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What can the biological mechanisms of COVID-19 tell us about solutions?

Overview:

COVID-19, novel coronavirus, or just the coronavirus–it doesn't matter, it has been changing our world everyday. It has sent countless countries into lockdown and frozen global economies. It has put a striking fear into the elderly and at-risk groups making them wonder when they'll ever be fully safe again. The current tactic to combat the onset of the coronavirus leaking into communities is social distancing. Social distancing has been a reasonable solution to effectively stop the spread of the virus. However, even when it was implemented, we understood that it was only temporary. The only reasonable solution to defeating the virus is by producing a stable, yet effective vaccine to leach immunity into our society and spare those susceptible. The only way we can accomplish this fantasy is by understanding why the coronavirus is so deadly and what makes it so unique and different than anything we have ever seen before. In doing this we need to examine its biological mechanism. This approach has become a hot commodity in the research world–millions of dollars of funding are being pumped into any research institution capable of contributing. Ultimately, the only way we can defeat this virus is by developing a vaccine and having an unanimous response to how the intermolecular concept of the virus unfolds (*this is a pun).

Hypothesis:

The novel coronavirus hides in the dark leaving most of its operations up in the air. Many of these are still shrouded in mystery while others begin to be discovered by the day. A reasonable idea is if the biological mechanisms are unveiled by scientific understanding then the coronavirus will ultimately meet its fate and stop in its path. The idea has its logical side–if we understand the identity of the coronavirus we can better defeat the enemy, knowing how it will respond to different situations. However, through the onset of research and development in the comprehension of COVID-19, if we understand its underlying processes then a vaccine will be the only necessary action to building immunity from the disease and reinstating our society.

Research:

In the beginning of the understanding of the coronavirus, it becomes essential to examine how we contract the virus and how it impacts the individuals. Firstly, a common understanding plastered across every new media and outlet website is that the coronavirus primarily affects the elderly and people with compromised immune systems. So, there is something about a younger,

strong immune system that scares off the virus, but when the virus encounters someone with a suppressed vaccine, the virus takes advantage. Currently, as it has become common knowledge, when people are infected they may show asymptomatic or symptomatic responses. The asymptomatic responses are the worst because it becomes nearly impossible to tell if you had the virus or not. The common symptomatic responses include shortness of breath, heavy breathing, muscle pain, sore throat, and headache among other things. In general, a good portion of people suffering from these symptoms may develop a severe amplification of the effects. According to the Washington Post, an article written by three of their experts, they detailed how the coronavirus begins, spreads, and develops within the body. In the beginning stages of the virus, it will stay and linger in the upper respiratory system, lurking because it can easily be transferred to another host because of coughing and sneezing (Kaplan, 2020). So a question that lingers is why the upper respiratory besides an increase in the potential of infection of others? Is it because the cells in that area can be hijacked to exponentially increase the local population of COVID-19?

Again, in order to correctly notice and pay attention to this coronavirus, we need to also understand its background. According to the same Washington Post article, the virus is "zoonotic" in nature meaning that "[it] jumped from an animal population into humans" (Kaplan, 2020). Some of the most deadly viruses we have ever encountered in human history has been a result of zoonotic viruses. Examples include the swine flu or the black plague. Basic biology shows that viruses manipulate healthy cells into producing copies of itself through the encoding of genetic material in RNA. In the Washington Post article, they reach out to a virologist at the University of Texas Medical Branch to get his expertise and insight to why the coronavirus is nothing like we have seen before in our history. Vineet Menachery, the virologist, states, "Let's say dengue has a tool belt with only one hammer," (dengue is a virus) "[t]his coronavirus has three different hammers, each for a different situation." This means a typical treatment that would alleviate these various other viruses, would not be proven to be effective against the coronavirus as it has other forms of defense. In addition to these "tools," the coronavirus has a "tool" that allows it to fix replication errors which lead to more effective and stable new generations of the virus, making it rapidly developing and increasing its odds at survival.

Figuring out and understanding how the coronavirus multiplies within the body can tell us how to target it and stop it from growing. In a section of the National Public Radio (NPR), Pien Huang, a global health and development reporter, unravels the coronavirus. She reports how the unlingerings of the development of the coronavirus in a similar way stated by the Washington Post–it looks for errors in its replication that might make it more susceptible and less likely to survive and then fixes them. According to them the coronavirus virus *mutates* at about "one-third of the rate of the typical flue." To an outsider this might not seem significant, but to anyone familiar with cell biology, that means the less mutations in the gene pool, the easier it is to combat before a new strain ultimately surfaces. In addition, this means that people

infected with the virus could be immune to it way longer than previously expected–possibly years. However, what is leading scientists to worry is the fact that the virus has not needed to use natural selection to its advantage. This idea means that the virus has replicated and spread extremely successfully which means it has not needed to use the few outliers in its gene pool to adapt to potential treatments. Thus, when vaccines and other treatments are deployed some of the population of the coronavirus might be resistant and then this form would take over the modern understanding of the coronavirus (Huang, 2020).

Some people may believe the coronavirus is something unknown to humans–it's not. It is something we have seen before, albeit never on this scale. During the early 2000s, there was a SARS outbreak, a coronavirus before the coronavirus. According to Science Daily, research from the Scripps Research Institute has made significant groundbreaking results. They believe they found a little hope for a cure. A cure in this regard is something that is out of the frame of question, but a potential cure seen in other subjects can lead us to attacking the cells of the coronavirus by understanding its weaknesses. This antibody has been used to target the mechanisms of the novel coronavirus and it has responded in a positive effect (positive according to humans). Despite not fully neutralizing the novel coronavirus, this gives great implications for the future because it leads to potentially targeting and developing therapies for eliminating sections of the virus, making it ineffective to humans (Yuan, 2020).

Conclusion:

Different ways in approaching the coronavirus problem is possibly the only way for a realistic solution. Nothing alone can defeat this virus and the way it impacts our life, however, a vaccine could exponentially excel our progress. In the development of the comprehension of how the RNA unravels and scans for imperfections and through the potential applications of antibodies seen to target the coronavirus, the only thing we can do is hope. Ultimately, we will not ever be able to tackle this without significant research progress, because to defeat your enemy, you need to know your enemy.

References

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