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How Safe Is 5G?

Most people have heard the term 5G but many don't know what it is. 5G is a loose term for the fifth generation of broadband mobile network technology. It's the successor to the current most widely used mobile network, namely 4G LTE. This network will provide several advantages over its predecessor, such as faster download and upload speeds, higher bandwidth, lower latency, and an overall more reliable service. These advantages are expected to create, enable, and reinvent industries. For example, it will reinvent the medical industry by enabling remote surgery. Internet of Things (IoT) in particular is expected to be transformed by 5G. Overall, this network is expected to be about 10 times faster than 4G LTE, but some experts predict it could eventually be 100 times faster (Duffy, 2020, para.7).

The speed and overall performance of 5G will come from the frequency range in which it's built on. Both 5G and 4G are built on the radio frequency section of the electromagnetic spectrum. According to Crave (2020), the radio frequency spectrum used by LTE ranges from 700 MHz to 2.7 GHz and 5G will use both the 450 MHz – 6 GHz and 24.25 GHz – 52.5 GHz, respectively (para. 4-5). The 24.25 GHz – 52.5 GHz range is located in the highest frequencies of the radio frequency spectrum. The waves produced at this range are small and are known as millimeter waves (mmWave). It's these waves that will enable 5G to deliver a more superior service. The problem with these waves, however, is that due to their small size, they don't travel very far. As a result, many more cell phone towers will be needed to make this network available to everyone.

Electromagnetic waves on all sides of the spectrum emit radiation but some of them are

more harmful to humans and the environment than others. The waves on the highest frequencies fall under the ionizing group and produce the most harmful radiation, whereas those with the lowest frequencies fall under the non-ionizing group and produce the least harmful radiation. . Ionizing means it can affect the atoms in living things, so it poses a health risk by damaging tissue and DNA. Indeed, people with constant exposure to ionizing waves may develop cancer and/or a variety of other health problems.

The frequencies used by 5G are in the non-ionizing category, but they aren't necessarily safe either. In May 2011, the International Agency for Research on Cancer (IARC) concluded that radio frequency radiation from devices that emit non-ionizing radiation in the frequency range 30 kHz-300 GHz, are a possible human carcinogen (IARC, 2011, para.1). Further research on this matter found that radio frequency radiation increases the risk of glioma: a type of brain cancer. However, there are also studies that found no link between 5G radiation and negative health effects (Nealon, 2020, para. 4). This is important because telecommunication companies, such as T-Mobile and Verizon, are currently on a race to lay the framework for 5G across the country.

Due to the conflicting research on the safety of 5G, there are groups of people who support it and others who oppose it. Some of the technology's strongest supporters include governments, telecommunication companies, 5G equipment vendors, and businesses. Two of the most important things for these groups are revenue and their ranking in the industry. On March 30, 2017, the Federal Communication Commission auctioned off spectrum frequencies from which it yielded $19.8 billion in revenue, with more than $7 billion of that going towards reducing the U.S deficit (Broadcast Incentive, 2017, para.3). And most recently, the president of

the United States said that the U.S. wants to be the leader in the movement of 5G, since the U.S. is already the leader in almost everything else (Trump, 2019, para.3).

In order to get 5G rolled out as quickly as possible, supporters have gone as far as to ignore studies that suggest the technology is not safe for humans or the environment. Indeed, both the International Commission of Non-Ionizing Radiation Protection (ICNIRP) and a government expert group in Switzerland, repeatedly ignored the evaluation of radio frequency radiation health effects from 5G (Hardell & Carlberg, 2020, para.4). There is evidence to suggest that politicians in these organizations were influenced by other groups who stand to benefit from the technology; thus, helping to push their agenda in supporting the no-risk argument.

Because radiation produced by 5G radio frequencies is considered non-ionizing, supporters simply back up their position on the issue by using the claim by definition. The problem with this claim is that there isn't enough research to suggest that non-ionizing radiation is completely safe. Therefore, this claim can be classified as an appeal to ignorance fallacy.

On the other hand, there are groups who oppose the release of 5G. These groups include but are not limited to scientists, medical professionals, local governments, and the Stop5GNL Foundation. The most important thing for these groups is preserving their health. In 2017, European scientists and doctors created the 5G appeal as a means to halt the roll out of 5G due to the potential health impacts. The appeal had 406 signatures from scientists and doctors as of September 23, 2020 (About, 2020, para.2).

