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How nuclear apologists mislead the world over radiation

George Monbiot and others at best misinform and at worst distort evidence of the dangers of atomic energy

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A girl is screened in Iitate, about 40km from the damaged Fukushima nuclear plant, where high levels of radiation have been detected. Photograph: Takumi Harada/AP

Soon after the Fukushima accident last month, I stated publicly that a nuclear event of this size and catastrophic potential could present a medical problem of very large dimensions. Events have proven this observation to be true despite the nuclear industry's campaign about the "minimal" health effects of so-called low-level radiation. That billions of its dollars are at stake if the Fukushima event causes the "nuclear renaissance" to slow down appears to be evident from the industry's attacks on its critics, even in the face of an unresolved and escalating disaster at the reactor complex at Fukushima.

Proponents of nuclear power – including George Monbiot, who has had a mysterious road-to-Damascus conversion to its supposedly benign effects – accuse me and others who call attention to the potential serious medical consequences of the accident of "cherry-picking" data and overstating the health effects of radiation from the radioactive fuel in the destroyed reactors and their cooling pools. Yet by reassuring the public that things aren't too bad, Monbiot and others at best misinform, and at worst misrepresent or distort, the scientific evidence of the harmful effects of radiation exposure – and they play a predictable shoot-the-messenger game in the process.

To wit:

1) Mr Monbiot, who is a journalist not a scientist, appears unaware of the difference between external and internal radiation

Let me educate him.

The former is what populations were exposed to when the atomic bombs were detonated over Hiroshima and Nagasaki in 1945; their profound and on-going medical effects are well documented. [1]

Internal radiation, on the other hand, emanates from radioactive elements which enter the body by inhalation, ingestion, or skin absorption. Hazardous radionuclides such as iodine-131, caesium 137, and other isotopes currently being released in the sea and air around Fukushima bio-concentrate at each step of various food chains (for example into algae, crustaceans, small fish, bigger fish, then humans; or soil, grass, cow's meat and milk, then humans). [2] After they enter the body, these elements – called internal emitters – migrate to specific organs such as the thyroid, liver, bone, and brain, where they continuously irradiate small volumes of cells with high doses of alpha, beta and/or gamma radiation, and over many years, can induce uncontrolled cell replication – that is, cancer. Further, many of the nuclides remain radioactive in the environment for generations, and ultimately will cause increased incidences of cancer and genetic diseases over time.

The grave effects of internal emitters are of the most profound concern at Fukushima. It is inaccurate and misleading to use the term "acceptable levels of external radiation" in assessing internal radiation exposures. To do so, as Monbiot has done, is to propagate inaccuracies and to mislead the public worldwide (not to mention other journalists) who are seeking the truth about radiation's hazards.

2) Nuclear industry proponents often assert that low doses of radiation (eg below 100mSV) produce no ill effects and are therefore safe. But , as the US National Academy

of Sciences BEIR VII report has concluded, no dose of radiation is safe, however small, including background radiation; exposure is cumulative and adds to an individual's risk of developing cancer.

3) Now let's turn to Chernobyl. Various seemingly reputable groups have issued differing reports on the morbidity and mortalities resulting from the 1986 radiation catastrophe. The World Health Organisation (WHO) in 2005 issued a report attributing only 43 human deaths directly to the Chernobyl disaster and estimating an additional 4,000 fatal cancers. In contrast, the 2009 report, "Chernobyl: Consequences of the Catastrophe for People and the Environment", published by the New York Academy of Sciences, comes to a very different conclusion. The three scientist authors – Alexey V Yablokov, Vassily B. Nesterenko, and Alexey V Nesterenko – provide in its pages a translated synthesis and compilation of hundreds of scientific articles on the effects of the Chernobyl disaster that have appeared in Slavic language publications over the past 20 years. They estimate the number of deaths attributable to the Chernobyl meltdown at about 980,000.

