

Gender Matters in
the Atomic Age

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United Nations

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Original Art by Loren Olson

Gender Matters in the Atomic Age.

I was honored to speak at **the Vienna Conference on the Humanitarian Impacts of Nuclear Weapons**, last December on the medical consequences of using nuclear weapons.

I am even more pleased to be here today, **focused on gender and nuclear weapons**. Thank you for this opportunity to speak, and thank you, all of you, for listening.

My slides will be published on line with citation and references.

See **<http://tinyurl.com/Radiation-UN-2015>**

Resources on Nuclear Weapons:

International Physicians for the Prevention of Nuclear War:

<http://www.ippnw.org/pdf/1998ForrowJAMA.pdf> "From Hiroshima to **Mutual Assured Destruction** to Abolition 2000." Lachlan Farrow, MD; Victor W. Sidel, MD; reprinted from the Journal of the American Medical Association, August 5, 1998; Vol 280, No 5,456—461.

European Leadership Network: 2014. Ambassador A. Kmentt.

http://www.europeanleadershipnetwork.org/avoiding-the-worst-re-framing-the-debate-on-nuclear-disarmament_1558.html

Resources on Gender and Radiation:

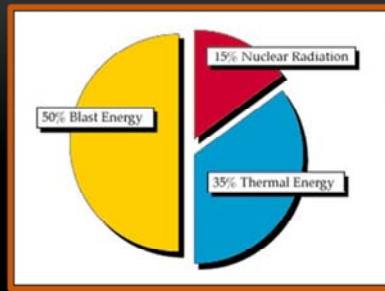
Nuclear Information and Resource Service:

<http://www.nirs.org/radiation/radhealth/radhealthhome.htm>

Institute for Energy and Environmental Research:

<http://ieer.org/projects/healthy-from-the-start/>

The energy profile of a nuclear explosion:



A nuclear explosion is composed of three types of energy: Blast, Heat, and Radiation.

All of these have both immediate and long-term medical consequences.

Today I will focus on radiation the long-term medical impacts of ionizing radiation.

I urge you to visit the photo exhibit now in the UN Lobby “Cries from Hiroshima and Nagasaki” to see the immediate medical impacts.

*** video of Olson’s talk in Vienna: <https://www.youtube.com/watch?v=zgUcLc8HNqc>

Broad Resources on nuclear weapons:

The Bulletin of Atomic Scientists; <http://thebulletin.org/search/topics/nuclear-weapons>

Union of Concerned Scientists:

<http://www.ucsusa.org/our-work/nuclear-weapons#.VHpzhDHF8xI>

International Atomic Energy Agency – Tools for Nuclear Inspection (factsheet):

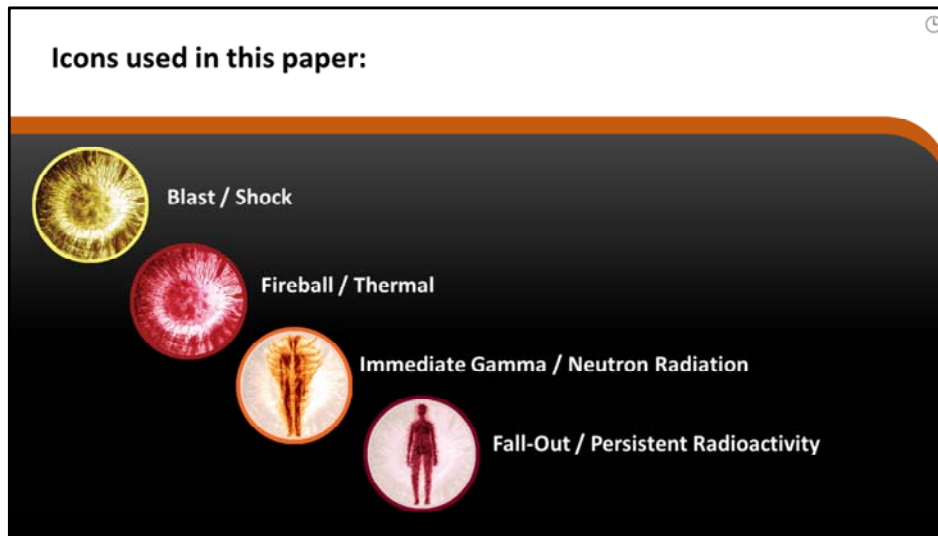
<http://www.iaea.org/sites/default/files/inspectors.pdf>

Women’s International League for Peace and Freedom / Reaching Critical Will:

<http://www.reachingcriticalwill.org>

Info on the Cries from Hiroshima and Nagasaki exhibit

<http://www.un.org/press/en/2015/note6444.doc.htm> (See also a FaceBook page)



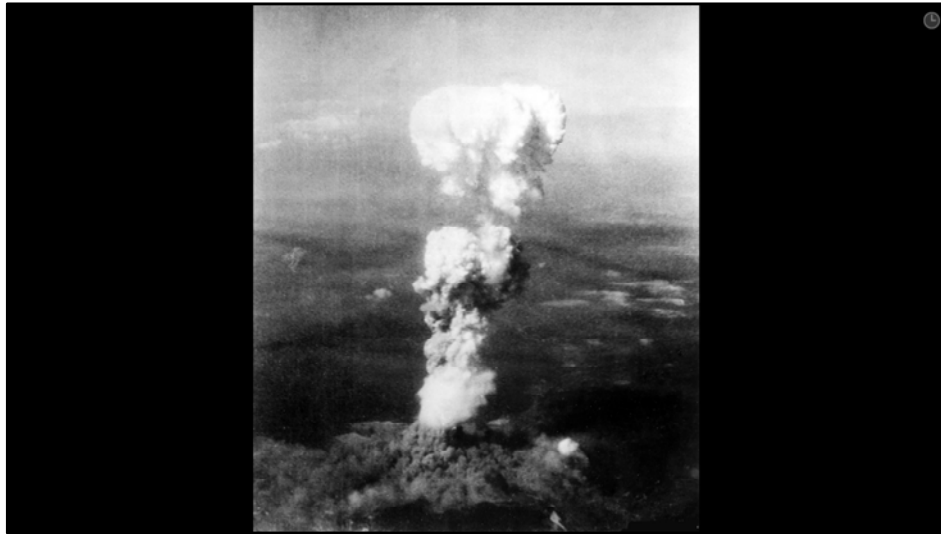
I am using four ICONS to track each type of energy from nuclear weapons and its impact human health:

- Yellow is Blast.
- Red is Thermal.
- Orange is Immediate Gamma / Neutron Radiation.
- Purple is longer lasting radioactivity from the atomic fission products.

