

Fukushima Dai-ichi and the Ocean: 10 years of study and insight Abstract Submission Form : Entry # 63

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Session

Biological uptake of radionuclides

Abstract Title (English, limited to 300 characters)

An evaluation of radiation doses and associated risk from the Fukushima nuclear accident to marine biota and human consumers of seafood

Abstract (English)

Radioactive isotopes originating from the Fukushima damaged nuclear reactor in Japan following the earthquake and tsunami in March 2011 were found in resident marine animals and in migratory Pacific bluefin tuna (PBFT). Publication of this information resulted in a world-wide response that caused public anxiety and concern, although PBFT captured off California in August 2011 contained activity concentrations below those from naturally occurring radionuclides. To link the radioactivity to possible health impairments, we calculated doses, attributable to the Fukushima-derived and the naturally occurring radionuclides, to both the marine biota and human fish-consumers. We showed that doses in all cases were dominated by the naturally occurring alpha-emitter Po-210, and that Fukushima-derived doses were 3-4 orders of magnitude below Po-210-derived doses. Doses to marine biota were about two orders of magnitude below the lowest benchmark protection level proposed for ecosystems ($10 \mu\text{Gray/h}$). The additional dose from Fukushima radionuclides to humans consuming tainted PBFT in the US was calculated to be 0.9 and $4.7 \mu\text{Sievert}$, for average consumers and subsistence fishermen, respectively. Such doses are comparable to, or less than, the dose all humans routinely obtain from naturally occurring radionuclides in many food items, medical treatments, air travel, or other background sources. Although uncertainties remain regarding the assessment of cancer risk at low doses of ionizing radiation to humans, the dose received from PBFT consumption by subsistence fishermen can be estimated to result in 2 additional cancer cases per 10 million similarly exposed people.