

Communicating Health Risks from Nuclear Accidents

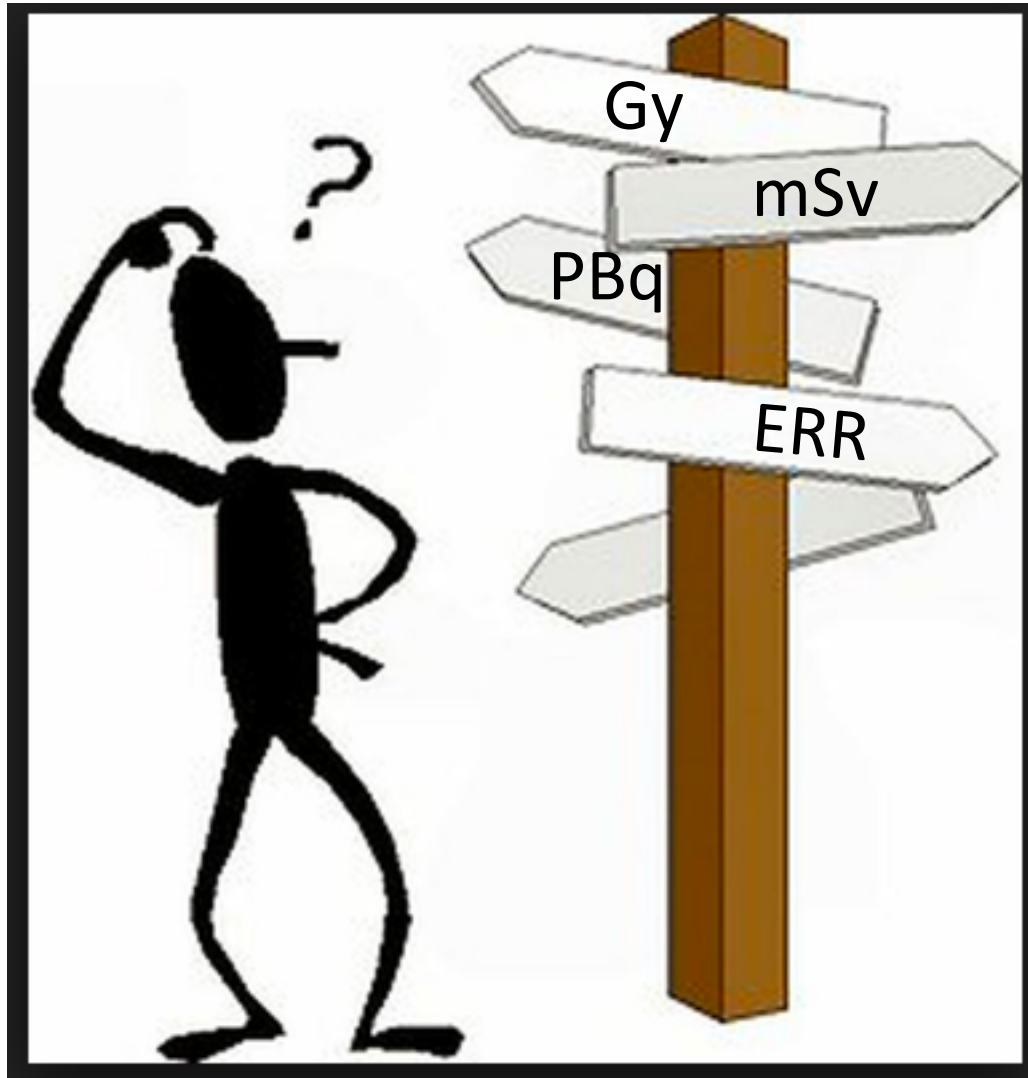
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The problem with radiation....

