# 8-6 Classification of Illnesses Attributable to Foods

## Classification of Illnesses Attributable to Foods

(A Classification by Symptoms, Incubation Periods, and Types of Agents)

<table>
<thead>
<tr>
<th>Disease</th>
<th>Etiologic Agent and Toxic Substances</th>
<th>Incubation Period</th>
<th>Signs &amp; Symptoms</th>
<th>Foods Involved</th>
<th>Specimens to Collect</th>
<th>Factors That Contribute to Outbreaks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gastrointestinal irritation group</td>
<td>Possibly resin-like substances in some mushrooms (mushroom species are different than those cited on pp. x &amp; y)</td>
<td>30 minutes to 2 hours</td>
<td>Nausea, vomiting, retching, diarrhea, abdominal cramps</td>
<td>Many varieties of wild mushrooms</td>
<td>Vomitus</td>
<td>Eating unknown varieties of mushrooms, mistaking toxic mushrooms for edible varieties</td>
</tr>
</tbody>
</table>

## Chemical Agents

**Antimony Poisoning**
- Antimony in gray enamelware
- Incubation period: Few minutes to 1 hour
- Signs: Vomiting, abdominal pain, diarrhea
- Foods Involved: High-acid foods and beverages
- Specimens: Vomitus, stools, urine
- Factors: Using/buying antimony-containing utensils, storing high-acid foods in gray enamelware

**Cadmium Poisoning**
- Cadmium in plated utensils
- Incubation period: 15 to 30 minutes
- Signs: Nausea, vomiting, abdominal cramps, diarrhea, shock
- Foods Involved: High-acid foods & beverages, candy love beads or cake decorations
- Specimens: Vomitus, stools, urine, blood
- Factors: Using/buying cadmium-containing utensils, storing high-acid foods in cadmium-containers, ingesting cadmium-containing foods

**Copper Poisoning**
- Copper in pipes and utensils, old dairy white metal
- Incubation period: Few minutes to few hours
- Signs: Metallic taste, nausea, vomiting (green vomitus), abdominal pain, diarrhea
- Foods Involved: High-acid foods and beverages, ice cream (ices) and beverages
- Specimens: Vomitus, gastric washings, urine, blood
- Factors: Storing high-acid foods in copper utensils or using copper pipes for dispensing high-acid beverages, faulty back-flow prevention valves in vending machines

**Fluoride Poisoning**
- Sodium fluoride in insecticides
- Incubation period: Few minutes to two hours
- Signs: Salty or soapy taste, numbness of mouth, vomiting, diarrhea, abdominal pain, pallor, cyanosis, dilated pupils, spasms, collapse, shock
- Foods Involved: Any accidentally contaminated food, particularly dry foods, such as dry milk, flour, baking powder & cake mixes
- Specimens: Vomitus, gastric washings
- Factors: Storing insecticides in same area as foods, mistaking pesticides for powdered foods

**Lead Poisoning**
- Lead in earthenware, pesticides, putty, plaster, cans with lead solder seams
- Incubation period: 30 minutes or longer
- Signs: Mouth and abdominal pain, milky vomitus, black or bloody stools, foul breath, shock, blue gum line
- Foods Involved: Beverages stored in lead containing vessels, any accidentally contaminated food
- Specimens: Washings, stools, blood, urine
- Factors: Storing high-acid foods in lead-containing vessels, storing pesticides in same area as food, imported canned high-acid foods with faulty seams

**Tin Poisoning**
- Tin in tinned cans
- Incubation period: 30 minutes to two hours
- Signs: Bloating, nausea, vomiting, abdominal cramps, diarrhea, headache
- Foods Involved: High-acid foods and beverages
- Specimens: Vomitus, stools, urine, blood
- Factors: Using uncoated tin containers for storing acidic foods. Very high tin concentrations are required to cause illness.

**Zinc Poisoning**
- Zinc in galvanized containers
- Incubation period: Few minutes to few hours
- Signs: Mouth and abdominal pain, nausea, vomiting, dizziness
- Foods Involved: High-acid foods and beverages
- Specimens: Vomitus, gastric washings, urine, blood, stools
- Factors: Storing high-acid foods in galvanized cans

