

RISK 6**Health risk assessment for radon of groundwater in Korea**

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An initial study has been conducted with Korea Institute of Geoscience and Mineral resources and National Institute of Environment Research to evaluate the distribution of radon levels and their risk levels of groundwater in Korea.

Probability distribution of 616 samples was log-normal one with 1,867pCi/L as arithmetic value, 920pCi/L as median and 40,010pCi/L as maximum during four years(1999-2002). In addition, 10% of total samples are in excess of 4,000pCi/L, 20% in excess of 2,700pCi/L, and 30% in excess of 1,700pCi/L, and 15 samples exceeds 10,000pCi/L.

Total samples are grouped into 10 areas and 5 rocks unit, and difference of concentrations among areas and rocks are statistically significant(respectively, $p < 0.0001$). The highest area is Daejeon located in ogcheon metamorphic rocks and granitic rocks, and most of all sites with high concentration sites are located in granitic rocks. The lowest area is Jeju located in volcanic rocks.

We have estimated excess cancer risks of radon based on these data. To estimate risks, first of all, use patterns of groundwater are categorized with 6 groups: for drinking, household, farming, washing cars, raising stock, and others. We considered risk only for drinking water and household water because radon is rapidly dispersed before it of other use reach human respiratory organs.

We select 565 samples for risk analysis, and applied unit risk which is 6.62×10^{-7} per pCi/L to be recommended by NAS committee. Unit risk was derived from considering radon ingestion and radon inhalation from water use. When estimating risk, we analyzed PDF of concentration and represented risk as 50 and 95 percentile values to consider uncertainty with Monte-Carlo simulation. It results in 10^{-4} level of their excess cancer risk and in 10^{-2} level in some areas with high concentration of radon. It must be monitor periodically and take adequate actions in these risky sites. We recommend that it needs to take more survey and finally set guideline for radon regulation in groundwater.