

# Radiation Safety

College of Dental Medicine

June 29, 2016

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**Radiation Safety**

# Training Outline

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

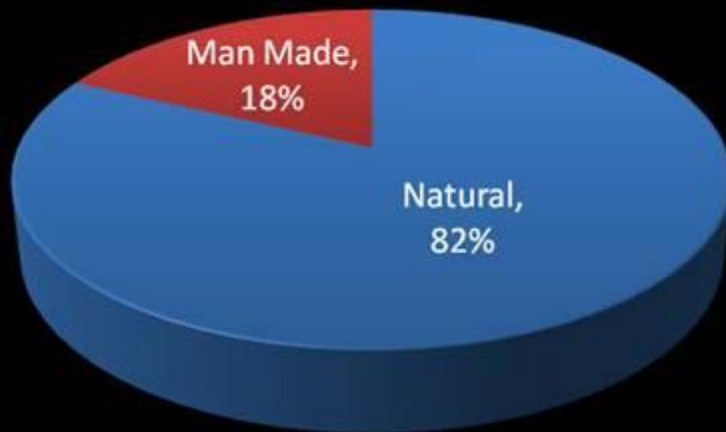


# Common Sources of Radiation Exposure

- 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



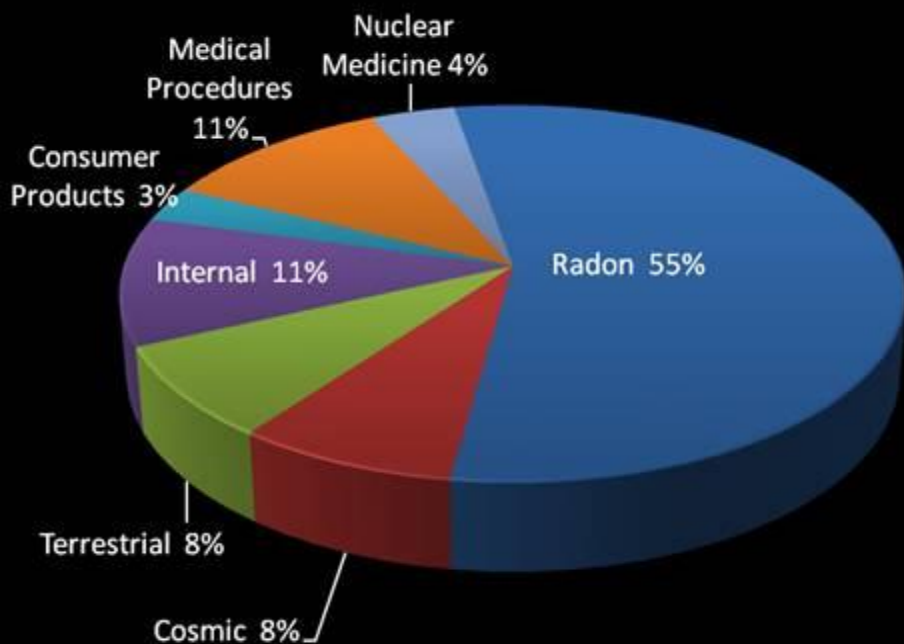
\* NCRP Report 93  
(1987)



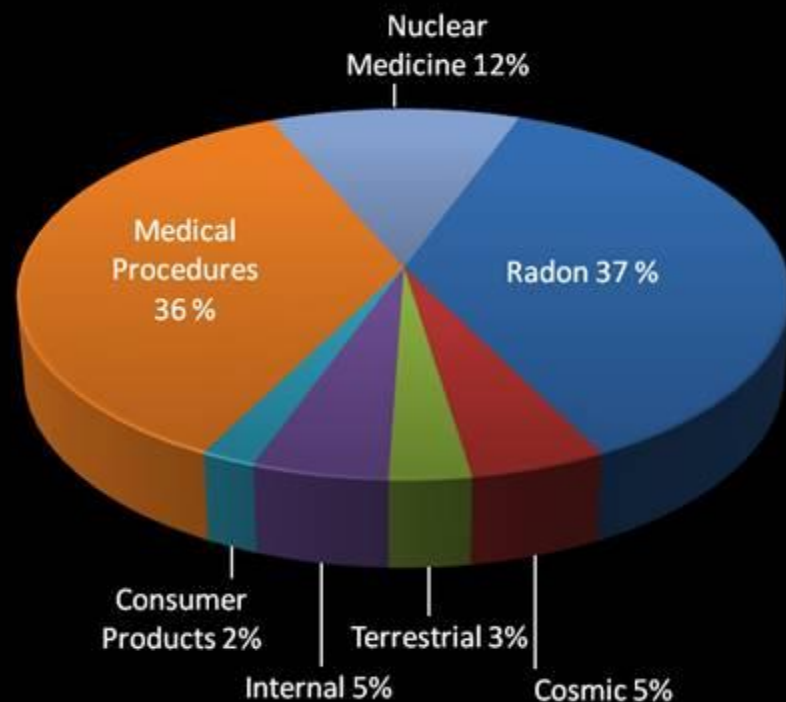
\* NCRP Report 160  
(2009)

\* 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

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# New York City Regulations

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- 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

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## 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

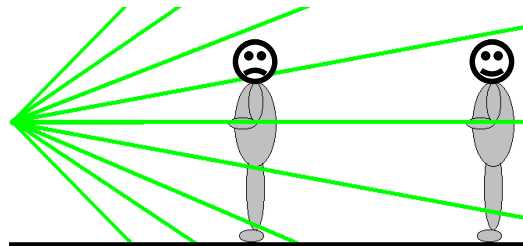


## Distance

- The greater the distance, the less dose received



- Stand outside room during exposure

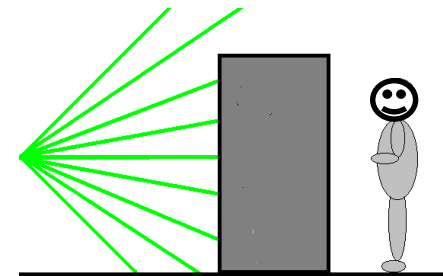


## Shielding

- 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

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- 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

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- 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!

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