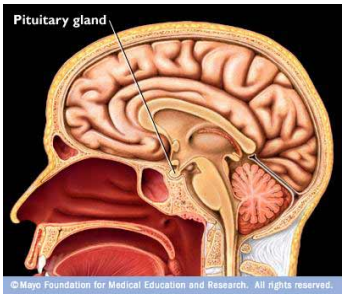
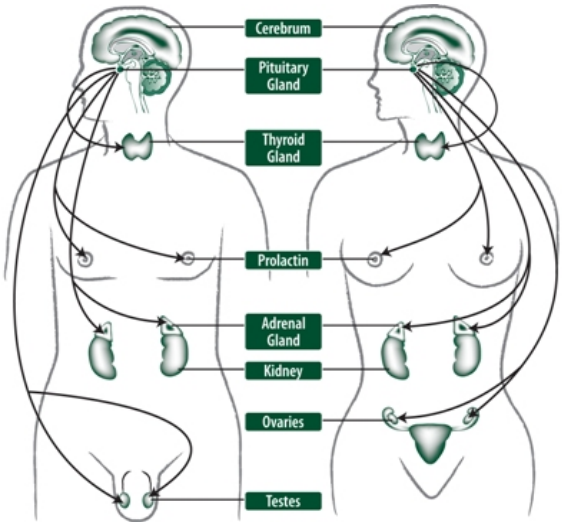
Medical Column



What is the Pituitary Gland?

The pituitary is a small, pea-sized gland located at the base of the brain, this is behind the bridge of the nose and below the base of the brain, close to the optic nerves.

The pituitary gland is an important gland and it is often referred to as the 'master gland', because it controls several of the other hormone glands. It consists of two parts (often called lobes) - a front part, called the anterior pituitary and a back part, called the posterior pituitary.



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The anterior pituitary makes several important hormones – Growth hormone, puberty hormones (or Gonadotrophins) that stimulate the ovaries & testes, Thyroid stimulating hormones (TSH, which stimulates the Thyroid Gland to make Thyroxine), Prolactin and Adrenocortitrophic hormone (ACTH, which stimulates the adrenal stress hormone, Cortisol).
The posterior pituitary makes the fluid balance hormone called Anti-diuretic Hormone (ADH).

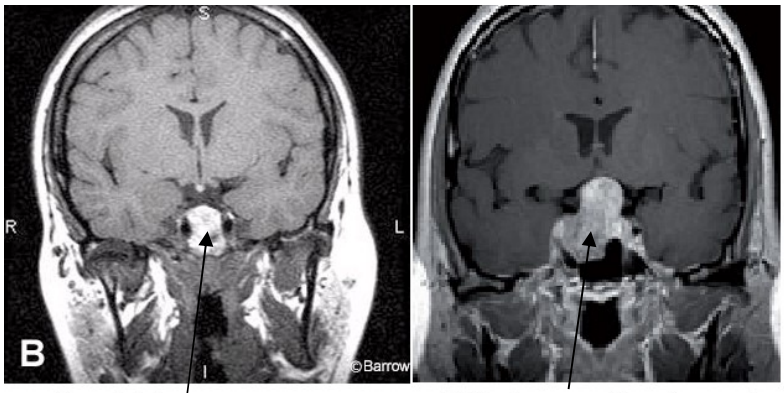
A pituitary tumour (or adenoma) is a benign growth on the pituitary gland. The tumour maybe 'non-functioning' (does not affect hormone production), secretes excessive hormones, or the tumour can push on the pituitary gland leading to reduced hormone production (hypopituitarism).

There are several different forms of pituitary tumours depending on how it affects hormones in our body. In this article we are going to talk more about Acromegaly.

What is Acromegaly?

Acromegaly is a condition caused when a pituitary tumour produces too much Growth Hormone (GH). This is a rare condition with a prevalence of ~50 cases per a million people. With an average of 3-4 patients being diagnosed per year per a million people.

Acromegaly usually develops between the ages of 30 and 50. If the condition develops before a person has stopped growing (before age 15-17yrs), it causes Gigantism, when a person grows far taller as GH causes continued bone growth. It is believed there is generally an 8 yr delay between symptom onset to diagnosis of Acromegaly, given the insidious onset of symptoms and its rarity making diagnosis difficult.



