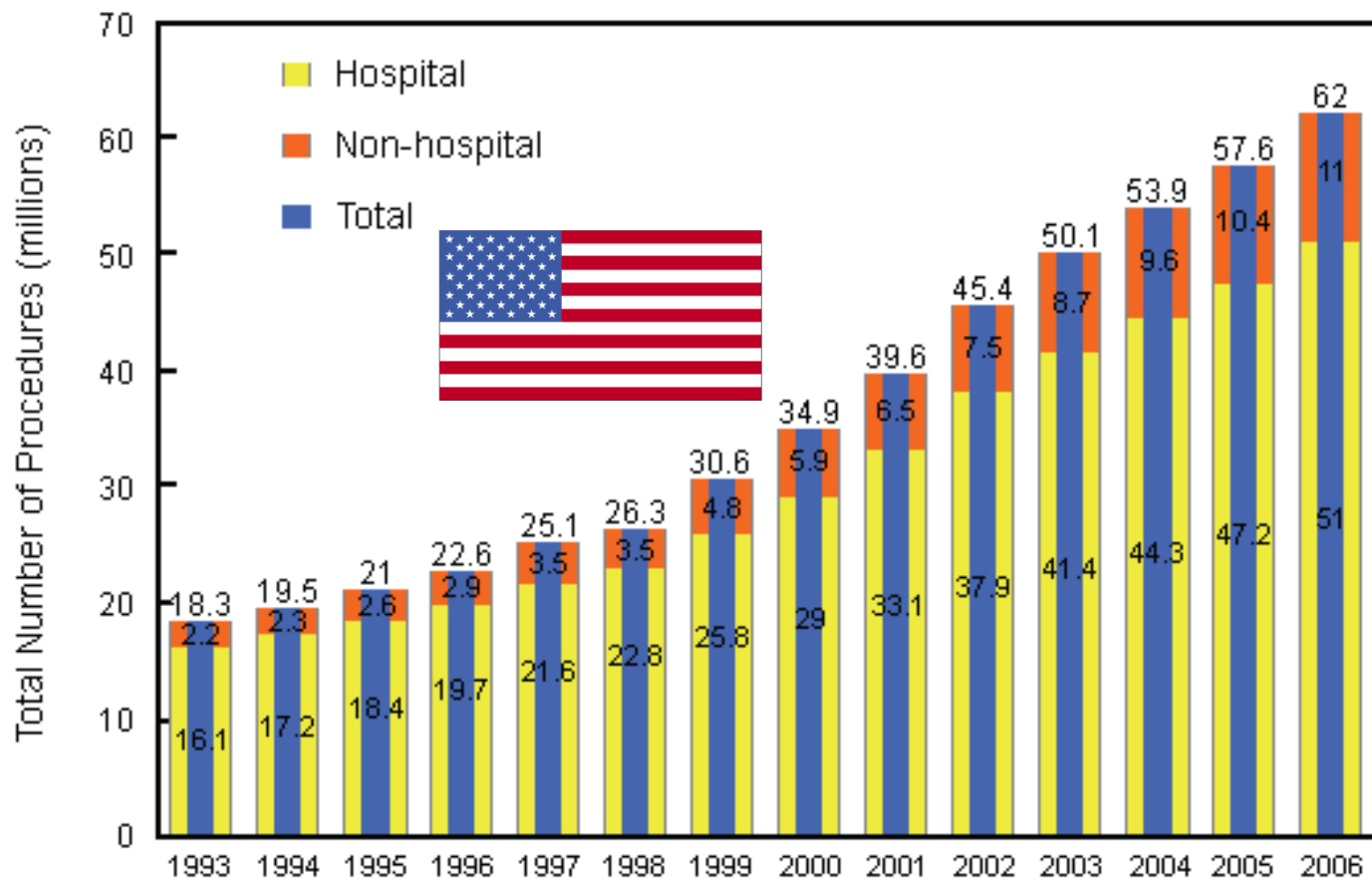


# The rapid expansion of CT can be adequately justified through the existing framework of referral criteria



**Against**



**Walter Huda PhD**

**Medical University of South Carolina**

# FINANCIAL DISCLOSURES

Research Support (*Siemens*)

Consultant (*Siemens*)

Book Royalties (*LWW, MPP*)

President (*Huda Physics in Medicine*)

