

Viral infections aggravated by electromagnetic fields

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Summary

In viral infections, a well-functioning immune system and good blood flow and oxygen transport are of great importance and virus replication must be reduced.

Scientific publications have shown that low-frequency and radio-frequency electromagnetic fields (LF and RF EMF) of the electricity grid and of wireless communication:

- weaken our immune system, cause health problems and weaken our general condition,
- promote blood clotting via the Rouleau effect, which leads to reduced blood flow, reduced oxygen transport and increased risk of thrombosis,
- increase the intracellular Ca^{2+} (calcium ion) concentration and oxidative stress, thus promoting virus replication.

EMF will therefore have a negative impact on the course and severity of viral infections.

Quantitative research into the consequences of EMF load on viral infections is still lacking, however. It is therefore unknown to what extent the COVID-19 pandemic has been aggravated by the EMF that are already present everywhere. It is also impossible to predict to what extent the health problems will worsen due to the increase in the EMF load when 5G is rolled out and what the consequences will be for future viral infections. In a worst case scenario, viral infections, such as we experience every year, can turn into pandemics.

General question

The COVID-19 pandemic prompted the question whether the course of viral infections is or can be influenced by electromagnetic fields (EMF), such as low-frequency (LF) EMF from electrical equipment and radio-frequency (RF) EMF from wireless communication. A literature study provided the necessary information, specifically about the effects of EMF on our immune system, on blood clotting and on virus replication, all important subjects for viral infections and certainly now for COVID-19.

1. Immune system and general condition

Non-thermal biological effects caused by LF and RF EMV have been demonstrated in thousands of peer-reviewed scientific publications at field strengths below and far below the ICNIRP exposure guidelines (refs. 1 - 4). Several of these effects cause health problems, including serious ones, and reduce our general condition. In refs. 5 - 8 it has been shown that EMF also affect our immune system. We cannot build immunity against EMF. Usually the first complaints only occur after long-term exposure to LF and/or RF EMF, so it often takes a long time to recognize the connection between the complaints and EMF as a possible cause or co-cause.

Given the severity of some viral infections, a properly functioning immune system is essential. The presence of EMF can be disastrous in a viral infection. When admitted to a hospital, additional complications may arise due to the presence of LF EMV and RF EMV (of wireless communication).

We have not built up immunity against SARS-CoV-2, the virus that causes the disease COVID-19. It is a new virus that is not recognized by our immune system. In many of the critically ill patients, this has led to an overactive immune system that attacks the lungs in particular, resulting in broken alveoli, causing insufficient oxygen to be absorbed into the blood. It is not clear to what extent these complaints are aggravated by an immune system weakened by EMF. This will be individually different given that persons individual susceptibilities to EMF are different. But with a viral infection, that extra EMF load can make an important difference.

2. The Rouleau effect, blood clots and thrombotic effects

The Rouleau effect (ref. 9), is the effect in which red blood cells stick together (stack) in the form of a roll of money. It occurs in some diseases and as an allergic reaction to some antibiotics. The stacking impedes blood flow - in particular through capillaries - and thereby also impedes the oxygen uptake in the lungs, the oxygen transport and the oxygen delivery elsewhere in our body.

In the context of this article, it is important that the Rouleau effect is also caused by the EMF of wireless communication (refs. 10, 11). In a publication from 1978 (ref. 12) it has already been described that there is a tendency for blood to clot when mm waves are used. These mm waves are not used now, but are planned for the future.

The respiratory problems in COVID-19 patients, especially in intensive care units, have recently been largely attributed (refs. 13, 14) to microvascular thrombosis, which leads to decreased blood flow to the tissues, with possible infarcts. Microvascular thrombosis is caused by clotting of the red blood cells. Clotting is mainly a three-dimensional effect but has a similar effect as the Rouleau effect, which is mainly one-dimensional (ref. 15).

Several publications have reported that the Rouleau effect promotes blood clotting (refs. 16-18). Thus, there is a link between the ubiquitous EMF of wireless communication and the clotting of red blood cells. Clotting contributes to oxygen deficiency and respiratory problems and is responsible for thrombosis in COVID-19 patients. Without research it cannot be quantified to what extent the EMF are partly responsible for the severity of these effects.

3. Virus replication, intracellular Ca²⁺ concentration and oxidative stress

Exposure to LF EMF from electrical devices and RF EMF from wireless communications leads to increased intracellular Ca²⁺ (calcium ion) concentrations (refs. 19 - 21) and to the

formation of reactive oxygen species (ROS) (ref. 2), and thus to oxidative stress. The ROS and other free radicals, also formed by the EMF, damage cellular components such as proteins, lipids and DNA and cause single and double breaks in DNA chains. These biological effects are responsible for health complaints and diseases, such as fatigue, memory and concentration problems, heart rhythm disturbances, reduced fertility, skin problems and gastrointestinal complaints. Some of the biological effects caused by EMF can be attenuated or prevented by using calcium channel blockers (CCB) (refs. 19 - 21) and by using antioxidants (refs. 22, 23).

