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Reviews

Possible health effects on the human brain by various generations of mobile telecommunication: a review based estimation of 5G impact

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Abstract

Purpose

The deployment of new 5G NR technology has significantly raised public concerns in possible negative effects on human health by radiofrequency electromagnetic fields (RF EMF). The current review is aimed to clarify the differences between possible health effects caused by the various generations of telecommunication technology, especially discussing and projecting possible health effects by 5G. The review of experimental studies on the human brain over the last fifteen years and the discussion on physical mechanisms and factors determining the dependence of the RF EMF effects on frequency and signal structure have been performed to discover and explain the possible distinctions between health effects by different telecommunication generations.

Conclusions

The human experimental studies on RF EMF effects on the human brain by 2G, 3G and 4G at frequencies from 450 to 2500 MHz were available for analyses. The search for publications indicated no human experimental studies by 5G nor at the RF EMF

frequencies higher than 2500 MHz. The results of the current review demonstrate no consistent relationship between the character of RF EMF effects and parameters of

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At the RF EMF frequencies lower than 10 GHz, the impact of 5G NR FR1 should have no principal differences compared to the previous generations. The radio frequencies used in 5G are even higher and the penetration depths of the fields are smaller; therefore, the effect is rather lower than at previous generations. At the RF EMF frequencies higher than 10 GHz, the mechanism of the effects might differ and the impact of 5G NR FR2 becomes unpredictable. Existing knowledge about the mechanism of RF EMF effects at millimeter waves lacks sufficient experimental data and theoretical models for reliable conclusions. The insufficient knowledge about the possible health effects at millimeter waves and the lack of in vivo experimental studies on 5G NR underline an urgent need for the theoretical and experimental investigations of health effects by 5G NR, especially by 5G NR FR2.

Q Keywords: RF EMF exposure health effects frequency dependence signal structure
underlying mechanisms

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Disclosure statement

The authors report no conflict of interest.

Additional information

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