

## HEALTH RISK ANALYSIS, RELATED TO THE USE OF MOBILE PHONES

Ураимжон Усманов

Andijan Machine-Building Institute

Assistant of the Department of Humanities

### ANNOTATION

As mobile device users grow, natural questions arise about their impact on people's health. In recent decades, the International Agency for Research on Cancer has regularly reviewed scientific and experimental evidence on the possibility of carcinogenic exposure to radiation emanating from mobile phones.

**Keywords:** non-ionizing electromagnetic radiation, brain cancer, central nervous system.

### INTRODUCTION

Currently, mobile (cellular) phones have become an integral part of modern telecommunications in the life of every person on the planet. According to [www.statista.com](http://www.statista.com), in 2022 the number of mobile users worldwide exceeded **7.2 mlrd** people. according to [orognozm](http://orognozm), in 2025 the number of mobile users worldwide will reach **7.5 billion** <sup>1</sup>mark.

The growth of the mobile market is explained mainly by the growing popularity of smartphones. In 2022, the number of smartphone subscribers worldwide exceeded **6.5 mLRD**<sup>2</sup>. The largest number of smartphone users falls on the share of China, India and the United States.

According to the Fortune Business Insights report, the global smartphone market share was \$48.5 billion in 2022, and by 2029 it will grow to \$792.5 billion. <sup>3</sup>

As mobile device users grow, natural questions arise about their impact on people's health. A small increase in the incidence of adverse health effects can have serious public health consequences in the long term.

#### **The impact of mobile phones on human health**

WHO draws attention to the fact that in addition to the number of cell phone calls per day, the duration of each call and the amount of time people use cell phones are important factors affecting the health of the cell phone<sup>4</sup>.

Abundant telephones are known to emit radiofrequency energy, a form of non-ionizing electromagnetic radiation that can be absorbed by tissues located close to the phone<sup>5</sup>.

Since portable phones are used close to the head, and in this case there is ionizing radiation, the researchers are particularly concerned about the appearance of **cancer of the brain and central nervous system**.

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<sup>1</sup> Cm. [www.statesman.com](http://www.statesman.com).

<sup>2</sup> Cm. [www.statista.com](http://www.statista.com).

<sup>3</sup> How big is the global Smartphone Market Share? Industry Size and Competitive Scenario // Digital Journal, December 19, 2022. Cm. likewise report Smartphone Market Share Forecast, 2022-2029.

<sup>4</sup> Electromagnetic fields and public health: mobile phones // [www.who.int](http://www.who.int), 8 October 2014.

<sup>5</sup> Impact of Electromagnetic Radiation (EMR) Produced by Mobile Phones and Networks on Human Health and Eyes, International Journal of Electromagnetics and Applications, 11(1): 1-9, Nov. 2, 2021.

To date, many studies have been conducted to examine cases of the effects of cell phone use on human health.

The amount of rf energy to which a mobile phone user is exposed depends on many factors, such as the phone's technology, the distance between the phone and the user, the degree and type of mobile phone use, and the user's distance from the cell towers.<sup>6</sup>

In recent decades, the International Agency for Research on Cancer has regularly reviewed scientific and experimental evidence on the possibility of carcinogenic exposure to radiation emanating from mobile phones.

Back in 2011, IARC classified mobile phone radiation as carcinogenic, which means that "there may be some risk" of carcinogenicity<sup>7</sup>, which in turn required more research into long-term intensive mobile phone use, as there was not enough scientific evidence to conclude about the dangers of cell phones.

A new study conducted by IARC scientists together with experts from Denmark, Finland, Sweden, provides information on the temporal trends in the incidence of gliomas among men in these countries in 1979-2016. This observation indicates that there is no measurable effect of mobile phone use on the risk of developing glioma.

