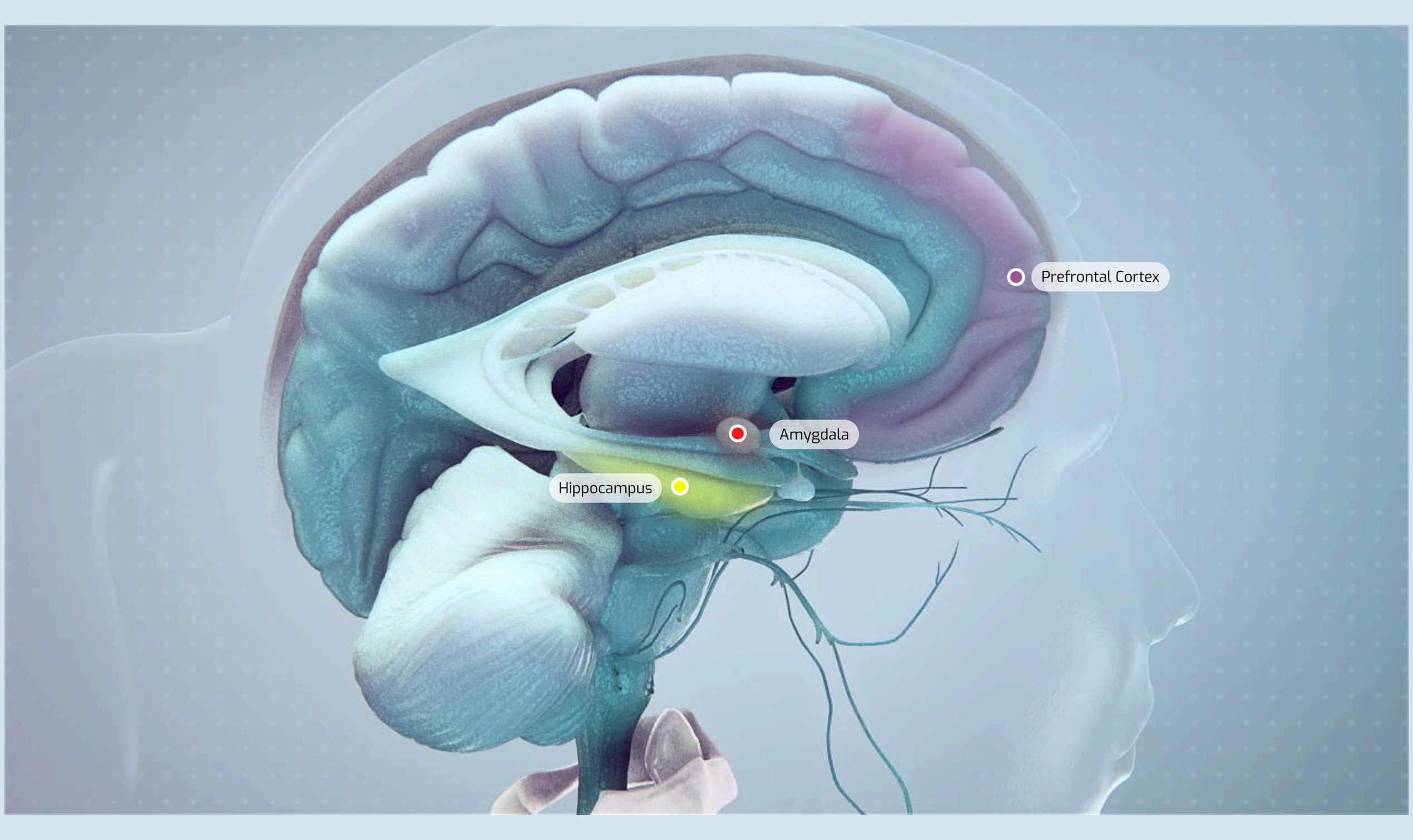
Disease
ADHD Neurobiology

MoD Video | Brain regions involved in ADHD | The Role of Monoamines in ADHD | The Role of Serotonin in A

Cortical regions implicated in ADHD



x

Prefrontal Cortex | Dorsolateral Prefrontal cortex (DLPFC)

- Responsible for many executive functions including processing speed, working memory, temporal foresight motor planning, selective

x

Prefrontal Cortex | Inferior Frontal cortex (IFC)

