



THE PREMED SCENE – VIRTUAL RESEARCH PC-2070

The year is 2070, and the planet has been plagued by a pandemic caused by a virus that is more contagious than ever. This investigation will include recommendations for slowing the virus's spread and mitigating its impact on humans.

By Angeline PHILIPS, Zayaan KHAN, Krishnapriya SINGH & Nikola SUSIE

INTRODUCTION

The Pilot Coli virus (PC-2070), has been compared to the Coronavirus (COVID-19) in that it has been shown to spread from infected person to person by respiratory droplets such as coughing. It can also be spread by cockroaches, who, if PC-2070 carriers, can bite people and transmit the virus into the blood, causing harm to the host's lymphatic system, i.e., immune system. PC-2070 virus can also cause harm to the cardiovascular and respiratory systems, as well as blood clotting and tumors, which can restrict the heart and other organs from working normally.

The PC-2070 genome contains four main structural proteins, similar to COVID-19. Figure 1 depicts these proteins: Spike glycoprotein (S), Membrane protein (M), Envelope protein [E], and Nucleocapsid protein (N).

- The S protein regulates the virus's attachment to host cell surface receptors.
- The M protein is responsible for the structure of the viral envelope.
- The E protein is in charge of viral budding.
- The N protein is involved in viral budding and binds to the RNA genome.

As PC-2070 replicates within the host via attachment and entry, interactions between the S protein and particular receptors trigger transmission. The virus enters the cytosol of the host cell, causing the viral and cellular membranes to fuse.

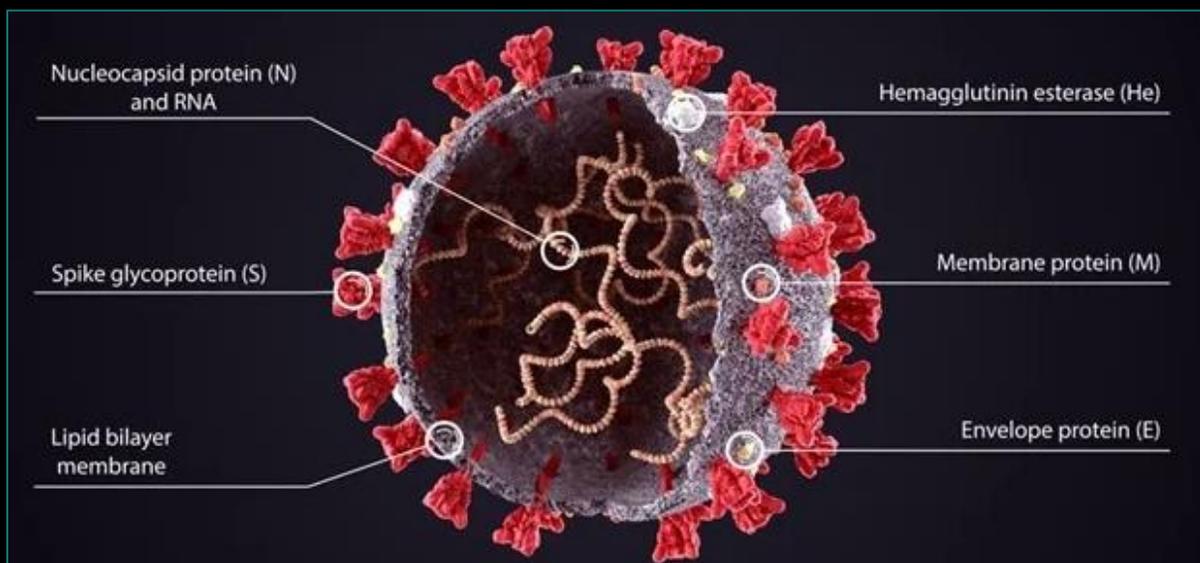


FIGURE 1: STRUCTURE OF PC-2070 WITH LABELS (Cuffari)

Infected people have been shown to lose several senses, including smell, within 5-7 days of infection. Impaired limb function and, in severe cases, limb loss were observed within a few hours of infection commencement. This is exacerbated by gradual disorientation and other neurological issues that develop after the infection has bypassed the central nervous system.

