

Increasing radiation exposure: who will pay?

Health impacts can be subtle, unexpected, and long term, making it difficult to see the handprint of radioactivity. Cancer, although often the focus, isn't the only disease endpoint. More subtle impacts can be just as detrimental.



Encouraging Contaminated Food

“There may be situations where a sustainable agricultural economy is not possible without placing contaminated food on the market. As such foods will be subject to market forces, this will necessitate an effective communication strategy to overcome the negative reactions from consumers outside the contaminated areas.” ICRP 111



Is there radiation in the food?
Ami, Strong Children Japan.

Allowing Unknown Genetic Impacts

ICRP does not calculate genetic impacts past the second generation of exposure.

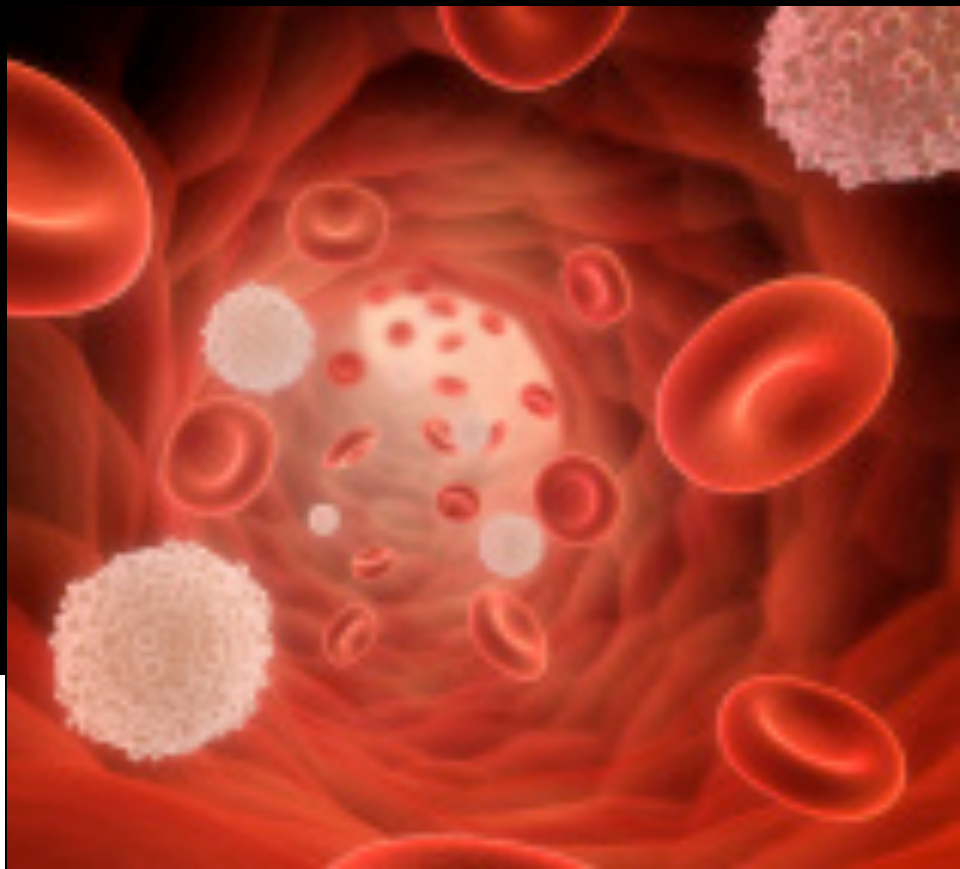
For the generational impact that ICRP *does* calculate, the second exposed generation has more genetic diseases than the first, *for the same dose to each generation.*



Pre-natal known unknowns: Blood Damage

ICRP says “...life-time cancer risk following in-utero exposure will be similar to that following irradiation in early childhood...”

Haematopoietic (blood-making) tissues appear more radiosensitive in embryos and fetuses than in newborns.



Pre-natal known unknowns: Embryo Damage

ICRP uses dose to the uterus to approximate dose to the embryo--defined as conception to day 56. Therefore, ICRP claims all embryonic tissues receive the same dose.

ICRP recognizes the shortcomings of this model but relies on “future developments” to correct these.

