

# Radiation Safety: College of Dental Medicine



# Training Outline

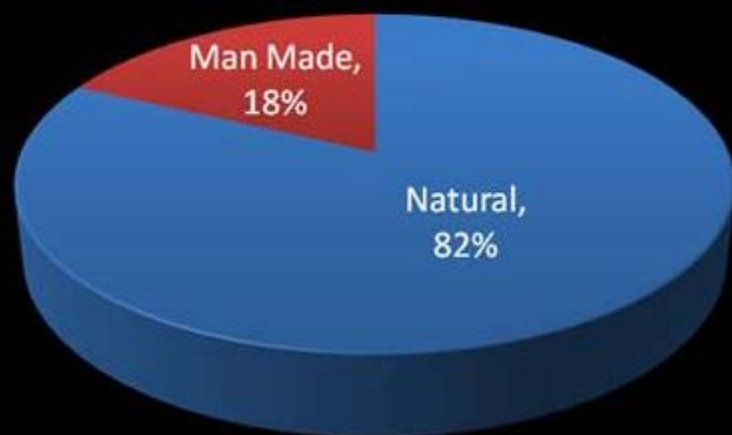
- Common Sources of Exposure
- NYC Regulations
- Potential Hazards
- Principles of Protection
- Declared Pregnant Workers
- Obligations of CODM Employees



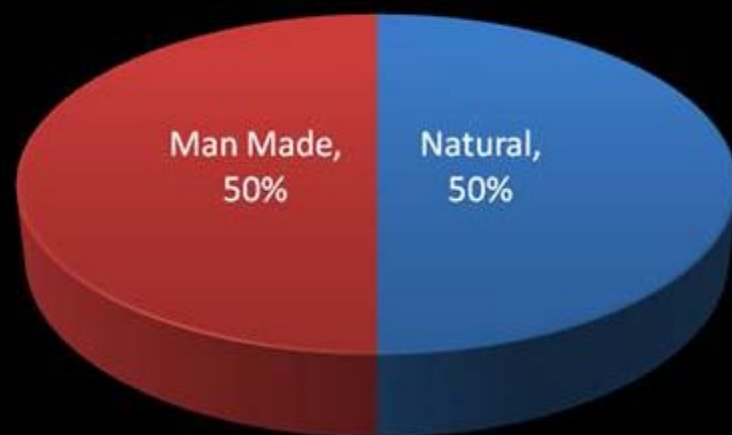
# Common Sources of Radiation Exposure

- 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



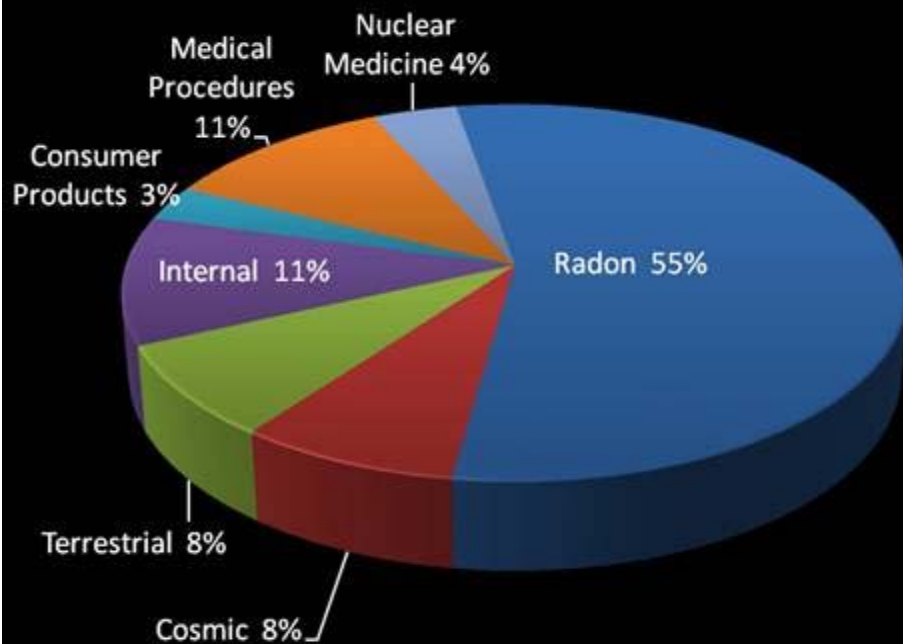
\* NCRP Report 93  
(1987)



\* NCRP Report 160  
(2009)

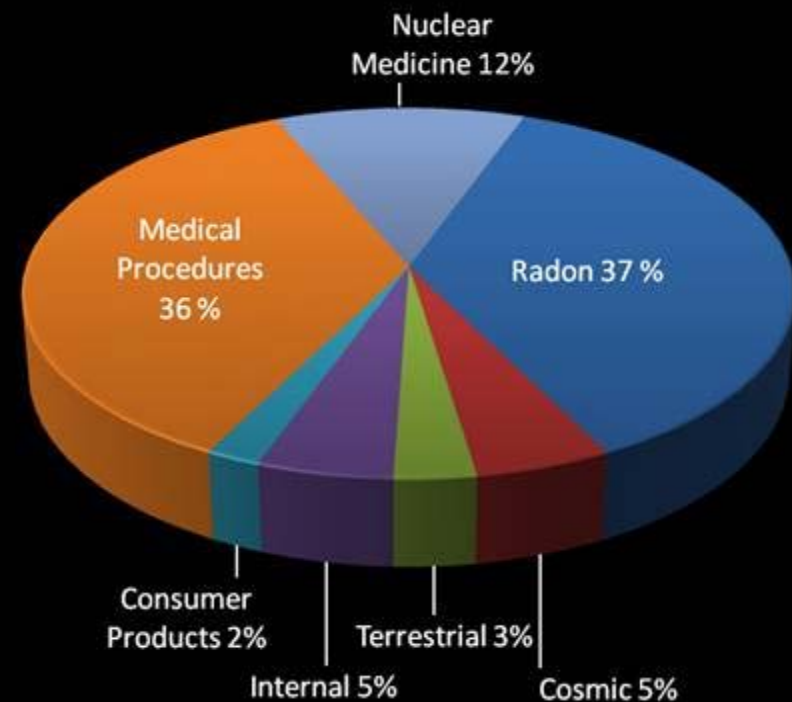
\* NCRP – National Council on Radiation Protection and Measurements