Individuals have an average of 12-24 hours to survive after being infected for the first time. This issue has taxed hospital systems due to the high transmissibility, which results in a significant influx of patients. The first government response has been widespread lockdown throughout the world, mimicking the early COVID-19 response. Over 100 million people worldwide have been infected in the

two weeks since the virus's emergence. With a case-fatality rate of 65% for those between the ages of 1-65 years old.

PROPOSED SOLUTION

Viruses are infectious organisms that can only multiply within the confines of a host organism (Scitable by Nature Education). These microbes can infect an array of living organisms such as plants, bacteria, animals ect. Because of their relatively simple structure, Viruses can replicate quickly when – and only when inside the host. Medical Microbiology [4th edition], goes through the stages of infection, incubation and peak ranges for different viruses. It was discussed that Viruses like the PC-2070 replicate very fast, hence they divide – to make more cells – quickly as well.

Cancerous cells also divide quickly due to their state and structure to form potentially life threatening tumors in different parts of the body. A combination of chemotherapy and radiationtherapy is used to treat cancers.

Chemotherapy is a highly specialized drug that is used to destroy cancer cells (*Cancer.Net Editorial Board*).

Radiation therapy is a cancer treatment that uses high doses of radiation to kill cancer cells and shrink tumors. It works by damaging the DNA of the cell which eventually leads to cell death (*National Cancer Institute*).

They both work by preventing cancer cells from growing, dividing, and proliferating. Chemotherapy has a greater effect on cancer cells because they grow and divide quicker than normal cells (Cancer.Net Editorial Board). Chemotherapy medications and radiation therapy, on the other hand, are extremely potent and can still cause harm to healthy cells.

This same logic can be applied to viruses which like cancer cells are quickly reproducing and hence can be targeted through chemo and radiation-therapy. To ensure that cancer treatments such as chemotherapy and radiationtherapy would work in the desired manner, clinical trials will have to take place. However, since this is an emergency situation the testing will have to be quick and efficient.

