

Title	Workshop on Hormones and the endocrine system
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Target level	KS3 science & GCSE
Publication date	September 2014

Activity	Length	Content included from the GCSE curriculum	Building on the GCSE curriculum
<b>1. Endocrine Gland Worksheet</b>	5 mins	Demonstrates specifically how hormones regulate the functions of many organs and cells. <b>Terminology:</b> Hormones, pituitary organ, hypothalamus, thyroid, adrenal gland.	Explores the involvement and effect of the hormones secreted from these organs. <b>Terminology:</b> growth hormone, adrenaline, thyroxine and triiodothyronine.
<b>2. Diagnosing Conditions Worksheet &amp; answer sheet:</b>	10 mins	Identifies the principle that a hormone imbalance can lead to a hormone related disorder.	Shows the hormone and gland involved for Acromegaly and Cushing's syndrome alongside the symptoms and treatment plans. <b>Terminology:</b> Acromegaly, Cushing's syndrome, cortisol, growth hormone
<b>3. Endocrine Bingo Game</b>	15 mins	Hormones are the body's natural chemical messengers and are transported in the bloodstream. Also covers Diabetes. <b>Terminology:</b> Type 1 & 2 Diabetes, insulin, pancreas,	How hormone imbalance can lead to a range of hormone related disorders. <b>Terminology:</b> Hyperprolactinaemia, hyperthyroidism, hypothyroidism, acromegaly, Klinefelter syndrome, Cushing's syndrome, Turner syndrome,
<b>4. Assessment</b>	15 mins	Hormones and how they travel in the body, endocrine organs and, diabetes (type 1 and 2) <b>Terminology:</b> Hormones, endocrine glands, Type 1 & 2 Diabetes, insulin, pancreas,	Hormones and endocrine glands associated with Acromegaly and Cushing's syndrome

The four activities are best undertaken in order with the teaching PowerPoint, however all can be performed independently.

## Workshop on Hormones and the Endocrine System

- PowerPoint: The start of the presentation is summarised on page 3. When you contact Maggy Fostier, you will be provided with the complete PPT document and can modify the slides if you wish so. In the notes section of each slide, you will also find extra facts that can be read out aloud to students.
- Activity 1 gets students to recall information on glands and hormones from the PowerPoint presentation. Students have to match hormones (described via the different effects they have in the body) with their associated glands (page 4-5).
- Activity 2. After getting further information on hormone related disorders through PPT slides and detailed fact sheets, students are asked to diagnose two hormone disorders after reading a description of a patient's symptoms (page 11-12). For each disorder, they are asked to determine the hormone causing the problem, the related gland, and any possible treatments.
- To conclude the session, there is bit more information on the PPT if you want to go through it, and we have two ways to test students knowledge: a fun and interactive Endocrine Bingo (Activity 3) and through a classic MCQ (Activity 4) (page 15 onwards).

## Hormones & the Endocrine System

Hormones are natural chemicals and are your body's chemical messengers.

They **travel in your bloodstream** to tissues or organs.

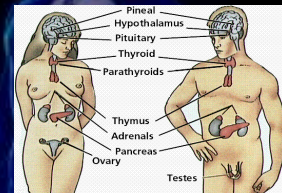
They work slowly and affect many different processes, including:

- Growth and development
- Metabolism - how your body gets energy from the foods you eat
- Sexual function
- Reproduction
- Mood

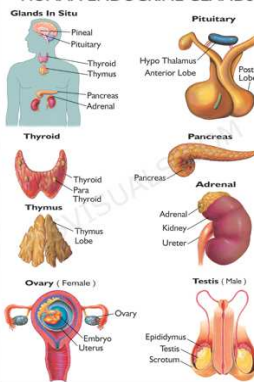
## Endocrine Glands

**Endocrine glands**, which are special groups of cells, **make hormones**. The major endocrine glands and organs are:

- Pituitary
- Pineal
- Thymus
- Thyroid
- Adrenal
- Pancreas
- Testes
- Ovaries



### HUMAN ENDOCRINE GLANDS



## Endocrine Glands

Changing hormone levels can cause big changes in your body.

The **endocrine system is slower than the nervous system** but has a more widespread and longer-lasting action.

The brain sends instructions to the endocrine system, and receives feedback from the endocrine glands.

The endocrine system constantly adjusts hormone levels.

**Adrenal glands**

When we are in danger the brain stimulates the adrenal glands to secrete the hormone adrenalin. This gets us ready for 'fight' or 'flight' by increasing heart rate, diverting blood to the muscles, opening up airways, increasing breathing rate and increasing the metabolism of carbohydrates to give us energy.

**Thyroid**

The thyroid gland produces the hormones thyroxine and triiodothyronine. These control the rate of energy release inside cells. They also affect the growth and development of parts of the body and are particularly important as we grow up.

**Pituitary and hypothalamus**

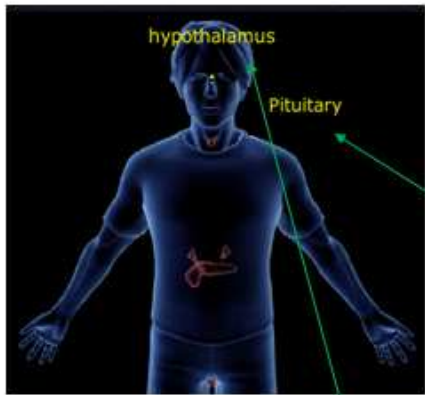
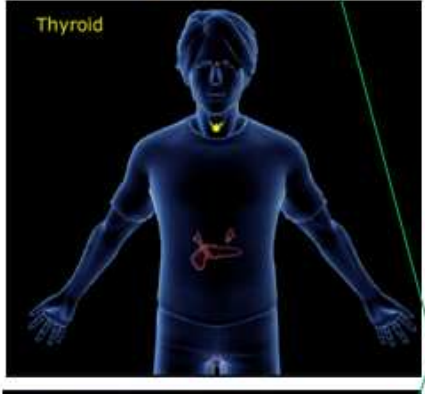

The pituitary gland secretes several important hormones which stimulate other endocrine glands. It also produces growth hormone which is important for controlling growth and development. The hypothalamus controls many everyday functions such as eating, drinking, body temperature, heart rate.

