



Food Poisoning Bacteria

What are these microbes?

It is estimated that every year more than five million Australians are affected by foodborne illness every year? Illnesses such as food poisoning are becoming more common as our lifestyles change – for one thing, we eat out more and more food is being prepared in advance. We have no accurate figures on how much food poisoning is the result of mishandling by the consumer, but it is thought to be between 12 to 20%.

Food safety is all about reducing the risk of becoming sick from eating foods. The principles of food safety are easy to apply in the home, when eating in the outdoors, at your local shop when buying groceries, and even at a restaurant.

Most food poisoning incidents are a result of mishandling food – keeping it at the wrong temperature, incorrect re-heating, and cross contamination. To help you handle your food safely, take a look at the following information. Remember that nearly ALL foods need to be handled with care.

Salmonella spp

Salmonella is associated mainly with raw meats, poultry and dairy products. However, many other foods have been implicated in outbreaks caused by *Salmonella*, and these include mayonnaise, salads, milk, orange juice, sprouted seeds and dairy products, etc. It gets into other foods by cross contamination from contact with raw foods, utensils, equipment and hands.

In Australia salmonellosis tends to be more prevalent in the warmer, northern parts of the country and eating food that has been kept in the temperature danger zone for too long a time is often the cause of the illness. Numbers as low as less than 10 cells have been responsible for causing foodborne disease. Sensitive individuals, e.g. frail elderly, young children and immunocompromised people, are much more likely to become ill after eating only a small number of cells. These people should never be given egg flips unless they have been made from pasteurised egg.

In many countries, *Salmonella* Enteritidis is a major problem in eggs, however at the time of writing this fact sheet, Australia does not have a major problem with this organism. Therefore, although consumption of lightly cooked eggs, eg. runny poached or soft boiled eggs, is not recommended for sensitive individuals, most people can still consume such foods without contracting an infection.

It usually takes 8 to 72 hours for symptoms of the illness to occur, but can take up to a few weeks, so it is not necessarily the last meal you ate that caused it. *Salmonella* cause a 'gastro-flu-like' infection which in most cases lasts about 2 to 5 days.

However, in some people they can lead to chronic conditions such as Reiter's Syndrome or reactive arthritis.

Salmonella usually needs to grow to reach high enough numbers to make healthy adults sick. However, in high fat foods, eg. peanut butter, potato crisps and chocolate and liquids which pass through the stomach quickly, eg. unpasteurised juices, the presence of only a few organisms can cause illness. It can also survive in fairly dry and acidic foods for some time.

Because *Salmonella* is found on a wide range of foods, we should assume that most animal foods are contaminated and handle them accordingly. Most outbreaks occur through cross contamination from raw to cooked food, and contaminated food remaining in the temperature danger zone for too long. If cooking or reheating is inadequate then the bacteria will survive.

Campylobacter

This is probably one of the most common causes of foodborne illness in Australia. It is present in the gut of a wide range of animals, especially birds. Outbreaks have been linked to the consumption of undercooked poultry, mince and sausages, unpasteurised milk, and cooked foods that have been contaminated by raw foods like meat and poultry. Pets may also be a source of infection. *Campylobacter* doesn't grow well in foods, rather it's presence in food can result in an infection. It is a problem because quite low numbers, ie. 500 to 600 cells of the bacteria can cause illness.

Symptoms can take 2 to 7 days to appear and are gastrointestinal, lasting for about 5 days. A fever may also be present. A small number of people are left with a chronic condition called Guillain Barre Syndrome which can last for several weeks or months.

Listeria monocytogenes

Listeriosis is a comparatively rare form of foodborne illness, but it can be a very serious disease in a small group of individuals. Those who are pregnant, immunocompromised, young children and the frail elderly are quite susceptible to food poisoning from *Listeria* and unfortunately, every year a few people die. It has also caused occasional outbreaks of mild gastroenteritis in healthy people.

The symptoms are usually described as 'flu-like', although vomiting and discoloured urine can occur. Miscarriage can result if a pregnant woman is infected, even if she doesn't show the symptoms. The time from infection to symptoms can be anywhere between 8 to 90 days.

Listeria is widely found on foods and most raw foods are likely to be contaminated. *Listeria* is easily killed by heat although cooked foods can easily become recontaminated through poor food handling.

This is one of the few pathogens that can grow in the refrigerator, so ready to eat food should never be stored in the fridge too long. Although it can grow in the fridge, it will do so only very slowly so make sure your refrigerator is keeping your food at or less than 5°C.

