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Melatonin improves quality and longevity of chronic neural recording

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Title: Melatonin Improves Quality and Longevity of Chronic Neural Recording

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One Sentence Summary: This study demonstrated the potent effect of melatonin treatment in inhibiting persistent inflammation and neuronal loss, as well as maintaining high quality neural recording in chronic microelectrode brain implantation.

Abstract

The chronic performance of implantable neural electrodes is hindered by inflammatory brain tissue responses, including microglia activation, glial scarring, and neuronal loss. Melatonin (MT) has shown remarkable neuroprotective and neurorestorative effects in treating central nervous system (CNS) injuries and degeneration by inhibiting caspase-1, -3 and -9 activation and mitochondrial cytochrome c release, as well as reducing oxidative stress and neuroinflammation. This study examined the effect of MT administration on the quality and longevity of neural recording from implanted microelectrode in the visual cortex of mice for 16 weeks. MT (30 mg/kg) was administered via daily intraperitoneal injection for acute (3 days before and 14 days post implantation) and chronic (3 days before and 16 weeks post implantation) exposures. During the first 4 weeks, both MT groups showed significantly higher single-unit (SU) yield, signal-to-noise ratio (SNR), and amplitude compared to the vehicle control group. However, after 4 weeks of implantation, the SU yield of the acute treatment group dropped to the same level as control group, while the chronic treatment group

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