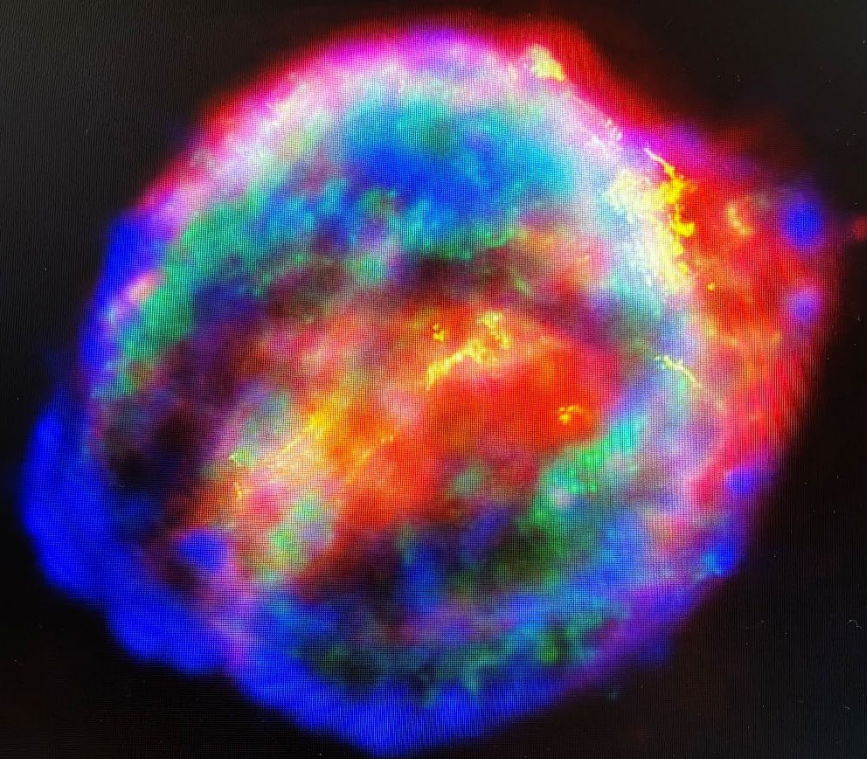
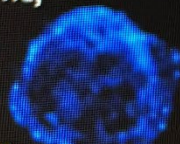





**GENDER** + RADIATION  
IMPACT **PROJECT**

**Slides with citations here:**

**[www.genderandradiation.org](http://www.genderandradiation.org)**

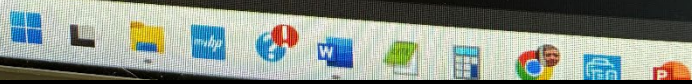


<p>X-ray</p>  <p>Chandra X-ray Observatory</p>	<p>X-ray</p>  <p>Chandra X-ray Observatory</p>	<p>Visible</p>  <p>Hubble Space Telescope</p>	<p>Infrared</p>  <p>Spitzer Space Telescope</p>
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**Kepler's Supernova Remnant • SN 1604**

NASA, ESA / JPL-Caltech / R. Sankrit & W. Blair (Johns Hopkins University)

