Typical bacteria found in everyday food

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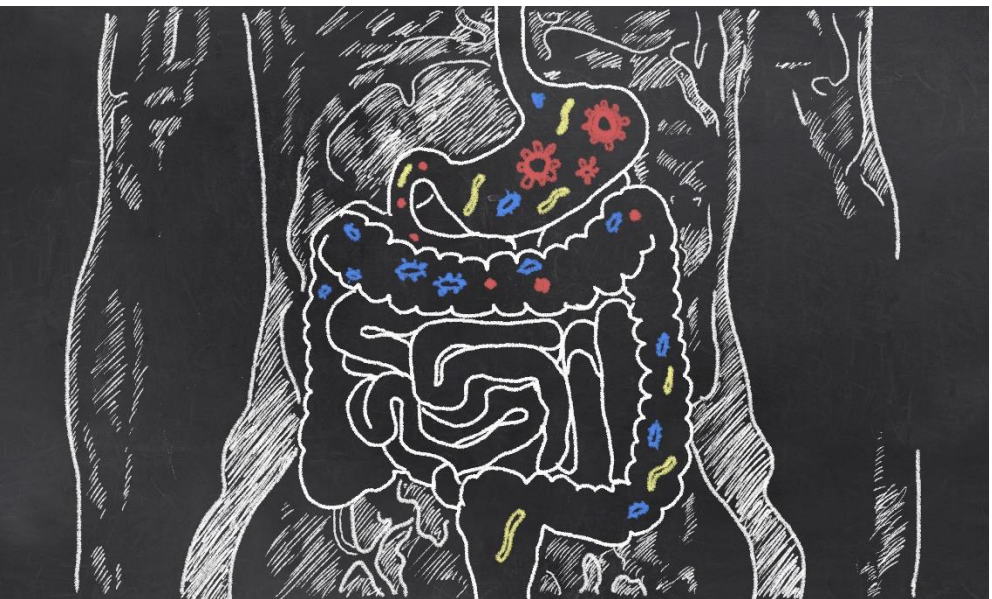
FOOD SAFETY

Bacillus cereus and other Bacillus species

This pathogen can cause two types of foodborne illness—the diarrhoeal type & the emetic or vomiting type. The illnesses are generally mild, but unpleasant nevertheless. Symptoms can be more severe for the young, elderly & immune-comprised.

Foods involved vary from starchy vegetables, meat products, cereal foods, sauces, puddings & spices. Cooked rice should always be cooled & stored in the refrigerator.
Bacillus cereus form heat resistant spores that are widespread in our environment & are common in soil and dust. Spores are dormant but germinate producing cells that can grow when they are in warm, moist & nutritious environments & some cells produce a heat resistant toxin if they grow for enough time.



Why does food poisoning occur?

There are two ways the types of illnesses mentioned above come about. If spores in dried foods (e.g. rice, dried spices, powders) survive during cooking and the cooked food is cooled slowly unrefrigerated, the spores germinate; cells grow to large numbers, and, in some cases, the cells produce a toxin.

1. Consuming large numbers of cells in the food cause the diarrhoeal type illness.

2. Consuming the toxin formed in the food causes the vomiting type illness. Reheating or cooking the food will not destroy this toxin as it is resistant to heat. Although this bacterium 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 two to three days.

To prevent Bacillus cereus food poisoning, store, handle and cool food safely.

Campylobacter & Listeria

Campylobacter

Campylobacter causes gastroenteritis with symptoms that can include diarrhoea, nausea, abdominal pain, fever, muscle pain, headache, and vomiting between 2–5 days after eating contaminated food. The illness generally lasts for 2–10 days. Campylobacteriosis can cause severe abdominal pain that can be likened to acute appendicitis. In rare cases, some people may develop secondary symptoms of muscle weakness or paralysis and conditions such as reactive arthritis and Guillain–Barré syndrome – these are very serious and debilitating illnesses.

Campylobacter is present in the gut of a wide range of animals, especially domestic or wild birds, also cattle, sheep, dogs and rodents. Food poisoning outbreaks have been linked to eating or drinking undercooked poultry, unpasteurised milk and dairy products, and untreated water. In the kitchen foods can become contaminated by direct contact with raw foods such as poultry or indirectly e.g. via chopping boards, knives and hands. Your hands may be contaminated when handling pets such a puppies or backyard poultry or by contact with other animals.

Unlike most other food poisoning bacteria, Campylobacter doesn't grow well in foods if at all, but it a problem because only small numbers of the bacteria can cause illness.