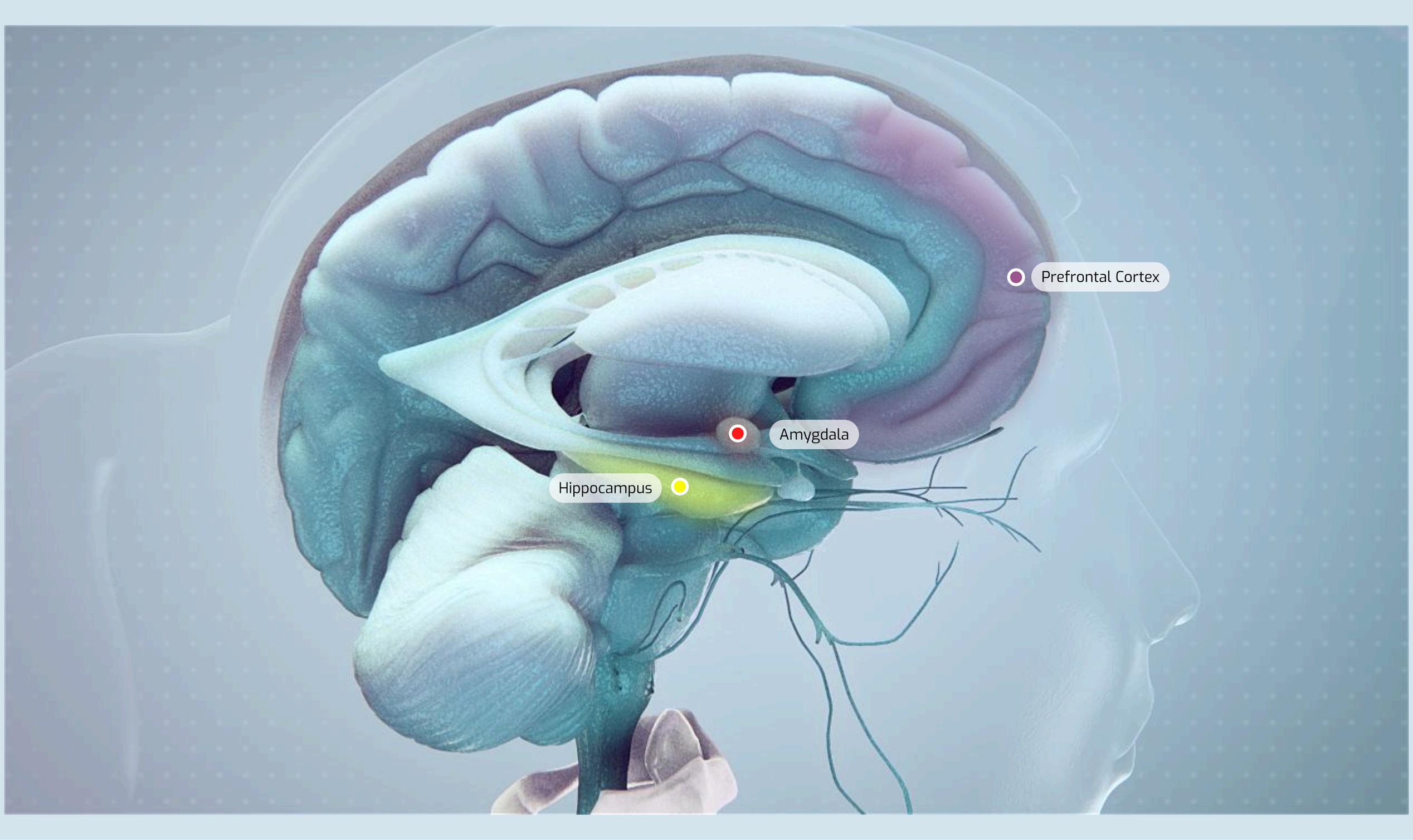
- Important for timing, inhibition, and sustained attention1.

x

Parietal cortex

- Responsible for attention and cognitive flexibility1.