## Incubation (Latency) Period 1 to 6 Hours

### Bacterial Agents

<table>
<thead>
<tr>
<th>Organism</th>
<th>Incubation Period</th>
<th>Signs &amp; Symptoms</th>
<th>Foods Involved</th>
<th>Specimens</th>
<th>Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bacillus cereus</td>
<td>0.5 to 5 hours</td>
<td>Nausea, vomiting, occasionally diarrhea</td>
<td>Boiled or fried rice, pasta, cooked cornmeal dishes, porridge</td>
<td>Vomitus, stool</td>
<td>Storing cooked foods at room temperature, storing cooked foods in large containers in refrigerators, preparing foods several hours before serving</td>
</tr>
<tr>
<td>Staphylococcus aureus</td>
<td>1 to 8 hours, mean 2 to 4 hours</td>
<td>Nausea, vomiting, retching, abdominal pain, diarrhea, prostration</td>
<td>Lower water activity foods (aw), e.g. cheese, whipped butter, ham, meat &amp; poultry products, cream filled pastry, food mixtures, leftovers, dry milk</td>
<td>Vomitus, stool, rectal swabs, carriers nasal swabs, swabs of lesions, anal swab</td>
<td>Inadequate refrigeration, workers touching cooked food, preparing food several hours before serving, workers with infections containing pus, holding foods at warm (bacterial incubating) temperatures, fermentation of abnormally low-acid foods</td>
</tr>
</tbody>
</table>

**Exhibit 8-6**

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CHEMICAL AGENTS

Nitrite poisoning
Nitrites or nitrates used as meat curing compounds or ground water from shallow wells
1 to 2 hours
Nausea, vomiting, cyanosis, headache, dizziness, weakness, loss of consciousness, chocolate brown colored blood
Cured meats, any accidentally contaminated food exposed to excessive nitrification
Blood
Using excessive amounts of nitrites or nitrates in foods for curing or for covering up spoilage, mistaking nitrites for common salt and other condiments, improper refrigeration of fresh foods.

TOXIC ANIMALS

Diarrhetic shellfish poisoning (DSP)
Okadaic acid and other toxins produced by dinoflagellates, Dinophysis acuminata and other species
0.5 to 12 hours commonly < 3 hrs
Diarrhea, nausea, vomiting, abdominal cramps, chills, fever, headache
Mussels, clams, scallops
Gastric washings
Harvesting shellfish from waters with high concentration of Dinophysis

INCUBATION (LATENCY) PERIOD USUALLY 7 TO 12 HOURS
FUNGAL AGENTS

Cyclopeptide and Gyromitrin groups of mushroom poisoning
Cyclopeptides and Gyromitrin in some mushrooms
6 to 24 hours average 6 - 15 h
Abdominal pain, feeling of fullness, vomiting, protracted diarrhea, loss of strength, thirst, muscle cramps, febrile rapid pulse, collapse, jaundice, drowsiness, dilated pupils, coma, death
Amanita phalloides A. verna, Galerina autumnalis, Gyromitra esculenta (false morels) and similar species of mushrooms
Urine, blood, vomitus
Eating certain species of Amanita, Galerina, and Gyromitra mushrooms, eating unknown varieties of mushrooms, mistaking toxic mushrooms for edible varieties

BURNING MOUTH, SORE THROAT AND RESPIRATORY SIGNS AND SYMPTOMS OCCUR

INCUBATION (LATENCY) PERIOD LESS THAN 1 HOUR
CHEMICAL AGENTS

Calcium chloride Poisoning
Calcium chloride freezing mixture for Frozen dessert bars
Few minutes
 Burning lips, mouth, throat, vomiting
Frozen dessert bar
Vomitus
Splashing of freezing mixture onto popsicles while freezing; cracks in molds allowing CaCl2 to penetrate popsicle syrup

Sodium hydroxide poisoning
Sodium hydroxide in bottle washing compounds, detergents, drain cleaners or hair straighteners
Few minutes
 Burning of lips, mouth, and throat; vomiting, diarrhea, abdominal pain
Bottled beverages
Vomitus
Inadequate rinsing of bottles cleaned with caustic

INCUBATION (LATENCY) PERIOD 12 TO 72 HOURS
BACTERIAL AGENTS

Beta-hemolytic streptococcal infections
Streptococcus pyogenes from throat and lesions of infected humans
1 to 3 days
Sore throat, fever, nausea, vomiting, rhinorrhea, sometimes a rash
Raw milk, foods containing eggs
Throat swabs, vomitus
Workers touching cooked foods, workers with infections containing pus, inadequate cooking or reheating, preparing foods several hours before serving

LOWER GASTROINTESTINAL TRACT SIGNS AND SYMPTOMS (ABDOMINAL CRAMPS, DIARRHEA) OCCUR FIRST OR PREDOMINATE

INCUBATION (LATENCY) PERIOD USUALLY 7 TO 12 HOURS
BACTERIAL AGENTS

Bacillus cereus enteritis
Enterotoxin of B. cereus. soil organism (strain differs from emetic form)
6 to 16 hours
Nausea, abdominal pain, diarrhea, some reports of vomiting
Cereal products, custards, sauces, starchy foods, e.g. pasta, potatoes, and meatloaf
Stools, vomitus
Inadequate refrigeration, holding of foods at warm (bacterial incubation) temperatures, preparing foods several hours before serving, inadequate reheating of leftovers

