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DEADLY RADON IN MONTANA? A REBUTTAL TO DR. LARSSON

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I would like to thank Dr. Larsson for her thoughtful reply.

Dr. Larsson raises the issue of possible confounders, which of course is a legitimate concern. However, I was questioning the claim that *radon* is deadly in Montana, rather than a claim of radon + confounders. Consequently, I looked only at radon. Still, as Cohen notes, large data inputs from ecological study designs help to reduce the effect of confounders to the case-control level (Cohen, 1990).

Dr. Larsson correctly notes that my (one-time) use of the term “low radon” in my original reply is not accurate, and that Montana has only the high and medium radon categories. In the remaining instances in my original reply, I did however use the term “lower” radon counties, that is, lower radon than the high radon counties.

I appreciate Dr. Larsson supplying me with the many expert opinions on the purported harmful effects of radon from various groups and agencies. But again, my inquiry was specifically about whether radon is deadly in Montana.

Dr. Larsson inquires about my rationale of using the age group of < 65. As stated in my initial reply, this age group was used since people with lung cancer could live to a ripe old age, and may or may not know they have the disease at the old age. Nonetheless, Dr. Larsson’s criticism on this point is valid. Consequently, lung and bronchus cancer mortality data for *all* ages were obtained from the National Cancer Institute’s databases (NCI, 2010) and a new analysis was performed. This time, instead of only one county in the lower radon category reporting lung/bronchus cancer mortality data, two counties reported: Musselshell county (85.5 deaths/100,000 persons) and Yellowstone county (54.7 deaths/100,000 persons). For these two counties, a mean of 70.1 ± 21.8 lung/bronchus deaths per 100,000 persons was observed. In the high radon category, 35 counties reported lung and bronchus cancer mortality data, with a mean of 51.3 ± 10.8 lung/bronchus deaths per 100,000 persons. In Excel (Microsoft Corp., Redmond, WA), a two-sample, two-tailed *t* test revealed a statistically significant difference between the lower lung/bronchus

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cancer mortality rate in the high radon counties compared to the higher lung/bronchus cancer mortality rate in the lower radon counties ($p = 0.0275$). In my original reply I noted that there was not a statistically significant difference between the lung/bronchus cancer mortality rates in high versus lower radon counties for persons $<$ age 65. Now, thanks to Dr. Larsson's suggestion to look at *all* ages, I find stronger evidence that radon is not deadly in Montana. Indeed it appears from this new analysis that the higher radon areas in Montana, with their lower lung/bronchus cancer mortality rates, may actually be showing a protective, hormetic type effect from radon when compared to the lower radon areas which have a higher lung/bronchus cancer mortality rate.

REFERENCES

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- NCI. 2010. Age adjusted death rates for Montana. Lung and Bronchus. [Cited 2010 Oct 21]. Available from: <http://statecancerprofiles.cancer.gov/map/map.noimage.php>