# BACKGROUND

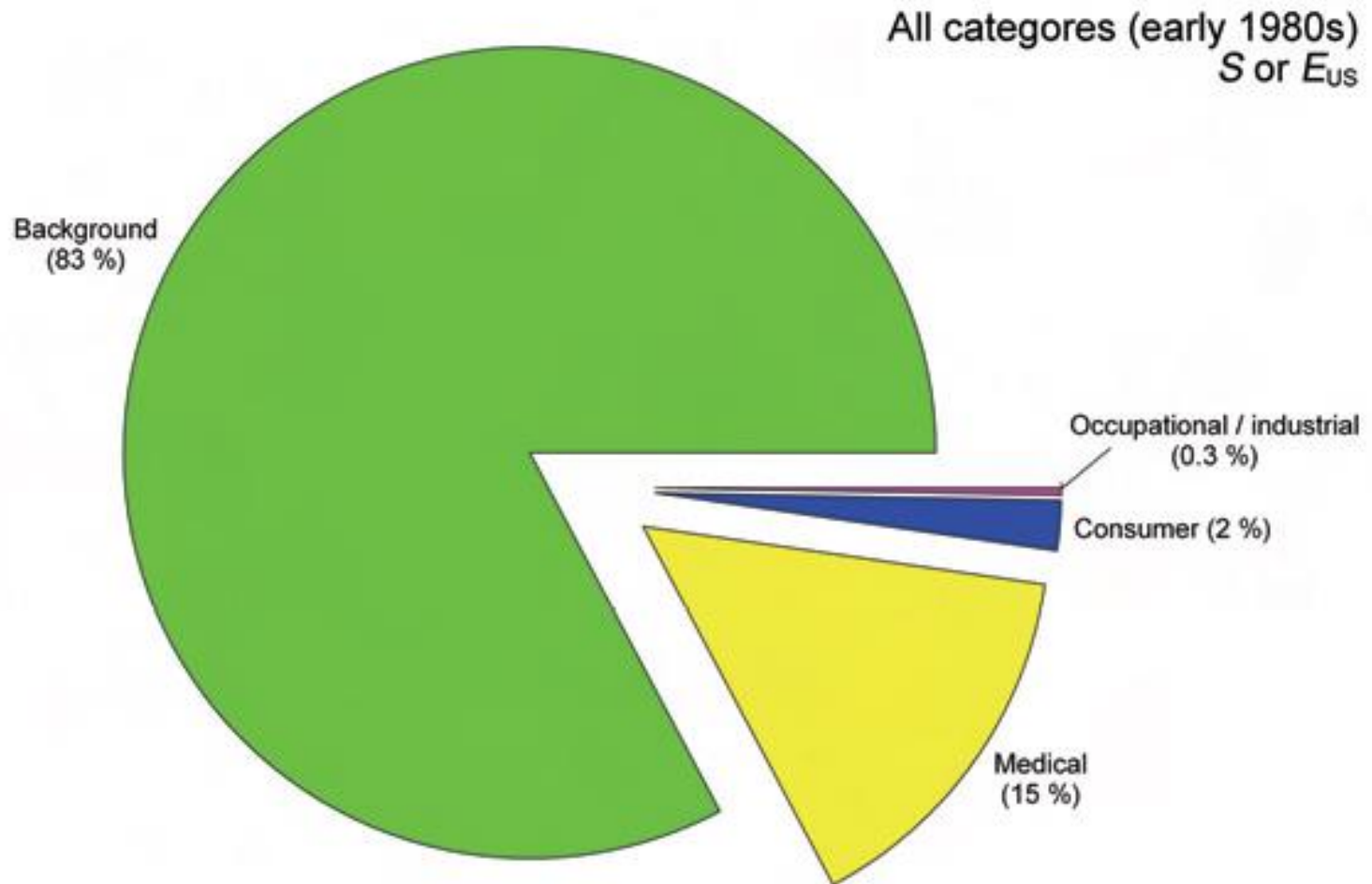
NCRP REPORT No. 93

**IONIZING RADIATION  
EXPOSURE OF THE  
POPULATION OF THE  
UNITED STATES**

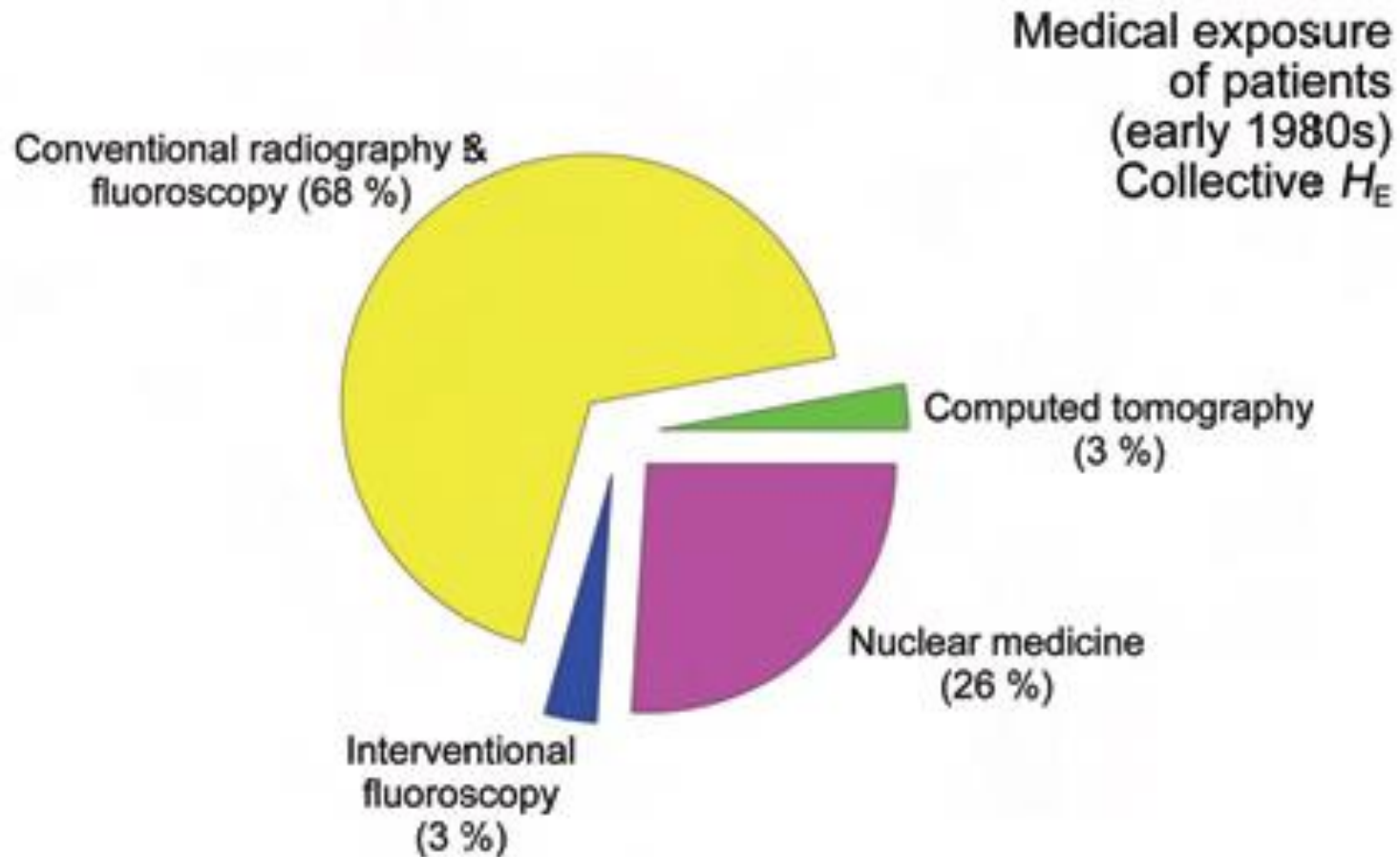
NCRP REPORT No. 160

