

Sixty Years of Radiation Fears Driven by Imagination and Mythology

**Health Physics Society
Annual Meeting**

Indianapolis, IN

**An Invited Presentation for a
Special Session
on the 60th Anniversary of the HPS**

WPM – A.1 Wednesday, July 15, 2015

by

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Sixty Years of Radiation Fears Driven by Imagination and Mythology

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Where would our profession be if people were not afraid of radiation? Fears have made our profession what it is today. The primary motivation for developments in technology and regulations for radiation safety has been fears of radiation. Prior to the advent of nuclear weapons, radiation was considered beneficial and even sought out for improved health. Public views changed drastically, however, after the world learned of the power, destruction, and harmful effects of radiation from atomic bombs. By the time of the first meetings of the Health Physics Society in 1955, fears of radiation were already strongly ingrained in the public mind. Photos of the terrible destruction of atomic bombs were widely publicized by the media. Memories of such photos and news stories became the basis for understanding the meaning of “radiation.” Fears are the basis of antinuclear sentiments and aversion to nuclear power, nuclear wastes, and especially nuclear bombs. Fears of radiation have moved our profession to very conservative practices in the name of radiation safety. And yet, psychologists know that fear is a good thing as a natural response of our brains for our protection. We have survived as a species by knowing when to be afraid and when to react for safety. Psychologists define fear as an emotional response to a specific stimulus, such as pain or immediate threat of danger. Since radiation does not produce any sensation in our bodies, then our fears of radiation have to be based on imagination. Thus, fear of radiation is not a true fear based on something happening right now, but a manufactured fear based on our imagination of terrible consequences. The primary delivery vehicle for radiation fears is the news media. The media thrives on telling us of dangers everywhere in the world, and seems to especially like stories of “Deadly Radiation.” In fact those words have been used to portray radiation for so long (at least 60 years) that now subconsciously people automatically react to the word “radiation” with aversion. Unfortunately, much of what the media reports is based on radiation mythology (common beliefs which are not technically true). Stories based on radiation mythology repeated over many decades have now become the basis for what people believe (their truth) about radiation.



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Director, Radiation Safety Counseling Institute 301-370-8573

- BS - Civil Engineering, University of Vermont (1961)
- MS - Sanitary Engineering, Massachusetts Institute of Technology (MIT) (1963)
- PSE - Professional Sanitary Engineer Degree, MIT and Harvard University (1963)
- PE - Licensed Professional Engineer, Vermont (1965 - present)
- PhD Studies, Radio and Nuclear Chemistry, Rensselaer Polytechnic Institute (1966-1972)
- Greater Washington Institute for Transactional Analysis - Counseling (1977-1980)
- CHP - Certified Health Physicist, American Board of Health Physics (1983-present)
- Johns Hopkins Fellow, Organizational Systems and Communications (1984-1985)
- FHPS - Fellow of the Health Physics Society and Past President (2000)
- Past President, American Academy of Health Physics (2015)
- Commissioned Stephen Minister - Counselor, United Methodist Church (2003-present)

Experience

- 2010 - pres. Director, Radiation Safety Counseling Institute. Workshops, training, and counseling for individuals, companies, universities, or government agencies with concerns or questions about radiation and x-ray safety. Specialist in helping people understand radiation, what is safe, risk communication, worker counseling, psychology of radiation safety, and dealing with fears of radiation and nuclear terrorism for homeland security.
- 2007 - pres. VP, Training Programs and consultant to Dade Moeller Radiation Safety Academy, training and consulting in x-ray and radiation safety, safety program audits, radiation instruments, and regulatory requirements.
- 1984 - 2007 Director, Radiation Safety Academy. Providing x-ray and radiation safety training, audits, and consulting to industry (nuclear gauges and x-ray), universities, research facilities, and professional organizations.
- 1988 - 2006 Manager and Contractor to National Institutes of Health (NIH) for radiation safety audits of 3,500 research laboratories and 2,500 instrument calibrations a year, along with environmental monitoring, hot lab and analytic lab operations, and inspections of three accelerators and over 100 x-ray machines.
- 1990 - 2005 President of Key Technology, Inc. a manufacturer and primary laboratory for radon analysis with over 1,500,000 measurements since 1985. Primary instructor at Rutgers University for radon, radon measurements, radiation risks, radiation instruments, and radon risk communication courses (1990-1998).
- 1986 - 1988 Laboratory Director, RSO, Inc. Directed analytical programs and Quality Assurance for samples from NIH, Aberdeen Proving Ground, radiopharmaceutical companies, and the nuclear industry.
- 1970 - 1985 Chief, Radiation Surveillance Branch, EPA, Office of Radiation Programs. Directed studies of radiation exposures from all sources of radiation in the US, coordinated 7 Federal agencies for nuclear fallout events, QA officer 8 years. Head of US delegations to I.A.E.A and N.E.A. on radioactive waste disposal. ANSI N-13 delegate (1975-1985). Retired as PHS Commissioned Officer (O-6) in 1985 with 29 years of service.
- 1963 - 1970 U.S.P.H.S. Directed development of radiation monitoring techniques at DOE National Labs, nuclear plants, and shipyards in the US and Chalk River Nuclear Laboratory in Canada.

