RADIATION

A. Natural Sources :

1. Cosmic Rays

Originate in the outer space & become weaker when they pass through atmosphere,

Impact : 35 mrad/year at normal height

Above 20 k.m. impact is 300 mrad/year

Contd.

- 2. ENVIRONMENTAL
  - i. Terrestrial
  - ii. Atmospheric
  - iii. Internal radiation

TERRESTRIAL

- Thorium, Uranium, Radium, Isotopes of K
- Present in soil, rocks, & buildings

Contd….

- Man derives 50 mrads./year

ATOSPHERIC RADIATION

- Radon
- Thoron

2 mrads/year

INTERNAL RADIATION

Uranium, Thorium, , Isotopes of K, Strontium

Contnd…..

And Carbon

Internal radiation Inflict about 25 mrads/year

Total amount of radiation received by an average person is 0.1 rad a year

B:- MAN MADE SOURCES

I. X-Rays
II. Radio active fallout

Contnd….

III –Miscellaneous

X-RAYS

Persons exposed are :

Patients, Radiologists & Radio technicians

The skin dose to the patient from a single X-Ray film varies roughly from 0.02-0.3 rad.

Contnd…..

RADIOACTIVE FALLOUT

Nuclear explosion release tremendous amount of energy in the form of Heat, Light, Ionizing radiation & many radioactive substances e.g. Isotopes of Carbon, Iodine, Cesium & Strontium

Cs & Sr are liberated in large amount & remain active for many years, H/L 28,30 yrs

Contnd…..

These particles float down to the earth for some years afterwards

In 1963 measurements were done in Germany

A person on average received 33 mrems from this source

MISCELLANEOUS

TV sets, Luminous wrist watches etc.

Types of Radiation

A. Electromagnetic Radiations
   1. X-Rays
   2. Gamma Rays

B. Corpuscular radiation
   1. Alpha Particles
   2. Beta Particles(electrons)
   3. Protons

Contnd…..

- IONIZING RADIATIONS
- NON IONIZING RADIATIONS

Ionizing Radiation

Radiation which has ability to penetrate the tissue and deposit its energy within them

1. Electromagnetic Radiation(x-rays and Gamma Rays)

Contnd…..

2. Corpuscular Radiations

a. Alpha Particles,

b. Beta Particles(electrons)

c. Protons

Alpha particles are ten times as harmful than x-rays, beta particles or Gamma rays

Luckily they have a little penetration power

Radiation Units

- The activity of a radioactive material is the number of nuclear disintegration per unit of time
- The unit of activity is a Becquerel (bq)
- Formerly the unit of activity was Curie (Ci)

1. Roentgen (unit of exposure)
2. Rad (unit of absorbed dose)

Contnd……

3. Rem (product of absorbed dose and modifying factors) The Rem indicates potential danger to health

Radiation units (Roentgen, Rad & Rem) are being replaced by SI Units

(International System of Units)

Biological effects of Radiation

SOMATIC EFFECTS

- Dose of 400-500 Roentgens is fatal in 50% cases & 600-700 in practically every case.
- Dose of 25-50 results in mild to moderate effects like lassitude, softening of muscles, effect on white blood cells.
- Delayed effects take time to develop

Contnd…..

They are as follows

1. Leukemia
2. Malignant tumors
3. Shortening of life

A. SOMATIC EFFECTS:

1. IMMEDIATE
   - Radiation sickness

Contnd….

- Acute radiation syndrome

2. DELAYED

- Leukemia
- Carcinogenesis
- Foetal developmental abnormalities
- Shortening of life

Contnd…..

B. GENETIC EFFECTS:

- Chromosomal Mutations
- Point Mutations

Genetic effects results from injury to chromosomes

Contnd….

- Chromosome mutation is associated with sterility
- Point mutation effects the Genes

Radiation Protection

- T.D.S Principal
  - Time
  - Distance
  - Shielding

DOSIMETER

Thermo luminescent dosimeter (TLDs)

Radiation Protection

- ICRP (International Commission on Radiological Protection)
- IAEA(International Atomic Energy Agency)
- WHO

NOISE

- Definition: Noise is un-wanted sound/ wrong sound in the wrong place at the wrong time, 21st. Century is said to be the century of Noise
- SOURCES OF NOISE
  - Automobiles
  - Factories

Contnd…..

- Industries
- Air Crafts
- Domestic sources as radios etc.

PROPERTIES OF NOISE :

MEASURMENT

Loudness measured in Decibels(Db)

Frequency measured in Hertz(Hz)

Contd…

EFFECTS OF NOISE EXPOSURE:

AUDITORY EFFECTS

- Auditory fatigue
- Deafness(temporary & permanent)
- TLV (threshold limit value) – 80 db
- Conversation-60 db
- Whispering ---20 db

Contnd….

- Street traffic -70 db

FREQUENCY-- 20-20,000 Hz

NON-AUDITORY EFFECTS

- Interference with speech
- Annoyance
- Efficiency
- Physiological changes(Bp, Pulse etc.)

Control of Noise

- Control of noise at source
- Control of transmission
- Protection of exposed person
- Legislation
- Education

LIGHT

REQUIRMENTS OF GOOD LIGHT

- Sufficient lighting
- Uniform distribution
- Absence of glare
- Absence of sharp shadows
- Steadiness
- Color of light(daylight color)

Contnd…

- Surroundings
- Should have contrasting colors

TYPES OF LIGHTING

1. Natural
2. Artificial

METHODS OF ARTIFICIAL LIGHTING

- Filaments Lamps

Contnd…

- Florescent Lamps

LIGHTING STANDARDS

Unit of illumination is Lux

0.1 Lux (full moon) to 100,000 Lux(sunshine)

BIOLOGICAL EFFECTS OF LIGHT

1. Degradation of Bilirubin
2. Biological rhythms of body temp. physical activity

Contnd….

3. Stimulation of Melanin synthesis
4. Activation of precursors of Vit. D
5. Adrenocortical secretion & food consumption