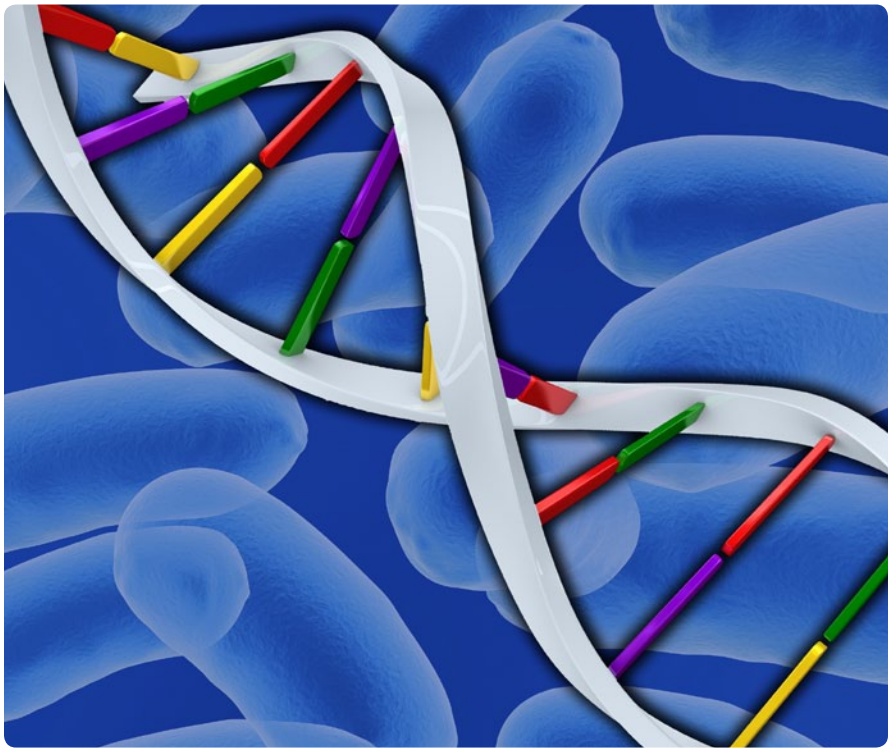
Genome Project for Food Pathogens Launched

The tiny organisms that cause foodborne illnesses—bacteria, viruses and others—are formidable foes. Despite efforts to reduce outbreaks, bacteria like *Salmonella, Campylobacter, E. coli* and *Listeria* are pervasive in the environment. Like masters of disguise, they evolve into different strains to adapt to changing surroundings.



Scientists will be studying and recording the genetic makeup of bacteria that have caused outbreaks of foodborne illnesses.

These microorganisms are collectively referred to as food pathogens. And they do a lot of harm. Every year an estimated 48 million Americans get sick from a foodborne disease, 128,000 are hospitalized, and 3,000 die, according to the Centers for Disease Control and Prevention (CDC).

Despite progress in our understanding of these pathogens, there is a lot that scientists do not yet understand, including where these harmful organisms live, how they survive or multiply in the environment, and whether some geographic locations affect them in unique ways.

To answer these and other questions, the Food and Drug Administration (FDA) is embarking on a five-year collaboration with public and private partners to create a public database of the gene sequences of 100,000 bacteria that have been responsible for outbreaks of foodborne illnesses around the world. Gene sequences are the ordered chemical building blocks that make up the bacteria's DNA.

The goal of this effort, called "The 100K Genome Project," is to give public health officials the tools they need to more rapidly identify the source of the contamination and bring these outbreaks under control, says Steven Musser, Ph.D., director of the Office of Regulatory Science in FDA's Center for Food Safety and Applied Nutrition (CFSAN).

The Practical Applications

Musser explains that this new database containing the genetic codes of food pathogens will:

- enable scientists in both the public and private sectors to develop tests that can identify the bacteria present in a sample within days or even hours.

"FDA is pleased to contribute the scientific and technical expertise necessary to create and maintain this food pathogen database that will be fully accessible and have long-lasting impact on protecting public health."

- help investigators discover the likely source of an outbreak. For example, a cluster of *Salmonella* illnesses is detected using current testing procedures but the contaminated food is not easily identified. A test would reveal what bacteria is present in the person's body and the genome database could indicate where that strain or one like it came from the last time it was detected. That would point investigators in the direction of a specific food or region.
- greatly expand the pool of researchers able to develop software for the diagnosis and analysis of potential hazards that could lead to new methods of preventing and controlling outbreaks. Making this information available to the public means that researchers throughout the world can use it. "If we keep this information to ourselves at FDA, we're limited to just what we can think of doing with it," says Musser.

A Public-Private Collaboration

This initiative is a collaboration between FDA, the University of California/Davis, and Agilent Technologies Inc.

The genomic sequencing will be done at a new facility at UC Davis that will coordinate the overall effort. As the gene sequences are completed, they will be stored in the National Institutes of Health's National Center for Biotechnology Information's public database.

FDA is providing hundreds of genetic sequences its scientists have already drafted, thousands of actual food pathogens for additional sequencing, and other technical support. Under a cooperative agreement grant to UC Davis, FDA scientists will guide the project and provide technical assistance.

Agilent—a company that manufactures equipment for electronic and bio-analytical measurement—is supplying expertise, instrumentation and funding.

The list of collaborators contributing to the project continues to grow. For example, CDC and the U.S. Department of Agriculture's Food Safety and Inspection Service (FSIS) have both joined the initiative.

"FDA is pleased to contribute the scientific and technical expertise necessary to create and maintain this food pathogen database that will be fully accessible and have long-lasting impact on protecting public health," says FDA Commissioner Margaret A. Hamburg, M.D.

"This initiative shows great promise as we look to improve our ability to identify and track down potential sources of foodborne outbreaks," said USDA Under Secretary for Food Safety Elisabeth Hagen, M.D. "FSIS intends to submit important bacterial strains from our regulatory testing program for sequencing at UC Davis, and we look forward to the benefits this public database could provide federal, state and local public health agencies."

CDC will provide its foodborne disease expertise, strains to be sequenced and other information for use in the project. CDC experts will also serve on the steering committee for the project.

The endeavor is also a reflection of FDA's focus on regulatory science, which is the scientific foundation of FDA's regulatory decisions, says Musser, who heads a lab at CFSAN with more than 120 researchers dedicated to preventing food safety problems before they occur, and identifying the causes when they do.

As it relates to food safety, regulatory science involves the development of tools, standards and approaches to assess the safety of the foods consumed by people and animals in this country. The database is an important advance, says Musser. "It doesn't get better than this."

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