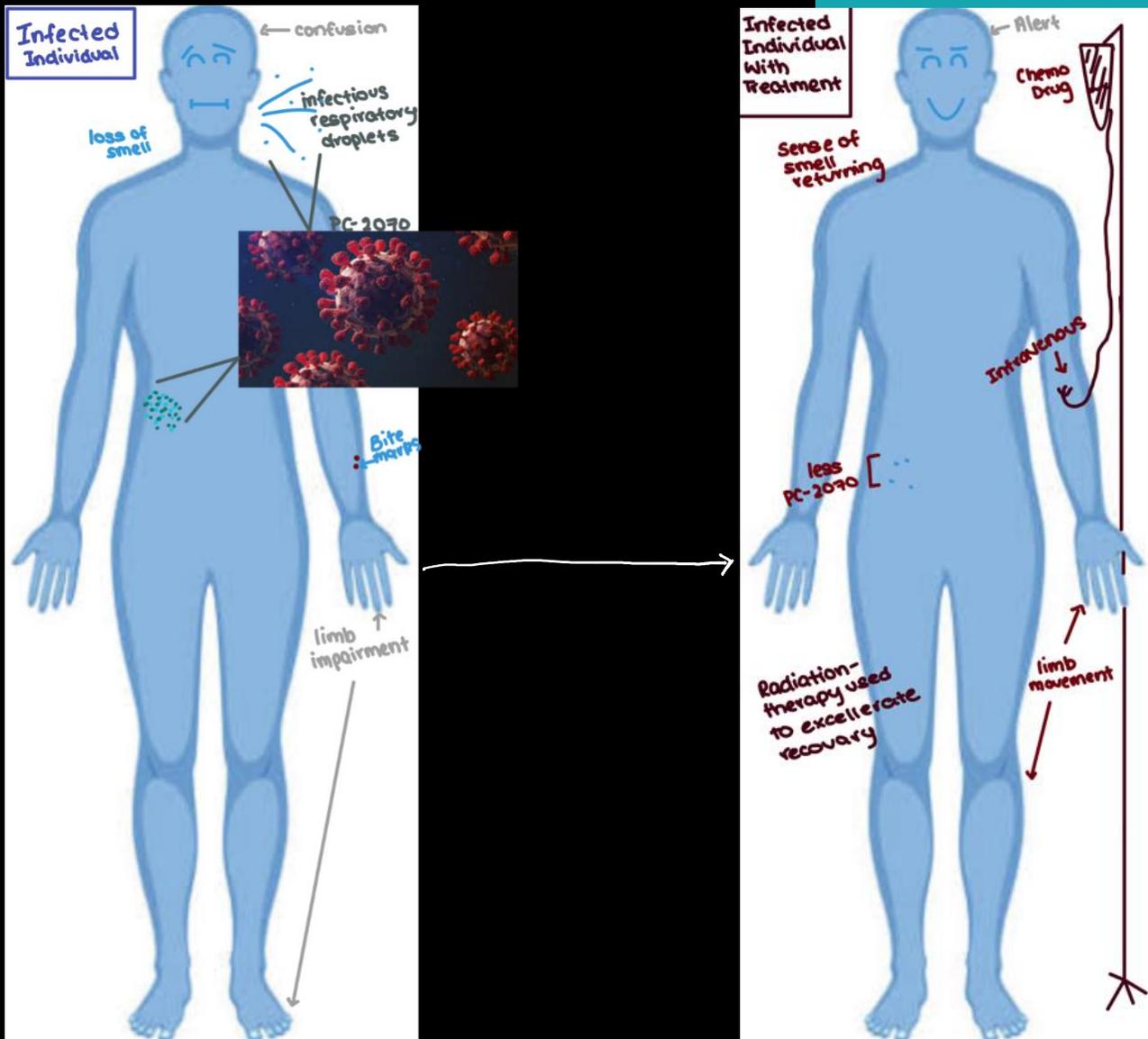
Step	Action
<p>1</p> <p>[approx. 7-8 months]</p>	<p>Initial trials will have to be conducted on animals such as mice, pigs and cockroaches to understand and study how the virus mutates and develop possible countermeasures. Different types of radiation, dosages and equipment can be used to find the one that would have the best result on humans. Once a feasible solution is found with the best chance of human trial success, human trials will commence. Most trials take between [4-5 weeks]. It is possible that this may take less time as extensive research on the effects of chemotherapy and radiation exposure has already been conducted on human subjects in the past. Collating all this information and using it in the context of this virus will help reduce research and development time and limit the death toll of the virus.</p>
<p>2</p> <p>[ongoing]</p> <p>WHY: To prevent the virus from spreading in the vulnerable age groups with 60% mortality rate.</p>	<p>During this time government interventions such as mandatory testing to identify hosts of the PC-2070 virus will be essential. Quarantine facilities will have to be created to quarantine identified infectees from the outside world.</p> <p>Military and health professionals will be on stand-by to help with the testing, transportation and smooth running of each elected facilities. Pharmaceutical companies, researchers and scientists as well as governments and businesses will have to work together to produce results, and conduct sufficient tests for the production of the treatment.</p> <p>Masks and limited gatherings will have to be placed to limit the spread of the virus and to prevent more infected individuals.</p>
<p>3</p> <p>[2-3 weeks]</p>	<p>Once possible chemotherapy drugs and radiation therapy doses have been found; a sample of 20-30 individuals confirmed with PC-2070 will become the subjects. These subjects will be voluntary or those whose symptoms have gotten to a point of no return.</p>
<p>4.</p> <p>[3-4 weeks for monitoring and re-trialing]</p> <p>[3 weeks to 3 months for the drug and treatment to be made available to the public]</p>	<p>These individuals will be monitored and those with the most positive responses will be re-trialed with other subjects and will be rolled into the market for public consumption.</p>

How it works:

Cancer treatment works by using highly potent drugs and radiation doses to do damage to the DNA of the cancer cell, after multiple treatment cycles this renders the cell useless and unable to replicate and grow. When a cell is unable to reproduce it dies and is broken down by the host's body.

The main problem with the PC-2070 virus is that it replicates and heavily damages the immune system of the host making them susceptible to sicknesses. Viruses have DNA [or RNA] which if damaged can cause cell death and limit or stop cell replication. Hence it is a viable option of treatment for the PC-2070 virus.

