

## 11 Chemical Messengers

Hormones and neurotransmitters are the chemical messengers acting throughout the body playing a major role in shaping everyday life and functions.

Hormones are the chemical messengers of the endocrine system and are transported from the glands where they are made by the blood to target cells or organs.

Neurotransmitters are the chemical messengers of the nervous system which transmit signals across a chemical synapse, such as a neuromuscular junction, from one neuron (nerve cell) to another 'target' neuron, muscle cell, or gland cell.

The action of neurotransmitters is extremely fast, up to few milliseconds. In contrast, the effect of hormones could last for a few seconds to a few days.

We have many chemical messengers in our bodies responsible for a vast range of functions but of particular interest to us in Fresh Little Minds are; cortisol and adrenaline and noradrenaline which are associated with our stress responses, and dopamine, serotonin, oxytocin and endorphins which help us feel good.

**Cortisol** is a steroid hormone produced in our adrenal glands which sit just above the kidneys. It helps maintain blood pressure and cardiovascular function; controls the body's blood sugar levels thus regulating metabolism, acting as an anti-inflammatory, influencing memory formation, controlling salt and water balance. Blood levels of cortisol vary dramatically, but generally are high in the morning when we wake up, and then fall throughout the day. This is called a diurnal rhythm.

It also has a very important role in helping the body respond to stress. Cortisol increases blood flow to the heart and muscles helping us respond to appropriately to stress. Depending on the threat, we may fight, take flight or freeze.

Under conditions of high unrelieved stress cortisol levels can remain high in the bloodstream which over time can lead to chronic inflammation damaging cells and tissues.

**Adrenaline** is a hormone also released from the adrenal glands and its major action, together with noradrenaline, is to prepare the body for fight or flight in times of stress, i.e. for vigorous and/or sudden action. They act to increase heart rate, blood pressure, expand the air passages of the lungs, enlarge the pupil in the eye, redistributing blood to the muscles and altering the body's metabolism, so as to maximise blood glucose levels (primarily for the brain).

**Oxytocin** controls key aspects of human behaviour, is sometimes known as the 'hug hormone' and is associated with attachment building. Oxytocin counters the effect of cortisol. Levels of the hormone tend to be higher during both stressful and socially bonding experiences. It creates feelings of calm and closeness and can induce sleep. It is the 'tend and befriend' hormone closely related to feelings of trust, commitment, and attachment. Oxytocin eases stress, can improve social skills and help crystalize emotional memories.

***Oxytocin can be released in response to;***

- Close physical touch
- Listening to words or music that we enjoy
- Meditation and prayer
- Releasing your emotions e.g. through crying
- Creativity and using your talents
- Smiling & laughter particularly when shared
- Hearing words of encouragement
- Exercise
- Being grateful
- Giving to others
- Engaging with a loved pet

The cultivation of oxytocin is essential for creating strong bonds and improved social interactions.

**Dopamine** is a neurotransmitter that acts on our brains motivating us to take action toward goals, desires, and needs, and gives a surge of reinforcing pleasure when achieving them. Procrastination, self-doubt, and lack of enthusiasm are linked with low levels of dopamine. Increased dopamine leads to more productivity. Dopamine is an addictive chemical but in a good way.

***Boost dopamine levels in your body by;***

- Discovering new things
- Eat lots of probiotic foods\*\*
- Avoid fatty and sugary foods
- Create
- Increase your protein (Tyrosine) in your diet\*
- Break down big jobs into smaller ones and celebrate your achievements
- Listen to music you enjoy
- Get enough sleep.
- Exercise often
- Meditate

*\*High levels of tyrosine are found in almonds, avocados, bananas, beef, chicken, chocolate, coffee, eggs, green tea, milk, watermelon, yogurt.*

*\*\*mostly fermented foods like yogurt, kefir and kimchi.*



**Serotonin** acts mostly in the digestive system and brain and affects mood and social behaviour, appetite and digestion, sleep and memory. It is responsible for making you feel significant or important and maintains mood balance. A deficit of serotonin can lead to depression and a sense of loneliness.

***Boost serotonin levels by;***

- Reflecting on past significant achievements
- Practice gratitude exercises
- Exposing yourself to the sun UV rays
- Maintaining good exercise and balanced diet

**Endorphins** are released in response to pain and stress. They interact with the receptors in your brain that reduce your perception of pain. Endorphins also trigger a positive feeling in the body, similar to that of morphine and help to alleviate anxiety and depression. The surging “second wind” and euphoric “runners high” during and after a vigorous run are a result of endorphins. They also work to lower stress levels and support the immune system.

***Endorphin boosters include;***

- Regular exercise,
- Laughter
- Aromatherapies such as vanilla and lavender
- Dark chocolate and spicy food