Normal pituitary

Pituitary tumour pushing onto normal pituitary gland

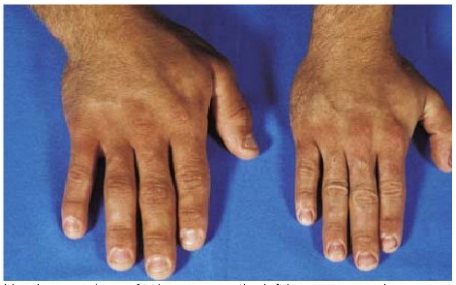
Acromegaly means large extremities in Greek, as swelling of soft tissues commonly lead to swelling in hands & feet, with a subsequent increase in ring & shoe size over a number of years for many patients.

Specific symptoms of acromegaly include:

- Enlarged hands and feet - often requiring larger rings or shoe sizes
- A change in the face, jaw or tongue:
  - Cheekbones or forehead are more prominent
  - Bite has changed (inability to bite) or teeth have become more widely spaced
  - Lips and tongue have enlarged causing snoring or dribbling at night

Symptoms that suggest acromegaly:

- Excessive sweating
- Heavy snoring or daytime sleepiness



Hand comparison of twins - one on the left has acromegaly. R Gagel, IE McCutcheon. Pituitary Gigantism. NEJM 1999;340:524. 1999.

- Tingling/numbness in both hands (carpal tunnel syndrome)
- Skin becoming more oily, thicker and hairier

Other conditions associated with acromegaly:
- Arthritis
- Diabetes
- High blood pressure

How is Acromegaly diagnosed?

The diagnosis is through a series of blood tests to check the hormone levels including GH (growth hormone), and IGF-1 (insulin-like growth factor 1) a hormone produced by GH stimulation, and is the main mediator of the effects of GH.

A special test maybe done by drinking a bottle of sugary liquid and measuring GH changes for 2 hours after.
Other blood tests to check other hormones produced by the pituitary gland will also be done.
And imaging of the pituitary gland via a CT or MRI scan.

Treatments for Acromegaly – by Professor IM Holdaway

These are exciting times for those with acromegaly, with many developments in the field of acromegaly treatment. Many, although not all, of these treatments are available in New Zealand.

Pituitary surgery:
Surgical removal of growth hormone –secreting pituitary adenomas causing acromegaly remains the most important form of treatment. Studies have shown that it is essential that the operation is done by an experienced neurosurgeon doing an appreciable number of similar operations each year. We are lucky in New Zealand that each major centre has at least one neurosurgeon with appropriate experience.

There have been major technical advances such as the use of endoscopy at surgery, which has improved surgical outcomes. The surgical cure rate for those with small adenomas (microadenomas) can be as high as 80-90%. Larger adenomas (macroadenomas) can extend into regions outside the pituitary cavity and may be more difficult to completely excise at operation, although cure can still be achieved in 40-50% of cases. Figures for surgical cure by the principal pituitary surgeon in Auckland, Mr Andrew Law, are at least as good as these international results.

For those not cured by surgery, or in the rare situation where surgery is for some reason contraindicated, circulating levels of growth hormone and the growth factor produced by growth hormone, IGF-I, can usually be controlled by other treatments. These include:

1. **Octreotide**, an analogue of the natural hormone somatostatin, inhibits secretion of growth hormone by pituitary adenomas. It is not active taken by mouth, so is usually given as a depot injection each month (*LAR Octreotide*).

2. **Cabergoline**, a medication similar to the natural hormone dopamine, can act to suppress growth hormone production in a proportion of patients. It can be taken orally.

3. **Pituitary radiotherapy**, given either as external beam radiotherapy using standard radiotherapy machines, or as highly focussed “stereotactic” radiotherapy, is an effective method to control growth hormone over-production and reduce the size and activity of any adenoma remnants. However, the effect of such radiotherapy is gradual, so ultimate cure of the condition by radiotherapy is achieved only slowly.

4. Overseas units can treat pituitary adenomas with “**gamma knife**” radiotherapy using a focussed beam of gamma-rays from a cobalt^{60} source. This has a rapid curative effect on the pituitary adenoma. The equipment for this type of therapy is not available in New Zealand.

5. **Pegvisomant**, an inhibitor of growth hormone binding to target cells in the liver, can lower serum levels of IGF-I, and is another effective method to reverse the symptoms of acromegaly. It is given by self-administered daily injection. At present the agent is not funded by Pharmac in New Zealand, and is very expensive for self-purchase.

Individuals with acromegaly are thus now in the fortunate position of having a range of therapies for their condition, and research on further methods of treatment is under way around the world.

Did you know?

"ONE IN FIVE individuals may have an abnormal growth on their pituitary gland, causing significant health complications that, if left undiagnosed and untreated, can impair normal hormone function and result in a reduced lifespan."

Shereen Ezzat, M.D., Professor of Medicine, University of Toronto