

Fear of Fresh

HOW TO AVOID FOOD-BORNE ILLNESS FROM FRUITS & VEGETABLES



A cluster of *E. coli* bacteria.

Q: Is it riskier to eat produce these days?

A: Yes. The outbreaks are bigger and more frequent than they were 20 or 30 or even 15 years ago. Even though we can identify and control outbreaks better than we used to, when contamination occurs with lettuce, spinach, cantaloupe, or tomatoes, we can have a big problem on our hands.

The headlines about *E. coli* O157:H7 in spinach tell the story. Since some produce is very conveniently packed in a bag and prewashed, there is nothing consumers can do to lower their risk. In many cases, you don't cook it. You don't blanch it. You don't do much except eat it. So it's critically important that it not be contaminated from the beginning.

Q: Why are outbreaks in produce on the rise in North America?

A: One reason is that people are eating more fresh fruits and vegetables than they did 30 years ago. That's a good thing. We want people to eat fresh produce. Before fresh spinach went off the market in the United States following the recent outbreak, something like a third of people we called had eaten fresh spinach in the previous week. That's great news.

Q: Are greens in bags causing more outbreaks?

A: Conceivably. Rather than just one head of lettuce or a bunch of spinach, there could be leaves from many different plants in one bag. Bacteria from one contaminated leaf in a bag, you can just imagine, would be over all the leaves in the bag by the end of the distribution chain.

It's a pooling issue, like ground beef. How many cows are in one patty of ground beef? How many cows contribute to one glass of milk? It means that procedures have to be in place to make sure that none of it is contaminated.

example, bacteria can creep in through the apple core. Germs can go in the hole at the very bottom of the apple where the flower was—it's called the calyx.

Q: Is organic produce less likely to have *E. coli*?

A: No. I don't see this as an organic versus conventional issue, just like it's not a domestic versus imported issue. There's room for improvement with both kinds of production and on both sides of the border.

Q: Which produce is most likely to have *E. coli* O157:H7?

A: The recurrent outbreaks have come from leafy greens—especially lettuce—sprouts, and unpasteurized juices and cider. It's not all fruits and vegetables. And apple cider might be a special case because it's sometimes made from apples that have fallen from the tree.

What those fruits and vegetables have in common is that they're grown fairly close to the ground, they're not cooked, and they're not acidic. In general, the bacteria that cause food-borne disease don't like acid. But North Americans have a phenomenal sweet tooth, and my understanding is that apples and tomatoes are getting sweeter and less tart and acidic.

Q: Is all food-borne disease rising?

A: No. Over the last ten years, we've witnessed important decreases, 29 to 32 per cent, in infections that are related to meat and poultry—like *E. coli* O157:H7 linked to ground beef; or *Listeria* infections, which are often linked to processed meats; or *Campylobacter*, which is linked to poultry.

We haven't eliminated them, but we're certainly headed in the right direction.

[There are no comparable statistics for Canada.]

Q: Does the bacteria come from nearby animals?

A: Possibly. We know that feedlots have *E. coli* O157:H7. How wise is it to grow spinach or lettuce plants, which are very close to the ground, just downwind or downstream or down the hill from a feedlot or cow pasture? Doesn't sound like a good idea to me.

The produce industry has to figure out how to prevent contamination. Maybe we need a half-mile buffer between feedlots and produce farms.

Q: Does it help to wash produce?

A: We recommend washing produce in general, even if you plan to peel it. When you slice a melon, for example, the knife can transfer bacteria from the surface to the inside.

But it's tough to get bacteria off greens. Those germs are very sticky. This triple-washed stuff that comes out of the bag—if it's got contamination on it, there's no way to wash it off, even if you use bleach or detergent.

And you can't wash off germs if they're inside the melon, mango, or apple. For



Photo: James Gathany, CDC.

Robert Tauxe is Acting Deputy Director of the Division of Foodborne, Bacterial and Mycotic Diseases at the U.S. Centers for Disease Control and Prevention. He spoke to *Nutrition*

Action's Bonnie Liebman by phone from his office in Atlanta, Georgia.



Q: What about Salmonella?

A: It's down 9 per cent. [Illnesses from *Salmonella* are also down in Canada.] *Salmonella* is complicated, because it can come from a number of foods and even non-food sources like pet turtles or lizards. And antibiotic-resistant *Salmonella*—much of it from ground beef—has become more of a problem over the last decade.

WHEN TO CALL THE DOCTOR**Q: Which symptoms should alert people to call the doctor?**

A: The red flag is diarrheal illness that's not resolved in three days or that's accompanied by a fever over 38.6°C [101.5°F] or by blood in the stools.

