FDA

GENOMIC NETWORK HELPS FIGHT FOODBORNE ILLNESSES

US Food and Drug Administration, US Centers for Disease Control and Prevention, National Institutes of Health, National Library of Medicine, US Department of Agriculture Food Safety and Inspection Service

During a foodborne disease outbreak, identifying the source of food contamination is key to ensuring public safety. A new public genomic surveillance platform, and the genomic database that underlies it, is helping U.S. public health officials quickly identify the sources of foodborne illness and contamination.

The Pathogen Detection platform was created at NIH-National Center for Biotechnology Information (NCBI), and the underlying genomic database includes contributions from the US Food and Drug Administration (FDA), Centers for Disease Control and Prevention (CDC), U.S. Department of Agriculture's Food Safety and Inspection Service (USDA-FSIS) and other global partners.

NCBI Pathogen Detection provides an easy-to-use web interface for users to track the daily influx of new isolates (biological strains) and query the deep underlying database for foodborne illness-causing microorganisms (pathogens) under surveillance. The NCBI web portal groups closely related genetic sequences into trackable "clusters," providing clues and leading to potential food contamination sources.

The platform also provides an antibiotic resistance profile for each isolate, enabling surveillance of antibiotic resistance in emerging and reemerging pathogens. These results provide US public health officials at the FDA, CDC, USDA-FSIS, international partners, and dozens of smaller public health laboratories the same public view of the US foodborne surveillance data, allowing seamless communication across many different levels of public health entities.

Four federal agencies work side by side to monitor and prevent foodborne illness. The FDA contributes food and environmental pathogen isolates from its GenomeTrakr network of field, state and partner labs. The CDC uses its mature PulseNet network of state and local laboratories to upload all clinical data. The USDA-FSIS contributes isolates from the foods and facilities it regulates, such as

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meat, poultry and egg products. The genomic sequences collected are all publicly available within the NCBI Pathogen Detection database and analysis portal built specifically for this project.

These genomic data have been used in more than 500 FDA investigations and several investigations by the CDC and USDA-FSIS. It has provided expeditious leads to outbreak sources, and many have led to accurate compliance actions related to contaminated food product recalls. The Pathogen Detection portal has helped the FDA and partners more productively monitor the effectiveness of preventive controls in food manufacturing environments.

The transition to genomic data in a publicly accessible database enables much finer resolution for source tracking and expands the participation and reach of contributing laboratories, enabling a truly global foodborne pathogen surveillance platform.

As the database expands, this high-resolution tool will continue to provide new insights into outbreak causes and risks, ensure effective and timely control of newly emerging and reemerging pathogens, and improve overall food safety. ❊

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Above: *Dr. Marc Allard (left) and Dr. Eric Brown record a podcast in which they discuss the GenomeTrakr network. Access the podcast at https://www. fda.gov/media/104782/download.*