Viral infections, similar to exposure of EMF, also lead to an increase in intracellular Ca^{2+} concentrations and to the development of oxidative stress. The increase in Ca^{2+} concentrations is essential for virus entry and replication and release. Viruses thereby utilize host cell signal transduction mechanisms (which transmit signals within a cell) to modulate Ca^{2+} concentrations in cells to their advantage (ref. 24) thereby promoting their survival and replication. This goes often at the expense of programmed cell death. Averaged over time, the modulating effect gives increased Ca^{2+} concentrations. Treatment of patients with calcium channel blockers (CCB), leading to lower intracellular Ca^{2+} concentrations, has been shown to significantly reduce virus replication (refs. 24-27), with less chance of permanent damage and faster recovery.

The oxidative stress induced by viral infections contributes to the weakening of the immune system and also promotes virus replication (refs. 28, 29).

Thus, EMF and viruses both cause an increase in intracellular Ca^{2+} concentrations, cause oxidative stress and promote and accelerate virus replication. The negative health effects of EMF and viruses will therefore reinforce each other.

Most antivirals work by interfering with virus replication (ref. 30). EMF have the opposite effect and can be seen as a pro-viral agent. That can be a major problem. This may already be the case with Covid-19 and the current EMV load in many places in the world.

In biological processes effects do not add up linearly. In human-to-human virus contamination, the reproduction factor is an important parameter that must be less than 1. In analogy, we can introduce a replication factor for viruses inside a human. A small increase of this, from for example 0.9 to 1.1 as a result of the EMF load, would already have major consequences.

4. Information related to COVID-19

- It has been suggested that the virus was caused by 5G. However, there is no sensible explanation how that could be.
- The virus is said to come from a laboratory instead of from the fish and poultry market in Wuhan. Given that that suggestion is supported and argued by Montagnier (Nobel Prize winner in the field of viruses) that is possible, but not generally accepted. How the virus

originated is, however, not important for the spread of the virus, nor for the effects described in this article.

- Various publications have linked the geographical distribution of the COVID-19 pandemic with the roll-out of 5G in the world (refs. 31, 32). This link seems to be limited, as far as 5G is concerned, but it is true that the hardest hit countries in the world, with the highest number of deaths per million inhabitants, are countries with well developed infrastructure for wireless communication (on May 29, 2020: Belgium, Spain, UK, Italy, France, Sweden, the Netherlands and USA). In contrast, the number of deaths per million inhabitants to date in many countries in Africa, with the least developed wireless infrastructure, is minimal, orders of magnitude less than in the most developed countries (ref. 33). The spread and increase of COVID-19 worldwide thus does give an indication that the EMF of wireless communication can play a negative role. That in itself is not enough evidence for a direct link. As for the geographical distribution, other factors also play a role, such as the measures taken in different countries: a strict or less strict lockdown and more or less testing. Air pollution (livestock, industry), humidity and temperature are also mentioned as possible important factors.

- Interference of effects of different viruses and of viruses and vaccines may also have negative health effects. 23 Countries with COVID-19 have stopped measles vaccination (ref. 34) for this reason, as a precautionary measure recommended by the WHO.

- Furthermore, there is a lot of information about effects that play a role in the severity of the COVID-19, such as shortage of zinc and vitamin D. Much has also been published about remedies. However, those are not topics of this article.

The three main points: weakened immune system, Rouleau effect and accelerated virus replication, have also been discussed in a Doyon publication (ref. 31). He, however, limits himself almost exclusively to COVID-19 and 5G. Most of what has been discussed here also applies to other viruses and to other EMVs, such as 3G, 4G, WiFi and LF EMV.

5. Our future?

Marion Koopmans, professor of virology, states in an interview in the AD on May 9 that "we will at least get a new wave." In China it is already there, 100 million people have entered a new lockdown (ref. 35). A study by Harvard University (ref. 36) predicts that without a vaccine such a "pandemic flu" will return every year and that a single lockdown will not be enough to stop SARS-CoV-2. These predictions seem to be a logical consequence of the still low immunization rate of the population all over the world. The consequences of the recently started roll-out of 5G, with the increasing EMF load, have not been included in those predictions. It is expected that our immune system will be more heavily loaded and that the effects of blood clotting and virus replication will worsen.

The development of a vaccine that should provide a solution usually takes several years and is not always successful, such as with HIV. Furthermore, SARS-CoV-2 is an RNA virus that

mutates easily, so that a developed vaccine may not work as well or no longer works. There will also be other viruses, the variety is large, especially in the animal kingdom.

6. Conclusions

Low-frequency and radio-frequency electromagnetic fields (LF and RF EMF) from the mains and from wireless communication:

- weaken our immune system,
- promote blood clotting via the Rouleau effect, impede blood flow and impede the oxygen transport,
- have a pro-viral effect by increasing intracellular Ca^{2+} concentrations and cause oxidative stress and thereby promote virus replication.

EMF will therefore have a negative impact on the course and severity of virus infections. The increase in the EMV (radiation) load when 5G is rolled out will intensify the negative effects. Quantitative research into the consequences of EMF load on virus infections is still lacking. In a worst case scenario, virus infections, such as we experience every year, can turn into pandemics.

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