EDITORIAL
Medical Imaging

JKMS

http://dx.doi.org/10.3346/jkms.2013.28.12.1701 • J Korean Med Sci 2013; 28: 1701-1702

Is It Safe to Eat Fish?

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After the Fukushima Daiichi's meltdown in 2011, it has been still plagued with the mishaps (1). Especially the recent leakages of highly radioactive water into the ocean from storage tanks lead to further increase of public frustration over the radiation risk and hazards (1). Nevertheless, frustration to radiation is mounting that the radiation leakage could lead to dangerous contamination of all seafood. The anxiety and distrust for Japanese marine fisheries produce several unbelievable rumors which were rampantly distributed through the borderless internet and social networking service (SNS).

In response to the Japan Fukushima Daiichi nuclear accident, the Korea Institute of Nuclear Safety (KINS) is conducting the intensified environmental radioactivity monitoring program in addition to the national environmental radioactivity monitoring and marine radioactivity investigation tasks (2). The monitoring results reported that a concentration level of radioactive cesium-137 (Cs-137) from seawater was undetectable to 0.00187 Bq/L in first quarter of 2013, and is undetectable to 0.00235 Bq/L in the second quarter of 2013. Also, the level of Cs-137 in the fish was undetectable to 0.174 Bq/kg in 2013 monitoring results (2). The results of 3 times of sampling and analysis for marine environmental samples (seawater and marine organisms) are as low as that had normally been detected in previous tests before the Fukushima accident (undetectable to 0.00404 Bq/L of seawater, to 0.174 Bq/kg of fish) (3-5).

Biological effects of radiation are typically divided into two categories. The first ones are acute or short term effects (called as acute radiation syndrome) when the body is exposed to high doses of radiation more than 1,000 mSv over short periods of time (6, 7). The second category represents exposure to low doses of radiation over an extended period of time producing chronic or long-term effects (8, 9). The associations between radiation exposure and the cancer development are mostly based on populations exposed to relatively high levels of ionizing radiation over 100 mSv (e.g., Japanese atomic bomb survivors, and recipients of selected diagnostic or therapeutic medical procedures). Even so, the International Commission on Radiological Protection (ICRP) conservatively assumes that any amount of radiation may pose some risks for causing cancer, and a linear no-threshold dose response relationship is used to describe the relationship between radiation dose and the occurrence of cancer (10).

There is no environment with "zero" of radioactivity in the world. Radiation exists all around us. It comes from outer space (cosmic), the ground (terrestrial), and even from within our own bodies. The average of radiation exposure from natural source in the world is about 2.4 mSv/yr (range 1-10 mSv) (7, 8). In Korea, average exposure from natural radiation is about 3 mSv/yr, which is variable depending on the regions (2-5). Food can also be a common source of natural radioactivity, one of which is a component of potassium called potassium 40 (K-40). According to the national survey of natural radioactivity in the food conducted by KINS, the radioactive potassium exists in almost all food with 50-250 Bq/kg level, which is calculated as about 4,000 Bq in a man of 70 kg body (2-5).

If Cs-137 enters the body, it is distributed fairly uniformly throughout the body's soft tissues. Unlike heavy metals, it is not accumulated in our body and eliminated through the urine. The biologic half-life of Cs-137 is about 70-120 days. The radiation dose from eating of 1 kg of frozen mackerel containing current dose limit 100 Bq of Cs-137 is calculated as 1.3 μSv. To reach the annually permissible dose of radiation to the public (1 mSv/yr), it needs eating as much as 1 ton of frozen mackerel (6).

In conclusion, there is no impact on our marine water and marine products from the radiation leakage from the Fukushima power plant. However, the government should intensify to collaborate with the related society by diversified cooperation to quell the unrest and distrust of the public. And the government should make every effort to avoid public's exposure of radiation by various theoretical evaluation and analysis, and continuously watch the trend. All fishes and fishery products should be monitored in a more stringent manner including the place of origin, monitoring of radioactivity for all marine products. The scientific community and the government should have more proactive response to the international standards, and allay public fears and unnecessary misunderstandings by notify-

pISSN 1011-8934
eISSN 1598-6357

ing the accurate facts to the public.

REFERENCES

1. Radiation dose measured at monitoring post of Fukushima Daiichi Nuclear Power Station. *Available at http://www.tepco.co.jp/en/index-e.html [accessed on 16 October 2013].*
2. Report of the Korean Government response to the Fukushima Daiichi nuclear accident. *Available at http://www.oecd-nea.org/nsd/fukushima/documents [accessed on 16 October 2013].*
3. Environmental radioactivity survey data in Korea. *Daejon: Korea Institute of Nuclear Safety, 2004.*
4. Environmental radioactivity survey data in Korea. *Daejon: Korea Institute of Nuclear Safety, 2008.*
5. Environmental radioactivity survey data in Korea. *Daejon: Korea Institute of Nuclear Safety, 2012.*
6. Valentin J ed. *The 2007 recommendations of the international commission on radiological protection. Ann ICRP 2007; 37: 1-332.*
7. Health risks from exposure to low levels of ionizing radioation: BEIR VII Phase 2. *Washington, D.C.: the National Academies Press, 2006.*
8. Tubiana M, Aurengo A, Averbeck D, Masse R. *Recent reports on the effect of low doses of ionizing radiation and its dose-effect relationship. Radiat Environ Biophys 2006; 44: 245-51.*
9. Laskey WK, Feinendegen LE, Neumann RD, Dilsizian V. *Low-level ionizing radiation from noninvasive cardiac imaging: can we extrapolate estimated risks from epidemiologic data to the clinical setting? JACC Cardiovasc Imaging 2010; 3: 517-24.*
10. Radiogenic cancer risk models and projections for the U.S. *population. Washinton, D.C.: U.S. Environmental Protection Agency (EPA), 2011.*

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http://dx.doi.org/10.3346/jkms.2013.28.12.1701