# Radiation Safety College of Dental Medicine

Health Physicist Radiation Safety

COLUMBIA UNIVERSITY Environmental Health and Safety

## **Training Outline**

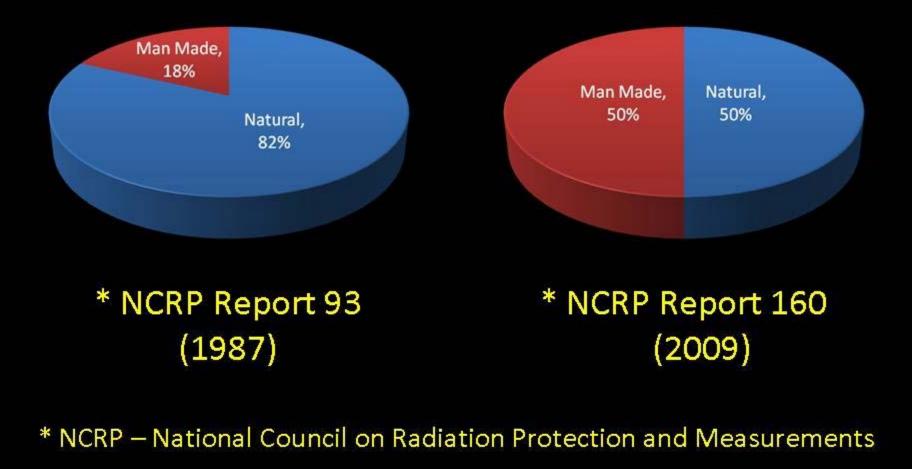
- Sources of Radiation Exposure
- > NYC Regulations
- > Potential Hazards of Radiation
- > Principles of Radiation Protection
- > Obligations of CODM Employees



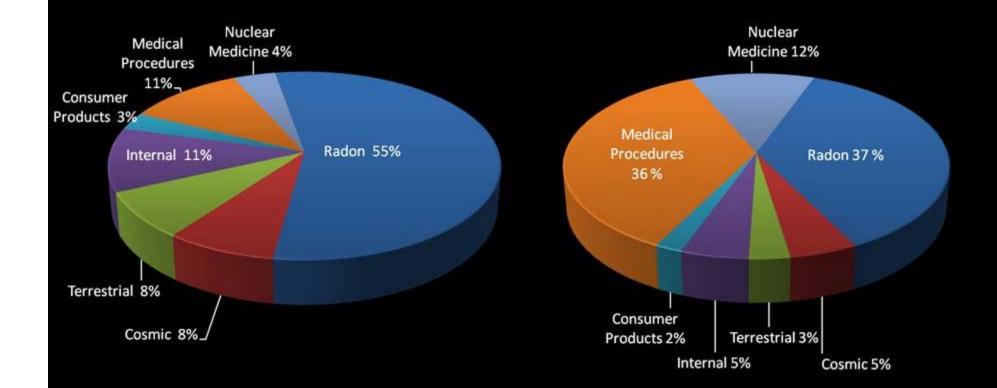
## Common Sources of Radiation Exposure

- > 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



## 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









COLUMBIA UNIVERSITY Environmental Health and Safety

### **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\*

COLUMBIA UNIVERSITY Environmental Health and Safety

### 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** = <u>As</u> <u>Low</u> <u>As</u> <u>R</u>easonably</u> <u>A</u>chievable

#### Time

The less time exposed, the less dose received

#### Distance

The greater the distance, the less dose received

#### Shielding

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

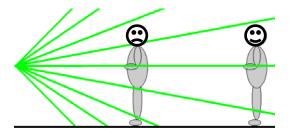


### Only use machine when you have to

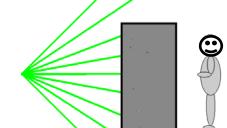


COLUMBIA UNIVERSITY Environmental Health and Safety









### **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

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

- Kassia Kelly Health Physicist Email: <u>kk2955@columbia.edu</u>
- Kostas Georgiou
   Senior Health Physicist
   Email:
   kg2537@columbia.edu

- Eva Nuemannova Dosimetry Associate Email: en2386@columbia.edu
- Grant Fong Associate Health Physicist Email: <u>gf2364@Columbia.edu</u>z

Max Amurao, PhD, MBA *Radiation Safety Officer* Email: <u>ma3272@Columbia.edu</u>

Radiation Safety www.ehs.columbia.edu

COLUMBIA UNIVERSITY Environmental Health and Safety

### Thank you!



COLUMBIA UNIVERSITY Environmental Health and Safety