**Evaluating the risk of radon vs. smoking**

**From a discussion on the AARST Radon Forum**

Oct. 20, 2017

Jeff Miner, Radon At Tahoe

I'm trying to find a copy of the smoking vs. radon risk chart of a few years ago. Remember, 4 pCi/L radon is equivalent to smoking x cigarettes a day in terms of cancer risk. Does anyone have access to that chart?

Thanks,
Jeff Miner
Radon At Tahoe

Oct. 24, 2017

Kevin Stewart, Director of Environmental Health at American Lung Association of the Mid-Atlantic

Looks like the conversation is potentially a fun hornet's nest to walk into, so ...

I wanted to give Bill Angell some support. One can see from the risk charts displayed in the 1986 Citizen's Guide and those in EPA's current version, the outcome of concerns that people expressed:
- Regarding smoking, the equivalence was criticized as inappropriate (some even said it was "scare-mongering"), at least in part, because smoking poses many other risks of death than only that due to smoking-induced lung cancer. Others pointed out the need to discuss explicitly the synergism of smoking and radon, and still others the need for the 70 years at 18 hours/day exposure for the equivalence to be drawn, etc. Bill or others may recall other objections at the time.
- Regarding the X-ray comparison, there were concerns among those doing medical radiology that the chart appeared to bring up the risk of death associated with X-rays, but without any context of its medical indications of diagnostic benefits. The quarrel wasn't so much with the arithmetic as it was with the human implications of discussing X-rays in a bad light. Some radiologists felt that there was so much "fear of radiation" on the part of patients that their job was hard enough as it was to convince people to get the X-rays they needed without any bad publicity associated with use of that tool.
- EPA "just looking at things scientifically and trying to motivate people into testing and fixing", had its communication hands slapped, and as a result, you can see that its current risk chart ( <https://www.epa.gov/radon/citizens-guide-radon-guide-protecting-yourself-and-your-family-radon> ) now uses other, familiar, if less controversial, comparisons based on "data calculated using the Centers for Disease Control and Prevention’s 1999-2001 National Center for Injury Prevention and Control Reports."

I also want to note that the sheet Marcel sent includes the disclaimer:
"This publication was supported by the Nevada Division of Public and Behavioral Health through Grant Number K1-9693515-0 from the U.S. Environmental Protection Agency. Its contents are solely the responsibility of the authors and do not represent the official views of the Nevada Division of Public and Behavioral Health nor the U.S. Environmental Protection Agency."
so I would suggest it not be referred to as an "EPA fact sheet"

[smoking vs. radon risk chart](https://www.radonlistserv.org/discussion/comment/128#Post_128)

Oct. 24, 2017

Jeff Miner, Radon At Tahoe

Great comments and thank you for the sources. So it seems there is no clear consensus on comparing radon risk to smoking risk. That's a shame. By now people understand that smoking is a high risk activity. It would be useful to be able to link radon risk, which most people are not familiar with, to smoking risk, which most people are familiar with.

So, to summarize:
1. The 2014 Nevada Radon newsletter report from Marcel Brascoupe of "living in a home with an average radon level of 4 pCi/l poses as much risk of developing lung cancer as smoking half a pack of cigarettes a day!"

2. Gail Orcutt's chart from AARST that "4 pCi/L equals 8 cigarettes a day"

So my question still is: What figures can I use when making a presentation to a group interested in the risks of radon to help them understand the radon risk of lung cancer as compared to smoking?

Thanks,
Jeff Miner
Radon At Tahoe

Oct. 26, 2017

Kevin Stewert

Within the range of uncertainty, "8" and "half a pack [=10]" cigarettes are basically the same number.
If you think the cigarette comparison is the best way to communicate to your audience, I wouldn't have a real objection to that so long as you do your best to be clear, using understandable language, that
a) you are talking about the U.S. average excess lung cancer risk only (cigarette smoking also being responsible for more non-cancer deaths than cancer deaths);
b) the risk from radon is much greater for people with a history of smoking than it is for people who are lifelong never-smokers;
c) anyone with lungs can get lung cancer, so radon increases never-smokers' lung cancer risks too;
d) no one deserves lung cancer.

Health communication depends on where one's audience is, what they know already, what they think they know (but inaccurately), and what they can be taught that will motivate change in behavior. There is an inherent conflict between a) presenting information tuned to an audience's capabilities and limitations, and b) knowing what detailed information exists and how the more scientifically minded might prefer to see it. All public health communicators need to navigate this. Too simplified, and you misrepresent reality; too complex, and you go above the heads of your listeners.

For your background, but not necessarily for display to some audiences, I've attached some images I've drafted to approximate the relative risks for U.S. average indoor radon and for the 4 pCi/L action level, for different US populations, so one can see how the relative risk model of lung cancer induction plays out. I do point out that the last graph shows risk of lifetime exposure only AT the Action Level. If long-term exposures are much higher, risk of death from lung cancer due to radon would be correspondingly greater.

I stress that I am happy to have epidemiologists review and refine this draft. Please note also that these are based on EPA's central estimates of risk, and that actual risks might be higher or lower.

Attachment

[Approximations of US Radon Health Risk K Stewart ALA Mid\_Atlantic 102617](https://www.radonlistserv.org/discussion/download/8/Approximations%20of%20US%20Radon%20Health%20Risk%20K%20Stewart%20ALA%20Mid_Atlantic%20102617.ppt) (433K)