

Finding the Needle in the Haystack

Catherine Feeney November 17, 2021





- RI Outbreak Investigations
- Pathogens causing FBI
- Salmonella Outbreaks
- E Coli
- Histamine
- Amnesic Shellfish Poisoning
- Copper Poisoning
- Campylobacter



Rhode Island FBI Investigations

About Rhode Island



- Population: 1.1 million
- Centralized Structure
 - No Locals
 - 3 field offices for Retail
 - Manufactured Foods
 - > Dairy
 - > Shellfish



Program Standards (manufactured food & retail)



RIDOH Outbreak Response





7 Steps in an FBI Investigation





Environmental Antecedents



DEPARTOR HUNDELING

Looks more like this....





Figure A. Sequence of events in investigating a typical outbreak of foodborne illness.



The Pathogens

The FBI Pathogens



- Over 250 foodborne diseases identified
- Most of them are caused by:
 - Bacteria
 - Viruses
 - Parasites



 Harmful toxins and chemicals can also contaminate food and cause foodborne illness

Top 5 Causes of FBI



- **Norovirus:** virus, spreads quickly usually associated with ready-toeat foods.
- **Salmonella:** bacteria, commonly associated with chicken and eggs.
- **Clostridium perfringens:** bacteria, found on raw meat and poultry, in the intestines of animals and in the environment.
- Campylobacter: bacteria, raw or undercooked poultry
- **Staphylococcus aureus:** bacteria, 25% of people and animals have staph on their skin and in their nose.

Other Bacteria



- **Listeria:** bacteria, associated with deli meats, soft cheeses, raw sprouts, melons.
- E. Coli: bacteria, associated with meat, leafy greens.
- **Clostridium botulinum:** bacteria, associated with homecanned foods, honey (for infants).
- **Vibrio:** bacteria, associated with shellfish when water temperatures get warmer

Chemically Related FBI Hazards



Toxins

- Marine toxins
 - Ciguatoxin
 - Scombroid toxin
 - Paralytic shellfish poison
 - Puffer fish toxin
- Heavy metals
 - Can cause vomiting in high concentrations
 - Occurs a few minutes to several hours (but in most cases in less than 1hour) after ingestion



Salmonella

Salmonella Montevideo



- National outbreak associated with salami products produced in RI
- July 2009-April 2010



- 272 people in 44 states reported ill
- Identified the suspect product through shopper card records in Washington state

Investigation at Processor



- Company said they routinely tested finished products
 - All results were negative for Salmonella
- What they *actually* tested were *almost-finished* products
 - Tested products after they were cured, but BEFORE they were coated in pepper





- Black pepper and crushed red pepper tested positive for *Salmonella* Montevideo
 - Pepper from two companies
 - Imported from three countries
 - Contaminated with four other serotypes of Salmonella





 Pepper samples also had high standard plate counts (indicator of bacterial contamination)

Lessons Learned



- Make sure finished product testing is done on *finished* products
- Cause of illness may not be final product, but rather an *ingredient*
- Spices have high bacterial contamination; use irradiated spices if possible if the spices will not go through a cooking process

Defusco's Bakery



Beginning...

March 25, 2011

- Notified of 11 illnesses and 7 hospitalizations at a nursing home
- Two cases preliminarily positive for Salmonella

Interviews identified that zeppoles, a cream-filled pastry, were served earlier in celebration of St. Joseph's Day (March 19)

Investigation



- Environmental Investigation
 - Pastry cream improperly cooled
 - Pastry shells stored in used egg boxes
 - Equipment/utensils not properly sanitized
- Inspection resulted in:
 - Closure of bakery (two locations)
 - Recall of all products from bakery
 - Inspection of other bakeries selling products from suspect bakery

Epidemiology



- Epi Investigation
 - Interviewed 80+ cases
 - 83 cases; 3 deaths
 - Implicated food
 - Zeppole or cream-filled pastry from Defusco's
 - People who ate zeppoles or cream filled pastry from Defusco's were 8 times more likely to become ill than people who did not eat cream filled pastries from Defusco's

Lab Results



- Samples
 - 54 Food Samples
 - All negative for Salmonella
 - 54 Environmental Samples (boxes, swabs, pastry bags)
 - All negative for Salmonella
 - Stool or Blood Samples
 - Ill patrons- 53 positive for Salmonella
 - All employees (stool)- All negative for Salmonella



E Coli





- 17 ill in 8 states in May 2019
- RI had one case who worked at a bakery
- Ate raw cookie dough



- Sampled unopened bag of flour
- Positive for Ecoli 026 and matched outbreak strain

Dangers of Raw Dough

DEP RANGENT OF

- 1st recall May 22nd
- Expanded recall in June, August, September, October



- Consumers need a wake-up call about dangers raw flour
- <u>https://www.foodsafetynews.com</u>