Clostridium perfringens necrotenteritis
Endo-enterotoxin formed during sporulation of C. perfringens in intestines, organisms in feces of infected humans, other animals, and in soil
8 to 22 hours, mean 10 hours
Abdominal pain, diarrhea
Cooked meat, poultry, gravy, sauces and soups
Stools
Inadequate refrigeration, holding foods at warm (bacterial incubation) temperatures, preparing foods several hours before serving, inadequate reheating of leftovers
### Incubation (Latency) Period Usually 12 to 72 Hours

**Bacterial Agents**

<table>
<thead>
<tr>
<th>Bacterial Agent</th>
<th>Incubation Period</th>
<th>Symptoms</th>
<th>Sample</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aeromonas diarrhea</td>
<td>1 to 2 days</td>
<td>Water diarrhea, abdominal pain, nausea, and headache</td>
<td>Stools</td>
<td>Contamination of foods by sea or surface water</td>
</tr>
<tr>
<td>Campylobacteriosis</td>
<td>2 to 7 days, mean 3 to 5 days</td>
<td>Diarrhea (often bloody), severe abdominal pain, fever, anorexia, malaise, headache, vomiting</td>
<td>Raw milk, raw clams and shellfish, water, poultry and meat</td>
<td>Stools, rectal swabs</td>
</tr>
<tr>
<td>Cholera</td>
<td>1 to 5 days, usually 2 - 3 days</td>
<td>Profuse, watery diarrhea (rice-water stools), vomiting abdominal pain, dehydration, thirst, collapse, reduced skin turgor, wrinkled fingers, sunken eyes, acidosis</td>
<td>Raw fish &amp; shellfish foods washed or prepared with contaminated water</td>
<td>Stools, rectal swabs</td>
</tr>
<tr>
<td>Cholera-like vibrio gastroenteritis</td>
<td>2 to 3 days</td>
<td>Watery diarrhea (varies from loose stools to cholera-like diarrhea)</td>
<td>Raw shellfish, raw fish</td>
<td>Stools, rectal swabs</td>
</tr>
<tr>
<td>Pathogenic Escherichia coli</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diarrhea (Three Forms):</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enteroptoxigenic E. coli (ETEC) Gastroenteritis</td>
<td>10 to 72 hours, usually 24 to 72 hrs</td>
<td>Watery diarrhea, abdominal cramps, nausea, malaise, low grade fever</td>
<td>Water, semi-soft cheeses, foods requiring no further heating</td>
<td>Stools, rectal swabs</td>
</tr>
<tr>
<td>Enterohemorrhagic E. coli (EHIE) Gastroenteritis</td>
<td>3 to 9 days, mean 4 days</td>
<td>Bloody diarrhea, severe abdominal cramping, complications - Hemolytic Uremic Syndrome (HUS), kidney failure</td>
<td>Raw ground beef, raw milk, cheese</td>
<td>Stools, rectal swabs</td>
</tr>
<tr>
<td>Enteroinvasive E. coli (EIEC) Gastroenteritis</td>
<td>10 to 72 hours</td>
<td>Severe abdominal cramps, watery diarrhea, vomiting malaise, complications – HUS, kidney failure</td>
<td>Raw milk, raw ground Stools, rectal swabs beef, cheese</td>
<td>Infected workers touching foods, inadequate refrigeration, inadequate cooking, inadequate cleaning and disinfection of equipment</td>
</tr>
<tr>
<td>Salmonellosis</td>
<td>6 to 72 hours, mean 18 to 36 hours</td>
<td>Abdominal pain, diarrhea, chills, fever, nausea, vomiting, malaise</td>
<td>Poultry, meat and their products, egg products, other foods contaminated by salmonellae</td>
<td>Stools, rectal swabs</td>
</tr>
<tr>
<td>Shigellosis</td>
<td>24 to 72 hours</td>
<td>Abdominal pain, diarrhea, bloody &amp; mucoid stools, fever</td>
<td>Any contaminated foods, frequently salads, water</td>
<td>Stools &amp; rectal swab</td>
</tr>
<tr>
<td>Vibrio parahaemolyticus Gastroenteritis</td>
<td>2 to 48 hours, mean 12 hours</td>
<td>Abdominal pain, diarrhea, nausea, vomiting, fever, chills, headache</td>
<td>Raw seafoods, shellfish</td>
<td>Stools, rectal swabs refrigeration, cross</td>
</tr>
<tr>
<td>Yersiniosis</td>
<td>24 to 36 hours</td>
<td>Severe abdominal pain, fever, headache malaise, sore throat may mimic appendicitis</td>
<td>Milk, tofu, water, pork</td>
<td>Stools, blood</td>
</tr>
</tbody>
</table>
### VIRAL AGENTS

