**THE INFLUENCE OF ELECTROMAGNETIC FIELDS ON HUMAN HEALTH**

The impact of non-ionising electromagnetic fields (EMFs) on human health has been a topic of numerous studies over the last three decades. In fact, the knowledge about EMF-caused biological effects has been constantly accumulated and analysed worldwide [1-3](#_ENREF_1).

The research has covered a wide range of electromagnetic frequencies: from zero up to 5 GHz. The main concern of the public has been associated with wireless networking technology, such as mobile telephony and Wi-Fi. Wi-Fi,(WLAN Wireless Local Area Network), is the technology for the wireless connection of various devices [4](#_ENREF_4). Such a technology has been widely used mainly for providing Internet access in offices, public places, universities, transport, etc. Nowadays, there are different types of Wi-Fi standards. The IEEE 802.11 Wireless LAN (WLAN) & Mesh is the leading standard for most countries. The type of frequencies of Wi-Fi depend on the countries' standards and approved protocols, including 900 MHz, 2.4 GHz, 3.65 GHz, 5.0 GHz, 5.9 GHz, 6 GHz, and 60 GHz frequencies.

Up to date, there is a range of reports on the bio-effects caused by Wi-Fi radiation, including oxidative stress [5-7](#_ENREF_5), sperm damage [8-11](#_ENREF_8), neural development [6](#_ENREF_6),[12](#_ENREF_12), apoptosis [5](#_ENREF_5),[7](#_ENREF_7), hormonal misbalance [7](#_ENREF_7),[13](#_ENREF_13), etc. The research was predominantly focused on the reproductive, nervous and cardio-vascular systems only [14](#_ENREF_14). However, the comprehensive investigation of the influence of Wi-Fi radiation on the gut microbiome has not been done yet.

The gut microbiome (microbiota) is implicated in the regulation of human health and metabolism. The microbiome has been demonstrated to have an impact on all systemic processes, including, but not limited to, immune and brain functions [15](#_ENREF_15),[16](#_ENREF_16). The gut microbiome and the immune system are intricately linked, with each influencing the other in complex ways. A healthy gut microbiome helps to maintain a strong immune system, while disruptions to the gut microbiome can lead to immune system dysfunction [17-19](#_ENREF_17). The gut microbiome helps to educate the immune system and promote tolerance to harmless antigens. The microbes in the gut produce various molecules that stimulate the immune system, helping to develop and maintain a balanced immune response. The gut microbiome also helps to prevent the overactive immune responses that can lead to chronic inflammation and autoimmune diseases.

The microbiome balance can be disrupted by a number of factors, including diet, antibiotics, and other environmental factors. It was shown that the ionizing radiation can disturb the structure and function of the gut microbiome, leading to a range of health problems [20](#_ENREF_20),[21](#_ENREF_21). Ionizing radiation can damage the DNA of gut microbes, leading to pathological changes in their composition and activity. This can result in the loss of beneficial bacteria and the overgrowth of harmful pathogens, finally, it can lead to imbalance in the intestinal microbiome. Such an imbalance might have a variety of effects on human health, including impaired digestion, weakened immune response, and increased risk of infections and other health problems [19](#_ENREF_19),[22](#_ENREF_22),[23](#_ENREF_23).

Ionizing radiation can have systemic effects on the human body, affecting the entire gut-liver-blood system. This can further impact the gut environment, reducing the availability of essential nutrients and fibre, and altering the production of hormones, essential vitamins, and other signalling molecules. Despite the massive data about the effect of ionizing radiation, there is a lack of information on the impact of non-ionizing and non-thermal electromagnetic radiation on the microbiota, including EMFs in the Wi-Fi radio-frequency range. This study aimed to shed the light on the reaction of the gut microbiome to long-term Wi-Fi exposure. We utilized the animal model (rats) to analyse the changes in microbiome structure caused by Wi-Fi irradiation.

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