Today Nuclear Weapons are very much larger than in 1945, but the forces are the same.

Art Credit:

Original Figures and Emblem by Loren Olson.
Icon formatting, Saro Lynch-Thomason, Fullsteam Labs.



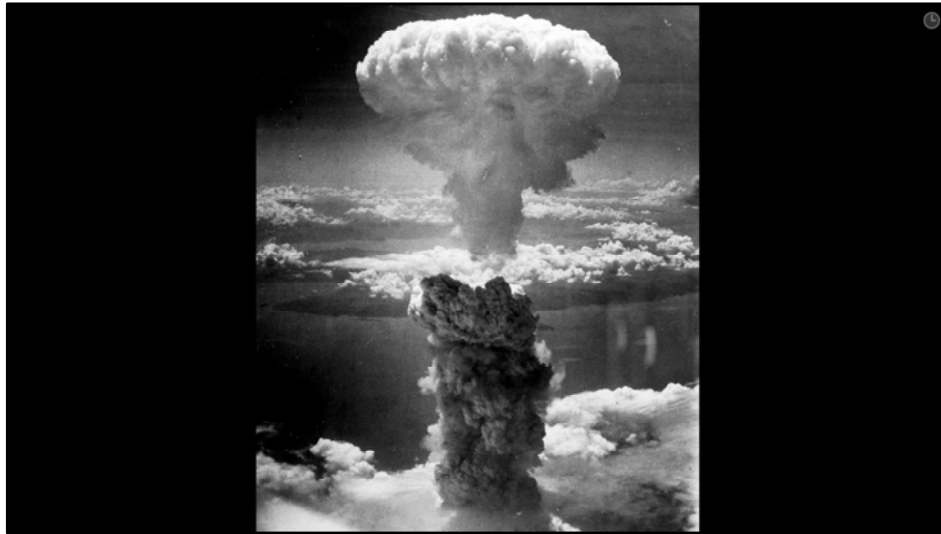
This photo was taken from the plane that dropped the bomb on Hiroshima.

It is a mistake to say that this photo is of the bomb.

This cloud is what was, moments before:
buildings,
trees,
homes,
girls,
boys,
women and men.

A nuclear detonation is inherently indiscriminate.

Photo Credit:
United States Department of Energy



And this was the City of Nagasaki.

I need to acknowledge the personal side of this:

I rely on data that comes from studies of people who survived those bombs. My government chose to use the first nuclear weapons on cities full of people.

Five years later, the US initiated a long-term study of the atomic bomb survivors. Researchers assumed that humanitarian aid might “skew the results” of their study and so medical treatment was not offered by the researchers.

This data is used widely, including by me.

Speaking only as one woman, I need to say I am very sorry.
I regret this history.

Photo Credit:
United States Department of Energy



Nagasaki, 1945.

The church is in both frames.

Today the weapon that leveled Nagasaki would be considered tactical. Today's weapons are very much larger.

The blast and heat destroyed structures and killed indiscriminately. Radiation levels at the epi-center were lethal. **Only** those with shielding survived.

A video of my presentation at the Vienna Conference includes more information on the acute medical consequences of using nuclear weapons. It has been edited to insert the slide images, and is posted here: <https://www.youtube.com/watch?v=zgUcLc8HNqc>

All the videos from the Vienna Conference on the Humanitarian Impacts of Nuclear Weapons (December 2014) are posted here:

https://www.youtube.com/watch?v=MTzbIE69Q4U&list=PLOX6GHcKYM_vZ-oSBpe2KTzgJrMxl-u6D



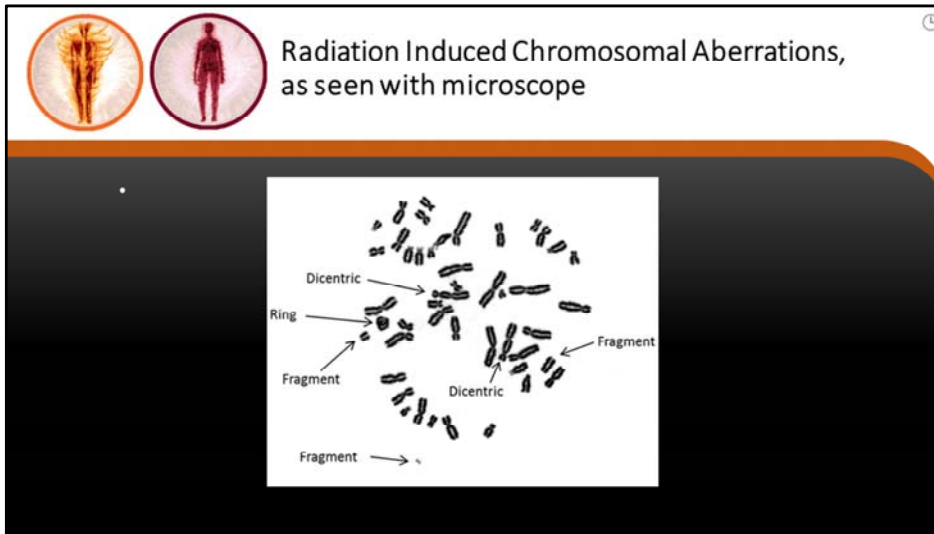
Immediate Fatalities

City	Estimated Population at the time of the bombing	Estimated number of acute deaths (with 2 – 4 months)
Hiroshima	340,000 – 350,000	90,000 – 166,000
Nagasaki	250,000 – 270,000	60,000 – 80,000

Source: Radiation Effects Research Foundation

At least 150,000 men, women and children died in 1945 from these two nuclear weapons; 250,000 over time.

