Study examines increase in lung cancer risk from combined radon and tobacco smoke exposure

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In the words of Dr. Ellen Hahn, professor in the University of Kentucky's colleges of nursing and public health, Kentucky has the "triple crown of lung cancer" - the country's highest rate of smoking combined with high rates of second-hand smoke exposure and high levels of radon exposure.

Nationally, lung cancer has the highest mortality rates of all cancers. While the relationship between tobacco smoke and lung cancer is well known, there is less awareness among the general public about the dangers of radon exposure. In the United States, radon exposure is the second leading cause of lung cancer, behind smoking. Second-hand smoke exposure is the third leading cause.

And, if you're exposed to radon and tobacco smoke, either through personal use or second-hand smoke, your risk of lung cancer increases tenfold. Hahn's current study, FRESH (Freedom from Radon Exposure and Smoking in the Home), examines the synergistic risk between tobacco smoke and radon exposure and whether risk can be reduced through dual home screening and subsequent interventions.

Radon is a radioactive soil gas that is colorless, odorless, and tasteless. It enters buildings through the foundation and plumbing and becomes trapped in indoor spaces. When inhaled, radon causes immediate DNA damage before decaying into lead, which might stay in the body for

decades. According to UK's Clean Indoor Air Partnership, exposure to radon is associated with an estimated 15,400 to 21,800 lung cancer cases in the United States each year, an estimated 3-14 percent of the total cases. Most radon-induced lung cancers are thought to be associated with low to moderate radon concentrations.

In Kentucky, radon exposure is variable but high, with about 40 percent of homes estimated to have radon exposure. The Clean Indoor Air Partnership reports that in Northern Kentucky, 19 percent of tested homes were at or above safe levels (4 pCi/L) in 2000-2004, compared with only 7 percent nationally.

"The whole state is in a high risk area for radon, according to the EPA," said Hahn.

She says that there's a myth that if you don't have a basement, you can't have radon exposure. The truth is that any type of building can have radon exposure, and her research indicates that there are high levels of radon in both urban and rural areas in Kentucky.

Unlike tobacco smoke exposure, which is observable and also detectable in hair and fingernails, radon exposure is only detectable through testing of indoor spaces, which is cost-effective and easy. If a building has unsafe levels of radon exposure, the radon can be mitigated from the soil by a certified mitigation specialist. Because there is no known safe level of exposure to radon, the Environmental Protection Agency recommends that Americans consider fixing their homes for radon levels between above 4.0 pCi/L. The mitigation process, however, can be expensive, ranging from $1,200 t o $2,500 depending on the size of a home.

Hahn's current FRESH study, originally supported by pilot funding from the UK Markey Cancer Center, UK College of Nursing, UK Got Grants Program and now supported by an R01 grant from the National Institutes

of Health, aims to prevent lung cancer by addressing the dual risk of radon and tobacco smoke exposure in homes through testing for exposure and encouraging risk reduction actions, including smoking outside (rather than inside) and radon mitigation. The study is still enrolling participants, and more information is available by calling 859-323-4587 or emailing UKFRESH@lsv.uky.edu.

In addition to individuals taking action to test their homes and adopt behaviors to promote clean indoor air, Hahn hopes that more policy-level changes can help protect people from radon exposure. She points out that Kentucky has only two laws related to radon: that if a home has been tested for radon the results must be disclosed in a sale, and that only certified professionals can perform radon mitigation services. There are no laws in Kentucky obligating radon testing for single family homes or multi-unit residences, schools, or business, and no laws mandating radon-resistant construction of new homes, which costs around half as much as mitigation.

"The radon laws nationally are pretty weak," she said. "There are some states that lead the pack, like Illinois, because people have advocated for laws there. But I think it's just a matter of the policy keeping up with the science. It's not until relatively recently that the science of radon risk has been indisputable. But we know now that it's a leading cause of lung cancer and we need to disseminate that information."

Hahn also sees federal tax incentives for energy efficiency as a potential model for radon testing and mitigation.

For now, though, it's up to individuals to test their homes and pay for mitigation if necessary. Many local health departments have radon programs and provide free radon test kits. Most testing is short term, lasting 3-7 days, and as easy as setting the testing envelope on a bookshelf. Long term tests of 90 days are encouraged if tobacco

smoking occurs in the home. County radon coordinators can provide test kits, and the Kentucky State Radon Program offers free radon test kits in counties without an established radon program. Radon test kits can also be purchased at local home improvement stores for $15-$25. The tests are then mailed, usually free of charge, for processing, and the lab mails or emails the results. Certified radon mitigation professionals can be found at ky-radon.info/KY_nehalist.html.

"There's so much you can do to prevent lung cancer," Hahn said. "But with radon, you can't fix it if you don't know you have a problem."

Provided by University of Kentucky

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