Subcortical regions implicated in ADHD



x

Basal ganglia

- Is implicated in ADHD as it forms part of the frontostriatal circuits, which have a role in timing and motor control
- Is made up of the **putamen nucleus caudate** and **nucleus accumbens** [1]

x

Amyglada:

- Mediates emotion and reward processing

x

Cerebellum

- Frontocerebellar circuits (formed by the interplay between the cerebellum, the frontal lobes, basal ganglia, and the thalamus) have been implicated in ADHD, in particular in timing and motor control

x

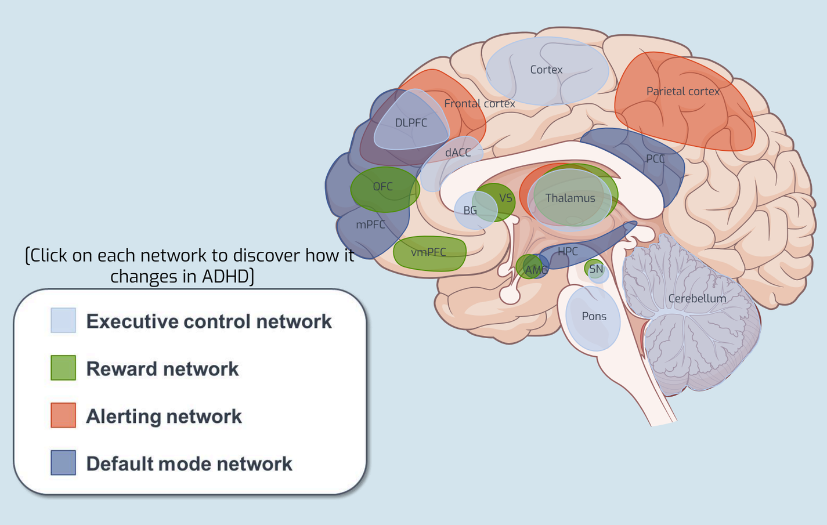
Anterior Cingulate Cortex:

- The ventral anterior cingulate cortex mediates affective components of executive control
- The dorsal anterior cingulate mediates the cognitive components of executive control

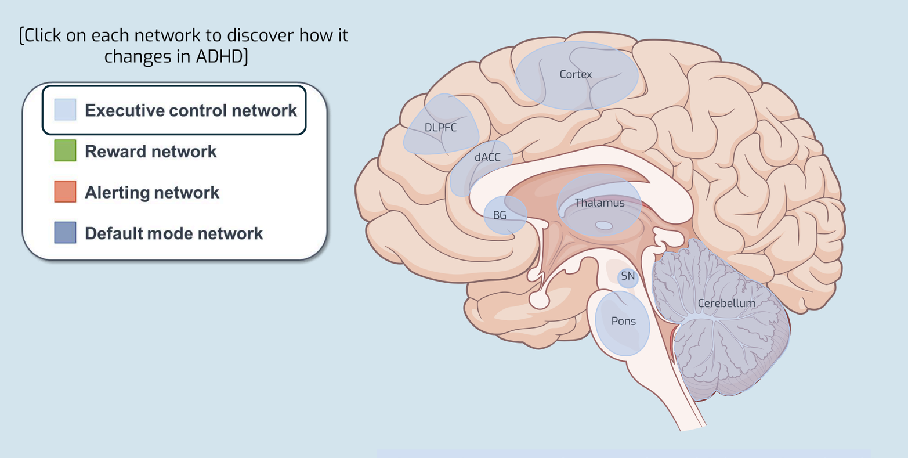
Neural Networks implicated in ADHD

- Distant brain regions are strongly interconnected, comprising distinct functional networks
- Networks that mediate executive functions, reward processing, and alerting and the default mode network have been implicated in ADHD

