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Journal Article Critique #2

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Vyas, A., Mitra, R., Shankaranarayan Rao, B.S., and Chattarji, S. (2002). Chronic stress induces contrasting patterns of dendritic remodeling in Hippocampal and Amygdaloid Neurons. *The Journal of Neuroscience*, 22(15), 6810-6818.

Article Critique of “Chronic Stress Induces Contrasting Patterns of Dendritic Remodeling in Hippocampal and Amygdaloid Neurons.

Summary

The authors conducted an experiment to investigate two aspects of how chronic stress affects the hippocampus and basolateral amygdala (BLA) regions in Wistar rats. First, the authors wanted to observe the affects of chronic stress in the amygdala and compare with those of the hippocampus. Second, they wanted to study whether any stress-induced changes followed the similar patters across two very different stress paradigms (actually, three if we count the control group). The two stress paradigms were called chronic immobilization stress (CIS) and chronic unpredictable stress (CUS).

The rats in the CIS group were put into rodent immobilization bags for two hours each day (10 a.m. to noon) and were deprived of food or water during the immobilization period. The rats in the CUS group were randomly subjected each day to two of eight stressors (forced swim for 3-4 minutes, lights left on over night, lights turned off for 3 hours during the day, cold, social isolation overnight, food and water deprivation overnight, cage movement for one hour, and immobilization for 1 hour). The study contained a control group as well.

Findings suggest that “chronic stress induces contrasting patterns of dendritic remodeling in Hippocampal and amygaloid neurons (Vyas et al., p. 1615). The CIS group demonstrated

significant dendritic atrophy in hippocampal CA3 pyramid neurons, with dendritic hypertrophy in the BLA neurons. Furthermore, according to the authors, “This CIS-induced enhancement in dendritic arborization was restricted only to BLA pyramidal and stellate neurons, which are presumably excitatory projection neurons (McDonald, 1982, 1992)” (Vyas et al., p. 6815). Finally, the patterns of morphological change differed by type of chronic stress experienced. CUS was not less significant than CIS and only caused atrophy in the CAE and BLA bipolar/bitufted neurons. Finally, CIS reduced open-arm activity in the elevated plus-maze¹ while CUS had no affect on anxiogenic behavior.

Implications for Education

Stress impacts one’s ability to learn. It would appear that higher levels of stress, especially when provided in predictable fashion, might stimulate growth in regions of the brain responsible for excitation and anxiety production (BLA). Conversely, similar stress appears to stifle growth (or even shrinking) in the parts of the brain responsible for mitigating anxiety. In addition to developing pedagogical and andragogical methods and strategies for employing good stress to stimulate healthy human development, teachers should also be on continual guard for evidence of inappropriate stress from outside the classroom and intervene when needed.

¹ For more information about the plus-maze protocol see J.M Giddings (2001) Modeling the Behavior of Rats in the Elevated Plus Maze (<http://www.stfx.ca/academic/mathcs/apics2001/Papers/jgiddings.pdf>).