Substantial Declines in Food-Borne Illness Found

Rates of some major infections dropped, but incidence rose for Vibrio *and* Salmonella.

BY MIRIAM E. TUCKER
Senior Writer

The incidence of several major food-borne infections declined markedly between 1996 and 2004, preliminary data from the Centers for Disease Control and Prevention suggest.

For the first time in 2004, the national incidence of Shiga-toxin–producing *Escherichia coli* (STEC) O157 infections fell below the Healthy People 2010 goal of 1 case per 100,000 population. In addition, rates of *Campylobacter* are approaching the target of less than 12.3 cases per 100,000, while the 2004 rate of *Listeria*, 2.7 per 1 million population, is nearly down to the goal of 2.5 cases per million, to be reached by the end of 2005.

But although most of the news from the CDC's 10-site Food-Borne Diseases Active Surveillance Network (FoodNet) was good, there were increases in the incidence of both *Vibrio* and of two *Salmonella* serotypes from baseline in 1996-1998 to 2004, according to the CDC (MMWR 2005;54:352-6).

In 2004, a total of 15,806 laboratory-confirmed cases of infections were identified in the FoodNet surveillance area, which included 44.1 million individuals, or 15.2% of the U.S. population. The three most frequent were *Salmonella* (6,464 cases), *Campylobacter* (5,665), and *Shigella* (2,231), followed by *Cryptosporidium* (613), STEC O157 (401), *Yersinia* (173), *Vibrio* (124), *Listeria* (120), and *Cyclospora* (15).

FoodNet cases were part of 239 nationally reported food-borne disease outbreaks, of which 58% were associated with restaurants. Of the 152 outbreaks in which an etiology was reported, the most common pathogens were norovirus (57%) and *Salmonella* (18%).

In 2003, FoodNet collected data on 52 cases of hemolytic-uremic syndrome in children less than 15 years of age (rate 0.6 per 100,000). Of those, 36 (69%) were among those younger than 5 years, the CDC said.

In comparing the preliminary 2004 numbers with those from 1996 to 1998, the CDC adjusted for the difference in FoodNet's population, which was just 14.2 million during the earlier time period. The estimated incidence of infections with *Campylobacter* decreased by 31%, *Cryptosporidium* by 40%, STEC O157 by 42%, *Listeria* by 40%, *Yersinia* by 45%, and overall *Salmonella* infections by 8%.

The estimated incidence of *Shigella* infections in 2004 wasn't significantly different from the baseline period, while overall *Vibrio* infections increased by 47%, to 2.8 per 100,000 population in 2004, the CDC reported.

Although the incidence of *Salmonella* decreased overall, only one of the five most common serotypes, *S. typhimurium*, actually dropped significantly (by 41%). Two of the others—*S. enteritidis* and *S. heidelberg*—didn't change, while both *S. newport* and *S. javiana* rose by 41% and 167%, respectively. The substantial increase in *S. javiana* was due in part to a multistate outbreak in 2004 that was associated with Roma tomatoes, they noted.

The substantial decline in STEC O157, first seen in 2003, coincides with several important food safety initiatives and educational efforts, and is consistent with reports from the U.S. Department of Agriculture of declines in contamination of ground beef following industry responses to governmental food safety initiatives.

The drop in *Campylobacter*, on the other hand, likely reflects efforts to reduce contamination of poultry and to educate consumers about safe food handling, the CDC said.

Rises in some *Salmonella* strains reflect a lack of understanding about the epidemiology of the organism and the methods by which it contaminates produce. Multidrug resistance is also a problem with *Salmonella*, particularly the *newport* strain. The reasons for the increase in *Vibrio*, typically associated with seafood, are not clear. The Food and Drug Administration is currently conducting an assessment. ■

Test for Salivary Glycoproteins May Soon Predict Caries Risk

BY MICHAEL FELTON
Contributing Writer

WASHINGTON — A test may soon be able to determine which patients, whether children or adults, are at greatest risk for dental caries, Paul C. Denny, Ph.D., said at the annual meeting of the American Association for the Advancement of Science.

Caries are the result of infectious disease, and if they remain untreated—in children or adults—they can cause abscesses outside the tooth, affect developing teeth in children, and even affect facial structures such as the jaw, said Dr. Denny of the University of Southern California.

The infectious agents are acid-producing bacteria in the mouth. These bacteria "have receptors on their cell walls that attach to specific sugars on chains of glycoproteins that are found in your saliva," he said.

These glycoproteins form a coating on the teeth called the pellicle. The bacteria use proteins called lectins to bind to these glycoproteins and then produce acid on the surface of the teeth.

