

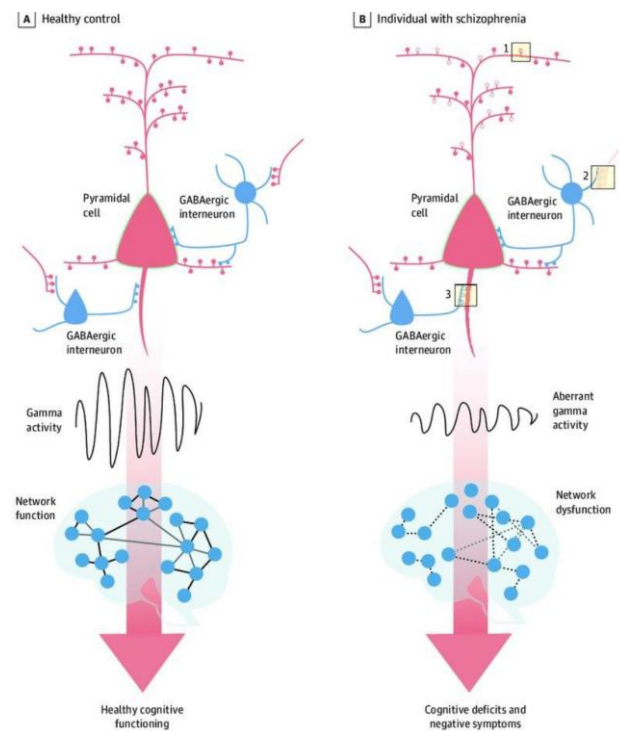
**Exercise Solutions: Disorders of the nervous system**

**1) What are the symptoms of cerebellar ataxia ? Which part of the brain is responsible for these ? Explain its role and mechanism.**

Answer: Patients show poorly coordinated movements with irregular trajectories, overshooting or undershooting targets. These symptoms arise from damage to the cerebellum, the brain region responsible for integrating sensory information and fine-tuning motor commands. Mechanistically, the cerebellum calibrates movement by comparing intended motor output with sensory feedback; when its circuits are disrupted, motor signals become poorly timed and inaccurate, leading to the hallmark coordination deficits.

**2) Explain how disruptions in excitatory-inhibitory balance within cortical microcircuits contribute to the negative symptoms of schizophrenia.**

Answer: In schizophrenia, dysfunction of cortical circuits, especially impaired GABAergic interneuron activity and reduced dendritic inputs to pyramidal cells, disrupts the balance of excitation and inhibition needed for normal gamma oscillations. This leads to abnormal rhythmic activity and poor coordination within cortical networks, which in turn produces negative symptoms such as apathy, as well as cognitive deficits.



**3) What are the limitations of the current “one size fits all” approach ?**

Answer: A “one-size-fits-all” approach fails to account for individual variability in genetics, brain circuitry, metabolism, environment, and disease expression. As a result, treatments may be less effective, take longer to optimize, or produce unnecessary side effects for some patients. This approach overlooks personalized factors that could guide more precise and effective interventions.

**4) Cite at least 2 treatment innovations for disorders of the nervous system and explain them.**

Bioengineering

- iPSC technology for patient-specific drug screening
- Cerebral organoids modeling brain development
- Brain-machine interfaces for motor restoration

Precision Psychiatry

-TMS (Transcranial Magnetic Stimulation) for personalized treatment, to target specific brain networks