COVID-19 Conversations

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COVID19Conversations.org
#COVID19Conversations
COVID-19 Conversations #21
The Fourth Wave: Vaccines, Variants, and the Future
September 1, 2021

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What are variants?

- SARS-CoV-2 virus has a long spike protein that protrudes from its shell and attaches to certain cells
- Small variations in the amino acid sequences (mutations) can change the shape of the spike protein and change its properties
  - More easily transmitted
  - More difficult for antibodies to bind to

3 characteristics give the delta variant evolutionary advantage:
- Mutations in the receptor binding domain make the variant “stickier”
- Mutation in the furin cleavage site makes it more efficient in entering target cells
- Mutation in NTD-antigenic supersite makes it less readily recognized by antibodies

The fourth COVID-19 wave, United States, July-September, 2021

<table>
<thead>
<tr>
<th></th>
<th>Daily Avg. on Aug. 30</th>
<th>14-Day Change</th>
<th>Total Reported</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cases</td>
<td>158,946</td>
<td>+12%</td>
<td>39,156,379</td>
</tr>
<tr>
<td>Tests</td>
<td>1,522,570</td>
<td>+45%</td>
<td>—</td>
</tr>
<tr>
<td>Hospitalized</td>
<td>100,663</td>
<td>+22%</td>
<td>—</td>
</tr>
<tr>
<td>Deaths</td>
<td>1,348</td>
<td>+91%</td>
<td>639,081</td>
</tr>
</tbody>
</table>

These are days with a reporting anomaly. Read more [here](#).
Average daily cases per 100,000 in past week by county, United States, August 31, 2021
Risk for COVID-19-unvaccinated individuals by county, United States, August 31, 2021
SARS-CoV-2 variants of concern, United States and United Kingdom, 2021

United States: 5/16/2021 – 8/21/2021

United States: 8/15/2021 – 8/21/2021 NOWCAST

United Kingdom

United States

Share of cases from Alpha and Delta variants

Now cases per 100,000 people

Oct. 1 - July 14

Oct. 1 - July 14

Alpha

Delta

FULLY VACCINATED

40%

1%

1%

40%

50 cases per 100,000

50 cases per 100,000

United States

Dated: 31 Aug 2021
What’s going on in the U.S.?

• Rise of more transmissible delta variant – now almost 100% of isolates in the U.S.
• Failure to vaccinate - far more important than vaccine failure
• Continued mixing of unvaccinated people with resultant transmission
• Less than full adherence to non-pharmaceutical interventions
• Failure to develop immunity in some immunocompromised individuals
  • Need for an additional dose in primary series
• Some evidence of declining vaccine effectiveness temporally associated with rise of delta virus – waning immunity, escape mutations??
  • Breakthrough infections
Effects of community vaccination level upon the % of cases in the vaccinated:
(RR 7.5x in unvaccinated)

Percentage of population vaccinated

% cases who were vaccinated
% cases who were unvaccinated

Courtesy of Dr. R. Schechter, CDPH
COVID-19 cases by vaccination status, Los Angeles County, May 1-July 25, 2021

Projections of incidence SARS-CoV-2 infection, United States, through December 31, 2021

Current projections: Vaccine distribution continues at current pace (57% fully vaccinated by 31 December), future mask use is the mean of mask use over the last 7 days, mobility increases in proportion to vaccine coverage. Worst: 100% of vaccinated individuals stop using masks, mobility increases irrespective of vaccine coverage, variants spread twice as fast. Masks: 95% mask usage is adopted.
Projections of hospital resource utilization for COVID-19 patients, United States, though December 31, 2021
SARS-CoV-2 variants of interest, World Health Organization, August 2021

<table>
<thead>
<tr>
<th>WHO label</th>
<th>Pango lineage*</th>
<th>GISAID clade</th>
<th>Nextstrain clade</th>
<th>Earliest documented samples</th>
<th>Date of designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eta</td>
<td>B.1.525</td>
<td>G/484K.V3</td>
<td>21D</td>
<td>Multiple countries, Dec-2020</td>
<td>17-Mar-2021</td>
</tr>
<tr>
<td>Iota</td>
<td>B.1.526</td>
<td>GH/253G.V1</td>
<td>21F</td>
<td>United States of America, Nov-2020</td>
<td>24-Mar-2021</td>
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<tr>
<td>Kappa</td>
<td>B.1.617.1</td>
<td>G/452R.V3</td>
<td>21B</td>
<td>India, Oct-2020</td>
<td>4-Apr-2021</td>
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<tr>
<td>Lambda</td>
<td>C.37</td>
<td>GR/452Q.V1</td>
<td>21G</td>
<td>Peru, Dec-2020</td>
<td>14-Jun-2021</td>
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<tr>
<td>Mu</td>
<td>B.1.621</td>
<td>GH</td>
<td>21H</td>
<td>Columbia, Jan-2021</td>
<td>30-Aug-2021</td>
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