TECHNICAL ELECTROSMOG (HIGH-FREQUENCY ELECTROMAGNETICFIELDS EMF) DAMAGES THE BRAIN, ESPECIALLY IN CHILDREN AND ADOLESCENTS

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ABSTRACT

Exposure to non-ionizing radiation and electromagnetic waves (type 5G) is constantly increasing. Mobile phone operators advertise coverage of 99.9% of the population and transmission rates of gigabytes per second. Our children are growing up in this unnatural world and are defencelessly at the mercy of exposure. New studies show that their brains are being deformed and damaged to an unprecedented extent. If we do not begin to protect our children from these influences, we will see a generation with inadequate brain skills.

Keywords: Technical Electrosmog, Children, Adolescents

1. INTRODUCTION

As the EEG shows, the brain mainly works with frequencies between 4 Hz and 30 Hz. Below this is sleep, above this is high concentration. The homeostasis of the brain is based on a sensitive interplay of these frequencies. It is therefore logical that external influences, such as those generated by mobile phone radiation, have an effect on this. New research results from Dr. Keren Grafen are available on this subject. Grafen (2022)

Neurobiology has shown how the sensory overload caused by digital media affects brain metabolism, inhibits the development of the prefrontal cortex and can also lead to addiction. This is how Prof. G. Teuchert-Noodt describes it. Teuchert-Noodt and Hensinger (2025) The new study by Kim et al. (2024) "*Radiofrequency exposure induces synaptic dysfunction in cortical neurons causing learning and memory alterations in early postnatal mice*" now also demonstrates pathological effects of radiofrequency radiation on brain development in the prefrontal cortex at the molecular level. Kim et al. (2024) Mobile phone radiation inhibits the development of synaptic structure and density as well as the growth of neurites with negative consequences for behavior, spatial learning and memory.

2. THE BLOOD-BRAIN BARRIER

Since 2000, Salford et al. have shown that EMFs can make the blood-brain barrier permeable. (Salford LG et al. (2003), Louis Slesin (2022), Cell Phones 'Can Trigger Alzheimer's', 5.2. (2003), Sırav and Seyhan (2016)) His revealing results highlight the immensely complex and potentially dangerous effects of EMFs on the brain - via a new route: the blood-brain barrier. It is now well documented that the extravasation (leakage) of albumin is associated with hyperpermeability of the blood-brain barrier. EMF-induced hyperpermeability of the blood-brain barrier opens the brain to pollutants that stress the brain, particularly at the immunological level, and can lead to silent inflammation of the glia.

Negative effects of cell phone radiation on memory have not only been proven in animal experiments. A study entitled "*A prospective cohort study on the memory performance of adolescents and the individual brain dose of microwave fields from radio communication*" on 700 adolescents in Switzerland found that high-frequency electromagnetic fields from cell phones have a negative impact on the development of memory performance in figural and verbal memory. The study was conducted by the Swiss Tropical and Public Health Institute in 2015. Foerster et al. (2018) The cell phone use of twelve to seventeen-year-olds was examined for one year. As expected, showed an increased exposure of the brain to radiation. One result: the more phone use, the poorer the performance in the figural memory test. Verbal memory also performed worse in frequent phone users.

3. THE HIPPOCAMPUS - THE CENTER OF EFFECTIVE LEARNING

Kim et al. (2024) have now provided a neurobiological explanation for the results of Foerster et al. (2018) What is the function of the hippocampus? The hippocampus owes its name to its shape, which is reminiscent of a seahorse. It is a fascinating structure in the brain that plays a crucial role in short-term memory, the transfer of information into long-term memory, emotions, motivation and spatial orientation.

A remarkable property of the hippocampus is its ability to form new nerve cells throughout life. This occurs in an embryonic germ cell, which is located in the hippocampus and enables continuous neurogenesis. This process contributes significantly to neuronal plasticity by maintaining the adaptability of the neuronal network and preventing the development of rigid structures. As the hippocampus must constantly store new information, the system inevitably remains receptive to environmental stimuli. The formation of new nerve cells in the hippocampus continues into adulthood and is an essential prerequisite for learning processes, emotional regulation and cognitive flexibility.

Another central function of the hippocampus is its involvement in the creation of cognitive maps. The discovery of place cells in the hippocampus and grid cells in the adjacent entorhinal cortex was awarded the Nobel Prize in Physiology or Medicine in 2014. These specialized nerve cells are crucial for encoding spatial information and enable the calculation of internal maps for navigation. Damage to the hippocampus has far-reaching consequences for cognitive and spatial processes. Experimental studies on rodents show that effective learning is no longer possible without this structure.

4. HF-EMF CAUSES BRANCHES OF NEURONAL TREES TO ATROPHY

A neuronal network can be figuratively compared to a forest: Each nerve cell resembles a tree whose branches branch out widely and are in contact with other trees. However, if individual branches or even entire trees die, gaps appear in the dense forest - the once lively connection between the trees is interrupted. This phenomenon was impressively demonstrated in the study by Kim et al. (2024): exposure to radiofrequency electromagnetic fields (RF-EMF) has a negative effect on the axons and dendrites of the nerve cells in the hippocampus. The branches of the neuronal trees atrophy, their number decreases and the network loses stability.

