

# Synaptic Transmission & Recreational Drugs

The nervous system is made up of billions of neurons, each constantly making and breaking connections with other neurons. These connections are called synapses. When the electrical signal (action potential) travelling down the neuron reaches the terminal, a chemical (neurotransmitter) is released. This drifts across the synaptic gap and binds to receptors on the post-synaptic dendrite. When this happens, it either increases or decreases the likelihood that the post-synaptic neuron will produce an action potential, depending on whether it is an excitatory or inhibitory synapse.

## Recreational drugs

Recreational drugs are drugs taken because of the enjoyable effects they produce. All recreational drugs produce their effects by altering what happens during synaptic transmission. Most recreational drugs either directly or indirectly increase the amount of dopamine present in the synapses of the reward pathway, a set of brain structures that allows us feel pleasure and reinforcement.

Drug	Effect on synapses	Effect on experience	Tolerance/dependency
Cocaine	Blocks reuptake at dopamine synapses, resulting in an increase in dopamine.	Alertness, confidence, euphoria.	Both
Heroin	Binds onto receptors for endorphin and enkephalin, stimulating them more than the brain's own neurotransmitters.	Kills pain; euphoria, relaxation.	Both
Cannabis	Binds onto receptors for anandamide, stimulating them more than the brain's own neurotransmitter.	Euphoria, relaxation, enhanced experience of sound e.g. music.	Causes tolerance. Probably doesn't cause dependency in low doses, but does in high doses.

## Key issue: using drugs to treat drug addiction

**What's the issue?** Some people think it is a good idea to treat drug addiction with other drugs. Other think this is a bad idea.

**Why does this matter?** A large number of people in the UK are dependent on recreational drugs (e.g. about 300,000 opioid users). Many of these want to stop using but can't. Drug/alcohol dependency has highly negative impacts on a person's ability to maintain relationships and function normally (e.g. hold down a job). The health and economic effects cost society a great deal of money.

**Why should we use drugs to treat addiction?** Drugs like methadone act on the brain in a similar way to heroin. They stimulate the opioid receptors so that the symptoms of drug withdrawal are reduced. However, they do not produce the same overwhelming euphoria, so the person can function normally. Methadone can help the user engage with other therapies.

**Why should we not use drugs to treat addiction?** Drug therapies substitute one addiction for another but do not address the psychosocial causes of addiction. Drug users are often strongly conditioned to respond to drug cues e.g. needles; methadone does not address this. Methadone can be dangerous if taken in excess. There have been children harmed/killed by finding and taking their parent's methadone.