Current Topics

Foodborne Illness Estimates Revised; Major, Minor Safety Changes Pending

Public health officials at the Centers for Disease Control and Prevention (CDC) in Atlanta, Ga., last December revised their estimates of U.S. foodborne illnesses, saying that 48 million individuals, or about 17%, are sickened each year, leading to about 3,000 fatalities. These revised statistics are the latest in a series of developments involving food safety. Prominent among them is a major legislative overhaul that provides officials of the Food and Drug Administration (FDA) with greater authority and resources to address national food-safety needs. Amid those two major developments are several noteworthy but more narrowly focused developments that deal specifically with meat safety.

“These estimates provide valuable information to help CDC and its partners set priorities and further reduce illnesses from food,” says CDC Director Thomas Frieden, referring to the pair of reports on foodborne illnesses that appear in the December Emerging Infectious Diseases and provide full details of the latest CDC estimates. “We’ve made progress in better understanding the burden of foodborne illness and, unfortunately, far too many people continue to get sick from the food they eat.”

Although the two reports from CDC provide the first comprehensive national estimates of foodborne illnesses since 1999, these new and older assessments are not directly comparable, according to CDC officials. One important difference is that CDC no longer counts the bulk of norovirus cases of gastrointestinal illnesses as being foodborne, noting that this virus is mainly spread by other means. Other changes in monitoring and analysis led CDC experts to conclude that genuinely foodborne illnesses decreased by about 20% during the past decade. Additional highlights from the two reports include:

- **Salmonella** was the leading cause of estimated hospitalizations and deaths, responsible for about 28% of deaths and 35% of hospitalizations due to known pathogens transmitted by food.
- About 90% of estimated foodborne illnesses, hospitalizations, and deaths were due to seven pathogens: *Salmonella*, norovirus, *Campylobacter*, *Toxoplasma*, *Escherichia coli* O157, *Listeria*, and *Clostridium perfringens*.
- Nearly 60% of estimated illnesses, but a much smaller proportion of severe illness, was caused by norovirus.

Insisting that the public health system can do better to decrease the burden of foodborne illnesses, FDA Commissioner Margaret Hamburg points to pending food safety legislation as a critical component of that effort. Once passed, that legislation “would provide us with new and long-overdue tools to further modernize our food safety program,” she says.

Although the Senate passed its bill, “the FDA Food Safety Modernization...”
Systems Scientists Find Microbial Gene Expression Networks Appealing

“Escherichia coli remember and predict, they’re highly sensitive and adaptive cellular computing machines wired together through chemical reactions,” says Yuhai Tu from the IBM T. J. Watson Research Center in Yorktown Heights, N.Y. Praising bacteria for being compact and energy efficient, Tu says they “are teaching us how to build better computing devices.” He and other systems scientists described examples in which bacterial research is providing insights of value not only for biology but other fields as well. They spoke this past November at a Systems Biology meeting, convened by the New York Academy of Sciences (NYAS) in New York, N.Y.

“The advantage of working with the E. coli sensory system is that we already know how its signals are received, transduced, and regulated on a molecular level,” Tu says. Moreover, chemoreceptor clustering, which amplifies signals at the receptor level, might provide insights into the design of mechanical sensor networks. “Chemoreceptors cluster for a reason,” he says. “It enables the cells to coordinate and amplify signals and respond to environmental changes with high sensitivity.

“At the systems level, all biological signaling pathways are processors designed to filter useful information out of noisy backgrounds,” Tu says. One way of looking at chemotaxis systems is as “low-pass filters” for computing the time derivative of ligand concentration and attenuating signals at higher cutoff frequencies. “The costs and limitations of both man-made information processing machines, or computers, and signal processing in living systems from bacterial cells to human brains are important investigative areas for IBM scientists,” he says.

Microbial environments have “selected for a dazzling diversity of bacterial behaviors,” according to another NYAS meeting participant, Saeed Tavazoie from Princeton Uni-