You can find out more about how to avoid food poisoning from *Listeria* from the fact sheet on the FSANZ web site:

<http://www.foodstandards.gov.au/whatsinfood/listeria/index.cfm>.

Escherichia coli

Many strains of *E. coli* are harmless and are found naturally in the gut of humans and animals. Traditionally its presence in foods has been an indication of faecal contamination of food or water. However, particular strains are pathogenic and traveller's diarrhoea and haemolytic uraemic syndrome (HUS) are caused by *E. coli* strains. Although pathogenic types are rare, in the last few years there have been several foodborne outbreaks from certain strains of *E. coli* both in Australia and overseas.

A wide variety of foods have been implicated including unpasteurised apple and orange juices, sprouted seeds, fruit, raw milk cheese, salads and meat and meat products especially undercooked minced meat patties in hamburgers. *E. coli* is easily killed by heating so cooking food properly is a basic method of control. Water can also be a source of the bacteria.

Staphylococcus aureus

Staphylococcus aureus, also known as 'Golden staph', is important from both a medical and food perspective. About half of us carry this organism in our skin and nasal passages. If you have an infected cut or sore, it can contain large numbers of *Staph*. Keep any cuts or sores well covered if you are handling foods.

Animals and poultry also carry this bacteria on their bodies and all raw meat and poultry products should be handled as though they are contaminated. Raw milk can also be a source of this bacteria.

It likes to grow in salty and sweet foods like those containing custard, hams, frankfurters, salads, cream-filled bakery products etc.

The important thing to remember is that *Staph*. produces a heat stable toxin as it grows and it is the toxin that makes you sick. If it is allowed to grow in food the toxin will remain even if the food is cooked again. The toxin takes only a very short time to make you sick (1 to 6 hours) and causes nausea, vomiting, abdominal cramps and diarrhoea as the usual symptoms.

Clostridium botulinum

Clostridium botulinum is one of the more well known foodborne disease microorganisms due to the severe nature of the illness. Fortunately, in Australia it is fairly rare.

As *C. botulinum* grows in food it produces a neurotoxin. This causes symptoms after about 12- 36 hours after consumption, although this can vary. Early symptoms include nausea, diarrhoea and vomiting, but neurological symptoms follow. Infant botulism is commonly reported in some countries in children under 1 year and the source of the infection is usually unknown. Sources of infection are likely to be dust and soil.

C. botulinum forms spores when it is heated and when conditions become favourable the spores germinate. In the past it has been mainly associated with canned foods but it has recently also been associated with vegetables in oil and some other foods.

Commercial canneries follow strict time and temperature heating schedules that are capable of killing the spores. In home bottling such regimes are not possible. If you are bottling at home stick to the high acid fruits, eg. pears, apples and stone fruit. If

you bottle tomatoes, mango, paw paw, banana or any other tropical fruit you must add some citric acid. Vegetables can only be safely bottled if bottled in vinegar. For further information on safe home bottling contact Food Science Australia on 02 9490 8333.

If you want to produce your own vegetables in oil or flavoured oils you can keep them refrigerated for up to 10 days. If you want to bottle them, you need to acidify the vegetables and any fresh herbs first. A fact sheet is available from: <http://www.foodscience.afisc.csiro.au/oilvine.htm> .

Clostridium perfringens

This is a less well known bacterium which causes severe stomach cramps and a mild form of diarrhoea that lasts only about 24 hours and therefore tends to go unreported. However, it is probably fairly common and can be fatal in the frail elderly or people who are already ill.

The symptoms begin in about 8 to 22 hours after the food is eaten. Large numbers of the bacteria have to be eaten before you get sick, but because the bacteria can grow very fast (the number can double every 18 minutes) it doesn't take long for large numbers to build up. The cause of the illness is a toxin that is produced when the bacteria forms spores in the gut. It's the presence of the toxin that makes you sick.

C. perfringens is widely found in soil and in intestinal tracts of humans. It is usually associated with food that has been allowed to stay warm for several hours. During cooking, which will kill most types of bacteria, *C. perfringens* turns into another form called a spore. A spore is like a seed, it stays dormant in the food until conditions are favourable, then like a plant seed it will germinate and grow. The spores of *C. perfringens* are very heat resistant and will withstand boiling for several hours.

It likes the sort of conditions you get in casseroles, stews, gravies, pie fillings and any other bulk cooked foods when they cool. In the nice warm conditions of cooling food, the spores germinate and grow. Whenever you cool food, make sure you cool it quickly by transferring it into a shallow container and refrigerating it when the steam stops rising. A large stockpot, even in a commercial fridge can take several days for the centre temperature in the pot to reach 5°C.