<table>
<thead>
<tr>
<th>Viral Agent</th>
<th>Human Source</th>
<th>Incubation Period</th>
<th>Symptoms</th>
<th>Diagnostic Tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>Astrovirus gastroenteritis</td>
<td>Feces</td>
<td>1 to 2 days</td>
<td>Diarrhea, sometimes accompanied by one or more enteric signs or symptoms</td>
<td>Stools, acute and convalescent blood</td>
</tr>
<tr>
<td>Acute viral gastroenteritis (Calicivirus)</td>
<td>Mean 36 hours</td>
<td>1 to 3 days</td>
<td>Nausea, vomiting, abdominal pain, diarrhea, low grade fever, chills, malaise, anorexia, headache</td>
<td>Clams, oysters, cockles, green salad, pastrys, frostings, ice, cut fruit salads</td>
</tr>
<tr>
<td>Amebic gastroenteritis</td>
<td>Stools, raw vegetables and fruit</td>
<td>5 days to several months; mean 3 to 4 weeks</td>
<td>Abdominal pain, constipation or diarrhea</td>
<td>Stools, intestinal biopsy</td>
</tr>
<tr>
<td>Anisakiasis</td>
<td>Fish</td>
<td>4 to 6 hours</td>
<td>Stomach pain, nausea, vomiting, abdominal pain, diarrhea, fever</td>
<td>Rock fish, herring, cod, squid</td>
</tr>
<tr>
<td>Beef tapeworm infection (Taeniasis)</td>
<td>Feces</td>
<td>3 to 6 months</td>
<td>Vague discomfort, hunger pain, loss of weight, abdominal pain</td>
<td>Raw or insufficiently cooked beef</td>
</tr>
<tr>
<td>Cryptosporidiosis</td>
<td>Stools</td>
<td>1 – 12 days, usually 7 days</td>
<td>Profuse watery diarrhea, abdominal pain, anorexia, low grade fever, vomiting</td>
<td>Apple cider, water</td>
</tr>
<tr>
<td>Cyclosporiasis</td>
<td>Stools</td>
<td>1 – 11 days, typically 7 days</td>
<td>Prolonged watery diarrhea, weight loss, fatigue, nausea, anorexia, abdominal cramps</td>
<td>Raspberries, lettuce, basil, water</td>
</tr>
<tr>
<td>Fish tapeworm infection (Diphyllobothriasis)</td>
<td>Stools, raw vegetables and fish</td>
<td>5 to 6 weeks</td>
<td>Vague gastrointestinal discomfort, anemia may occur</td>
<td>Raw or insufficiently cooked fresh water fish</td>
</tr>
<tr>
<td>Giardiasis</td>
<td>Stools</td>
<td>1 to 6 weeks</td>
<td>Abdominal pain, mucoid diarrhea, fatty stools</td>
<td>Stools, diarrhea, weight</td>
</tr>
<tr>
<td>Pork tapeworm infection (Taeniasis)</td>
<td>Stools, meats</td>
<td>3 to 6 months</td>
<td>Vague discomfort, hunger pains, loss of weight</td>
<td>Raw or insufficiently cooked pork</td>
</tr>
</tbody>
</table>

### NEUROLOGICAL SIGNS & SYMPTOMS (VISUAL DISTURBANCES, TINGLING, PARALYSIS) OCCUR

#### INCUBATION (LATENCY) PERIOD USUALLY LESS THAN 1 HOUR

### FUNGAL AGENTS

<table>
<thead>
<tr>
<th>Fungal Agent</th>
<th>Incubation</th>
<th>Symptoms</th>
<th>Diagnostic Tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ibotenic acid group of mushroom poisoning</td>
<td>0.5 to 2 hours</td>
<td>Drowsiness and dizziness, state of intoxication, confusion, muscular spasms, delirium, visual disturbances</td>
<td>Amanita muscaria, A. pantherina and related species of mushrooms</td>
</tr>
<tr>
<td>Muscarine group of mushroom poisoning</td>
<td>15 minutes to 2 hours</td>
<td>Excessive salivation, perspiration, tearing, reduced blood pressure, irregular pulse, pupils constricted, blurred vision, asthmatic breathing</td>
<td>Clitocybe dealbata, C. rivulosa, and many other species of Inocybe and Boletus mushrooms</td>
</tr>
<tr>
<td>Organophosphorous poisoning</td>
<td>Few minutes to few hours</td>
<td>Nausea, vomiting, abdominal cramps, diarrhea, headache, nervousness, blurred vision, chest pain, cyanosis, confusion, twitching, convulsions</td>
<td>Any accidentally contaminated food</td>
</tr>
</tbody>
</table>