Because there's research to suggests that 5G radiation may increase cancer rates, these groups use the claim by policy to argue their position. It's true that studies have found a link between brain tumors and 5G radiation, but there are also studies that found no link. Hence, this

claim can be classified as a hasty generalization.

Should 5G be made available despite conflicting reports on whether the technology is safe? Supporting groups certainly believe it should be. Their position on this issue comes from a variation of the utilitarian approach, known as ethical egoism, or the ethics of self interest. This ethical theory was first introduced by Henry Sidgwick. In this approach, an individual often uses utilitarian calculation to produce the greatest good for him or herself. Based on the decisions supporting groups have made regarding this issue, such as ignoring studies that suggest this technology is harmful for the purpose of self interest, it's clear that this is the appropriate framework.

According to the supporting groups this is the appropriate course of action because the availability of 5G will not only benefit them but society as well. One of the biggest benefits will come from 5G unlocking the path to the fourth industrial revolution (industry 4.0). Industry 4.0 is the concept of a smart factory, which will take what was started in the third industrial revolution with the adoption of automation and computers and make it better with smart and autonomous systems fueled by data and machine learning. As a result of the support of smart machines that keep getting smarter as they get access to more data, factories will become more efficient and productive and less wasteful.

5G supporters have everything to gain from the technology, such as money and status as the industry leader, but many of them also have a lot to lose. If the technology gets delayed or canceled due to health reasons, companies who've spent millions on 5G research wouldn't be able to get their money back or make a profit from their investment. The consumer would also lose in the way that they wouldn't be able to purchase the most advance tech devices that 5G

would enable.

Opposing groups, on the other hand, don't believe the technology should be made available until proven safe. Their position on this issue comes from the common good approach of ethics. This ethical framework was first introduced in the writings of ancient Greek philosophers Plato and Aristotle. In this approach, an individual makes decisions based on what is good for the community. This requires respect and compassion for others. The opposing group's decision to protest against the roll out of 5G technology on the basis that it may be harmful to the community embodies the common good approach. Making it the best suitable framework.

For opposing groups, halting the roll out of 5G is the appropriate course of action because the technology has not been proven safe without a doubt. According to Page (2020), Thom Beukers, the lawyer for the Stop5GNL Foundation, the planned roll out is “unethical” and he felt supporters should “not gamble with the health of the public ”(para.7). In addition to potential negative health effects, the roll out can result in physical violence against 5G maintenance workers and damage to 5G antennas. Indeed, the installation of antennas has only begun and there's already been attacks on the workers installing them and the antennas. The destruction of private property and violence on workers is not something the opposing group has taken credit for, nor it is something they advocate but it's certainly a problem that can get worse if the roll out continues.

If it's decided that the 5G roll out will not be postponed, opposing groups may have a lot to lose. Not in the form of money but in the form of their health. The health effects would be serious and irreversible to those affected.

It's clear there's a lot on the line for those who support 5G and those who oppose it. On one hand, the supporting group can increase their monetary gains from the technological advancements enabled by 5G but on the other hand, the opposing group can potentially increase their chances of getting cancer because of it. The main difference between the two is that one group is motivated by money and rankings, while the other is only motivated by the truth. In fact the opposing group isn't really opposed to the technology at all, they just want it to be proven safe before it's released. As a counter argument, supporting groups say that studies have already proven it's safe.

I reviewed some of the studies that didn't find a connection between 5G radiation and bad health, and I found four flaws. One, the studies were conducted on animals, not humans. Two, because the technology is relatively new, no studies have been made on large populations. Three, when 5G is available everywhere, people will not only be exposed to radiation from 5G, but also from 4G, 3G, and 2G. In other words, the airwaves will be more congested and people will get a larger dose of radiation. Four, the inability of 5G waves to travel long distances will require the installation of 5G radios in every other street corner, this means more radiation at a closer proximity.

After reviewing the arguments of both groups and conducting my own research on this matter, I don't believe the link between 5G radiation and bad health has been completely ruled out. One of the most important factors that lead to my conclusion is the fact that there's conflict of interest within some organizations that didn't find adverse health effects in their studies. Because of this, I stand with the opposing group on this matter. Like them, I believe in the common good approach and I agree that the technology needs to be stopped until research proves

it's safe without a doubt.

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