

## Study and Search for Main Reason of Lung Cancers Based on Cherenkov Radiation in Environmental Radiation

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A location distribution of patients occurred lung cancers in Japan is almost corresponded to a location distribution of concentration of  $^{222}\text{Rn}$  according to Japanese publications. However, the main reason of the cancer could not be explained only internal exposures by inhalation of  $^{222}\text{Rn}$  (approximately 1.1 mSv/yr). On the other hands, it cannot be considered tobacco or atmosphere contamination effect of dust such as PM2.5 contributes to the local distribution of the patients. We developed a prototype detector based on Cherenkov radiation using silica aerogel with a refractive index of 1.0411, which has sensitivity of a beta ray with energy over than 1.31 MeV and suppresses events of cosmic ray muons. The detector observed radiation as mean count rates of 30 cph/L in atmosphere on a week, in our laboratory room, where the incident window of detector was cleaned up using an air duster. It is considered that  $^{214}\text{Bi}$  is uranium decay series emitted beta rays with energy over than 1.31 MeV in atmosphere gas. Thus, it was considered the detector observed beta rays with a maximum energy of 3.27 MeV from  $^{214}\text{Bi}$  in atmosphere gas. Although radioactivity increasing by uranium decay series becoming equilibrium must be observed by the detector if there is only  $^{222}\text{Rn}$  in the gas of atmosphere, the result was not observed. Therefore, it means the gas of atmosphere had radiation of  $^{222}\text{Rn}$ ,  $^{218}\text{Po}$ ,  $^{214}\text{Pb}$ ,  $^{214}\text{Bi}$ , and  $^{214}\text{Po}$  of uranium decay series in radiation equilibrium. If that is true, the radiation dose in environment might be underestimated to 0.2-0.5. As a result, inhalation of atmosphere can cause 2-5 times of radiation dose estimated in conventional. And mean radiation dose per a year should be corrected from 2.4 mSv/year according to the effect. Therefore, the main reason for occurring lung cancers was found internal exposures by inhalation of the radiation of uranium decay series in atmosphere gas.