Biological Processes Underlying the Cognitive and Behavioural Effects of Neural Network Therapy®

Purpose

The purpose of this project is to connect the neurobiology of the Neural Network Therapy (NNT®) technique with positive impacts seen on clients' emotional health and well-being. We aimed to investigate the biological actions this technique promotes, leading to the positive changes.

Research Question

How does NNT® work, biologically, to promote behavioural changes and improve emotional health?

Methods

A literature review was conducted covering current research in six areas. A review was then written on the current understanding of these topics in regard to the amygdala, prefrontal cortex (PFC), and hippocampus, providing an explanation for the biological processes underlying Neural Network Therapy®.

Findings

Emotions:
Memories associated with negative emotions are more likely to be retrieved, especially when experiencing negative emotions.

Coping and Resilience:
Poor coping leads to decreased connectivity between amygdala and prefrontal cortex. Past exposure to "controllable" stressors leads to a similar future reaction to "uncontrollable" stressors.

Neuroplasticity:
Chronic stress is associated with dendritic atrophy in the hippocampus and prefrontal cortex, and hypertrophy in amygdala.

The Stress Response:
Chronic dysregulation of the hypothalamic-pituitary-adrenal axis (HPA axis) leads to down-regulation of its inhibitory mechanisms and up-regulation of excitatory mechanisms.

Behaviour:
Behavioural networks become sensitized from chronic stress. Response can be out of proportion to the stimulus. Dorsolateral striatum contributes.

Memory and Learning:
Highly emotional, negative memories are more likely to be conserved. During integration there is a shift from considering context to more habitual pathways.

Next Steps

The next step will be to investigate specific exercises within the Neural Network Therapy Practice Guide, written by CFHC founder Kim Sargent. This project has yielded an understanding of biological mechanisms underlying the technique as a whole, and future research can dive deeper into the specific mechanisms of each exercise that clients perform.

Conclusions

Emotions: Negative memory bias can occur in response to negative affect and repeated negative memory retrieval.

Coping and Resilience: Poor coping skills affect the ability of the PFC to inhibit the amygdala in response to a stressor, so reactionary effects can be long-lasting and out of proportion to the stressor. A sense of control leads to more positive reactions.

Neuroplasticity: Loss of dendrites in inhibitory centers of the HPA axis means less regulation. Gaining dendrites in the main excitatory center can lead to fast, frequent activation of the stress response.

The Stress Response: Dysregulation of the HPA axis promotes its activation and inhibits negative feedback inhibition.

Behaviour: Behavioural networks can become primed to anticipate stress from any stimulus and react quickly.

Memory and Learning: The memory of one stressful event may incorporate several other highly emotional memories too, distorting the true context and outcome.

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