

Radon: The Second Leading Cause of Lung Cancer?

Deh, deh, deh, dehrrrrr.....

By John R. Goodman BS RRT

Has anyone reading this article ever heard of a gentleman named Stanley Watras? Well, unless you are in the business of eliminating the gas radon from the typical American home, it would be pretty unlikely. In 1984, Stanley Watras was a construction engineer at the Limerick nuclear plant in Pottstown, PA. As you would imagine there were all types of monitors installed to insure the safety of their workers from accumulating unsafe doses of radiation.

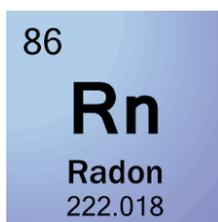
Enter Stanley Watras (literally). One day upon arriving at the plant a number of the radiation monitors went off simultaneously. On this day (December 2, 1984), there was absolutely no nuclear fuel at the plant, so there was no way Stanley could have been contaminated there. This went on for two weeks when eventually they discovered Stanley was actually bringing the radiation with him to work. Measurements made at his house showed radiation levels about 700 times higher than considered safe for humans (now determined to be 4pCi/L). His home actually tested at 2700 pCi/L! This is something like smoking 135 packs of cigarettes per day. The source of the radiation turned out to be radon. Stanley's house was built over a 10 meter wide vein of uranium.



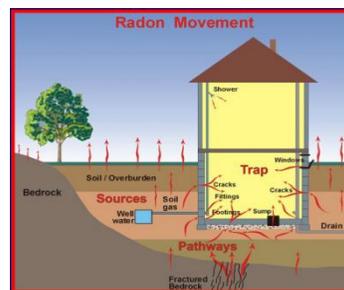
Stanley Watras and family in front of their home.



radon is found everywhere.



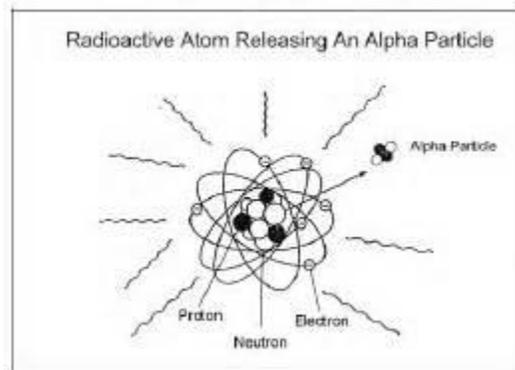
radon chemically expressed.



Natural movement of radon

So what the heck is radon? Radon (first discovered in 1900) is a gas that is created in soils that contain uranium or radium. Uranium naturally decays to form radium, and the radium decays into radon. Of course these conditions are found over most of the inhabited world. It is an inert gas without smell, taste or odor. There is no known way of testing for radon in the body, nor can any of us “sense” the presence of radon in our body.

The strange case study of Stanley Watras set in motion a series of events that literally created an industry almost overnight, but more on that later. Like all radioactive elements, as radon decays it produces alpha, beta, and gamma rays (sometimes called “daughters or daughter particles”). Only the alpha particles are considered hazardous. This is because they have enough energy to penetrate the actual DNA of lung tissue cells and *possibly* cause that cell to mutate and over time become cancerous.



So called “daughter particle” or the alpha particle
Can theoretically hit the DNA so hard it can force a genetic mutation

Shortly after the Watras case hit the media, radon came under the microscope of the EPA. Since there were no significant scientific papers to study in the mid 1980's, much of the data came from the studies of uranium miners who worked in the four corners areas of the southwest in the early and mid 1950's. It had been noted in various studies that indeed, uranium miners had a higher incidence of lung cancer. However as many as 90% of the miners also smoked. Plus, the dust clouds they stirred up with their mining contained dozens of other noxious agents, dust, and irritants. Studies in miners in other parts of the world echoed the same results.



No one questions the fact that the uranium workers of the 50's were subjected to very high levels of radon and many other known carcinogens and went on to

develop lung cancer. They smoked an awful lot “back in the day” as well.

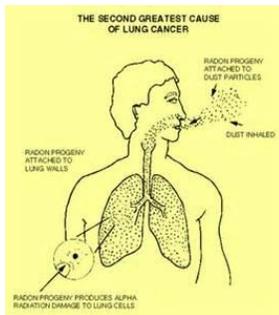
But how do you extrapolate the data gathered on miners, with many variables, to the typical home in the United States and elsewhere? Well, since there were so few peer reviewed studies of radon gas in domestic housing, the “experts” at the EPA, American Lung Association, National Academy of Sciences, and the National Council on Radiation Protection determined that the “risk” of developing lung cancer would approach zero (0) if the measured radon level in a typical home dwelling did not exceed 4 picocuries/Liter of air measured or 4 pCi/L. This was all done using a linear model of exposure starting with the radon levels found in the miners and then progressively dropping the number of “acceptable pCi/L” until they determined 4 pCi/L was an acceptable level mitigating the possibility of developing lung cancer almost (but not quite) to zero.