### PARASITIC AGENTS

<table>
<thead>
<tr>
<th>Parasitic Agent</th>
<th>Human Source</th>
<th>Incubation Period</th>
<th>Symptoms</th>
<th>Diagnostic Tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amebic dysentery (Amebiasis)</td>
<td>Infected humans</td>
<td>5 days to several months; mean 3 to 4 weeks</td>
<td>Abdominal pain, constipation or diarrhea</td>
<td>Stools, intestinal biopsy</td>
</tr>
<tr>
<td>Anisakiasis</td>
<td>Fish</td>
<td>4 to 6 hours</td>
<td>Stomach pain, nausea, vomiting, abdominal pain, diarrhea, fever</td>
<td>Rock fish, herring, cod, squid</td>
</tr>
<tr>
<td>Beef tapeworm infection (Taeniasis)</td>
<td>Infected cattle</td>
<td>3 to 6 months</td>
<td>Vague discomfort, hunger pain, loss of weight, abdominal pain</td>
<td>Raw or insufficiently cooked beef</td>
</tr>
<tr>
<td>Cryptosporidiosis</td>
<td>Infected humans</td>
<td>1 – 12 days, usually 7 days</td>
<td>Profuse watery diarrhea, abdominal pain, anorexia, low grade fever, vomiting</td>
<td>Apple cider, water</td>
</tr>
<tr>
<td>Cyclosporiasis</td>
<td>Infected humans</td>
<td>1 – 11 days, typically 7 days</td>
<td>Prolonged watery diarrhea, weight loss, fatigue, nausea, anorexia, abdominal cramps</td>
<td>Raspberries, lettuce, basil, water</td>
</tr>
<tr>
<td>Fish tapeworm infection (Diphyllobothriasis)</td>
<td>Infected fish</td>
<td>5 to 6 weeks</td>
<td>Vague gastrointestinal discomfort, anemia may occur</td>
<td>Raw or insufficiently cooked fresh water fish</td>
</tr>
<tr>
<td>Giardiasis</td>
<td>Infected humans</td>
<td>1 to 6 weeks</td>
<td>Abdominal pain, mucoid diarrhea, fatty stools</td>
<td>Stools, diarrhea, weight</td>
</tr>
<tr>
<td>Pork tapeworm infection (Taeniasis)</td>
<td>Infected swine</td>
<td>3 to 6 months</td>
<td>Vague discomfort, hunger pains, loss of weight</td>
<td>Raw or insufficiently cooked pork</td>
</tr>
</tbody>
</table>

### Fungi

- Ibotenic acid and muscimol in some mushrooms
- Sonic acid and muscimol in some mushrooms
- Ibotenic acid and muscimol in some mushrooms
- Ibotenic acid and muscimol in some mushrooms
- Ibotenic acid and muscimol in some mushrooms
- Ibotenic acid and muscimol in some mushrooms
- Ibotenic acid and muscimol in some mushrooms

### Toxic Mushrooms

- Amanita muscaria, A. pantherina and related species of mushrooms
- Clitocybe dealbata, C. rivulosa, and many other species of Inocybe and Boletus mushrooms
- Any accidentally contaminated food

### Poisoning

- Failure to wash hands after defecation, infected person touching ready-to-eat foods, inadequate cooking or reheating
- Polluted shellfish growing waters, poor personal hygiene, infected persons touching prepared foods, foods not requiring further cooking, contaminated waters
- Poor personal hygiene, infected workers touching food, inadequate cooking
- Ingestion of raw fish, inadequate cooking
- Lack of meat inspection, inadequate cooking, inadequate sewage disposal, sewage contaminated pastures
- Inadequate sewage or animal waste disposal, contamination by animal manure, contaminated water, inadequate filtration of water
- Inadequate cooking, inadequate sewage disposal, sewage contaminated lakes
- Poor personal hygiene, infected workers touching foods, inadequate sewage disposal
- Lack of meat inspection, inadequate cooking, inadequate sewage disposal, sewage contaminated pastures
- Eating Amanita muscaria and related species of mushrooms, eating unknown varieties of mushrooms, mistaking toxic mushrooms for edible varieties
- Eating muscarine group of mushrooms, eating unknown varieties of mushrooms, mistaking toxic mushrooms for edible varieties
- Spraying foods just before harvesting, storing insecticides in same area as foods, mistaking pesticides for powdered foods
## TOXIC ANIMALS

