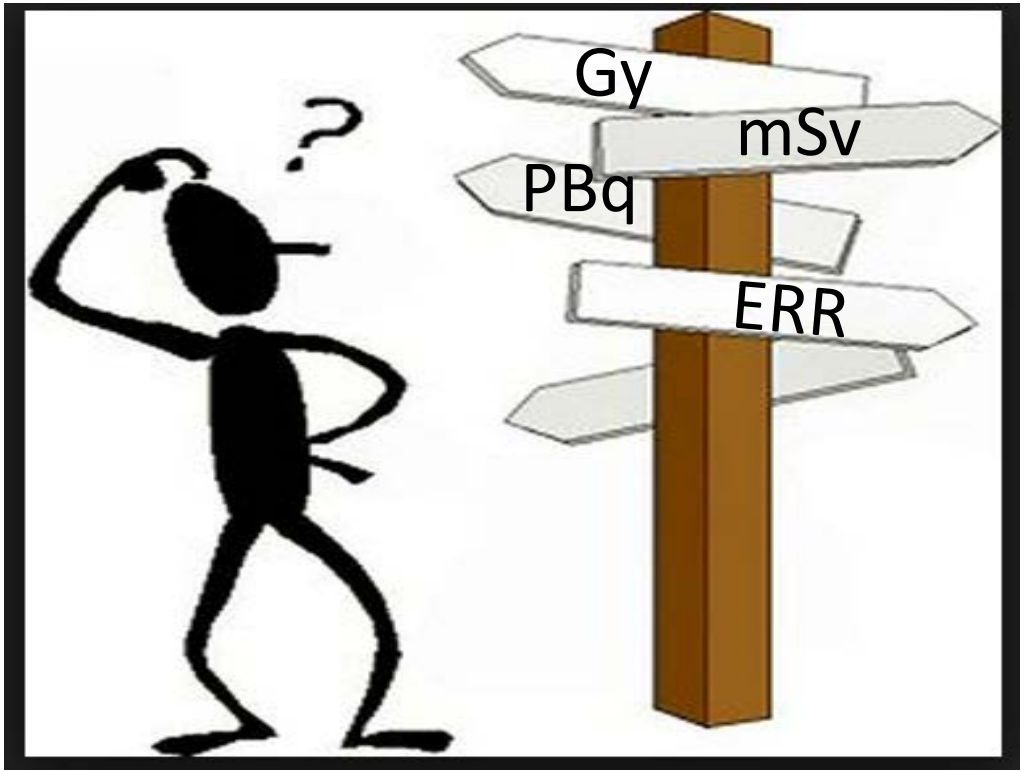
The challenges communicating the health risks of radiation

Gerry Thomas, Imperial College London
gerry.thomas@imperial.ac.uk

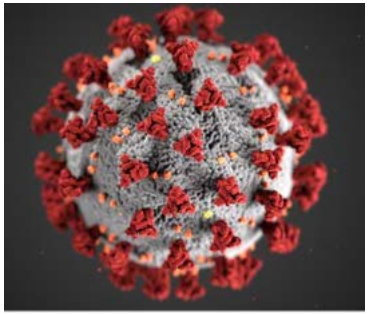
The problem with radiation risk communication

- Too much jargon
- Level of understanding an unconscious biases of audience
- Communication of uncertainty



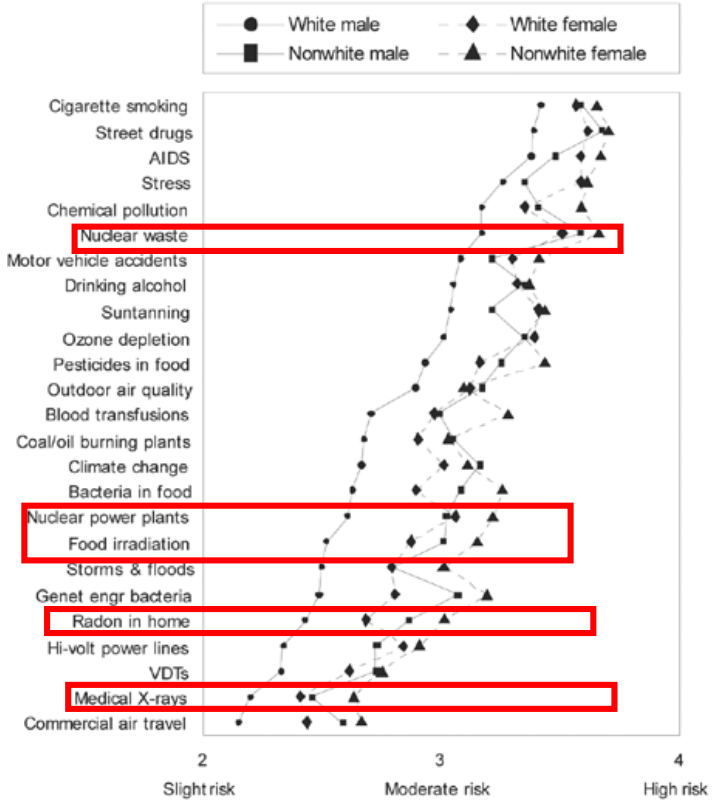
Public Perception of Risk – Fear Factors

