COVID-19 Clinical Update

USET COVID-19 ECHO Presentation

January 15, 2021

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USET Tribal Epidemiology Center

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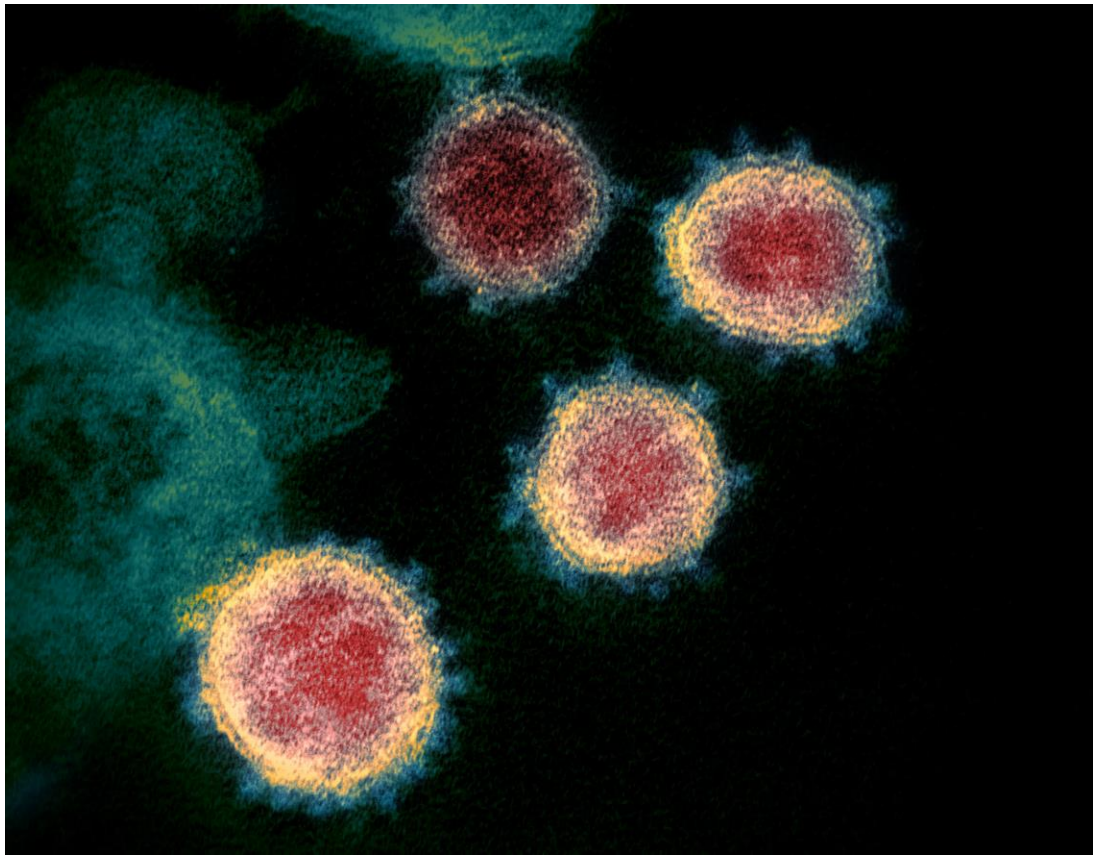
Day 311 of the COVID-19 Pandemic



- Viral Variants
- False negative testing with viral variants
- Vaccine reactions
- Vaccine news
- Resources

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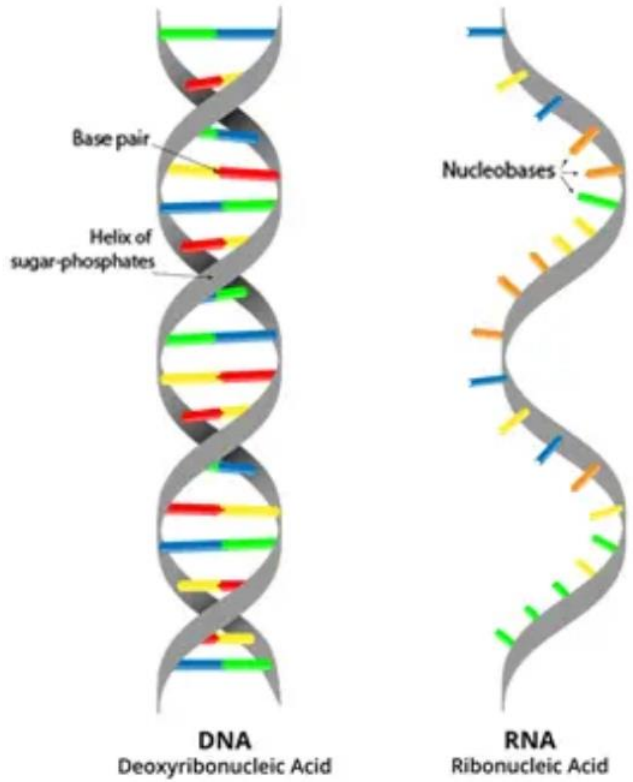
What's the difference between RNA and DNA?



