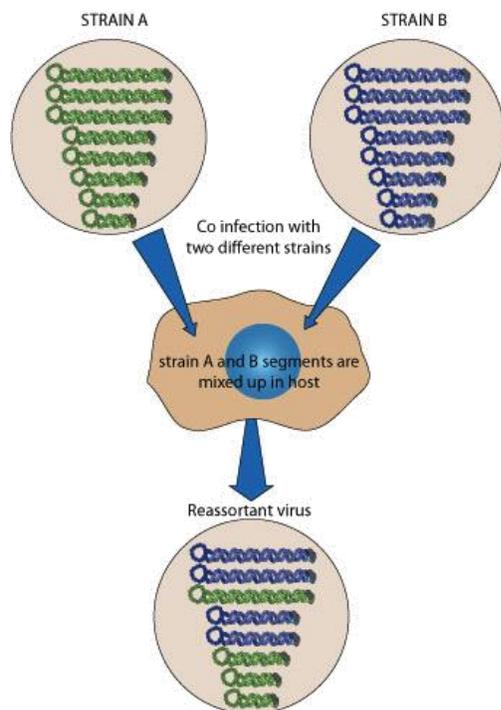


**Dear valued patients:**

Wow, things continue to happen, so I will continue to post

### Mutation

A lot of people complain about the flu virus vaccine and how it does not work as well as they wish. This is because the virus can mutate, so when the vaccine is made months in advance of the flu season, the actual influenza virus can change. The influenza virus gene set is broken into several segments which code for a gene. When two viruses are in the same cell, they can swap segments, creating new combinations. Once they swap, bam, they can easily make a new combination.



What about the current coronavirus? A molecular geneticist at Johns Hopkins said that there are only 4-10 genetic differences between strains infecting people in the US and those that came from Wuhan. That is a small number of differences considering the large number of people it has passed through. This may suggest that the gene set is not as broken into segments as the influenza virus. He says this small number of differences may mean that a vaccine for the SARS-CoV2 could confer protection with a single administration rather than a yearly administration. It would be more like the chickenpox and the measles vaccine which generally immunize people long term.

### Coronavirus

I have been asked a good question. Does our testing just check for coronavirus or the exact SARS-CoV-2 causation virus? The answer is that our testing is pretty darn good. We can distinguish between the coronaviruses. Recent viral cultures from patients in my office have been checked for Coronavirus 229E, Coronavirus HKU1, Coronavirus NL63 and Coronavirus OC43. I have also been able to check for other

common respiratory pathogens such as Adenovirus, metapneumovirus rhinovirus, influenza A and B and the list goes on. At this time, I am not able to test for SARS-CoV-2. These tests are known as PCR tests. Thanks for the question Mark.

