Review of: "Estimation of lung cancer deaths attributable to indoor radon exposure in upper northern Thailand"

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Potential competing interests: The author(s) declared that no potential competing interests exist.

General content

The paper aim to present the potential contribution of radon exposure on the high incidence of lung cancer in upper northern Thailand (UNT). The reviewer have several comments as follows:

Title and Abstract

- The present paper has a compelling title
- The abstract starts with the fairly good opening paragraph, but later falls incoherence at presenting the main results.

Introduction/Background

- Radon that contribute mainly in environment is known by about forty isotopes, but only three are common enough to have environmental significance, namely Rn-222 (called ‘radon’, half-life 3.83 days, decay energy 5.59 MeV), Rn-220 (called thoron, half-life 55.6 seconds, decay energy 6.29 MeV), and Rn-219 (called actinon, half-life 3.96 seconds). Presently, Rn-222 and Rn-220 are recognized as the most critical sources of ionizing radiation accounting for nearly half of the total effective dose from all natural sources of radiation (UNSCEAR, 2008). Radon isotopes and their progenies jointly contribute to the risk of lung cancer with different effects due to their half-life and decay energy. A high percentage of inhaled atoms of Rn-220 will dissolve in lung fluid and decay within several seconds in the human body, whereas only a small percentage of the longer-lived inhaled Rn-222 will do so, because Rn-222 dissolved in body fluid can be exhaled or diffuse out of the human body during hours to days after inhalation, before the occurrence of radioactive decay. Therefore, it is necessary to clarify which radon isotope are studied. In case of radon in the study corresponding to Rn-222 isotope, authors have to explain the negligible concentration of Rn-220 isotope to indoor radon exposure in UNT.
- Authors should consider to add information of the study area in the introduction section due to location of the study area in a typical active fault zone in Thailand or give more information of geologcal setting in the study area, a subsection in the Methods section. Ambient radon concentration possibly came from active fault may play an important role to indoor radon concentrations in UNT.

Methods and study area

- The number of healthy controls is different in Sections: the Data Collections (78) and in the indoor radon measurements (115). It is necessary to explain this difference, because later, in the results section, authors also used only data of 78.
- The present paper measured radon concentration in bedrooms by the same detector (CR-39) responding as indoor

radon concentration. The similar setting detector in all participant houses is suitable, but square of bedrooms has to be mentioned in order to define resemblance of radon concentration in measured bedrooms.

- The present paper have to clarify the number of lung cancer cases and healthy controls by age in order to estimate number of lung cancer death attributable to indoor radon exposure by the equation 3 to calculate the ERR.

Results and discussion

- The present paper need to analyse reasons of choosing data of 78 in total of healthy control participants of 115 in table 4.
- The present paper also has to analyse exposure indoor radon duration in detail to estimate the annual effective dose. Participants spent about 16.45 hours per day at home but not only in bedrooms, hence the authors need to seperate bedroom-time and/or explain indoor radon concentrations in other rooms in the study houses. Moreover, position of beds in bedrooms is significant to calculate the EAD according to inhomogeneity of indoor radon concentration, or the authors have to demonstrate homogeneous indoor radon concentration in each bedroom.
- AED values of cases and controls were similar (difference is < 4%), hence authors need to present more data in order to define effect of indoor radon on the development of lung cancer in UNT.
- The authors need to unify the data in same times, for instance: authors can't compare data of total lung cancer cases in UNT from 2015 to 2019 with those in the whole Thailand country in 2012.
- In data tables, there are some signals of (*) that have to be explained.
- It is necessary to give meaning of some columns in table 5: Only radon, other, radon.

Verdict

The present paper need to improve its results based on reviewer's comments before offically publishing.