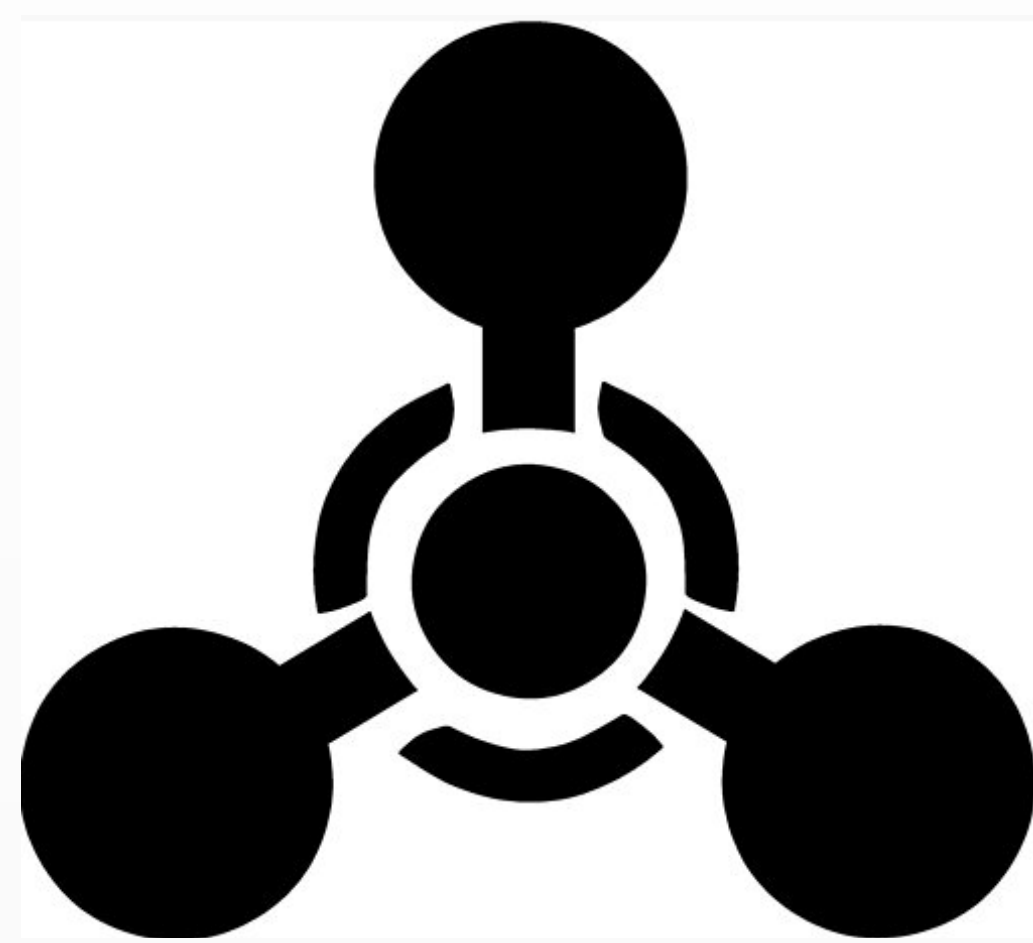


Low-Level Organophosphate Exposure Compromises Service Members' Sleep Quality

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Organophosphorus nerve agent exposure inhibits acetylcholinesterase causing overstimulation of the cholinergic system, resulting in immediate and long-term detrimental health effects.

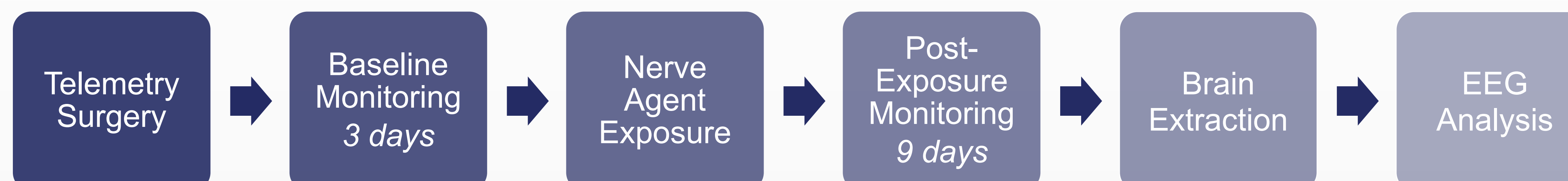


In the event of a mass casualty scenario, moderately exposed victims may experience long-term effects of exposure, including sleep disturbances.

