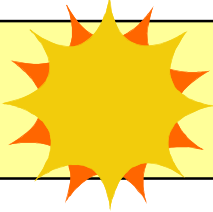
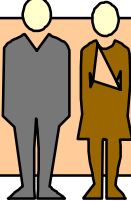
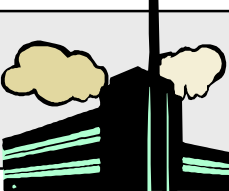
Explosive (Div 1.1).....	Explosive
Explosive (Div 1.2).....	Explosive
Explosive (Div 1.3).....	Explosive
Poison gas (Div 2.3).....	Poison gas
Dangerous when wet (Div 4.3).....	Dangerous when wet
Toxic materials and infectious substances (Div 6.1).....	Poison (Toxic)
Radioactive (Class 7, in Radioactive III packaging).....	Radioactive

DOT Table 2 Materials

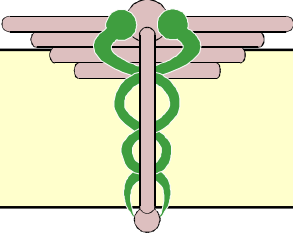
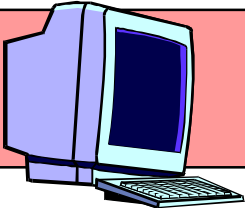
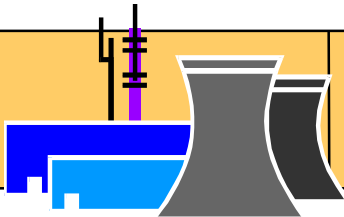
If material is classed as:	It must be placarded as:
-----------------------------------	---------------------------------

Explosive (Div 1.4).....	Explosive
Explosive (Div 1.5).....	Blasting agent
Explosive (Div 1.6).....	Explosive
Non-flammable gas (Div 2.2).....	Non-flammable gas
Oxygen (Div 2.2).....	Oxygen
Flammable gas (Div 2.1).....	Flammable gas
Combustible liquid.....	Combustible
Flammable liquid (Class 3).....	Flammable
Flammable solid (Div 4.1).....	Flammable solid
Oxidizer (Div 5.1).....	Oxidizer
Organic peroxide (Div 5.2).....	Organic peroxide
Toxic materials and infectious substances (Div 6.1).....	Poison (Toxic)
Corrosive (Class 8).....	Corrosive
Irritating.....	Dangerous