ssc2004-15a

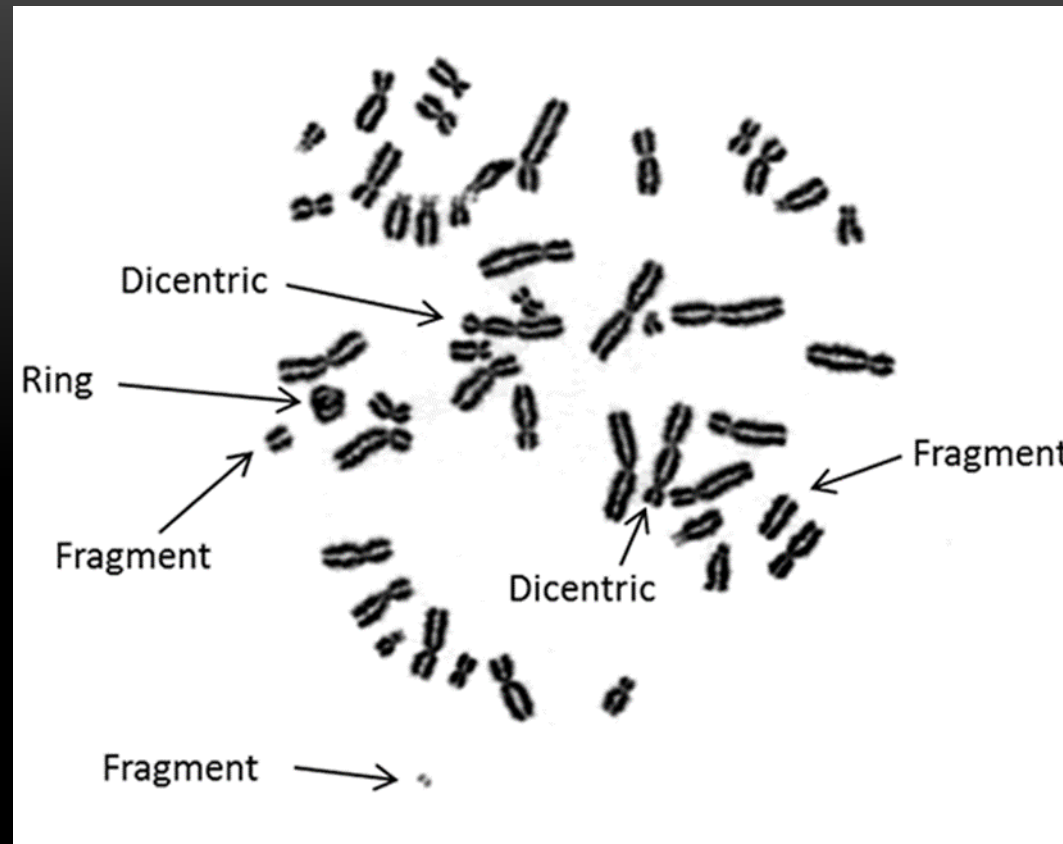




1945 New Mexico USA  
Trinity



# Radiation Induced Chromosomal Aberrations, as seen with microscope





# Nuclear energy = old steam generator PLUS new radiation life did not “grow up with”

- Ongoing radioactive releases, periodic venting and possible explosions and meltdowns dispersing radioactivity in our environment.
- RADIOCESIUM / RADIOSTRONIUM / RADIOIODINE
- PLUTONIUM / AMERICIUM / NEPTUNIUM (more!)
- In air, food and water, NOT the same as “natural” radiation.