Infections can be avoided by not consuming undercooked poultry, unpasteurised milk and dairy products, untreated or unprotected water, by preventing cross–contamination in the kitchen, kitchen hygiene, and washing hands after handling or contact with raw meat and poultry, pets and other animals.

Listeria Monocytogenes

Listeriosis caused by the bacterium, Listeria monocytogenes, is a comparatively rare form of foodborne illness, but it can be a very serious disease in pregnant women, people with poor immune systems and older adults, all of whom need to avoid certain foods.

The bacterium can cause two forms of illness.

The most serious is when it invades the bloodstream (septicaemia), the central nervous system (meningitis) or the uterus of pregnant women (causing premature birth, stillbirth or abortion).

The symptoms of listeriosis are usually described as 'flu–like', although fever and gastrointestinal symptoms can occur in pregnant women. The time from consuming the bacterium to showing the signs of illness can be between 8 to 90 days.

The second form is non–invasive and causes gastroenteritis about one day after consuming contaminated food.

Listeria is widely found in the environment so most raw foods are likely to be contaminated. Listeria is easily killed by heat, although cooked foods can easily become re–contaminated through poor food handling after cooking.

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 for 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 and never buy or eat packaged refrigerated food after its use by date. Vulnerable people should consume pre–prepared salads and deli meats soon after purchase or heat before eating.

Clostridium botulinum & Clostridium perfringens

Clostridium botulinum

This is one of the better-known food poisoning bacteria due to the severe nature of the illness.

It can cause death, if not treated. Fortunately, botulism occurs rarely in Australia.

The illness is caused by a potent neurotoxin produced by the vegetative cells as they grow. This causes symptoms about 12– 36 hours after ingestion, although this can vary. Early symptoms include nausea, diarrhoea & vomiting, but neurological symptoms follow. Infant botulism is commonly reported in some countries in children under one year old. The source of the infection can be unknown although spores in honey that produce toxins in a baby's tummy have been implicated.

When spores of Clostridium botulinum in dust are mixed with moist & nutritious food they can produce cells that produce the neurotoxin as they grow. This bacterium will only grow when oxygen levels are low and if the foods are not refrigerated or do not contain preservatives. Such conditions are typically present in canned, bottled, or vacuum-packed foods and in some fermented and traditional foods.

A wide variety of under-processed commercial and home processed foods, such as bottle fermented vegetables & fish, have been reported to cause illness internationally. The toxin is destroyed by heating although many processed foods are not heated before eating (e.g. bottled or canned fish, vegetables, meat spreads).

Canned, bottled and vacuum-packed food should only be purchased from a reliable source. If food is processed this way at home, strictly follow reliable recipes and follow manufacturer's instructions for processing equipment.

Clostridium perfringens

This is a less well-known bacteria 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.**

Symptoms begin 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.

Clostridium 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, Clostridium 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 Clostridium perfringens are very heat resistant and will withstand boiling for several hours.

E.coli & Staphylococcus aureus

Escherichia coli (E.coli)

Many strains of E. coli are found naturally in the gut of humans and animals where they may be harmless unless they find their way into other body sites or wounds. Traditionally tests for the presence of E. coli in foods and water have been used to indicate if there is any faecal contamination present. However, particular strains are known to make people sick and some are a common cause of traveller's diarrhoea and diarrhoea in infants in developing countries.

One important type of E. coli produces enterotoxins called Shiga toxins and causes diarrhoea that is often bloody. Patients can develop blood clotting conditions and kidney failure that may result in death. Although these severe infections are not common, in the last few years there have been several food poisoning outbreaks caused by these and other types E. coli both in Australia and overseas. Young children, older adults and immune–comprised people have an increased risk of more severe infections and death.

A wide variety of foods have been implicated in outbreaks caused by Shiga toxin producing E. coli around the world, including unpasteurised apple and orange juices, sprouted seeds, fruits and vegetables, raw milk and raw milk cheeses, raw flour and cookie dough, and meat and meat products, especially undercooked minced meat patties in hamburgers. Untreated and unprotected water supplies can also be a source of the bacterium.

E.coli is easily killed by heating. Thoroughly cooking food is a basic method of control eg hamburger meats. Avoiding consuming raw milk and certain dairy products, washing fruits and vegetables to be eaten raw in clean water, and ensuring drinking and irrigation water are safe will help to reduce the risk of infection, particularly for high risk consumers.

Staphylococcus aureus (Golden Staph)

Staphylococcus aureus, also known as 'Golden staph', is a bacterium that can cause food poisoning. About a third of us carry this organism in our skin, hair, nose, & throat where it usually present in low numbers & causes no harm unless it invades the body. If you have an infected cut or sore, or a sty it can contain very large numbers of Staphylococcus aureus.