# 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

# Common 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

# New York City 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

9

## 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

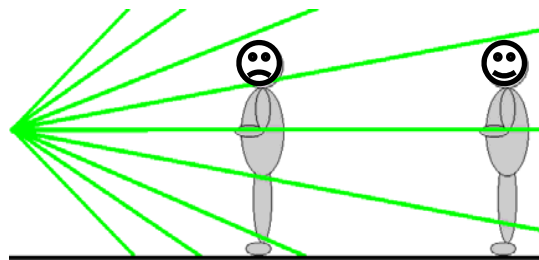


## *Distance*

The greater the distance, the less dose received



Stand outside room during exposure

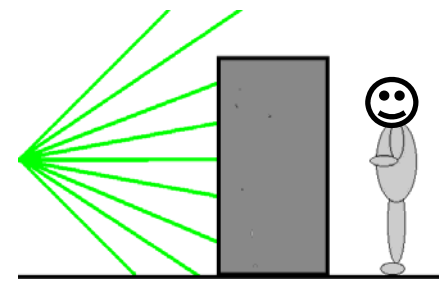


## *Shielding*

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

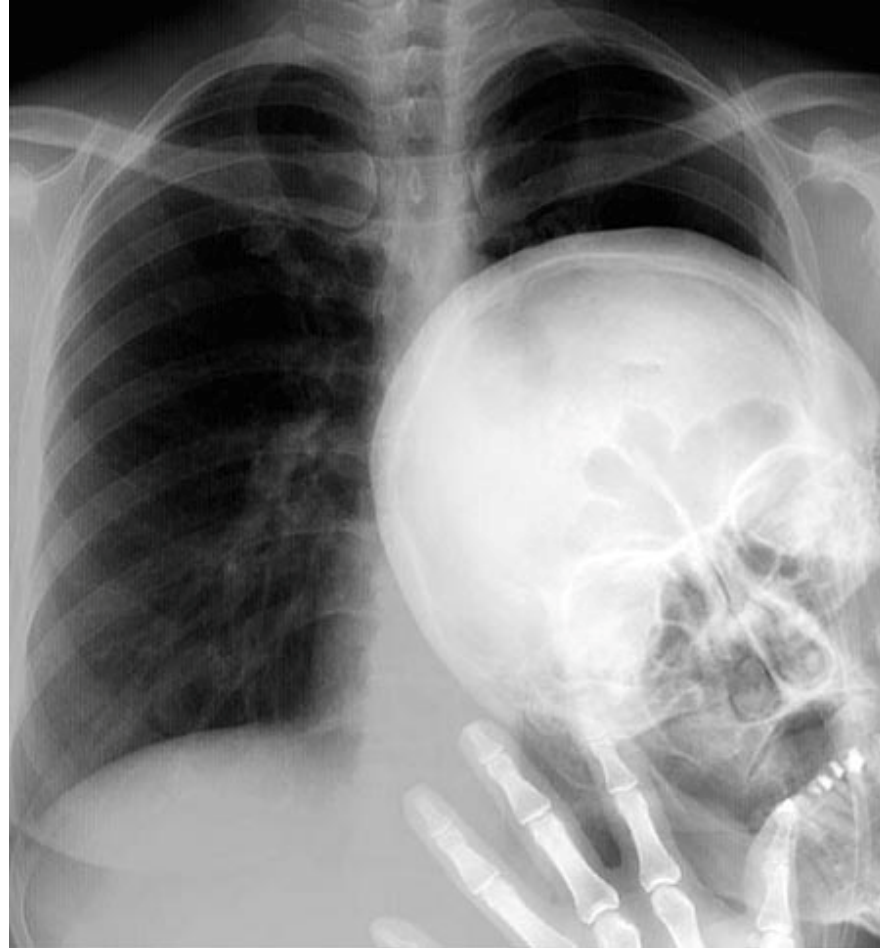
# Obligations of CUMC Personnel

- 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



# Thank you!

13



# Clinical Radiation Safety Contact Information

Location:  
601 W 168<sup>th</sup> St  
Suite #56  
Phone: (212) 305-0303

- Kassia Kelly  
*Health Physicist*  
Email:  
[kk2955@columbia.edu](mailto:kk2955@columbia.edu)
- Kostas Georgiou  
*Senior Health Physicist*  
Email:  
[kg2537@columbia.edu](mailto:kg2537@columbia.edu)
- Eva Nuemannova  
*Dosimetry Associate*  
Email:  
[en2386@columbia.edu](mailto:en2386@columbia.edu)
- Grant Fong  
*Associate Health Physicist*  
Email:  
[gf2364@Columbia.eduz](mailto:gf2364@Columbia.eduz)

Max Amurao, PhD, MBA  
*Radiation Safety Officer*  
Email:  
[ma3272@Columbia.edu](mailto:ma3272@Columbia.edu)