The authors of the study emphasized that the lack of an observed effect on glioma incidence rates is indicative of any significant effect of mobile phone use on glioma development.<sup>8</sup>

But according to Martin Rösl, head of environmental impact and health at the Swiss Institute for Tropical Research and Public Health, the type of radiofrequency radiation emitted by a mobile phone is not a concern. He stressed: "Smartphones have very low radio emission, the same as TV and radio signals. It is not ionizing, not radioactive and incomparable to X-rays. Direct damage to the structure of DNA due to this type of radiation is not possible."<sup>9</sup>

Another expert in epidemiology and public health, Frank de Vocht from the University of Bristol, also believes that it is unlikely that the dangers of mobile phones could go unnoticed: "If the use of mobile phones significantly increased the risk of serious diseases, such as oncology, using the scientific methods that we have, this would quickly be revealed."<sup>10</sup>

At the same time, this issue is not completely exhausted, as it may seem to optimists.

In contrast, a study of 1339 mobile phone users published in 2014 found that the most active mobile phone users have an increased risk of developing glioma. It was found that these most active users, who in total used a mobile phone for more than 900 hours, spent an average of 54 minutes a day on the phone.<sup>11</sup>

Thus, the increased risk of developing brain tumors as a result of mobile phone use has not been established, the intensive use of mobile phones and the lack of data for 15-20 years require further scientific and practical research in this direction.

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<sup>6</sup> Volkow ND, Tomasi D, Wang GJ, et al. Effects of cell phone radiofrequency signal exposure on brain glucose metabolism. *The Journal of the American Medical Association*, 2011, 305(8):808–813.

<sup>7</sup> Frei P, Poulsen AH, Johansen C, et al. Use of mobile phones and risk of brain tumours: update of Danish cohort study. *British Medical Journal*. 2011, p. 343.

<sup>8</sup> Deltour I., Poulsen A., Time trends in mobile phone use and glioma incidence among males in the Nordic countries, 1979–2016, *Environ International*, Published online 28 August 2022)

<sup>9</sup> Quotation from Charli Shield, Do mobile phones harm our health? *Deutsche Welle*, August 10, 2018.

<sup>10</sup> Quotation from Nika Voyutskaya, What harm does a smartphone do to the brain? *Deutsche Welle*, 30 August 2018 r.

<sup>11</sup> Courau, G, Bouvier, G, et al., Mobile phone use and brain tumours in the CERENAT case-control study, *Journal of Occupational and Environmental Medicine*, 71(7): (9 May 2014). 514-522

The American Cancer Society (AEO) says that the above CLASSIFICATION of IARC in its subtext means that there is some risk associated with cancer. Although the evidence in favor of the occurrence of cancer is not convincing enough to consider them the cause, however, the situation needs to be further investigated.

Scientists from around the world have published their own findings on other health issues that appear to be the result of increased mobile phone use. The following is a brief list of the problems:

- tumors of the salivary glands;<sup>12</sup>
- dizziness and migraines;<sup>13</sup>
- deterioration in the quality of sleep;<sup>14</sup>
- changes in the production of specific proteins in human cells;<sup>15</sup>
- irritation of the skin, especially of the face (this condition is known as electromagnetic hypersensitivity);<sup>16</sup>
- problems in behavior and an increased risk of developing a cancerous tumor in children.<sup>17</sup>

A number of scientists have identified the presence of such adverse effects of mobile phone use on health, such as changes in brain activity and reaction time.<sup>18</sup>

A new study involving the same scientist Martin Rösli found a link between the use of mobile phones and adverse effects on memory abilities in young people.

Swiss researchers studied 700 teenagers between the ages of 12 and 17. They monitored their phone use habits and gave them memory-related tasks. Over the course of a year, participants had to complete a questionnaire about their mobile phone habits, as well as answer questions about their psychological and physical health.

The study participants then underwent a series of computerized cognitive tests. According to Rösli, a unique feature of the study was the use of phone user data from mobile operators. This meant that the researchers knew on which network each call made by the participants occurred and how long it lasted.

The study found that exposure to mobile phone radiation for one year can have a negative impact on memory performance in certain areas of the brain in adolescents, where "exposure" refers almost exclusively to phone calls.<sup>19</sup>

The experts also noted that 80% of the absorbed radiation comes from finding the phone close to the head, which reveals that the memory function of the brain is more vulnerable to the negative effects of radiation at the moment when the phone is held on the right side of the head.

<sup>12</sup> Sadetzki S, Chetrit A, Jarus-Hakak A, et al. (2008) Cellular phone use and risk of benign and malignant parotid gland tumors-A nationwide case-control study. *American Journal of Epidemiology* 167: 457-467.

