Natural viruses demobilization using low power electric currents

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Abstract: Today, many advances have been made in recognition and treatment of viral diseases, although the nature of viruses, prevention, and treatment of some of them has remained not very clear. Many unknown viruses in short time have shown detrimental effects on human health, while the number of people who suffering from viral diseases are increased. In this paper, we introduce a new treatment for viral disease by injecting the electrical current into the viral affected environments. In this method, low electrical currents with a set of different parameters are injected to the viruses in laboratory environment, before transmitting them to the cellular environment. Then we have investigated impact of the currents that injected on viruses. During the experiments it was observed that electrical current injection can demobilize the natural viruses. Also, several parameters were tested for electrical currents, and we have tried to find set of parameters not only with the greatest impact on viruses, but also with the least damage on living cells. Finally, we concluded that in case of viral diseases, typical treatments can potentially be alternated by electrical current injection.
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1. Introduction

Viruses are microorganisms that do not have any cellular structure, thus they should be conducted with a host cell to reproduce and feed of materials in it. In fact, virus out of the living body do not have any biological activity. On the other hand, they are extremely dangerous microorganisms that cause awful epidemic diseases in human history such smallpox, polio, yellow fever, AIDS, Spanish flu and so on. The first attempt to deal with the virus goes back a few thousand years ago, when the Chinese doctors were trying to treat children who suffer chickenpox. Their method was something like smallpox vaccination, but in an incomplete and rudimentary way.

Today, many advances have been made in recognition and treatment of viral diseases, although the nature of viruses, prevention and treatment of some of them yet has remained not very clear. Perhaps there are still many unknown viruses that can affect human health in a short time. While scientists still face some issues viral diseases treatment. Regarding many developments in science, medicine, and engineering, it might be possible using physical methods to weaken or eliminate viruses.

1- Objectives Article

Viral diseases are serious threats, and unfortunately there are serious problems both in identifying and combating viruses. Thus, defeating them using a variety of drugs or vaccines have not been very successful yet. In fact, mutation is an obstacle which decrease the efficiency of anti-virus drugs and vaccination. There are a lot of factors that cause mutations inadvertently or intentionally, directly or indirectly, and made a mutation of the known virus and generate a variety of new and unknown viruses that may be more dangerous and deadlier. Thus it is clear that there is an urgent need to deal with viruses. Rising drug costs and delays in obtaining effective treatment, we have to think of alternative therapy and this requirement will be increased incidence as medical costs are increasing, and a lack of effective treatments is obvious. As a final point to show, the importance of this study, estimated number of AIDS patients based on statistics and studies of World Health Organization (who) and the Iranian Ministry of Health in 2010, is about 90 thousand people in Iran. While that a few years ago, no one had believed this number be more than ten thousand patients in the country. So it is time for think about a solution to deal with these microscopic creatures that are very dangerous as well.

2- Approach Tests and Results

The physical characteristics of viruses to eliminate them by physical methods with a weak electrical field can be electric charge, magnetic charge, the natural frequency and resonance and bio-chemical structure. The method described in this paper is firstly injection of electrical current to virus-

containing solution. The parameters of this current, then this solution is placed in an environment full of host cells for 48 to 72 hours. Then the situation of this environment is regarding number of active viruses (viral load) assessed. We built up this study based on a simple hypothesis which insists virus is an animate, so it can be demobilized. Also, electric currents have some effects on any live organism, including viruses. The opted approach is to select a non-vital virus and conduct it with low electric currents and evaluate how it was affected. Regarding the safety of the research team and availability, the non-vital herpes simplex virus was chosen. During the tests we usually added 5 mL of virus container to a 50 mL (appx) of PBS solution. Keeping one sample as the test key, others will be injected by electric currents in different time durations and with diverse characteristics. In fact, the solution almost works like a capacitor. Figure 1 shows the test setup, and figure 2 illustrates the system block diagram.

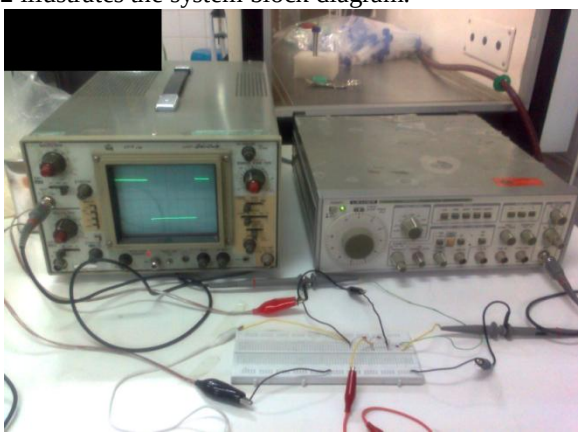

Figure 1. Test setup

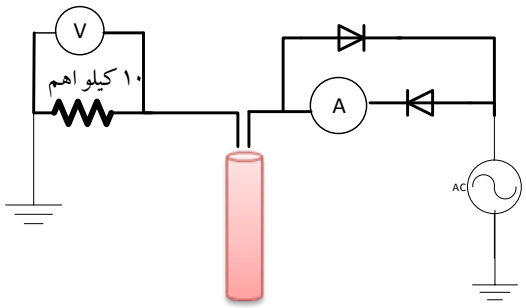

Figure 2. The system block diagram

In that diagram, signal generator generates the proper electric current, measure the voltage and current, and electrodes conduct the signal to the virus container. Ruthenium electrodes were employed due to the minimum oxidation and ionization property of that element. When the injection period is over, the virus solution is transferred to the host cell environment. Monkey kidney cells were used as the host. The virus will be left in the environment for 48 and 72 hours. Then the viral load will be estimated. To evaluate the viral load and effectiveness of the method, we monitor the rate of infected host cells.

