

# Effectively Communicating Radiation Risks: The Toughest Task

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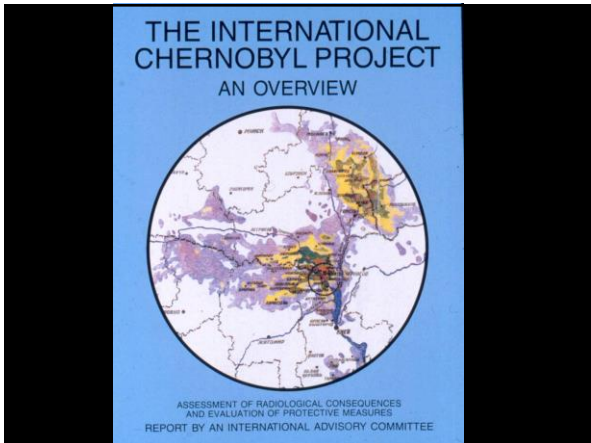
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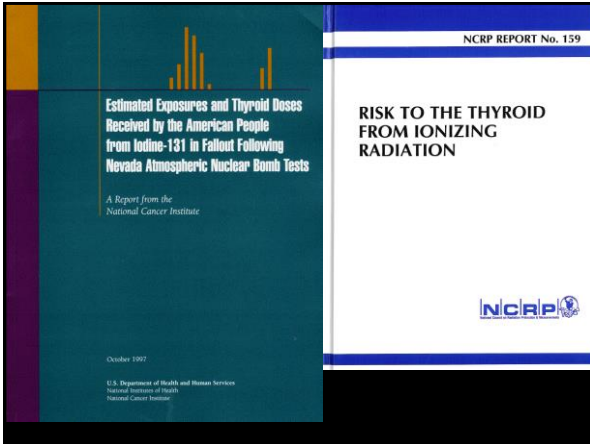
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International Society for Nuclear Air Treatment Technologies 6/24/2014

## Overview

- Qualifications
- Perceptions
- Contamination
- Science
- Risk Communication
- Outrage Factors
- Risk of Risk Aversion





**But Am I A Trusted Souce?**

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**Disclosures**

I Earn A Living Injecting People With Radioactive Materials.

**"Nobody believes the official spokesman... but everybody trusts an unidentified source"**

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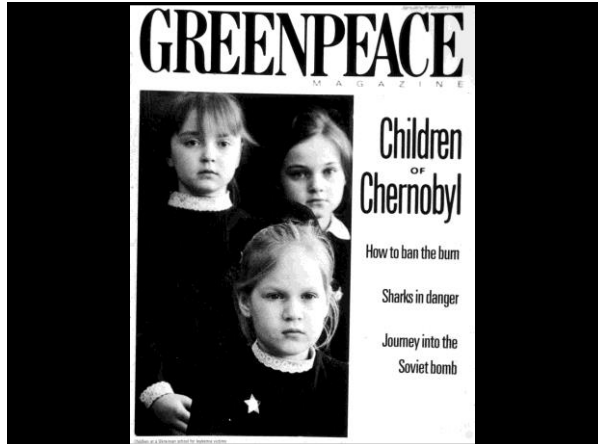
**The Simple Lie Is Often More Believable Than The Complicated Truth**



**Shared Values**

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- Truth
- Environment
- Future For My Grandchildren And Your Grandchildren



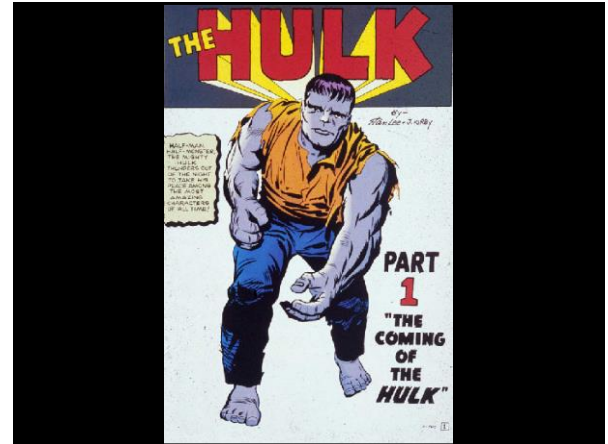
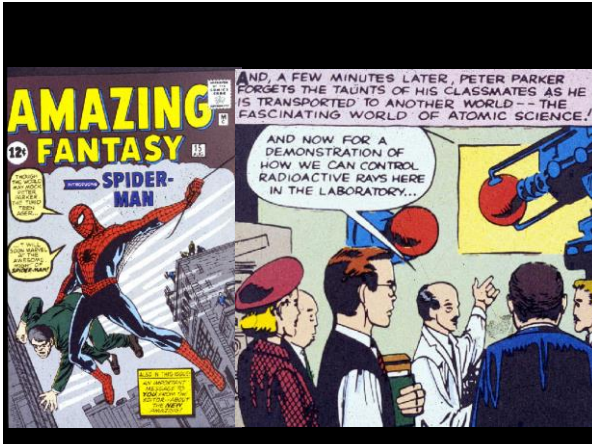


