Dr. Delgado COVID-19 Update 5-14-20

WHO BECOMES SICK?

Though scientists at first thought age was the dominant factor, with young people avoiding the worst outcomes, new research and emerging data has revealed a multitude of features likely
impacting disease severity.

1. AGE

According to the CDC, about 8 out of 10 deaths associated with COVID-19 in the U.S. have occurred in adults ages 65 and older. The trend may be due, in part, to the fact that many elderly people have chronic medical conditions that can exacerbate the symptoms of COVID-19, according to the CDC. The ability of the
immune system to fight off pathogens also declines with age, leaving elderly people vulnerable to severe viral
infections.

2. Hypertension and heart disease

People with conditions that affect the cardiovascular system, such as heart disease and hypertension, generally suffer worse complications from Covid-19 than those with no preexisting conditions, according to the American Heart
Association. A study of Covid-19 patients in Wuhan, China, found that more than 1 in 5 patients developed visible heart damage — some of the sampled patients had existing heart conditions, and some did not.

By attacking the lungs directly, the virus might deplete the body's supply of oxygen to the point that the heart must work harder to pump oxygenated blood through the body and become compromised. In addition, the virus might also attack the heart directly, as cardiac tissue contains angiotensin-converting enzyme 2 (ACE2)— a molecule that the virus plugs into to infect cells.
Lastly, in some individuals, Covid-19 may also kickstart an overblown immune response known as a “cytokine storm,”
wherein the body becomes severely inflamed and the heart could suffer damage as a result. This “storm” likely explains the inflammatory syndrome now being seen in increasing numbers in
children.

3. OBESITY

Several early studies have suggested a link between obesity and more severe Covid-19 disease in people. One preliminary study, that hasn't yet been peer-reviewed, found that the two biggest risk factors for being hospitalized from the coronavirus are age and obesity. Another study in patients younger than 60 showed that those who were obese were twice as likely to be hospitalized and 1.8 times as likely to necessitate a critical care admission. This has important and practical implications in a country like the U.S. where nearly 40% of adults are clinically obese.

It's not clear why obesity appears linked to more hospitalizations and more severe Covid-19 disease. It is likely multifactorial and more research is necessary.

4. DIABETES

In a literature review of multiple studies, the Journal of Infection found that people with diabetes were 3.7 times more likely to have critical cases of Covid-19 or die than those without any underlying

conditions. In general, poorly controlled diabetics are more susceptible and have poorer outcomes with a myriad of infections. Whether this is due to diabetes directly or the fact that it is
generally associated with cardiovascular, renal and other comorbidities remains unclear.

The progression of Covid-19 infections and type 2 diabetes is likely linked to changes in the body's immune system. Review of past research reveals that patients with obesity and/or diabetes
showed immune systems that were suboptimal in their response. An impairment is noted in white blood cells called Natural Killer (NK) cells and also in B cells, both of which help the body fight off infections.

5. BLOOD TYPE

Blood type may be a predictor of how susceptible a person is to contracting Covid-19, though scientists haven't found a definitive link between blood type per se and severity of disease.

Numerous studies “suggest" that individuals with A blood types are more likely to test positive than other blood types and that O blood types were less likely to test positive than others.

Why blood type might increase or decrease a person's risk of getting Covid-19 is not known. A person's blood type indicates what kind of certain antigens cover the surfaces of their blood cells; These antigens produce certain antibodies to help fight off a pathogen. Past research has suggested that at least in the SARS coronavirus, anti-A antibodies helped to inhibit the virus; that
could be the same mechanism with SARS-CoV-2, helping blood group O individuals to keep out the virus.

More research is needed.

6. SMOKING

People who smoke cigarettes appear to be prone to severe COVID-19 infections, meaning they face a heightened risk of developing pneumonia, suffering organ damage and requiring breathing support.

A study of more than 1,000 patients in China, published in the New England Journal of Medicine, illustrates this trend: 12.3% of current smokers included in the study were admitted to an ICU, were placed on a ventilator or died, as compared with 4.7% of nonsmokers.

7. GENETICS

Some people dying from Covid-19 are young and healthy and without any risk factors, but scientists still don't know why. Now, genomics company 23andME is offering free genetic tests to 10,000 people who have been hospitalized with the disease hoping to discover genetic factors that could point to an answer.

They are working in concert with an international consortium of researchers whom are all sharing their detailed medical records and the genetic data from several countries.

Scientists hope to find a gene(s) that strongly influences, or even possibly determines, why some people are more impacted by exposure to the virus.

Will be interesting to follow this storyline.

VACCINE UPDATE

As with all vaccines, the idea is to trick our body into thinking it's been infected. Then, those self-made spike proteins would train our bodies to detect and terminate any real Covid-19 infections before the virus can advance.

As soon as the genetic sequence of SARS-CoV-2 was posted online in late January, three groups began independently working on adenoviral vector vaccines against COVID-19: CanSino Biologics, the University of Oxford, and Johnson & Johnson.

The engineered adenoviral vectors are designed to shuttle a gene from the SARS-Cov-2 novel coronavirus that causes Covid-19 into our bodies where our cells will read it and make coronavirus spike proteins and hence generate an immune response.

One attractive feature is that adenoviruses' inflammatory effects mean developers don't have to use adjuvants, molecules added to conventional vaccines, to direct the immune system's attention to the viral protein. The adenoviruses themselves drive the inflammation, which is kept under control by giving the vaccines at low doses so as not to elicit an infection.

The most ambitious approach is by Oxford University as I mentioned previously. In late April, it started a 1,100-person trial to prove its vaccine's safety while looking for any signs that it works. Its goal is to complete that study in just a month and then begin a Phase III trial of 5,000 people as soon as June. If successful, Oxford's program would leapfrog all other COVID-19 vaccines in development.

Oxford is likely to have the first efficacy data in the world and if it is deemed sound could begin distribution before the
end of the year. Their vaccine platform is based on 30 years of research using adenovirus vector vaccines and is considered a “proven” technology and delivery system. We can only hope.

Many obstacles remain and a cautious approach and stringent review is required prior to any true implementation.

ANTIBODY UPDATE

A recent study from China, which has not been peer-reviewed, studied the levels of antibodies in 285 positive coronavirus patients. Within the first week, 40%
developed short-term antibodies (IgM) and 95% were positive within 2 weeks. All had developed long-term antibodies (IgG) within 3 weeks. This is reassuring.

But many questions still remain around antibodies: whether everyone develops them (the study was limited), what level of antibodies is necessary to confer protection, do the antibodies confer immunity and for how long that protection may last.

In order to know just how much protection and for how long these antibodies confer immunity, researchers like the team in China will need to continue to follow them, and perhaps even do challenge experiments to expose them to the virus again and see if their antibodies protect them from reinfection.

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