**Reference Man**, a convention in radiation assessment, is a 25—30-year-old male, 5' 7"



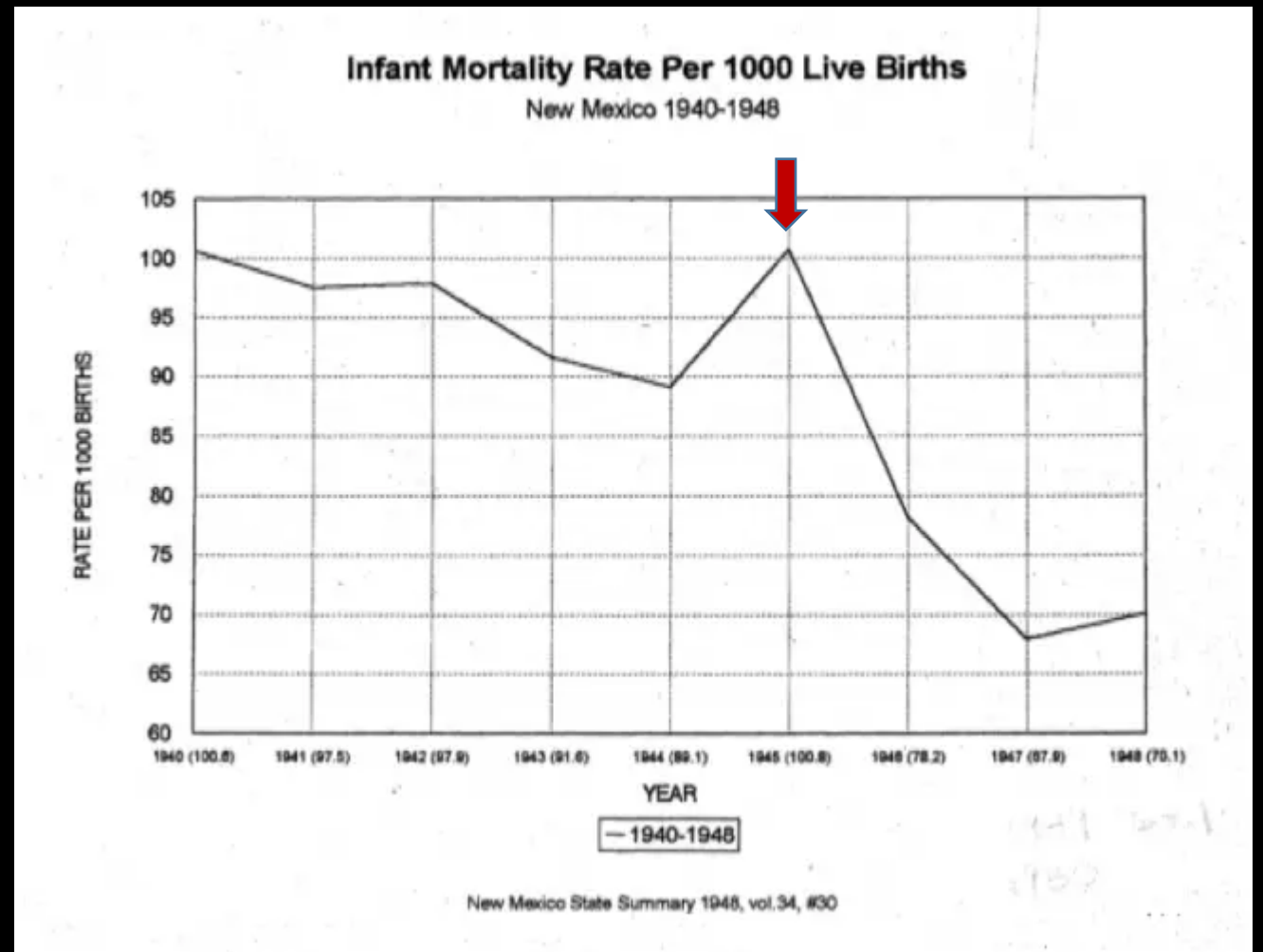
- Weight of 154 lbs
- Industrial worker
- Gets food from the store
- Drinks water from public supply
- Does not spend much time outside—no garden or chickens!
- Sleeps in a built home
- **Does not factor radioactivity in air, food or water—internal exposure**