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## Perceptions

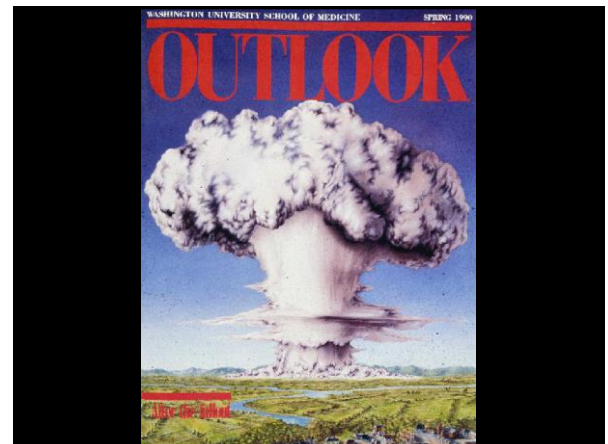
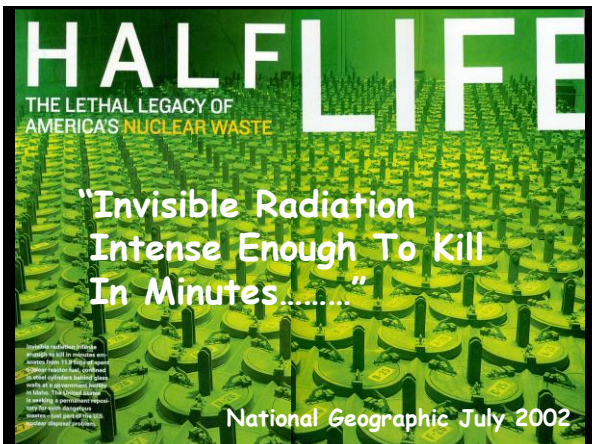
- Perceptions Are Often Very Different Than the Realities
- Determining Risk Is Very Complicated



**Living With Radiation**

Radiation. Hardly a word in any language generates more anxiety. And living with radiation can, in fact, be frightening...Nuclear waste is piling up.

National Geographic April 1989



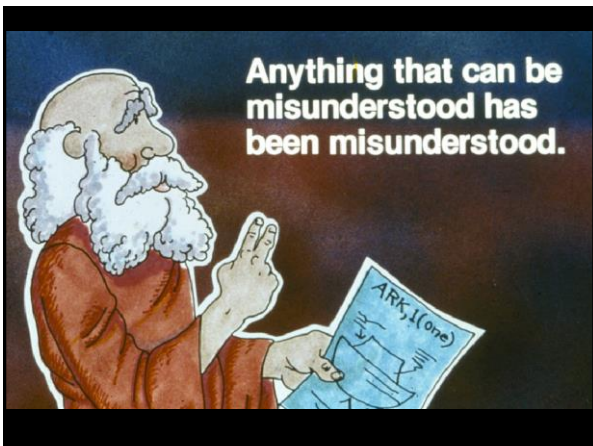


### Playing It Safe

Greg Evans, professor of environmental health and director of SLU's Institute for Biosecurity, said first responders can never take too many precautions when responding to unknown or potentially terrorist threats.


"You've got people who developed rashes," Evans said. "Until you can find out what it is and where it came from, you have to take every possible measure to protect people who might come in contact with whatever it is."