**IONIZING RADIATION  
EXPOSURE OF THE POPULATION  
OF THE UNITED STATES**

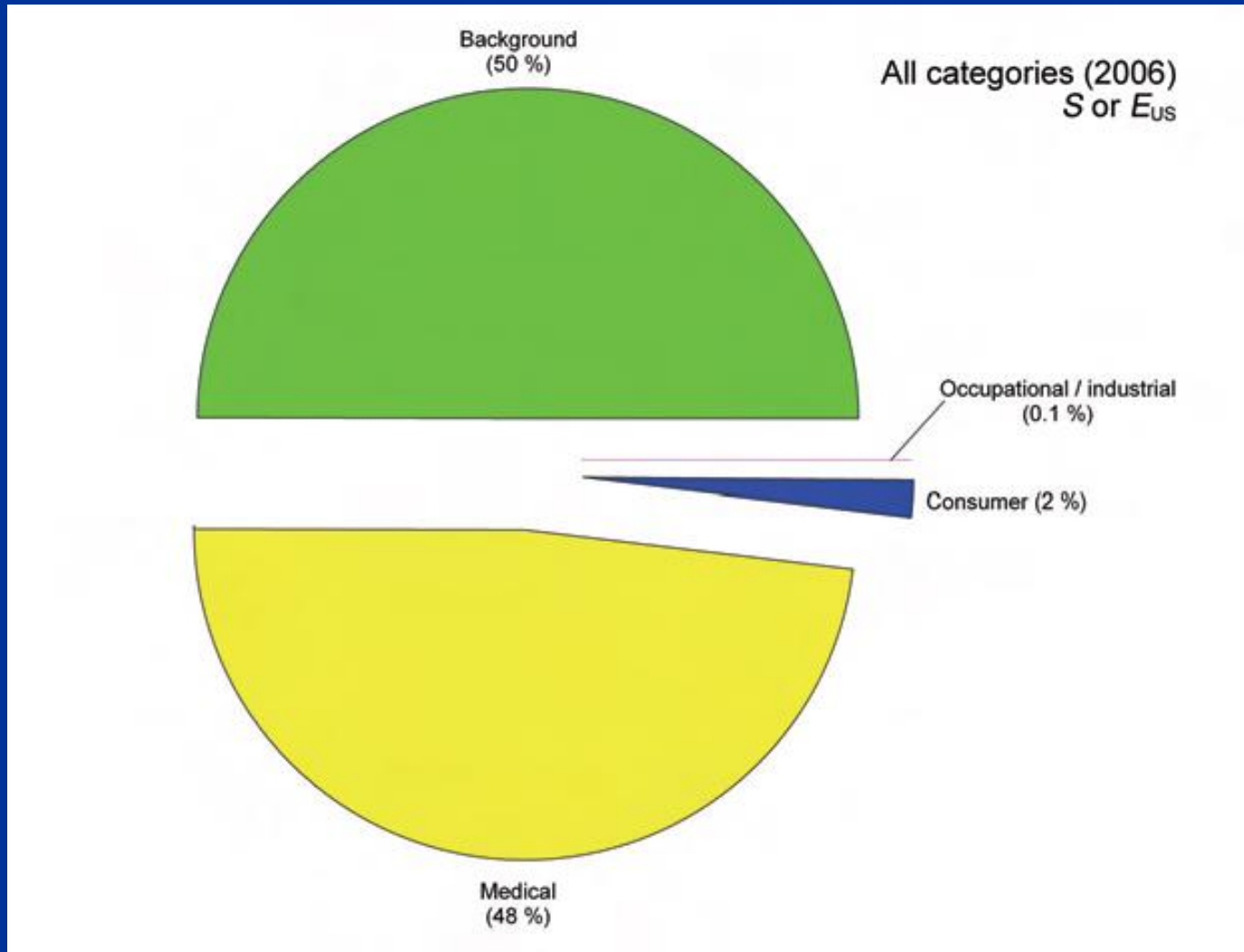
# 1980's ..... 3.6 mSv/year



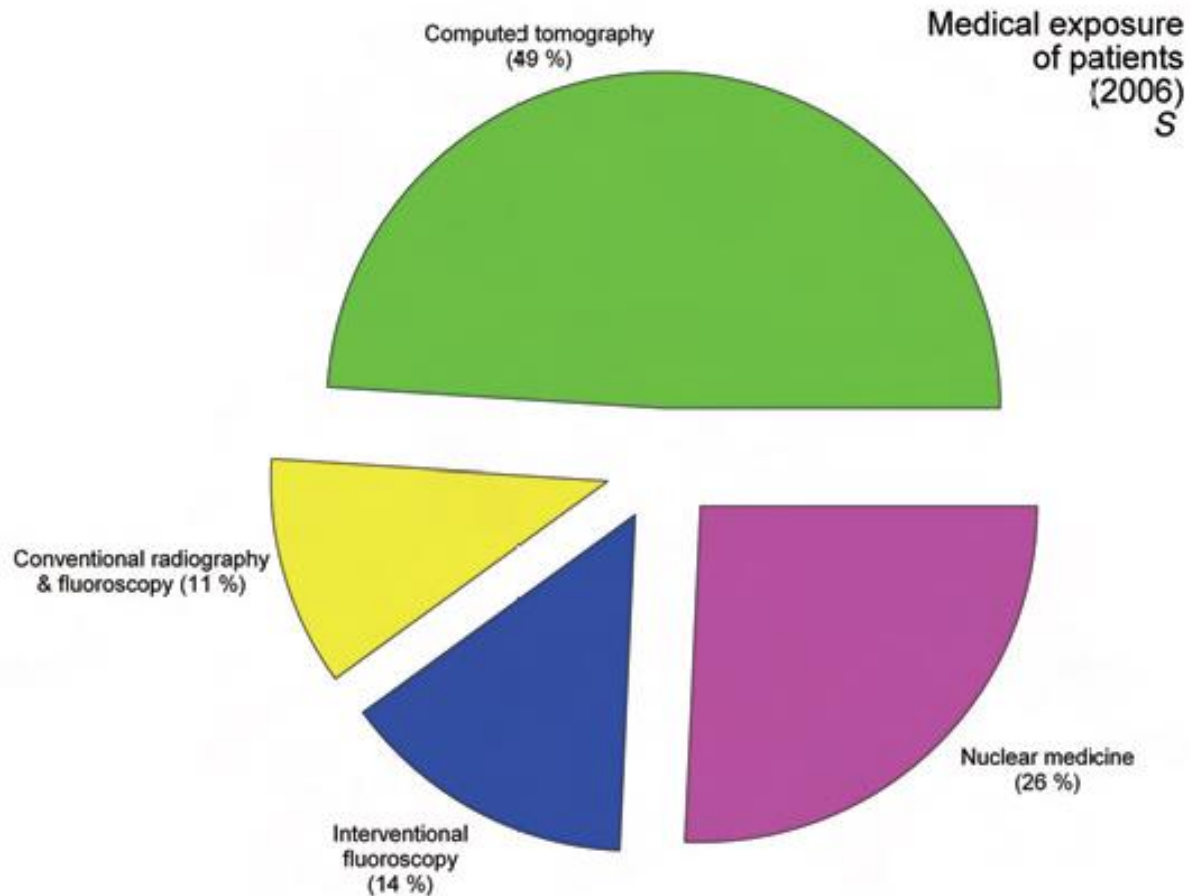
# US Medical Per Caput Dose ~ 0.6 mSv in 1980