<sup>13</sup> Schuz J, Waldemar G, Olsen JH, & Johansen C. (2009 Feb. 5). Risks for Central Nervous System Diseases among Mobile Phone Subscribers: A Danish Retrospective Cohort Study. *PLoS ONE*, 4(2): 1-5.

<sup>14</sup> Arnetz BB et al (2007) The Effects of 884 MHz GSM Wireless Communication Signals on Self-reported Symptom and Sleep (EEG)- An Experimental Provocation Study *PIERS Online* 3(7):1148-1150.

<sup>15</sup> Karinen A, Heinavaara S, Nylund R, & Leszczynski D (2008 Feb. 11). Mobile phone radiation might alter protein expression in human skin. *BMC Genomics*, 9(77). Retrieved from <http://www.biomedcentral.com/1471-2164/9/77>.

<sup>16</sup> Yakymenko, I., Tsybulin O, Sidorik, E., et al. (2015). Oxidative mechanisms of biological activity of low-intensity radiofrequency radiation, *Electromagnetic Biology and Medicine*.

<sup>17</sup> Zahid Naeem, Health risks associated with mobile phones use, *International Journal of Health Sciences*, 2014 Oct; 8(4): 5-6.

<sup>18</sup> Over there same.

<sup>19</sup> Milena Foerster, Martin Rösli, A Prospective Cohort Study of Adolescents' Memory Performance and Individual Brain Dose of Microwave Radiation from Wireless Communication, *Environmental Health Perspectives*, July 23, 2018.

After all, in the right hemisphere of the brain there are those areas that are responsible for the work of memory<sup>20</sup>.

### **Behavioral changes associated with phone use**

Thus, there is a growing number of researchers expressing concern not so much about the potential **biological** consequences of mobile phone use as about **the behavioral changes** observed in active users.

In 2015, scientists A.Schöni, K.Roser and M. Rösli found in the study that adolescents who excessively use the phone on, especially after the "break", revealed a violation of **sleep patterns** and **fatigue**<sup>21</sup>.

Let's touch upon other aspects related to the behavioral consequences of using mobile phones. When mobile phones are used in close proximity to some **medical devices** (including pacemakers, implanted defibrillators, and some hearing aids), there is a possibility of interference with their operation.

There is also the possibility of interference between mobile phone signals and **on-board electronics**. Some countries allow the use of mobile phones on airplanes during flight using systems that monitor the phone's power output.<sup>22</sup>

Studies have revealed an increased risk of **traffic accidents** – about 3-4 times more likely to crash due to distraction when mobile phones are used while driving.<sup>23</sup>

### **Steps to Reduce Exposure to RF Radiation**

Research scientists have formulated a number of recommendations to reduce exposure to radiofrequency radiation during frequent use of mobile phones.

First of all, it would be safer to use a landline(home) phone and, albeit not on a regular basis. If there is no landline and mobile phones are used, it is recommended to shorten the duration of calls and the frequency of calls.

Safer is the use of hands-free devices, which provides a greater distance between the phone and the user's head. This includes wired headsets for mobile phones or Bluetooth wireless headphones.

In case of non-use of hands-free devices, it is advised to put the mobile phone on a "speakerphone" or keep it at a certain distance from the ear. Scientists also advise changing sides while talking on the phone.

It is strictly important to remember that, if possible, you should avoid telephone conversations or using the device while charging the phone. It is also not recommended to carry the phone in your pocket, at belt level or anywhere close to the body, as cell phones emit radiation even when not in use.

It is also advisable to limit the use of a mobile phone in rural areas or in any place with a poor network. After all, the farther away from the cell tower the user is, the greater the likelihood of receiving radiation.

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<sup>20</sup> Over there same.

<sup>21</sup> Schoeni A, Roser K, Rösli M (2015) Symptoms and Cognitive Functions in Adolescents in Relation to Mobile Phone Use during Night. PLoS ONE 10(7), July 29, 2015.

<sup>22</sup> Zahid Naeem, Health risks associated with mobile phones use, International Journal of Health Sciences, 2014 Oct; 8(4): 5-6.