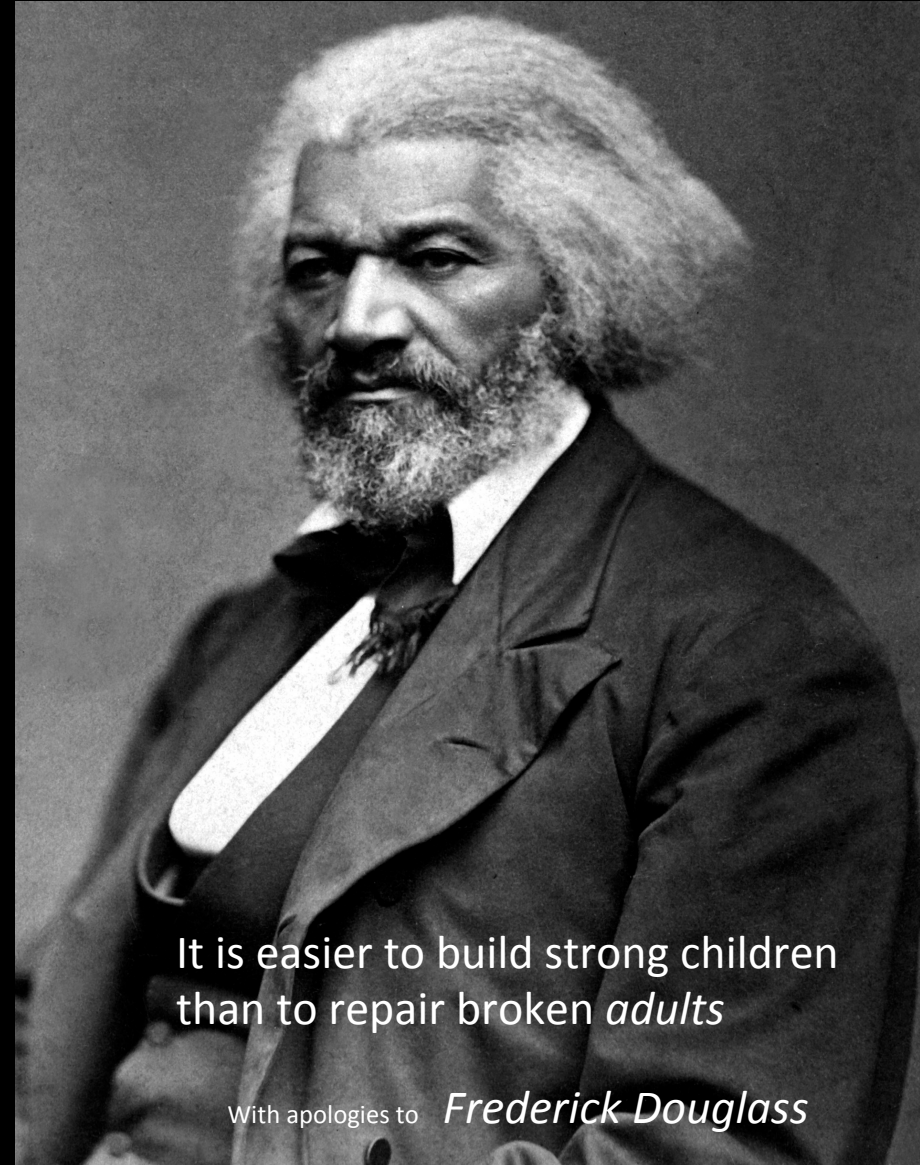


The Crystal Ball
John William Waterhouse

Pre-natal known unknowns: Tissues & Organs

ICRP calculates in utero tissue and organ damage by using radiation models developed for those already born.

ICRP recognizes this approach may not be appropriate, but says there isn't enough data to change it and it's "convenient".



It is easier to build strong children than to repair broken *adults*

With apologies to *Frederick Douglass*

Ignoring the Placenta

ICRP views the placenta only as a thoroughfare for radionuclides, from woman to fetus.

In reality, the placenta is a fully functioning, ad hoc organ developing during pregnancy, subject to damage from radioactivity.



