



Dr Anthony Vernon

**Topic 3:**

**Neurotransmission defects  
and mental health: Focus on  
schizophrenia**

Part 3 of 3

**Module:**

**Biological Foundations of Mental Health**

Week 3:

Synaptic transmission and neurotransmitter systems

# Part 3

## Involvement of other neurotransmitters



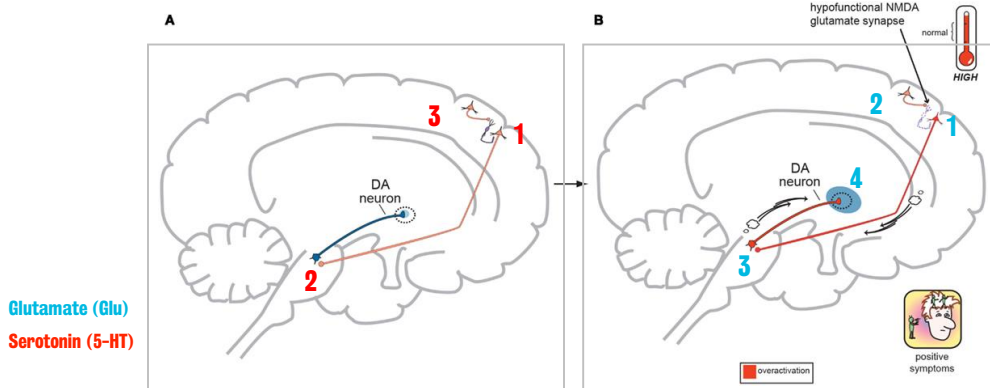
**Treatment-resistant** patients have **elevated levels of the neurotransmitter glutamate** in the **frontal cortex**.



Atypical antipsychotic drugs have a dual action at dopamine and serotonin receptors.



Dopamine, glutamate, and GABA interact and regulate each other making the situation more complex.



Imbalances in glutamate and GABA systems may also give rise to dopamine imbalance.

N-methyl-D-aspartate receptor blocking drugs (e.g. ketamine) lead to excess glutamate, which causes the manifestation of positive symptoms in schizophrenia in healthy individuals and exacerbates positive symptoms in schizophrenia patients.

Schwartz et al. (2012)

**Week 3** Synaptic transmission & neurotransmitter systems

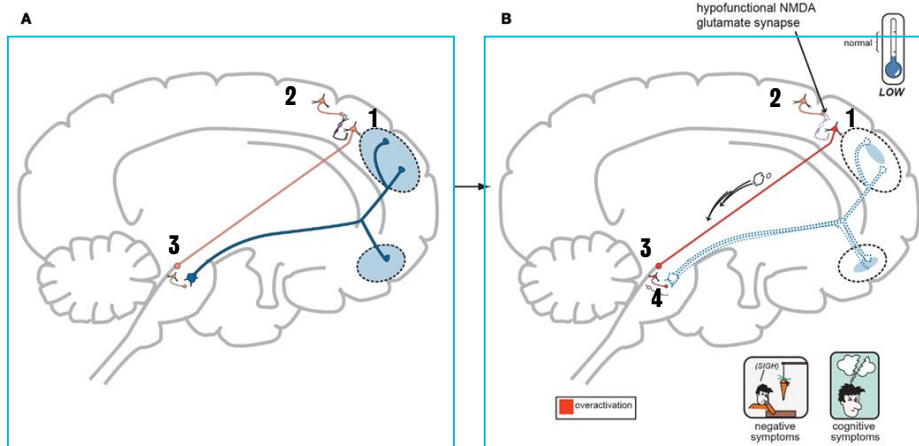
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## Glutamate and negative symptoms

**Glutamate-GABA-dopamine circuitry in the normal brain**

**Glutamate-GABA-dopamine circuitry in the schizophrenia brain**



Schwartz et al. (2012)

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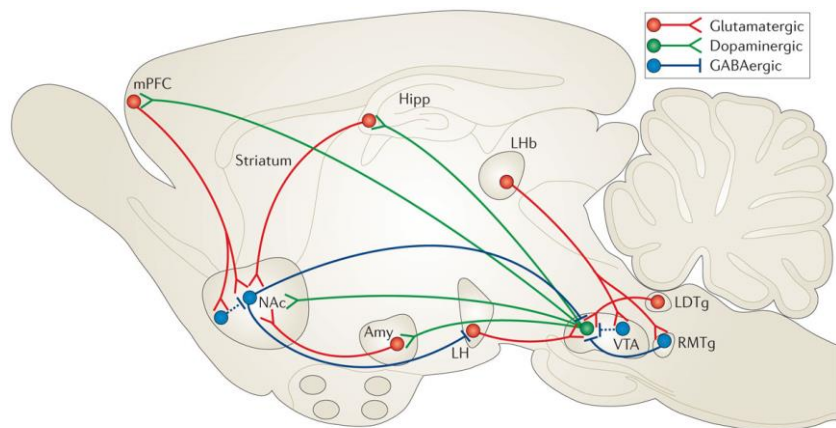
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## Reflections

## Dopaminergic, glutamatergic and GABAergic connections

This activity defines  
behavioural outcomes.

Defective activity will inevitably lead to **behavioural disturbances** driven by alterations in dopamine, GABA and glutamate neurotransmission.



Russo & Nestler (2013)

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## Attributions

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# End of topic