# Radiation Exposure in Pregnancy: Three Generations

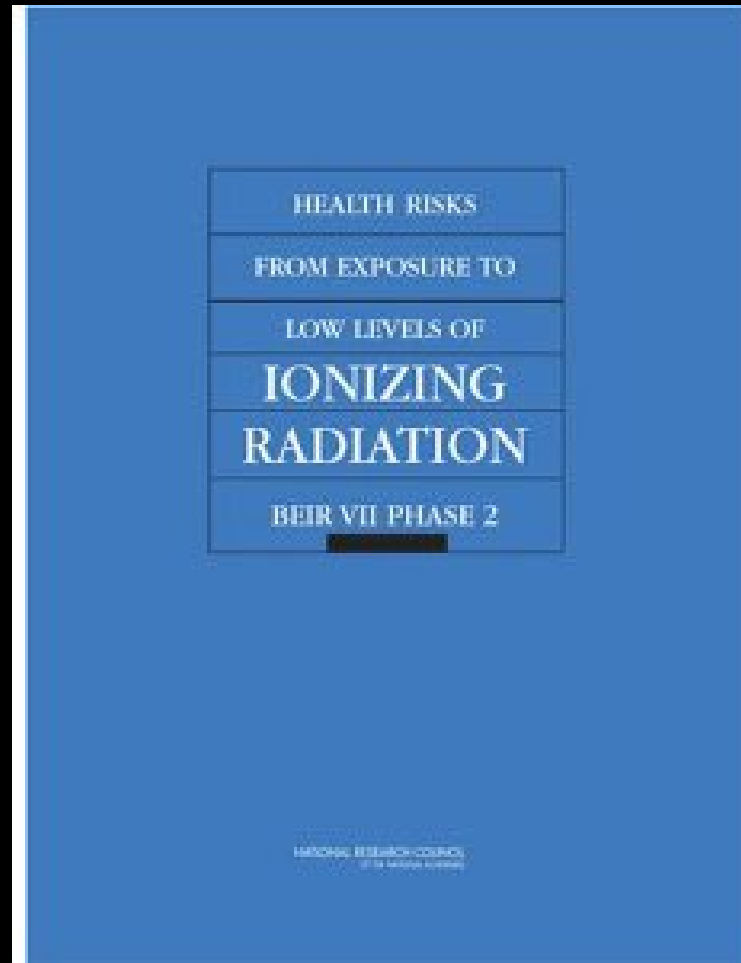


# New Mexico, USA 1945



Tucker and Alvarez (2019) , Figure 2.