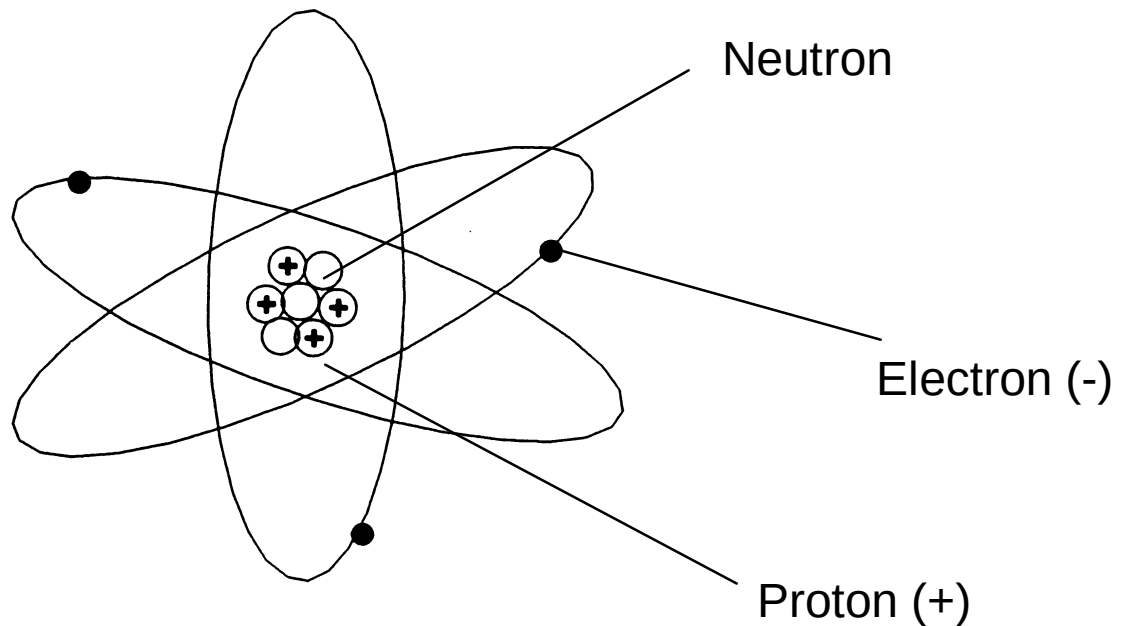
Radiation from Natural Sources

	Source	mrem/year
	Cosmic rays	28
	The earth	26
	Radon	200
	The human body	25
	Building materials	4

Radiation from Manmade Sources

	Source	mrem/year
	Medical	90
	Fallout	5
	Consumer products	1
	Nuclear power	0.3

Parts of an Atom

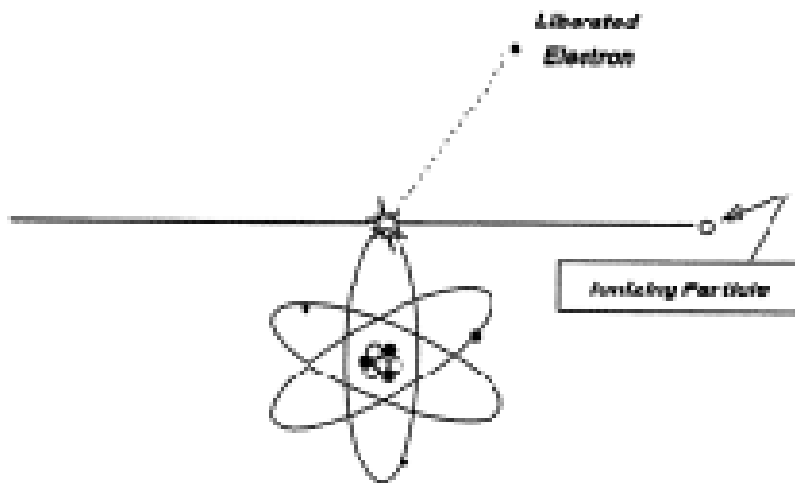


The nucleus contains positively charged protons and neutrons, which are not charged

Orbiting electrons are negatively charged

When the number of protons and electrons are equal, charges are balanced and the atom is stable

Ionization



An electron can be knocked from its orbit

The atom becomes charged, or “ionized”

Atoms

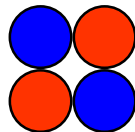
Elements are defined by the number of protons

 = Proton

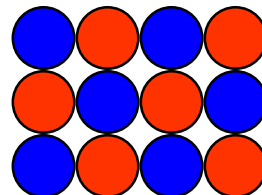
 = Neutron



Hydrogen
1 Proton

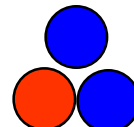
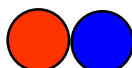