# 2006 ..... ~ 6 mSv/year



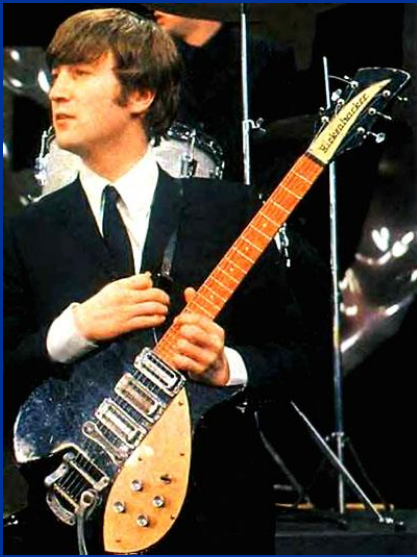
# US Medical *Per Caput* Dose ~ 3 mSv in 2006



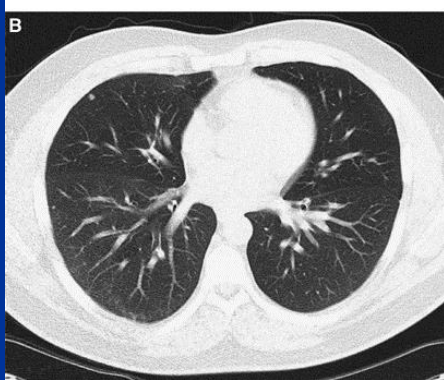


# Accepted Radiological Wisdom





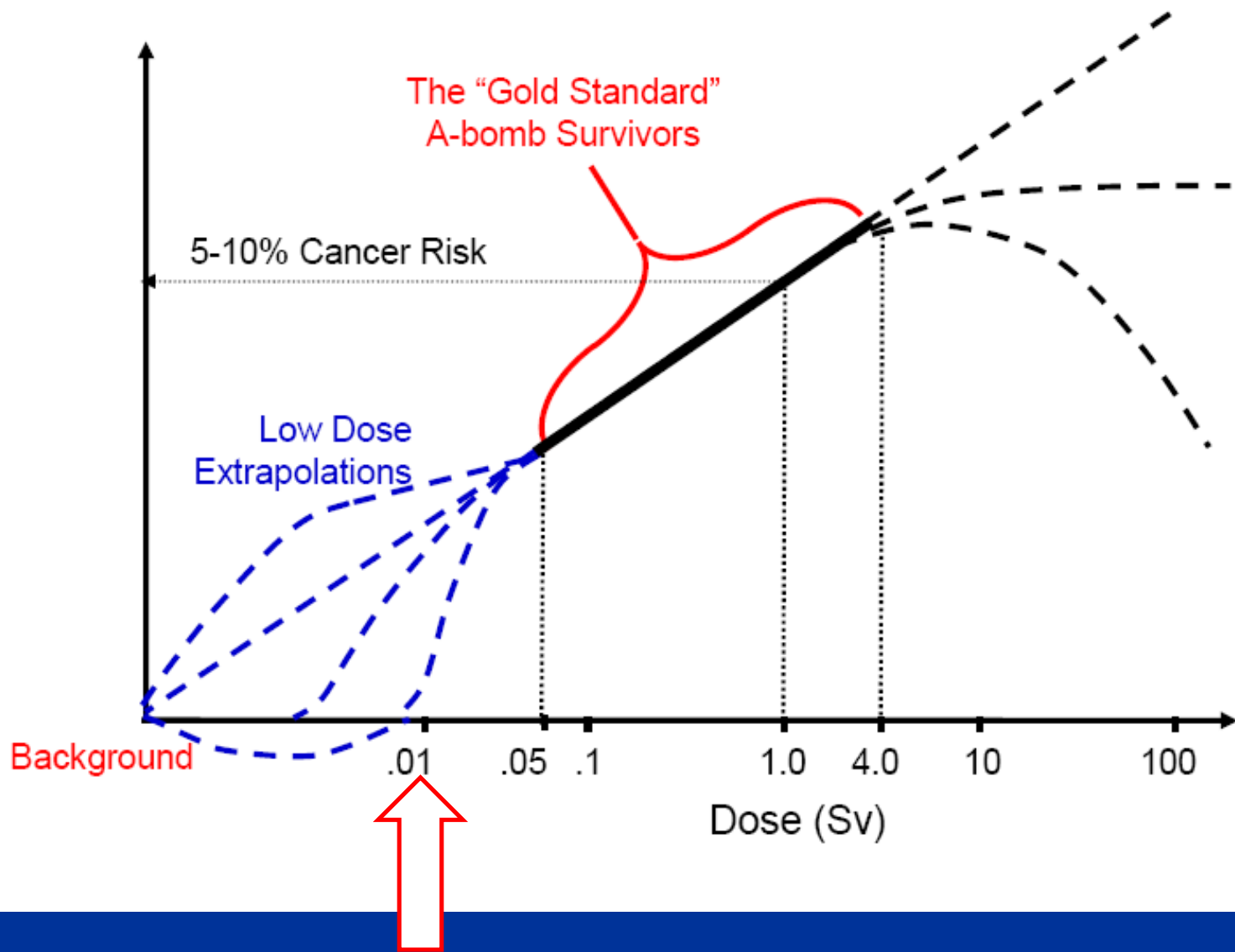
+



**$CTDI_{vol} \sim 15 \text{ mGy}$**

**$DLP \sim 500 \text{ mGy-cm}$**

**Effective dose  $\sim 10 \text{ mSv}$**



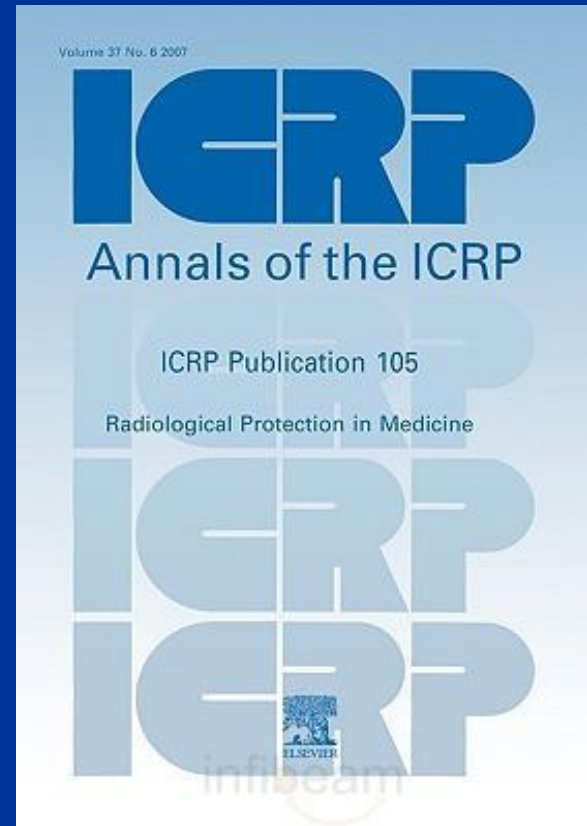