If a very young child seems lethargic or doesn't seem to be making much urine or

tears, that could be a sign of dehydration and is another reason to seek medical attention. Any young child with diarrhea should start drinking pediatric electrolyte solution—it's in all the drugstores—to prevent dehydration.

Q: How soon do the symptoms of *E. coli* O157:H7 show up?

A: They usually appear within 3 to 4 days, but it could be anywhere from 1 to 10 days. Most people have bloody diarrhea and severe abdominal cramps, but sometimes the infection causes non-bloody diarrhea or no symptoms at all. Usually the person gets little or no fever, and the illness resolves in 5 to 10 days.

Q: How many people end up with life-threatening complications?

A: About 3 to 8 per cent get hemolytic uremic syndrome, or HUS. Some don't have complete kidney failure, but most do.

There are two parts to HUS. One is the kidney failure—that's uremia, the 'U.' The other is hemolysis, the 'H.' That's when red blood cells look like they've been through a blender.

The *E. coli* toxin damages blood vessels by creating small strands across the insides, so when the red blood cells go through them, it's like they're going through a cheese cutter. It just slices up the red cells.

So people may need transfusions and dialysis before the blood vessels get better. They're destroying their own red blood cells. Even with intensive care, 3 to 5 per cent of these patients die.

Q: Should doctors send a stool sample to the local health department?

A: That's absolutely vital to our tracing the outbreaks. But the doctor may wait to see if the diarrhea goes away in a few days. We recommend a stool specimen if it's a severe illness, bloody diarrhea, high fever, or if the illness is lasting.

A stool sample can also tell the doctor whether the infection will respond to an antibiotic and to which antibiotic. With so much resistant bacteria around, that could be especially important. But often the patient will get better with no antibiotics.

Q: Can antibiotics make *E. coli* O157:H7 infections worse?

A: There's a real paradox. The *E. coli* harms people by producing a toxin that destroys blood vessels in the gut, kidney,

Bugs are Breaking Out All Over

The Public Health Agency of Canada estimates that 11 million Canadians are sickened each year from food-borne bugs. The price tag: close to \$600 million in hospitalization costs, medical expenses, and other "direct" costs, and some \$100 million in premature deaths, lost productivity, and other "indirect" costs.

Here are some of the foods that are most likely to cause food-borne illness. The list is drawn from a database of some 5,000 outbreaks that sickened more than 150,000 people from 1990 through 2004. The database is maintained by the Centre for Science in the Public Interest (publisher of *Nutrition Action*). A few caveats from CSPI director of food safety Caroline Smith DeWaal:

- The database includes outbreaks that occurred entirely in the United States or in both Canada and the United States. It doesn't include outbreaks that were confined to Canada.

- Most food-borne illnesses are isolated cases, so outbreaks (two or more people sickened by the same food) are the exception.

- Many outbreaks and illnesses are never investigated or reported to authorities.

- Foods with multiple ingredients (like tacos, lasagna, cheeseburgers, chili, egg salad, stuffing, and some sandwiches) are in the database but most aren't listed here.

All Bugs (includes *E. coli* O157:H7)

Food	Outbreaks	Cases*
Greens-based salad	199	7,555
Turkey	109	5,832
Chicken	215	3,979
Ground beef	171	3,425
Shellfish	155	3,399
Berries	20	3,330
Tomatoes	19	2,852
Lettuce	56	2,380
Eggs	74	2,117
Ham	46	2,107
Sprouts	30	2,018
Ice cream	44	1,807
Cheese	50	1,791
Melon	29	1,683
Juice & cider	22	1,514
Unpasteurized milk	56	1,457
Scallions	9	1,221
Potatoes	40	1,099
Luncheon meat	50	1,014
Bread	32	980
Fresh tuna	193	824
Fruit salad	17	538
Mahi mahi	71	422
Fresh salmon	14	195

***E. coli* O157:H7**

Food	Outbreaks	Cases*
Ground beef	107	2,028
Lettuce	12	336
Unpasteurized milk	4	222
Greens-based salad	9	216
Coleslaw	3	194
Apple cider/juice	6	142
Alfalfa sprouts	3	120
Potato salad	2	49
Melon	2	36

* Number of people sickened. (For the latest report from the CSPI outbreak database, see www.cspinet.org/foodsafety/outbreak_report.html.)

Source: *Outbreak Alert! 2005*, Centre for Science in the Public Interest.

