RADIATION SOURCES - RADIATING HEALTH AND PROGRESS.... ..... BUT NEED REGULATION NEVERTHELESS!!!

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ATOMIC ENERGY REGULATORY BOARD
Contents- The four W’s

- What are radiation sources?
- Where are they used?
- Why do we need them?
- When is their use dangerous and how to overcome this?
The Electromagnetic Spectrum

NON-IONISING

Wavelength (meters)
Radio: $10^3$
Microwave: $10^{-2}$
Infrared: $10^{-5}$
Visible: $0.5 \times 10^{-6}$
Ultraviolet: $10^{-8}$
X-ray: $10^{-10}$
Gamma Ray: $10^{-12}$

IONISING

About the size of...
Buildings
Humans
Honey Bee
Pinpoint
Protozoans
Molecules
Atoms
Atomic Nuclei

Frequency (Hz)
$10^4$
$10^8$
$10^{12}$
$10^{15}$
$10^{18}$
$10^{20}$
Applications of Radiation- All areas of life

Medical- Diagnosis and treatment
Industrial- Food processing, Radiography, Gauges and measurement
Research - Irradiation of samples, Calibration sources, tracers
Agriculture- Tracer studies
MEDICAL USES

- RADIOTHERAPY
- INTERVENTIONAL RADIOLOGY
- RADIO-PHARMACEUTICALS
- COMPUTED TOMOGRAPHY
- BLOOD/TISSUE IRRADIATOR
INDUSTRIAL USES

FOOD IRRADIATION

INDUSTRIAL RADIOGRAPHY

NUCLEONIC GAUGES
RESEARCH

- TRACER STUDY
- IRRADIATION OF SAMPLES
Atomic bomb survivors

"RADIATION IS INDEED DISASTROUS"

Alexander L. - Polonium poisoning of Russian spy

Image courtesy: socialistworld.net

Image courtesy: GOOGLE

No More Fukushima, Chernobyls, Bhopals!
THE question to ask is not "IS THERE ANY RADIOACTIVITY PRESENT?" BUT RATHER, "HOW MUCH, AND IS IT ENOUGH TO BE HARMFUL?"
Atomic Energy Regulatory Board, Anushakti nagar Mumbai

Safety Research Institute at Kalpakkam

Regional Centers at Chennai, New Delhi and Kolkata
Linear-Non Threshold model for Radiation safety

DNA damage

CANCER RISK
- Epilation
- Erythema
- GI/CNS Symptoms
- Death

These effects are more profound in the foetus and children

AERB mandates in this area for reduction
“Licence in accordance with Atomic Energy (Radiation Protection) Rules, 2004 from AERB is mandatory requirement for the procurement and use of radiation sources in India”.
Safety Research funding

- Safety in application of nuclear and radiation facilities
- Environmental Impact Assessment
- Transport of Radioactive material
- Radioactive Waste Management
- Civil and Structural Engineering
- Spent Fuel Storage
- Reactor Physics
- Thermal Hydraulics/Fluid Structure Interactions in Reactors under Accident Conditions
- Medical/Industrial Applications of Radiation
- Fire and Industrial Safety
- Use of Radiation Sources for Research Purposes
- Radiobiology/Radiation Dosimetry/Radiation Protection
- Applied Chemistry in Nuclear Industry
- Safety Evaluation Methodology
- Front and Backend Fuel Cycle Facilities
- Occupational Health and Environmental Safety
Take-away quiz

1) The type and quantity of radionuclide determines its hazard
   True or false

2) Radiation sources are if used properly do not pose any danger.
   True or False

3) Pregnant women should not undergo X-ray examination
   True or False

4) Whole body CT-scans can detect cancer in the body
   True or False

5) We are surrounded by Natural/ Cosmic radiation
   True or False

6) It is better to keep away from a radiation source when not required
   True or False

7) MRI is an ionizing radiation source.
   True or False

8) A person is radioactive after he undergoes an X-ray
   True or False

9) A person is radioactive after he has a Nuclear Medicine procedure
   True or False

10) No radioactive source should be touched
    True or False
RADIATION SYMBOLS....TO BE AWARE OF..

Thank you...