Monbiot dismisses the report as worthless, but to do so – to ignore and denigrate an entire body of literature, collectively hundreds of studies that provide evidence of large and significant impacts on human health and the environment – is arrogant and irresponsible. Scientists can and should argue over such things, for example, as confidence intervals around individual estimates (which signal the reliability of estimates), but to consign out of hand the entire report into a metaphorical dustbin is shameful.

Further, as Prof Dimitro Godzinsky, of the Ukrainian National Academy of Sciences, states in his introduction to the report: "Against this background of such persuasive data some defenders of atomic energy look specious as they deny the obvious negative effects of radiation upon populations. In fact, their reactions include almost complete refusal to fund medical and biological studies, even liquidating government bodies that were in charge of the 'affairs of Chernobyl'. Under pressure from the nuclear lobby, officials have also diverted scientific personnel away from studying the problems caused by Chernobyl."

4) Monbiot expresses surprise that a UN-affiliated body such as WHO might be under the influence of the nuclear power industry, causing its reporting on nuclear power matters to be biased. And yet that is precisely the case.

In the early days of nuclear power, WHO issued forthright statements on radiation risks such as its 1956 warning: "Genetic heritage is the most precious property for human

beings. It determines the lives of our progeny, health and harmonious development of future generations. As experts, we affirm that the health of future generations is threatened by increasing development of the atomic industry and sources of radiation ... We also believe that new mutations that occur in humans are harmful to them and their offspring."

After 1959, WHO made no more statements on health and radioactivity. What happened? On 28 May 1959, at the 12th World Health Assembly, WHO drew up an agreement with the International Atomic Energy Agency (IAEA); clause 12.40 of this agreement says: "Whenever either organisation [the WHO or the IAEA] proposes to initiate a programme or activity on a subject in which the other organisation has or may have a substantial interest, the first party shall consult the other with a view to adjusting the matter by mutual agreement." In other words, the WHO grants the right of prior approval over any research it might undertake or report on to the IAEA – a group that many people, including journalists, think is a neutral watchdog, but which is, in fact, an advocate for the nuclear power industry. The IAEA's founding papers state: "The agency shall seek to accelerate and enlarge the contribution of atomic energy to peace, health and prosperity through the world."

Monbiot appears ignorant about the WHO's subjugation to the IAEA, yet this is widely known within the scientific radiation community. But it is clearly not the only matter on which he is ignorant after his apparent three-day perusal of the vast body of scientific information on radiation and radioactivity. As we have seen, he and other nuclear industry apologists sow confusion about radiation risks, and, in my view, in much the same way that the tobacco industry did in previous decades about the risks of smoking. Despite their claims, it is they, not the "anti-nuclear movement" who are "misleading the world about the impacts of radiation on human health."

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[1] See, for example, WJ Schull, *Effects of Atomic Radiation: A Half-Century of Studies from Hiroshima and Nagasaki* (New York: Wiley-Lis, 1995) and DE Thompson, K Mabuchi, E Ron, M Soda, M Tokunaga, S Ochikubo, S Sugimoto, T Ikeda, M Terasaki, S Izumi et al. "Cancer incidence in atomic bomb survivors, Part I: Solid tumors, 1958-1987" in *Radiat Res* 137:S17-S67 (1994).

[2] This process is called bioaccumulation and comes in two subtypes as well, bioconcentration and biomagnification. For more information see: J.U. Clark and V.A. McFarland, *Assessing Bioaccumulation in Aquatic Organisms Exposed to Contaminated*

Sediments, Miscellaneous Paper D-91-2 (1991), Environmental Laboratory, Waterways Experiment Station, Vicksburg, MS and H.A. Vanderplog, D.C. Parzyck, W.H. Wilcox, J.R. Kercher, and S.V. Kaye, Bioaccumulation Factors for Radionuclides in Freshwater Biota, ORNL-5002 (1975), Environmental Sciences Division Publication, Number 783, Oak Ridge National Laboratory, Oak Ridge, TN.

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