Source for data reported in the table:
Radiation Effects Research Foundation.
http://www.rerf.jp/general/qa_e/qa1.html



Radiation is invisible but we can see the damage it has done to these chromosomes.

Resources:

Dicentric and other chromosomal aberrations are common in people who have suffered acute radiation exposure. The damaged chromosomes are found in white blood cells and can be assessed as a biological dosimeter. More information here:

http://www.rerf.jp/radefx/late_e/chromoab.html



Children's bodies are small; so the same amount of radiation delivers a larger dose.

Since children are growing, the cells in their bodies are dividing more rapidly. DNA is more likely to be damaged when in cell division.

Art Credit:

Saro Lynch-Thomason, Fullsteam Labs

Resources on Disproportionate Impact of Radiation on Children / In Utero:

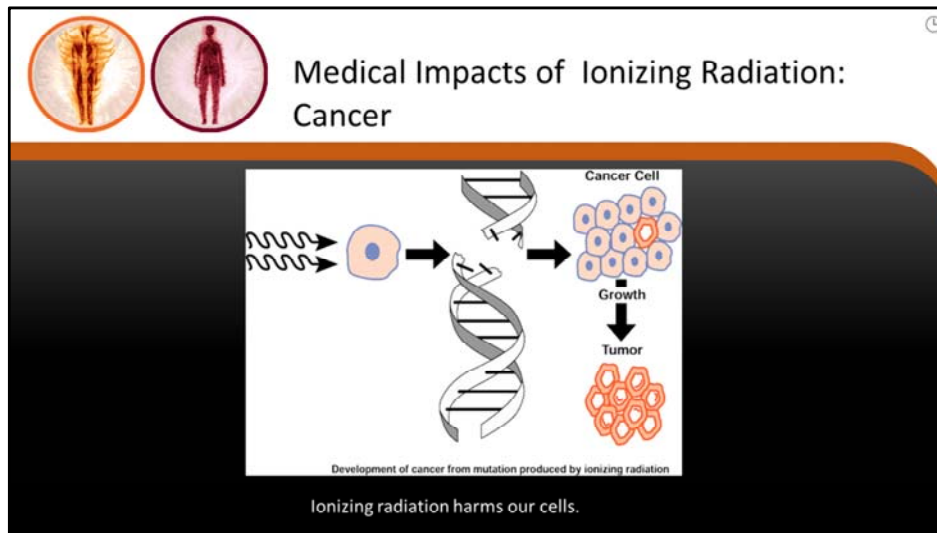
Dr Alice Stewart; broad description of her work:

<http://www.nytimes.com/2002/07/04/world/alice-stewart-95-linked-x-rays-to-diseases.html> and Gayle Green, 2001. "Alice Stewart, the Woman Who Knew Too Much."

Original Study: Stewart, et al, 1958. "Survey of Childhood Malignancies" British Medical Journal, June 28, pages 5086 – 1508.

Dr Rosalie Bertell; "No Immediate Danger?" 1985. Women's Press Toronto, Canada and also Summertown Books, USA.

See also www.ieer.org – "Healthy from the Start."



Cancer is the most studied long-term consequence of non-lethal radiation exposure.

WHEN genetic material inside a living cell is damaged, sometimes our bodies can repair that damage.


Otherwise the abnormal cell may sit quietly in the body for years or even decades before it makes us sick.

There is no way to predict which exposure will result in cancer. In general, more radiation equals more cancer risk.

However, even an exposure too small to measure could, sometimes, result in cancer death.

Resources

Previous pages have listed some of the classic authors on radiation of the 20th century. The National Institute of Environmental Health in the United States published this broader piece "Cancer and the Environment: What You Need to Know." posted: http://www.niehs.nih.gov/health/materials/cancer_and_the_environment_508.pdf



Ionizing Radiation: No Safe Dose

- Regulatory agencies acknowledge:

There is no “safe” dose of ionizing radiation.

**Radiation is not safe for males, new findings show that ionizing radiation is more harmful for females:
Gender is a factor.**

Regulatory agencies acknowledge:
There is no safe dose of ionizing radiation.
Radiation is not safe for males, but new findings show that ionizing radiation is more harmful for females:
there is a gender factor.

Citation and Resources:

Nuclear Information and Resource Service: Factsheet, “The Myth of the Millirem” posted:
<http://www.nirs.org/factsheets/mythmiliremftsht.htm>

Dr. Rosalie Bertell, 2000; “No Immediate Danger? Prognosis for a Radioactive Earth.”
Summertown Books.

Dr. Helen Caldicott, 1994. “Nuclear Madness.” WW Norton Co.

Dr. John Gofman, 1990. “Radiation Induced Cancer from Low-Dose Exposure: an
Independent Analysis.”