<table>
<thead>
<tr>
<th>Poisoning Type</th>
<th>Poisonant</th>
<th>Incubation Period</th>
<th>Symptoms</th>
<th>Sample Material</th>
<th>Prevention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paralytic shellfish poisoning (PSP)</td>
<td>Saxitoxin and similar toxins from plankton Alexandrium species which are consumed by shellfish</td>
<td>Few minutes to 30 minutes on average, may take up to 2 hrs</td>
<td>Tingling, burning, numbness around lips and finger tips, giddiness, incoherent speech, respiratory paralysis, sometimes fatal</td>
<td>Bivalve molluscan shellfish, e.g., clams mussels, viscera of crabs and lobsters</td>
<td>N/A</td>
</tr>
<tr>
<td>Tetradon poisoning (Aka Fugu (puffer Fish) poisoning)</td>
<td>Tetrodotoxin from intestines and gonads of puffer type fish</td>
<td>10 minutes to 3 hrs</td>
<td>Tingling sensation of fingers &amp; toes, diziness, pallor, numbness of mouth and extremities, gastrointestinal symptoms hemorrhage and desquamation of skin, eyes fixed, twitching, paralysis, cyanosis sometimes fatal</td>
<td>Puffer-type fish</td>
<td>N/A</td>
</tr>
<tr>
<td>Neurotoxic shellfish poisoning (NSP)</td>
<td>Brevetoxins from from Gymnodinium species</td>
<td>Few minutes to few hours</td>
<td>Paresthesia, reversal of hot and cold temperature sensations, nausea, vomiting, diarrhea</td>
<td>Shellfish (mussels, clams) from S.E. coastal waters</td>
<td>Gastric washings</td>
</tr>
<tr>
<td>Amnesic Shellfish poisoning (ASP) or Domoic Acid</td>
<td>Domoic acid from diatoms (Toxin is heat stable)</td>
<td>30 min. to 24 hrs for gastrointestinal symptoms, neurological symptoms within 48 hrs</td>
<td>Initially nausea, vomiting, abdominal pain, diarrhea, neurological signs include: confusion, memory loss, disorientation, seizure, coma, death may occur</td>
<td>Shellfish (mussels, clams), finfish (anchovies), viscera of crabs and lobsters</td>
<td>N.A.</td>
</tr>
<tr>
<td>Diarrhetic shellfish poisoning (DSP)</td>
<td>Listed previously</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### PLANT TOXICANTS

<table>
<thead>
<tr>
<th>Poisoning Type</th>
<th>Poisonant</th>
<th>Incubation Period</th>
<th>Symptoms</th>
<th>Sample Material</th>
<th>Prevention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jimson weed</td>
<td>Tropane alkaloids in Jimson weed</td>
<td>Less than 1 hour</td>
<td>Abnormal thirst, photophobia, distorted sight, difficulty in speaking, flushing, delirium, coma, rapid heart beat</td>
<td>Any part of a plant, tomatoes grafted to Jimson weed stock</td>
<td>Urine</td>
</tr>
<tr>
<td>Water hemlock poisoning</td>
<td>Resin and cicutoxin in hemlock root</td>
<td>15 to 60 minutes</td>
<td>Excessive salivation, nausea, vomiting, Stomach pain, frothing at mouth, irregular breathing, convulsions, respiratory paralysis</td>
<td>Root of water hemlock Cicutavirosa and C. masculine</td>
<td>Urine</td>
</tr>
</tbody>
</table>

### INCUBATION (LATENCY) PERIOD 1-6 HOURS

<table>
<thead>
<tr>
<th>Poisoning Type</th>
<th>Incubation Period</th>
<th>Symptoms</th>
<th>Sample Material</th>
<th>Prevention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chlorinated hydrocarbon poisoning</td>
<td>30 minutes to 6 hrs</td>
<td>Nausea, vomiting, paresthesia, dizziness muscular weakness, anorexia, weight loss, confusion</td>
<td>Any accidentally contaminated food</td>
<td>Blood, urine, stools gastric washings</td>
</tr>
<tr>
<td>Ciguatera poisoning</td>
<td>Ciguatoxin in intestines, roe, gonads &amp; flesh of tropical marine fish</td>
<td>3 to 5 hours, sometimes longer</td>
<td>Tingling &amp; numbness about mouth, metallic taste, dry mouth, gastrointestinal symptoms, watery stools, muscular pain, dizziness, dilated eyes, blurred vision, prostration, paralysis, reversal of hot and cold temperature sensations sometimes fatal</td>
<td>Numerous species of tropical fish</td>
</tr>
</tbody>
</table>
### INCUBATION (LATENCY) PERIOD USUALLY 12 TO 72 HOURS