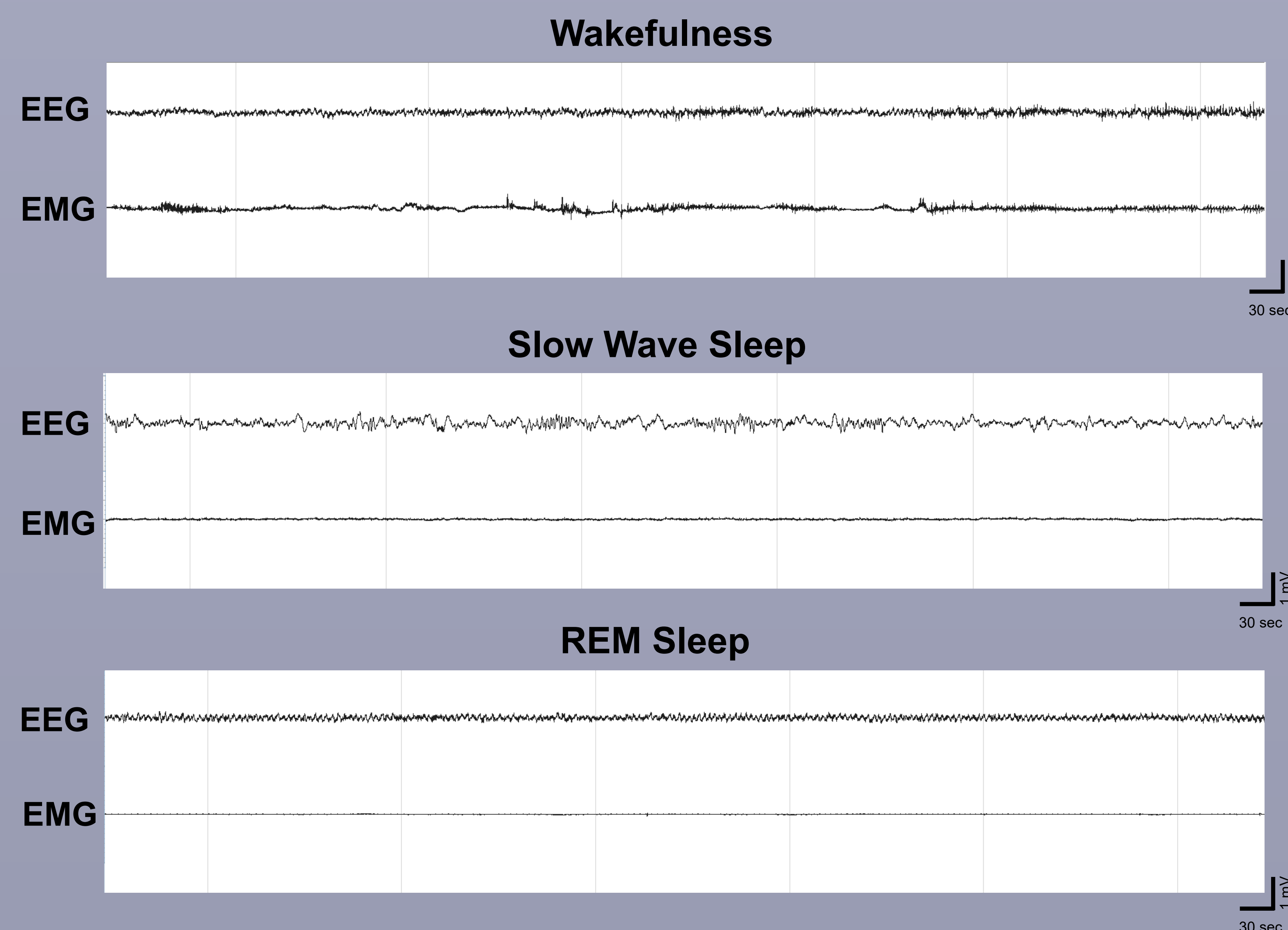


In this work, we sought to establish a rat model to study the impacts of low-level nerve agent poisoning on sleep-wakefulness cycles.

Can we model the impact of low-level organophosphate poisoning on sleep-wakefulness in a rat model?