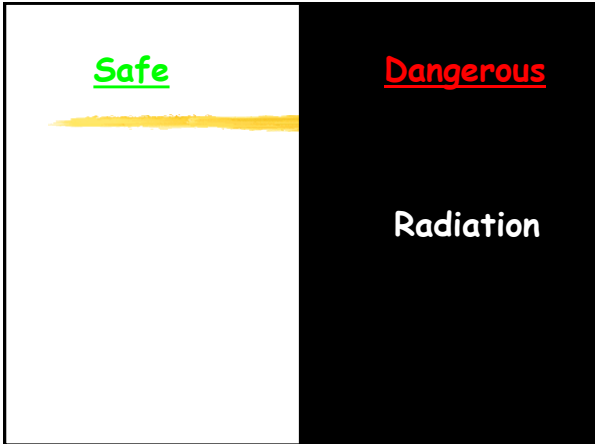
He believes the nation is less prepared for a terrorist attack than it was five years ago, saying the government has shifted its focus to other problems such as rebuilding the economy and fighting infectious disease.



### Perceived Effects

Radiation is frightening

A close-up photograph of a severely damaged, charred, and mangled piece of meat, likely a result of radiation exposure. The meat is dark and has a jagged, irregular shape, illustrating the perceived effects of radiation.



### Overview

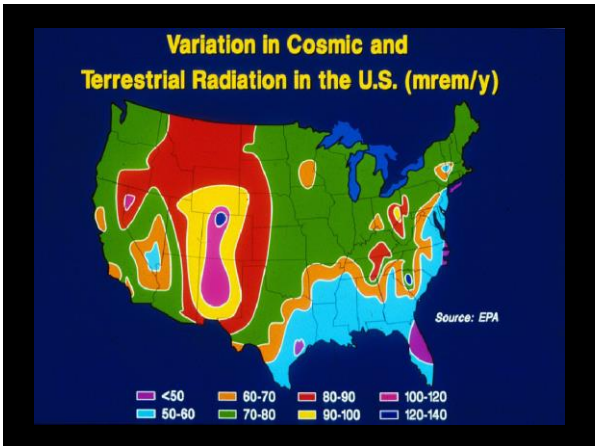
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### EPA's Definition of Contamination

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- 1 in 10,000 to 1 in 1,000,000 Lifetime Chance of Dying
- 1 in 10,000 Corresponds to Approximately 2 mSv Lifetime 0.03 mSv/year
- Natural Background (1 mSv/year [3 mSv with Radon])
- Background in Denver is 1 mSv More Per Year Than Florida



### Contamination

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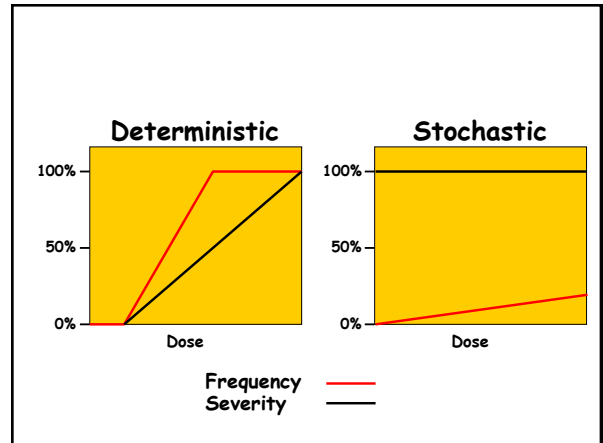
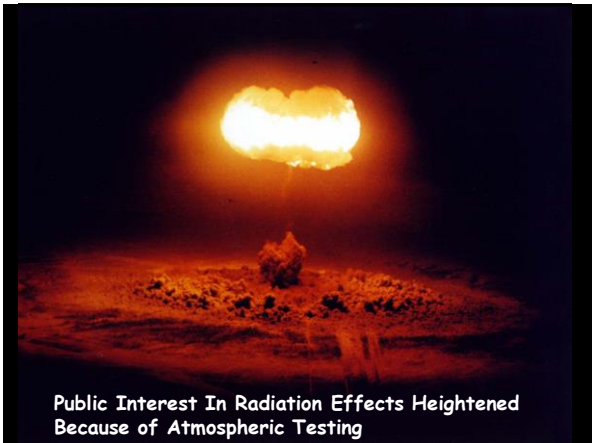
- Impossible To Regulate At Levels That Other Contaminants Are Regulated
- Property Values
- Local Communities Don't Pay The Cost of Cleanup
- Risk of Risk Aversion