Overview | Executive control | Reward | Alerting | Default mode

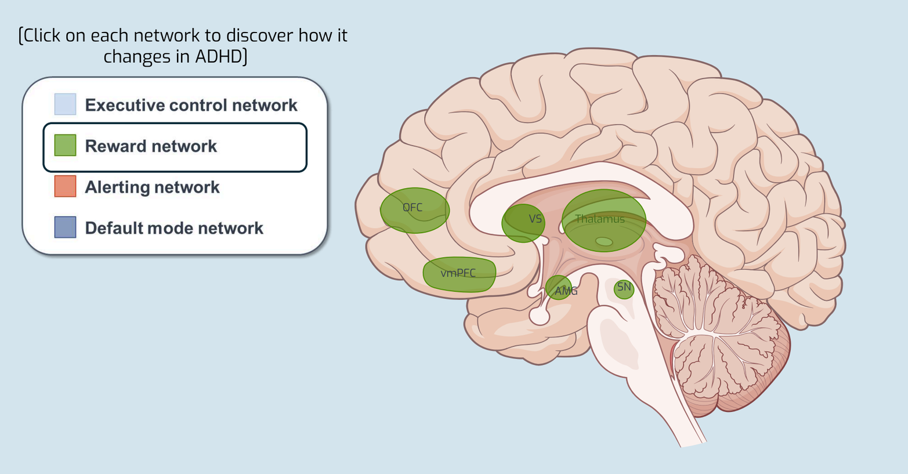


Overview | Executive control | Reward | Alerting | Default mode



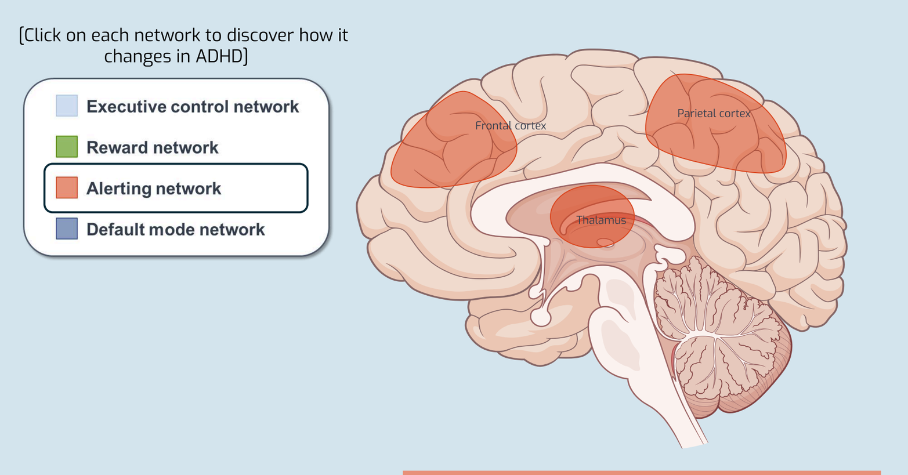
Executive control networks, which are involved in planning, goal-directed behavior, and cognitive flexibility, are under activated in ADHD, producing symptoms including procrastination and disinhibition1.

Overview | Executive control | Reward | Alerting | Default mode



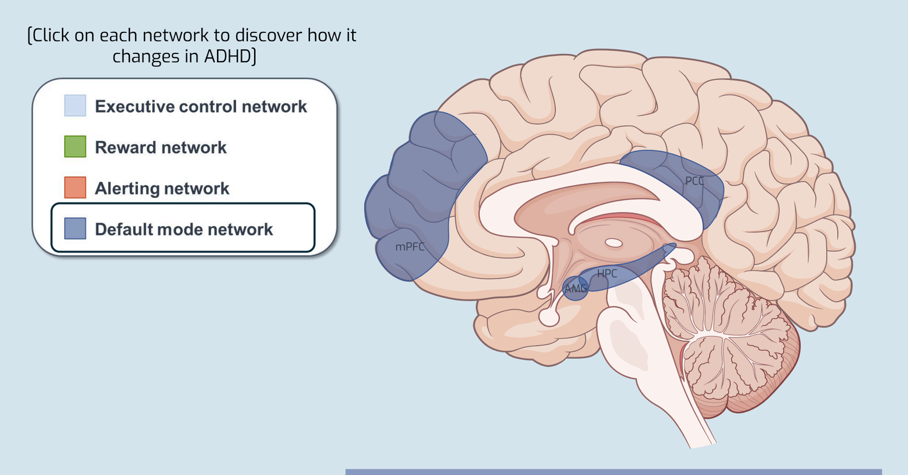
Dysfunction in reward networks manifests as impulsivity, showing a preference for immediate rewards over delayed incentives

Overview | Executive control | Reward | Alerting | Default mode



Dysfunction in the frontoparietal alerting network (which maintains response readiness) result in inattention and increased distractibility.

Overview | Executive control | Reward | Alerting | Default mode



Dysfunction in the default mode network (which deactivates when engaged in tasks that require conscious attention) results in inattention and increased distractibility.

References:
1. Faraone SV, Bellgrove MA, Brikell I, et al. Attention-deficit/hyperactivity disorder. Nat Rev Dis Primers. 2024;10(1):11. Published 2024 Feb 22. doi:10.1038/s41572-024-00495-0.
2. Ji JL, Spronk M, Kulkarni K, Repovš G, Anticevic A, Cole MW. Mapping the human brain's cortical-subcortical functional network organization. Neuroimage. 2019;185:35-57. doi:10.1016/j.neuroimage.2018.10.006

References:
1. Ref