Representative EEG Traces

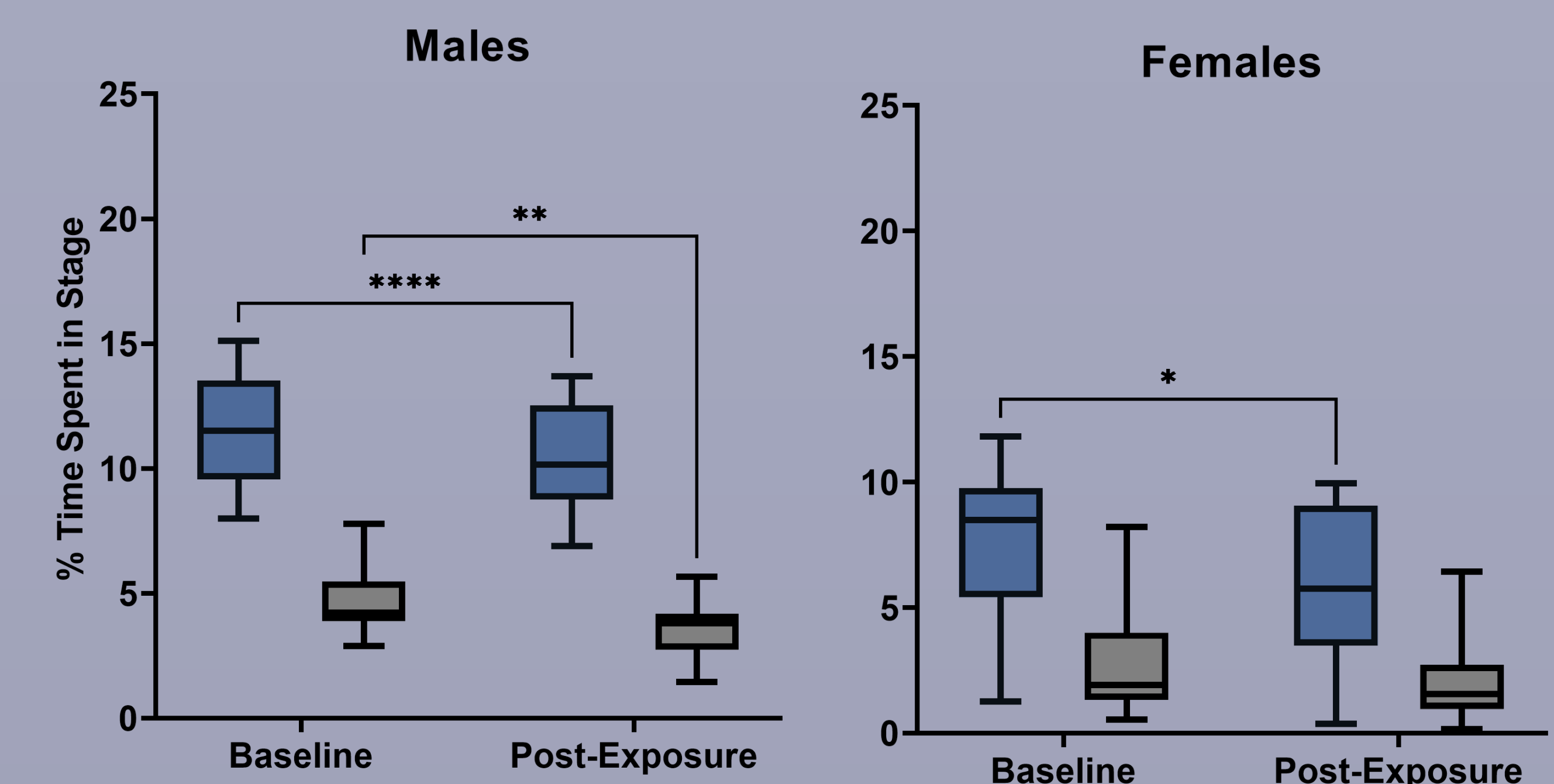


Low-level nerve agent poisoning produced....