- DNA is composed of 2 strands of nucleotide base pairs
- RNA is a single strand of single unpaired nucleotide bases
- RNA is inherently less stable

https://www.technologynetworks.com/genomics/lists/

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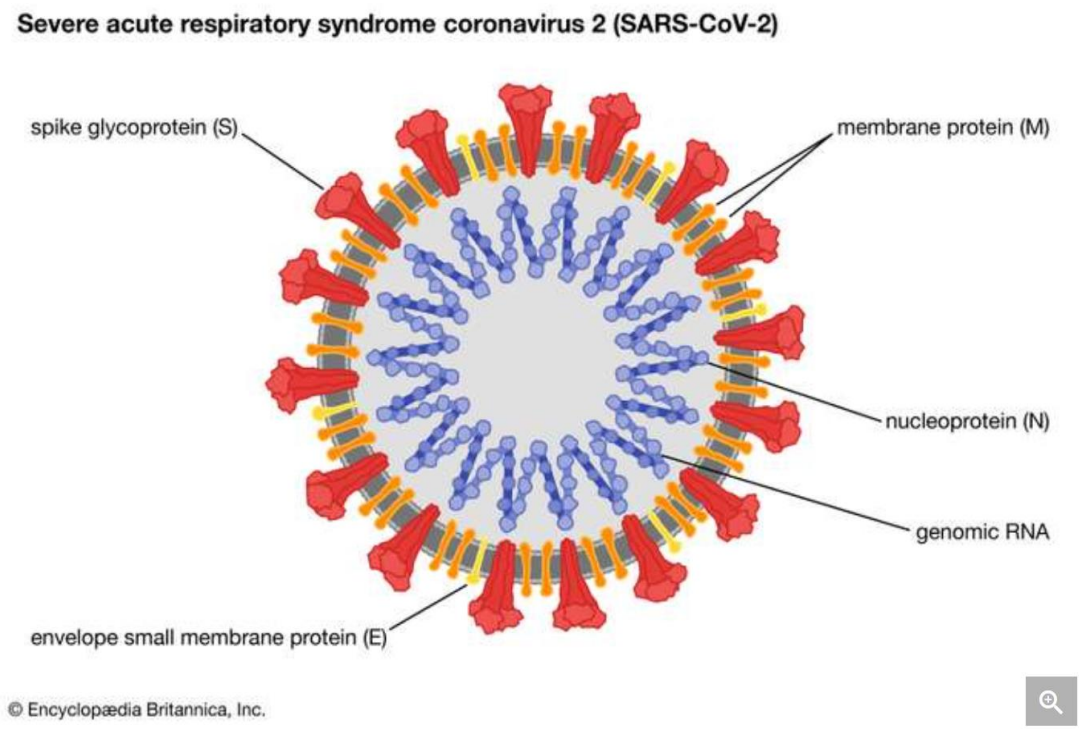
SARS-CoV-2



SARS-CoV-2
The coronavirus SARS-CoV-2, the cause of the COVID-19 pandemic.
Encyclopædia Britannica, Inc./Patrick O'Neill Riley

- SARS-CoV-2 is an RNA virus
- Genetic code is contained in RNA inside the viral envelope
- Mutations tend to occur frequently in RNA viruses
- SARS-CoV-2 is less prone to mutation than the average RNA virus