Helium
2 Protons



Carbon
6 Protons

1. What elemental nuclei are these?



2. How many neutrons does Carbon 60 have?

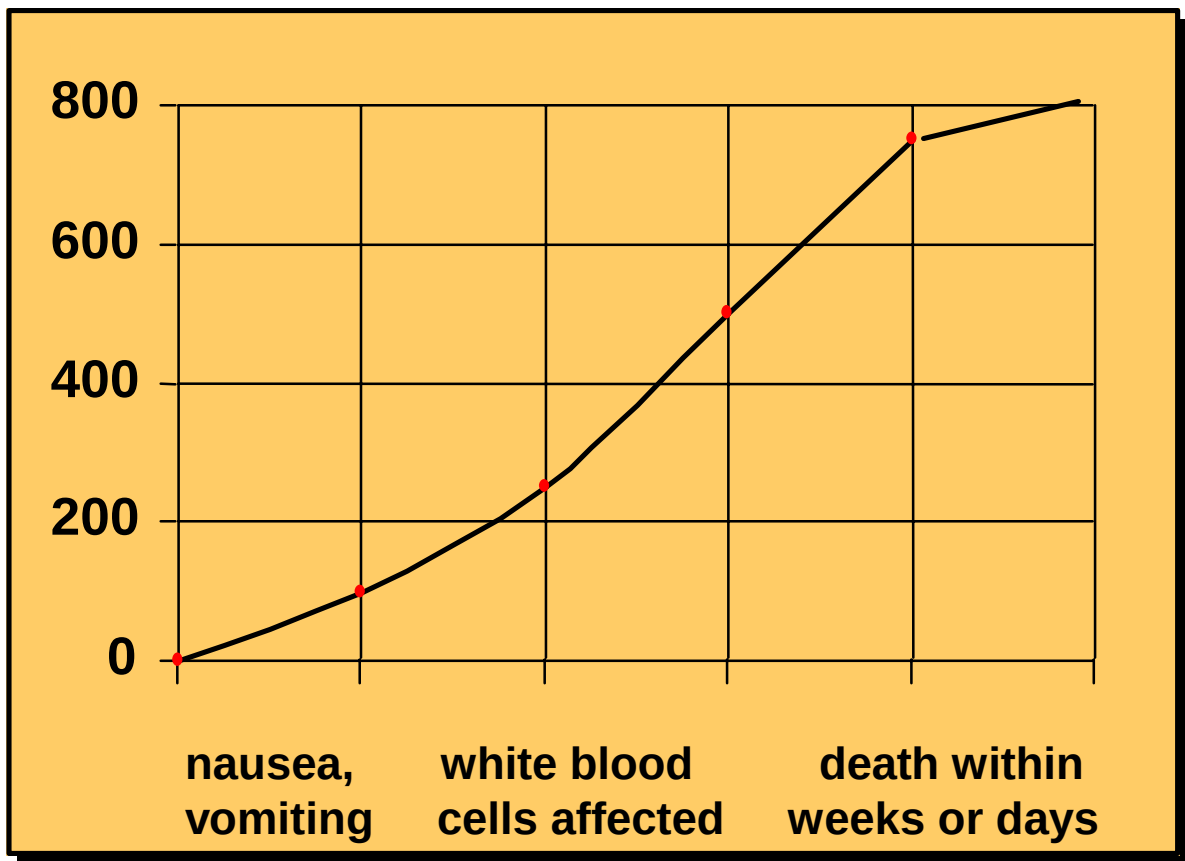
3. How many neutrons and protons does Carbon 13 have?

Answers:

1. Because they have only one proton, all these nuclei are different isotopes of hydrogen
2. Carbon 60 has 54 neutrons (plus 6 protons)
3. Carbon 13 has 7 neutrons and 6 protons

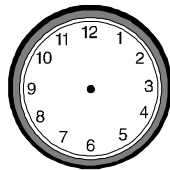
Stages of Acute Radiation Syndrome

R



Precautions for Radiation Hazards

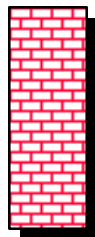
Time



Distance



Shielding



Placards/Labels for Radioactive Materials



Radioactive white - I

Contains almost no radiation
(0.5 mR/hr on surface)