THE DIRTY DOZEN

Bug	Major Symptoms	Some Foods that have Caused Outbreaks	How Soon it Typically Strikes	How Soon it Typically Ends
Campylobacter (bacteria)	diarrhea (can be bloody), cramps, fever, vomiting	undercooked poultry, unpasteurized (raw) milk, contaminated water	2 to 5 days	2 to 10 days
Ciguatera (toxin)	<i>within 2 to 6 hours:</i> abdominal pain, diarrhea, general pain and weakness, nausea, temperature reversal (hot things feel cold and cold things feel hot), tingling, vomiting <i>within 2 to 5 days:</i> slow heartbeat, low blood pressure	large reef fish like barracuda, grouper, red snapper, and amberjack	2 hours to 5 days	days to months
Clostridium botulinum (bacteria)	vomiting, diarrhea, blurred vision, double vision, difficulty swallowing, muscle weakness that spreads from the upper to the lower body	home-canned foods, improperly canned commercial foods, herb-infused oils, potatoes baked in aluminum foil, bottled garlic	12 to 72 hours	days to months (get treatment immediately)
Cyclospora (parasite)	diarrhea (usually watery), loss of appetite, substantial weight loss, stomach cramps, nausea, vomiting	imported berries, lettuce	1 to 14 days (usually at least 1 week)	weeks to months
E. coli O157:H7 (bacteria)	severe diarrhea that is often bloody, abdominal pain, vomiting (usually accompanied by little or no fever)	undercooked beef, unpasteurized (raw) milk or juice, raw produce, salami, contaminated water	1 to 8 days	5 to 10 days (get treatment immediately, especially for a child or elderly person)
Hepatitis A (virus)	diarrhea, dark urine, jaundice (yellow "whites" of the eyes), flu-like symptoms	shellfish, raw produce, foods that are not reheated after coming into contact with an infected food handler	15 to 50 days	2 weeks to 3 months
Listeria (bacteria)	fever, muscle aches, nausea, diarrhea (pregnant women may have mild flu-like symptoms; can lead to premature delivery or stillbirth)	fresh soft cheeses, unpasteurized (raw) or inadequately pasteurized milk, ready-to-eat deli meats and hot dogs	9 to 48 hours for gastrointestinal symptoms, 2 to 6 weeks for infections in the blood, brain, or uterus	days to months (get treatment immediately)
Noroviruses (virus)	nausea, vomiting (more common in children), abdominal cramping, diarrhea (more common in adults), fever	poorly cooked shellfish, ready-to-eat foods touched by infected food handlers, salads, sandwiches	12 to 48 hours	12 to 60 hours
Salmonella (bacteria)	diarrhea, fever, abdominal cramps, vomiting	eggs, poultry, unpasteurized (raw) milk or juice, cheese, raw produce	1 to 3 days	4 to 7 days
Scombrototoxin (toxin)	flushing; rash; burning sensation in skin, mouth, and throat; dizziness; hives; tingling	fresh tuna, bluefish, mackerel, marlin, mahi-mahi	1 minute to 3 hours	3 to 6 hours
Vibrio parahaemolyticus (bacteria)	watery diarrhea, abdominal cramps, nausea, vomiting	undercooked or raw seafood	2 to 48 hours	2 to 5 days
Vibrio vulnificus (bacteria)	vomiting, diarrhea, abdominal pain, bacteria in the blood, wounds that become infected	undercooked or raw shellfish (especially oysters), other contaminated seafood	1 to 7 days	2 to 8 days (get treatment immediately)

Source: Adapted from *Diagnosis and Management of Foodborne Illnesses: A Primer for Physicians and Other Health Care Professionals* (www.cdc.gov/mmwr/preview/mmwrhtml/rr5304a1.htm), by the American Medical Association, American Nurses Association, U.S. Centers for Disease Control and Prevention, U.S. Food and Drug Administration, and U.S. Department of Agriculture.

and brain. An antibiotic drug kills the *E. coli*, but it also can provoke them to make a lot more toxin. So it may make the patient worse. Antidiarrheal agents like loperamide should also be avoided.

WHAT'S NEXT?

Q: What new food-borne illnesses are emerging?

A: Some new and highly resistant strains of *Salmonella* have appeared in recent

years. In Japan, they've seen cases of hepatitis E from pork sushi.

And in Finland, they're seeing outbreaks of *Yersinia pseudotuberculosis*. It's a second cousin to the bug that causes the plague. Finland recently realized that the outbreaks of what looks like appendicitis were due to this bug, which was traced to eating local lettuce.

Q: So people there may have unnecessary surgery for appendicitis?

A: Yes. Doctors perform surgery and find

no problem with the appendix, but they see big swollen nodes all over the intestines. That's what the gastrointestinal tuberculosis looks like.