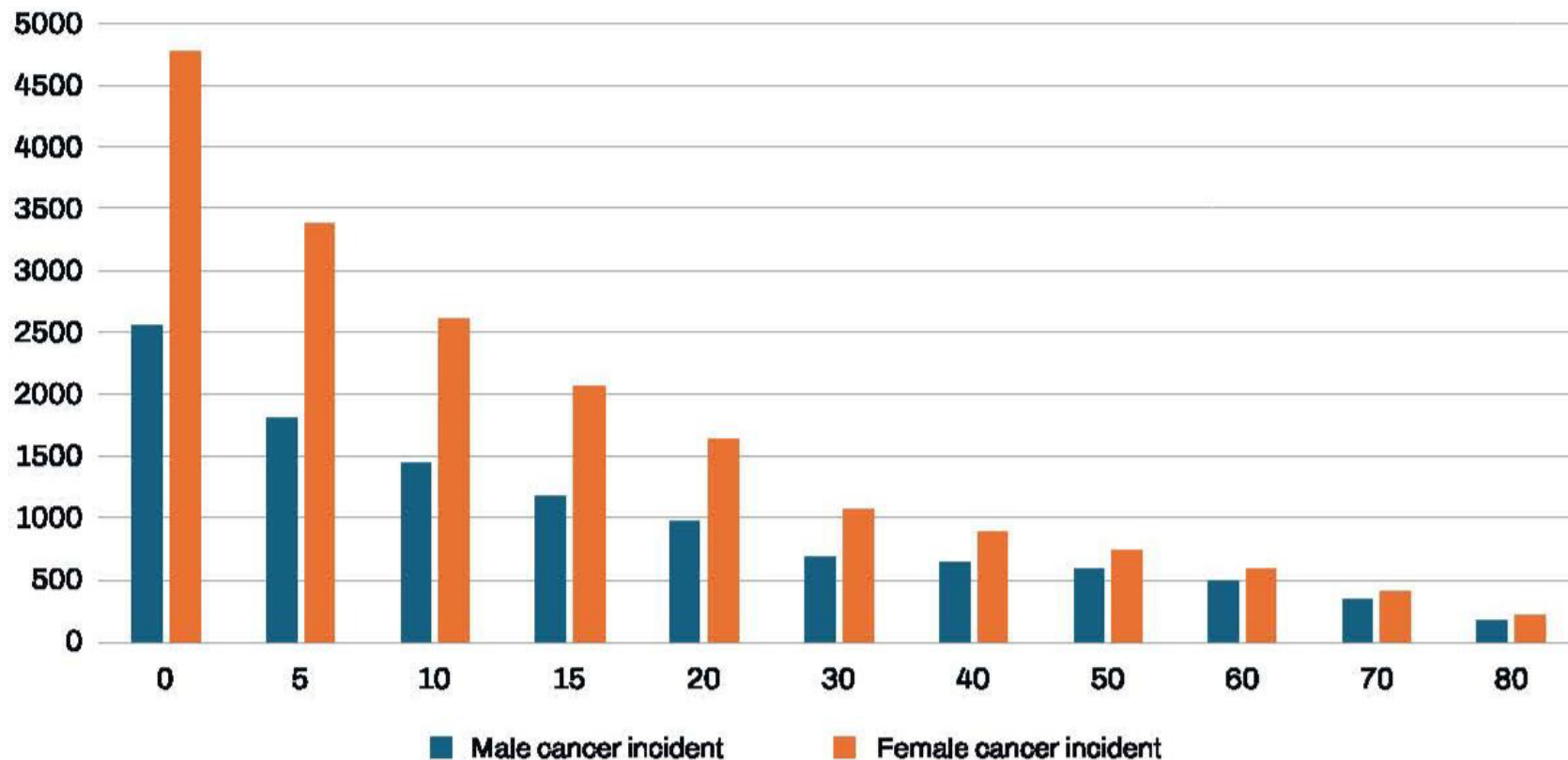




U.S. National Academy of Science:  
Biological Effects of Ionizing Radiation (BEIR VII Phase 2)  
published 2006.

**FIGURE 2.**

## Cancer incidence by 100,000 by age at time of exposure



*Based on Table 12D-1, NAS, 2006, Biological Effects of Ionizing Radiation (BEIR VII). This bar chart presents a hypothetical case of rate of cancer incidence by age at time of radiation exposure based on data presented in the LSS. Exposure rate (1 Gy) was consistent for each individual, which allows age of exposure and biological sex to be assessed as contributing factors in cancer incidence as a radiation outcome.*




Radiation is more harmful to children



**Children Between Birth and 5 Years**





Radiation regulation based on Reference Man results in systematic under-reporting of radiation harm for the global population.



The book cover features a dark teal background with a lighter, hazy teal area at the top and bottom, suggesting a sky or water scene. The title and authors' names are centered in white text on the dark teal band.