Health Physics and Professional Activities


Health Physics Society (HPS) plenary member 1966; President-elect, President, Past President (1998-2001), Fellow (2000), Treasurer (1995-1998); Secretary (1992-1995); Executive Cmte. (1992-2001), Chair, Finance Cmte. (1996-1998); Head of U.S. delegation to IRPA X (2000). RSO Section Founder and Secretary/Treasurer (1997-2000); Co-founder and President, Radon Section (1995-1996). Co-Chair Local Arrangements Cmte. Annual Meeting in DC (1991); Public Info. Cmte. (1985-1988); Summer School Co-Chair (2004); Chair, President's Emeritus, Cmte (2006); Chair, Awards Cmte. (2002); Chair, History Cmte. (2005-2012); Historian (2012-Pres.) Continuing Education Cmte. (2005-2012). Academic Dean for HPS Professional Development School on Radiation Risk Communication (2010) and Radiation Instruments School (2014). PEP, CEL and Journal Reviewer. AAHP Instructor; Treasurer, AAHP (2008 - 2011). AAHP President-elect, President, Past President (2012-2015). Baltimore-Washington Chapter: President (1990-1991) and Honorary Life Member; Newsletter Editor (1983-2005); Public Info. Chair (1983-1991), Science Teacher Workshop Leader (1995 - Pres.). New England Chapter HPS, Newsletter Editor, Board of Directors, Education Chair (1968-1972). President, American Association of Radon Scientists and Technologists (1995-1998) and Honorary Life Member, Charter Member; Board of Directors; Newsletter Editor (1990-1993). Founder and first President, National Radon Safety Board (NRSB) (1997-1999). Member of American Industrial Hygiene Association (1997-Pres.) (Secretary, Vice Chair, Chair, Ionizing Radiation Committee, 2009-2012), Conference of Radiation Control Program Directors (1997-Pres.), Studied H.P. communication styles and presented Myers-Briggs seminars to over 3500 H.P.s since 1984. Over 35 professional society awards. Licensed Professional Engineer since 1965. Certified Health Physicist since 1983.

Publications

Authored over 500 book chapters, articles, professional papers, training manuals, technical reports, and presentations on radiation safety. Author of monthly column, "Insights in Communication" HPS Newsletter 1984 - 1989, 1994 -2001, and 2012- 2013. Contact at: 301-990-6006, ray@radiationcounseling.org, 301-370-8573, www.radiationcounseling.org

60+ Years of Radiation Fears Driven by Imagination and Mythology


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Is Radiation Fear a Factor Today ?

- How big a role does fear play in our work related to radiation safety ?
- Which is the greatest challenge for radiation safety ?
 - Technical issues ?
 - People issues ?
- Is everyone afraid of radiation ?
- Is radiation fear a true fear or a manufactured fear ?
 - Based on experience or imagination ?



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Historical Fears of Radiation

- The HPS inherited a legacy of Radiation Fears
- Every health physicist has anecdotes of radiation fears
- Most of what we do for radiation safety is driven by peoples' fears
- We implement extraordinarily conservative practices for radiation safety to protect fearful people
- When did the fears of radiation begin ?

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Beginnings of Radiation Fears

- Public fears of radiation began a long time before the founding of the HPS
- According to Weart, *"The Rise of Nuclear Fear"*
- Fears began in early 1900s as a fear of "Mad Scientists"
 - Delving into forbidden secrets
- Discovery of radioactive decay – called "Transmutation"
 - This word became entangled with ideas of Alchemy, Cosmic Transformations, and Apocalyptic Perils



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When Did the Fears Begin ?

- Stockholm 1903, Pierre Curie, Nobel Prize

"Is it right to probe so deeply into nature's secrets? The question must here be raised whether it will benefit mankind, or whether the knowledge will be harmful. Radium could be very dangerous in criminal hands. Alfred Nobel's discoveries are characteristic; powerful explosives can help men perform admirable tasks. They are also a means to terrible destruction."

