Bundesamt
für Strahlenschutz

Spotlight on EMF Research

Spotlight on “Influence of radiofrequency electromagnetic fields exposure on sleep patterns in preterm neonates” by Besset et al. in International Journal of Radiation Biology (2024)

Category [radiofrequency, human study]

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Competence Centre Electromagnetic Fields (KEMF)

1 Putting the paper into context by the BfS

The influence of radiofrequency electromagnetic fields (RF-EMF) on individual parameters of the sleep electroencephalogram (EEG) has been sufficiently investigated [2, 3]. Thereby, the head was exposed to field intensities that roughly correspond to the intensities of the radiation fields of a mobile phone terminal. Sleep quality and the macrostructure of sleep were not altered. The number of results available for children and adolescents is significantly smaller than for adults, and newborns have not yet been studied in this respect. Preterm neonates are considered to be particularly sensitive to environmental influences. At the same time, they are exposed to weak RF-EMF in the hospital [4, 5].

2 Results and conclusions from the authors‘ perspective

The present study [1] investigated the relationship between RF-EMF exposure and sleep EEG in 29 preterm neonates. The sleep EEG was recorded three weeks after birth over the course of one night, from 8:00 in the evening to 8:00 in the morning. The electric field strength was measured over the three-week period using a measuring device attached to the wall of the incubator, 30 cm away from the child's head [5]. The field strength values were very low, with an average (median) of approximately 0.03 V/m and maximum values of around 0.24 V/m (99 percentile). Correlations were calculated between individual parameters of the sleep EEG and the exposure, which was determined (i) over the three-weeks period and (ii) during the night of the EEG measurement.

Some correlations were identified, all of which were not statistically significant after Bonferroni correction for multiple testing. The authors provide a detailed discussion of these non-significant findings without acknowledging that they may occur simply be chance.

The authors conclude that chronic exposure to low RF-EMF intensities does not disrupt the sleep structure of preterm neonates, despite individual variations such as an increased proportion of undefined sleep (neither REM nor non-REM) and increased sleep fragmentation. These changes could indicate reduced brain maturation in the most exposed children, but there is no evidence to suggest that this will have any adverse effects on their health.

3 Comments by the BfS

The present study makes an important contribution to closing the existing data gap regarding the influence of RF-EMF on preterm neonates, who can react particularly sensitively to environmental stimuli. The exposure conditions in the investigated hospital department were comprehensively characterized in advance [4,5], but the mean (median) field strengths of 0.03V/m are at a very low level, which does not cover the range of typical exposures in everyday life [6].

After correction for multiple testing, no correlation was found between exposure to RF-EMF and the sleep EEG of preterm neonates. This suggests that the low RF-EMF exposure does not alter their sleep patterns. However, the statistical power of the study was not calculated, and it cannot be excluded that the sample size was too small to detect an effect if present.

The authors identify a statistically insignificant correlation, which may indicate that the brains of the most highly exposed preterm neonates were the least mature. Brain maturation is primarily dependent on the week of pregnancy in which the children were born. However, the authors did not consider this factor, stating that the week of gestation and the exposure were independent factors. A previous study by the authors indicated that the measured fields did not originate from medical devices but depended on the activity of the persons in the vicinity, such as the use of mobile and cordless phones [4]. The earlier children are born, the more care they need. This can influence the behaviour of the people around them, including the use of mobile devices. It would therefore have been important to show these correlations and to include the week of pregnancy in the analysis. Furthermore, incubators are surrounded by low-frequency magnetic fields [7] and it would have been of interest to consider their influence as well.

The presented data suggest that the very low exposures to RF-EMF do not disrupt the sleep of preterm neonates. This is a result relevant for radiation protection. However, small sample size, and lack of consideration of certain variables in the analysis limit the validity of the study.

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Bundesamt für Strahlenschutz
Postfach 10 01 49
38201 Salzgitter

Tel.: +49 30 18333-0
Fax: +49 30 18333-1885
E-Mail: spotlight@bfs.de
De-Mail: epost@bfs.de-mail.de

www.bfs.de

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