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A Mini Review on the Corona Various- A Universal Long Standing Problem: T-Cell Therapy Might Show Some Light in New Vaccine Development

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Abstract

Stimulation of the body's immune system might be important to cure many diseases. The induction of cellular immune responses has thus far received little attention in respiratory virus vaccine development. CD8 T cells are critical for mediating clearance following many acute viral infections in the lung. In addition, memory CD8 T cells are also capable of providing protection against secondary infections. The present mini reviewed the present status of corona virus and was attempted to elucidate the future danger of coronavirus. A suggestion for the development of T-cell based therapies has been made to fight against Coronavirus. The enhancement of immunity using T-cell therapy might show a new light in this regard. Because of genetic diversity and frequent mutational change, it appears to be difficult to find a permanent solution of the corona problem in the near future. Vaccinations that solely promote the induction of neutralizing antibodies may not be optimal in providing protection against the coronavirus respiratory infections, in particular. Therefore, human civilization is going to face unprecedented experiences, if not social and individual cares are always maintained and common people

understand the seriousness of the virus.

Keywords: Cora virus, T-cell, DNA, antibody, Covid-19

I. Introduction

The corona virus was originally known as the avian infectious bronchitis virus. This virus was first isolated in 1937 and it caused devastating infections in chicken . Coronavirus (CVS) in humans was first isolated from the nasal cavity and transmitted to the human ciliated embryonic trachea cells in vitro . The drugs tried till date, used medicines or preventives like hydroxychloroquine, Remdesivir, the HIV medicines, etc. have not conclusively shown to be truly beneficial. There is also scattered news about plasma cell therapy. However, at the moment, for people who are sick and go to the hospital for treatment, it is mostly respiratory failure; they have trouble breathing and other complications. The best possible medicine is supportive care. Unfortunately, even if you look at history, for none of the acute viral infections, there is no good treatment. There is at present no specific treatment for disease caused by a novel coronavirus. However, many of the symptoms are treated based on the patient's clinical condition. However T cell and Plasma therapy are being attempted for the treatment of acute diseases like cancer . Humans are highly susceptible to infection with respiratory viruses including respiratory syncytial virus (RSV), influenza virus, human metapneumovirus, rhinovirus, coronavirus, and parainfluenza virus. While some viruses simply cause symptoms of the common cold, many other respiratory viruses induce severe bronchiolitis, pneumonia, and even death following infection. Despite the immense clinical burden, the majority of the most common pulmonary viruses lack

long-lasting efficacious vaccines. Nearly all current vaccination strategies are designed to elicit broadly neutralizing antibodies, which prevent severe disease following a subsequent infection. However, the mucosal antibody response to many respiratory viruses is supposed to be not long-lasting and declines with age. Therefore, vaccinations that solely promote the induction of neutralizing antibodies may not be optimal in providing protection against many respiratory virus infections. The induction of cellular immune responses has thus far received little attention in respiratory virus vaccine development. CD8 T cells are critical for mediating clearance following many acute viral infections in the lung. In addition, memory CD8 T cells are capable of providing protection against secondary infections. Therefore, it was suggested the combined induction of virus-specific CD8 T cells and antibodies may provide optimal protective immunity. Such T cell therapy in cancer research has been quite successful . Since T cell therapy, stimulating the body's immune system, such therapy appears to be promising for curing the corona infection. We briefly discussed the prospect of T cells in future corona research. For the awareness of common people, our intention is also to give a glimpse about the danger of corona virus affecting millions of people worldwide.

