



2024 Influenza A Virus HPAI H5N1 Outbreak Weekly Report May 29, 2024

Introduction

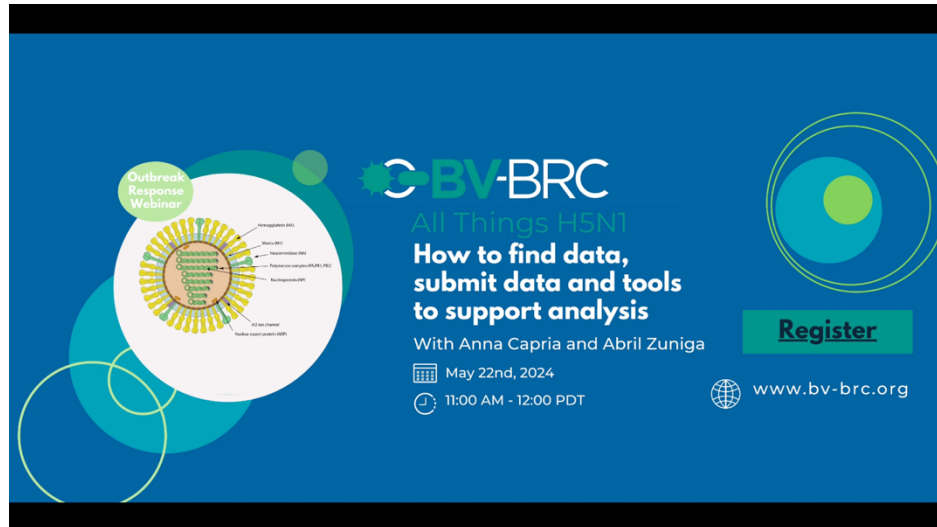
In March 2024, several cases of highly pathogenic avian influenza A (HPAI) H5N1 virus were confirmed in dairy cattle in Texas, with cases spreading to at least eight other states (<https://www.biorxiv.org/content/10.1101/2024.05.01.591751v1>). In addition, a human case of influenza from the same clade and genotype was also diagnosed in a dairy worker from Texas around the same time. As part of an effort to track this outbreak, the United States Department of Agriculture (USDA) Agricultural Research Service (ARS) and the USDA National Veterinary Services Laboratories (NVSL) have been working to collect and sequence samples from additional cattle as well as avian species and other animals that also appeared to be infected with HPAI that might be related to the virus from the Texas dairy cattle. The genomic sequences of each virus isolate (consisting of the eight genomic segments sequenced for each individual isolate) are assembled from the sequenced short read data, and after undergoing quality control, are submitted to the GenBank sequence repository where they become publicly available. To enhance the ability of the USDA to rapidly submit sequences to GenBank, personnel from the Bacterial and Viral Bioinformatics Resource Center (BV-BRC) have been collaborating with USDA scientists to assist them with the submission of assembled HPAI genomic sequences to GenBank.

The BV-BRC provides a database of complete and partially sequenced microbial genomes from both viral and bacterial pathogens. This data is derived from the GenBank repository and includes metadata obtained from the GenBank record as well as associated NCBI BioProject, BioSample, and SRA repository records. All this metadata provides users with the ability to search for specific datasets from the BV-BRC web site using the filtering and sorting features built into BV-BRC web-retrieval tools. To provide rapid access to sequences and other data and information from the 2024 HPAI outbreak, the BV-BRC provides an outbreak-specific web page with links to this information: (https://www.bv-brc.org/outbreaks/H5N1/#view_tab=overview).

This report provides statistics on the public availability of HPAI H5N1 genomic sequences historically, and especially from isolates collected since 2024 in North America.

Updates

- The BV-BRC team hosted a webinar on May 22nd and outlined tools for analysis and the recent updates on the BV-BRC website including the outbreak pages. There were 103 attendees from around the world and country.



- On May 24, CDC [reported a second human case of H5 bird flu](#) tied to dairy cow outbreak, along with preliminary genomic analysis of the isolate. The genomic sequences for this isolate are available in both [GenBank](#) and [BV-BRC](#).

Statistics (As of May 29, 2024)

The numbers provided below are obtained from the BV-BRC database. These numbers should be equivalent to those available from GenBank with the exception that newly submitted sequences may take a few days to be available from the BV-BRC database. Unless otherwise indicated, the number of sequences reported includes sequences from all the influenza A genomic segments. For the 2024 outbreak, where we have isolate-specific information, we report the number of isolates along with the number of sequenced genomic segments. These numbers include the sequences generated by the USDA as well as sequences submitted from all other sources.