Much of the book is posted here (no fee):

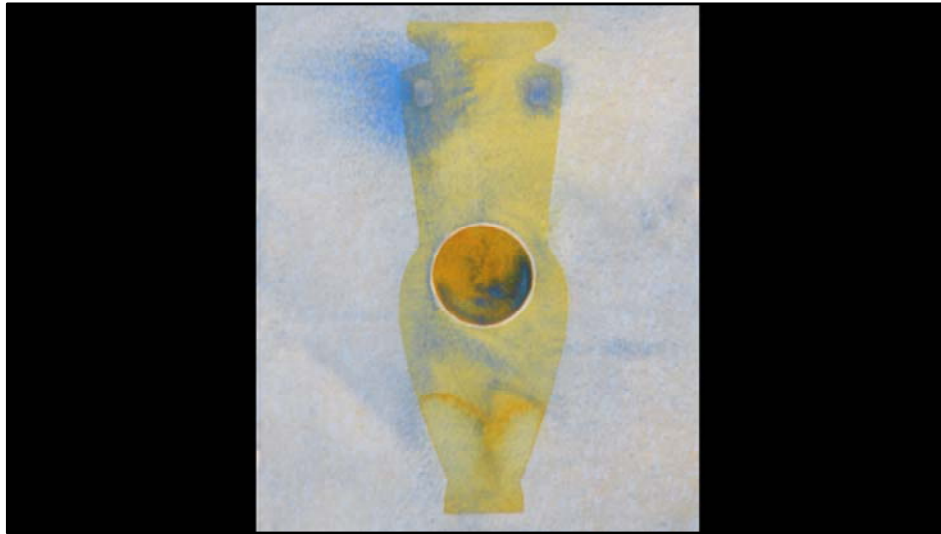
<http://www.ratical.org/radiation/CNR/RIC/contents.html>

Møller AP and Mousseau TA(2012) The effects of natural variation in background
radioactivity on humans, animals and other organisms. Biological Reviews
DOI: 10.1111/j.1469-185X.2012.00249.x

Ian Fairlie, 2013. “Recent Evidence on the risks of very low doses of radiation” posted:

<http://www.ianfairlie.org/news/recent-evidence-on-the-risks-of-very-low-level-radiation/>

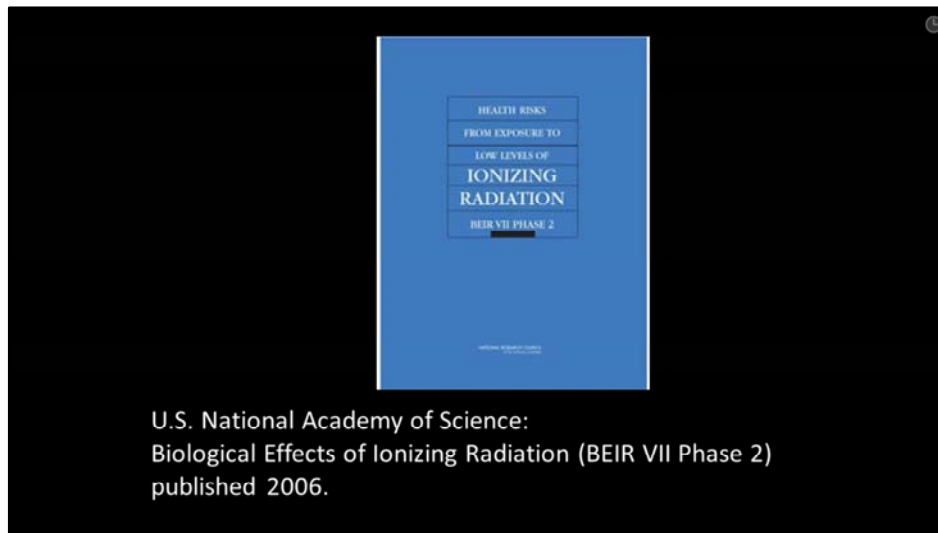
and: <http://www.nirs.org/radiation/radhealth/ianfairlieepalecture415.pdf>



Field and lab studies show that plants, insects, animals (including mammals) are harmed by ionizing radiation, including natural background radiation.

IN 1942 our species began splitting atoms, resulting in massive new radioactivity that is impacting all life.

First atomic chain (fission) reaction recorded in human history was in December, 1942 in Chicago, USA under an area called Stagg Field at the University of Chicago.



This is a very famous report, the Biological Effects of Ionizing Radiation, #7, also called “BEIR VII.”

The data is primarily from 93,000 survivors of the Hiroshima and Nagasaki; this is the largest data-set we have that includes all ages and both genders.

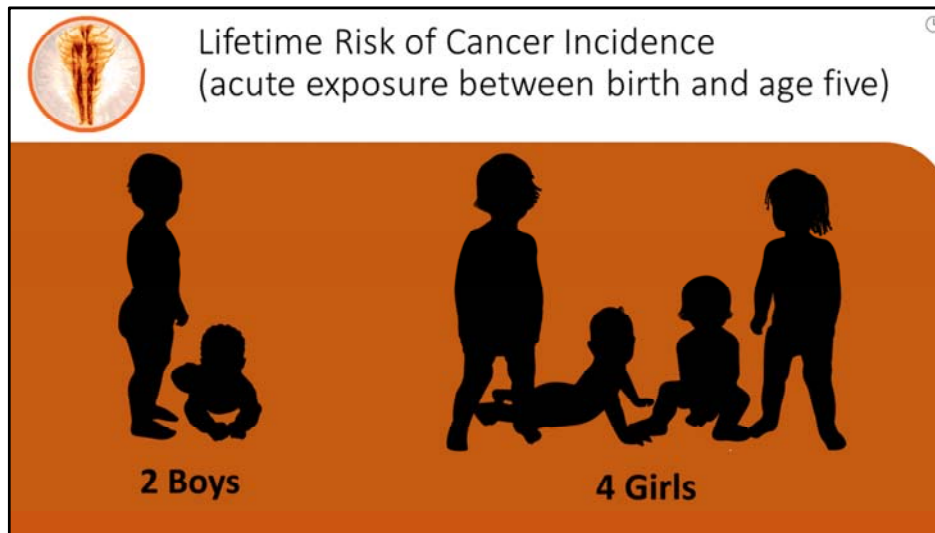
BEIR VII was published in 2006, after the youngest remaining A-Bomb survivors turned 60, hence the tag “life-span study.”