2. Corona Virtues and Their Spread

Corona virus is a very dangerous human killer which has taken the lives of thousands of people worldwide. It is an enveloped virus having different types. Corona viruses have a typical group belonging to the Family: Coronaviridae, and Subfamily: Coronavirinae. They are single stranded RNA viruses, quite large, enveloped structures: a fat-layer that protects viral particles when travelling from person to person in

air. That sheath, if dry out, kills the virus. High humidity, low temperature, low wind and solid surface are ideal places for the growth or coronavirus. Smooth, nonporous surfaces like doorknobs and tabletops are better at carrying viruses. Porous surface like money , hair and fabric do not allow fabric to survive long because their micro or nananopores on these materials might trap the microbes and prevent its transfer as suggested by Rachel Graham, an epidemiologist at the University of North Carolina. Therefore, electrospun nano fibrous meshes would be suitable for making high quality masks in future. So far, the consensus has been that the virus causing the disease Covid-19 is mostly transmitted through large droplets that are created when people cough, sneeze or talk. That consensus is the foundation for the Centres for Disease Control and prevention's recommendation that people wear cloth face masks and stay least 6 feet apart, as well as the World Health Organization' (WHO). The mass of a typical corona virus might be ~10 -7 g which is much smaller than the air droplets which might be few micrograms. But droplet size may vary from nano to micron size. So air droplets or aerosol can easily carry the virus and even fly with the virus. There might be a liquid to gas phase transition of the droplets [https://doi.org/10.1063/PT.3.4184] as soon as it comes in contact with the human body temperature just before freeing the virus. The droplets physics should be fascinating. The new coronavirus typically spreads when droplets from an infected patient coughs or sneezes, and the droplets land on or get inhaled by another person. According to WHO, the Covid-19 virus is not airborne, like measles, and does not spread between people who are 6 fit apart. Some research, however, suggests that viral droplets can travel farther than 6 feet in certain conditions, and that live coronavirus can persist in the air in aerosol form. The main difference between droplets and aerosols is that the former are heavy and large, so they can't stay aloft for long. The latter, called droplet nuclei by the WHO are smaller than 5 micrometers are the main carriers.

3. Corona Virus and Their Spread

A. Types of Corona Species

There are almost twenty six types of corona type virus and can be divided into four groups: Alpha, Beta, Gamma and Delta. This division has

been made on the basis of their different genetic changes. Depending on the host and environment their genetic modulations or mutation might be possible. They have different antigenic cross-reactivity and genetic makeup.

B. Environmental Effect

Effects of different viruses on differ hosts depend on environmental temperature, pressure and humidity . But most of the viruses become inactive at higher temperatures. Between 30-37oC for 3-5 hrs, may kill the virus. Above 60oC it is enough to kill the virus in a couple of hours. But it depends on humidity and wind flow of the place. Low temperature, low humidity is ideal for the growth of the coronavirus. This is why the USA, England, France, suffered a lot. In India, Pakistan, Bangladesh etc. where both temperature and humidity are high, activity of the virus is less as indicated by the lower rate of coronavirus death in the countries, although many people in these countries are not well aware about this virus. The main cause of corona spread in these countries appears to be due to contact of patients coming from different parts of the world during the first state. Unfortunately, most of the people of these countries do not try to understand the importance of social distance and use of masks and washing hands which might be the main reason for the spread of corona in these tropical countries. Indians are lucky; India's average temperature is higher. Humidity is also relatively high. Taiwan is close to China but the corona patients are much less and now corona death almost nil during the end of April,2010 and the people there are going offices with musk and maintaining social distances. Their economy is going to be stable. When corona was first detected in Taiwan, the temperature was around 20oC and humidity was ~ 70. Temperature is a little lower than 30oC but the humidity is high which made coronavirus weak in

Taiwan. Air flow or wind may also spread coronavirus.