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A Chronology of Radiation - 1896

- January - Wurzburg, Wilhelm Roentgen
 - Mysterious, unknown emanations, called X-rays
- February - Discovery of radiation from Uranium- H. Becquerel 
- March 3 - First reports of possible x-ray injury; damage to eyes
 - T.A. Edison, W.J. Morton
- March 14 - Concern expressed over possibility of x-ray injury - F. Battelli
- April 10 - Epilation noted from x-ray exposure - J. Daniel 

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Fears of Radiation

- Fears of radiation have evolved since the discovery of x-rays and injuries in 1896
- Radiation became deadly with media reports of the radium girls, radithor, atomic bombs, fallout, TMI, Chernobyl, and predictions by people who fanned the flames of public fears
- Media has bombarded us with stories of awful consequences of radiation
 - “Deadly Radiation”


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Radium Dials



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The Radium Girls



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When Radiation Became “Deadly” - Hiroshima



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Nagasaki



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Public Concerns for Radiation

- 1950s - Concern about radiation moved from the rarified realms of scientific discourse to the front page as a result of fallout controversy.
- 1952 - Washington Post, "Clouds of Death Over Utah"
 - fallout from Nevada Test Site

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Scare Stories – 1970s

- Leaks of radioactive material at low-level waste burial ground in Moorhead, KY
- Expected doses - 0.1 mrem
- How the media reported
 - "It's Spilling all over the US"
 - Nuclear Grave is Haunting KY"
 - "There's No Place to Hide"

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Fanning the Flames of Fear

- 1963 – "The fact that Sr-90 could be measured in children's bones and teeth was chilling. In the public's mind this contamination was dreadful."
Ralph Lapp
- Public concerns lead to Nuclear Test Ban Treaty
- The flame of public fear, once lit, would not sputter and die out as long as the epidemons fanned the flames of controversy. (abusers of statistics and epidemiology)
 - Dr. Earnest Sternglass
 - Dr. John Gofman
 - Dr. Karl Morgan

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1979



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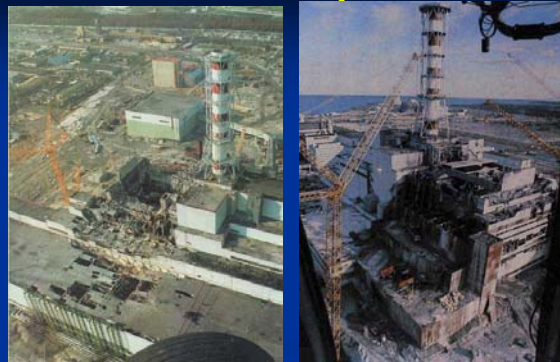
TMI

- Walter Cronkite, “The danger faced by man for tampering with natural forces, a theme from the myths of Prometheus to the story of Frankenstein, moved closer to fact from fancy.”
- Long after the technological dangers had subsided, the psychological effects of the TMI accident lingered on.

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Chernobyl



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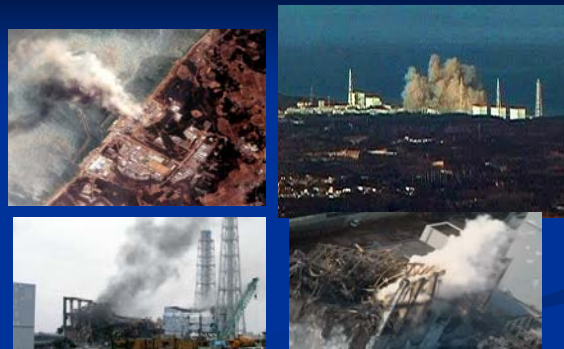
Psychological Consequences of Chernobyl

- Psycho-neurological symptoms
 - Fatigue, sleep disturbances, impaired memory
 - Impaired attention and sensorimotor activities
 - Anxiety, stress, depression, neurasthenia, hypochondria
 - Similar to chronic fatigue syndrome
 - No correlation with dose or contaminated area

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Fukushima Dai-ichi - 2011



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Role of the Media

- Scare stories about radiation sell news and advertising
- Radiation is not new or mysterious
- TV is for entertainment, not education
- Gross over coverage of radiation stories
- Media has created mental mind set –
 - Most everyone now believes radiation is deadly

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Fear of Radiation

- Psychological effects may be equally, if not more, damaging than physical health effects
- Fear is created by the unconscious mind as a protective mechanism
- Result of linking radiation with emotional trauma
 - Real life scare – not likely
 - Benign event – movies, TV, news – most likely
- Powerful negative association, unconscious mind says this is very dangerous and to avoid radiation, I will attach terrible feelings to radiation, to assure that I will be safe
- A radiophobia is born

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Fears of Radiation

- True fear is a gift
- Unwarranted fears lead to anxieties
- Fears of radiation and anxieties have likely killed far more people than ever harmed by radiation
- Perhaps we should be telling people
“It is actually very difficult to harm someone with radiation”

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Summary on Fears of Radiation

- The HPS inherited a legacy of fears of radiation from atomic bombs and fallout
- Radiation fears have been further fueled by media coverage of TMI, Chernobyl, and Fukushima
- Fears are the result of images of anticipated unacceptable consequences from exposure to radiation
- Fears of radiation are now rooted in our subconscious as “Deadly Radiation”

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