



Covid-19: A Hypothetical View on Infection

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Opinion

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Opinion

Coronaviruses are a large group of related RNA viruses causing illness in animals or humans [1]. In humans, several coronaviruses cause respiratory infections ranging from mild such as common cold to more severe diseases with a possible lethal outcome, such as Severe Acute Respiratory Syndrome (SARS), Middle East Respiratory Syndrome (MERS) and Coronavirus Disease 2019 (COVID-19). COVID-19 is caused by the most recently discovered coronavirus, SARS-CoV-2 (Severe Acute Respiratory Syndrome Coronavirus 2) and is now a pandemic. [2]. Common symptoms may include fever, cough, shortness of breath, muscle and joint pains, fatigue, sore throat, sputum production, nausea, vomiting, diarrhea and loss of smell and taste. Complications may include pneumonia, multi-organ failure [3].

Given ongoing pandemic, numerous scientific papers on this topic are published, but opinions and results are different. However, all agree that the virus is highly contagious, spreads rapidly and is fatal to the elderly population. The same goes for influenza virus. The question is why it is so.

Entry point for coronavirus to infect human cells is specific protein, ACE2 receptor, present in lungs, heart, blood vessels, kidneys and liver gastrointestinal tract [4]. There are data that ACE receptor is present also in nervous system [5,6]. So the virus may cause damage and blockage of the respiratory center, the main cause of coronavirus mortality. At the onset of the pandemic, there were two opposing views: ACE inhibitors, commonly prescribed for patients with hypertension and heart failure, have protective effect (logical conclusion) and in another opinion, these patients are more susceptible to COVID-19. Recent clinical trials showed there is no correlation between illness and ACE inhibitors (illogical) [7].

Since the beginning of pandemic, the turnover of

immune-boosting preparations has increased, but strong immune response damages the lungs, followed by severe bacterial inflammation. Simply, due to virus infection, cytokine release occurs and the cellular immune response is triggered. Clinical findings are similar to influenza infection: elevated CPR level, increased blood pressure, tachycardia, elevated blood sugar, organism prepares for fight [8]. Immune system kills epithelial cells contaminated by virus and lymph accumulates in the lungs. This may be disastrous for patients with chronic diseases. Patients with weaker immune response and milder symptoms have better chances. The question is why SARS-CoV-2 is lethal for elderly people and patients with long-term chronic diseases. Here is a simple example- if you force young or healthy person to run 500 m, he will succeed, but if you force old or ill person, some will not survive.

It is important to understand why some patients are more susceptible to coronavirus and have severe disease, while others have mild symptoms. The assumption is that virus has been present in the human population for a long time [9]. The immune system is already used to its presence; hence there are patient's wild mild symptoms. This virus is like hundreds of other viruses, bacteria and fungi, part of the homeostatic microbiom (HM) responsible for normal functioning of all physiological systems in human body [10]. Why the virus was so lethal for elderly population living in nursing centers? Main reason is elderly people were isolated from HM ring, they were in contact predominantly with medical stuff and had monotonous diet leading to disrupted HM [10,11]. For majority, contact with coronavirus was contact with new and unfamiliar. Mutual relationship of microorganisms in normal and healthy HM is still unknown. Disruption of HM leads to multiplication of some conditional pathogens which are part of normal saprophytic flora. Laboratory tests detect certain pathogenic microorganisms,

but for some microorganism, there are no matching tests.

Another possibility is that there are different strains of virus, one causing mild symptoms, another causing COVID-19 (SARS CoV 2).

Immunological reactions develop very quickly, on day 4 there is maximum of blood interferon (secreted by lymphocytes, fibroblasts, epithelial cells, macrophages). Symptoms are fever, fatigue, myalgia, leukopenia, and thrombocytopenia. After 4-6 days, synthesis of antibody begins, and after 8 days, concentration of antibodies in the blood increases. This is first line of defense preventing amplification and spreading of the virus.