You now have 5 minutes to complete the Endocrine Gland Worksheet

## Activity 1: Endocrine Gland Worksheet – 5 mins

This activity gets students to draw upon the knowledge covered in the PowerPoint and aims to consolidate this information by recall. The four organs and their descriptions illustrate how different hormones have different effects in the body.

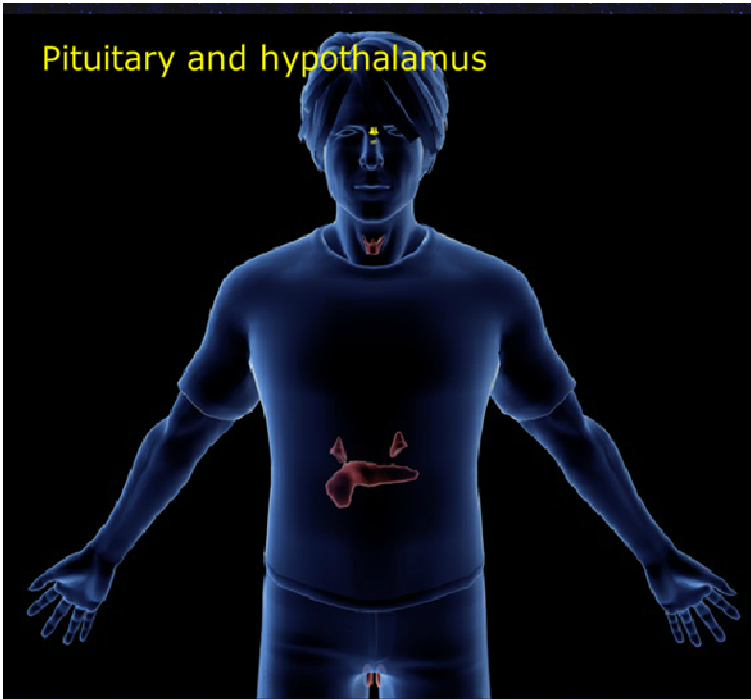
**Students work individually or in pairs. The worksheet is on the following page and is modifiable. The answers are shown below with a green arrow.**

 <p>hypothalamus Pituitary</p>	<p><u>Link the endocrine gland (left) to its description (right)</u></p>
 <p>Thyroid</p>	<p>This gland produces growth hormone which is central in growth and development. It also produces other hormones which stimulate a variety of endocrine glands.</p>
 <p>Adrenal glands</p>	<p>These glands are stimulated by the brain when we are in danger, so the hormone adrenaline can be secreted. This prepares us for the "fight" or "flight" response, which increases heart rate, increases breathing rate, diverts blood to the muscles, opens up airways and increases the metabolism of carbohydrates to give us a burst of energy.</p>
	<p>This gland produces the hormones thyroxine and triiodothyronine. These hormones are important when we grow up as they affect the growth and development of different parts of our body. They also control the energy release inside cells.</p>
	<p>This gland controls our everyday functions such as heart rate, temperature, eating and drinking.</p>
<p>Endocrine gland worksheet answers</p>	

*Students should begin to understand the variety of endocrine glands and their specialised functions. Further work could include investigating the hormones produced by these glands in more detail, followed by a mini test to check that students can remember which hormone is produced by which gland.*



## Pituitary and hypothalamus

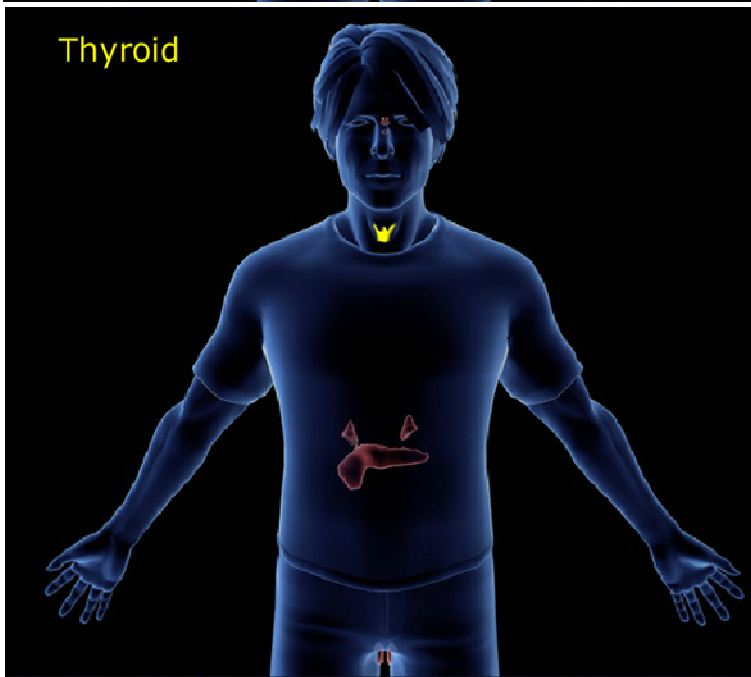


### Link the endocrine gland (left) to its description (right)

This gland produces growth hormone which is central in growth and development.

It also produces other hormones which stimulate a variety of endocrine glands.