- Long history of being made to fear radiation (from atomic weapons)
- General acceptance of medical radiation exposure, and exposure to natural radiation (e.g. Spas) believed to be beneficial
- Relationship between dose and response to all toxins (including radiation)
- Perception that individual dose from nuclear accidents is much higher than it is
- Atomic bomb exposure very different to nuclear accident



The problem with radiation risk communication



- Too much jargon
- Health effects depend on physics, chemistry and biology
- Political football
- Lots of misinformation and very little understandable science
- Constant emphasis on safety – **must be unsafe**

Public Perception of Radiation

New Book Concludes – Chernobyl death toll: 985,000, mostly from cancer



<http://www.globalresearch.ca/new-book-concludes-chernobyl-death-toll-985-000-mostly-from-cancer/20908>

2065 toll

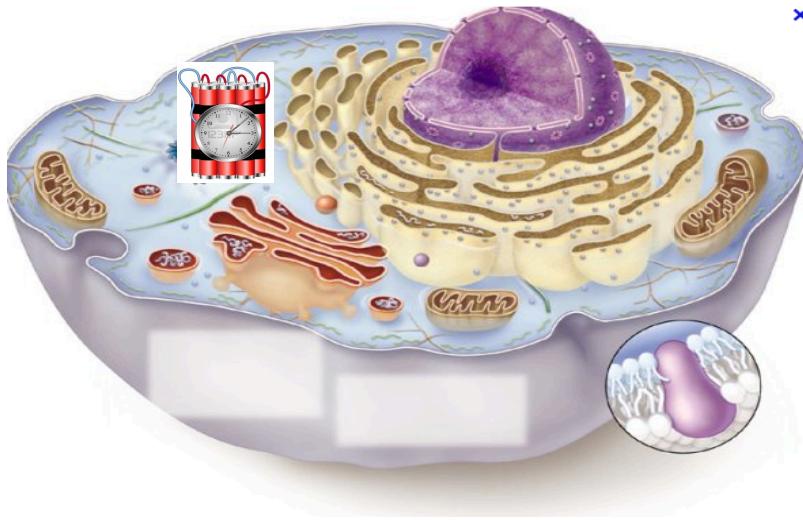
The mainstream view puts the toll in five figures. Environmental physicist Jim Smith of the University of Portsmouth, UK, prefers to cite a 2006 study by Elisabeth Cardis of the International Agency for Research on Cancer in Lyon, France. This predicted that by 2065 Chernobyl will have caused about 16,000 cases of thyroid cancer and 25,000 cases of other cancers, compared with several hundred million cancer cases from other causes.

<http://www.newscientist.com/article/dn20403-25-years-after-chernobyl-we-dont-know-how-many-died.html>

Health effects of radiation – simple facts

Health effects involve a combination of exposure and tissue dose (c/w health effects of sunlight)

- People must have been exposed to radiation
- Effect depends on the radioactive isotopes emitted
- Dose must be large enough to have a demonstrable effect in the numbers exposed (very small doses need very large populations to be exposed to demonstrate an effect)

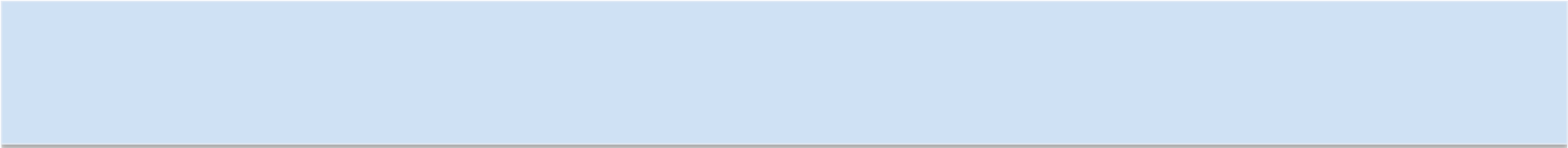



- × Biological effect of radiation depends on the amount of time the radioactive isotope stays in the body (biological half-life) and the frequency with which the isotope emits radiation (physical half-life)

- Long physical half-life, short biological half-life – little effect (e.g. Cs-137)
- Short physical half-life, long biological half-life – big problem (e.g. I-131)

Put these in order of dose....

