# ASSESSMENT OF THE INTENSITY OF ELECTROMAGNETIC RADIATION FROM MOBILE PHONES AFFECTING THE HUMAN HEAD

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**The relevance of scientific work.** The Digital Economy of the Republic of Uzbekistan program has approved the Concept of creating and developing 5G/IMT-2025 networks. The development of 5G communications will have a significant impact on the implementation of many innovative projects and initiatives: the Smart City project, Unmanned Transport, full-scale virtual and augmented reality services, remote surgical intervention, rescue operations, autonomous driving, the Internet of Things, etc. [1,2].

Along with the great technical advantages over previous generations of communications (2G, 3G, 4G), 5G technology has completely different radiating characteristics: a larger number of radiating elements, signal modulation, a three-dimensional beam, the ability to control the beam, and a different spectral range of radio frequencies. 5G networks will operate in several different frequency bands, of which lower frequencies are proposed for the first phase of 5G networks. Some of these frequencies (mainly below 1 GHz) were actually used or are currently being used for earlier generations of mobile communications. The new 5G bands, which are supposed to be used in Russia, will have microwave (ultra-high) and EHF (extremely high) radio frequency ranges and centimeter and millimeter wavelengths of electromagnetic radiation compared to previous generation communication networks [3, 4, 12].

Currently, a person is surrounded by many wireless communication devices. These include both infrastructure facilities of various networks (base

stations) and equipment used by subscribers of these networks (mobile phones) [5].

The former have a general effect on the body, which is strictly regulated by law, while the latter, being a subscription service, is in users' hands, near the body. Their impact, in addition to the general one, has a local component and depends on the mode and intensity of use [6, 7, 11].

The main target organ of electromagnetic radiation of the radio frequency range (ER RFR) from a mobile phone (MP) is the brain. Existing regulations prevent the presence of organic changes in brain tissue caused by heat exposure, however, they do not exclude non-thermal effects of radiation [8, 9, 10].

**The results of the study.** In the Republic of Uzbekistan, according to SanRN 0370-19, the standard value of the energy flux density (EFD) near the front panel of the MP is 100 μW/cm2. However, this technique has a number of limitations, as it requires monitoring compliance with the standard by measuring the EFD of the ER at a distance of 0.37 m from the MP with a controlled value of 3 μW/cm2.This is due to the fact that at a distance of less than 0.37 m, based on the wavelength parameters of the radiation frequencies used for mobile communications, MP is not a point emitter, therefore, the influence of the relative position of the meter antenna and the MP antenna (due to the different location of the antennas in different MP) on the measurement result is visible. According to the regulatory documents, failure to exceed the EFD level of 3 μW/ cm2 at a distance of 0.37 m guarantees compliance with the standard of 100 μW/cm2 near MP, but all data on radiation levels in the area closer to 0.37 m are calculated. Thus, the existing technique cannot be used to obtain real values of EFD near different MP, therefore, it does not make it possible to compare different MP designs with each other in terms of their possible effects on the brain. This may conceal additional factors that make it difficult to study and correctly assess the risk factor in question in order to prevent the development of non-thermal effects. Rationing in the West is based on an

assessment of only the thermal effects of ER RFR. The normalized parameter is the specific absorbed power SAR (Specific Adsorption Rate), according to ICNIRP, it should not exceed 2 W/kg (recommended by the Cellular Equipment Manufacturers Association (CTIA) value is 1.6 W/kg). Based on their own analysis of the accumulated scientific data, many official, governmental and public organizations in their publications and appeals indicate the need to revise the standards [7, 8]. Standards only guarantee the absence of damage due to heating during operation of the wireless device.

**Conclusions.** Thus, in order to estimate the ER of RFR from smartphones, there is a need to obtain real values of the EFD ER in the immediate vicinity of the front panel of the devices and their distribution, taking into account the topography of the human head.

**References:**

1. Жаворонков Л. П., Петин В. Г. Влияние электромагнитных излучений сотовых телефонов на здоровье //Радиация и риск (Бюллетень Национального радиационно-эпидемиологического регистра). – 2016. – Т. 25. – №. 2. – С. 43-56.

2. Верещако Г. Влияние электромагнитного излучения мобильных телефонов на состояние репродуктивной системы и потомство. – Litres, 2016.

3. Ященко С. Г. и др. Гигиеническая оценка влияния электромагнитных факторов коммуникационных устройств на состояние здоровья студентов //Гигиена и санитария. – 2017. – Т. 96. – №. 10. – С. 1001-1003.

4. Боталов Н. С. и др. Гигиеническая оценка влияния электромагнитного излучения на здоровье человека //Международный студенческий научный вестник. – 2017. – №. 6. – С. 20-20.

5. Вятлева О. А., Текшева Л. М., Курганский А. М. Физиолого-гигиеническая оценка влияния мобильных телефонов различной интенсивности излучения на функциональное состояние головного мозга детей и подростков методом электроэнцефалографии //Гигиена и санитария. – 2016. – Т. 95. – №. 10. – С. 965-968.

6. Васильев Ю. В. и др. Оценка влияния электромагнитного излучения сотовых телефонов на здоровье подрастающего поколения //Children's Medicine of the North-West. – 2020. – Т. 8. – №. 1. – С. 74-75.

7. Новикова А. А. Проблема оценки воздействия электромагнитного излучения на человека. – 2017.

8. Вторникова Н. И. и др. Оценка интенсивности электромагнитного излучения мобильных телефонов, воздействующего на голову человека //Ученые записки СПбГМУ им. ИП Павлова. – 2017. – Т. 24. – №. 4. – С. 75-81.

9. Гордыгина Н. О., Юльметова Р. Ф. Экологическая оценка воздействия электромагнитного излучения на центральную нервную систему живых организмов //низкотемпературные и пищевые технологии в xxi веке. – 2019. – С. 212-215.

10. Никитина В. Н. и др. Методические подходы к измерению и оценке воздействия электромагнитных полей, создаваемых смартфонами //Гигиена и санитария. – 2022. – Т. 101. – №. 8. – С. 855-860.

11. Костромеева М. С., Ильинских Н. Н. Влияние электромагнитного излучения сотовых телефонов на ядерные структуры клеток буккального эпителия человека //Вестник науки и образования. – 2017. – №. 8 (32). – С. 11-15.

12. Яншина Э. Р., Левкович А. Л. Исследование электромагнитного излучения мобильных телефонов //Техносферная безопасность. – 2015. – С. 86-90.