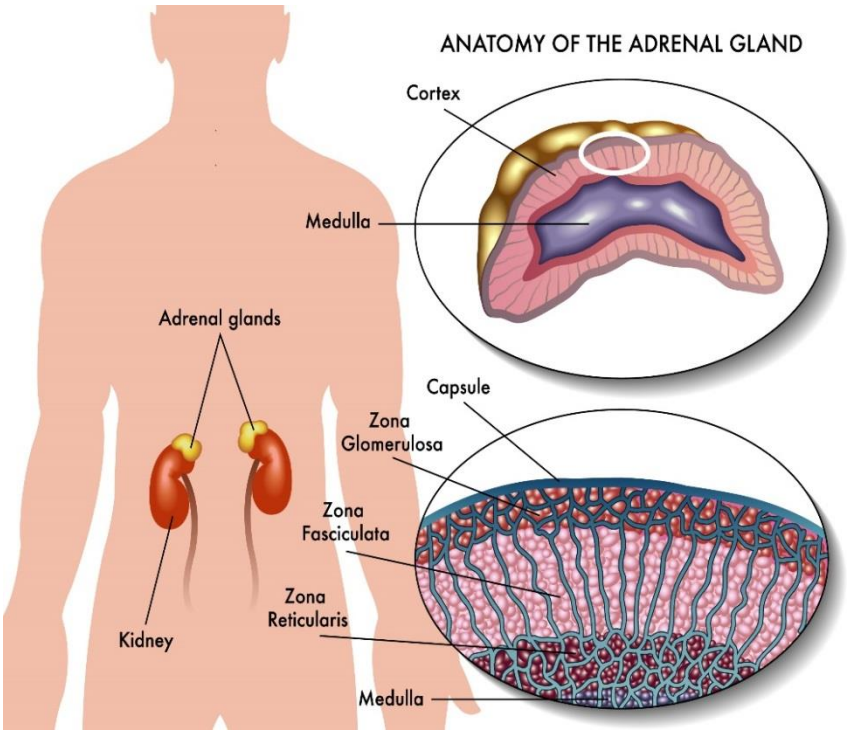
THE ADRENAL GLAND.

The adrenal, or suprarenal, glands are located on the top of each kidney. You have two adrenal glands, (one above each kidney) that produce hormones that give instructions to virtually every organ and tissue in your body. Death would result if the adrenal cortex were to stop functioning as it controls metabolic processes that are essential to life.



The suprarenal glands are divided into two parts.

The outer portion of the gland is called the ***adrenal cortex***. The adrenal cortex produces three different types of hormones, which are known collectively as steroids.

i. ***Mineralocorticoids*** which control the balance of sodium (salt) and water in the body, which maintains the amount of blood in the heart and circulatory system, and regulates blood pressure.
ii. ***Glucocorticoids*** which regulate the way the body uses carbohydrate, protein and fat. They also affect the levels of glucose (sugar) in the blood.
iii. ***Gonadocorticoids*** which regulate sex hormones such as estrogen.

The ***adrenal medulla*** is the inner portion of the suprarenal gland (adrenal gland). The adrenal medulla produces the hormones ***adrenaline (epinephrine) and noradrenaline (norepinephrine).*** These hormones make the heart beat faster, cause sweating, increase blood supply to vital organs, slow down digestion and make the eyes' pupils dilate. These effects are important in helping the

body to react to emergency and stressing situations. Adrenaline and noradrenaline are sometimes called the hormones of 'fight or flight'.

ADRENAL GLAND DISORDERS.

With adrenal gland disorders, your glands make too much or not enough hormones.

In ***Cushing's syndrome***, there's too much cortisol, while with ***Addison's disease***, there is too little. Some people are born unable to make enough cortisol.

Cortisol is a life sustaining adrenal hormone essential to the maintenance of homeostasis. Called "the stress hormone," cortisol influences, regulates or modulates many of the changes that occur in the body in response to stress including, but not limited to:

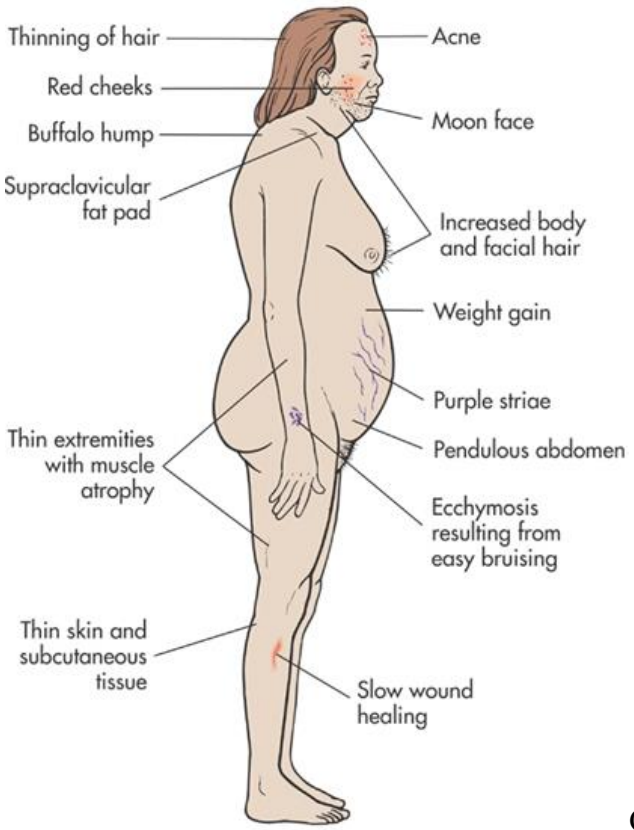
- Blood sugar (glucose) levels
- Fat, protein and carbohydrate metabolism to maintain blood glucose (gluconeogenesis)
- Immune responses
- Anti-inflammatory actions
- Blood pressure
- Heart and blood vessel tone and contraction
- Central nervous system activation

