

Exposure to 1.8 GHz Radiofrequency Electromagnetic Radiation Causes Sleep Disorder in *Drosophila melanogaster*

Ziyan Zhang, Yanyan Liao, Peng cai

Institute of Urban Environment, Chinese Academy of Sciences, Xiamen, China

Overuse of mobile communication devices is considered to be an important factor causing sleep problems, but it is not clear whether the associated radiofrequency electromagnetic radiation (RF-EMR) affects sleep. The impact and mechanism of RF-EMR exposure on sleep in male fruit flies were investigated. Continuous wave RF-EMR exposure environments with 1.8 GHz and different intensities were simulated. The dose-effect relationship between RF-EMR exposure and the sleep of male flies was investigated. The effect difference was further studied between daytime or nighttime exposure in 1.8GHz, 1W/m² RF-EMR environment. Our data showed that the sleep time and sleep quality of flies would significantly deteriorate under each exposure intensity. When the exposure intensity was greater than 1w/m², the unit activity capacity also decreased significantly. The effects of daytime and nighttime exposure on sleep and sleep compensation were different. In the daytime exposure group, the sleep duration and the mean sleep duration per episode were reduced significantly during the daytime. Conversely, sleep duration increased significantly at night after exposure was stopped, with a decrease in the number of sleep episodes and an increase in the mean sleep duration per episode, which indicated that sleep quality deteriorated during the day and improved at night. Similarly, in the nighttime exposure group, the sleep duration and quality decreased significantly at night, but the sleep duration was not affected in the daytime, while the sleep quality had a certain improvement, which indicated that flies were more sensitivity to RF-EMR at night and more difficult to restore from damage. RF-EMR was shown to be a stress factor that could significantly affect male flies' sleep time and quality, which should be paid great attention as a potential health hazard and need more studies in the future.

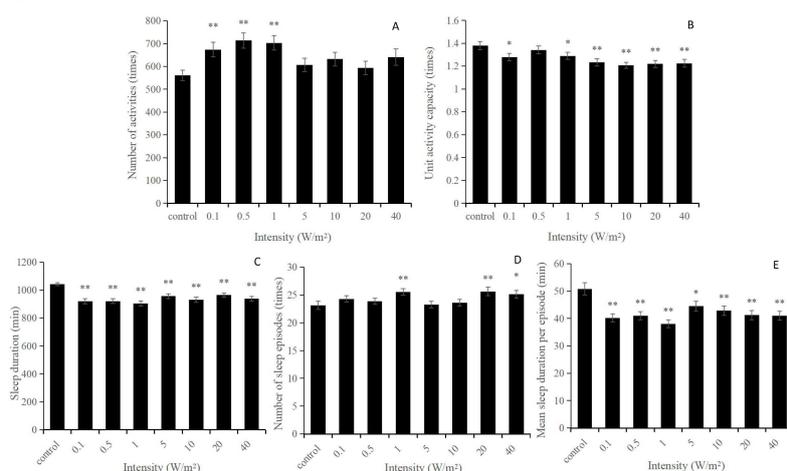


Fig. 1. Effects of 1.8GHz RF-EMR exposure on activity and sleep of male flies (n=96)
 (A) Total number of activities in 24 h, (B) unit activity capacity, (C) total sleep duration in 24 h, (D) number of sleep episodes in 24 h, and (E) mean sleep duration per episode.