### The PCR tests

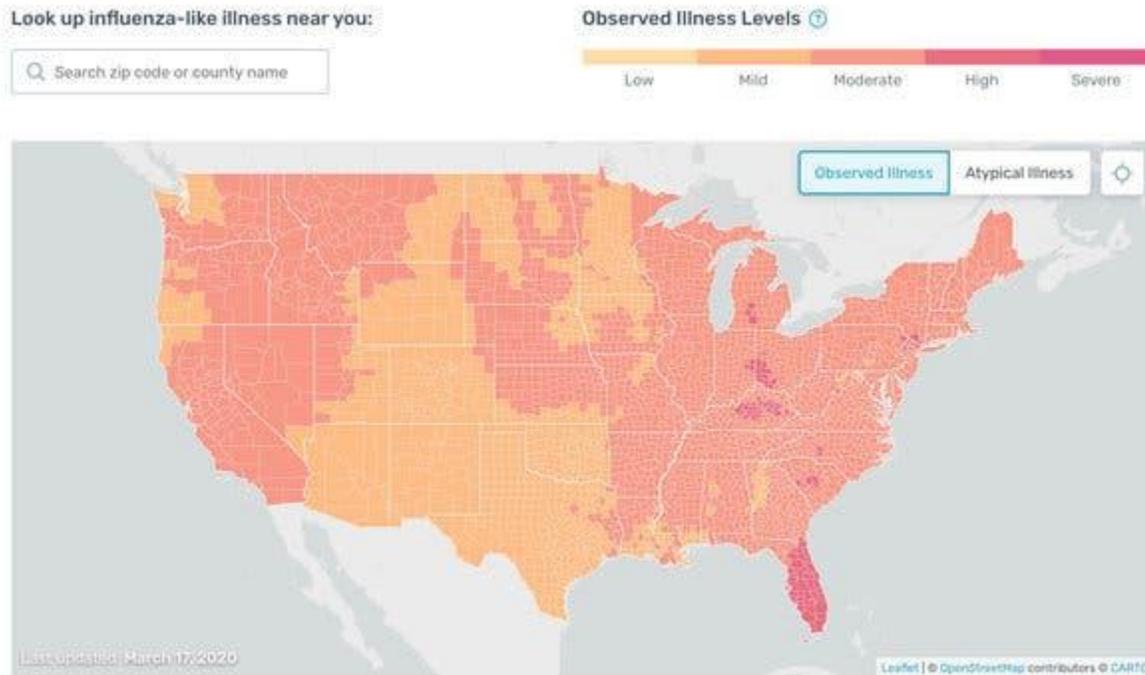
To administer a PCR test, we take a swab and try to get a sample from your nose or nasopharynx, or oropharynx, depending on the disease. This swab is put in a special medium and transferred to the lab. The lab uses a PCR test (polymerase chain reaction) which works by detecting specific genetic material within the virus. Evidently the SARS-CoV-2 has nearly 30,000 nucleotides or building blocks of genetic material. The PCR test developed by the University of Washington for example targets just 100 nucleotides which are specific to SARS-CoV-2. These 100 nucleotides include two genes of the SARS-CoV-2 gene set. A sample is positive if it finds both genes, inconclusive if it has one and negative if neither. I suspect there will be several commercial tests over the ensuing months and testing times will come down remarkably. We do PCR strep and flu tests in the office now in about 15 minutes.



So then what are antibody tests? The human body makes antibody in response to an infection. It is a protein that helps attack the invader and kill it. Let's take the chickenpox virus, herpes zoster, as an example. For the older folks who had chickenpox as children, your body was infected with the chickenpox virus and your body immediately made an immunoglobulin called IgM or immunoglobulin M. This is a great "attack and destroy" immunoglobulin although it is not so good at surveillance. As you recovered, your body never wanted to see this disease again. In response, you slowly stopped making IgM and started making IgG a surveillance antibody. This rapid response antibody quickly watches out for the virus and makes sure you don't get the disease again. These antibodies are carried to various locations in your body by your blood stream. We can tell roughly if you have had a current infection, recent infection or past infection by checking on the levels of each antibody to each disease. When you have a vaccination or if you have had the disease in the past you should read high IgG antibodies but very low IgM antibodies. If you have had SARS-CoV-2 your level of antibodies will follow this outline.

## Tracking People

With smart devices we may be able to pick trends in disease using human temperature. Here is what the human temperature map looks like during a typical flu season.