- Annual exposure (Po-210) to average smoker
 - Dental X-ray
 - CT scan (whole body)
- Radiotherapy for breast cancer
- 135g of brazil nuts
 - Average annual dose (UK)
- Average dose to 6M residents near to Chernobyl (over 25 years)
 - Transatlantic flight

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- Dose values (in red):
- 0.005mSv
 - 0.07mSv
 - 2.7mSv
 - 9mSv
 - 10 mSv
 - 13 mSv
 - 100mSv
 - 50 Sv

Radiation releases in perspective

	131-I	137-Cs
A-bomb tests in 1960s	675,000 PBq	948 PBq
Chernobyl	1,760 PBq	85 PBq
Fukushima	100-500 PBq	6-20 PBq

Sources: www.unscear.org/docs/reports/2008/11-80076_Report_2008_Annex_D.pdf
http://www.unscear.org/docs/reports/2013/13-85418_Report_2013_Annex_A.pdf

Chernobyl vs Fukushima

Chernobyl

- evacuees mean thyroid dose 500 mGy (range 50-5000mGy)
- Non evacuees: 100mGy
- Lifetime exposure 9mSv (6M residents); 50mSv , 150,000 residents

Fukushima

- evacuees estimated thyroid doses up to 80mGy,
- Non evacuees estimated 45-55mGy
- Actual measured doses mean 4.2 mGy
- Estimated lifetime exposure 10mSv (if no remediation)

NB – lifetime exposure to background radiation approx 170mSv

Limiting exposure

- Move population away from source
- Limit inhalation by staying inside and keeping windows and doors shut
- Stop ingestion of contaminated foodstuffs
- Block uptake of radionuclides (e.g. stable iodine prophylaxis)



Chernobyl – Health effects

- 28 from ARS
- 15 deaths from thyroid cancer in 25 years
- 1% death rate overall predicted for thyroid cancer.
16,000 excess thyroid cancers in total predicted –
therefore 160 deaths
- No (scientific) evidence of increased thyroid cancer
outside 3 republics
- No effect on fertility, malformations or infant mortality
- No conclusion on adverse pregnancy outcomes or still
births
- Heritable effects not seen and very unlikely at these
doses
- No proven increase in any other cancer (including
liquidator cohorts)

Fukushima Health effects

- No radiation related deaths compared with 1656 who died as a result of the evacuation or stress related to it, and 20,000 in tsunami
- Unlikely to be any increase in thyroid cancer at the doses received
- Psychological harm due to evacuation and radiophobia – very likely
- Huge economic effect on local area and Japan as a whole

Is this response from the media justified?



Or has it just made a difficult situation worse?

- UNSCEAR, WHO reports on Fukushima both conclude that the health effects of radiation from Fukushima will be negligible
- BUT the psychological effects on public health will be considerable
- Same conclusion as the WHO report on Chernobyl (published on line Feb 2011, but dated 2008)

We seem to have learnt nothing in 28 years

- Reports from UNSCEAR, WHO all state that the health effects of fear of radiation are worse than those of radiation itself
- Only radiobiological consequence of Chernobyl was thyroid cancer in those exposed in childhood
- Simple measures can be taken to protect population from exposure
- Need better public engagement to explain real rather than perceived risks

How do we get the message across?

- Put risks from radiation into perspective with other common place risks
- Take on the pseudoscientists and shout louder than they do
- Correct myths put out by the media (and school textbooks)
- Engage the public and emphasise the benefits of nuclear power (small individual risk – huge potential benefit to society)

Suggestions for public communication

- Engage the media in providing facts not fiction
- Engage scientists to provide an independent voice – **we need to get out more!**
- Discuss openly with all sections of the community
 - Schools, community groups, environmental campaigners etc
- Make everyone feel part of the decision making process – **local engagement**