## Thyroid

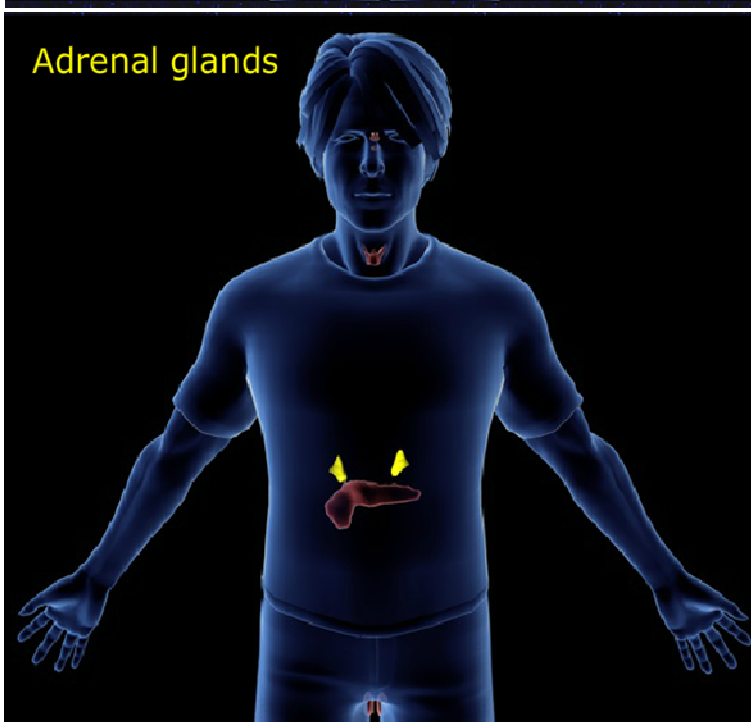


These glands are stimulated by the brain when we are in danger, so the hormone adrenaline can be secreted. This prepares us for the “fight” or “flight” response, which increases heart rate, increases breathing rate, diverts blood to the muscles, opens up airways and increases the metabolism of carbohydrates to give us a burst of energy.

This gland produces the hormones thyroxine and triiodothyronine.

These hormones are important when we grow up as they affect the growth and development of different parts of our body. They also control the energy release inside cells.

## Adrenal glands



This gland controls our everyday functions such as heart rate, temperature, eating and drinking.

## Hormone Related Disorders

Endocrine disorders are typically grouped into two categories:

- 1) Endocrine disease that results when a gland produces too much or too little of a hormone, called a **hormone imbalance**.
- 2) Endocrine disease due to **the development of lesions**, which may or may not affect hormone levels.

## Adrenal Gland Disorders

### Diabetes:

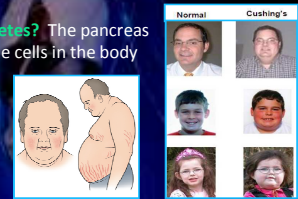
The pancreas regulates blood sugar levels by releasing insulin

**What happens in Type 1 diabetes?** The pancreas does not produce insulin

**What happens in Type 2 diabetes?** The pancreas can still produce insulin but the cells in the body become resistant to insulin

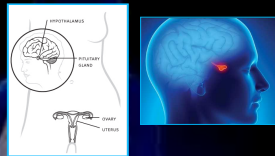
### Cushing's syndrome :

Too much adrenal hormone



## Pituitary Gland Disorders

**Hyperprolactinaemia** – too much prolactin hormone

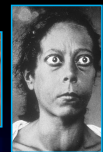


**Acromegaly** (gigantism) too much growth hormone, so bones and body parts grow abnormally fast

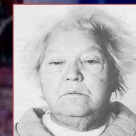


## Thyroid Gland Disorders

**Hyperthyroidism** - too much thyroid hormone.



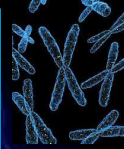
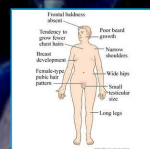
**Hypothyroidism** – Too little thyroid hormone.



## Sex Hormone Disorders

Inherited (genetic and chromosomal) disorders:

**Klinefelter syndrome:**  
An extra X chromosome in a male



**Turner syndrome:**  
A missing or changed X Chromosome in a female



## Your Task!

Read the fact sheets on each endocrine disorder and then read two patient symptom profiles. Your task is to diagnose from the symptoms which endocrine disorder the person has!



1) Natalie Smith

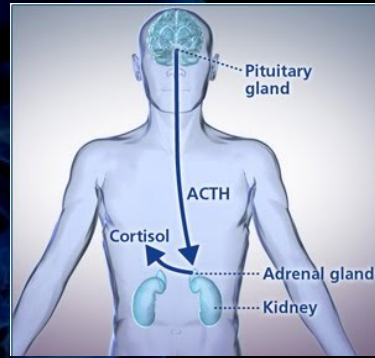
2) Sara Martin

# What is Cushing's Syndrome?

Cushing's syndrome consists of changes that result from having too much cortisol in the blood for a long period of time. Cortisol is a steroid hormone produced by the adrenal glands, located above the kidneys.

Cortisol helps the body to:

- Respond to stress
- Maintain blood pressure and cardiovascular function
- Keep the immune system in check



## Did you know?

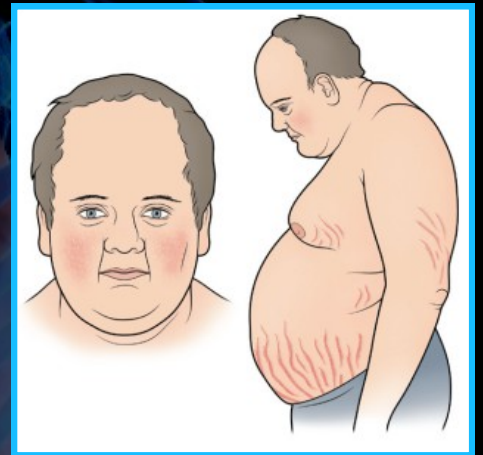
Cortisol is sometimes called "the stress hormone" because one of its most important functions is to help the body respond to stress.

## What causes Cushing's Syndrome?

Cushing's syndrome can be caused by factors outside the body and factors within the body. The symptoms for both are the same. It is uncommon for Cushing's syndrome to be caused by factors within the body, where the adrenal glands produce too much cortisol. It usually comes on slowly and can be difficult to diagnose.

