

The Leading Seafood Cuisine of Anisakidosis in Japan

TO THE EDITOR—Iwata et al [1] reported the suitability and feasibility of freezing raw fish to eliminate the risk of anisakidosis infection. They compared frozen and raw sushi materials, squid, and mackerel, using a suitable scientific method. However, we discuss this study's misleading interpretation.

During the last few decades, many inexpensive sushi restaurants have opened in Japan, where people can enjoy affordable sushi cuisine. The growth of the sushi market has increased 1.5 times within the past decade. The gross market was worth 315 billion yen (\$2.78 billion) in 2015. According to a nationwide survey, the incidence of anisakidosis (reported as food poisoning) has been rising in Japan (Figure 1) [2], which is discordant with the linear growth in the sushi market. The total frequency of the reported anisakidosis cases has raised 5 times much more than the growth ratio of sushi market in this decade. Therefore, we believe that the increase is due to a reporting bias (official reporting system recommended in 1999 and established in 2013). Some review articles have suggested that the increase in anisakidosis incidence is because of advances

in endoscopic techniques and instruments [3, 4].

The substantial difference in anisakidosis prevalence between Japan and China, which has a culture of consuming raw seafood, is under investigation [3]. While Japanese eat fresh raw fish as sushi and sashimi, Chinese eat oil-cooked fish. This difference may be caused by different cooking styles in these countries. Based on the official record, the leading seafood source of anisakidosis is mackerel, of which more than half is pickled (Figure 1). Raw or undercooked squid is rarely the cause of food-related anisakidosis (Figure 1), indicating that squid is relatively safe. A comprehensive review on anisakidosis published in *Clinical Infectious Disease* revealed that seafood served in community sushi bars/restaurants tends to be less contaminated [5]. This may be because all franchised sushi restaurants in Japan use frozen squid. A higher incidence of anisakidosis is anticipated with the use of undercooked seafood in local food houses or homes [5]. Epidemiological studies in Japan have revealed that anisakidosis is more frequent in coastal population, with most cases occurring among fishermen [5]. These factors suggest that the most unsafe cuisine in Japan is pickled

mackerel. Pickling does not sterilize anisakids. Thus, the recommendations of Iwata et al will not help decrease the incidence of anisakidosis in Japan.

We also have concerns on 2 minor issues. The first issue is that medical students and residents are not the most suitable participants to study because they are not the most typical representatives of the community. The second issue is regarding seafood freshness. The authors used seafood purchased unfrozen material 2 days earlier, which cannot be regarded as fresh.

All franchised restaurant managers and sushi chefs have been educated to avoid the risk of anisakidosis. It is known that within 20 hours after the death of the host sea fish, anisakid larvae move from fish intestines to the muscles at 20°C but not at 4°C. Consumption of fresh unfrozen sushi without the risk of anisakidosis requires adequate preservation at 4°C and consumption on the day of the catch. In 2014, President Obama visited Japan formally and greatly enjoyed eating *fresh* seafood at the sushi dining bar Jiro in Ginza. Professionals know that really fresh sushi material, caught in the morning, has a minimal anisakidosis risk.

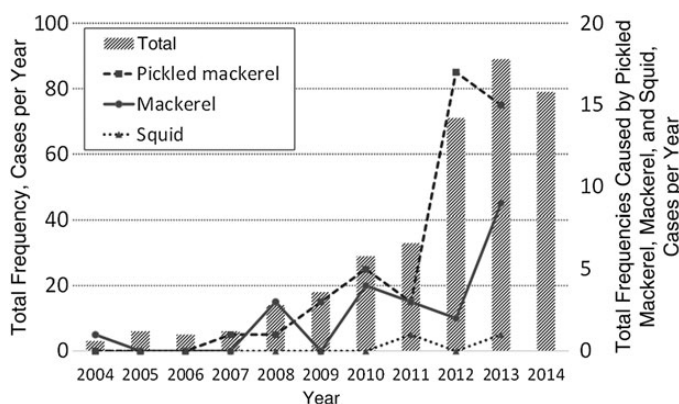


Figure 1. Frequency of anisakidosis (reported as food poisoning) for squid, mackerel, and pickled mackerel from 2004 to 2014 (based on data from the Food Safety Commission of Japan) [2].

Note

Potential conflicts of interest. All authors: No potential conflicts of interest. All authors have submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest. Conflicts that the editors consider relevant to the content of the manuscript have been disclosed.

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