THE SCIENTISTS WHO  
ALERTED US TO THE  
DANGERS OF RADIATION

*By*

IAN FAIRLIE AND CINDY FOLKERS

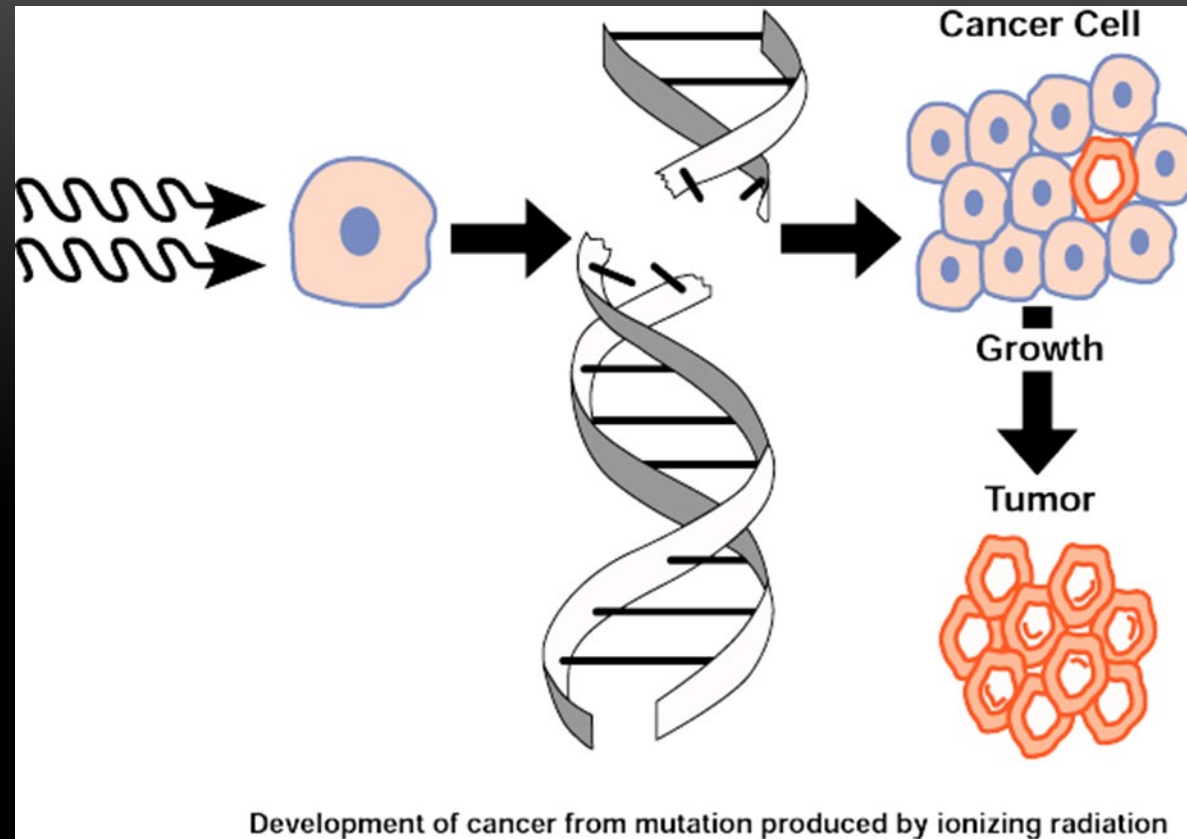


THANK YOU

[gender.radiation@gmail.com](mailto:gender.radiation@gmail.com)



# Medical Impacts of Ionizing Radiation: Cancer



Ionizing radiation harms our cells.