The glycoproteins of the pellicle play a very important role by lubricating the tooth surface. The composition of these sugar chains is genetically determined and varies from individual to individual, said Dr. Denny.

What if some people make sugar chains that facilitate bacterial attachment, and other people do not? The test Dr. Denny and his colleagues have developed uses a small amount of saliva and lectins attached to color-producing enzymes to produce a visible reaction between a specific lectin and its partner glycoprotein. He has formed a company to commercialize the test.

"We do find that some of these sugar types are strongly positively correlated with the number of caries," he said. "But we also find that some of these chains are negatively correlated with the number of cavities, and it's the relative proportions of these positive and negatively correlated chains that give rise to the great range of [cavities] that one sees within a group of people."

Many of the same sugars incorporated into the pellicle are related to blood type. For instance, people with type B blood have galactose as part of the glycoproteins in their pellicle and saliva.

The researchers tested for eight glycoproteins in 21 different people. After analyzing the data, they created a plot showing that an individual's caries risk can be predicted with glycoprotein testing alone.

For instance, the group of people who never had cavities had common glycoproteins (risk level 1), but those who had numerous cavities throughout their mouths had a significantly different combination of glycoproteins (risk level 4). Between the two extremes, combinations of glycoproteins accounted for those with cavities in their molars (risk level 2), and those with more cavities in both their molars and premolars (risk level 3).

"And if you apply this to children before they have caries, you have the prescription or treatment plan for prevention," he said. "You could have children grow up caries-free regardless of their risk level."

Dr. Denny showed the results from children's saliva, which suggested that even though they do not have any caries yet, by their late 20s, they can expect to have 3-8 cavities unless there is intervention such as fluoride treatments, better oral hygiene, and more frequent dental checkups. ■

Data on Food-Borne Illness Show Freezing Doesn't Kill All the Bacteria

BY TIMOTHY F. KIRN
Sacramento Bureau

INCLINE VILLAGE, NEV. — Freezing a food does not always kill all the bacteria in it. Covering boiling water helps kill all the organisms in the pot. And houseflies can carry pathogenic *Escherichia coli*.

Those are some of the intriguing findings of recent studies about food-borne infectious disease, said Robert W. Derlet, M.D., at an annual emergency medicine meeting sponsored by the University of California, Davis.

U.S. Department of Agriculture researchers looked at whether refrigerating or freezing chicken at either 4° C or –20° C would kill *Campylobacter jejuni*, which is prevalent in U.S. poultry, said Dr. Derlet, chief of emergency medicine at the University of California, Davis.

They found that when the chicken was frozen for 1 week, about 10% of the *C. jejuni* population survived, and when it was frozen for 2 weeks, 5% survived.

However, most home refrigerators cannot achieve –20° C. In addition, he said, "Other studies have shown that even with months of freezing, some bacteria that are hardy survive. *E. coli*, as well as salmonella, tend to be hardy environmental organisms."

The researchers concluded that freezing is not a substitute for proper cooking (Appl. Environ. Microbiol. 2004; 70:7103-9).

Researchers from the Centers for Disease Control and Prevention, who are studying *Bacillus anthracis* because of its potential use as a bioterrorism agent, investigated whether boiling water contaminated with the organisms would sterilize the water. They found that when the water was covered and boiled for 3 minutes or 5 minutes, all the organisms were killed. However, when the water was boiled uncovered, high numbers of the organisms survived (Emerg. Infect. Dis. 2004;10:1887-8).

Some organisms can encapsulate into spores and survive intense temperatures, Dr. Derlet said. Clostridia, for example, form temperature-resistant capsules that break down when they cool, which is why there are instances of people becoming sick after eating soup that has cooled.

Researchers at Kansas State University collected flies from a cattle farm in that state to see if the insects could be contributing to dissemination of *E. coli* O157:H7, which may be present in up to 40% of beef that comes from a feedlot or passes through a stockyard.

They found that 6% of the flies collected harbored the organism, which can cause hemolytic-uremic syndrome (Appl. Environ. Microbiol. 2004;70:7578-80).

Flies can also carry shigella, salmonella, and cholera, and a fly needs only a second to get its mouth parts onto your food—though it is not known if in that time the fly can deposit enough organisms to make someone ill.

An investigation of an outbreak of about 3,000 cases of salmonellosis contracted from raw tomatoes served at a fast-food restaurant chain in 1999 demonstrated that *Salmonella enterica* can be transferred from hands and grow rapidly in tomatoes, Dr. Derlet noted. A recent study has now shown that it can survive on vegetables for 200 days, at least under experimental conditions (Appl. Environ. Microbiol. 2004;70:2497-502). ■