C. Interaction with Human Cells

Only the Alpha and Beta corona viruses genera contain strains pathogenic to humans (Paulrs et al. 2020). Corona viruses have long been recognized as important veterinary pathogens, causing respiratory and enteric diseases in mammals as well as in birds. Of the known coronavirus species, only six have been known to cause disease in humans: HCoV-229E, HCoV-OC43, HCoV-NL63, HCoV-HKU1, severe acute respiratory syndrome coronavirus (SARS-CoV) and Middle East respiratory virus coronavirus (MERS-CoV). The first four types are endemic locally and they have been associated mainly with mild, self-limiting disease, whereas the latter two can cause severe illness are beta corona viruses and are among the pathogens included in the World Health Organization's list of high-priority threats (A research and development blueprint for action to prevent epidemics (WHO, revised February, 2018). This corona virus again became evident in late 2019 and early 2020, when a novel corona virus was discovered to be the cause of a large and rapidly spreading outbreak of respiratory disease, including pneumonia, in Wuhan, China (WHO statement regarding cluster of pneumonia cases in Wuhan, China (World Health Organization, January 9, 2020); Emergencies: Novel coronavirus 2019 (World Health Organization). The virus, provisionally designated 2019-nCoV, was given the high prevalence and wide distribution. Because of their large genetic diversity as well as the frequent recombination of their genomes, and increasing activity at the human and animal interfaces, these viruses represent an ongoing threat to human health (2020) was isolated and the viral genome sequenced. 2019-nCoV or Covid-19 was characterized as a beta coronavirus, and thus became the seventh discrete

corona virus species capable of causing human disease.

D. How to Dominate Corona Virus

No effective drugs or vaccines against the infectious agent. Only physical separation like isolation and quarantine are necessary for controlling corona viral infections .The incubation period, which ranges from 2-14 days in the case of SARS . Government is often reluctant to impose longer lockdown. But without lockdown and maintaining social distances , there is no easy way. The success of these measures was demonstrated in Singapore, Taiwan, South Korea and elsewhere. In Taiwan, the application of Level A quarantine resulted in the prevention of the disease. The use of Level B quarantine (that of travelers arriving from affected areas), in contrast, reduced the number of new cases and deaths by only about 5% . Hygienic measures are recommended to prevent the spread of disease in situations where individuals are in contact with patients. Washing hands with soap and water or with alcohol-based handrubs is effective for interrupting virus transmission., chemical disinfectants such as povidone-iodine, or heating . The MERS virus is capable of surviving for up to 48 hours at 20ºC and for 24 hours at 30ªC . Personal protective equipment, including eye protection, is recommended for health care personnel, as well as surgical masks or N-95 disposable filtering respirators . Airborne precautions should be applied especially when performing aerosol-generating procedures such as intubation. All infectious specimens should be handled and transported with caution, and must be tested in laboratories meeting WHO BSL3 standards. The efficient and collaborative international response to tackle the corona virus outbreak might be important.

III.T- Cell Therapy

The T-cells are white blood cells that are responsible for detecting foreign or abnormal cells - including cancerous ones - and then latching onto them to tell the rest of the immune system that they need to be attacked. Antigens (Ag), according to immunology, are structures specifically bound by antibodies (Ab) or a cell surface version of Ab ~ B cell antigen receptor (BCR). The T and B cells are cellular components of adaptive immunity. The antigen may originate from within the body with might be termed as self-antigen or from the external environment- non-self antigen. The immune system is supposed to identify and attack non-self invaders from the outside or other harmful substances present in the body and usually does not react to self-antigens under normal homeostatic conditions due to negative selection of T cells in the thymus [7]. Once the T cell has received a specific antigen signal and a general signal, it receives more instructions in the form of cytokines. These determine which type of responder the cell will become – in the case of helper T cells, it will push them into Th1 and Th2 types. In these types, the cells are exposed to the cytokine IL-1, IL-4 (for Th1) or IL-17(IL-6, IL-23) (for Th2). Each one of these cells has a specific task to perform in the tissue and in developing further immune responses. The resulting cell population moves out to the site of the infection or inflammation in order to deal with the pathogen. Other cells like neutrophils, mast cells, and epithelial cells present at the tissue site of inflammation also release cytokines, chemokines, short peptides and other molecules which further activate and proliferate T-cells. The T- cell Homeostatic function can be analyzed in the following way. In practice, adoptive T-cells are transferred. First the patient showing the disease symptom is selected and then T-cells of the same patient's blood is extracted (not from the blood of other bodies), and, using gene