Cells infected by viruses display on the surface specific antigens recognized by cytotoxic T-cells, NK cells, macrophages, polymorphonuclear leukocytes. Infected cells are also killed by antibodies and complement components. While defending against viruses, immune system kills and damages its own respiratory cells leading to severe complications, accumulation of lymph and mucus in lungs and shortness of breath. Therefore is better to reduce immune response instead to intensify. For this purpose nonsteroidal anti-inflammatory drugs (Brufen/Ibuprofen) and steroidal drugs (corticosteroids, such as Hydrocortison) are used. There are different opinions, some find nonsteroidal drugs less favorable than steroidal and vice versa. Short-term usage probably does not have as harmful effects as long-term one. Many clinics use blood plasma obtained from patients recovered from Covid 19 for a treatment of other patients infected by coronavirus, since it contains antibodies. But this therapy could be dangerous, provoking elevated levels of fibrinogen in blood and blood clotting, or cross-reaction on donor's antibodies and formation of antibodies complexes with harmful consequences.

Doctors in China used combination of corticosteroids and antibiotics (right approach) but also antiviral and antimalarial medicaments that may have damaging effects, and I don't recommend their use. The question is when to start medical treatment with corticosteroids. It is important to follow the concentration of components of complement system. When concentration start to decrease, its sign that immune response is intense and therapy should be started immediately.

All mucosa is lined with the layer of saprophytic bacteria, but in infections, proliferation of pathogenic bacteria occurs and therefore, antibiotics are medicaments of choice. In clinical practice, there are two groups of physicians, one group for the use of antibiotics in viral infections in chronic cases and smokers, for example. The other group does not

recommend antibiotic usage, but I agree with the first group.

Coronavirus has a diameter 50-200 nm. Strangely, manufacturers of medical masks do not specify to what particle size they are effective. Masks protect mostly from droplets generated by coughing, sneezing or talking. What about dry viral particles coming from some surface or spread by wind? Protective masks and suits are not 100 percent effective; they only reduce possibility of infection

Standard test for detection of SARS-CoV-2 virus is RT-PCR (reverse transcription polymerase chain reaction), most often from nasopharyngeal swabs [12,13]. However these tests are not completely reliable. There are patients who are positive on coronavirus, but don't have any symptoms, or antibodies in the blood. There are also persons with negative results showing severe symptoms of COVID-19. Such results may give false percent of diseased and newly discovered cases regarding the total number of the tested persons.

In 2017, 250-600 thousand people died from influenza virus, but this fact did not receive adequate media attention. All deaths of patients showing some symptoms of coronavirus infection and with underlying medical condition, are attributed to SARS-CoV-2 which increases the mortality rate (symptoms of toxic pulmonary edema caused by poisoning with harmful chemicals such as chlorine are similar to the symptoms of COVID-19 infection). There are more types of coronavirus. One is native, causing mild reaction and has been present for a long time in human population. Other types have novel antigenic determinants not recognized by immune system. These are mutated virus or laboratory experiments went wrong.

Conclusion

There are currently no licensed vaccines or therapeutics for COVID-19, so medicaments of choice are immunosuppressive drugs (corticosteroids) combine with antibiotics. Avoid treatment with blood plasma or clinically untested drugs, such as Chloroquine. Unfortunately, humans must accept that new coronavirus will continually circulate in the human population and learn to live normally (co-live) in its presence, like with many other diseases.

World biomedical science could not cope with COVID-19 pandemic and the question is why. For decades, mostly profitable researches, resulting in some technical solution or patent, have been funded. No foundation finance research projects if they don't bring any profit (for example, vaccines or drugs). This may be acceptable for the technical sciences, but not for the medical ones. This separates science from fundamental researches that should be funded by state. World biomedical science with wrong approach has

demonstrated how wrong it is to build a house on weak and bad foundations. This can endanger the health of the entire human population.

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