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DHSS provides update on COVID-19 variant virus monitoring

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JEFFERSON CITY, MO -- Variants of the COVID-19 virus continue to develop around the world, and scientists in the United States and around the world continue to monitor them for their characteristics as they relate to infectivity, morbidity and response to available vaccines and treatments. At this time, the most concerning virus variants are required to be **reported to the Centers for Disease Control and Prevention (https://www.cdc.gov/coronavirus/2019-ncov/more/science-and-research/scientific-brief-emerging-variants.html)** (CDC): those that have emerged from the United Kingdom (known as 20I/501Y.V1, VOC 202012/01, or B.1.1.7), South Africa (known as 20H/501Y.V2 or B.1.351) and Brazil (known as 20J/501Y.V3 or P.1). To date, one person has been identified as having the UK variant in Missouri and none with the South African or Brazilian variant. At least 45 states have reported at least one case of the UK variant to the CDC.

Missouri is a national thought leader for its use of sewage analysis to study the prevalence of COVID-19 virus within samples from around the state to monitor prevalence and trends in an aggregated manner. Working with the University of Missouri and Missouri Department of Natural Resources, the Missouri Department of Health and Senior Services (DHSS) recently widened its capacity to do coronavirus viral sequencing to also look at sewage samples from around the state to further enhance surveillance for existing and emerging variants.

As previously noted (https://health.mo.gov/news/newsitem/uuid/d831a879-4f93-4b30-a0a0-214d6cd55662/state-continues-to-monitor-covid-19-variant-viruses), the analysis indicated the B.1.1.7 (UK) variant was present in sewage samples collected from throughout the state. 15 of the 23 communities tested showed small amounts (often a fraction of a percent) of genetic material containing mutations consistent with the B.1.1.7 variant.

To conduct this sequencing, Missouri's team looks at the genetic region of COVID-19 virus that evolves the fastest and contains the mutations found in many of the recognized variants. The sequences identified in the samples are analyzed to see if there are mutations present that are found in known variants. An example of this would be the two important mutations in this region of B.1.1.7 (UK) variants: N501Y and A570D.

Sequences were also analyzed for the presence of the Brazil and South African variants which contain the mutations, E484K and N501Y. However, no sequences with this combination of sequences have been identified. Therefore, no Brazilian or South African variants have been found in sewage analyses, and there are no known clinical cases of such an infection at this time in Missouri.

"It is important to note that this is a point-in-time analysis that likely doesn't reflect the true prevalence as it stands today in the areas of the state where samples were collected," said Dr. Randall Williams, director of the DHSS. "This is the first set of samples analyzed, so we are limited in the conclusions we can draw from this information. The data is complex and is subject to epidemiological and laboratory analysis and interpretation from which to draw conclusions."

Due to the complicated nature of these studies, Missouri experts ask that individuals think of genetic mutations like genetic fingerprints. Each variant has several mutations, and findings of a single mutation do not confirm the presence of a variant. Whole genome sequencing has to be done in order to fully identify all mutations; therefore levels of variant virus in this sewage analysis are considered likely estimates.

Another set of emerging variants that are being studied in the United States are the California variants, B.1.427 and B.1.429, which are not required to be reported to the CDC. Both of these variants contain the signature mutation L452R. To date, the Missouri State Public Health Laboratory identified two B.1.429 cases from historical Missouri samples while developing COVID-19 whole genome sequencing methodology. One additional case was also determined from a patient who presented clinically. New information coming out of California this week suggests the B.1.427/429 variants may be more infectious than previous commonly circulating variants in the United States. Missouri's sewage analysis shows that it is present in Missouri samples as well, but similar to the UK variant, not in large amounts.

"As of today, Missouri has the second lowest COVID-19 case rate in the United States, and we are thankful to all who are helping to make that a reality," said Williams. "However, we understand that COVID-19 is a dynamic situation caused by a continually evolving virus, and we are committed to constantly studying it and adapting to it as needed. We are thankful for those leading the sewage analysis efforts in Missouri and helping bring this knowledge to other states as well."

Though recent sewage analyses have detected low levels of these two variants, UK and South California, there is no clear association with increasing human cases of variant virus in Missouri. The variant testing and genetic sequencing in sewage is an evolving science, and Missouri is one of the first to be conducting this testing.

"Although there are many unknowns at this time, we presume these variants are clinically present in Missouri," said Williams. "At this time, we do not know if these low variant virus levels will increase, so we must reemphasize that it is still really important to wash your hands well and often, maintain physical distance and wear masks if you can't be distanced from others outside your household. We also continue to ask that individuals consider getting vaccinated when they are able. The vaccines that are currently available in the United States appear to be effective against these variant viruses."

Percentages of COVID-19 Virus Genetic Material Containing Variant Mutation

		Variant/Mutation			
Facility	**Sample date**	**B.1.1.7 (UK)**	**B.1.427/ B.1.429 (California)**	**Brazil or South African**	**Unmatched mutation**
		N501Y/A570D	**L452R**	**E484K/N501Y**	**E484K**

Wastewater Treatment Facilities

Hannibal	2/1/21	8.9%	1.4%	0.0%	0.5%
Columbia	1/6/21	0.5%	0.3%	0.0%	0.2%
Springfield Southwest	2/1/21	0.0%	4.5%	0.0%	0.6%
St. Louis Metropolitan Sewer District - Lemay	1/6/21	0.0%	1.4%	0.0%	1.1%
Union West	2/1/21	0.0%	0.0%	0.0%	0.5%
Fulton	2/2/21	0.1%	0.7%	0.0%	1.0%
St. Louis Metropolitan Sewer District - Grand Glaize	1/6/21	0.0%	0.3%	0.0%	1.0%
Jefferson City	1/12/21	0.6%	1.7%	0.0%	1.0%
Independence Rock Creek	12/30/21	0.6%	3.6%	0.0%	0.5%
St. Louis Metropolitan Sewer District - Coldwater Creek	1/26/21	0.5%	1.2%	0.0%	0.4%
Southwest City	2/2/21	0.1%	0.5%	0.0%	0.5%
St. Louis Metropolitan Sewer District - Lower Meramec	1/26/21	0.6%	1.4%	0.0%	1.1%
St. Louis Metropolitan Sewer District - Missouri River	1/12/21	0.3%	0.3%	0.0%	0.6%
Kansas City Blue River	1/28/21	0.4%	0.9%	0.0%	1.3%
Cassville	1/28/21	0.0%	2.6%	0.0%	0.7%
Carrollton	1/25/21	0.2%	0.4%	0.0%	0.4%
Monett	2/1/21	0.0%	1.2%	0.0%	0.4%
Northeast Public Sewer District - Interim Saline Creek Regional	2/2/21	1.0%	0.7%	0.0%	1.0%
Dexter West	2/2/21	0.0%	4.6%	0.0%	0.5%
Little Blue Valley Sewer District - Atherton	1/11/21	3.8%	2.9%	0.0%	0.6%
Nixa	1/25/21	0.2%	1.1%	0.0%	0.2%
Warrensburg East	1/24/21	0.0%	4.9%	0.0%	0.5%

St. Peters Spencer Creek	2/2/21	0.4%	0.4%	0.0%	0.6%
Correctional Facilities					
Fulton Reception and Diagnostic Center	1/28/21	0.1%	1.0%	0.0%	0.6%
Moberly Correctional Center	1/31/21	0.0%	2.3%	0.0%	0.4%
Eastern Reception and Diagnostic Center	1/28/21	4.3%	1.0%	0.0%	0.7%

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