

## Why did I eat that? Scombroid (histamine) fish poisoning in Oregon

Histamine fish poisoning, also called scombroid or scombrotoxin poisoning, indicates a reaction after eating of fish or other foods laden with histamine. When certain types of oily fish (e.g., tuna, sardines, skipjack, mackerel, mahi-mahi, Table 1) are exposed to temperatures warmer than 40° Fahrenheit for several hours, bacteria in the fish decarboxylate histidine, yielding histamine (Figure 1).\*

Subsequent cooking might kill the bacteria but does not inactivate the heat-stable histamine, which remains, colorless and tasteless, in the fish. Ingestion of histamine-contaminated fish can mirror an allergic reaction, with symptoms that may include flushing, swelling, itching, headache, hives, occasionally dry mouth, lightheadedness, palpitations, nausea, vomiting and diarrhea, ensuing typically within minutes but up to two hours after consumption. Symptoms usually resolve within a few hours with or without antihistamine treatment.

### Clinician's role

Any marine intoxication, including scombroid, is reportable in Oregon immediately to local public health authorities (LPHAs). Upon report, the LPHA will work with the Oregon Health Authority, the Oregon Department of Agriculture (ODA) and the U.S. Food and Drug Administration (FDA) to sort out where in the food supply chain the contamination occurred (at point of harvest, on the fishing vessel, at any point in transport or distribution, at the restaurant or market or at a private residence – such as the case's home), and take any action needed to prevent ongoing exposure of others. Commensurate public health actions (embargo of leftover product or recall of product in the same lot) can be implemented in situations where

**Table 1. A short list of fishy food implicated in scombroid poisoning**

Fish	Family
Tuna	<i>Scombridae</i>
Swordfish	<i>Scombridae</i>
Marlin	<i>Scombridae</i>
Mackerel†	<i>Scombridae</i>
Bonito	<i>Scombridae</i>
And other <i>Scombridae</i> imposters, including:	
Saury	<i>Scomberesocidae</i>
Mahi-mahi	<i>Coryphaenidae</i>
Yellowtail Amberjacket	<i>Carangidae</i>
Bluefish	<i>Pomatomidae</i>
Anchovy	<i>Engraulidae</i>
Escolar	<i>Gempylidae</i>
Sardine	<i>Clupeidae</i>

And some non-fish for good measure:  
Swiss, gouda and cheddar cheeses<sup>1</sup>

† "Skombros" is Greek for mackerel

\* Compounds produced as fish deteriorate: histamine and putrescine and cadaverine (oh, my!).

contaminated product is available for sale outside the home.

Interviews of the mealmates of confirmed scombroid cases in Oregon have revealed at least two reasons why people might not seek medical attention following a histamine reaction: 1) they

don't recognize their symptoms as resembling an allergic reaction; or 2) they mistake the histamine poisoning for a food allergy and self-medicate. Otherwise, scombroid-afflicted persons do tend to seek medical care, typically at the nearest emergency department (ED).

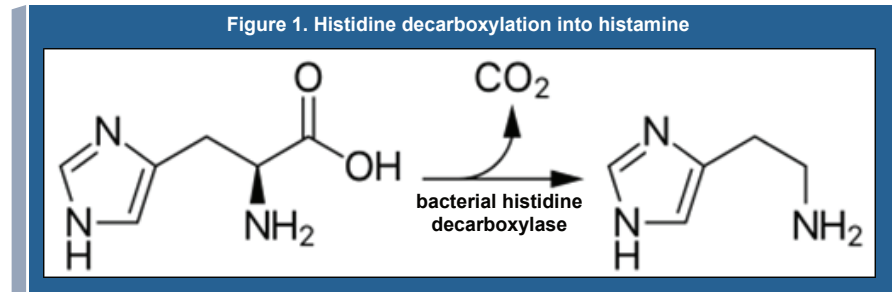
The diagnosis of scombroid is a clinical one; the astute clinician will ascertain a history with the following clues:

- Recent consumption of fish
- No known allergies to said fish
- Similar symptoms reported by mealmates, and
- Possible reports of the fish tasting tingy, peppery or metallic

### A progressive scombroid dinner

Japan began to identify isolated cases of scombroid in the 1950's, and the U.S. and Britain soon followed suit; research in the 1980's finally linked fish and histamine.<sup>2</sup> Following are highlights of recent notable scombroid outbreaks:

- In 1998, 4 persons fell ill in Pennsylvania, all within minutes of eating a tuna-and-spinach salad.<sup>3</sup> Upon trace back, Chester County public health authorities and the Pennsylvania Department of Agriculture established that the contamination had occurred in the water where the tuna were caught. Tuna are "ram ventilators," which means that they breathe by opening their mouths and swimming forward ("ramming" water past their gills; they must swim in order to breathe).<sup>4</sup> The 40–60 -pound yellowfin tuna involved in this outbreak had been caught in the Gulf of Mexico on fishing lines up to 60 miles long. It took so long to reel it in that the (now dead) fish came up to semi-tropical temperatures, which allowed bacteria to proliferate and histamine to be produced.
- In 2003, Marin County, California health officials reported 42 cases of scombroid among attendees of a retreat center who ate escolar fish.<sup>†</sup> Investigators found a dose-response relationship between the amount of fish consumed and the severity of illness among attendees: the lucky ones who were assigned, as part of the retreat, to go to bed hungry, ate less fish and had less severe symptoms of scombroid.<sup>5</sup>
- In the interest of protecting the health of their customers, fishmongers have demonstrated their eagerness to recall voluntarily any potentially contaminated



