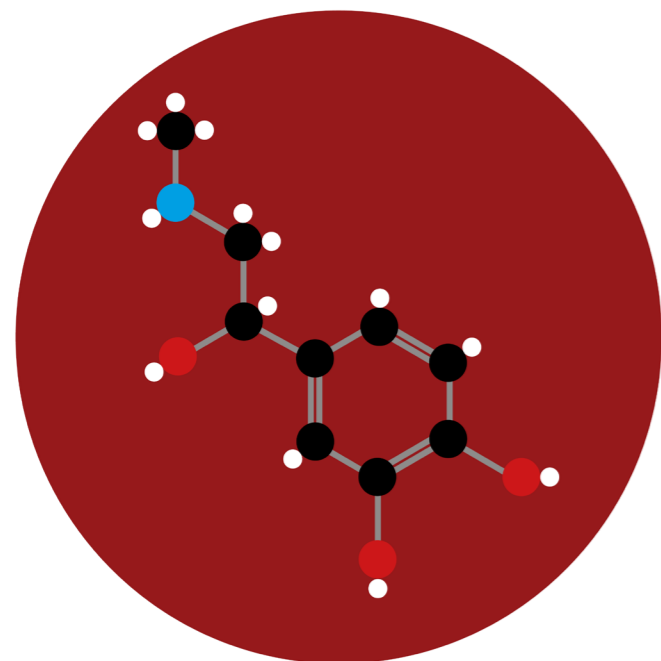


# CHEMICAL STRUCTURES OF NEUROTRANSMITTERS

## ADRENALINE

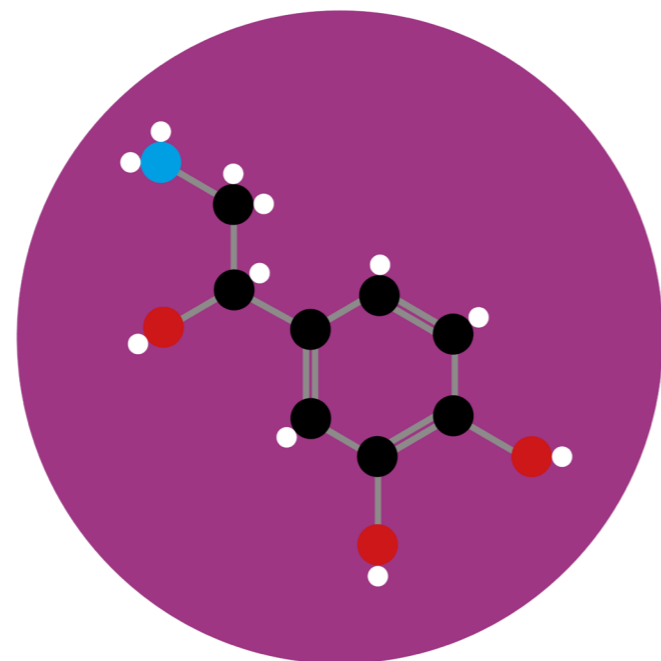
THE 'FIGHT OR FLIGHT' NEUROTRANSMITTER



Adrenaline, also known as epinephrine, is a hormone produced in high stress or exciting situations. It stimulates increased heart rate, contracts blood vessels, and dilates airways, to increase blood flow to the muscles & oxygen to the lungs. This leads to a physical boost, and heightened awareness. EpiPens, which are used to treat allergic reactions, work by injecting adrenaline.

## NORADRENALINE

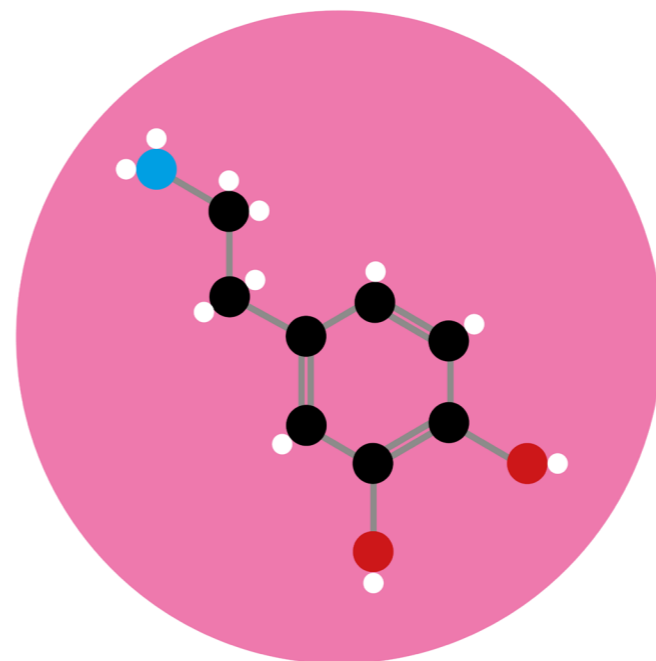
THE CONCENTRATION NEUROTRANSMITTER



Noradrenaline, also known as norepinephrine, is a neurotransmitter that affects attention & responding actions in the brain. Alongside adrenaline, it is also involved in the 'fight or flight' response. Its effect in the body is to contract blood vessels to increase blood flow. Patients diagnosed with ADHD will often be prescribed drugs designed to help increase levels of noradrenaline in the brain.