## Signs and symptoms of Cushing's syndrome

- Weight gain, especially in the upper body
- Rounded face (moon face) and extra fat on the upper back
- High blood sugar (diabetes)
- High blood pressure
- Thin bones
- Muscle loss and weakness
- Thin, fragile skin that bruises easily
- Purple-red stretch marks (usually over the abdomen and under the arms)
- Depression, anxiety, irritability and difficulties thinking clearly
- Too much facial hair in women
- Acne



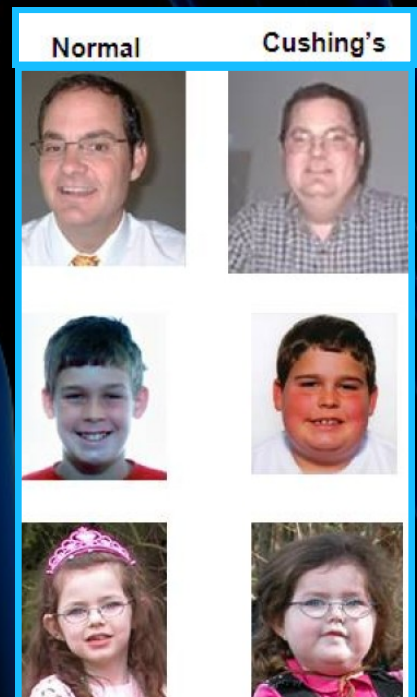
## How is Cushing's syndrome diagnosed?

- 1) **Salivary Cortisol Measurements:** In healthy people, cortisol levels are very low during this period of time. In contrast, people with Cushing's syndrome have high levels.
- 2) **Urine Test to measure Cortisol Level**
- 3) **Dexamethasone Test:** Measuring cortisol levels measured after taking dexamethasone. Normally, dexamethasone causes cortisol to drop to a very low level, but with Cushing's syndrome, this doesn't happen.

## How is Cushing's syndrome treated?

Treatment is aimed to restore a normal balance of hormones and bringing down cortisol levels. The treatment for Cushing's syndrome varies.

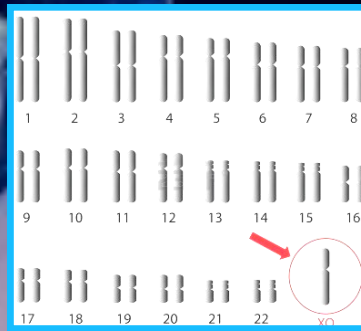
- **Corticosteroid use:** take long-term high dosage corticosteroids
- **Surgery** to remove the tumour that is causing high cortisol levels
- **Radiation** therapy to destroy any tumour cells that are left behind.
- **Medications** to lower cortisol, if surgery/radiation is not effective
- **Further surgery:** Some people must have both adrenal glands removed





# What is Turner Syndrome?

Turner syndrome (TS) is a genetic condition that is caused when a female baby is born with a missing/changed X chromosome. TS occurs worldwide in about 1 in 2,000 females.



Did you know?

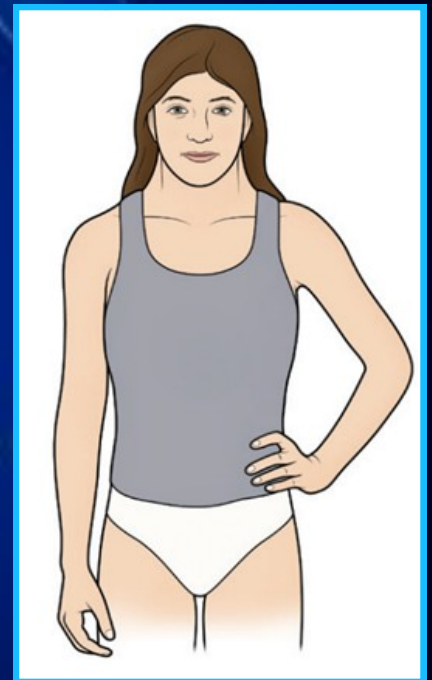
Early diagnosis and treatment of Turner syndrome in girls can help promote normal growth and development.

## What causes Turner Syndrome?

Chromosomes contain the genes that tell your body how to function. Normally, a person has 46 chromosomes. Females usually have two X chromosomes. Turner Syndrome is caused by a missing or changed X chromosome. This is a random event – so any girl could be born with TS.

## Signs and symptoms of Turner Syndrome

- Short stature
- Broad chest
- Curvature of the spine
- Ovaries that do not produce hormones or eggs
- Eye issues such as a 'lazy eye'
- Moles on skin
- Low-set ears and small lower jaw
- Low hairline
- Wide and short neck, sometimes with neck webbing— extra skin that joins the neck with the collarbone
- Arms that turn out more than usual at the elbows
- Missing knuckle
- Puffiness of the hands and/or feet
- Small nails



## How is Turner Syndrome diagnosed?

**Chromosome Test:** Turner's syndrome may not be diagnosed until a girl reaches puberty. A blood sample is analysed under a microscope to look for missing or changed chromosomes.



## How is Turner Syndrome treated?

TS is a lifelong genetic disorder so there is no cure. However it can be managed by:

**1) Growth hormone therapy:** Injections of a growth hormone are given to increase their height. Treatment can begin in early school if TS is detected at a younger age.

**2) Hormone replacement therapy:** Most girls with TS need estrogen therapy to develop the physical changes that normally occur at puberty such as menstruation and breast growth. Estrogen is available as an injection, pill, spray, gel or patch. After menstruation begins, progesterone can be given to make sure regular menstrual cycles occur.

# What is Acromegaly?

Acromegaly is a seriously rare condition caused by too much growth hormone (GH). The pituitary gland, located at the base of the brain releases GH into the bloodstream and is carried around the body.

- **Children:** GH stimulates growth and development in children. When there is too much GH, gigantism occurs.
- **Adults:** GH affects muscle strength, bone health, energy levels and one's sense of well-being. It occurs mainly in middle-aged men and women.

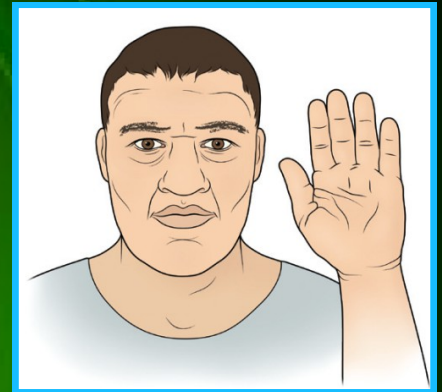


## Did you know?

Acromegaly is a very rare condition. Each year, about three new cases of acromegaly occur for every million people.

