What is the evidence that indoor radon exposure is really a health risk?

The earliest evidence of radon-related health risk came from long-term cohort studies of underground miners conducted over the past 60 years. This evidence was of sufficient strength by 1988 that the World Health Organization's International Agency for Research on Cancer (IARC) classified radon and its short-lived decay products as known human carcinogens (Group 1 or Class A). Furthermore, the National Cancer Institute has led an on-going international study of 68,000 underground miner radon risks. In addition, the National Academy of Sciences' extensive assessment of the miner and other health risks associated with indoor radon is found in *Health Risks of Exposure to Radon (BEIR VI)* which is available at www.nap.edu/openbook.php?record_id=5499 Based upon this report, the U.S. Environmental Protection Agency (EPA) completed *EPA Assessment of Risk of Radon in Homes* which is available at www.epa.gov/radiation/docs/assessment/402-r-03-003.pdf

Since the 1980s, more than 40 residential case-control studies have been conducted. Overall, these studies reflected increased risk of lung cancer in homes with elevated indoor radon. The data from 22 of these studies were pooled which allowed for more rigorous risk assessment (7 studies in North America; 13 studies in Europe; 2 studies in China). The risk estimates from these pooling studies were similar but higher than the miner cohort studies - - - thus, **giving very strong evidence that radon exposure in the home increases the risk of dying from lung cancer**. Further information about radon health risks is found in the World Health Organization's *WHO Handbook on Indoor Radon – A Public Health Perspective* www.who.int/ionizing_radiation/env/radon/en/index1.html

The strength of the evidence of the health risk associated with indoor radon exposure led WHO to recommend that (economically developed) countries establish radon reference levels, where mitigation would be recommended, at 100 Becquerels per cubic meter (Bq/m^3) or 2.7 picoCuries per liter (pCi/L). The WHO recommendation is 33% lower than the EPA 4 pCi/L Threshold for Action. The Health Physics Society, an organization of 5,500 radiation safety professionals from 44 countries, recommends reducing exposures below 2.7 pCi/L www.eurekalert.org/pub_releases/2009-11/hps-hps112509.php and www.hps.org/documents/indoorradon.pdf

I have heard that there is research that suggests that exposure to low levels of radon do not pose a health risk; is that true?

There have been "ecological" studies that suggest that there is not a risk of lung cancer at low levels of radon exposure. However, ecological studies should not be used for risk assessment. Some of those who argue hormesis (low doses of ionizing radiation are safe) are supported by those in the nuclear and chemical industry

The National Academy of Sciences reviewed the health risk associated with exposure to low levels of ionizing radiation, including radon, and found, **"The scientific research base shows that there is no threshold of exposure below which low levels of ionizing radiation can be demonstrated to be harmless or beneficial,"** said committee chair Richard R. Monson, associate dean for professional education and professor of epidemiology, Harvard School of Public Health. **"The health risks – particularly the development of solid cancers in organs – rise proportionally with exposure."** Further information is available at http://books.nap.edu/catalog.php?record_id=11340 books.nap.edu/catalog.php?record_id=11340 Other organizations sharing this perspective of the National Academy of Sciences include: National Council on Radiation Protection and Measurements (NCRP) and the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR).

Furthermore, there is evidence from cohort studies of underground miners that reflect increased risk of lung cancer with radon exposure at concentrations as low as 2 pCi/L for periods of less than 2 years.

Is there evidence that radon exposure may be related to health risks other then lung cancer?

Yes, there are more than 20 studies that have examined the association of indoor radon exposure and leukemia in general as well as childhood leukemia and chronic lymphocytic leukemia. Most of these studies have been "ecological" investigations and normally ecological studies are not used for health risk assessment. Thus, this evidence should be considered more suggestive and in need for further research. Other radon-related health risks have been conducted including those involving: Alzheimer; Cardiovascular diseases; Multiple sclerosis. While some of these studies found evidence suggestive of increased risk associated with radon exposure, evidence of a clear link has not been established and further research is needed.

Source

William J. Angell
Professor and Director, Midwest Universities Radon Consortium, University of Minnesota
Co-editor, *WHO Handbook on Indoor Radon – A Public Health Perspective*