Headway
the brain injury association

Hormonal imbalances after brain injury

In this publication, we explain what hormones are, how a brain injury can affect the delicate balance of hormones, what the consequences of hormonal imbalances after brain injury are and what professional support is available to brain injury survivors with this issue.

www.headway.org.uk
0808 800 2244

Contents

Introduction 1
What are hormones? 2
How a brain injury can affect hormones 4
Symptoms of hormonal imbalances after brain injury 5
Diagnosis and treatment of hormonal imbalances after brain injury 6
Coping with hormonal imbalances after brain injury 7
Complications of hormonal imbalances after brain injury . 8
- Hypopituitarism 8
- AVP deficiency (formerly known as diabetes insipidus) 8
- Growth Hormone Deficiency 9
- Adrenal insufficiency 9
- Hyperprolactinemia 10
- Lifestyle challenges 10
- Mental health 10
- Puberty, pregnancy and childbirth 11

Conclusion 11
Glossary 12
Acknowledgements 13

Introduction

The human body relies on chemical messengers, called hormones, to function properly. Injury to the brain can affect the production and activity of hormones, causing wide-ranging symptoms that can affect physical health, mental wellbeing and overall quality of life.

In this publication, we explain:

- what hormones are;
- how a brain injury can affect the delicate balance of hormones;
- what the consequences of hormonal imbalances after brain injury are;
- what professional support is available to brain injury survivors with this issue.

Words in bold are defined in a glossary at the end.

Remember that you can also get help for any of the issues covered in this publication from the nurse-led Headway helpline on 0808 800 2244 or helpline@headway.org.uk.

The information in this publication does not replace clinical guidance from medical professionals. You should always get advice from your GP or other suitably qualified professional for help with managing the effects of brain injury.

What are hormones?

Hormones are chemical messengers in our body that help us to keep a stable internal environment, for example stopping us from getting too hot or too cold.

Other things that hormones control are:

- hunger and thirst
- sleep/wake cycles
- growth

- sexual and reproductive function
- mood
- energy, among others

This process of keeping the body's internal environment stable through the delicate balance of hormones is called **homeostasis**.

There are many hormones, produced and controlled by glands in different parts of the body. This system of hormone production, release and monitoring across the body is known as the **endocrine system**.

The brain has a key role in the endocrine system. Within the brain are areas that are responsible for making and releasing hormones. The pituitary gland is one such area and is known as the master gland. It is located at the base of the brain and is responsible for controlling glands throughout the body.

Some important hormones that the brain produces are listed below:

- Adrenocorticotropic hormone – this helps to produce the 'stress hormone' cortisol, which makes our bodies respond to stressful situations.

- Growth Hormone (GH) – this controls body growth in children, including muscle mass and body fat. In adults it is important for metabolism, muscle and bone health, and overall energy levels.

- Melatonin – this controls our body's cycle of sleeping and waking up, known as the body's circadian rhythm.

- Serotonin – this controls our mood and helps us to feel happy. Serotonin has a range of other functions, including

helping with sleep, blood clotting, movement and digestion.

- Vasopressin, also known as Antidiuretic Hormone (ADH) – this helps to balance water and blood pressure in the body. Problems with ADH levels can cause a condition known as Arginine Vasopressin deficiency (AVD). More information on AVD is provided in the section *Complications of hormonal imbalances after brain injury.*

There are various other hormones produced by the brain that are not included in the above list but have equally important roles in maintaining the body's internal environment.

How a brain injury can affect hormones

The key areas of the brain responsible for producing, releasing and monitoring hormones are:

- Hypothalamus – this area sits deep within the brain and links the **endocrine system** with the **nervous system**. It has a key role to play in the process of **homeostasis**.

- Pituitary gland – this tiny gland is located at the bottom of the brain. It produces hormones that are responsible for multiple bodily functions, as well as controlling other glands throughout the body. For this reason, it is often called the 'master gland'.

- Pineal gland – this is located deep within the brain and is involved in producing the hormone melatonin, which is involved in our sleep/wake cycle.

These parts of the brain can be injured through accidents (including seemingly 'minor' accidents that cause a **concussion/mild traumatic brain injury**), assaults, falls, stroke, developing a tumour, cyst or other medical

complications. Such injuries can affect the delicate balance of hormone activity within the body, causing a wide range of issues.

The issues experienced will depend on the specific hormone affected and the severity of the injury. For example, problems with melatonin production may cause a brain injury survivor to struggle with getting to sleep at night.

Symptoms of hormonal imbalances after brain injury

Many of the symptoms of hormonal imbalances can be difficult to distinguish from the effects of the brain injury itself, such as depression, mood swings, fatigue, headaches, problems with vision, sexual difficulties and problems with **cognition**.