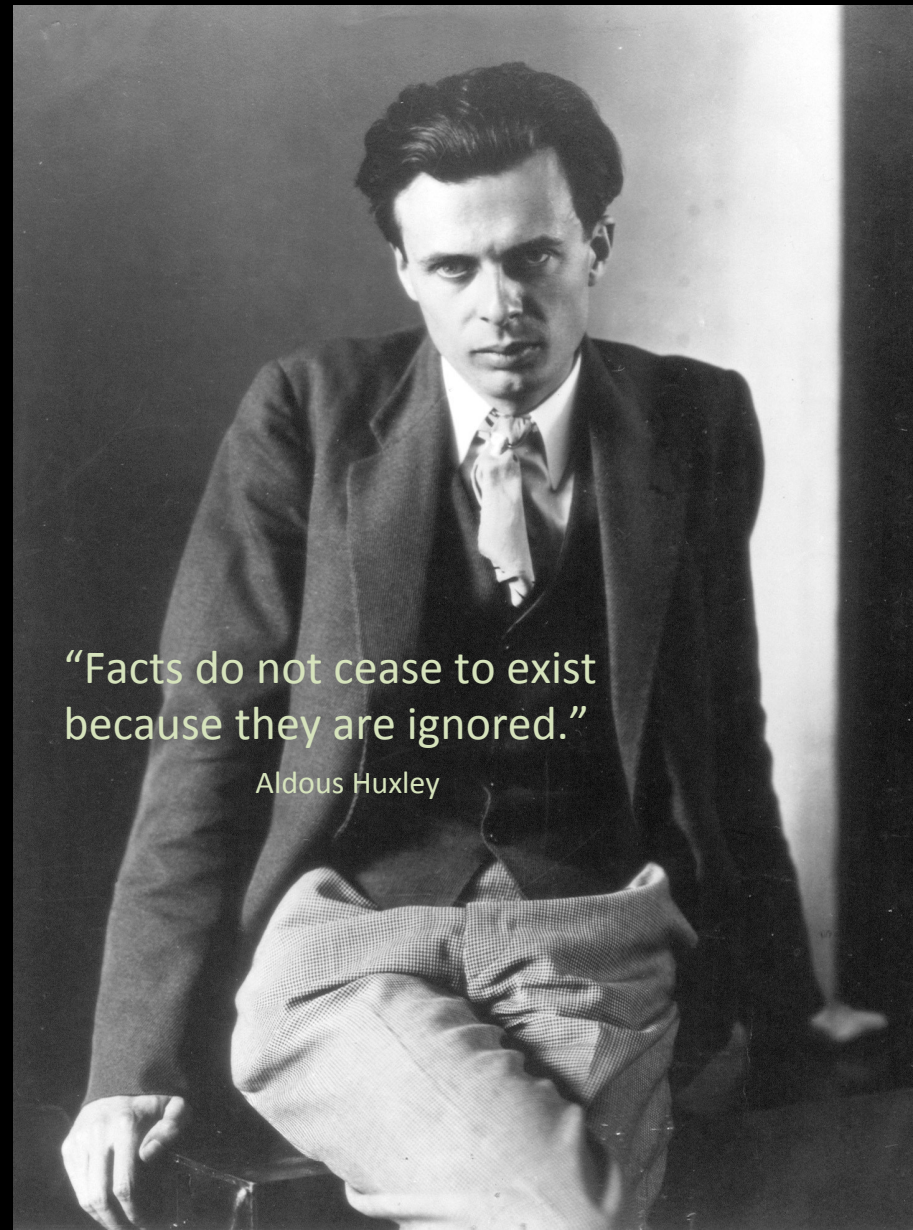
The Elephant in the Room, Banksy exhibition, L.A.

Ignoring Childhood Leukemia: Chernobyl

U.S. experts claim there is not solid evidence for childhood leukemia increases following exposures to Chernobyl radioactivity.

10 mSv total for significant increase, indication of increases at lower doses

Detailed statistical analysis of data shows there are, in fact, increases of childhood leukemia in Belarus and Ukraine after the Chernobyl nuclear explosion.



“Facts do not cease to exist because they are ignored.”

Aldous Huxley

Everyday Exposures and Childhood Leukemia

Researchers hesitate to admit connection between radiation releases from reactors and childhood leukemia.