#### BACTERIAL AGENTS

<table>
<thead>
<tr>
<th>Agent</th>
<th>Symptoms</th>
<th>Incubation Period</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vibrio vulnificus</td>
<td>Vertigo, double or blurred vision, dryness of mouth, difficulty in swallowing, speaking and breathing, descending muscular weakness, constipation, pupils dilated or fixed, respiratory paralysis, gastrointestinal symptoms may precede neurological symptoms. Frequently fatal.</td>
<td>2 hours to 8 days, mean 18 to 36 hrs</td>
<td>Home canned low acid foods, vacuum packed fish; fermented fish eggs, fish and marine mammals</td>
</tr>
<tr>
<td>Listeriosis</td>
<td>Septicemia</td>
<td>5 to 21 days, mean 10 days</td>
<td>Inadequate heat processing of canned foods and smoked fish, uncontrolled fermentation</td>
</tr>
</tbody>
</table>

### INCUBATION (LATENCY) PERIOD GREATER THAN 72 HOURS

#### CHEMICAL AGENTS

<table>
<thead>
<tr>
<th>Agent</th>
<th>Symptoms</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Mercury poisoning</td>
<td>Numbness, weakness of legs, spastic paralysis, impairment of vision, blindness, coma</td>
<td>1 week or longer</td>
<td>Urine, blood, hair</td>
</tr>
<tr>
<td>Triorthocresyl Phosphate Poisoning</td>
<td>Gastrointestinal symptoms, leg pain, ungainly high stepping gait, foot and wrist drop</td>
<td>5 to 21 days, mean 10 days</td>
<td>N/A</td>
</tr>
</tbody>
</table>

#### GENERALIZED INFECTION SIGNS AND SYMPTOMS (FEVER, CHILL, MALAISE, ACHE) OCCUR

### INCUBATION (LATENCY) PERIOD GREATER THAN 72 HOURS

#### BACTERIAL AGENTS

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<tbody>
<tr>
<td>Brucellosis</td>
<td>Fever, chills, sweats, weakness, malaise, headache, muscle and joint pain, loss of weight</td>
<td>7 to 21 days</td>
<td>Failure to pasteurize milk, livestock infected with brucelae</td>
</tr>
<tr>
<td>Typhoid fever</td>
<td>Malaise, headache, fever, cough, nausea, vomiting, constipation, abdominal pain, chills, rose spots, bloody stools</td>
<td>7 to 28 days, mean 14 days</td>
<td>Infected workers touching foods, poor personal hygiene, inadequate cooking, inadequate refrigeration, inadequate sewage disposal, obtaining foods from unsafe sources, harvesting shellfish from sewage contaminated areas</td>
</tr>
<tr>
<td>Listeriosis</td>
<td>Low grade fever, flu-like illness, stillbirths, meningitis, encephalitis, sepsis, fatalities occur</td>
<td>3 to 21 days, maybe longer</td>
<td>Inadequate cooking, failure to properly pasteurize milk, prolonged refrigeration, immunosuppressed, pregnant, aged persons, and neonates are at high risk</td>
</tr>
<tr>
<td>Vôbrio vulnificus Septicemia</td>
<td>Malaise, chills, fever, prostration, cutaneous lesions, fatalities occur</td>
<td>16 hr mean &lt; 24 hr</td>
<td>Eating raw shellfish, inadequate cooking, persons with liver damage are at high risk</td>
</tr>
</tbody>
</table>

#### VIRAL AGENTS

<table>
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<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hepatitis A (Infectious hepatitis)</td>
<td>Fever, malaise, lassitude, anorexia, nausea, abdominal pain, jaundice</td>
<td>10 to 50 days, mean 25 days</td>
<td>Infected workers touching foods, poor personal hygiene, inadequate cooking, harvesting shellfish from sewage contaminated waters, inadequate sewage disposal</td>
</tr>
</tbody>
</table>

(Notes: Hepatitis E is an emerging viral pathogen. It has similar incubation periods and symptoms as Hepatitis A and can be transmitted in foods.)

