mTOR SIGNALING MEDIATES TBI-ENHANCED NEURAL STEM CELL PROLIFERAION

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Traumatic Brain Injury (TBI) induced neuron death was once thought to be irreversible. However, the identification of neural stem cells (NSCs) in the adult brain holds the hope of repairing injured brain following TBI. Our previous study showed that TBI promotes NSC proliferation in an attempt to initial an innate repair and/or plasticity mechanisms. However, this induced proliferation is transient without significantly increasing neurogenesis. It suggests that additional intervention is required to further increase NSC proliferation to enhance neurogenesis for successfully repairing the damaged brain following TBI. In order to determine the molecular mechanism that mediates TBI-enhanced NSC proliferation, we assessed the activity of mammalian target of rapamycin (mTOR) signaling by detecting the level of Phospho-S6 Ribosomal protein (pS6), an indicator of the activity of mTOR signaling. We found that the level of pS6 was transient but dramatically increased prior to TBI-enhanced NSC proliferation. In contrast inhibiting the activity of mTOR signaling with rapamycin attenuated this effect, indicating that mTOR signaling mediates TBI-enhanced NSC proliferation. Further stimulating mTOR signaling strengthened the effect of TBI-enhanced NSC proliferation. These results suggest that mTOR signaling mediates TBI-enhanced neural stem cell proliferation and stimulating mTOR signaling may be a potential therapeutic approach to enhance neurogenesis for post-traumatic functional recovery.

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