Radioactive yellow - II

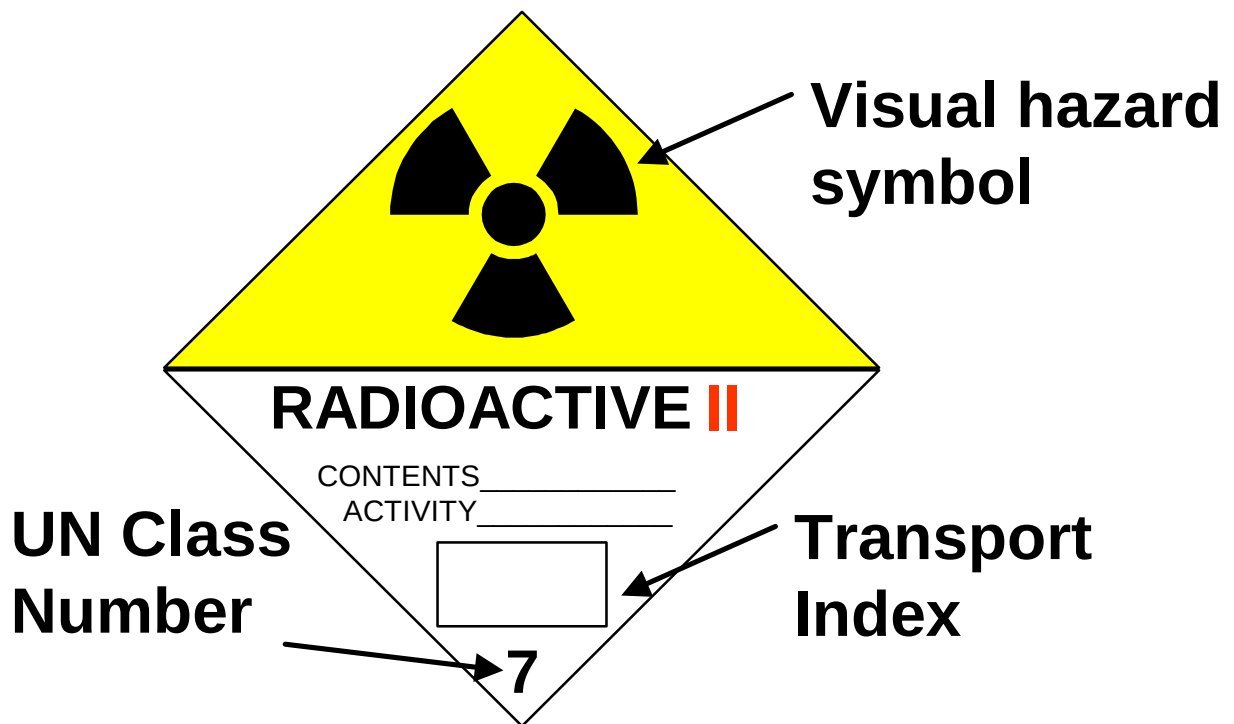
Low radiation levels (50 mR/hr
maximum on surface; 1 mR/hr
maximum at 1 meter)



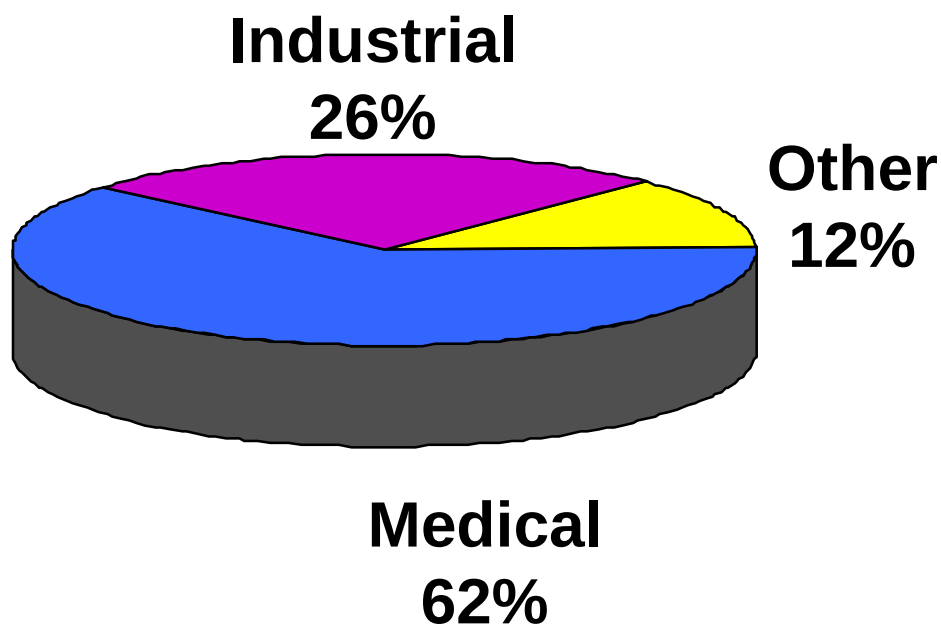
Radioactive yellow - III

Higher radiation levels (200
mR/hr maximum on surface;
10 mR/hr maximum at 1 meter)