# Lifetime Risk of Cancer Incidence (acute exposure between birth and age five)



**2 Boys**



**4 Girls**



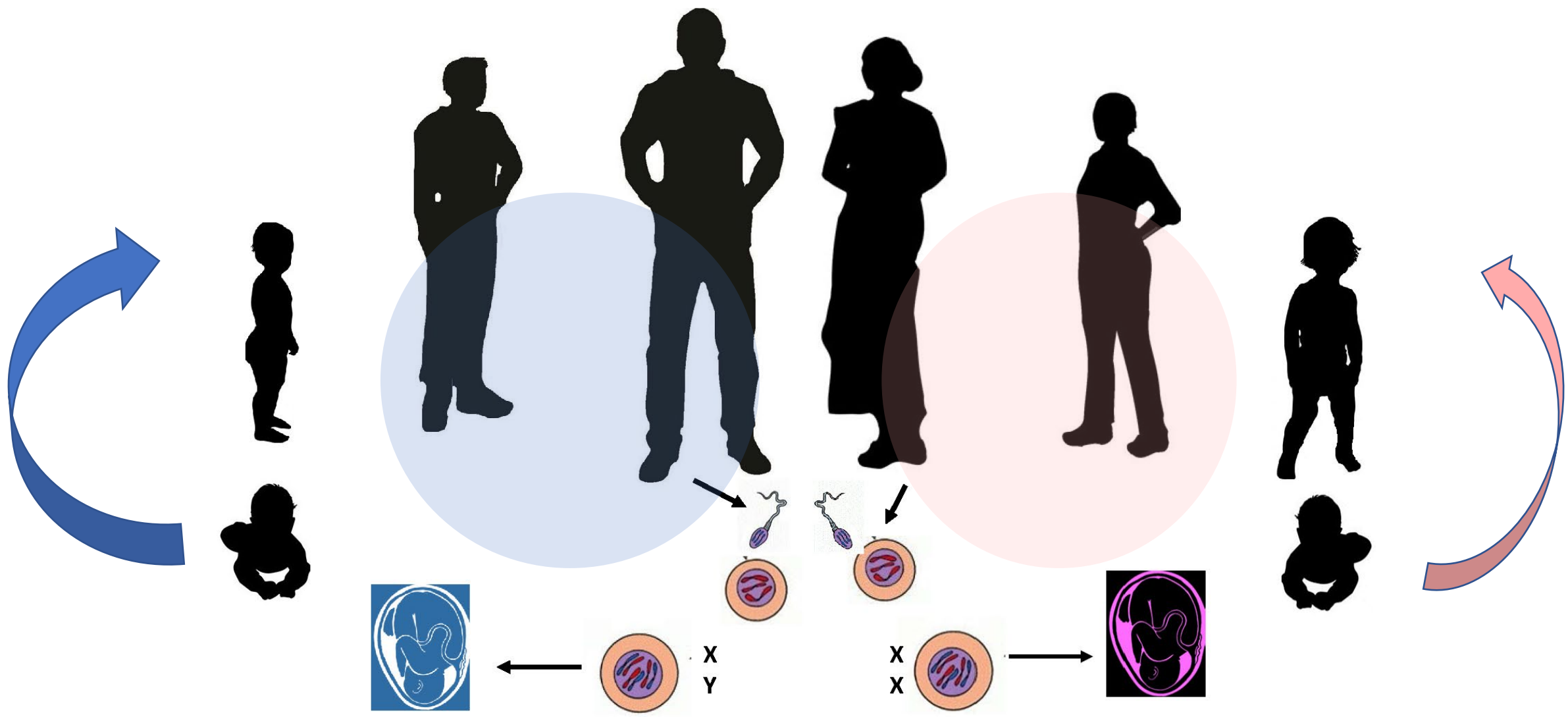
# Lifetime Cancer fatalities among those exposed to ionizing radiation as adults



**2 Men**



**3 Women**



Full Human Lifecycle ∞

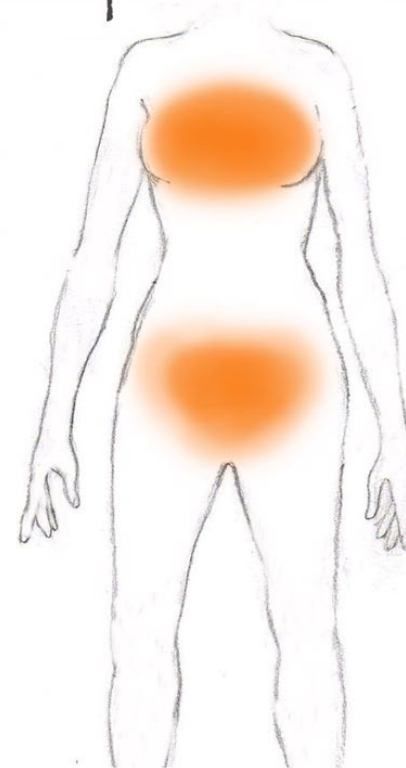


# Why is biological sex a factor in radiation harm?



Dr. Rosalie Bertell 1929--2012

Females have 50% more  
high-risk tissue  
compared to males



U.S. Nuclear Regulatory Commission (NRC)  
“lifetime risk of **FATAL** cancer from annual  
exposure to 100 millirems (1 mSv) for 70 years is  
3.5 in 1000 exposed”