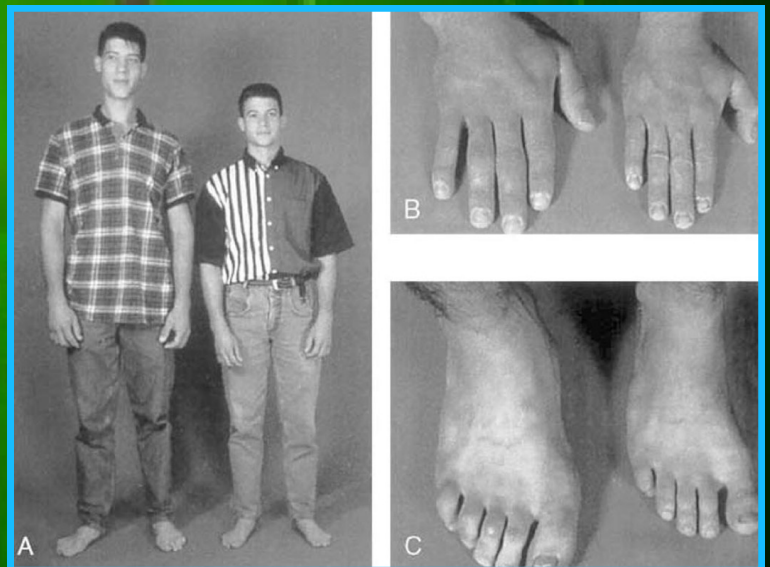
## What causes Acromegaly?

Acromegaly is caused by a tumour in the pituitary gland. The tumour produces too much GH and increases the level of GH in the blood. High levels of GH increases the amount of insulin-like growth factor-1, a hormone produced in the liver that also promotes growth. Acromegaly is sometimes caused by hormone-producing tumours in other parts of the body.



## Signs and symptoms of Acromegaly

- Increased sweating
- Large hands and feet and sometimes numbness or burning of them
- Thick lips, coarse facial features
- Arthritis
- Goitre (enlarged thyroid gland)
- High blood glucose (sugar)
- Heart failure or enlarged heart
- High blood pressure
- Sleep apnoea (breathing stops and starts during sleep)
- Tiredness
- Headaches and Vision problems
- Menstrual disorders



## How is Acromegaly diagnosed?

- 1) **Medical Imaging techniques:** Magnetic resonance image (MRI)/Computed tomography (CT) scan of the head
- 2) **Growth Hormone Test:** Measuring GH level during an oral glucose tolerance test where you drink a sugary liquid and have blood samples taken over 3 hours. If the GH level does not decrease then you may have acromegaly
- 3) **Insulin-like Growth factor-1 Test:** Measuring IGF-1 level in a blood sample

## How is Acromegaly treated?

Treatment is aimed to restore a normal balance of hormones and bringing down cortisol levels. The treatment for Cushing's syndrome varies.

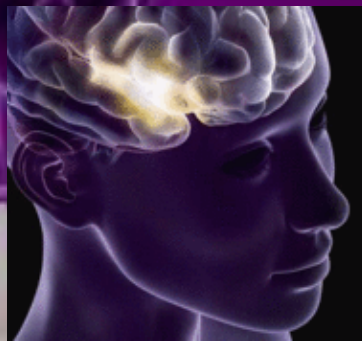
- **Surgery** to remove the tumour that is causing high GH levels
- **Radiation** therapy on the pituitary gland
- **Medications** To lower GH levels such as Somatostatin, if surgery/radiation is not effective



# What is Hyperprolactinemia?

Hyperprolactinemia is a condition where a person has high levels of the hormone prolactin in the blood. Prolactin is made by the pituitary gland, a small organ at the base of the brain. Prolactinomas occur more in women than in men and don't usually occur in children.

Prolactin affects the levels of estrogen and testosterone. An important role of prolactin is to initiate breast milk production after childbirth, so in pregnancy it is normal to have high levels of prolactin.



## Did you know?

The pituitary gland is called the master gland because it makes hormones that control levels of other hormones. Normal functioning of the pituitary gland is needed for good health.

## What causes Hyperprolactinemia?

A growth or tumour on the pituitary gland called a prolactinoma causes Hyperprolactinemia. The tumour creates too much prolactin. Normally, these tumours are not cancerous.

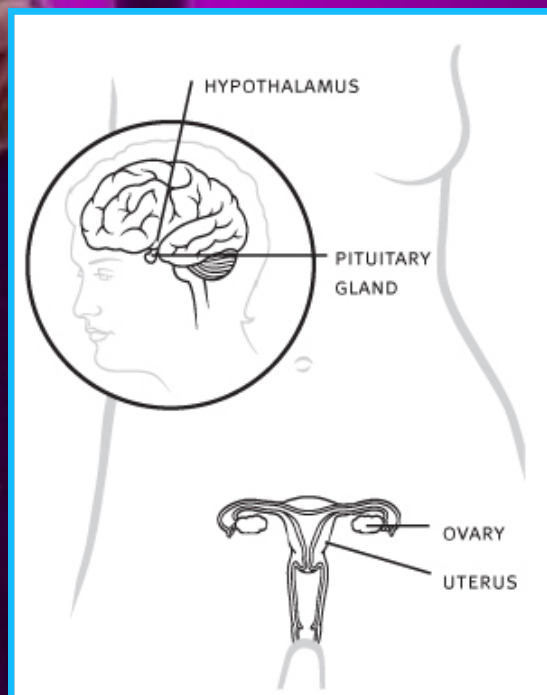
## Signs and symptoms of Hyperprolactinemia

Women:

- Infertility
- Decreased sex drive
- Bone loss
- Menstruation problems
- Producing breast milk when not pregnant
- Painful intercourse

Men:

- Infertility
- Decreased sex drive
- Bone loss
- Breast enlargement
- Erectile dysfunction
- Less body hair and less muscle tissue



## How is Hyperprolactinemia diagnosed?

- 1) **Prolactin Test:** A blood sample is tested. If there is a lot of prolactin present, thyroid hormone is tested. If thyroid hormone levels are normal, hypothyroidism is not a cause. It must be checked that the woman is not pregnant.
- 2) **Magnetic Resonance Imaging:** Of the brain and pituitary is done to see the location and size of the pituitary tumour.