**Assume that radiation risks are real  
because:**

**Cautionary Principle**

**ICRP/UNSCEAR/BEIR  
(No Threshold)**

# Justified

# Optimized



# 10 mSv + ICRP risk factors



**~ 0.04% cancer fatality**

**~ 0.06% detriment**

**~ 0.1% cancer induction**

? Can we do better `?

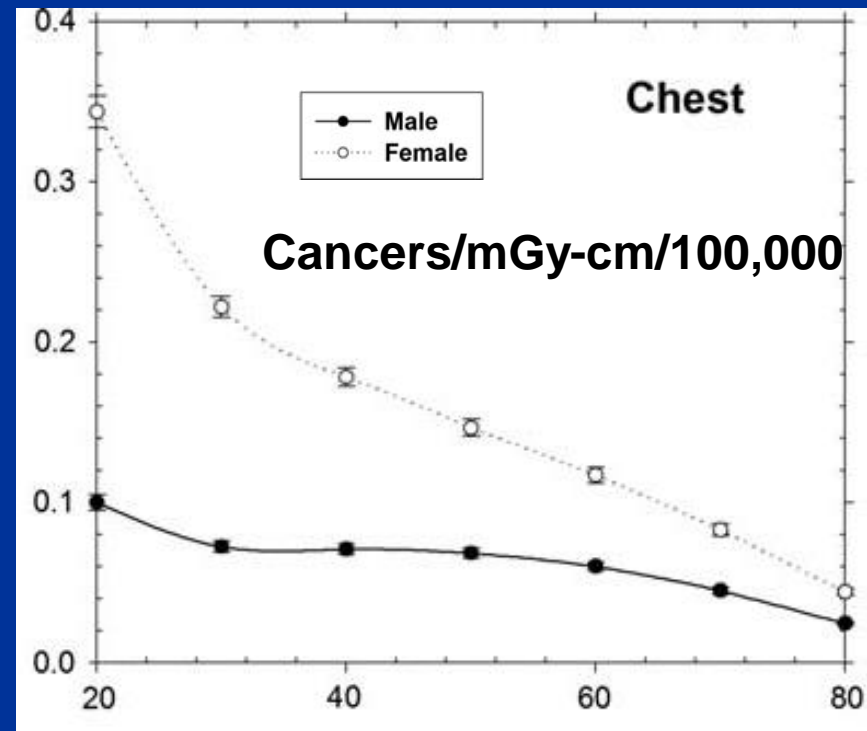
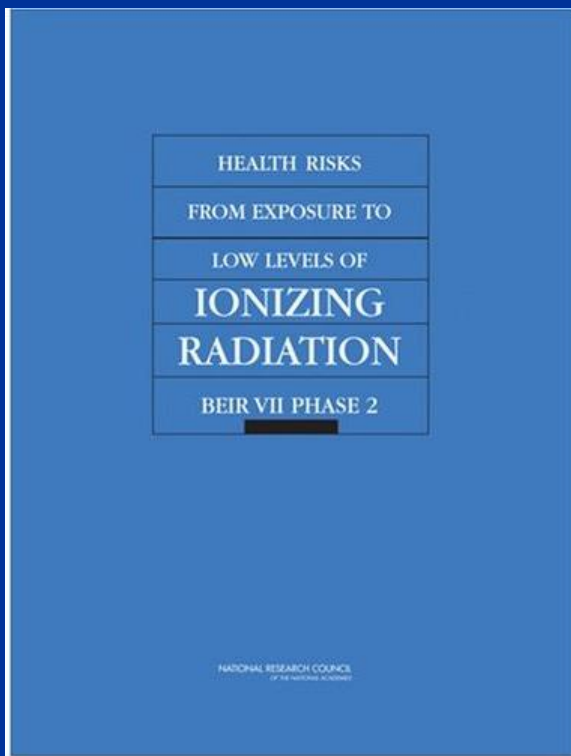