Transport Index

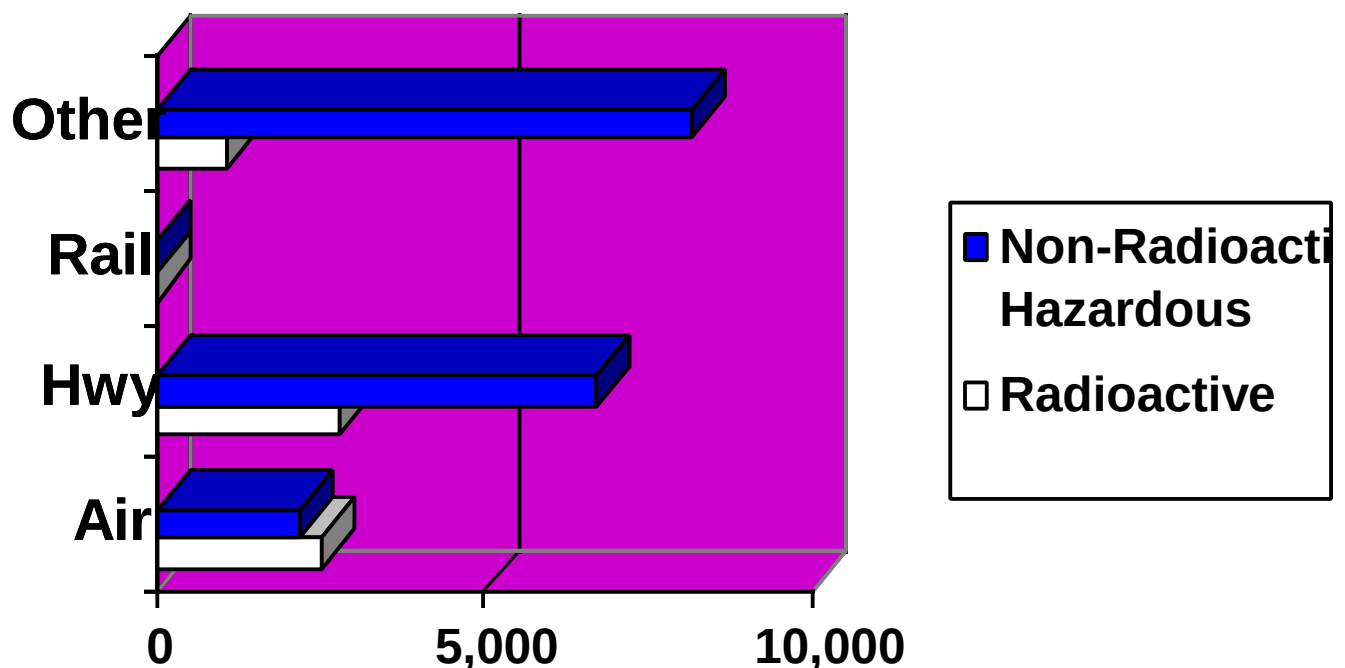


Radiological Shipments by Industry



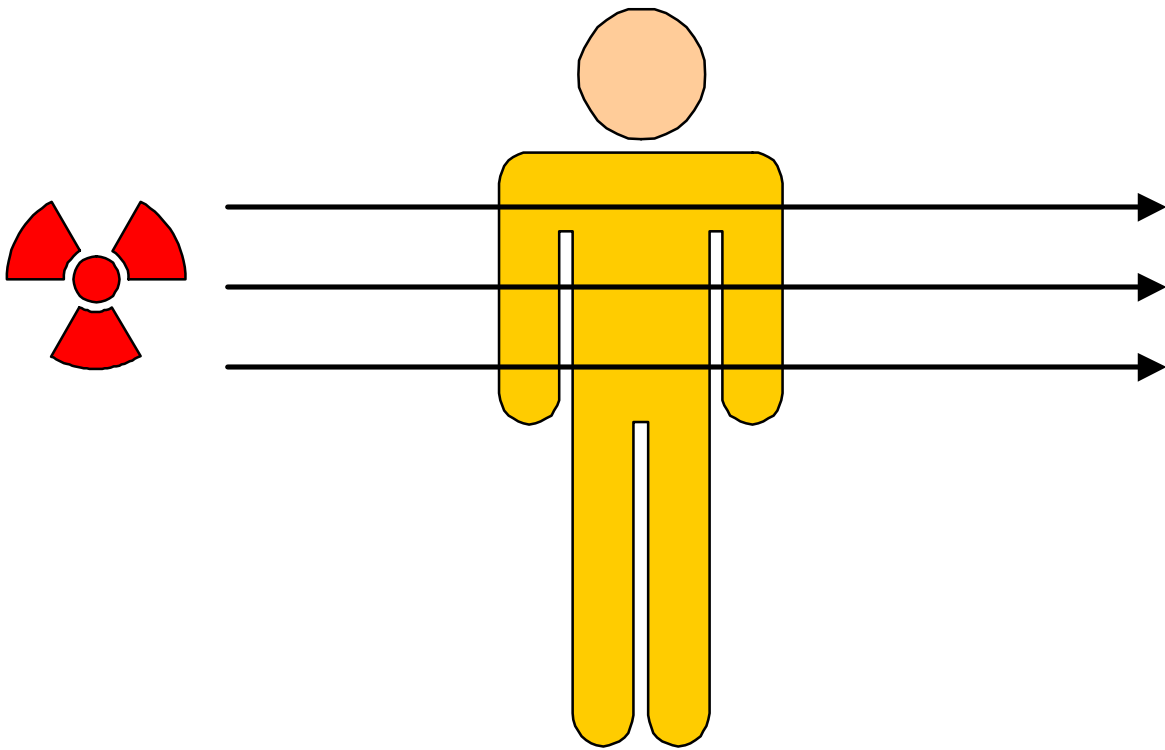
“Other” includes fuel rods, fissile materials, utility waste, and military shipments

DOE Shipments by Transportation Mode



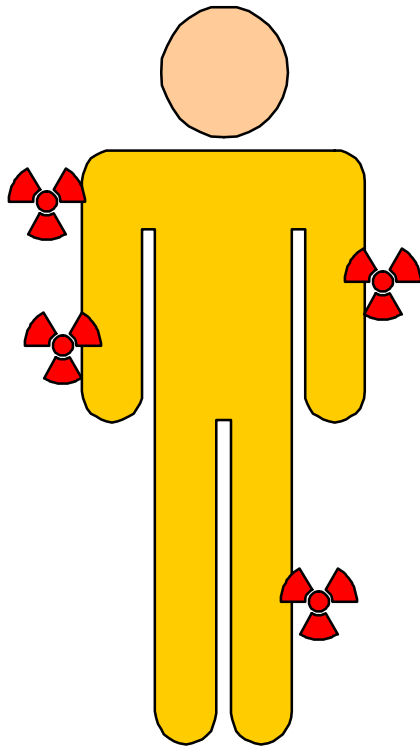
“Other” includes ship, private motor carrier, and parcel and freight forwarders.

Exposure to External Sources



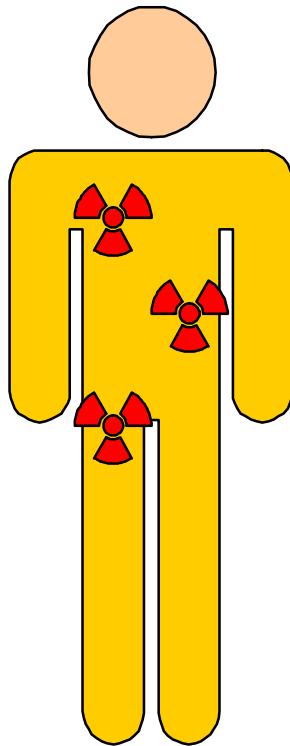
**Patients exposed to external
sources of radiation do not pose
contamination problems**

External Contamination



Externally-contaminated patients should be checked with radiation meters and given on-scene emergency care ASAP

Internal Contamination



Internally-contaminated patients must be given medical care for injuries but there is little you can do to treat radiation exposures