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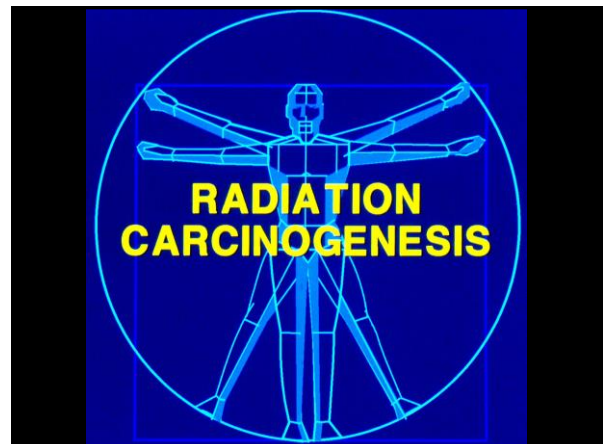
## Science

- Imperfect
- Increasing Politicized
- Knowledge-based Decisions Are Most Likely To Work



## Linear No Threshold Hypothesis

- No Safe Amount of Radiation
- What Human Activity Is Risk Free????



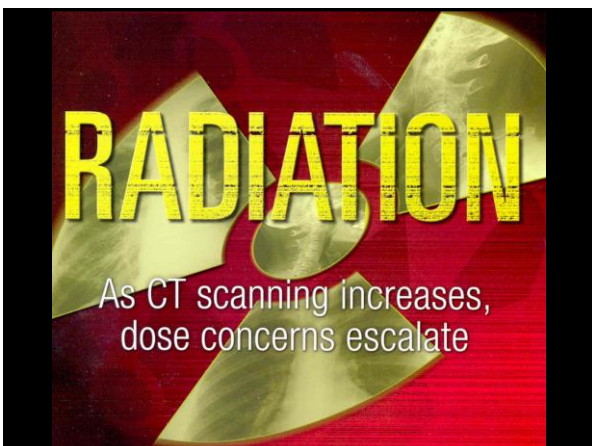
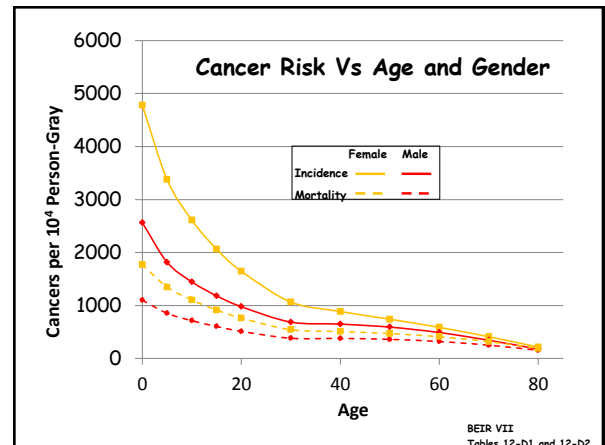


## Atomic Bomb Survivors

- Over 100,000 Survivors
- Both Sexes
- All Ages
- Whole-Body Radiation
- Doses Well-Known

## Long-Term Health Effects Difficult to Detect

- Hiroshima and Nagasaki
  - 120,000 Survivors
  - 8% Increase in Cancer Deaths
  - 500-800 Excess Deaths



## Risk of 1 CT Scan

1 In 2,000 Chance Of Developing A Fatal Cancer

What Is The Risk Of Not Doing The CT?

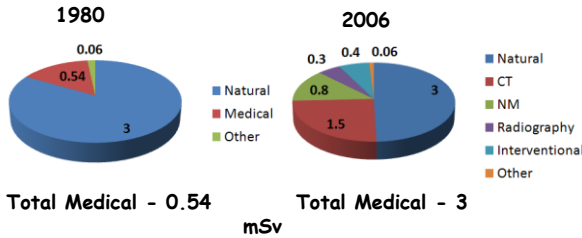
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## NCRP Report

6 times small = small  
6 times 1 cent = 6 cents



Mettler FA: HP 95-502, 2008

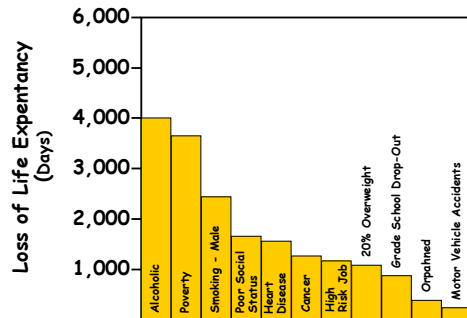
## What Does 1 In 2,000 Chance Of Developing A Fatal Cancer Mean???