The possible effects on spatial orientation are even more profound: EMF exposure can impair both the formation and function of cognitive maps. This would not only affect our memory, but also more complex thought processes - such as the ability to distinguish between past and future, or social interaction with other people. Just as a damaged forest not only changes its ecosystem but also affects the lives of countless animals, a disrupted neuronal network could have far-reaching consequences for our thinking and behavior. The expression of the glutamate receptors AMPA (9) (α-amino-3-hydroxy-5-methyl-4-isoxazolepropionic acid) and NMDA (N-methyl-D-aspartate) was significantly reduced in the studied hippocampal neurons. Consequences for neuroplasticity can be derived from this.

5. HEBBIAN LEARNING SYNAPSE

Hebb's learning synapse is a fundamental principle of neuronal plasticity and was formulated in 1949 by the Canadian researcher Donald Hebb (10): "*Neurons that fire together, wire together*". This means that the synaptic connection between two nerve cells is strengthened when they are active at the same time. More precisely, if a presynaptic neuron (transmitter) is active at the same time as a postsynaptic neuron (receiver), the synaptic connection is strengthened. This phenomenon is called Long-Term Potentiation.

The process works as follows: An incoming signal first activates the AMPA receptor, which immediately transmits the excitation. Only when the nerve cell remains active over a longer period of time - as is the case with learning processes through repeated stimulation - the NMDA receptor is activated. A special feature of the NMDA receptor is that it is blocked by a magnesium ion in the resting state. Only when sufficient input is applied to the receptor cell is this blockade removed. This leads to a structural change in the synapse via various chemical processes: it grows, becomes more stable and increases in size. These changes facilitate signal transmission at this synapse and thus increase the efficiency of learning.

The significantly reduced expression of AMPA and NMDA glutamate receptors in hippocampal neurons - as Kim was able to show in the above-mentioned study - means that learning processes are impaired at a physiological level. This in turn means that the brain's ability to adapt structurally and functionally to experience and environmental factors - a process known as neuroplasticity - is inadequate. The consequences are far-reaching: the anatomical correlate for all learning is impaired.

6. HF-EMF INFLUENCE THE HOMEOSTASIS OF BRAIN RHYTHMS

The electrophysiological correlation discovered by Hoffmann et al. (2001) at the Institute Teuchert-Noodt shows that electromagnetic fields (EMF) in the frequency range from 4 Hz to 30 Hz influence neurogenesis. It is particularly striking that EMF exposures in the frequency range of 1, 29 and 50 Hz significantly reduce neurogenesis, while frequencies such as 8 and 12 Hz have no effect. The study interprets that only certain frequencies activate the release of neurotransmitters and hippocampal hormones, which in turn control the changes in the hippocampus.

This finding opens up an important hypothesis: there is a common mechanism that can be found in both the study by Hoffmann et al. and the study by Kim et al. The EMF-driven regulation of neurotransmitters and hormones could be the trigger for reduced BDNF (Brain-Derived Neurotrophic Factor) expression and thus for reduced synaptic density. BDNF is a protein that plays a central role in the formation of new synapses in the brain. A deficiency of BDNF is associated with cognitive deficits and neurodegenerative diseases. Lehmann et al. (2009), Neufeld et al. (2009))

7. THE BRAIN LEARNS THROUGH 3-DIMENSIONAL MOVEMENT

Healthy brain development plays a central role in learning, as the brains of children and young people are particularly plastic and malleable. This makes it particularly open on the one hand, but also particularly susceptible to harmful influences on the other. To use the metaphor of the forest, every new experience, every learning and every interaction is integrated into this neural network as new "branches". Harmful or unsuitable stimuli cause this forest to wither. It is not only harmful influences that play a role here, as described above with reference to the damaging effect of EMF radiation, but also the way in which learning takes place. The brain learns primarily through movement, through grasping, and in 3 dimensions. This means that we not only passively absorb information, but also integrate and anchor it in the brain through active, physical engagement with the environment. As was the case in schools in the past, when children were actively involved.

The increasing dependence on digital devices and the associated permanent EMF exposure can have a negative impact on neuronal growth and cognitive abilities, especially in the particularly susceptible brains of children and adolescents. In neurobiology, such cases are referred to as "emergency maturation".

8. CONCLUSION

If these findings are already being ignored by interest-driven politicians, they should at least serve as a warning signal to parents, teachers and educators. It is high time that the negative effects of high-frequency EMF on the brain development of children and adolescents were taken seriously. Precautionary measures such as reducing the use of cell phones and screens in children, using wired alternatives instead of WLAN, and minimizing exposure in the sleeping area through shielding devices are necessary to avoid foreseeable potential long-term damage. Doepp (2021), Doepp M (2021))

We should not forget that mankind has lived in an analog, 3-dimensional world since its creation. The reduction to 2-dimensional screens in a digitalized world is absolutely unnatural and can only be tolerated by the brain in adulthood at best. Children's brains, with their plasticity, develop in a pathological and dangerous direction when permanently exposed to mobile communications/EMF.

CONFLICT OF INTERESTS

None.

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