Congress responding to a huge national outcry passed the Radon Abatement Act of 1988. The act called for (and wait for this) a national goal of reducing indoor radon levels down to outdoor radon levels. Logical right? As most of us know, we are exposed to natural background radiation every single day of our lives. Outdoor measurements of radon vary tremendously as you make your way around the world. In point of fact, radiation is radiation whether man made or natural in origin. Our bodies certainly cannot distinguish if our bodies are being bombarded daily with natural or man-made production of radiation.

In the same year, the EPA declared that “contamination of homes across the nation by cancer causing radon was the nation’s most serious air pollution problem and *recommended* that virtually every home in the USA be tested for radon. This is the very nucleus of the radon/lung cancer connection, as this is where the first estimates of 20,000 or so radon caused lung cancer deaths per year first came to light. Millions of dollars were spent in public awareness campaigns, many, many articles and documentaries were produced to help inform the public of the dangers of radon. And guess what happened. No real public outcry! Why? Several causes have been postulated. Many people simply didn’t feel actually threatened by radon as they had no knowledge of it before, and felt it was not a substantial risk to themselves or their families. Many people simply felt that it was a naturally produced byproduct of radioactive decay, and therefore nothing to worry about. By the mid to late 1990’s the hysteria over radon was just about over due to what was termed “radon apathy.” But there was no apathy noted by the real estate industry and the simultaneously created, multibillion dollar radon mitigation industry.

In effect, buyers of new houses were demanding radon testing and mitigation if radon levels were found to be greater than 4 pCi/L in the house THEY were interested in buying. Since radon levels lower than 4pCi/L are very hard to find anywhere in the United States, radon testing (and mitigation) if necessary has become a routine part of home inspection before purchase. In the Denver area radon mitigation systems cost right around \$1000.00. If you are really motivated to sell, you will in all probability install the system.

So in my opinion, the whole radon and lung cancer relationship is actually *not* based on dozens of peer reviewed papers proving the connection, but rather the mathematically derived *risk* that you might develop lung cancer after many years of exposure to radon. In fact, in the EPA extrapolations, they assumed you would stay in the same house for 70 years, and stay inside your house 75% of the time. According to the EPA's current **Citizens Guide for Radon**, out of 1,000 people exposed to 4 pCi/L of radon for 70 years, 2 could get lung cancer if they never smoked and 29 if they were smokers. The flip side of this coin is that 998 non-smokers would **not** get lung cancer. But human nature being what it is, most people believe they will be one of the two people who get lung cancer, not one of the 998 who don't.



This is how radon daughter particles get into lung tissues



Typical Radon mitigation system



radon meter showing a reading of just over 2 pCi/L

So do as many as 22,000 people die of lung cancer every year due to radon exposure? The answer is **Nobody Knows**. Not really. To date this has still not been scientifically determined. No valid, scientific, peer-reviewed studies in the medical literature. None...zero...zilch...nada. For the past few months I have been questioning pulmonologists, radiologists, and long time respiratory therapists. So far, with several hundred years of combined experience, none of us have ever seen a case of lung cancer that could in any way be attributed to radon levels found in typical American homes. But maybe you do live *in an old abandoned uranium mine* and all occupants in your home smoke every day for 70 years. So who or what are we to believe?

It's true, thousands of otherwise healthy, lifelong non-smoking people *do die* of lung cancer every year in the United States. Remember that lung cancer was very rare at the start of the 20th century. The rise in lung cancer can be traced roughly with the development of the tobacco industry. However, other possible causes or contributors to the development of lung cancer that have been validated must include geographic patterns, race and ethnicity, environmental and occupational exposures, exposure to second hand smoke, diet, air pollution, genetics, COPD, and of course radon. It is also true that most of the scientific community *does* believe that very high exposures to radon, over a suitable period of time cannot be healthy for us. In the end, despite the varying controversies on the risk of radon exposure, it would seem that until we have *much, much* more rigorous scientific study, we should probably test and mitigate for radon. Costs are "relatively" low and much like fire alarms, or security alarms each of us has to decide just how much we want to protect our families and for many of us, it more or less becomes the cost of doing business in contemporary America. This is certainly going to be true for almost all people who are contemplating selling their homes in the near future.

As a way of bringing this article full circle, Stanley Watras himself got into the radon mitigation business in 1988. And due to his personal involvement with the initial radon scare, became one of the most successful radon mitigating contractors in Pennsylvania. To the best of my knowledge and research, neither Stanley nor any family member has yet to develop lung cancer. If I find out anything to the contrary...you know I will acknowledge that information in a future article of the month.

Radon Gas

“...risks of health effects are either too small to be observed or are non-existent.”

Source: Health Physics Society