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P92. Neural Mechanisms Underlying Progressive Impairment of Memory after Early Life Stress

Kristen L. Brunson, Enikő Kramár, Bin Lin, Yuncai Chen, Laura Lee Colgin, Gary Lynch, and Tallie Z. Baram; Irvine, CA

Early life stress is thought to cause cognitive deficits in adulthood, but the underlying mechanisms are unknown. Here we provide a neurobiological basis for these disorders in a rat model. Neonatal rats were raised under conditions of chronic emotional stress for a week (postnatal days 2–9) by exposure to fragmented maternal care. As adults, they were tested for two forms of hippocampus-dependent learning and memory. Memory was severely but selectively impaired in middle-aged rats, but these deficits were not evident earlier in adulthood, suggesting that the disturbances were progressive. Upon examining potential underlying deficits in synaptic plasticity, it was found that only the older rats had impaired long-term potentiation in hippocampus. Aberrant mossy fiber sprouting was evident in middle-aged, early life stress rats and may cause a slowly developing cascade that disrupts physiology and plasticity in CA3. In CA1, basic physiology was preserved, but early life stress eventually led to dendritic atrophy and disturbances in synaptic plasticity. These findings indicate that relatively short periods of emotional stress early in life may lead to progressive impairments in memory that emerge only late in adulthood, and may signify accelerated