The working assumption is that *Yersinia* causes disease in deer and rabbits, which are getting into the lettuce and carrot fields and contaminating them. It's not a problem in this country, but there are other problems elsewhere in the world, and I expect that we'll be finding more of them in our food supply.



SAFE AT HOME

How you handle food matters. With enough warmth, moisture, and nutrients, one bacterium that divides every half hour can produce 17 million progeny in 12 hours.

Putting food in the fridge or freezer stops most bacteria from growing. Exceptions: *Listeria* (typically found in soft cheese, lunch meats, and hot dogs) and *Yersinia enterocolitica* (typically found in undercooked pork and unpasteurized milk) grow at refrigerator temperatures.

Rules for Leftovers 2 Hours — 2 Inches — 4 Days



2 Hours from oven to refrigerator

Refrigerate or freeze leftovers within 2 hours of cooking. Otherwise throw them away.



2 Inches thick to cool it quick

Store food at a shallow depth—about 2 inches—to speed chilling.



4 Days in the refrigerator—otherwise freeze it

Use leftovers from the refrigerator within 4 days. Exception: use stuffing and gravy within 2 days. Reheat solid leftovers to 74°C (165°F) and liquid leftovers to a rolling boil. Toss what you don't finish.

- Buy **fresh-cut produce** like half a watermelon or bagged salad greens only if it's refrigerated or surrounded by ice.
- Store **perishable fresh fruits and vegetables** (like strawberries, lettuce, herbs, and mushrooms) or **precut or peeled produce** in a clean refrigerator at a temperature of 4°C (40°F) or below.
- Wash your hands for 20 seconds with warm water and soap before and after preparing **any food**.
- Wash **fruits and vegetables** under running water just before eating, cutting, or cooking, even if you plan to peel them. Don't use soap (it leaves a residue). Produce washes are okay. (Exception: triple-washed bagged lettuce or other produce needs no further washing.)
- Scrub **firm produce**, like melons and cucumbers, with a clean produce brush. Let them air dry before cutting.

- Remove the outer leaves of **heads of leafy vegetables** like cabbage and lettuce.
- Don't eat **raw sprouts** (alfalfa, bean, clover, or radish).
- Cooking a food at 71°C (160°F) will kill any *E. coli* O157:H7.
- Neither **processed spinach** (frozen or canned) nor **other fresh or processed leafy greens** (like lettuce or kale) were implicated in the recent *E. coli* outbreak.
- Drink only pasteurized **milk, juice, or cider**.
- For more information on handling produce safely: www.canfightbac.org, www.foodsafetynetwork.ca, food safety hotline (866-503-7638).
- For information on *E. coli* O157:H7: www.inspection.gc.ca/english/fssa/concen/cause/ecolie.shtml.

Sources: Canadian Food Inspection Agency, Canadian Partnership for Consumer Food Safety Education, U.S. Centers for Disease Control and Prevention, U.S. Department of Agriculture, U.S. Food and Drug Administration, Centre for Science in the Public Interest.

Q: What about in North America?

A: Some investigators have raised the possibility that the *E. coli* that causes urinary tract infections comes from the animals we eat, but the link is by no means proven.

Q: Have antibiotics made some *Salmonella* resistant?

A: Yes. Anytime an antibiotic is used in a hospital, in a child with an earache, or in animals on a farm, there are winners and losers in the local bacterial population. You hope that the losers are the bacteria that were making the patient, child, or animal sick. But if there's a bacterium there that's resistant, it's a winner.

The bacteria in food that make us ill—like *Salmonella* or *Campylobacter*—have their natural home in animals, not people. So antibiotic use in those animals can make those bacteria resistant.

Q: Are bacteria that live in people also becoming resistant?

A: Yes. The antibiotics we use in people cause resistance in the bacteria that cause pneumonia and tuberculosis. We have to try to reduce unnecessary antibiotic use for people who have colds. Antibiotics aren't going to make them better. Likewise, we have to promote prudent antibiotic use in animals.

Q: And the farm is where contamination starts?

A: Right. Most of the progress we've made with *E. coli*, *Listeria*, and *Campylobacter* has been at the slaughterhouse. The process is cleaner than it was before. But many of the animals coming in off ranches and farms are still contaminated.

And I'm concerned that back on the farm, bugs are transferring from animals to plants or cycling back and forth from animals to plants. You can't slaughter a spinach plant in a way that guarantees that it comes out clean. So the effort has to be focused on the farm, and that includes the animal farm.

Q: Should people stop eating leafy greens?

A: No. We want to encourage people to eat fresh fruits and vegetables. But obviously, the spinach problem—and previous problems with lettuce, tomatoes, and other fresh produce—show us that contamination is not under control. 🍅