<sup>23</sup> Quotation from Ryan Gorman, One in four car accidents caused by cell phone use while driving, The Daily Mail, 27 March 2014.

A number of experts advise switching to the use of text messages instead of long telephone conversations.

As can be seen, there are a number of opportunities for a more disciplined and safe approach to the use of mobile phones, which will affect human health in the long term.

### **Inference**

Judging by recent trends, the number of mobile users will grow even more dynamically in the coming years. People's dependence on the use of mobile phones is also growing, and therefore, the question of their impact on public health is relevant.

On the one hand, scientists talk about the low-level non-radioactive radiation of mobile phones. The above studies have not revealed a clear and unambiguous effect of mobile phone use on the risk of developing brain cancer.

But this may also be due to the fact that not enough scientific and empirical studies have been conducted on the carcinogenicity of radiation from mobile phones.

After all, many scientific works indicate such critically serious consequences as dizziness and migraine, deterioration in the quality of sleep, slowing down memory, skin irritation, etc.

These trends suggest the need for a rational and disciplined approach to the use of mobile phones in our daily lives and professional activities. The absence of a direct correlation between the occurrence of cancer and the use of the phone does not mean the absence of other health risks.

### **REFERENCES**

1. How big is the global Smartphone Market Share? Industry Size and Competitive Scenario // Digital Journal, December 19, 2022. См. также доклад Smartphone Market Share Forecast, 2022-2029.
2. Electromagnetic fields and public health: mobile phones // www.who.int, 8 October 2014.
3. Impact of Electromagnetic Radiation (EMR) Produced by Mobile Phones and Networks on Human Health and Eyes, International Journal of Electromagnetics and Applications, 11(1): 1-9, Nov. 2, 2021.
4. Volkow ND, Tomasi D, Wang GJ, et al. Effects of cell phone radiofrequency signal exposure on brain glucose metabolism. The Journal of the American Medical Association, 2011, 305(8):808–813.
5. Frei P, Poulsen AH, Johansen C, et al. Use of mobile phones and risk of brain tumours: update of Danish cohort study. British Medical Journal. 2011, p. 343.
6. Цитата из Charli Shield, Do mobile phones harm our health? Deutsche Welle, August 10, 2018.
7. Quote from Nika Voyutskaya, What harm does the smartphone cause to the brain? Deutsche Welle, 30 August 2018
8. Courau, G, Bouvier, G, et al., Mobile phone use and brain tumours in the CERENAT case-control study, Journal of Occupational and Environmental Medicine, 71(7): (9 May 2014). 514-522

9. Sadetzki S, CHetrit A, Jarus-Hakak A, et al. (2008) Cellular phone use and risk of benign and malignant parotid gland tumors-A nationwide case-control study. *American Journal of Epidemiology* 167: 457-467.
10. Schuz J, Waldemar G, Olsen JH, & Johansen C. (2009 Feb. 5). Risks for Central Nervous System Diseases among Mobile Phone Subscribers: A Danish Retrospective Cohort Study. *PLoS ONE*, 4(2): 1-5.
11. Arnetz BB et al (2007) The Effects of 884 MHz GSM Wireless Communication Signals on Self-reported Symptom and Sleep (EEG)- An Experimental Provocation Study *PIERS Online* 3(7):1148-1150.
12. Karinen A, Heinavaar S, Nylund R, & Leszczynski D (2008 Feb. 11). Mobile phone radiation might alter protein expression in human skin. *BMC Genomics*, 9(77). Retrieved from <http://www.biomedcentral.com/1471-2164/9/77>.
13. Yakymenko, I., Tsybulin, O., Sidorik, E., et al. (2015). Oxidative mechanisms of biological activity of low-intensity radiofrequency radiation, *Electromagnetic Biology and Medicine*.
14. K. T. Makhamadkasimdzhanovna, CONTENTS OF ELECTRONIC EDUCATIONAL LITERATURE AND NATURE - Proceedings of International Conference on Scientific ..., 2023
15. K.T.Muhammadqasimdjanovna, CREATION OF ELECTRONIC LEARNING LITERATURE SYSTEM SOFTWARE - *ResearchJet Journal of Analysis and Inventions*, 2022
16. Веб сайт [www. statesman. com](http://www.statesman.com).