- Uncontrollable
- Having catastrophic potential
- Having fatal or dread consequences
- Distribution of risks and benefits is unequitable
- Not understood
- Novel
- Delayed in their manifestation of harm



Slovic P. 1987. Perception of risk. Science 236:280–85

Communication of risk and uncertainty – with whom



FLYNN, J.; SLOVIC, P.; MERTZ, C. K. Gender, race, and perception of environmental health risks. *Risk Analysis*, New Jersey, v. 14, n. 6, p. 1101-1108, 1994.

x 2

x 1

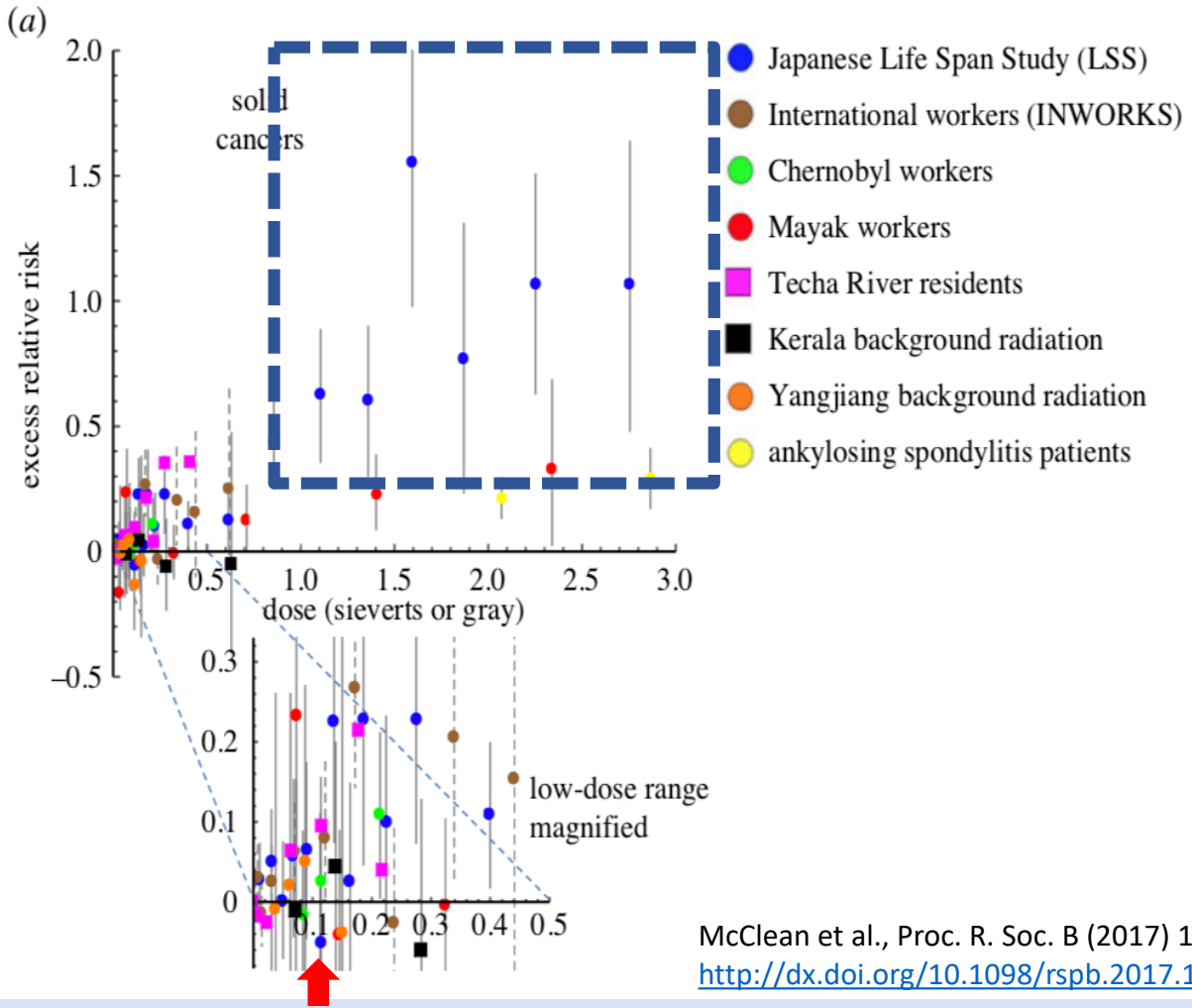
Health effects of Exposure to Radiation from NPP Accidents