# Benefits > Radiation Risks



**Eliminate Unnecessary  
Radiation (Risks)**





Radiation Protection Dosimetry (2011), pp. 1–12

doi:10.1093/rpd/ncr376

## ESTIMATING CANCER RISKS TO ADULTS UNDERGOING BODY CT EXAMINATIONS

Walter Huda<sup>1</sup> and Wenjun He<sup>2,\*</sup>

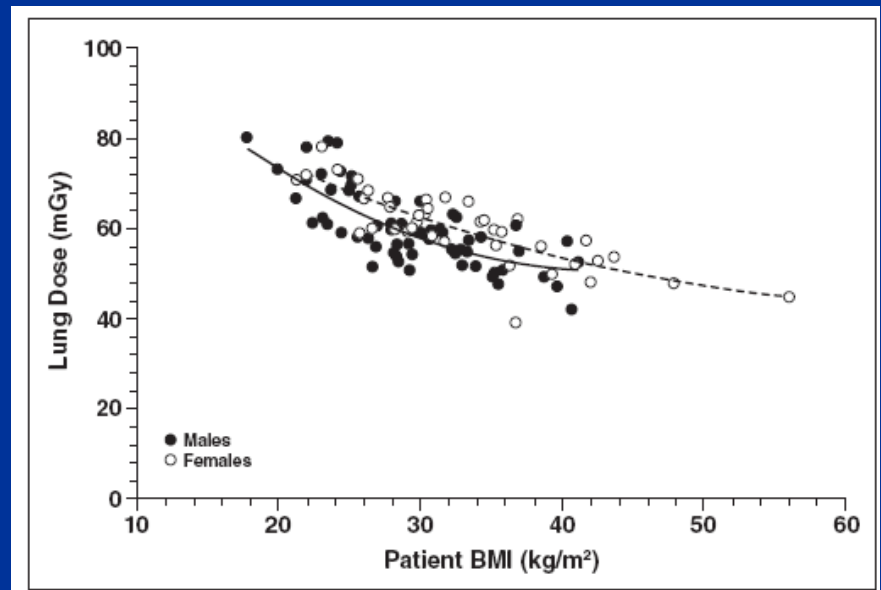
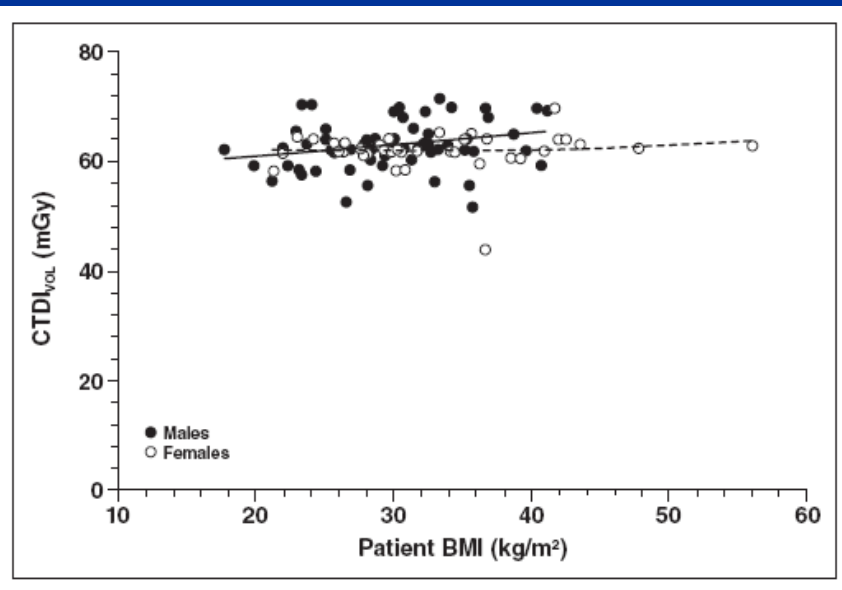
<sup>1</sup>Department of Radiology and Radiological Science, Medical University of South Carolina, 96 Jonathan Lucas Street, MSC323, Charleston, SC 29425, USA

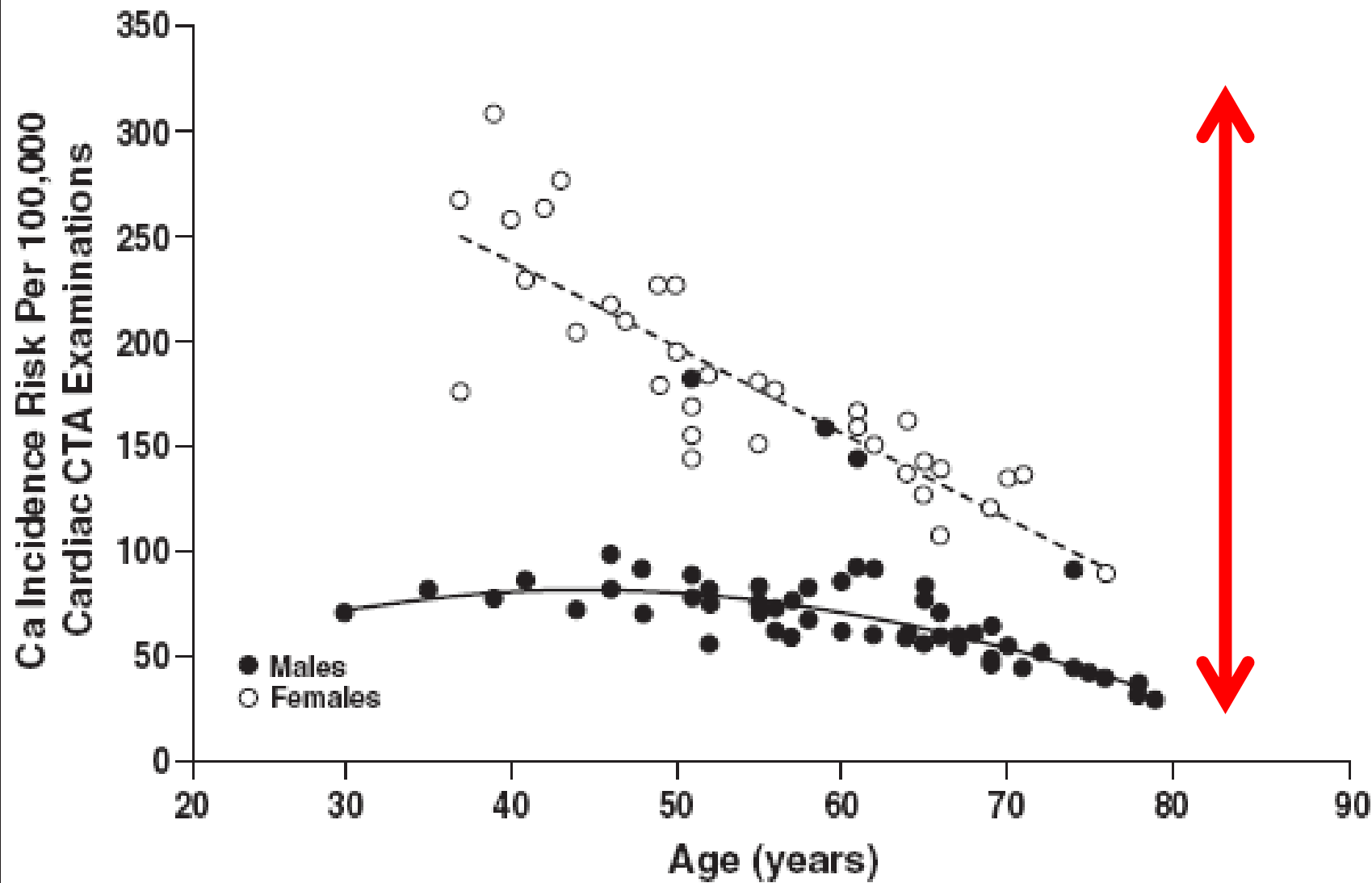
<sup>2</sup>Clemson-MUSC Bioengineering program, Department of Bioengineering, Clemson University, 173 Ashley Avenue, PO Box 250508, Charleston, SC 29425, USA