Harmful Algal Blooms

About Harmful Algal Blooms

- Amnesic Shellfish Poisoning (ASP) also known as domoic acid (DA) poisoning
- Domoic acid is produced by diatoms of the phytoplankton genus *Pseudonitzschia*
- NSSP Model Ordinance requires that growing areas be placed in the closed status when the DA concentration is equal to or exceeds 20 parts per million in the edible portion of raw shellfish



Timeline of Activities





Response Activities

- Updating MOUs between RI Department of Health and RI Department of Environmental Management
- Establishing SOPs for routine monitoring, including measures of:
 - Plankton presence in waters
 - Toxin presence in plankton
 - Toxin presence in shellfish meats
- Establishing SOPs for water closures and reopenings
- Added a new laboratory method to facilitate confirmatory testing (LC-MS/MS)







Scombroid Poisoning

Scombroid Fish Poisoning



- Scombroid fish poisoning
 - Aka Histamine fish poisoning
- Histamine is produced when bacteria metabolize naturally occurring histidine in fish.
 - Most often occurs when fish is held at warm temperatures
- Resembles an allergic reaction:
 - Facial flushing, sweating, rash, burning or peppery taste in mouth, diarrhea, and abdominal cramps
- Symptoms typically disappear within several hours
- Associated with fish from the Scombridae family, such as tuna and mackerel

Tuna Steaks





Timeline of Activities





Timeline of Activities







Nicole Alexander-Scott, MD, MPH Director of Health Three Capitol Hill Providence, Rhode Island 02908-5097 www.health.ri.gov



Public Health Press Release

For: Immediate release Date: May 4, 2017 Contact: <u>Joseph Wendelken</u> (401-222-3998)

Dave's Marketplace Recalling Frozen Tuna Steaks

The Rhode Island Department of Health (RIDOH) is advising consumers that Dave's Marketplace is recalling 10oz Frozen Tuna King tuna steaks sold at the retailer on or after March 23, 2017.

This lot of frozen tuna steaks is being recalled as a result of elevated histamine levels that were detected during routine surveillance sampling at RIDOH's State Health Laboratories.

When consumed in food, histamine can result in symptoms including tingling or burning in the mouth, facial swelling, rashes, hives and itchy skin, nausea, vomiting or diarrhea. Anyone experiencing these symptoms after consuming frozen Tuna King tuna steaks from Dave's Marketplace should seek medical attention. Young children, elderly people, individuals who are immunocompromised, and pregnant women are particularly susceptible to foodborne illness. At this time, there have not been any reports of illnesses associated with this recall.

Scombroid Outbreak: Detection





- On September 16th, 2019, healthcare provider alerted CAIDE about a scombroid case
 - Restaurant A
- Scombroid is on the reportable diseases & conditions
Scombroid Outbreak: Investigation

 CFP received an illness complaint from two individuals who became ill after eating at Restaurant A.

Table 1. Symptoms for Rhode Island Cases

Symptoms	Rhode Island Cases (n=3) n (%)
Redness/Flushing	3 (100)
Dizziness	3 (100)
Rash or Hives/Urticaria	3 (100)
Itching	2 (66.6)
Headache	2 (66.6)
Paresthesia	1 (33.3)
Stomach pain/nausea	2 (66.7)
Diarrhea	2 (66.6)
Vomiting	1 (33.3)







- CFP conducted another on-site investigation
 - No storage or handling issues were observed
- Product consumed by ill individuals came from the same source as the product that caused the first illness
 - They had received a new shipment of this contaminated product
- CFP contacted Restaurant A's supplier to determine their distribution in Rhode Island
- Collected additional samples

Scombroid Outbreak: Investigation

- CFP Performed an onsite investigation at RI establishment
 - No issues observed at the retail level (e.g., temperature abuse, etc.)
 - Collected invoices for traceback
 - Collected samples of frozen tuna loins and steaks
 - Embargoed Product









Collection Site	Product Distribution	Histamine Concentration (PPM)	
Restaurant A	Tuna	4.7	
Restaurant A	Tuna	>500	
Restaurant A	Tuna	>500	
Restaurant A	Tuna	2.6	
Restaurant A	Tuna	<2.5	
Restaurant A	Tuna Loin	3200	
Market B	Tuna	3400	
Ready to Eat Stand at Market A	Tuna	3300	
Ready to Eat Stand at Market A	Tuna loin	6400	
Ready to Eat Stand at Market A	Tuna loin	14	





Table 2. Sample Results for Rhode Island Food Samples

Collection Site	Product Distribution	Histamine Concentration (PPM)
Restaurant A	Tuna	4.7
Restaurant A	Tuna	>500 ★
Restaurant A	Tuna	>500 🔶
Restaurant A	Tuna	2.6
Restaurant A	Tuna	<2.5
Restaurant A	Tuna Loin	3200 ★
Market B	Tuna	3400 🔶
Ready to Eat Stand at Market A	Tuna	3300 🗡
Ready to Eat Stand at Market A	Tuna loin	6400 ★
Ready to Eat Stand at Market A	Tuna loin	14



Scombroid Outbreak: Traceback



Figure 1. Traceback of the tuna to the Vietnamese firm and the trace forward from the distributor that Restaurant A received their tuna from.