***Bacillus cereus* and other *Bacillus* species**

This pathogen can cause two types of foodborne illness — the diarrhoeal type and the emetic or vomiting type. Like *C. perfringens* the illness is a mild one, but unpleasant nevertheless.

The diarrhoeal type occurs within 8 to 16 hours of eating the food and lasts for about 24 hours. Foods involved vary from starchy vegetables, meat products, cereal foods, sauces, puddings and spices. A much shorter time is required for symptoms of the emetic type to appear (0.5 to 5 hours). The most common food associated with the emetic type is rice. Cooked rice should always be cooled and stored in the refrigerator.

B. cereus can form heat resistant spores and a heat resistant toxin. If cooked food is allowed to cool slowly the spores can germinate. If growth occurs then the toxin can form under certain conditions. Reheating or lightly cooking the food will not destroy this toxin.

Although this bacteria can grow and produce toxin at refrigeration temperatures, it does so much more slowly than at room temperature. Precooked food should not be stored in the refrigerator for more than 2-3 days.

Viruses

Viruses are not living organisms but bits of reproductive material that attack human cells and hijack them. An infected cell then starts making more viruses until it can't make any more, breaking open and releasing the new viruses into the body to infect more cells. The most important viruses that cause foodborne disease are Hepatitis A, Norwalk virus, Norovirus and some of the Caliciviruses. Viruses don't grow in food, and one particle is enough to make you sick.

Symptoms can be severe gastroenteritis or similar to the 'flu'. Generally the illness only lasts one or two days. The exception is Hepatitis A which can be a severe illness and last for many weeks.

What should I do if I get sick?

What should you do when you have suspected food poisoning? Seek medical attention. Food poisoning can be particularly serious in young children, the elderly and people of all ages in poor health. Early medical attention is recommended, especially for these at risk groups.

Contact your local health department and report the illness. It probably wasn't the last meal you ate, but if you have any food samples keep them for analysis. If you are feeling unwell visit your doctor. Some types of food poisoning are life threatening and early diagnosis can help avoid severe consequences.

Remember, food that makes you sick can still look fresh and tasty.

How to prevent these microorganisms making you and your family sick

Microorganism	Control measures
<i>Salmonella</i> spp. <i>Campylobacter</i> <i>E. coli</i> Viruses	<ul style="list-style-type: none"> keep hot food hot and cold food cold Don't keep food in the temperature danger zone (i.e. at or below 5 and above 60°C) any longer than necessary reheat food to steaming hot before serving (at least 75°C) cook food properly, heat to at least 75°C keep raw and cooked food separate keep kitchen and utensils clean wash and dry your hands properly avoid handling food when you are ill
<i>Listeria monocytogenes</i>	<ul style="list-style-type: none"> keep hot food hot and cold food cold Don't keep food in the temperature danger zone (i.e. at or below 5 and above 60°C) any longer than necessary heat food to steaming hot before serving (above 75°C) cook food properly keep raw and cooked food separate keep kitchen and utensils clean

	<ul style="list-style-type: none"> • store ready to eat foods in the fridge for only a short time • avoid high risk foods
<i>S. aureus</i>	<ul style="list-style-type: none"> • keep hot food hot and cold food cold Don't keep food in the temperature danger zone (i.e. at or below 5 and above 60°C) any longer than necessary • keep raw and cooked food separate • keep kitchen and utensils clean • wash and dry your hands properly • cover any cuts or sores when handling food
<i>C. botulinum</i>	<ul style="list-style-type: none"> • keep hot food hot and cold food cold Don't keep food in the temperature danger zone (i.e. at or below 5 and above 60°C) any longer than necessary • bottle only high acid fruits at home • add citric acid to tomatoes, melons and tropical fruits • bottle vegetables in vinegar, no less than half the liquid should be vinegar • be careful when making vegetables in oil or flavoured oils to use only acidified or dried vegetables
<i>C. perfringens</i> <i>B. cereus</i>	<ul style="list-style-type: none"> • keep hot food hot and cold food cold Don't keep food in the temperature danger zone (i.e. at or below 5 and above 60°C) any longer than necessary • cool food quickly after cooking if you want to store it, • reheating food to steaming hot (75°C) before eating, stir the food to make sure all parts are heated through

Need more information?

Telephone Project Co-ordinator: 0407 626 688
Email: info@foodsafety.asn.au
Website: www.foodsafety.asn.au