Generally, prior studies have suggested that points below should be considered in electric current characteristics determination:

- High voltage and current can damage the living tissue and cells.
- Voltage and current must be chosen so that be strong enough to damage the virus, while the cells keep unharmed.
- Natural tissue bandwidth is limited, so high frequencies can't be effective.
- Effects of Direct Current such as ionization are appreciable on live tissue. So use of alternative current can be advised.

3- Discussion

During several stages of experiments, many parameters of the electric field, test setup, and environment were tried. Table 1 shows the result of a series of test. Electric field characteristics include the wave shape, frequency, voltage, and current. Another parameter is time duration of injection.

As that table suggests, the hypothesis of the study is confirmable. In fact, low alternative current in the scale of a few ten milliamps can demobilize the virus in a few minutes tim window. Also, the former prediction of lack of effectiveness of higher frequency was true. The most effective frequency was true. The most effective frequencies are less than or equal 1Hz. Selected wave shape was square (rectangular) and the voltage on electrodes was reported too. In one test we increased the voltage to see if even higher voltage in high frequencies could be effective which they were not. Next we concentrated on more appropriate the lower frequencies to try the effects of wave shapes. As Table 2 shows, sinusoid signals are as effective as square signals in lower frequencies of 0.1 and 1 Hz, while less effective in 10 Hz. However in further test when we decreased the injection time, sinusoid signal even in the lowest frequencies were less effective than the square. In those tests 30 seconds of low frequency square wave injection was enough to demobilize the virus.

Table 1. General test results

Frequency (Hz)	Current (mA)	Time of injection (min)	Voltage (V)	Wave shape	Viral load (appx)
0.1	30	5	0.3	Square	(completely demobilized) 0%
1	35	5	0.42	Square	0%
10	15.7	5	0.44	Square	50 %
100	14.8	5	0.44	Square	(no effect) 100%
1 K	12	5	0.39	Square	100%
10 K	83	5	7.5	Square	100%

Table 2. concentration on lower frequences

Frequency (Hz)	Current (mA)	Time of injection (min)	Voltage (V)	Wave shape	Viral load (appx)
0.1	30	5	0.3	square	0 %
0.1	30	5	0.3	sin	0 %
1	35	5	0.42	square	0 %
1	35	5	0.42	sin	50 %
10	15.7	5	0.44	square	50 %
10	15.7	5	0.44	sin	66 %

4- Key Findings

The injection time parameter, is important. We managed to demobilize the virus in less than 1 minutes. A longer injection time can increase the side effects on the host body, so we should keep it as low as possible.

The frequency parameter seemed to be the most important parameter in these tests. In this case, the very high frequency had no effect on viruses, but if the frequency was chosen as one hertz or less, could easily kill the viruses.

Other influencing parameter, was the wave form of signal the injected. In this case, the square wave can more easily eliminated viruses than sinusoid wave.

5- Conclusion

Every day, the viral infections and deadly viral diseases increase, but there is no completely effective way to cure some of them. The approach of this study will be opening a new area to deal with viral disease. Figure 3 and 4 show the cells infected by the Herpes simplex virus without and with electro trophy. Viral load in Figure 4 can be estimated as 0% as the cells are living intact. It can be concluded that the effects of low electric currents worth more studies. Where the side effects on cells and organs and in vivo experiments must be studied and experienced.

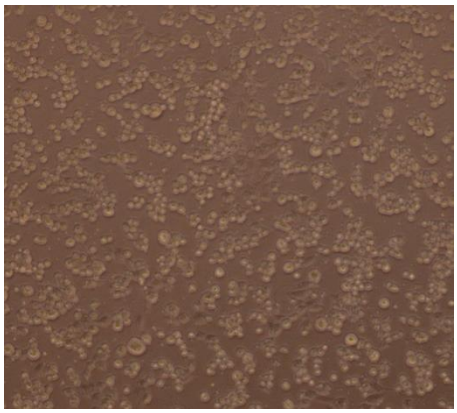

Figure 3. cells infected by the herpes simplex

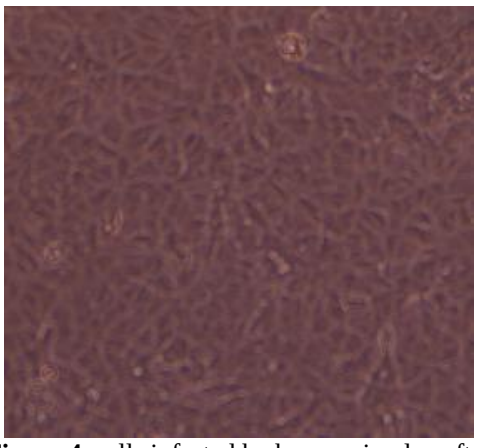

Figure 4. cells infected by herpes simplex after injecteion of electrical current

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