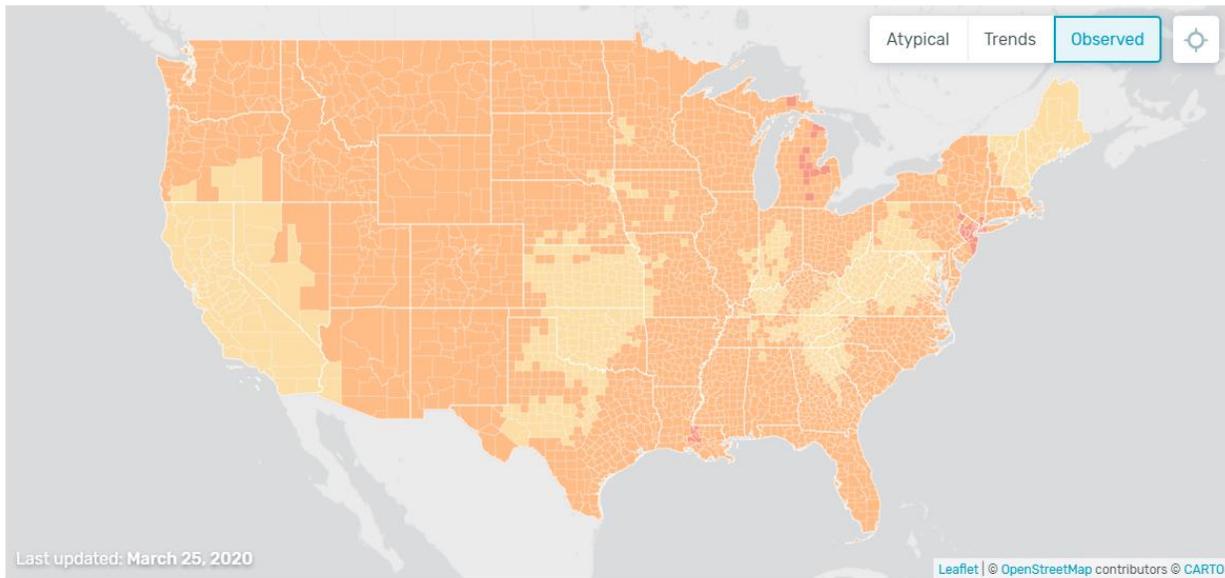


The map tells you where new clusters of fever occur; an increase in testing is advised in fever cluster areas. A fever map can be an early warning indicator for illness spread. The CDC system lags because it depends on reports from doctor's office of body temperature recorded in the office and transmitted to the CDC. Sudden spikes with these "smart" sensors may indicate where coronavirus will next arrive.

Fever maps have several confounding factors that make interpretation imperfect. Below is the map for March 25. Why is the map not more red? Due to widespread school closures, and stay at home orders, etc., the feverish illness levels are dropping in many regions. The site that publishes the data states that **this does not mean that COVID-19 cases are declining** (we know they are not). It may indicate these measures are starting to slow down the spread.

Look up influenza-like illness near you:

Observed Illness Levels ?



### **Summertime and the livin' is easy**

A new study published by MIT found that 90% of COVID-19 transmission through last Sunday occurred in areas with temperatures between 37-63 degrees Fahrenheit. In warmer climates, the virus can continue to spread but at a slower rate. It is noted that northern states have higher rates of infection than southern states.

As the temperature warms, we will see if this trend in temperature continues. There is a difference between forward looking statistical studies and what actually happens. As the weather continues to warm, we will actually be in a better place to analyze the data and make predictions.

### **A case study**

The Lancet recently published a case study about a woman in her 60's who returned from China in mid-January of 2020. One week later she was hospitalized with pneumonia and tested positive for SARS-CoV-2. Her husband did not travel but had frequent contact with the wife. He was admitted 8 days later and tested positive as well. They had 372 documented contacts who were closely followed; not one of the 372 contacts converted to positive. Here are the details if you are interested.

