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Towards 5G communication systems: Are there health implications?

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Abstract

The spread of radiofrequency electromagnetic fields (RF-EMF) is rising and health effects are still under investigation. RF-EMF promote oxidative stress, a condition involved in cancer onset, in several acute and chronic diseases and in vascular homeostasis. Although some evidences are still controversial, the WHO IARC classified RF-EMF as "possible carcinogenic to humans", and more recent studies suggested reproductive, metabolic and neurologic effects of RF-EMF, which are also able to alter bacterial antibiotic resistance. In this evolving scenario, although the biological effects of 5G communication systems are very scarcely investigated, an international action plan for the development of 5G networks has started, with a forthcoming increment in devices and density of small cells, and with the future use of millimeter waves (MMW). Preliminary observations showed that MMW increase skin temperature, alter gene expression, promote cellular proliferation and synthesis of proteins linked with oxidative stress, inflammatory and metabolic processes, could generate ocular damages, affect neuro-muscular dynamics. Further studies are needed to better and independently explore the health effects of RF-EMF in general and of MMW in particular. However, available findings seem sufficient to demonstrate the existence of biomedical effects, to invoke the precautionary principle, to define exposed subjects as potentially vulnerable and to revise existing limits. An adequate knowledge of pathophysiological mechanisms linking RF-EMF exposure to health risk should also be useful in the current clinical practice, in particular in consideration of evidences pointing to extrinsic factors as heavy contributors to cancer risk and to the progressive epidemiological growth of noncommunicable diseases.

Keywords: 5G; Cancer; MMW; Noncommunicable diseases; Prevention; RF-EMF.

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