Chernobyl

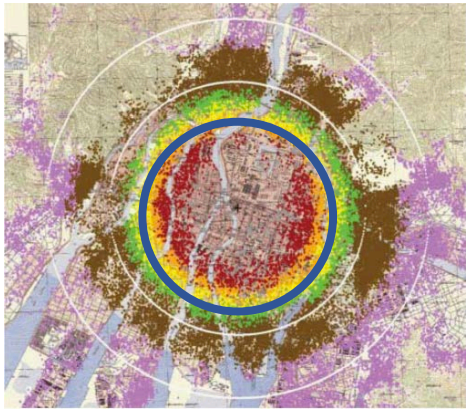
- Major health effect is on mental health from fear of radiation
- 28 deaths from ARS
- Increase in thyroid cancer in those exposed as children – possible excess of 16,000; likely mortality 160 over 50+ years
- No tumor biomarker for radiation exposure nor evidence for transgenerational effect
- No increase in other cancers so far, either in liquidators or in population

Fukushima

- Major health effect is on mental health from fear of radiation and dislocation of communities – no radiobiological health effect
- More than 2000 deaths in those evacuated rapidly – predominantly in the elderly and vulnerable



McClean et al., Proc. R. Soc. B (2017) 1070.
http://dx.doi.org/10.1098/rspb.2017.1070



Rings represent 2 and 3 km from epicenter

Red >1000mGy 5%

Orange 500-1000mGy

Yellow 200-500mGy

Green 100-200 mGy

Brown 5-100 mGy

Pink <5 mGy **84%**

Douple et al., doi: 10.1001/dmp.2011.21

What does this mean?

Health Risks from Exposure to Low Levels of Ionizing Radiation: BEIR VII Phase 2. Washington, DC: National Research Council; 2005. National Research Council, Committee to Assess Health Risks from Exposure to Low Levels of Ionizing Radiation.

Radiation risk in context

	Increased mortality
Megacity versus small town living	**2.8%**
Passive smoking	**1.7%**
Exposure of 250mSv (Chernobyl Liquidator)	**1.0%**
Exposure of 100mSv (Chernobyl Liquidator)	**0.4%**

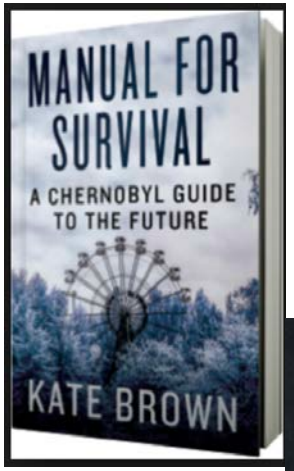
Source: Smith J BMC Pubic Health 2007 7:49

Risk scenario	Average Years of Life Lost (YOLL)
Smoking Male doctor who is a lifetime smoker compared to non-smoker.	10
Obesity White male aged 35 who is obese (BMI = 30.0–39.9) or severely obese (BMI >40): risk relative to BMI = 24.	Obese: 1–4 [a] Severely obese: 4–10[a]
Radiation Atomic bomb survivor who was in the most exposed group: within 1500 metres of the hypocentre. Shielded whole body kerma > 1 Gy, mean 2.25 Gy.	2.6 (1.3–5.2)[a]

Source: Smith J BMC Pubic Health 2007 7:49

NB Radiation doses from nuclear accidents much lower than from A-bomb, so risk even lower

Consequences of public myth versus scientific evidence



How do we improve radiation risk communication?

- Does the argument about LNT get us anywhere?

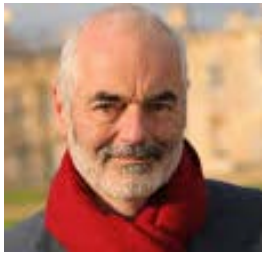
- Will more data at low doses improve our/the public's understanding?

Understanding unconscious biases – particularly around dose
A better understanding of how to communicate health risks and put them into context – would help not just with radiation.

- Requires interaction with social scientists/opinion influencers – not always easy for lab based scientists

Risks of Radiation Risk Miscommunication

- We face many risks in life – radiation exposure is just one
- By miscommunicating radiation risks, we endanger life
- We need to learn the lessons of miscommunicating the health risks of Chernobyl and Fukushima



Prof David Spiegelhalter, Winton Professor for the Public Understanding of Risk at the University of Cambridge, said:

"Given the pleasure presumably associated with moderate drinking, claiming there is no 'safe' level does not seem an argument for abstention. There is no safe level of driving, but government do not recommend that people avoid driving. Come to think of it, there is no safe level of living, but nobody would recommend abstention."

http://www.sciencemediacentre.org/expert-reaction-to-systematic-analysis-of-the-health-impacts-of-alcohol/