# Public Policy and Radiation

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CANADA

Know then thyself, presume not God to scan;
The proper study of Mankind is Man.
Plac'd on the isthmus of a middle state,
A being darkly wise, and rudely great:
With too much knowledge for the Sceptic side,
With too much weakness for the Stoic's pride,
He hangs between; in doubt to act, or rest,
In doubt his Mind or Body to prefer
Born but to die, and reas'ning but to err;
Alike in ignorance, his reason such,
Whether he thinks too little, or too much:
Chaos of Thought and Passion, all confus'd;
Still by himself abus'd, or disabus'd;
Created half to rise, and half to fall;
Great lord of all things, yet a prey to all;
Sole judge of Truth, in endless error hurl'd:
The glory, jest, and riddle of the world!

- Alexander Pope. *An Essay on Man*


www.casa-in-italia.com/artpx/dut/Brugghen.htm

# Stephen Lewis – thinking about ethanol

# LNT Model

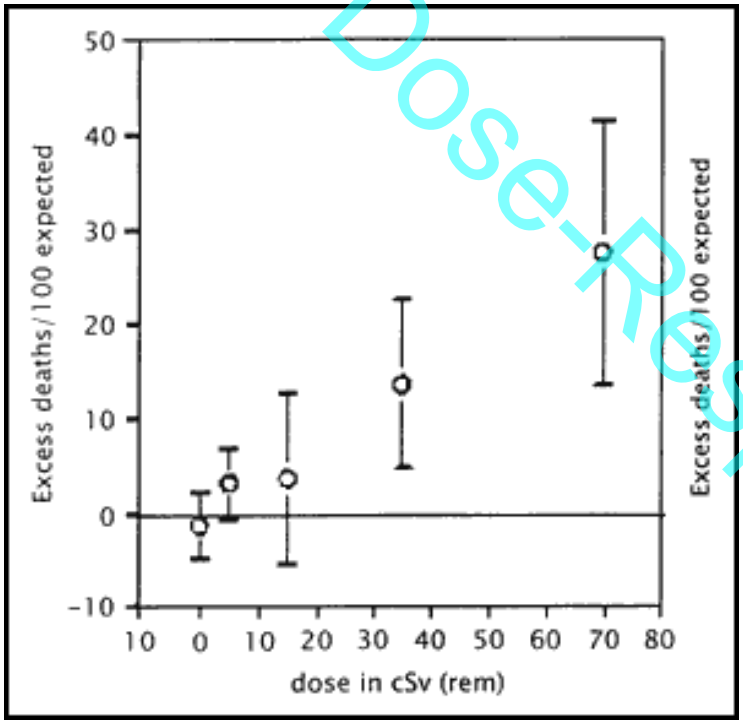


**Figure 1: Excess deaths from solid tumours per 100 "expected" among Japanese A-bomb survivors (1950—90) vs. dose**

Pierce D.A. et al, Studies of the mortality of atomic bomb survivors, Report 12, Part 1, Cancer 1950—90, Radiation Research, vol. 146, p1—27, 1996.

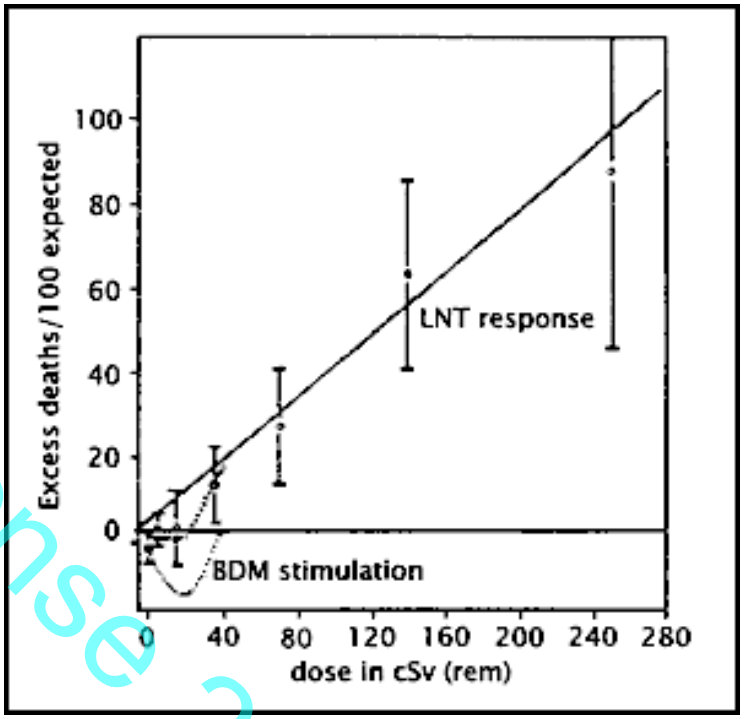


**Figure 2: Data from Figure 1 extended to high dose and with proposed analysis into an LNT component (solid line) plus a contribution at low dose from biological defence mechanisms (BDM) (small dotted line) to give a resultant behaviour at low dose (large dotted line), merging into the LNT line above 50 cSv**