It is the source of the data for the findings I am about to present.

Citation:

The Biological Effects of Ionizing Radiation, VII; Phase 2 is available at no charge for a PDF file here: <http://www.nap.edu/openbook.php?isbn=030909156X>

Important note: BEIR VII data reflects acute (quick) external radiation exposure (the moment of the bomb explosion); internalized radioactivity in air, food and water is not considered. It is important to say that the findings in this presentation on Gender may, or may not apply to internal exposures.



The survivors of Hiroshima and Nagasaki were grouped by the age they were at the time of the bombing. These groups were tracked over their lifetimes. Cancers and cancer deaths were counted.

There are many problems with this data, but we can broadly say that those who were five years or younger in August, 1945 had the most cancer at some point in their lives.

Those exposed as girls were twice as likely to get cancer at some point than were those who were exposed as boys.

For every male in the 0-5 cohort that suffered cancer at some point in their lives, TWO females got cancer at some point in their lives.

The BEIR VII report is where these numbers are found; the report itself does not discuss gender as a risk factor. I published my findings in 2011. Independent from my work, Dr. Arjun Makhijani published the same findings in 2005.

*** **Art Credit:** Saro Lynch-Thomason, Fullsteam Labs

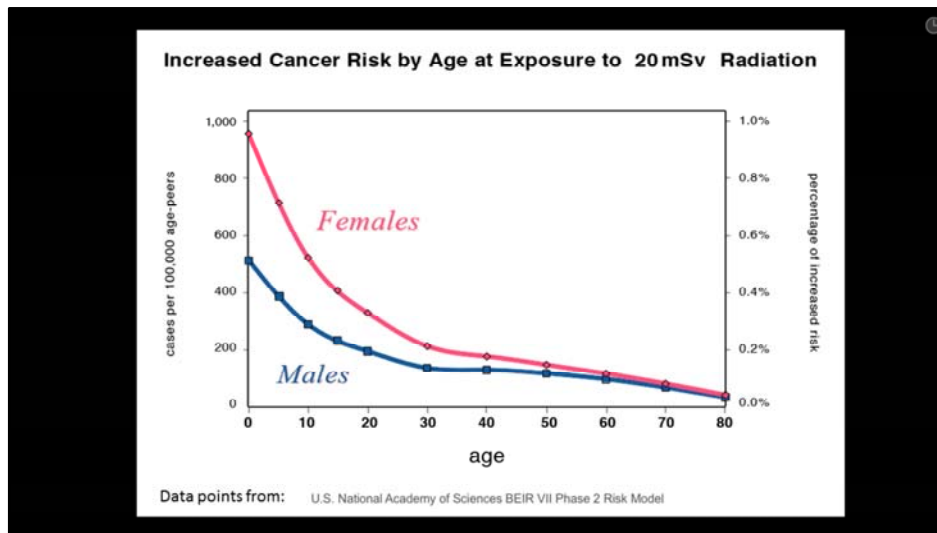
Source:

Olson, 2011. NIRS Briefing Paper: "Atomic Radiation is more harmful to women." posted: <http://www.nirs.org/radiation/radhealth/radhealthhome.htm>

Makhijani, 2005 started the Healthy from the Start Campaign to address disproportionate impact of ionizing radiation on young females.

<http://ieer.org/projects/healthy-from-the-start/>

And <http://ieer.org/resource/health-and-safety/open-letter-to-president-bush-on-protecting-the-most-vulnerable/>



Here is the same information in graphic form.

The pink line is girls, the blue line is boys.

We can easily see the gender difference and that it is greatest in the youngest children.

The entire graph is a snapshot of our species cancer-response to acute radiation exposure.

Graph provided to NIRS by Ian Goddard, 2011.

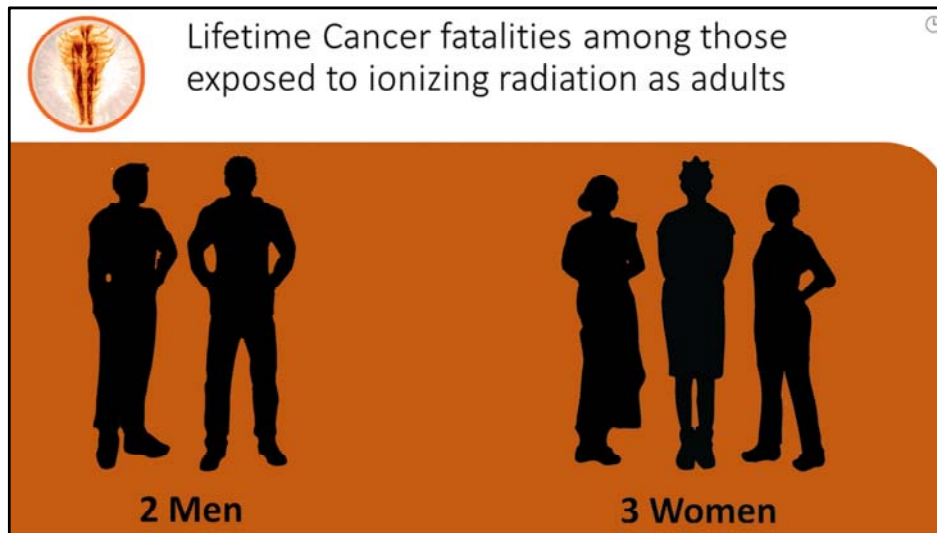


It is extremely important to understand that little girls are not a “sub-population.”

We are an inextricable link in the human lifecycle.

Note:

The US Environmental Protection Agency staff in charge of proposing revisions to the current radiation standards in the USA responded to a comment about little girls by referencing “sub populations.” This author noted that little girls in New York or London or any other place are “sub populations” – little girls as a whole are part of the human life cycle.



