Mercury stable isotope in skipjack tuna (*Katsuwonus pelami*), a tracer of methyl mercury spatial distribution in Ocean?

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Mercury (Hg) level in tuna is a valuable bioindicator of marine methylmercury (MeHg) since >90% of total Hg (THg) is in the form of MeHg. Application of Hg stable isotope to tuna highlight the potential of this tool as a unique geochemical tracer of MeHg. However, interpretation of stable isotope data in highly migratory species is still a matter of debate. In this study, we measured Hg stable isotope ratio along with carbon (C) stable isotope ratio in muscle tissue of skipjack tuna collected from North Western Pacific. Typical north-south seasonal migration of this species enable us to compare the latitudinal gradiant of $\delta^{13}C$ in particulate organic carbon (POC). It helps to discuss metabolic turnover issue. The $\delta^{13}C$ showed increasing trend from north to south which is consistent with the global latitudinal gradient of POC. According to the recent experimental studies using bluefin tuna, turnover rates of C and MeHg are similar and these take around one year. Their turnover rate of skipjack tuna might be shorter considering its life span, but is likely in the order of several months. Nevertheless, $\delta^{13}C$ seem to reflect, at least partly, recent isotope signal before catching. Based on this assumption, we interpreted the geographical variation of Hg stable isotope along with the biogeochemical dataset of ocean. The $\delta^{202}Hg$ and $\Delta^{199}Hg$ showed significant geographical variation among the three different ocean currents, i.e., (i) Oyashio (North Pacific Subpolar Gyre), (ii) Kuroshio (North Pacific Gyre), (iii) Equatorial Counter Current (ECC). Variation of $\Delta^{199}Hg$ most likely reflects depth of migration. Shallower migration in Oyashio than warmwater currents is consistent with general ecological understanding of this species. Lower THg level in ECC than Kuroshio is consistent with reported MeHg distribution in ocean. Overall, we conclude that Hg stable isotope in skipjack tuna is a good tracer for spatial distribution of MeHg in Ocean.