All childhood cancers about 175 mrem per year (200 nSv/hr); 4 mSv cumulative-leukemia

37% increase near reactors in under five year olds within five Km (thanks to Drs. Ian Fairlie and Alfred Körblein for childhood leukemia pooled data)

The NAS says childhood leukemia is a sentinel indicator for radiation exposure in a community

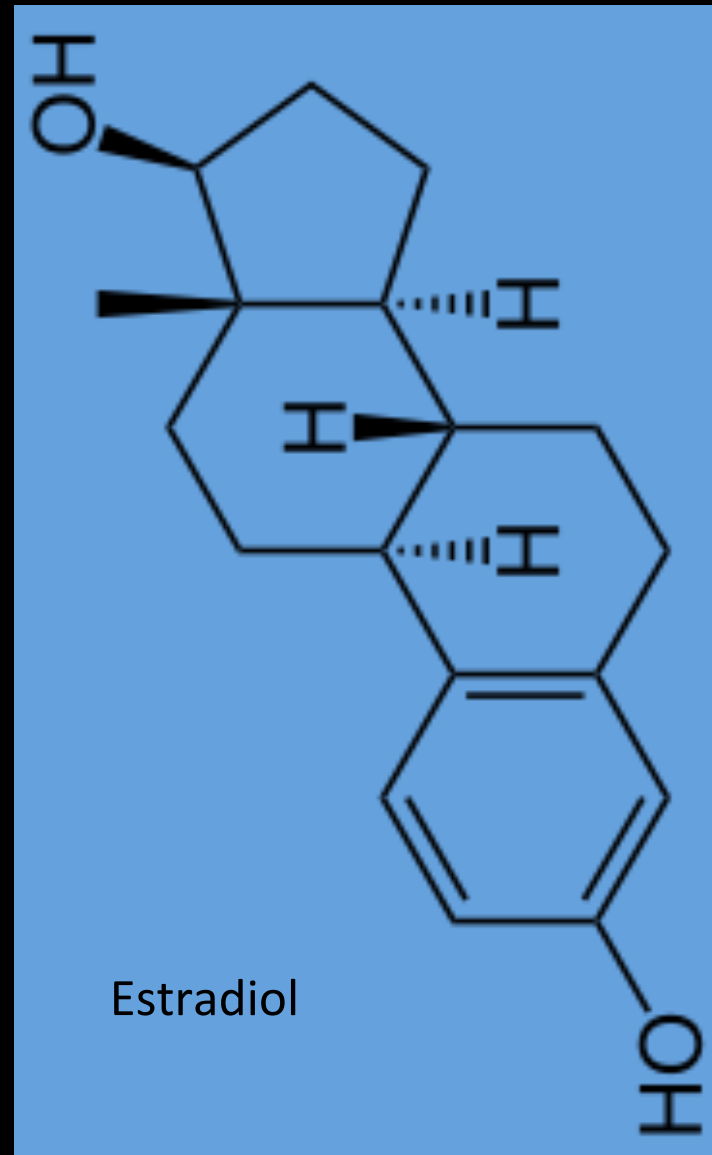


Suffer the Possibility: Non-cancer Impacts at low doses

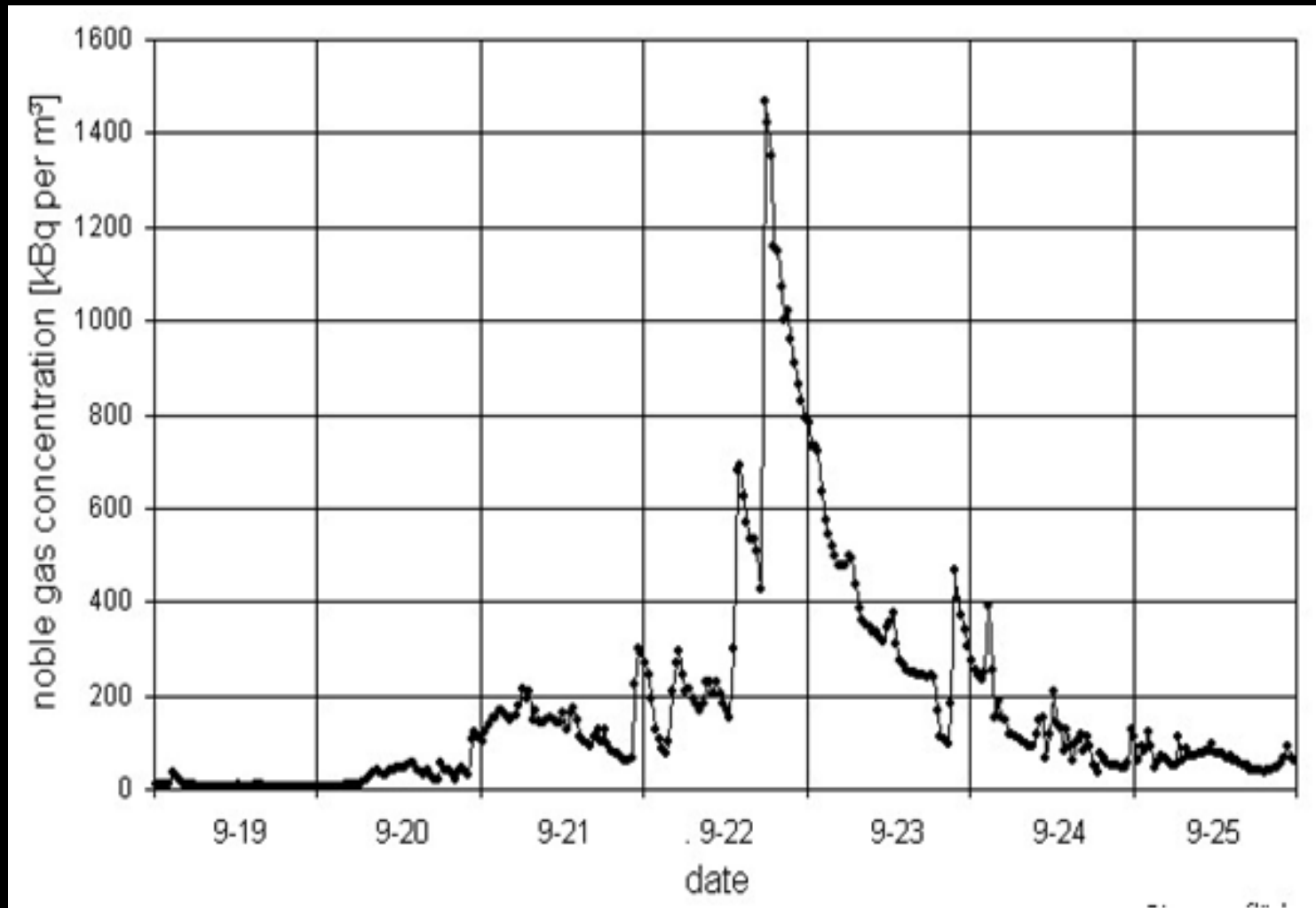
Effects on estrogen, neural development and other non-cancer impact pathways, are downplayed or ignored.

*Neural effects: up to 4 mSv subclinical
Detectable brain damage starting at 11 mSv*

Research shows radioactivity can act along the same biological pathways as estrogen. In addition, radioactivity can also be responsible for negative, subclinical health impacts such as impaired neural development.



Radiation released in trickles AND spikes



Noble gas concentrations at Gundremmingen C, September 19-25 (graph used with permission of [Dr. Alfred Körblein](#))

Revisiting US Radiation Standards

PAGs would raise exposures allowance permanently in the event of catastrophic radiation release.

20 mSv first year, 5 mSv after

The levels EPA proposes are levels already shown to increase negative childhood impacts.



Revisiting US Radiation Standards