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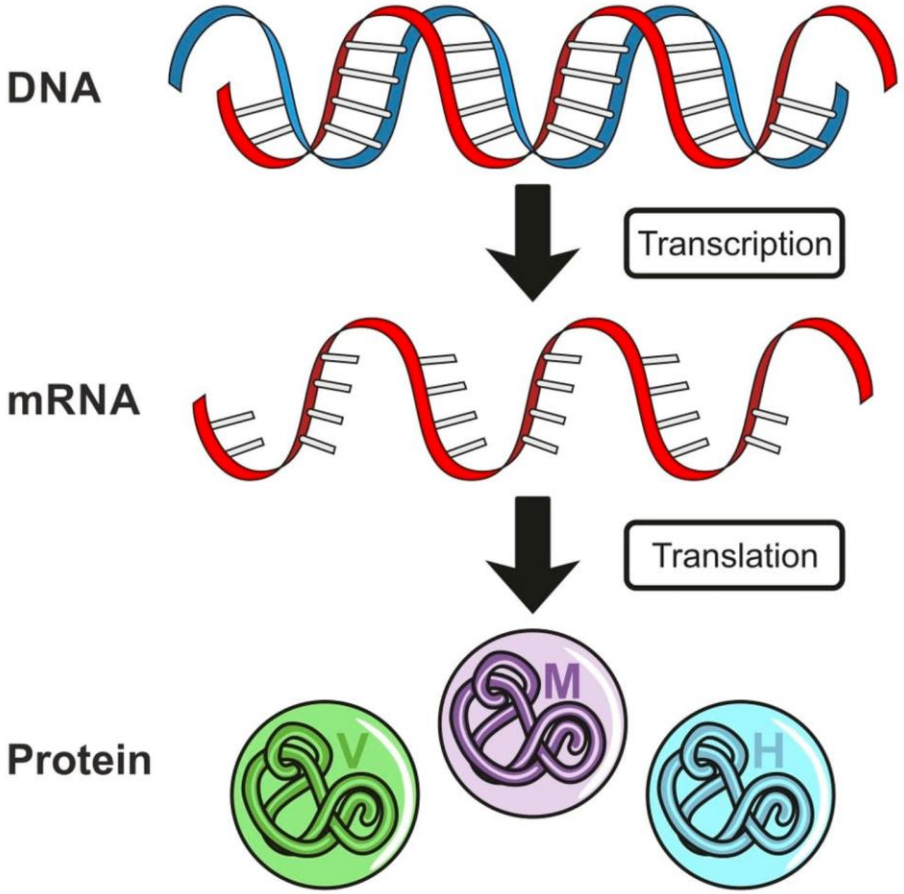
Brief Review of Genetics



- In cellular organisms, the genetic code is carried in DNA
- DNA is **transcribed** into mRNA
- mRNA is then **translated** in the ribosomes to make proteins
- mRNA is rapidly degraded after being used by the ribosomes, and does not go back into the nucleus

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Viral Variants

- Mutation – change in the genetic sequence (or code)
- Variant – viral genome that varies in sequence from the original
- Strain – viral variant that has demonstrably different characteristics
- Different characteristics could be differences in:
  - Ability to replicate
  - Transmission – ability to infect human or animal host
  - Ability to escape from immunity

Potential Consequences of Viral Mutation

1) Ability to spread more quickly in people
2) Ability to cause either milder or more severe disease in people
3) Ability to evade detection by specific diagnostic tests
4) Decreased susceptibility to therapeutic agents, such as monoclonal antibodies
5) Ability to evade natural or vaccine-induced immunity

SARS-CoV-2 Variants

- D614G - China
- Y453F – Denmark – mink farms
- N501Y – UK (aka B.1.1.7, aka 501Y.V1)
- N501Y – South Africa (aka B.1.351, aka 501Y.V2)
- Others happening all the time

So What's the Bottom Line?

- CDC, in partnership with state and local health departments, universities, and other entities, tracks variants
- Strain Surveillance in the US:

  Emerging SARS-CoV-2 Variants | CDC

(https://cdc.gov/coronavirus/2019-ncov/more/science-and-research/scientific-brief-emerging-variant.html)

"Currently no evidence that any strains has any impact on severity of disease or vaccine efficacy"

False Negative Testing with Viral Variants

- On January 8th the FDA issued an alert regarding SARS-CoV-2 viral mutations of diagnostic testing
- Three PCR tests affected:
  - Mesa Biotech Accula
  - TaqPath COVID-19 Combo Kit
  - Linea COVID-19 Assay Kit

"The FDA believes the risk that these mutations will impact overall testing accuracy is low"

Genetic Variants of SARS-CoV-2 May Lead to False Negative Results with Molecular Tests for Detection of SARS-CoV-2 - Letter to Clinical Laboratory Staff and Health Care Providers | FDA

What Does This Mean for Your Clinic?

