

Radiation Safety

**Health Physicist
Radiation Safety**

Training Outline

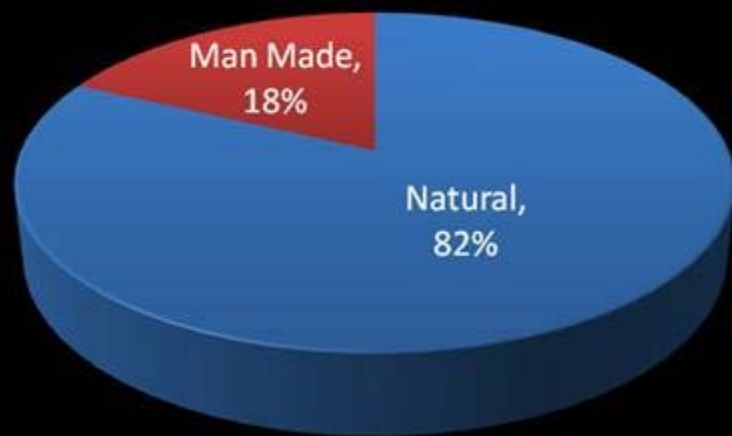
- Sources of Radiation Exposure
- NYC Regulations
- Potential Hazards of Radiation
- Principles of Radiation Protection
- Obligations of CODM Employees



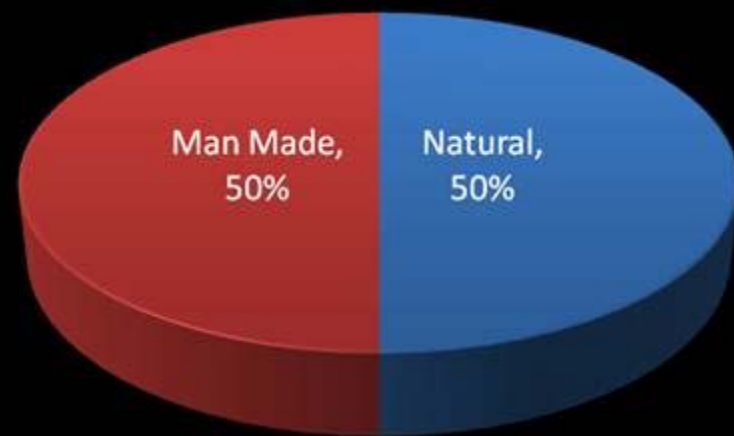
Common Sources of Radiation Exposure

- Everybody on the planet is exposed to radiation.
- Radiation occurs naturally in the atmosphere, in building materials, even in our own bodies.
- Individuals are also exposed to man-made sources of radiation.
- Naturally occurring background (baseline) radiation levels in the United States averages approximately 3 mSv per year.
- The baseline radiation is not included in dosimeter reports.
- Exposure versus Contamination
 - Radioactive Materials – Contamination & Exposure
 - X-ray Devices – Exposure. A person receiving an x-ray is exposed to radiation but is not contaminated.

The Changing Patterns of Radiation Use in the USA



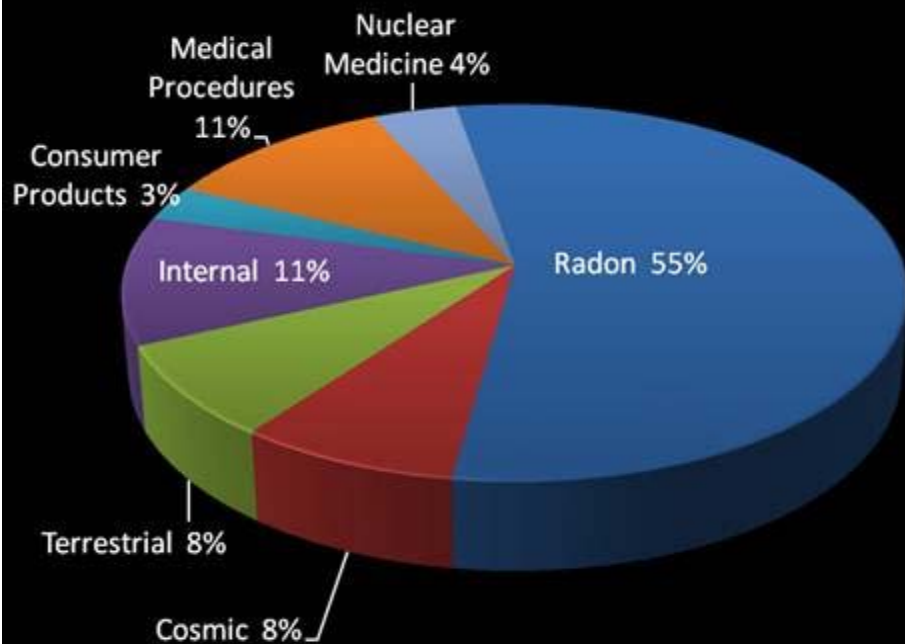
* NCRP Report 93
(1987)



* NCRP Report 160
(2009)