## DOPAMINE

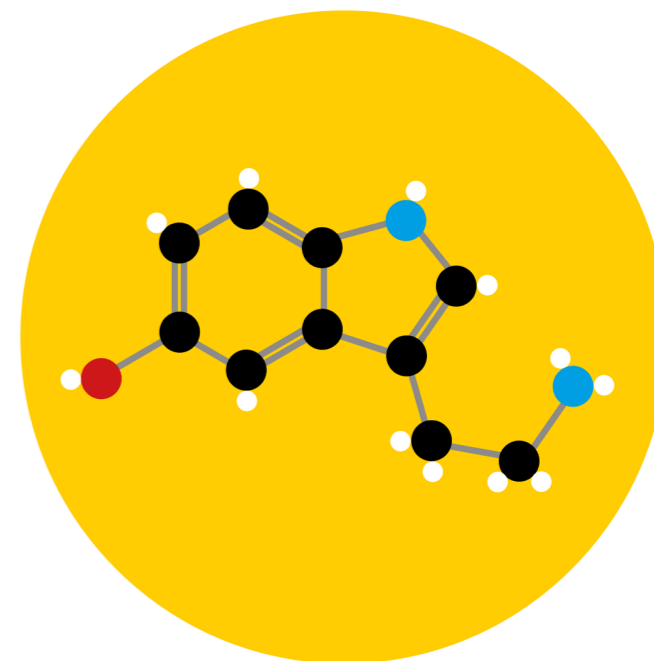
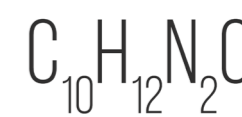
THE PLEASURE NEUROTRANSMITTER



Dopamine is associated with feelings of pleasure & satisfaction. It is also associated with addiction, movement, and motivation. The feelings of satisfaction caused by dopamine can become desired, and to satisfy this the person will repeat behaviours that lead to release of dopamine. These behaviours can be natural, as with eating and sex, or unnatural, as with drug addiction.

## SEROTONIN

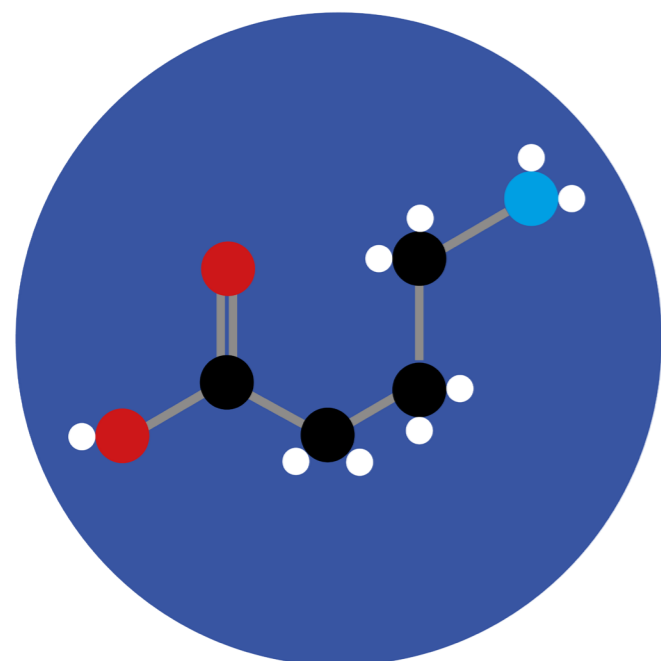
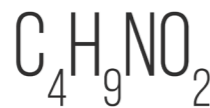
THE MOOD NEUROTRANSMITTER



Serotonin is thought to be a contributor to feelings of well-being and happiness. It regulates the sleep cycle along with melatonin, and also regulates intestinal movements. Low levels of serotonin have been linked to depression, anxiety, and some mental disorders. Antidepressants work by increasing serotonin levels. Exercise and light levels can also both have positive effects on the levels of serotonin.