Rewrite of 1977 standards would still not account for carbon-14 and tritium exposure.

These isotopes can concentrate in fetal tissue at twice the amount compared to maternal tissue.



Revisiting US Radiation Standards

NRC accepted petitions to consider replacing the LNT model of radiation cancer causation for one based on hormesis, which states smaller doses of radiation may be beneficial.

SETTLED SCIENCE: Hormesis is irrelevant

There is no indication that hormesis makes any difference in human health outcomes following exposure to radiation.



Revisiting US Radiation Standards

NRC already bases its standards on ICRP recommendations and it sets its limit at 100 millirem per year.

100 mrem per year is about what humans already get from *unavoidable* sources of radioactivity.

Even the most up-to-date ICRP recommendations are not protective enough of early life stages and females



“Normalization” burden will be borne by the vulnerable

Females, pregnancy, childhood

Children are not a subpopulation—
they are everyone.

Risks for various radiation doses:

*All childhood cancers at about 200 nSv per hour)
CNS and leukemia highest risk*

Leukemia background rad (4 mSv cumulative)

*Leukemia Chernobyl: 10 mSv total for significant
increase, indication of increases at lower doses*

*Impaired neural development (4 mSv or under)
Clinical brain damage (as low as 11 mSv)*

www.beyondnuclear.org