- Our Lifetime Risk of Dying of Cancer Is 25%
- One CT increases our risk to 25.05%
- Risk of Not Having The CT
- 1,999 Chances in 2000 That Absolutely No Harm Will Occur

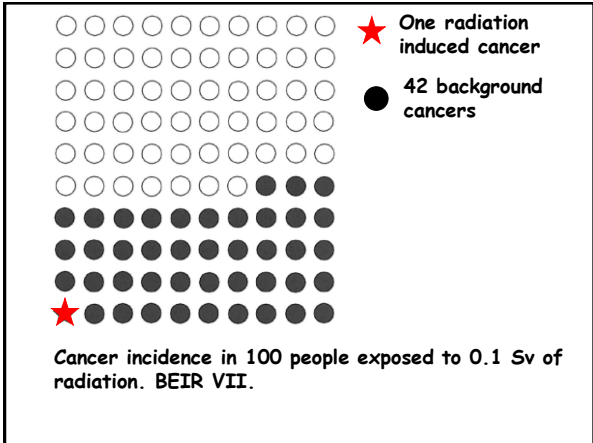
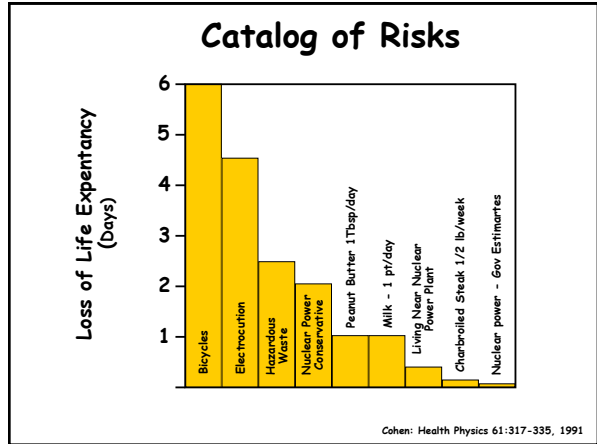
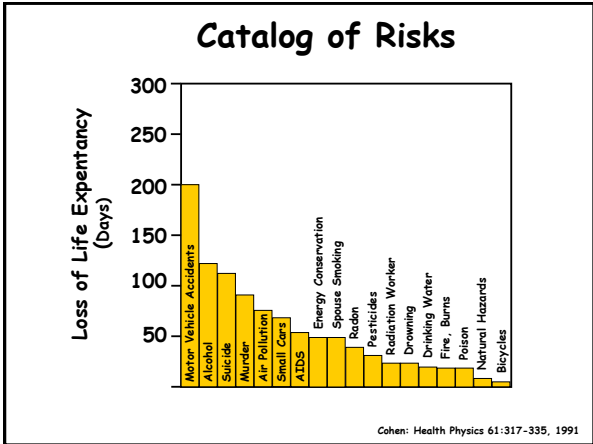
## What Does 1 In 2,000 Chance Of Developing A Fatal Cancer Mean???

- Assumption - If You Get A Cancer Caused By Radiation, You Will Die 15 Years Prematurely.
- 1/2000 Times 15 Years = 2.7 Days Of Life Lost

## Catalog of Risks



Cohen: Health Physics 61:317-335, 1991



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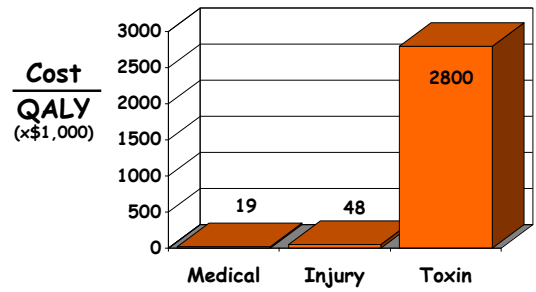
- ### Outrage Factors
- Involuntary
  - Unnecessary
  - Risks > Benefits
  - Benefits and Risks Not Coupled
  - Dreaded Outcome
  - Ongoing Risk
  - Not Shared Equitably
  - Unfamiliar
  - Morally Reprehensible

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## Risks of Risk Aversion

Tengs, T.O., et al., *Five-hundred life-saving interventions and their cost-effectiveness*. Risk Anal, 1995. 15(3): p. 369-90.

## Risks of Risk Aversion



Tengs, Risk Anal, 1995, 15: 369-90.

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