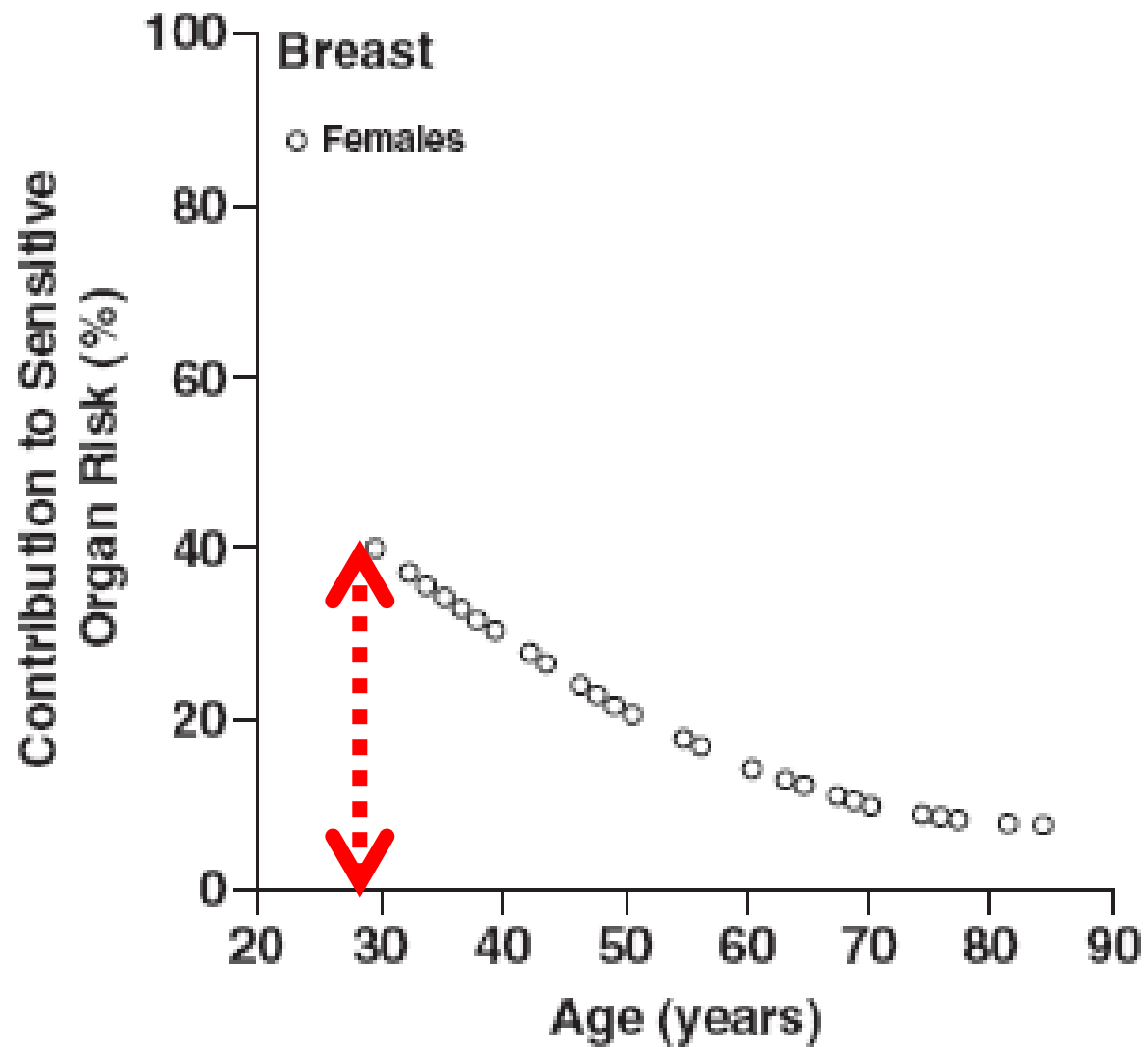
# Radiation-Related Cancer Risks in a Clinical Patient Population Undergoing Cardiac CT