Gender was also a factor for those who were adults at the time of the bombings.

Over their lifetime women exposed as adults suffered 50% more cancer death than did men in the same age group.

For every 2 men in these cohorts who died of cancer, three women died of cancer.

Source:
(see above) Olson, Makhijani, numbers in tables of BEIR VII.

Art Credit:
Saro Lynch-Thomason, Fullsteam Labs



Why is Gender a risk-factor for more cancer?



Dr. Rosalie Bertell

Females have 50% more
high-risk tissue
compared to males



Why is gender a risk factor for cancer from exposure to ionizing radiation?

Today we do not know.

Dr Rosalie Bertell suggested that it is because female bodies have more sensitive reproductive cells.

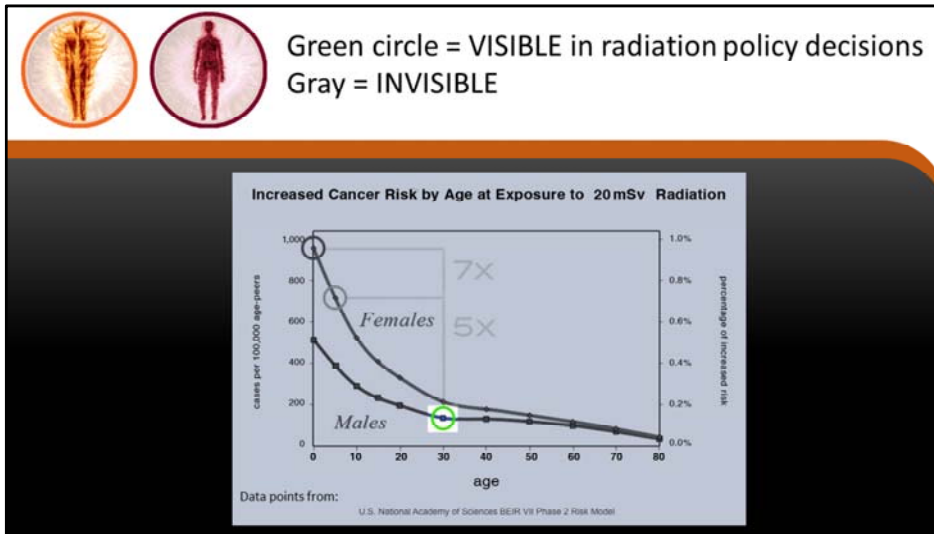
Maybe it is due to a higher percentage of fatty tissue, or maybe gender-differences in the endocrine system?

These questions have not been asked, let alone answered.

Art Credit:

Dave Shannon

Add cites of Rosalie's work



It took 60 years to see this gender difference.

On this slide the green circle is the “Reference Man” – corresponding to an adult male military or paramilitary atomic worker of the 1940’s and 1950’s.

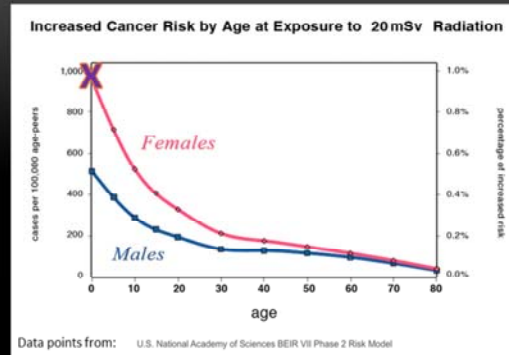
The rest of the slide is gray showing that decision-makers have not seen information about males of other ages, or information about females at all. Until very recently we have been invisible.

Note:

Radiation standards are periodically revised. Recent efforts by radiological agencies have begun to incorporate age and gender factors. Unfortunately, these efforts are AVERAGE and based on gross generalities rather than any further gender-specific research. The International Committee for Radiological Protection (ICRP) is contemplating using a “reference hermaphrodite” – which would assume part male organs and part female. While this reflects an effort, there is no basis to believe that such an approach would provide the necessary level of protection.



Responsible radiation regulation: Life Cycle Protection



This year radiation standards are being revised.

For instance, in the United States both the Environmental Protection Agency and Nuclear Regulatory Commission are rewriting radiation exposure regulations.

In order to ensure the viability of our species over time regulations should protect its most vulnerable phase: on this graph that would be the X marking girls 0—5 years old.

This is not happening; it is not even being discussed by regulatory agencies.



Hiroshima and Nagasaki are unique;
not conservative



- Deaths that came after the blasts, between 1945 and 1950 not included in data;
- Survivors studied 1950 -- 2005 are **STRONGER** group than any "general population"

The A-Bomb survivor data set is incomplete. The studies and data collection began in 1950, 5 years after the bombs.

Many who survived the initial blasts then died in the next few years. These deaths are not part of the data-set.

As a result, the group that was studied is strong; stronger than the general population.

Critiques of the Survivor Studies have been written by some of our greatest independent radiation researchers of the 20th Century:

Dr Steven Wing; Dr John Gofman, Dr Alice Stewart, the European Commission on Radiation Regulation (ECRR).

An annotated bibliography of these critiques is under production by this author, and will be posted, along with many other resources on these matters here:

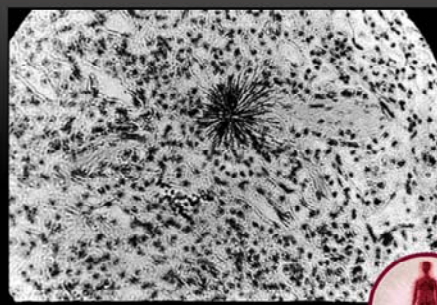
<http://www.nirs.org/radiation/radhealth/radhealthhome.htm>



A-Bombs: One fast pulse of external ionizing radiation – like an X-ray



Medical X-Ray image



Plutonium particle in lung tissue



The epi-center of an atomic blast gets one fast pulse of gamma rays and neutrons. The source is external to the body, like X-rays (photo on left side of slide).