Other symptoms that are more specific to hormonal imbalances include:

- Arginine Vasopressin deficiency (AVD) – causing increased thirst and excessive urination.
- Constipation
- Dry skin
- Fatigue
- Increased sensitivity to cold
- Hot flashes
- Irregular periods/loss of normal menstrual function
- Low blood pressure/dizziness
- Vomiting
- Insulin resistance
- Weight loss
- Muscle weakness
- Pale appearance
- Reduced body hair

- Reduced fertility
- Reduced libido/interest in sex
- Erectile dysfunction

The presence of these symptoms can help with identifying whether someone's brain injury has affected their hormone levels. However, symptoms can be mild or may be due to other health problems. This can make it difficult to identify or diagnose hormonal imbalances after brain injury. As a result, hormonal imbalances may remain undiagnosed after the injury.

Due to the problem of underdiagnosis, some people may live for a long time with hormonal imbalances after brain injury without even realising it. Check through the list of symptoms above, including those similar to the common effects of brain injury, and talk to your GP if you have any concerns about these having developed in the weeks, months or years after your brain injury.

Diagnosis and treatment of hormonal imbalances after brain injury

If someone is experiencing symptoms after brain injury such as those listed in the previous section, they may need to be investigated for hormonal imbalances. This should start through a conversation with the person's GP.

Prepare for your GP appointment by making a list of your symptoms and how these have affected your life. You may wish to bring a family or trusted friend along with you. If you have been keeping a 'symptom diary', consider bringing this along.

If appropriate, the GP may refer the brain injury survivor for further assessment with a specialist called an **endocrinologist** (or **neuroendocrinologist**).

An endocrinologist may undertake different blood tests to measure hormone levels in order to better understand the causes or symptoms that the survivor is experiencing. They may also ask the survivor to have a brain scan to examine any injury to the brain that may be causing the symptoms.

Treatment depends on the type of hormone affected and the impact of hormonal imbalances on the survivor's life. For some, hormone replacement therapy (HRT) may be a suitable method of treatment. This aims to replace the hormones affected by the brain injury in order to restore balance to the body's internal state. It may be possible for someone to be on several types of HRT at once. Medication may be offered to help with balancing hormones or needed to treat more specific complications of the imbalances. The endocrinologist may need to monitor the effect of HRT or medication over time.

In cases such as brain tumours, more intensive treatments such as surgery or radiotherapy may be needed. The clinical team will discuss this with the survivor and manage their treatment very carefully.

Coping with hormonal imbalances after brain injury

In many cases, hormone replacement therapy or medication will be effective enough to help the brain injury survivor cope with hormonal imbalances after their injury.

Sometimes it may be necessary to learn new ways to cope with managing the effects of hormonal imbalances, such as learning strategies for coping with fatigue or **cognitive** issues.

Our publications offer guidance on coping with many of the effects of brain injury, available on our website.

The Pituitary Foundation also offers guidance on living with pituitary and other hormonal imbalance conditions on their website at www.pituitary.org.uk/information-index/living-with-a-pituitary-condition.

Complications of hormonal imbalances after brain injury

Hypopituitarism

The pituitary gland is a key brain structure involved in hormone production and management. Damage to this structure can commonly cause a condition called hypopituitarism, where the pituitary gland can no longer produce its regular hormones.

When pituitary function is disrupted after a t**raumatic brain injury**, it is referred to as post-traumatic hypopituitarism (PTHP). PTHP can remain underdiagnosed as can be mild or difficult to distinguish from other symptoms of brain injury.

Hypopituitarism can cause many of the symptoms listed in the section *How does a brain injury affect hormones?*

AVP deficiency – (formerly known as diabetes insipidus)

The hormone responsible for sodium and water balance in the body is called vasopressin and it is known as an anti-diuretic hormone. An underproduction of this hormone can cause a condition called Arginine Vasopressin Deficiency, formerly known as diabetes insipidus. This is different to the condition diabetes mellitus, a disorder related to high blood sugars often referred to as type II diabetes. AVD causes increased thirst and excessive production of dilute urine.

Treatment of AVD involves taking anti-diuretic medication. In most cases, AVD following TBI resolves quickly after the injury, but in rare cases it can last for longer, sometimes permanently. In these cases, it may be necessary to take lifelong hormonal replacement therapy.

Growth Hormone Deficiency

Hormones are involved in body growth, including things such as muscle mass and body fat. Growth hormone deficiency (GHD) is a condition where growth hormones are not produced properly. In children it can lead to slow height growth resulting in short stature. In adults this can cause bodily changes such as reduced muscle mass, increased weight gain (including obesity), thinning skin, reduced bone density (which can cause a condition known as osteoporosis), impaired heart function, mood changes and fatigue. These changes can be difficult to adjust to, both physically and psychologically. Self-esteem may be affected, or there may be problems with completing activities the person usually enjoys. GHD can be treated with growth hormone replacement therapy. Regular exercise and a healthy diet might help with weight issues.