Source: US NRC Expanded BRC Policy, Federal Register in  
1990

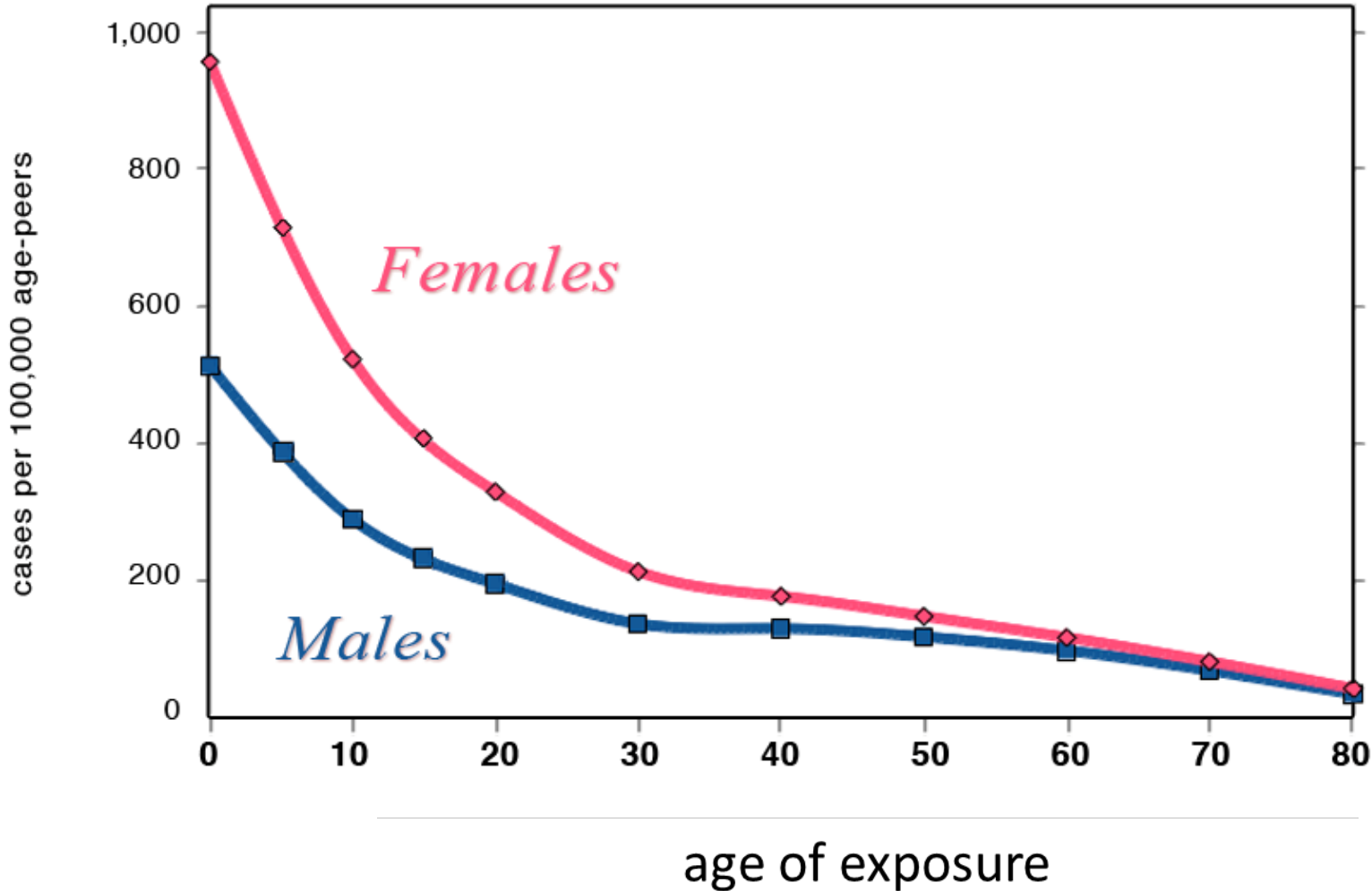
3.5 in 1000 =  
1 in 286 (rounded)

Exceeds promise of  
1 in a million deaths per year

1 in 286 ~

US NRC failed to state that these are all  
**REFERENCE MEN**

# Increased Cancer Risk by Age at Exposure to 20 mSv Radiation



Data Source: U.S. National Academy of Sciences BEIR VII Phase 2 Risk Model