The physiological effects can be monitored by observing the behaviors of the infected, with their behaviors after treatment. The treatment should bring the subject back to 'normal' state, however if symptoms from the PC-2070 virus continue such as loss of smell or limb, or other neurological such as confusion continue, they can be provided additional therapy, or the treatment can be refined accordingly to also target this aspect of the virus.





“THE PROTECTION OF RIGHTS, SAFETY, AND WELL-BEING OF RESEARCH PARTICIPANTS ARE THE MAIN ETHICAL CONCERNS IN CLINICAL RESEARCH.”

- Vasantha Muthusamy

EVALUATION

Pros

- ▶ Already have vast amounts of research on chemotherapy and radiation therapy
- ▶ Is a viable option as it has been used to treat other illnesses before
- ▶ Can be made to be subsidized for the public to use at an affordable level
- ▶ The biological similarities between viruses and cancer cells allow it to be treated and combated in similar ways
- ▶ Because of cancer, radiation therapy and chemotherapy specialists exist, hence accelerating the time taken for the treatment to come out for the PC-2070, which would allow the world to recover faster from this pandemic

Cons

- ▶ The Government would lose money from all the subsidization that they would have to do for the treatment of PC-2070, as it is quite expensive [drug and therapy]
- ▶ Chemotherapy and radiation therapy may only be efficient if done more than once [as seen in cancer treatments], hence may be rendered less efficient
- ▶ Since there is no experiments or data on using chemotherapy or radiation therapy for the use of combating viruses it has a potential chance of failing or not working as theorized above.
- ▶ Since the testing involved human subjects, it may be a violation of human rights and/or be potentially harmful for the test subjects.
- ▶ Side effects are unknown of refining chemo and radiation to attack virus cells

Technical limitations can include not enough chemotherapy drugs which can be countered by getting pharmaceutical companies to produce more of the drug. Specialized equipment will be needed to administer radiation therapy, hence having the manufacturers produce bulk of them. If there were to be a shortage of the treatment it would have to be given to the people that needs it to the most, i.e., vulnerable people, pre-existing conditions, children, healthcare workers etc.

Social and Ethical issues include the safety of the participants in the human trials. It is the moral duty of the researchers to make sure that the human trial participants have the least amount of negative impact due to the study. A combination of prior knowledge when dealing with chemo and radiation as well as additionally testing on non-human subjects [such a mice, rats etc.] first would help reduce the incidence of negative impacts.

“The PC-2070 is a highly contagious virus likened to the CORONAVIRUS”



At first the treatment may be hard for the general public to access as the treatment would have to go through FDA approval and testing which would take significant time. It will also have to go through the government to become subsidized. However, to combat this it can be given through private insurance holders and wait time would be reduced through cooperation from the government and the FDA.

Since many different dosages, concentrations and such will be tested to find the most appropriate and suitable treatment in response to PC-2070, to find the ‘best’ option for the criteria, it will be based on the following:

- a) Is it safe for humans?
- b) Does it target side-effects of PC-2070 such as limb immobilization, fatality, progressive confusion etc?
- c) Is it a feasible solution?
- d) Is it expensive to manufacture?

The one that fits these criteria’s the best will proceed for human trials and is one of the ways this report is trying to address limitations and challenges to this proposal.

CONCLUSION:

The year is 2070, and the world is in the grip of a pandemic caused by a virus that is more infectious than ever. This enquiry went through the PC-2070 virus, researched and proposed actions strategies to decrease the virus's transmission and reduce its impact on humans.

This report put forth that Chemotherapy and Radiation Therapy that was refined to target Viruses would be a potentially effective and quick medical response to the pandemic and would be highly beneficial to humans, environment, economies, and such.

The side effects of PC-2070 were identified and were relatively addressed through the above-mentioned treatment.

With the combination of the chemo-and-radiation therapy, government interventions and treatments, the PC-2070 virus should be eliminated from society. The treatment should also allow the average time to live from first infection to increase from 12-24 hours to much longer so that the medicine can take effect. The fatality cases for those between 1-65 should also decrease from 65% to only 1-2% as the treatment should effectively save most [realistically not all] of the infected.