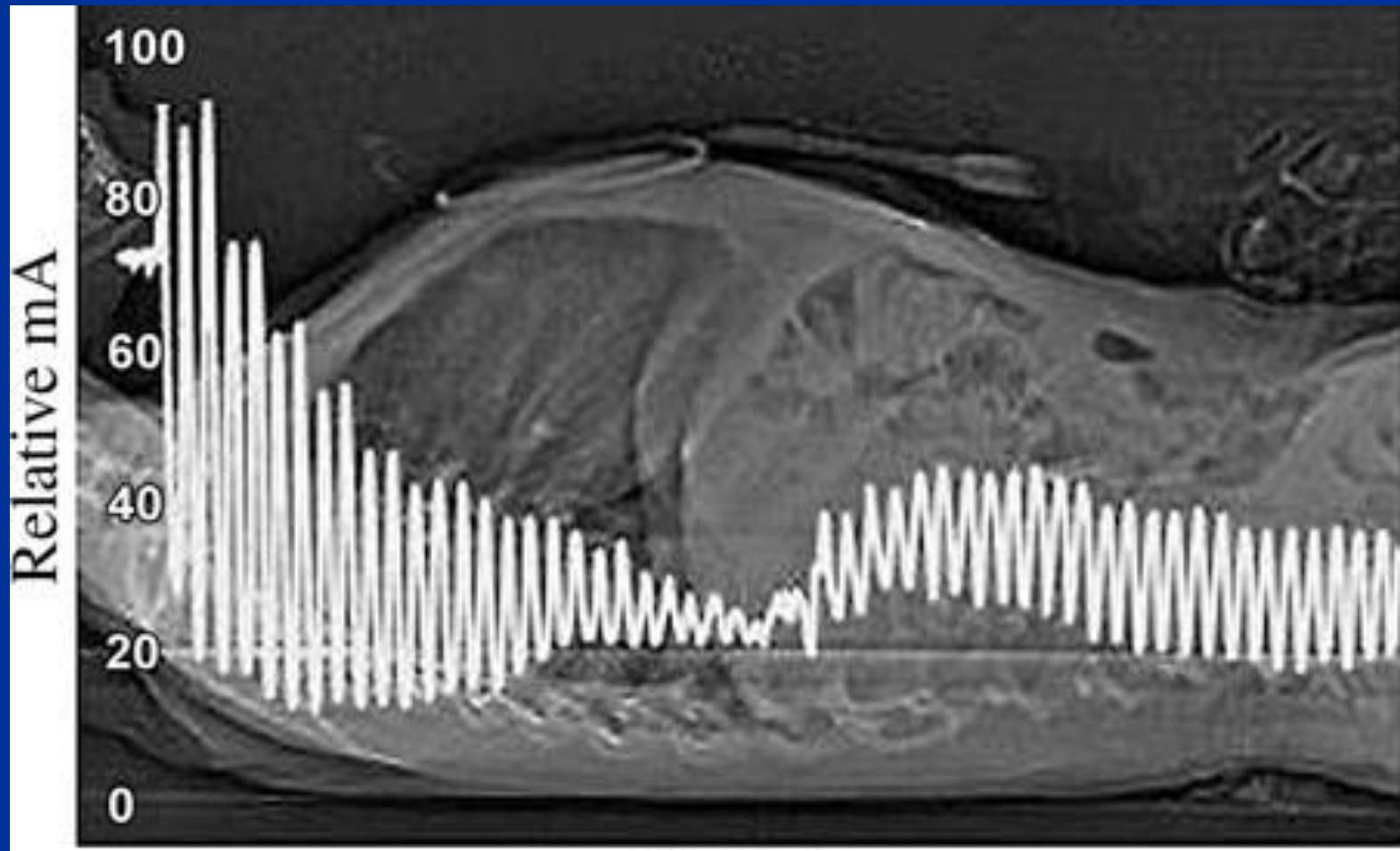
*AJR* 2011; 196:W159–W165

**OBJECTIVE.** The purpose of our study was to estimate cancer induction risk and generate risk conversion factors in cardiac CT angiography.









Radiation Protection Dosimetry (2011), Vol. 143, No. 1, pp. 81–87  
Advance Access publication 9 November 2010

doi:10.1093/rpd/ncq291

## **X-RAY TUBE CURRENT MODULATION AND PATIENT DOSES IN CHEST CT**

Wenjun He<sup>1,\*</sup>, Walter Huda<sup>2</sup>, Dennise Magill<sup>2</sup>, Emily Tavriles<sup>3</sup> and Hai Yao<sup>1</sup>

# **RADIATION RISK CAVEATS**

**Latent period**

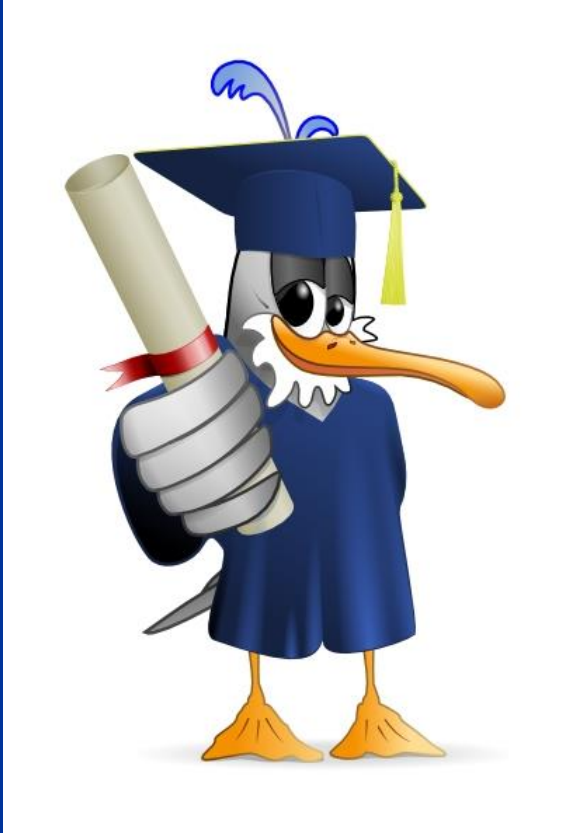
**Differences in life expectancy of  
“patients” and normal population**

**Risk Uncertainties**

# SUMMARY



# Understand (Any) Radiation Risks in CT



**Improve Ability to Justify/Optimize**



**Thank You**



***Reprint requests: [huda@musc.edu](mailto:huda@musc.edu)***