transfer, introduce receptors that will aggressively target the specific diseased cell (say, cancer cell, or other deadly disease cells). When such T- cells are again transferred back inside the body, these newly engineered T-cells regenerate from the patients' blood and create an army of immune cells prepped to take down the disease even the cancerous tumours or other virus cells. This is some sort of creating a vaccine from a patient's source to fight against the DC of the source (patient) itself. Here the T- cells of truly affected and truly cured patients maintaining proper protocol must be considered.

The CD8 -T cells might play a critical role in mediating viral infections including RSV, IAV, and HMPV . In addition, recent studies utilizing CD8 -T cell peptide-specific immunization strategies observed significantly reduced lung viral titters following IAV, RSV, or SARS challenges. Therefore, the induction of virus-specific CD8 T cell responses has the potential to improve upon the efficacy of current vaccination strategies. Vaccinations that solely promote the induction of neutralizing antibodies may not be optimal in providing protection against many respiratory virus infections. The induction of cellular immune responses has thus far received little attention in respiratory virus vaccine development. CD8 T cells are critical for mediating clearance following many acute viral infections in the lung. In addition, memory CD8 T cells are capable of providing protection against secondary infections. It is possible that the ideal vaccine for respiratory virus infections will include the induction of both virus-specific CD8 T cells and neutralizing antibodies. A vaccination approach combining both arms of the adaptive immune response may allow for optimal viral control in the absence of disease symptoms. However, before CD8 T cells can be developed further as a mediator of protective immunity, the balance between protection and

pathology must be achieved. The patient showing the disease symptom is selected and then T-cells of the same patient's blood are extracted. Here there is also a problem to find a truly virus infected patient and the peak period of collection of blood from the patient. Again since the corona virus changes symptoms due to mutations, the same medicine may not be suitable for different patients. More research is needed to work with T-cell therapy.

IV. Discussion and Conclusion

With the high incidence and wide circulation of corona viruses, large genetic variety as well as the frequent genome recombination along with increasing activity in the human blood, this virus is a threat to human health and society. Because of genetic diversity and frequent mutational change it might be difficult to find a suitable corona vaccine in the near future. Therefore, human civilization is going to face undesired experiences, if not social care is always maintained and common people understand the seriousness of the virus. Use of masks, keeping social communication distance between individuals and keeping hands away from touching the mouth, ear and nose must be maintained by everyone for a pretty long time to fight Coved -19. The virus not only attacks immune system cells, it becomes difficult for the bodies to fight the virus. There are also other features that make it hard to cure with vaccines or antiviral drugs. As the diseases like HIV, corona etc. are not easy to fight with vaccines and drugs because of the facts that the virus can be latent for a long time and the virus may remain dormant in cells. The the immune systems or antiviral drugs may not recognize the virus. The virus is just a sleeping piece of DNA/RNA. Though antiviral drugs are able to block the active virus in the body, they may not remove the latent virus from the cells which can reactivate at a later time. Moreover, the virus is

also highly variable. Reverse transcriptase (In viruses, reverse transcriptase allows the virus to insert its DNA to the host cell's DNA, forcing the cell to make more viruses) may also make mistakes, which result in a constantly changing virus that is difficult to target. However, research on a vaccine against the virus is continuing. The best defence against the virus is to block transmission and transmission requires exchange of body fluids. Humans can utilize protective measures to prevent this transmission. Public education campaigns have become very important to bringing the rates of the HIV type infection under control. The enhancement of immunity using T-cell therapy might show a new light to fight coronavirus. From now on, people should not let their protection down and should thoroughly practice the “new corona like disease prevention lifestyle” to achieve their own safety. Use of the proper sunlight, drinking warm water and immunity increasing foods and drugs are being suggested for a long fight with Covid-19.

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