<sup>†</sup> Escolar, by the way, is more notorious in public health circles for the diarrhea caused by the fish's undigestible waxy esters, which earned it the moniker of "the Ex-lax® fish."<sup>6</sup>

product — an action that Whole Foods Market took in 2010 when they recalled all packages of frozen yellowfin tuna distributed to 28 states and the District of Columbia after reports of just two illnesses.<sup>7</sup>

## Epidemiology

Because scombrototoxin (histamine) can contaminate many types of fish found and distributed all over the world, by some estimates scombroid is the most common single illness associated with seafood.<sup>8</sup> Although individual cases of scombroid are not nationally notifiable, the Centers for Disease Control and Prevention does collect data on all foodborne outbreaks. A review of these data for 1998–2014 indicates that histamine poisoning or scombroid was the largest category of illness reported among the 736 fish-related outbreaks — accounting for 289 outbreaks, handily edging out ciguatera by 31 outbreaks (Figure 2).<sup>9</sup> The annual number of outbreaks peaked in 2001 (at 33) and has been hovering around  $\leq 10$  a year since then.

These outbreaks have tended to be small (many comprised just two or three individuals; mean of 13 cases and median of two cases) and were predominantly associated with exposure at a restaurant.

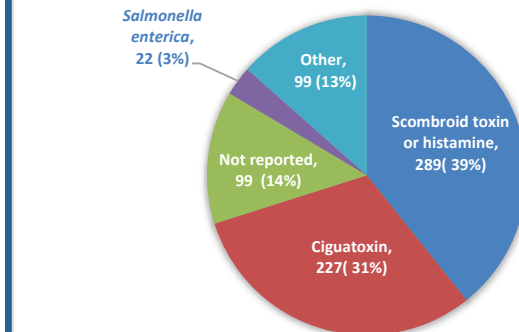
## Oregon

Since 2013, eight cases of scombroid have been reported here. Six of those cases were identified by an ED or urgent care clinic provider; the remainder were reported by meal mates. Newly implemented ED syndromic surveillance suggests, however, that scombroid is under-reported in Oregon. For example, since 2014, a search of ED records mentioning symptom “allergy” and exposure “fish” (and excluding “nut,” “bee” and other commonly reported allergic reactions) found 22 ED visits. Upon review of provider notes, 10 visits were suspiciously scombroid-like (Table 2). Such cases would appear to have been reportable to public health.

### Clues:

- Recent consumption of fish
- No known allergy to fish
- New, unexpected reaction
- No new medications
- Sudden onset
- Allergic-like reaction
- Resolution within several hours with and without antihistamines
- Spoiled fish may taste fine, but may taste metallic, peppery or otherwise strange

Figure 2. CDC Fish-borne outbreak data



- Medications such as isoniazid (INH) and monoamine oxidase inhibitors (MAOIs), which inhibit histamine metabolism, are also thought to predispose patients to histamine reactions.<sup>2</sup>

## FDA and ODA testing

FDA regulates fish to try to ensure that it remains at proper temperatures. Fifty parts per million (ppm), equal to 5 mg per 100 g fish, is FDA's limit for histamine.<sup>10</sup> Although clinical laboratory tests are not commonly used to confirm a diagnosis of scombroid, both FDA and ODA can test food for histamine. If multiple food samples from an implicated product yield histamine >50 ppm, we can be fairly sure that the product was the cause of any histamine-like illness and will attempt trace back with an eye to recalling implicated product.

## Scombroid prevention in 7 words

Keep fish iced or refrigerated until cooking.

## For more information

- Scombrototoxin Poisoning and Decomposition.  
[www.fda.gov/Food/FoodborneIllnessContaminants/BuyStoreServeSafeFood/ucm335658.htm](http://www.fda.gov/Food/FoodborneIllnessContaminants/BuyStoreServeSafeFood/ucm335658.htm)

## References

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7. Whole Foods Market voluntarily recalls frozen whole catch yellow fin tuna steaks due to possible health risks. FDA 2010. Available at: [www.fda.gov/safety/recalls/archiverecalls/2010/ucm207477.htm](http://www.fda.gov/safety/recalls/archiverecalls/2010/ucm207477.htm). Accessed 25 Aug 2016.

**Table 2. Selected emergency department notes consistent with scombroid**

Patient	Clinical Notes
1	Had dinner and ate fish and then body started feeling hot and started having chills. Has allergy to shrimp, has eaten fish before without problems. Denies any SOB, just "feel hot in my body."
2	Pt believes fish caused swelling in her throat and tongue. No prior allergy to fish. Pt ambulatory to ED c/o allergic reaction. Pt states she ate fish at approx. 1730 and at approx. 1800 she began to get "bumps under my tongue" and the sensation of throat swelling. Pt denies new medications and states she ate food that she has had previously w/o difficulty/reaction. Pt denies CP and itching. Pt states she took 25mg Benadryl PO at approx. 1950
3	PT ate sushi around 1820. Feels like lips are swelling, swallow difficult, feels SOB. Faint wheeze right lung audible. Denies hx food allergy. Pt currently denies any shortness of breath or tightening in throat.
4	Pt presents for concern for allergic reaction. Ate fish around 1900 or 2000, 30 min after felt itching, dizziness, felt heart beating fast. Pt aox4, talking in full sentences, no airway issues, managing secretions. No rash. Reports itchiness currently all over. Was seen here recently for other allergy concerns, but no known allergies.

8. Lipp E, Rose J. The role of seafood in foodborne diseases in the United States of America. *Rev Sci Tech OIE* 1997;16:620–40.
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