Linear relationships are mathematical not biological

# Deterministic (non-stochastic)



- Severity varies with dose
- Threshold dose
  - Skin reddening 3-5Gy
  - Opacity of eye lens 2-10Gy
  - Permanent sterility 2.5-6Gy

NOTE: ICRP figures for Humans

Population, ecosystem, microenvironment

# Stochastic radiation effect



- Probability of occurrence, but not severity, is a function of dose
- No threshold

- Individual not population
- Physicists' delusion

# Stochastic radiation effect

- ICRP (2007) guesses at a value of 5.5% per Sievert for cancer and 0.2% per sievert for heritable effects after low dose radiation exposure.
- This can be used to calculate a collective dose
  - Ridiculous example
- Natural background of 2.1mSv per year in Germany results in a total dose of 172,000 Sv for 82,000,000 inhabitants

# Collective dose

- 172000x5.5/100=9460 cancer deaths from background radiation

# Collective dose

- The basic assumptions have not been experimentally validated
- It is based on target theory which was developed before much was known about DNA or cancer

# Science policy is policy about how science will be used to inform decisions

- 3.45ppb formaldehyde cancer risk
- Model No. of cancers
- One hit 21,000
- Multistage <1
- Probit 0

# Collective dose

Does it make sense to exclude medical radiation from exposure limits?

# Is the trade off argument valid?

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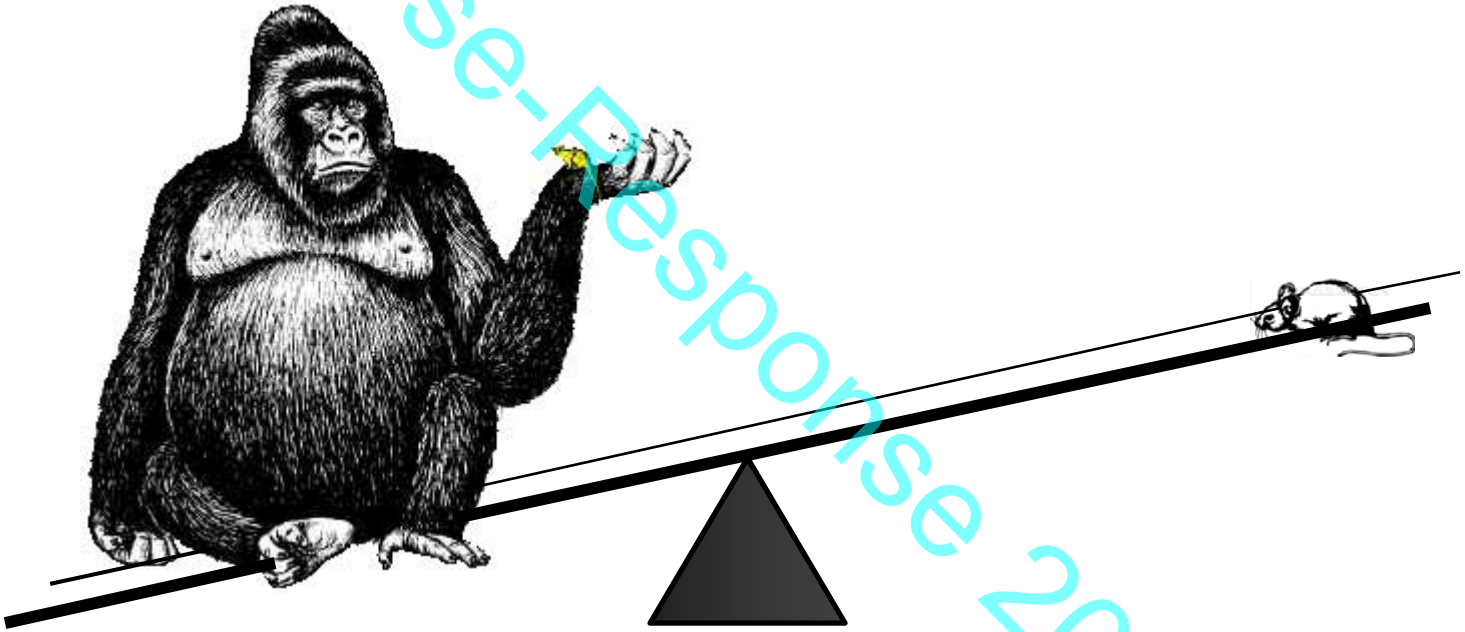
Are there any risks?

What is the economic cost of unnecessary protection?



# Utilitarian Ethics

- Morally correct course of action consists in the greatest good for the greatest number
- Is consequentialist

# Lorenz Rhomberg - QUALYs

- Trade offs will be relieving risk on some by imposing risk on others

# George Gray-science vs science policy

- Want “best estimates” of risk not “health protective” with unknown (and often different levels of) conservatism.
- Need a clear public health case that not considering low dose non-monotoxicity is a public health threat.