Radioactivity also called “Fall-Out” traveled away from Hiroshima and Nagasaki; internal exposures were not included in the Life Span Study (BEIR VII).

Fission products like Cesium and Strontium and Plutonium —that contaminate air, water and food – get inside the body. Radioactivity inside our bodies causes very different impacts. The photo on the right side shows plutonium in lung tissue.

The black areas are dead cells from very high local radiation exposure from radioactive particle emissions at close range.

This is very different from X-rays.

Photo Credit:

Left side: International Atomic Energy Agency.

Right side: Robert del Tredici, used by permission



More than 2000 nuclear explosions that have already occurred.

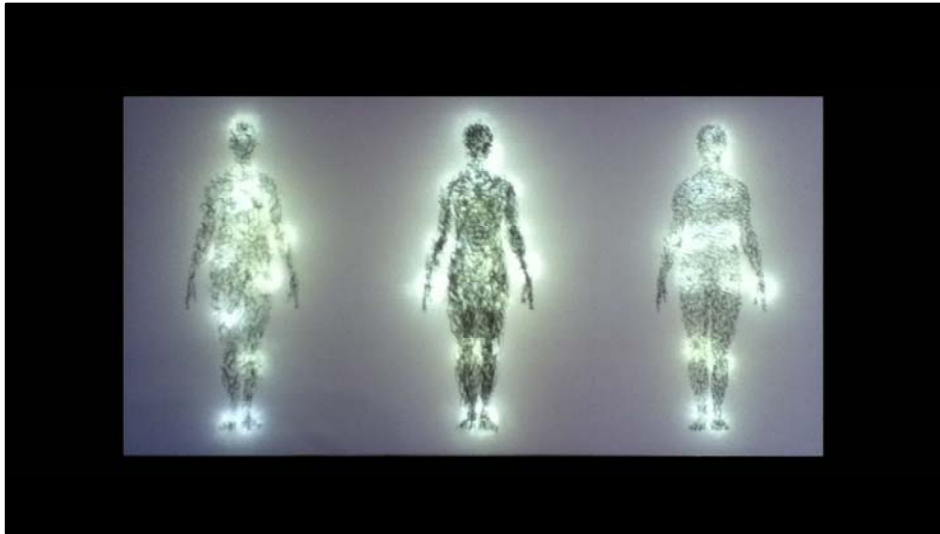
Our planet is already contaminated, even without waging a full-scale nuclear war.

Art Credit:

This image, used with permission from Mr. Hashimoto is a screen capture from a short film by Isao Hashimoto, entitled "1945-1998." posted here:

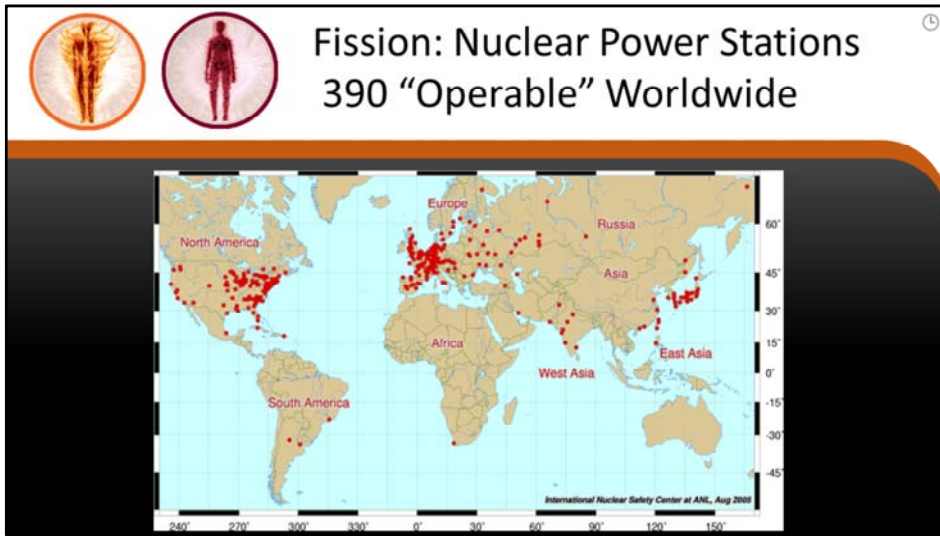
<http://www.ctbto.org/specials/1945-1998-by-isao-hashimoto/>

The DVD which shows the progression of nuclear explosions between 1945 and 1998, more than 2000 in all, is also available from the artist.



We do not yet know whether gender is a factor when it comes to harm from internal radioactivity.

Art Credit: Original multi-media work by Loren Olson



Fission also happens at 390 nuclear reactors worldwide. Each red dot is a nuclear power reactor.

Reactors are the "slow bomb." In one year fission at these sites produces as much heat and radioactivity as detonation of 1100 A-Bombs.

Use of nuclear weapons near a reactor could greatly increase radiological exposures.



Environmental Contamination: Chernobyl and Fukushima



40% of Europe contaminated above 4,000 Bq / m²
by Chernobyl reactor explosion in 1986



Gamma levels in proximity to Fukushima Daiichi, map
constructed by Lionel Bergeret from SAFecast data

Major reactor accidents contaminate large areas of land and water. Chernobyl contamination is shown on a large-scale on the left. The more local map on the right shows the contamination from the Fukushima Daiichi catastrophe in Japan.

Both of these nuclear melt-downs and explosions spread radioactivity into air and water with global-level impacts.