Scombroid Outbreak: Traceback



Figure 1. Traceback of the tuna to the Vietnamese firm and the trace forward from the distributor that Restaurant A received their tuna from.



Scombroid Outbreak: Investigation



- September 17th two of the frozen unopened samples had histamine levels in amounts greater than 500ppm.
- Released the embargo at Restaurant A and all product was disposed.
- Notified FDA of sample results to initiate recall.
 FDA notified CFP that the product was traced back to Importer A, an importer in Florida who had received the product from a Vietnamese firm.

Additional cases in Vermont potentially linked to this product



Scombroid Outbreak: Sample Results



- 10 samples of frozen tuna collected:
 - Samples collected at 3 different facilities in RI.
 - 6 samples >500ppm of histamine
 - 3 of those 6 were greater than 3000ppm



Scombroid Outbreak: Communication



RIDOH Food Establishment Advisory

October 1, 2019

Frozen Raw Tuna Loins From MiCal Seafood, Inc. Contain High Levels of Histamine

The Rhode Island Department of Health (RIDOH) Center for Food Protection (CFP) is advising food establishments to not consume or serve yellowfin tuna loins from MiCal Seafood, Inc., until further notice. Food samples of this product that were tested at the State Health Laboratory indicated that it contained high levels of histamine. The samples were collected in response to receiving consumer complaints after consuming this product.

Scombroid poisoning is caused by eating fish that has not been under proper temperature control at any point in the distribution system, and therefore contains high levels of histamine. Scombroid poisoning is most commonly caused by fish that have naturally high levels of the amino acid histamine, which bacteria convert to histamine when the fish is not correctly stored.

Scombroid symptoms usually develop within a few minutes to an hour after eating contaminated fish. They usually resemble an allergic reaction, such as flushing of the face, headache, heart palpitations,

- ✓ Sent an advisory to all
 licensed RI Establishments
 via MailChimp
- Notified FDA of all sample results and traceback

documents

✓ CAIDE issued a

provider advisory

Scombroid Outbreak: Results



- Multi-state Scombroid Fish Poisoning (SFP) Outbreak
 - Suspect Food: Tuna
- 51 cases across 11 states
- Florida Importer did a recall on October 3rd



- Vietnamese firm was put on import alert in November 2019
- Several recalls were conducted from various importers

Scombroid Outbreak: AAR



Successes

- Collected samples that helped lead to the recall
- Conducted traceback/traceforward
- Publication with FDA and multiple states
- FDA was able to identify the firm and put them on the import alert list

Challenges

Delays with recall

Take Home Messages



- Scombroid is a reportable illness in RI
- Such high histamine levels had not been seen before in RI
 - suggest the product was highly contaminated and decomposed.
- Early detection of cases and a prompt recall is essential to preventing additional cases.



Copper Poisoning

Rose Gold Cake



- The cake was ordered from a RI bakery
- The frosting on the cake was described as "metallic, glittery, and rose gold." (pictured on right)





Epidemiologic Investigation

• Interviews:

- 6 ill individuals (ages 1-11)
- No other common events were identified
- Exposures: the cake was a common item among all ill individuals, no well individuals consumed the frosting
- Symptoms: vomiting, diarrhea
- **Onset:** 30 minutes to 10 hours after consumption of cake
- **Duration:** generally, less than 10 hours



Environmental Health Investigation



- CFP sent state food inspectors to the bakery.
- Key components:
 - Implement immediate control measures;
 - Conduct a food flow of suspect items;
 - Collect invoices and other information about suspect ingredients; and
 - NEARS manager interview and NEARS environmental observations.

Food Flow of Cake



Ingredients: Cake Mix, Frosting, Luster Dust
Cake is baked
Cake is frozen
Cake is frosted
Cake is frozen
Luster dust is added to butter extract and painted on cake with a brush in intervals to

get nice thick layer

Luster Dust



- A non-edible ingredient called
 Rose Gold Dust was applied as a decoration to the frosting of the cake in question.
- This ingredient is also broadly known as a type of **Luster Dust**.



