Hacking the stress system: the stress response as an adaptive trait that can work for or against you

VI - Depression, PTSD and anxiety

Disclaimer

I am not a psychiatrist! I am a scientist! Especially if you are experiencing mental health issues, do NOT try anything we discuss today without first consulting your specialist. Non of the information discussed today reflects individual differences and your personal physician can judge much better than I ever can, how this information may affect you.

Major Depression

A point in advance: major depression is every bit as much a biological disorder as diabetes or hypothyroidism. However, rather than glucose transportation or thyroid function being disrupted, the mechanism that allows you to pull yourself together after a stressful event does not work properly. Major depression is therefore often described as learned helplessness.

Major depression: symptoms

- Psychological symptoms
  - Sadness / grief
  - Learned helplessness
  - No motivation
  - Anxiety
  - Elevated pain susceptibility
  - Suicidal thoughts
  - Loss of interest in social interactions
  - Loss of interest in hobbies
- Slower speech
- Early morning wakening
- Constipation
- Altered appetite
- Diminished sex drive

American Psychiatric Association. (2013). Diagnostic and statistical manual of mental disorders (5th. In *American Journal of Psychiatry*. https://doi.org/10.1176/appi.books.9780890425596.744053

Neurobiology of depression

- Disruption of
  - Noradrenalin
    - Psychomotor symptoms
  - Dopamine
    - Motivation / anhedonia
  - Serotonin
    - Grief
- Neuro inflammation
  - Omega 3 supplementation
  - Antibiotics

Shekhar, S., Hall, J. E., & Klubo-gwiezdzinska, J. (2021). The hypothalamic – pituitary – thyroid axis and sleep Introduction. *Current Opinion in Endocrine and Metabolic Research*, *17*(October 2020), 8–14. https://doi.org/10.1016/j.coemr.2020.10.002

Careful: Thyroid hormone deficiency

- Thyroid deficiency may lead to downstream effects which look a lot like impression.
  - Make sure you consume sufficient iodine!
  - Check thyroid function (Hashimoto's)
  - Sleep deprivation

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Stress may trigger and deepen a major depression

- Strong evidence for a genetic predisposition
- Stress triggers the disorder (3-4 episodes of severe prolonged stress)
- After the first episode it becomes much easier to trigger the next one

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Quitting: Noradrenaline / dopamine: and internal reward

- Dopamine appears to balance noradrenaline function and buffer the tendency to quit.
  - Keep us on the right path
  - Internal reward
    - Slicing time (milestones), small rewards
    - Altruism (perhaps a downstream effect of oxytocin)

Learned helplessness as an adaptive trait in the face of unescapable suffering

- High stress
- Low motivation to avoid suffering (dopamine deficiency)
- Diminished ability to find internal peace if disaster can strike at any moment

Post-Traumatic stress disorder

Where Major depression can be understood as learned helplessness, PTSD seems to be the desperate struggle to keep control

- Highly adaptive under certain high-stress conditions
- The confrontation with the realisation that one is never safe
- High comorbidity with depression (it's a state that cannot be maintained for long)

Mac Gillavry, D. W., & Ullrich, D. (2020). A novel theory on the predictive value of variation in the β-endorphin system on the risk and severity of PTSD. *Military Psychology*, 1–14. https://doi.org/10.1080/08995605.2020.1730111
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Post-traumatic stress disorder: Main Symptoms

- Reaction to extreme stressor
  - Acute or repeated exposure
- Hypervigilance
- Flashbacks and intrusive thoughts
- Nightmares

American Psychiatric Association. (2013). Diagnostic and statistical manual of mental disorders (5th. In *American Journal of Psychiatry*. https://doi.org/10.1176/appi.books.9780890425596.744053
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Neuromodulators involved in PTSD

- Noradrenaline & the locus coeruleus
- Dopamine
- β-endorphin / Galanin
  - Morphine
  - Post-combat delayed onset
- Oxytocin

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Anxiety: the stress system in overdrive

Anticipation gone to extremes

- Anxiety is largely related to the excessive anticipation of potential stressors in the future.
- Elevated noradrenaline
- Increased limbic system (emotional processing) activity
  - Amygdala!
  - Thalamus
  - Hypothalamus
  - Hippocampus
  - Prefrontal cortex

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Feedback loops to reduce anxiety

- Benzodiazipams / Valium
- Meditation
- Yoga