## What is *E. coli* O157:H7?

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What is *E. coli* and why is it suddenly causing so much concern? Since the organism, formally called *Escherichia coli*, was first identified more than a hundred years ago it has been known as part of the normal bacteria that inhabit the large intestines of many mammals, including humans. Not only does it not harm us there, it actually helps us by producing. vitamins such as vitamin K and B-complex vitamins that we cannot make ourselves. The human intestine has billions of bacteria that also help us by growing there and preventing dangerous bacteria from surviving. Animals that are deliberately kept sterile from right after birth have no bacteria in their intestines. These animals are very sickly and require large amounts of vitamins to survive.

If the *E. coli* in the intestines are supposed to be there and are essential for a healthy intestinal tract, how does the same strain cause severe food poisoning? Well, the strain that causes trouble is a rare strain of *E. coli* that has slightly different genetic characteristics than the strain that normally lives in the intestines. This troublemaker is called *E. coli* O157:H7. It is part of a group of *E. coli* strains that are called enterohemorrhagic. This means that they cause bleeding in the large intestines, which is something that the normal *E. coli* cannot do. The enterohemorrhagic strains like *E. coli* O157:H7 have an extra gene that produces the Shiga-like toxin (SLT) (also called verotoxin) that destroys the cells that line the wall of the large intestines. When these cells are destroyed, we lose a lot of water and salt (diarrhea), and the damage causes blood vessels to break leading to the loss of blood (hemorrhage). The disease is particularly dangerous in small children, who may die from this infection.

How do we get this strain and how can we avoid it? Although the strain is rare, it takes only a few cells of *E. coli* O157:H7 to cause an infection, so we need to be careful. Since this strain grows in the intestines of mammals, it is most frequently spread via contaminated animal meat. Meat processing plants are usually scrupulous about sanitary conditions, but it takes so few of these bacteria to cause an infection that it is difficult to completely prevent contamination. This strain is easily killed by heat, so simply cooking any product to a temperature of about 160° F will solve the problem. Usually only the surface of meat is contaminated with bacteria and these surface bacteria are easily killed when the meat is cooked. The biggest problem is when meat is ground into hamburger and the bacteria penetrate into the meat. If the meat is not cooked thoroughly, bacteria may survive in the center. That is why hamburgers have been such a problem in this disease. The current recommendation is to cook all ground meat to an internal temperature of 160° F to insure its safety.

There is another way to make meat safe, although it is not yet commonly used in this country. That method is sterilization of foods by X-ray irradiation. This treatment penetrates meat and other foods to kill all living organisms, but does not cook the food. Although this has been shown to be a very safe and effective way to eliminate all microbial contamination of foods, it has not yet been widely accepted by consumers in this country.