### PARASITIC AGENTS

<table>
<thead>
<tr>
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<th>Symptoms</th>
<th>Incubation Period</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Angiostrongylus cantonensis (rat lung worm) from rodent feces and soil</td>
<td>Gastroenteritis, headache, stiff neck and back, low-grade fever</td>
<td>14 to 16 days</td>
<td>Inadequate cooking, ingesting raw food</td>
</tr>
<tr>
<td>Toxoplasmosis</td>
<td>Fever, headache, myalgia, rash</td>
<td>10 to 13 days</td>
<td>Biopsy of lymph nodes, blood</td>
</tr>
<tr>
<td>Trichinosis</td>
<td>Gastroenteritis, fever, edema about eyes, muscular pain, chills,</td>
<td>4 to 28 days, mean 9 days</td>
<td>Muscle biopsy</td>
</tr>
</tbody>
</table>

(Notes: Angiostrongylus cantonensis is a common parasitic infection found in many parts of the world. It is transmitted by the intermediate host, the rat, and can cause significant neurological problems. Toxoplasmosis is a parasitic infection caused by Toxoplasma gondii, which can be transmitted through contaminated food, drink, or soil. Trichinosis is a parasitic infection caused by Trichinella spiralis, which is transmitted through consumption of undercooked or raw pork or wild game.)
INVESTIGATIONS OPERATIONS MANUAL 2017

EXHIBIT 8-6

ALLERGIC TYPE SYMPTOMS (FACIAL FLUSHING, ITCHING) OCCUR

INCUBATION (LATENCY) PERIOD LESS THAN 1 HOUR
BACTERIAL (AND ANIMAL) AGENTS

- Scombroid Poisoning or Histaminosis
  - Histamine-like substance produced by proteus sp. or other bacteria from histidine in fish flesh
  - Few minutes to 1 hr
  - Headache, dizziness, nausea, vomiting, peppery taste, burning throat, facial swelling and flushing, stomach pain, itching of skin
  - Tuna, mackerel, Pacific dolphin (known as the mahi on the Pacific coast of the U.S.), jack, anchovy, marlin, swordfish, bluefish, sometimes from ripened cheese

CHEMICALS

- Monosodium glutamate (MSG) poisoning
  - Excessive amounts of monosodium glutamate (MSG)
  - Few minutes to 1 hr
  - Burning sensation in back of neck, forearms chest, feeling of tightness, tingling, flushing, dizziness, headache, nausea
  - Foods seasoned with MSG
  - N/A
  - Using excessive amounts of MSG as flavor intensifier.

- Nicotinic acid (niacin) poisoning
  - Sodium nicotinate used as a color preservative
  - Few minutes to 1 hr
  - Flushing, sensation of warmth, itching abdominal pain, puffiness of face and knees
  - Meat or other food in which sodium nicotinate has been added
  - N/A
  - Using sodium nicotinate as color preservative

- Dietary supplements of niacin used chronically
  - A few days to a few a few months
  - Impairment of liver function (elevated transaminases), can result in fulminant liver failure
  - High potency dietary supplements, especially when used in multiples (500mg or more per day)
  - N/A
  - Dietary supplements of niacin can cause similar acute symptoms as niacin, but seldom does because of infrequent use at high doses

INCUBATION (LATENCY) PERIOD 1 TO 6 HOURS
TOXIC ANIMALS

- Hypervitaminosis A
  - Vitamin A containing foods or dietary supplements
  - Acute: 1 to 6 hours
  - Headache, gastrointestinal symptoms, dizziness, collapse, convulsions, desquamation of skin
  - Liver & kidney of arctic mammals
  - Blood
  - Eating liver & kidney from cold region animals

- Chronic: days to months or years
  - Chronic use can cause liver disease, including cirrhosis
  - High potency dietary supplements, especially with chronic use
  - N/A or Blood?
  - Chronic usage of dietary supplements containing 25,000 IU vitamin A or more per day

1. Symptoms and incubation periods will vary with the individual and group exposed because of resistance, age, and nutritional status of individuals, number of organism or concentration of poison in ingested foods, amount of food ingested, pathogenicity and virulence of strains of microorganisms or toxicity of chemical involved. Several of the illnesses are manifested by symptoms in more than one category and have an incubation range that overlaps the generalized categories.

2. A more detailed review can be found in:
   - A. Bryan, F.L. 1982, Diseases Transmitted by Foods (A classification and summary), second edition, Centers for Disease Control, Atlanta, GA.

3. Samples of any of the listed foods that have been ingested during the incubation period of the disease should be collected.

4. Carbon monoxide poisoning may simulate some of the diseases listed in this category. Patients who have been in closed care with motors running or have been in rooms with improperly vented heaters are subject to exposure to carbon monoxide.