

Title: Genomic Surveillance

Throughout the COVID-19 pandemic, scientists have said that “the virus changes very quickly” and that “new variants may change the way we respond to the pandemic.”

But how do we know that the virus changes, creating new variants like Delta, or Omicron?

The answer is genomic surveillance, a process where scientists gather genetic sequence data from representative populations to detect new variants and monitor trends in circulating variants.

Genomic surveillance is not new. Scientists around the world have used genomic surveillance to track other viruses like Ebola and flu.

Throughout the COVID-19 pandemic, scientists have used these same methods to monitor changes to SARS-CoV-2, the virus that causes COVID-19.

So how does this work?

A random selection of positive viral samples is used as part of a coordinated surveillance effort.

Scientists gather the samples, determine the genetic sequence in that sample, and then analyze and compare it to other sequences in a large, public database.

There are 3 main components of genomic surveillance: 1. Genomic Sequencing 2. Compiling and Analyzing Sequence Data 3. Publishing Findings and Advising Public Health Professionals

When a person tests positive on a PCR-based test, the sample may be sent from the testing laboratory to another laboratory to sequence, or decode, the virus’s genetic material.

32 This sample never includes the patient's personal information and results are used for surveillance only,
33 not for diagnostic or clinical purposes.

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35 The sequencing process maps out the genome of the virus, presenting scientists with a fingerprint of
36 that virus that can be characterized, and compared to other viral sequences.

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38 Laboratories, both in the United States and around the world, upload these sequences into public
39 databases.

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41 A key takeaway from the COVID-19 pandemic is the importance of having large, collaborative groups of
42 scientists, who can look at the same data, and agree on appropriate public health actions.

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44 Genomic Surveillance helps scientists do two things.

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46 Identify key mutations that may change the virus' behavior or its effectiveness with treatments or
47 vaccines.

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49 And track genetic mutations within the virus as it replicates and changes into new lineages and
50 sublineages.

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52 Genomic surveillance provides valuable information to public health professionals. Which they use to
53 make decisions about how to respond to the COVID-19 pandemic.

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55 If a variant emerges that causes more severe disease, like the Delta variant, genomic surveillance will
56 help scientists understand where and how fast that variant is spreading.

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58 As a result, you may hear guidance changes to recommended personal protective measures, or that
59 another vaccine booster is recommended.

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61 By detecting specific mutations in the genome, scientists can also monitor for variants that may be more
62 resistant to certain treatments.

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64 When they are, scientists communicate with doctors to ensure that effective treatments are used
65 appropriately to treat patients.

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67 It's important for us at CDC to provide transparent, timely, and critical information that will help drive
68 public health decision-making.

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70 CDC publishes SARS-CoV-2 variants circulating in the United States and the proportion of each variant
71 causing infections, by region on the CDC COVID Data Tracker.

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73 We also provide weekly updates in the COVID Data Tracker weekly review.

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75 CDC will continue to monitor emerging variants, assess the threat they may pose, and communicate any
76 implications to public health.