- Influenza A virus, total sequences to-date (all time): [1,065,779](#)
- Influenza A virus, HPAI H5N1 sequences to-date (all time): [54,648](#)
- Influenza A virus, HPAI H5N1 sequences collected in 2024: [2,579](#) genomic sequences from 320 virus isolates.

HPAI, H5N1 virus isolates collected and sequenced in 2024, by host and US states:

Host Name	Number of Viral Isolates
American crow	1
Aythya americana	1
Bald eagle	1
Blackbird	2
Branta canadensis	3
Buteo jamaicensis	1
Canada goose	4
Cattle	208
Chenonetta jubata	1
Chicken	21
Common raven	1
Crow	2
Cygnus cygnus	1
Dairy cattle	1
Domestic cat	12
Duck	1
Feline	2
Goat	15
Grackle	3
Great horned owl	1
Harris-hawk	1
Homo sapiens	2
Lophodytes cucullatus	1
Mallard	1
Mountain-lion	2
Mute swan	2
Pelecanus erythrorhynchos	1
Peregrine falcon	1
Pigeon	1
Raccoon	1
Red-tailed hawk	2
Skunk	9
Snow goose	3
Turkey vulture	1
Turkey	9
Western gull	1

US State	Number of Viral Isolates
California	7
Colorado	1
Idaho	6
Illinois	2
Indiana	5
Iowa	1
Kansas	14
Maryland	2
Michigan	21
Minnesota	21
Missouri	7
Montana	4
New Mexico	30
North Carolina	8
Ohio	14
Oklahoma	1
Oregon	3
South Carolina	3
South Dakota	21
Texas	134
Utah	2
Washington	7

Phylogenetic Analysis

- The latest phylogenetic trees for all eight segments can be accessed using the URL below, which include the second human isolate from Michigan.
https://www.bv-brc.org/outbreaks/H5N1/#view_tab=phylogenetics

News

Title	Date	Source
Study Shows Novel Influenza Virus Infections in Humans in the United States Would Likely be Detected Through Existing Health Care Surveillance	May 29	CDC
Highly Pathogenic Avian Influenza Detected in a Flock of Commercial Layer Chickens in Sioux County	May 28	Iowa Department of Agriculture and Land Stewardship
H5N1 Virus Found in Beef for First Time, FSIS Says	May 28	AGWEB
Alpacas infected with H5N1 avian flu in Idaho	May 28	CIDRAP
Highly Pathogenic Avian Influenza (HPAI) H5N1 Detections in Alpacas	May 28	USDA
Highly Pathogenic Avian Influenza Detected in Three New Dairy Herds	May 25	Michigan DARD
Study confirms infection in mice fed H5N1-contaminated raw milk	May 24	CIDRAP
Updates on H5N1 Beef Safety Studies	May 24	USDA
Technical Update: Summary Analysis of the Genetic Sequence of a Highly Pathogenic Avian Influenza A(H5N1) Virus Identified in a Human in Michigan Avian Influenza (Flu)	May 24	CDC
Outbreak of Highly Pathogenic Avian Influenza A(H5N1) Viruses in U.S. Dairy Cattle and Detection of Two Human Cases — United States, 2024	May 24	CDC
HHS advances plan to produce 4.8 million H5N1 vaccine doses	May 22	CIDRAP
Michigan reports 3 more H5N1 outbreaks in dairy herds	May 20	CIDRAP

Publications

Title	Date	Source
Pandemic preparedness through vaccine development for avian influenza viruses	May 28	Human Vaccines and Immunotherapeutics
Detection of Novel Influenza Viruses Through Community and Healthcare Testing: Implications for Surveillance Efforts in the United States	May 26	Influenza and Other respiratory viruses

Cow's Milk Containing Avian Influenza A(H5N1) Virus — Heat Inactivation and Infectivity in Mice	May 24	NEJM
Development of a nucleoside-modified mRNA vaccine against clade 2.3.4.4b H5 highly pathogenic avian influenza virus	May 23	Nature
A combination influenza mRNA vaccine candidate provided broad protection against diverse influenza virus challenge	May 23	Virology
A Chymotrypsin-Dependent Live-Attenuated Influenza Vaccine Provides Protective Immunity against Homologous and Heterologous Viruses	May 8	MDPI