

Neurobiology of mental disorders

In general

- Changes in the brain signal transmission are essential in the development of mental disorders
- genetic effects, effect of stress (environmental factors) and effect of disturbed chronobiology) - it is proposed that the bases of biological changes (plasticity, connections) are changes in neurotransmission, signal transduction and information storage and processing

Examples of mental disorder and their neurobiological etiopathogenesis

1. Depression

- **Monoamine hypothesis**
 - Most antidepressants work by inhibiting the reuptake of monoamines (e.g., serotonin, noradrenaline, dopamine), indicating that a lack of monoamines plays a major role in the pathophysiology of depression (and other mood disorders). MAO-A activity and density of adrenergic transporters are included in the pathophysiology → regulation of serotonin and norepinephrine levels in the brain -
- More recent hypothesis (low yield for examination)
 - Neurotrophic hypothesis of depression: CREB (cAMP response element binding protein) is one intracellular target of long-term antidepressant treatment and BDNF (brain-derived neurotrophic factor) is one target gene of CREB
 - Inflammatory and neurodegenerative hypothesis of depression: Depression is associated with both inflammatory processes, as well as neurodegeneration and reduced neurogenesis

2. Bipolar disease

- hypothesis of mitochondrial dysfunction
- calcium and mitochondrial dysfunction hypothesis
- corresponds to the neurotrophic hypothesis → role of calcium in signaling pathway in synaptic plasticity regulation

3. Schizophrenia

- Dopamine hypothesis
 - Dopamine excess in the mesolimbic pathway
 - Dopamine reduction in the frontocortical pathway
- Glutamate hypothesis
 - developmental anomaly of glutamate synapse -> secondary dopaminergic dysfunction
 - NMDA antagonists mimic some positive and negative symptoms as seen in schizophrenia
 - likely both hypothesis (glutamate and dopaminergic abnormalities) are implicated in that disease