## How is Hyperprolactinemia treated?

- **Prescription Medicines:** Bromocriptine and cabergoline reduce how much prolactin is produced
- **Surgery** to remove the tumour if medicines are ineffective. Surgery is needed if the tumour reduces vision.
- **Radiation** therapy to shrink the tumour destroy any tumour cells that are left behind.

## Activity 2: Diagnosing Conditions Worksheet – 10 mins

The PPT presentation continues with a presentation of hormone related disorders. Using the factsheets provided, the students must work out what condition the two patients have. Students must identify the hormone disorder, hormone involved, gland involved and treatment from reading the text description of the patient and matching the descriptions to the factsheet.

**Students work individually or in pairs. The worksheet is on the following page and is modifiable. The answers are shown below in the textbox.**

### **Patient 1: Natalie smith**

**Hormone Disorder:** Acromegaly  
**Hormone involved:** Growth hormone  
**Gland involved:** Pituitary Gland  
**Treatment:**

Surgery to remove the tumour that is causing high GH levels, radiation therapy on the pituitary gland or medications to lower GH levels such as Somatostatin, if surgery/radiation is not effective.

### **Patient 2: Sara Martin**

**Hormone Disorder:** Cushing's syndrome  
**Hormone involved:** Cortisol  
**Gland involved:** Adrenal gland  
**Treatment:**

Corticosteroid use: take long-term high dosage corticosteroids, surgery to remove the tumour that is causing high cortisol levels, radiation therapy to destroy any tumour cells that are left behind, medications to lower cortisol, if surgery/radiation is not effective or further surgery: some people must have both adrenal glands removed.

*Students should begin to understand the complexities of endocrine gland disorders using these two examples. They should appreciate how individual each disorder is and understand that there is a hormone or group of hormones associated with each disorder. By diagnosing the conditions themselves, they should understand the variety of symptoms and treatments. Further work could include investigating other endocrine gland disorders to produce a factsheet following the same format. Alternatively, other patient descriptions can be created and the activity can be repeated.*



# Diagnose the Hormone-Related Condition!

Read the patient profiles and fill in the boxes below to diagnose the hormone disorder.  
Pictures below show the patient before and after their new symptoms.

## Patient 1: Natalie smith



32 years of age. Recently had a minor road traffic accident. It was found that the accident was due to a loss of vision from 20/20 vision to a reduction of 12% in right eye and 10% in left eye. From 29 years of age patient has put on a lot of weight, even changing eating habits has not managed to shift any of the gained pounds. A disproportionate stature has been noticed. A diamond ring received as a present doesn't fit anymore. Patient has been suffering from obstructive sleep apnoea (OSA). Chest pains and difficulty breathing. Large hands and pronounced jaw. Experiences frequent flushing - generalised increase in sweating, and has soft tissue swelling.

**Hormone Disorder:**

**Hormone involved:**

**Gland involved:**

**Treatment:**

## Patient 2: Sara Martin



25 years of age. She has signs for osteoporosis and easily bruised skin. She suffers from weakening muscles. She has recently been complaining about feeling low and having long onsets of bad moods – suggestive of depression. She has been suffering from hypertension and glucose intolerance, which may be due to her obesity. Her facial features look different as friends and family have noticed a particular change in weight. She seems to have put on weight dramatically especially around her neck.

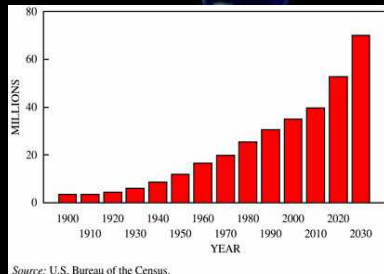
**Hormone Disorder:**

**Hormone involved:**

**Gland involved:**

**Treatment:**

## Our population is ageing!



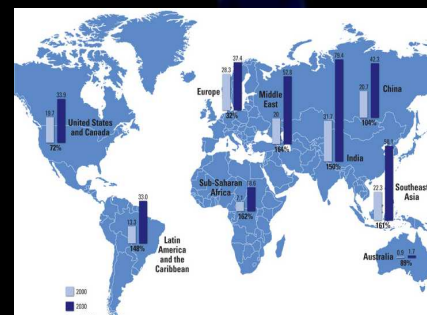
## Did you know hormones affect wound Healing?

- Wound healing involves many stages. Changes to these stages can be detrimental.
- With age, many health issues arise which can reduce quality of life.
- As you age there are changes in the actions of cells in wound healing.
- The rate of healing gets slower as you grow older.
- Some sex hormones are involved in wound healing, some you probably haven't heard of!
- Global health services and the mortality rate as a result of ageing and wound healing issues is a big problem.

## Our Endocrine system undergoes changes with age

Pregnenolone:	Sharp decrease to low levels after 40 years
Growth hormone :	Decrease in secretion from around 45 years
Insulin :	Loss of sensitivity with ageing and obesity
DHEA:	Decrease to very low levels
Estrogen:	Decrease in men / sharp fall in women
Testosterone:	Decrease in men
Estrogen + Prolactin:	Decrease in women
Cortisol:	Decrease in release
Aldosterone:	Decreases

## Diabetes incidence (millions) 2000-2030



## Diabetes



The pancreas regulates blood sugar levels by releasing insulin

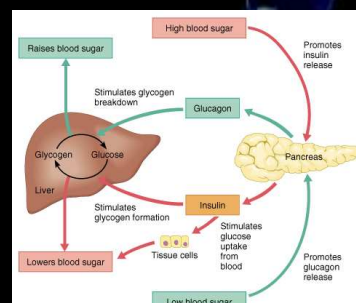
Not enough insulin leads to inability to convert blood sugar to glucose

**What happens in Type 1 diabetes?** The pancreas does not produce insulin

**What happens in Type 2 diabetes?** The pancreas can still produce insulin but the liver becomes resistant to insulin

**Diabetes and Ageing combined can lead to many secondary complications!**

## Diabetes



## Diabetes



Before

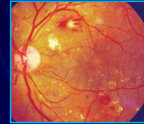
After



## Diabetes and other problems

• Too much glucose in the blood can damage the blood vessels to the limbs, heart, kidney and eye as well as damaging nerves. This causes:

- **Diabetic Neuropathies** - Injuries to blood vessels supplying nerves
- **Heart disease**
- **Stroke**
- **Kidney disease**
- **Impotence**
- **Peripheral vascular disease**
- **Retinopathy** - Damage to the back of the eye



## What else can go wrong?

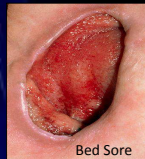
One common effect of Diabetes is skin ulcers. It is worsened if we don't have enough estrogen as then our skin can't heal properly!