LNT → LHTL

Linear High Threshold Low

Right/Wrong › Ethics, moral

Correct/Incorrect › Scientific

Incomplete › Lacks adequate data


http://twiceadopted.files.wordpress.com/2009/07/st_george_slaying.jpg

# Decision making

- “Extremism appears to lead to clear cut decisions, whereas moderation embarrasses us by emphasising problems that are yet to be solved”

Garrett Hardin

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*"after this, therefore because of this"*

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- Infer actions, where there may be none

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"*after this, therefore because of this*"

- Infer actions, where there may be none

- Tends to links events that are not even related

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***Noam Chomsky, 1957***

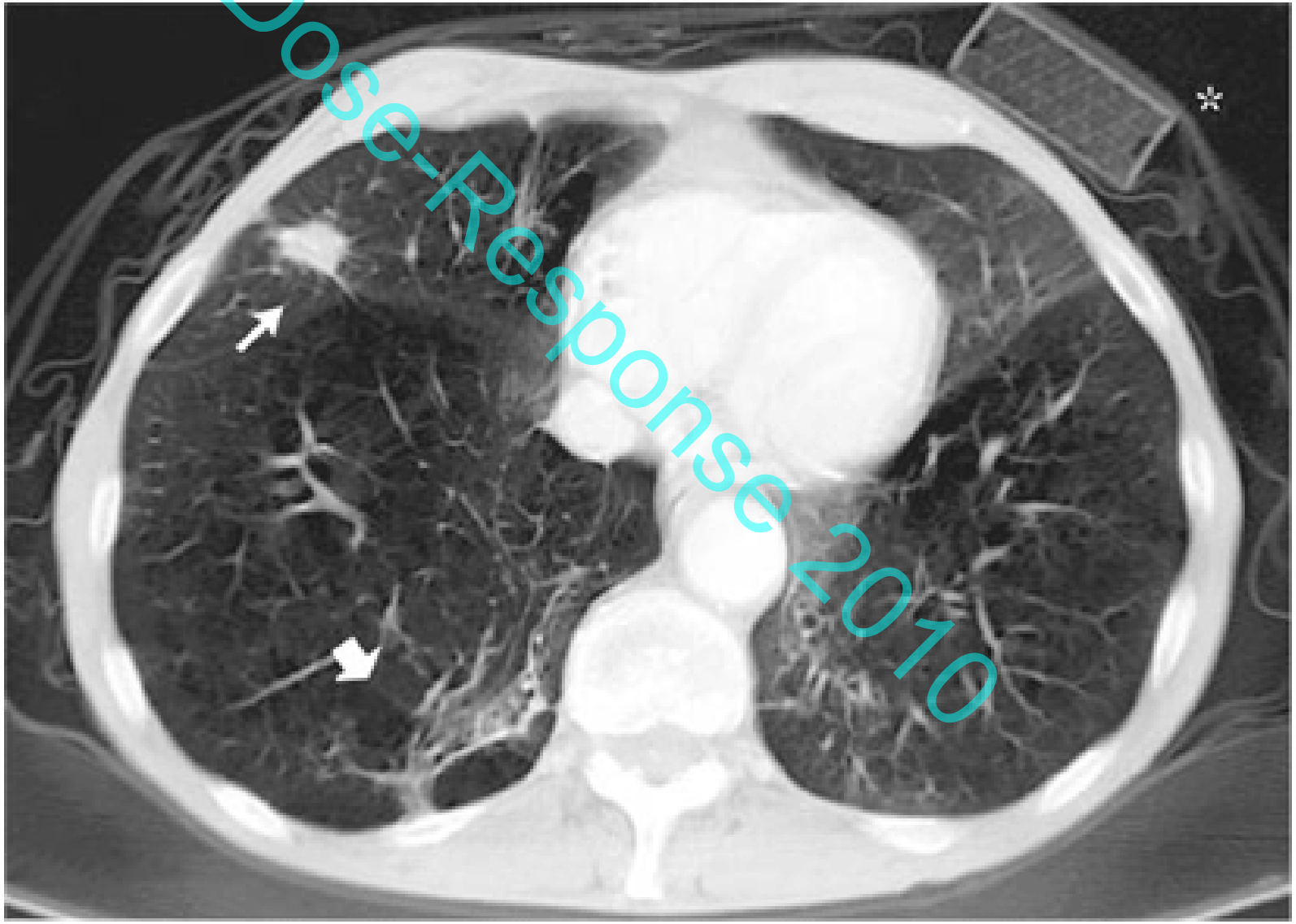
**To demonstrate sentence structure alone is not enough to convey an idea**

“Whether it is fox hunting, smoking, adoption agencies or microchips in rubbish bins, we are a society that is increasingly intolerant, repressive, regulated and untrusting and, in consequence, we have officials who are dictatorial, interfering and untrustworthy”

- *Neil Addison BL*

Director Thomas More Legal Centre

# Computerized Tomography
# (10-100 mGy)

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