1. An overall decrease in REM sleep
2. Fragmented REM sleep in males

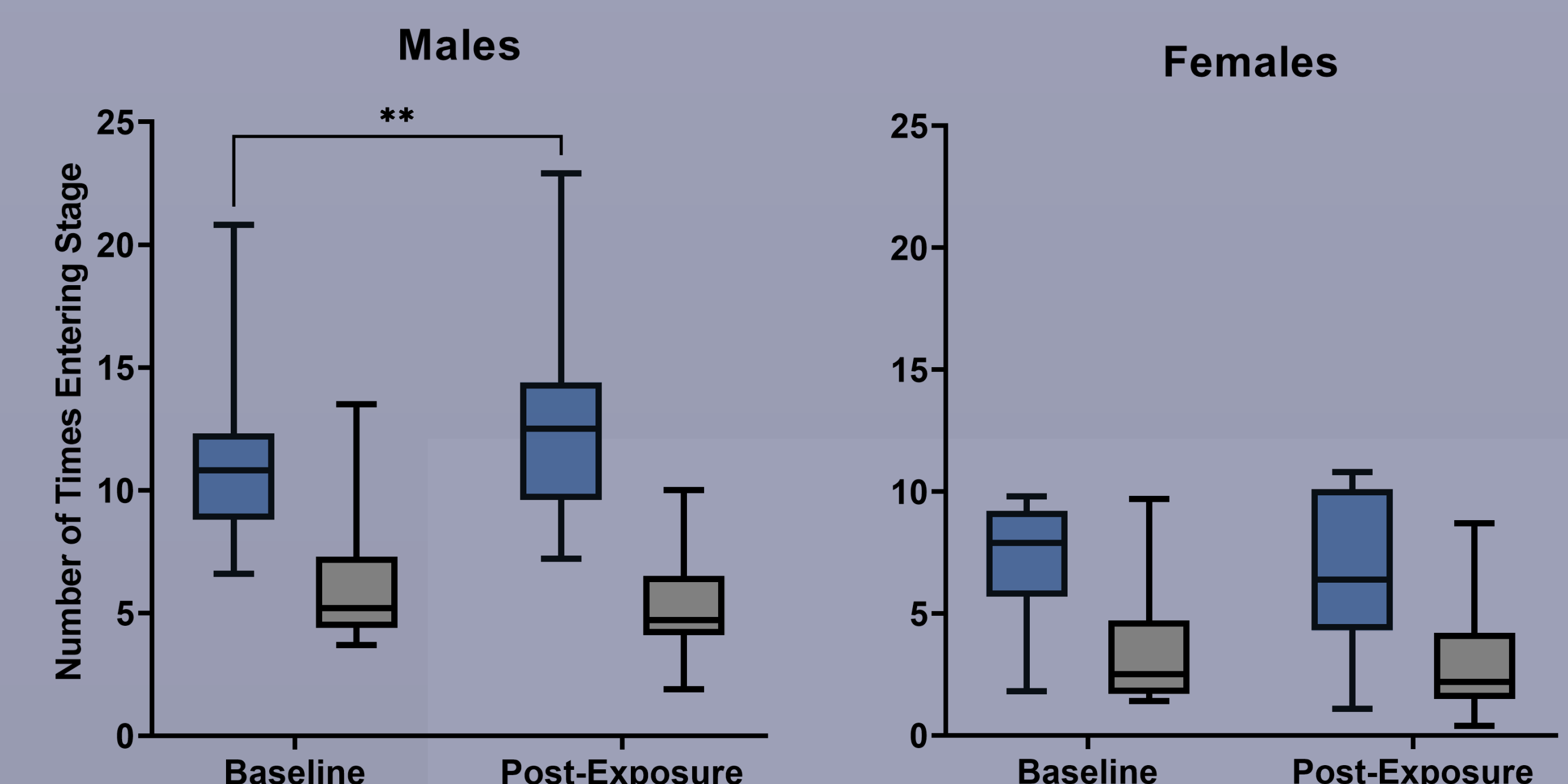
- This type of sleep disruption prevents memory consolidation and brain detoxification which can lead to cognitive issues, fatigue, and memory loss.
- Antidepressants such as bupropion have been found to increase REM sleep percentage and duration and present a potential therapeutic option for decreasing this effect post-exposure and improving health outcomes and readiness for service members.

Percent Time Spent in REM Sleep



During the light and dark cycle, male rats experience decreased time spent in REM from baseline ($M = 11.66$) to post-exposure ($M = 10.18$). During the light cycle, female rats experience decreased time spent in REM from baseline ($M = 7.66$) to post-exposure ($M = 5.83$).

Number of Times Entering REM Stage



During the light cycle, male rats experience an increase in the number of times entering REM from baseline ($M = 11.15$) to post-exposure ($M = 13.15$). Unlike male rats, female rats do not experience significant differences in the number of times entering REM.



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