Endocrine: Effects of illness & treatment on growth & development

Treatment for a brain tumour or a tumour in the head and neck area is likely to include radiotherapy to the brain. Treatment may also include chemotherapy (drug treatment) and surgery. All these treatments can affect your hormone levels. The position of the tumour is also an important factor in determining which hormone problems might occur.

Hormones - what are they?

Hormones are chemical messengers produced naturally by the body; they are essential to help you grow, regulate your metabolism, control puberty, fertility and many other things. They also have life saving functions e.g. stress and thirst control. They work by sending specific messages to other organs/parts of your body, in a type of "postal messaging" system.

The pituitary gland and the hypothalmus:

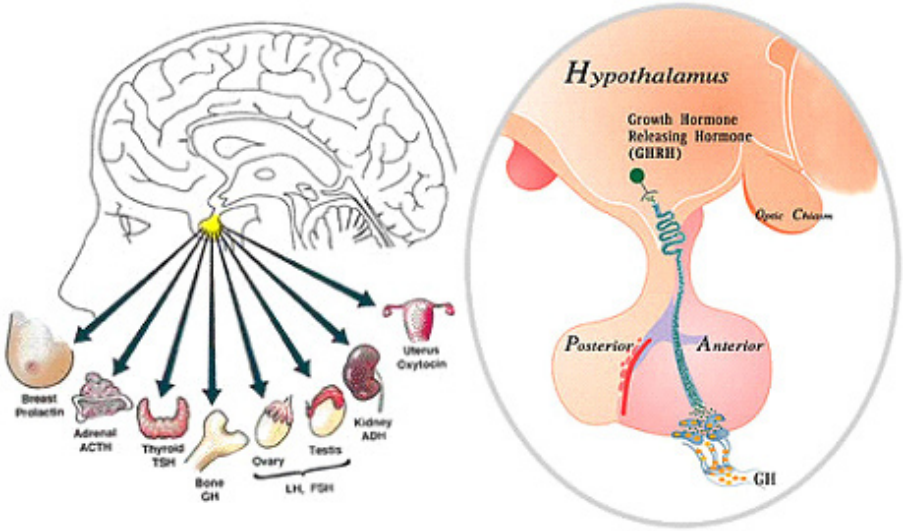
The main place these natural chemicals are produced is in a part of the brain called the pituitary gland. - see diagram. Above and next to this there is another important area, in the centre of the brain, called the hypothalamus. This controls bodily functions such as sleep/wake rhythms, thirst, hunger and body temperature. The hypothalamus sends messages to the pituitary gland via special "releasing" hormones. This tells the pituitary to send its own hormones to other parts of the body.

There are 2 areas of the pituitary, the anterior (front) part controlling

1. growth (growth hormone, GH)
2. metabolism (thyroid stimulating hormone TSH)
3. puberty (luteinizing hormone LH)
4. fertility (follicle stimulating hormone FSH)
5. response to stress and/or illness (adreno-corticotrophin hormone ACTH)
6. milk secretion in breast feeding (prolactin)

and the posterior (back) part producing

1. antidiuretic hormone (ADH controls thirst & fluid levels in the body)
2. oxytocin (important during childbirth)



Any illness can cause a temporary "shut down" to the system and alter hormone levels. However after treatment for a brain tumour, and after any treatment where the pituitary has been affected, this can be more permanent.

Some hormones are vital for life such as stress and thirst/water balance hormones. Others are more important for wellbeing and quality of life such as growth hormone and puberty hormones. Hormone levels can be increasingly affected over time.

What if the hormones are affected?

Growth hormone (GH) is the first hormone that is likely to be affected . This gets its name because it is a vital hormone to make you grow when you are a child. Your growth is followed very carefully after treatment and if you are not growing and are found to be lacking this hormone a synthetic (artificial) form of it is given as a replacement to the natural hormone. This is given as a small daily injection, using a pen injector/transjector, like those used by diabetics.

Once you have stopped growing you may be advised to continue having the growth hormone injections. This is because GH, together with other hormones and a healthy life style, continues to have an effect on your metabolism, bone strength, muscle tone and also your heart. The dose taken as an adult is lower than the one you have as a child to help you grow. It will still be an injection.

Thyroid hormones (T4 & TSH) are often affected. An underactive thyroid is usually picked up after a routine blood test, before you notice any symptoms. Symptoms of an underactive thyroid are gaining weight, feeling tired, feeling cold when others are not and thinning hair. Thyroid hormone is replaced by taking a small tablet of thyroxine each day.

Puberty & fertility are controlled by separate pituitary hormones **(LH & FSH)** & are less likely to be affected. If puberty is late in starting or (occasionally) starts early there are drugs that can be given to help both situations.

Stress hormone (ACTH) is very important and it is vital to be able to produce enough at times when your body needs to. If it is found to be lacking, it can be replaced by taking tablets of hydrocortisone **(cortisol)**, each day and taking an increased dose if you are ill. You will need to wear a medic alert bracelet and be taught how to give cortisol by injection in an emergency. Cortisol is a naturally occurring steroid and if you need cortisol replacement you will only be taking enough to replace what you would naturally be producing. There is always a lot of "bad press" about taking steroids. It should not be confused with taking synthetic steroids in other situations where much larger doses may be needed for treatment or when they are abused (taken illegally) such as in some areas of sport.

It is called **panhypopituitarism** if you are found to be lacking all these hormones

ADH is a hormone produced from the back of the pituitary. It helps control water balance in your body and is produced when you are thirsty or deprived of water. It is a very important life saving hormone. It is not usually affected by treatment unless the tumour has been in or very close to the pituitary. Lack of ADH can be replaced by DDAVP (desmopressin) tablets or nasal spray. Being unable to produce ADH is called ***diabetes insipidus***.

How it all works

Areas within the body receive their specific messages from the hypothalamus and pituitary. The levels of all the hormones are measurable in the blood.

1. the bones receive GH – helps growth and keeps bones strong
2. the thyroid receives TSH and then produces thyroxine
3. the ovaries and testes receive LH and then produce the hormones that are needed for puberty.
4. the egg or sperm producing cells in the ovaries and testes receive FSH.
5. the female breast needs prolactin to produce milk
6. the kidneys receive the ADH message to regulate thirst and the amount of urine passed.
7. the womb receives oxytocin during childbirth – it causes the placenta to separate

Safety of hormone replacement

All hormone replacements now available are produced synthetically (artificially) and are as close to the natural hormones as possible. Most come as tablets, some are gels, creams or patches to put on the skin; growth hormone comes as an injection similar to those needed by diabetics, and cannot be given in any other form.

Lifelong need for Endocrine Follow up

Hormones are important for well-being, general, sexual and reproductive health. Once you begin a replacement hormone you are likely to need it for life. Because of this it is likely you will need to continue to attend a hospital clinic for occasional check ups, as well as seeing your GP, for the rest of your life.