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

Staphylococci can grow quickly in moist and nutritious foods and as it grows it produces a heat stable toxin. It is the toxin in the food that makes you sick. The staphylococci are killed by cooking and pasteurisation. In contrast, the toxin remains active even after severe heating. This means that if staphylococci are allowed to grow in food the toxin will remain even if the food is cooked or re–heated again. The toxin takes only a very short time to make you sick (one to six hours) and causes nausea, vomiting, abdominal cramps and diarrhoea as the usual symptoms.

Foods that are linked with outbreaks have commonly been those that have been cooked, further prepared with direct contact with hands, and held unrefrigerated in the temperature danger zone for extended periods of time. Staphylococci will grow in salty and sweet foods, and examples that have caused outbreaks include those containing custard, and cream–filled bakery products, ham, frankfurters, salads with ham, egg, tuna, chicken, cheese, potato and pasta, etc.

Prevention of staphylococcal intoxication includes practicing food safety rules (cook, chill, clean and separate) and, in particular, thorough hand washing before handling food, and not handling food if you have a nose or eye, skin or wound infection.

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Salmonella

Salmonella food poisoning is referred to as salmonellosis. **The symptoms include diarrhea, fever, abdominal cramps and vomiting which in most cases lasts about two to five days.** However, in some people it can lead to chronic conditions such as Reiter's Syndrome or reactive arthritis. **It usually takes 8 to 72 hours for symptoms of salmonellosis to occur, so it is not necessarily the last meal you ate that caused it.** Salmonella is present in the faeces of ill people and can remain present for some time after symptoms have gone.

In Australia, salmonellosis tends to be more prevalent in the warmer months. Eating food that has been kept in the temperature danger zone for too long allowing the bacteria to grow is often the cause of the illness. However, even small numbers of Salmonella can cause foodborne disease. **Sensitive individuals such as the elderly, young children and people with low immune systems, are much more likely to become ill after consuming only a small number of cells.**

Salmonella is found in healthy animals and birds farmed for food, wildlife and pests, their manures and environment**. As a result, salmonellosis has commonly been linked with consuming animal products such as inadequately cooked meats or poultry, other foods contaminated by raw meats and poultry, as well as foods containing raw or undercooked eggs, and unpasteurised dairy products such as raw milk or cheeses.**

It is important to note that it is now recognised that contaminated raw fruits and vegetables (e.g. sprouts, paw paw, melons, leafy salad vegetables), spices, and nuts have been identified in outbreaks. Dishes including the foods mentioned as ingredients and that are not cooked or heated before consumption have been linked with outbreaks e.g. raw egg mayonnaise and other sauces, eggnogs, desserts (tiramisu, mousse, fried ice cream etc.).

Salmonella can be transferred to other foods by cross contamination with raw foods, utensils, equipment and soiled hands. Food and water can also be contaminated during food handling or harvesting if handlers are infected and do not wash hands adequately after using the toilet or after caring for an infected person.

Salmonella contaminating food and surviving cooking can grow to a sizeable population of bacteria if the storage temperature is not controlled. The presence of only a few bacteria have caused illness in high fat foods like peanut butter, potato crisps and chocolate where they can survive, and liquids which pass through the stomach quickly, such as unpasteurised juices. It can also survive in relatively dry and mildly acidic foods for some time during food storage.

Because Salmonella is a natural resident in the gut of food production animals we should assume that it is in raw animal foods such as meat, poultry, milk & eggs. Fruits & vegetables can also be contaminated, for example if they come in contact with animal or bird faeces or contaminated water during production. See individual food products and safe food handling practices (cook, chill, clean, separate) for further information.

Viruses

The most important viruses that cause foodborne disease are Hepatitis A, Norovirus and Rotavirus.

Viruses are different to bacteria. Unlike bacteria that can grow on foods under various conditions, viruses do not grow in food. They rely on other cells such as those of humans, animals and plants, to be able to multiply. Viruses do this by invading specific host cells, taking over the cell's machinery forcing it to make new virus particles then rupturing the cell to release lots of new viruses. Only a few virus particles are believed to be required to cause infections.

During the cooler weather in the southern parts of Australia viral infections such as Norovirus and Rotavirus can become more common. Regular handwashing is one of the best ways to stop these viruses spreading. If you don't have access to handwashing facilities then alcohol sanitiser is also a good option but make sure you cover all surfaces of both hands before it dries.

Do you need further Food Safety information or Training?

This article was written by Sarah Friedrich, OSCAR Care Group Food Safety Auditor & Trainer. Please call or email Sarah via our contact details below.