Venous Ulcer



Diabetic Ulcer



Bed Sore

**Remember: some of these conditions, such as Diabetes, can be controlled with preventive measures in your lifestyle 😊**

**Thank you for listening!**

### Activity 3: Endocrine Bingo - 15 mins

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Endocrine Bingo is a fun and interactive way to get students to test what they have learnt so far in a game format.

Minimum duration is 15 minutes, but it can last longer dependent on time available.

**Students work individually or in pairs. The endocrine bingo worksheets are below and are modifiable. The instructions presented are self-explanatory. Each student should be given a bingo card, scissors, glue (however the game can be recycled without) and tokens.**

# ENDOCRINE BINGO

Number of Players: Any

Level: GCSE or above

#### Game set up:

Each player will need to cut apart the squares on the endocrine words page and glue these words onto empty squares on their bingo card. They must pick 16 of the 24 endocrine words. Note: Everyone's board will be different.

Provide tokens for players to place on squares as questions are read.

#### Instructions of Game:

The teacher reads out the questions and students must guess which part of the endocrine system is being described.

They place one of their tokens on the part they think is correct. When they achieve a horizontal or vertical four in a line, they must shout "Bingo". They must read aloud their answers so the teacher can check they have answered all correctly. If they have, they have won the game.

*To make the game continue for longer you could play until "Full House", where students must cover the whole board.*

#### Items needed:

- One copy of the two pattern pages for each player
- Scissors
- Glue stick
- Tokens to place on squares, 15 per player



# ENDOCRINE BINGO QUESTIONS

(Every endocrine word has at least one or two questions each. Answers are shown beside each question.)

- 1) These are natural chemicals and are your body's chemical messengers: **HORMONES**
- 2) Hormones travel in this to reach tissues and organs: **BLOODSTREAM**
- 3) This gland secretes several important hormones which stimulate other endocrine glands: **PITUITARY GLAND**
- 4) This gland is also known as the master switchboard because it's the part of the brain that controls the endocrine system: **HYPOTHALAMUS**
- 5) This gland is responsible for regulating blood sugar levels: **PANCREAS**
- 6) This gland produces the hormones thyroxine and and triiodothyronine which control the rate of energy release inside cells: **THYROID GLAND**
- 7) When we are in danger the brain stimulates these glands to secrete the hormone adrenaline, to prepare us for the "flight" and "fight" response: **ADRENAL GLAND**
- 8) The endocrine system works very closely with this: **NERVOUS SYSTEM**
- 9) This disease has two types, type 1 and type 2. It is caused by issues with insulin and the pancreas: **DIABETES**
- 10) The pancreas regulates blood sugar levels by releasing this hormone: **INSULIN**
- 11) Men produce this hormone in their testes: **TESTOSTERONE**
- 12) Women produce this hormone in their ovaries: **ESTROGEN**
- 13) This organ sends instructions to the endocrine system: **BRAIN**
- 14) This condition is also referred to as gigantism: **ACROMEGALY**
- 15) This is caused when a person has too much adrenal hormone: **CUSHING'S SYNDROME**
- 16) The endocrine system constantly adjusts hormone levels so that the body can function normally and achieve this: **HOMEOSTASIS**
- 17) This is caused when a person has too much prolactin hormone: **HYPERPROLACTINAEMIA**
- 18) This is caused when a person has too much thyroid hormone: **HYPERTHYROIDISM**
- 19) This is caused when there is too little thyroid hormone: **HYPOTHYROIDISM**
- 20) This is caused when a male has an extra X chromosome: **KLINEFELTER SYNDROME**
- 21) This is caused when a female has a missing or changed X Chromosome: **TURNER SYNDROME**
- 22) This is caused by hormone levels that are too high or too low or if your body does not respond normally to hormones: **HORMONE RELATED DISORDERS**
- 23) This term describes an endocrine disease that results when a gland produces too much or too little of a hormone: **HORMONE IMBALANCE**
- 24) The endocrine glands produce them: **HORMONES**
- 25) This gland produces growth hormones which is important for controlling growth and development: **PITUITARY GLAND**
- 26) This gland control everyday important functions such as eating, sleeping, body temperature and heart rate: **HYPOTHALAMUS**
- 27) This gland produces insulin: **PANCREAS**
- 28) The endocrine system is much slower than this: **NERVOUS SYSTEM**
- 29) In the United States, this is the most common endocrine disease: **DIABETES**
- 30) This organ can receive feedback from the endocrine glands: **BRAIN**
- 31) This occurs when there is too much growth hormone so bones and body parts grow abnormally fast: **ACROMEGALY**
- 32) In Diabetes, the pancreas does not produce this: **INSULIN**
- 33) An endocrine disease can be caused by a development of this: **LESIONS**

# ENDOCRINE BINGO

Cut out 16 of the 24 endocrine word boxes on the other sheet and stick on the empty boxes below to create your individual bingo card. Listen to the questions and if you have the correct answer put your token on that box. When you get 4 in a line shout BINGO!




