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Elimination of the geomagnetic field impairs adult hippocampal neurogenesis and cognition

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Elimination of the geomagnetic field impairs adult hippocampal neurogenesis and cognition

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The geomagnetic field (present-day intensity 25-65 μT, GMF) plays a fundamental role in the survival and evolution of organisms, but organisms including human beings could be exposed to hypomagnetic field (HMF, intensity < 5 μT), e.g., during geomagnetic polarity reversals, some artificial environments without GMF such as magnetic shielded room, and the prolonged periods in deep-space travelling. Previous studies have shown that HMF exposure could trigger central nervous system (CNS) dysfunction-like behavioral effects and influence the cognitive processes of various animals, from insects to human beings. However, the underlying mechanism is still an enigma. In general, adult hippocampus continuously generates new-born neurons throughout animals' life which are functionally integrated into hippocampal circuits and contribute to memory and learning, and the process of adult neurogenesis has been shown to be strongly influenced by a variety of environment stimuli. Here, we show that long-term HMF exposure markedly attenuates cell proliferation, influences multiple stages of neurogenesis of adult hippocampus, resulting in the impairments of hippocampal neurogenesis and hippocampus-dependent cognition of mice. This study provides new insights into the potential risk of long-term HMF exposure on adult hippocampus in deep space missions.