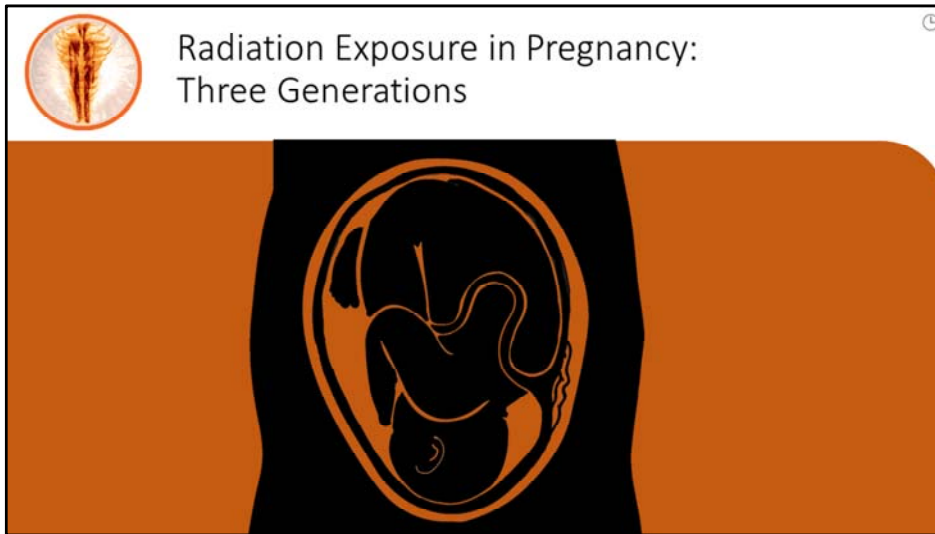
Monitoring / Mapping:

<http://blog.safecast.org/>

And:

<http://www.ratical.org/radiation/Chernobyl/IRSN14dayPlume.html> (takes a long time to load but is worth it.)

<http://gamma.tar.bz/maps/static/>



This picture shows three generations.

The mother

The growing fetus

And the “primary germ cells” for the next generation are there too.

The egg you came from was formed inside your maternal grandmother.

Your father’s *spermatogonia* were formed when he was inside your paternal grandmother.

The primary germ cells form an unbroken chain back to the beginning of our species.

Art Credit:

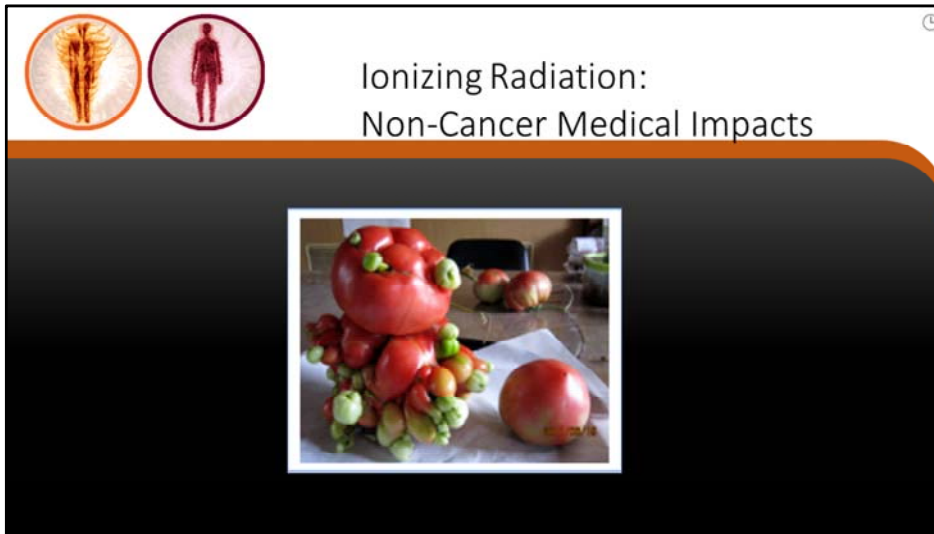
Saro Lynch-Thomason, Fullsteam Labs



Dr Alice Stewart: "Childhood cancer is a post-birth defect."

New findings show that tritium, a fission product from reactors will cross the placental barrier to the developing fetus, damaging stem cells that will result in increased rates of Leukemia in children living near those sites.

Dr Alice Stewart called other types of childhood cancer a post-birth defect.



Radiation impacts our cells.

When the reproductive cells are harmed, deformations are one outcome.

This happens to all babies: plants, animals, humans.

We also suffer:

Loss of fertility;

Spontaneous abortion and miscarriage;

Possible heritable mutations;

Avoidance of reproduction due to uncertainty.

This is not birth control, radiation impacts our CAPACITY to reproduce.

Resources:

Impact on radiation exposure on reproduction has been very difficult to study in human beings. The work of Moller and Mousseau on species with a shorter life span (birds, bugs, plants) shows that ionizing radiation does reduce population size, results in mutations that are heritable and that some of the mutations are expanding in populations outside the initial study areas near Chernobyl and Fukushima. See:

[http://www.academia.edu/1376987/Abundance of birds in Fukushima as judged from Chernobyl](http://www.academia.edu/1376987/Abundance_of_birds_in_Fukushima_as_judged_from_Chernobyl) and: <http://cricket.biol.sc.edu/chernobyl/papers/moller-et-al-Ecol-Ind-2013.pdf>

Radiation exposure can also lower our overall immune function, leading to many symptoms like increases in other illness, chemical intolerance and in the extreme and AIDS-like

syndrome.



Fission results in massive release of ionizing radiation. Earth's Biosphere is being changed in ways we cannot foretell.

Much radioactivity persists into Deep Time.

Art Credit: Original painting by Loren Olson



This is a picture of health:
These women have recently stopped a nuclear waste dump from
being put on their People's Traditional lands.

Radiation prevention is more than avoiding harm. It is a source of
health and empowerment.

See: <http://www.foe.org.au/muckaty-winnerz>



We know these words. In Vienna, I said them in a new way:

PREVENTION IS THE CURE.



The future is in our hands.

I want to thank this community for moving this discussion forward.
Thank you.