## γ-AMINO BUTYRIC ACID

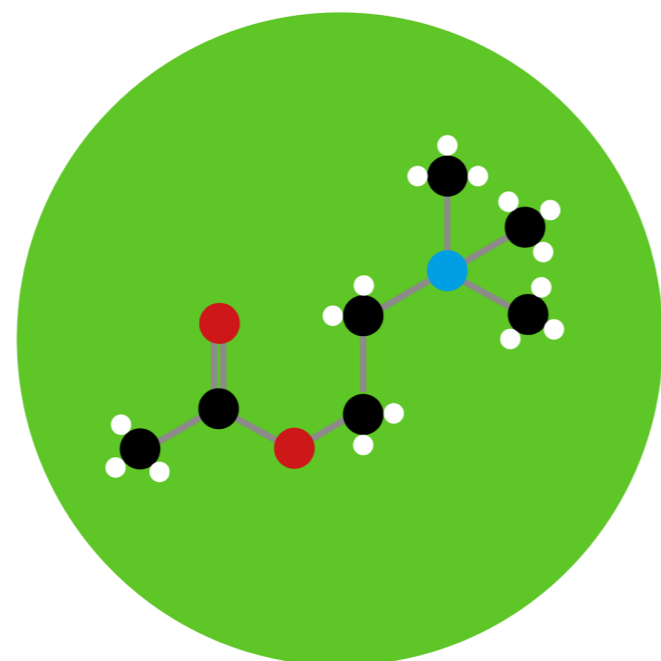
THE CALMING NEUROTRANSMITTER



Gamma-aminobutyric acid (GABA) is the major inhibitory neurotransmitter of the brain; its role is to calm firing nerves in the central nervous system. Increased levels improve mental focus and relaxation, whilst low levels can cause anxiety, and have also been linked with epilepsy. GABA also contributes to motor control and vision. Drugs to treat epilepsy often act by increasing levels of GABA in the brain.

## ACETYLCHOLINE

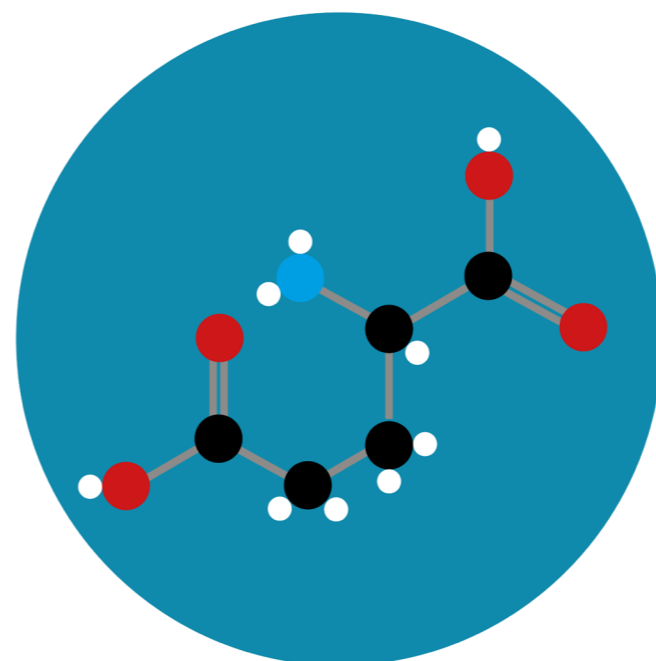
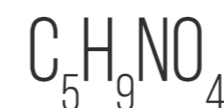
THE LEARNING NEUROTRANSMITTER



Acetylcholine, often shortened to ACh, is the principle neurotransmitter involved in thought, learning and memory. In the body, it is involved in activating muscle action. Damage to the acetylcholine producing areas of the brain has been linked with the memory deficits associated with Alzheimer's disease. Acetylcholine is also associated with attention, and enhancement of sensory perception upon waking.

## GLUTAMATE

THE MEMORY NEUROTRANSMITTER

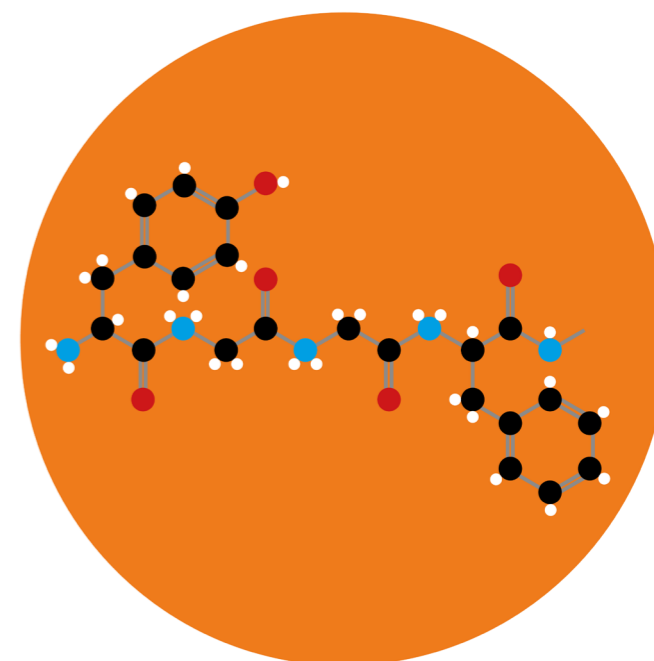


Glutamate is the most common neurotransmitter in the brain, and is involved in cognitive functions, such as learning and memory. It also regulates brain development and creation of nerve contacts. Glutamate is actually toxic to neurons in larger quantities, and if too much glutamate is present it can kill them; brain damage or strokes can lead to the creation of a harmful excess, killing brain cells.

## ENDORPHINS

THE EUPHORIA NEUROTRANSMITTERS

20+ TYPES IN THE HUMAN BODY



Endorphins are a range of compounds, the biologically active section of which is shown above, formed from long chains of multiple amino acids. They are released in the brain during exercise, excitement, pain, and sexual activity, and produce a feeling of well-being or even euphoria. At least 20 types of endorphins have been identified in humans. Certain foods, such as chocolate & spicy foods, can also stimulate the release of endorphins.