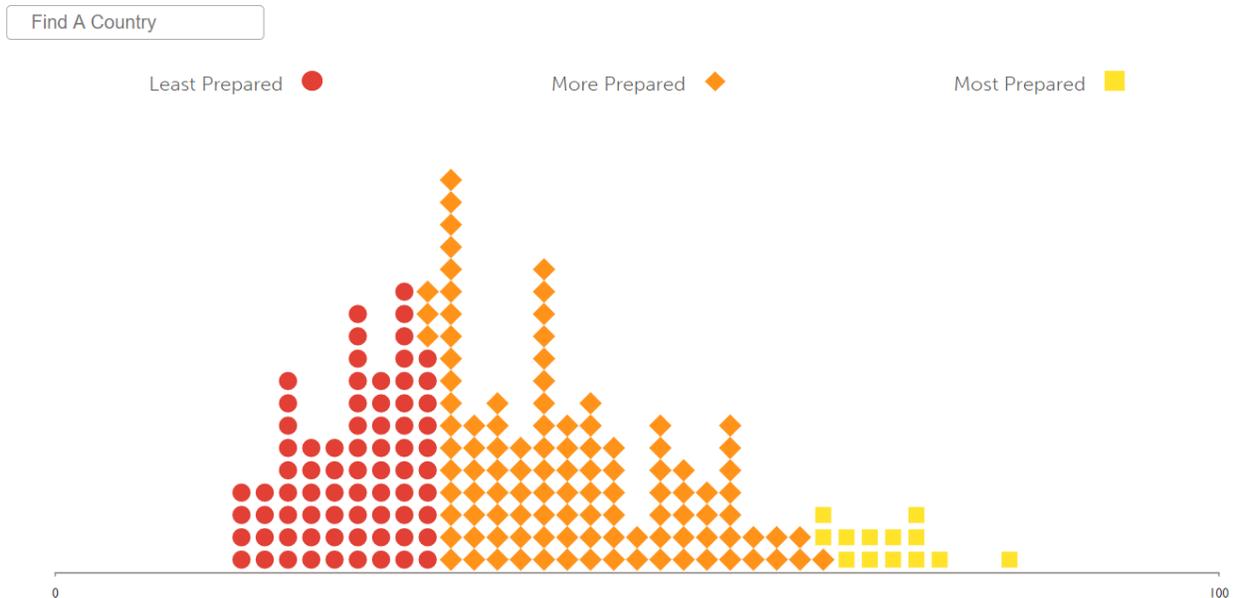
- 372 contacts of both cases were identified.
- 347 underwent active symptom monitoring including 152 community contacts and 195 healthcare contacts.
- Contacts who developed fever, cough or shortness of breath became “persons under investigation” and were tested for SAR-CoV-2.

- Of the 347 under active monitoring, 43 became “persons under investigation” or developed symptoms in addition to patient #1 and her husband, patient #2
- Surprisingly, the 43 under investigation all tested negative.

No don't go giving up your masks just yet. We don't know why these two individuals did not pass on the disease. It is possible that different people shed viruses at different rates and these two were non-shedders. There might be asymptomatic people who are shedders. Continued research on the types of carriers will need to be done even after we see the crises through to the other side.

**Be thankful to be American**

The GHS is a global health security index of 195 countries. It makes a comprehensive health assessment and benchmarks the health security of a nation. The GHS was developed by Johns Hopkins Center for Health Security (JHU), the Economist Intelligence Unit (EIU) and the Nuclear Threat Initiative (NTI). These groups worked with an international advisory panel of 21 experts from 12 countries. Risks for health are evaluated for Prevention, Detection and Reporting, Rapid Response, Health System, Compliance with International Normals and Risk Environment (<https://www.ghsindex.org/>). Here is the graph telling you about each country



You may ask who that country is to the far right. Yep, that would be the United States. If you have a health crisis anywhere in the world, you are fortunate enough to be in the best place on the planet.

**Art and Disease**



*Bonaparte Visits the Plague Stricken in Jaffa by Antoine-Jean Gros*

Bonaparte Visits the Plague Stricken in Jaffa (French: Bonaparte visitant les pestiférés de Jaffa) is an 1804 painting commissioned by Napoleon Bonaparte by Antoine-Jean Gros to portray an event during the Egyptian Campaign. This striking scene shows General Bonaparte making a visit to his sick soldiers at the Armenian Saint Nicholas Monastery. The visit is supposed to have occurred in Jaffa on 11 March 1799. The commission was an attempt to embroider Bonaparte's mythology and quell reports that Napoleon had ordered fifty plague victims in Jaffa be given fatal doses of opium during his retreat from his Syrian expedition.

Thank you to Gail who has offered to help me with the art, of which my knowledge is sadly deficient.

Also, thanks to:

Chief of IT and design: Sarah Wilson

Editor-in-Chief: Alisa Wilson. You may have noticed typos in my last email. Unfortunately, after my wife did a fine job editing, I accidentally reverted to prior version. Mea Culpa.