Control Measures



- All non-edible Luster Dust bottles were placed under embargo
 - Some bottles were not labeled as edible or non-edible
 - Those without ingredients were considered nonedible
- Identified and embargoed other products for sale in the retail area that were coated with Luster Dust
 - Chocolate Pops
 - Pretzels with Chocolate



Luster Dust





Luster Dust Traceback





Copper Highlighter Dust – 2 oz (Non Edible – Non Toxic)

This copper highlighter can be used for decorating show pieces or cake stands. It's non-toxic and edible, making it a great choice for sprinkling on pastry stands.

C ADD TO WISHLIST

SKU: DCD2 Categories: Dust, Gold & Silver Décor, Gold & Silver Décor Tag.

Luster Dust Traceback





SECTION III - COMPOSITION / INFORMATION ON INGREDIENTS

		Full text of R-Phrase		
Chemical characterisation of the	Hazard(ous)	%weight	CAS	
ingredients(s) (in the preparation)	Ingredient(s):			
Name: IUPAC	Copper	90, 80, 70	7440-{	
Name: IUPAC Name: IUPAC	stearic acid	+/- 1%	57-1′	

Luster Dust Traceback





The metallic effect finishes (special effects) combined with the excellent hiding power have resulted in the use of aluminium and gold bronze pigments for a wide variety of industrial coatings, including consumer goods, interior design, floor coverings ...

Gold bronze and copper pigments for Industrial coatings

Available in Rich Gold, Rich Pale Gold, Pale Gold and Copper shades

Conventional		Water based	Particle size		Optical Characte	ristics	
Powders	Pastes	Aquastab Pastes	D10	D50	D90	Brilliance	Coverage
2500	2500/WS/85-15	2500/BG8B"/80-20	16	42	78	*****	***

Food Sampling



CFP collected a leftover slice of cake from the party host's residence for chemical testing by the SHL.



More Luster Dust Sampling









Laboratory findings of the slice of cake:

- 22.1 milligrams of copper per gram of Rose Goldcoated frosting
- ~nearly 900 milligrams of copper on the slice of cake
- A RIDOH toxicology specialist confirmed that these levels would have been sufficient to cause the symptoms that were described.

Outbreak Conclusions



- Symptoms and illness onsets were most consistent with a heavy metal poisoning
- The cake frosting was identified as the suspect food item:
 - It was consumed by all ill individuals
 - It was decorated with a product that was not labeled for consumption
- Laboratory evidence supported this suspect etiology and identified copper as the metal associated with the poisoning.

Next Steps/Questions



• What are other inedible luster dusts made of?

- RIDOH sampled 28 other luster dusts and found: aluminum, barium, chromium, copper, iron, lead, manganese, nickel, and zinc.
- Do other bakeries use these properly?
 - A few other RI bakeries visited were using inedible luster dust on an edible part of a food.

• **RIDOH issued guidance to bakeries**

• Edible glitters and dusts must have an ingredient list.

FDA Guidance



FDA Advises Home and Commercial Bakers to Avoid Use of Non-Edible Food Decorative Products

f Share 🏾 🕊 Tweet 🛛 in Linkedin 🖉 Email 🔒 Print

FDA is advising home and commercial bakers to avoid using glitter and dust products to decorate cakes and other food items unless the products are specifically manufactured to be edible.

The agency has become aware that some non-edible decorative glitters and dusts are promoted for use on foods. Home and commercial bakers need to be aware that these types of glitters and dusts are not intended to be used directly on foods and may contain materials that should not be eaten.

To Eat or Not Too Eat: Decorative Products on Foods Can Be Unsafe

Take Home Messages



- Luster dust is a trend with bakers
- There are edible dusts so it's important to educate environmental health staff to identify the differences
- Inedible luster dust is meant for decorations
- Guidance to consumers and bakeries could potentially prevent another outbreak from happening



Campylobacter in Oysters

Changing Outbreaks



- FBI complaints 8 from 2 parties, 2 others
- 6 of 9 reported ill 8-16 oyster farm tour
- 1 of 4 reported ill 8-19
- Other unrelated
- 3 confirmed for Campylobacter Jejuni
- Sampled oysters from restaurant
- 1 positive for Campylobacter Lari

Positive Sample



- Oyster Farm on Potters Pond
- Campylobacter Lari associated with Seagulls



Closed for Shell Fishing



- Worked with Dept of Environmental Management
- In Consultation with FDA
- Model Ordinance warrants closure
 - Human illnesses related to Campylobacter Jejuni
 - Positive sample for Campylobacter Lari

Sampling and Next Steps



- Picked up additional samples
- 3 more C Lari positives & 1 C Jejuni
- Elevated fecal coliform
- Starting with bird abatement plan
- Consultation with FDA to establish reopening criteria
Take Home Messages



- Work with other agencies and FDA
- Develop criteria to reopen
- 3 weeks of sampling
 - No positives for Campylobacter
 - Fecal coliform below established level

Reopened 1st week of November



Thank you!