Adrenal insufficiency

Adrenal insufficiency is a condition in which the adrenal glands (small glands above the kidneys) do not produce enough of the hormone cortisol. This can cause a range of issues such as fatigue, headache, weight loss or reduced appetite, bodily pains and muscle weakness, excessive thirst, among other symptoms. An endocrinologist can help to diagnose and treat adrenal insufficiency.

Hyperprolactinemia

This is a condition in which the pituitary gland of the brain produces too much prolactin. This can cause general issues such as infertility, loss of libido, low bone mass, milky discharge from nipples, as well as some gender specific effects such as changes in menstruation and vaginal dryness in women, and erectile dysfunction, low levels of testosterone, and enlarged breast tissue in men (known as gynaecomastia).

Lifestyle struggles

Living with the symptoms of hormonal imbalances after brain injury can be very challenging. Brain injury survivors with this issue may find themselves experiencing significant struggles in aspects of life such as employment, relationships, self-esteem and activities of daily living. Mental health can be affected as a result of these struggles.

Mental health

Living with the effects of brain injury can be difficult. They can cause people to feel frustrated, depressed, anxious or even suicidal. These can be a direct result of injury to the brain but can also be experienced following imbalances to hormones in the brain that control mood.

It is important for people to reach out for support if their mental health is affected by brain injury. They can get professional support through their GP, or contact mental health helplines for support and advice, such as Samaritans. Our nurse-led helpline can also offer emotional support, a listening ear and advice on coping with a brain injury.

Counselling, talking therapies or neuropsychological support may be available through a referral from the GP or privately. These can provide more intense and specialised support for

mental health.

Puberty, pregnancy and childbirth

Several hormones controlled by the brain are involved in processes related to puberty, pregnancy and childbirth. Disruptions to these hormones can cause delays in puberty onset, affect menstrual periods or fertility, or interfere with the process of having a baby. An endocrinologist may need to closely monitor a brain injury survivor with hormonal imbalances throughout the duration of their pregnancy. Hormone replacement therapy can help with managing these issues.

If you are struggling to cope with these issues, it is important to get help. Speak to your GP or contact our helpline to talk about your experiences and feelings. If you are struggling with your mental health, consider asking your GP about getting a referral for counselling or other talking therapies.

Conclusion

We hope that this information has been helpful in understanding how hormones can be affected by brain injury and how to cope with this issue. For further support, contact our nurse-led helpline on 0808 800 2244 or helpline@headway.org.uk.

The Pituitary Foundation is a UK charity that supports people affected by pituitary and other hormonal imbalance conditions. More information on their support is available at www.pituitary.org.uk.

Glossary

Cognition – the brain's ability to learn, remember, think and process information, including skills such as memory, decision making and multi-tasking.

Concussion/mild traumatic brain injury – a mild and often temporary form of brain injury as a result of injury to the head. More information on this is available in our publication *Mild head injury and concussion*.

Endocrine system - the system of hormone production, release and monitoring across the body.

Endocrinologist – a medical doctor who specialises in the investigating and treatment of the endocrine system. A neuroendocrinologist further specialises in the nervous system's role in the endocrine system.

Glands – organs in the body that produce hormones or other substances such as sweat and saliva.

Homeostasis - the process of keeping the body's internal environment stable through the delicate balance of hormones.

Nervous system – the brain, spine and nerves in the body that control the processing of information from our environment and our response to it.

Acknowledgements

This information has been reviewed by Dr Darran McDonald, Consultant Endocrinologist & Dr Sue Jackson, Independent Chartered Psychologist and member of the Pituitary Foundation's Medical Advisory Committee.

We hope that this has been a helpful resource. Please consider sharing your feedback with us by scanning the QR code or by visiting our publication feedback survey https://uk.surveymonkey.com/r/hwpublications.

Learn more and support our work at www.headway.org.uk/get-involved.

This information was last reviewed in 2026.

We're here to listen.

If you need support, or have a question about brain injury, contact our free nurse-led helpline:

0808 800 2244
helpline@headway.org.uk

0115 924 0800 | enquiries@headway.org.uk
www.headway.org.uk

Head office: Bradbury House, 190 Bagnall Road,
Old Basford, Nottingham, NG6 8SF

Headway – the brain injury association is registered with the Charity Commission for England and Wales [Charity No. 1025852] and the Office of the Scottish Charity Regulator (Charity No. SC 039992]. Headway – the brain injury association is a company limited by guarantee registered in England [No. 2346893].