- Know Your Test…
- Stay tuned for more updates

Vaccine Reactions (Pfizer/BioNTech and Moderna)

- Local Reactions
  - Arm soreness, erythema (redness), swelling
- Systemic Reactions
  - Fatigue, headache, muscle aches, joint pain, chills, fever
- Allergic Reactions
  - 1 in 90,000 cases of anaphylaxis
  - Probably a reaction to one of the 4 lipids that make up the nanoparticles

Vaccine Reactions

When giving any vaccine, have the following:

- Epinephrine (at least 3 doses)
- Antihistamine (such as diphenhydramine)
- Blood pressure cuff
- Timing device (to assess pulse rate)
- Stethascope
- Observation period of at least 15 minutes

Contraindications to mRNA Vaccines

- Severe allergic reaction (anaphylaxis) after a previous dose of any mRNA vaccine
- Immediate allergic reaction of any severity to a previous dose of mRNA vaccine or any of its components
- Immediate allergic reaction of any severity to PEG (polyethylene glycol) or polysorbate
- When in doubt, consult an allergist

Vaccine News

- The Janssen/J&J vaccine expects to have efficacy data in the next 2 weeks
- Viral-vectored vaccine using adenovirus 26
- One shot vaccine?
- Expect an EUA sometime in late February or early March
- Limited vaccine supply at first, but potential for 1B doses by end of the year

DOI: 10.1056/NEJMoa2034201

WHO Vaccine Candidate Tracker

September 21, 2020

- 38 vaccine candidates in human trials
- 9 candidates in Phase 3
- 149 in pre-clinical
- 187 total vaccine candidates

January 15, 2021

- 68 vaccine candidates in human trials
- **20 candidates in Phase 3**
- 163 in pre-clinical
- 214 total vaccine candidates in some phase of development

https://www.who.int/publications/m/item/draft-landscape-of-covid-19-candidate-vaccines

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CDC Vaccine Tracker

https://covid.cdc.gov/covid-data-tracker/#vaccinations

- 30,628,175 doses distributed
- 11,148,991 doses administered
- 9,690,757 individuals have received 1 or 2 doses
- 1,342,086 people have received 2 doses
- State data: among USET Tribal Nation states:
  - Alabama has administered 21.2% of vaccine rec'd, 1.64% of population
  - Connecticut has administered 52.3% of vaccine, 4.39% of population

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Resources

- IHS website: https://www.ihs.gov/coronavirus/vaccine/
- CDC website: https://www.cdc.gov/coronavirus/2019-nCoV/index.html
- USET website: https://usetinc.org/covid19

Vaccine Tracking Websites:

- Milken Institute: https://covid-19tracker.milkeninstitute.org/
- London School of Tropical Medicine: https://vac-lshtm.shinyapps.io/ncov_vaccine_landscape/
- WHO: https://www.who.int/publications/m/item/draft-landscape-of-covid-19-candidate-vaccines
- NY Times: https://www.nytimes.com/interactive/2020/science/coronavirus-vaccine-tracker.html

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A Few Resources:

Vaccine Tracking Websites:

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- London School of Tropical Medicine: https://vac-lshtm.shinyapps.io/ncov_vaccine_landscape/
- WHO: https://www.who.int/publications/m/item/draft-landscape-of-covid-19-candidate-vaccines
- NY Times: https://www.nytimes.com/interactive/2020/science/coronavirus-vaccine-tracker.html

Basic Vaccine Technology Article:

"Covid-19: the eight vaccine technologies being tested" – from the *International Veterinary Vaccinology Network:*

https://www.intvetvaccnet.co.uk/blog/covid-19/vaccine-eight-types-being-tested

CDC Vaccine Website for COVID-19:

https://www.cdc.gov/coronavirus/2019-ncov/vaccines/index.html

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Thank You for Your Time and Attention!

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Have a great weekend!

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