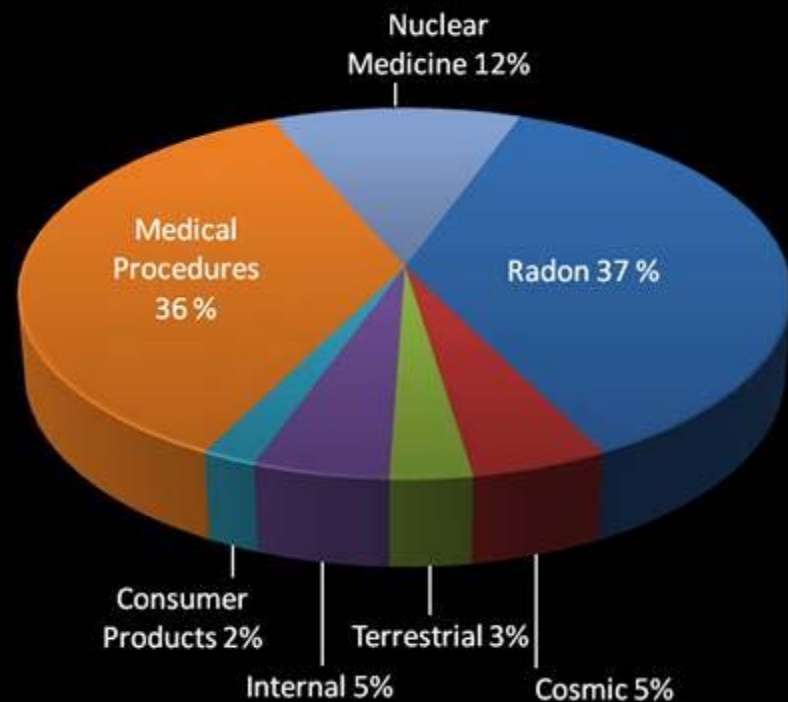
* NCRP – National Council on Radiation Protection and Measurements

The Changing Patterns of Radiation Use in the USA



Average Effective Dose (1987)

3.6 mSv / year



Average Effective Dose (2009)

6.2 mSv / year

Sources of Radiation Exposure to CODM



New York City Regulations

- The safe use of radiation is governed by Article 175 of the Rules of the City of New York
- CUMC and NYP use radiation under licenses and permits issued by the New York City Department of Health and Mental Hygiene
- Applicable regulations, radioactive materials licenses, x-ray registrations, conditions, information notices, bulletins, etc. are available for review by any CUMC and NYP employee by contacting Radiation Safety

NYC Regulations

Exposure Type	Annual Limit (mrem)
Whole Body (Deep)	5,000
Lens of Eye	15,000
Whole Body (Shallow)	50,000
Extremity	50,000
Any Individual Organ	50,000
Embryo/Fetus (DPW)	500 /entire pregnancy
	50 /month of pregnancy

**Average annual exposure of CODM personnel
is less than 10 mRem***

Potential Hazards for Radiation Workers

High Dose Risks

Deterministic Effects

- Threshold dose below which effect is not observed
- Severity of effect increases with increasing dose
- e.g. Cataracts, erythema, fibrosis, hematopoietic damage

Low Dose Risks

Stochastic Effects

- No threshold dose for effects to appear
- Severity of effect is unchanged with increasing dose
- e.g. Cancer

Principles of Radiation Protection

ALARA = As Low As Reasonably Achievable

Time

- The less time exposed, the less dose received



- Only use machine when you have to

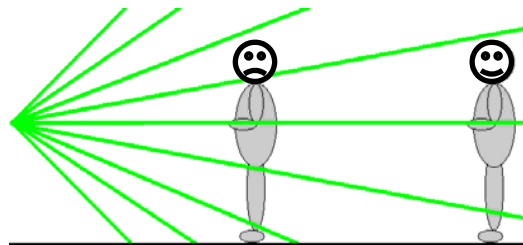


Distance

- The greater the distance, the less dose received



- Stand outside room during exposure

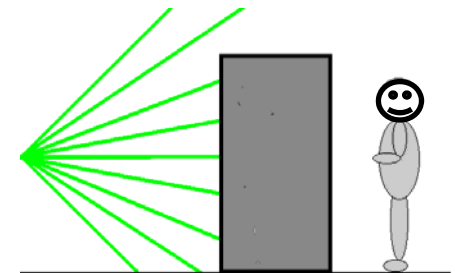


Shielding

- A physical barrier of high-Z material (i.e. lead or concrete) can absorb photons



- Walls of most dental offices provide adequate shielding from x-rays



Declared Pregnant Workers

- The embryo and fetus have a heightened sensitivity to radiation
- CUMC provides a voluntary and confidential program for workers/students who are pregnant while working with radiation
- The program provides for enhanced protection and dosimeter monitoring of the unborn child
- All individuals interested in the program should set up a confidential consultation with the Radiation Safety Officer

Obligations of CUMC Personnel

- Each employee has an obligation to report unsafe conditions to the Radiation Safety Office
- Each employee has the right to be informed of occupational radiation safety exposure, and may request a dosimeter
- Each employee has an obligation to return personal radiation dosimeters to the Radiation Safety Office in a timely manner



Clinical Radiation Safety Contact Information

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Thank you!