# ENDOCRINE WORDS

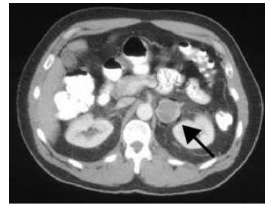
## NERVOUS SYSTEM



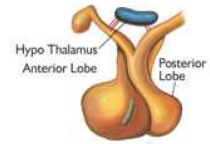
## DIABETES



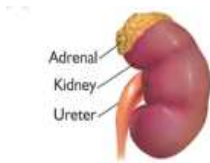
## LESION



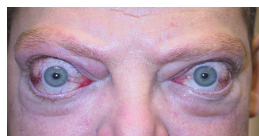
## PITUITARY GLAND



## ADRENAL GLAND



## HYPERTHYROIDISM



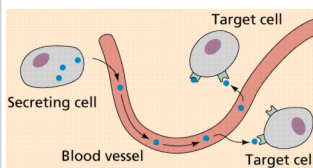
## PANCREAS



## BRAIN



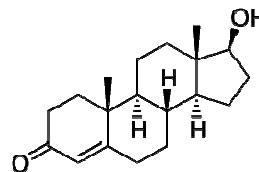
## HORMONES



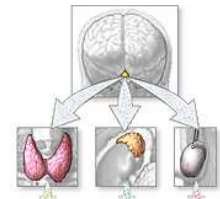
## HOMEOSTASIS



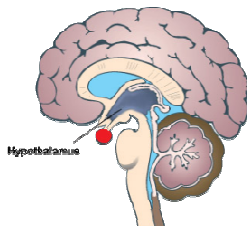
## TESTOSTERONE



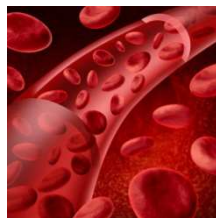
## HORMONE RELATED DISORDERS



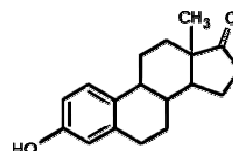
## HYPOTHALAMUS



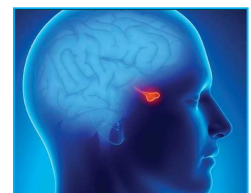
## BLOODSTREAM



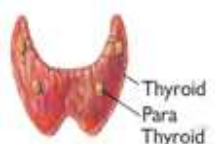
## ESTROGEN



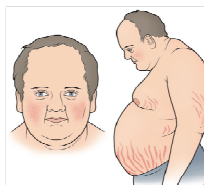
## HYPERPROLACTINAEMIA



## THYROID GLAND



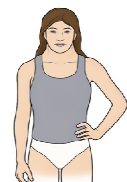
## CUSHING'S SYNDROME



## INSULIN



## TURNER SYNDROME



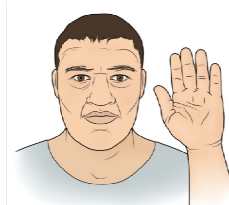
## KLINEFELTER SYNDROME



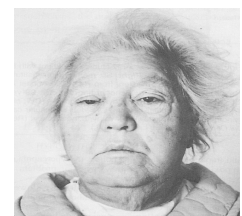
## HORMONE IMBALANCE



## ACROMEGALY



## HYPOTHYROIDISM





## Activity 4: Classic MCQ assessment – 15 mins

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This activity challenges students to draw upon the knowledge covered in all the activities.

**Students work individually. The assessment is on the following page and is modifiable.**

### Assessment Answers – Correct answer is highlighted in green.

**What are hormones?**

1) Natural chemicals and your body's chemical messengers

**What do hormones travel around the body in?**

3) Bloodstream

**“The endocrine system is slower than the nervous system but has a more widespread and longer-lasting action.”**

1) True

**Which one of these organs is NOT a major endocrine organ?**

2) Lung

**The endocrine system is made up of organs and tissues that produce what?**

2) Hormones

**In the United States, what is the most common endocrine disease?**

3) Diabetes

**How does the pancreas regulate blood sugar levels?**

3) By releasing insulin

**What happens in Type 1 diabetes?**

1) The pancreas does not produce insulin

**What happens in Type 2 diabetes?**

2) The pancreas can still produce insulin but cells in the body are no longer sensitive to it/ become resistant to insulin

**What hormone is involved in causing Cushing’s syndrome?**

1) Cortisol

**What endocrine gland is involved in Cushing’s syndrome?**

1) Adrenal Gland

**What hormone is involved in causing Acromegaly?**

2) Growth hormone

**What endocrine gland is involved in Acromegaly?**

2) Pituitary gland

**Assessment**

Name: \_\_\_\_\_

**1. What are hormones?**

- a) Natural chemicals and your body's chemical messengers
- b) Brain chemicals that communicate information throughout our brain and body
- c) Electrical messages

**2. What do hormones travel around the body in?**

- a) Neurons
- b) Skin
- c) Bloodstream

**3. "The endocrine system is slower than the nervous system but has a more widespread and longer-lasting action."**

- a) True
- b) False

**4. Which one of these organs is NOT a major endocrine organ?**

- a) Thyroid
- b) Lung
- c) Adrenal glands
- d) Pancreas

**5. The endocrine system is made up of organs and tissues that produce what?**

- a) Blood
- b) Hormones
- c) Urine
- d) Carbon dioxide

**6. In the United States, what is the most common endocrine disease?**

- a) Acromegaly
- b) Turner's syndrome
- c) Diabetes

**7. How does the pancreas regulate blood sugar levels?**

- a) By releasing testosterone
- b) By absorbing oxygen
- c) By releasing insulin

**8. What happens in Type 1 diabetes?**

- a) The pancreas does not produce insulin
- b) The adrenal gland stops producing insulin
- c) The hypothalamus stops producing insulin

**9. What happens in Type 2 diabetes?**

- a) The pancreas stops producing insulin
- b) The pancreas can still produce insulin but cells in the body are no longer sensitive to it/ become resistant to insulin
- c) The liver produces insulin

**10. What hormone is involved in causing Cushing's syndrome?**

- a) Cortisol
- b) Growth hormone
- c) Testosterone
- d) Estrogen

**11. What endocrine gland is involved in Cushing's syndrome?**

- a) Adrenal Gland
- b) Pituitary gland
- c) Thalamus

**12. What hormone is involved in causing Acromegaly?**

- a) Cortisol
- b) Growth hormone
- c) Testosterone
- d) Estrogen

**13. What endocrine gland is involved in Acromegaly?**

- a) Adrenal Gland
- b) Pituitary gland
- c) Thalamus