Adult neurogenesis in PTSD

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Posttraumatic stress disorder is characterized by recurrent recalls of bad memories, insomnia with nightmares and emotional withdrawal, all of which are long-lasting after the initial traumatic experiences. The present study was aimed to determine whether a traumatic experience influences adult neurogenesis seen in the hippocampal dentate gyrus (DG). Adult male mice were subjected to restraint stress in a metallic cage immersed in water at 25°C up to the individual clavicle for 3 h as a traumatic experience, followed by various behavioral tests 14 days later. Mice were also intraperitoneally injected with the tricyclic antidepressant imipramine or the selective serotonin reuptake inhibitor fluvoxamine at a dose of 30 mg/kg for 14 consecutive days after stress once a day. Stressed mice showed increased freezing behaviors induced by the tone fear-conditioning task and forced swimming test, respectively, in addition to the increased spontaneous locomotor activities. Both imipramine and fluvoxamine significantly suppressed these stress-induced behavioral changes, while the stressful manipulation induced a significant decrease in the number of clustered cells labeled by 5-bromo-2’-deoxyuridine (BrdU) in the DG 5 days later with a complete return within 7 days. A significant decrease was seen in the number of BrdU-positive cells 5 days after a traumatic re-experience by forced swimming test done on the day 9, whereas daily intraperitoneal administration of either imipramine or fluvoxamine significantly prevented the decrease in the number of BrdU-positive cells. These findings suggest that traumatic stress could modulate the proliferative activity of neural progenitor cells expressed in the DG of murine hippocampus under adult neurogenesis.