Causes of adrenal gland disorders

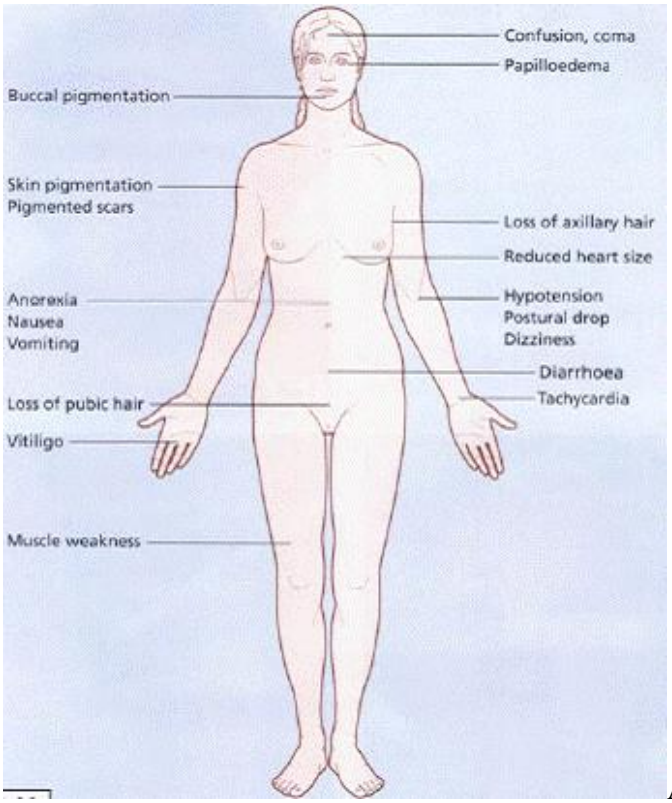
They include:-

- Genetic mutations
- Tumors including pheochromocytomas
- Infections
- A problem in another gland, such as the pituitary, which helps to regulate the adrenal gland
- Certain medicines

Treatment depends on which problem you have. Surgery or medicines can treat many adrenal gland disorders.



Cushing's syndrome.



Addison's disease.

Tumors.

Tumors can be either benign or malignant. Most adrenal gland tumors are benign. They usually do not cause symptoms and may not require treatment. Tumours of the adrenal gland can develop in either the cortex or the medulla.

Benign tumours of the cortex are called ***adrenal cortical adenomas.*** Malignant tumours are called ***adrenal cortical carcinomas.***

The most common type of tumour in the medulla is called a ***pheochromocytoma***. These can be benign or malignant. A small number of pheochromocytomas start outside the medulla part of the adrenal gland and are known as ***extra-adrenal pheochromocytomas.***

Only one adrenal gland is usually affected. Rarely, tumours may occur in both adrenal glands. (***Bilateral adrenal tumours).***

PHEOCHROMOCYTOMA.

A pheochromocytoma is a rare, usually noncancerous (benign) tumor that develops in cells in the center of an adrenal gland. It's a small vascular tumor of the adrenal medulla, causing irregular secretion of ***epinephrine and norepinephrine***, leading to attacks of raised blood pressure, palpitations, and headache.

If left untreated, a pheochromocytoma can result in severe or life-threatening damage to other body systems, especially the cardiovascular system.

Signs and symptoms of pheochromocytomas often include:

- High blood pressure
- Rapid or forceful heartbeat
- Profound sweating
- Severe headache
- Tremors
- Paleness in the face
- Shortness of breath

Less common signs or symptoms may include:

- Anxiety or sense of doom
- Abdominal pain
- Constipation
- Weight loss

These signs and symptoms often occur in brief spells of 15 to 20 minutes. Spells can happen several times a day or less often. Your blood pressure may be within the normal range or remain elevated between spells.

Triggers of symptomatic spells

Spells may occur spontaneously or may be triggered by such factors as:

- Physical exertion
- Anxiety or stress
- Changes in body position
- Bowel movement
- Labor and delivery

Foods high in tyramine, a substance that affects blood pressure, also can trigger a spell. Tyramine is common in foods that are fermented, aged, pickled, overripe or spoiled. These foods may include:

- Some cheeses
- Some beers and wines
- Dried or smoked meats
- Avocados, bananas and fava beans
- Pickled fish
- Sauerkraut or kimchi

Certain medications that can trigger a symptomatic spell include:

- Decongestants, Stimulants, such as amphetamines or cocaine

DIAGNOSIS OF ADRENAL TUMUORS.

Tumours of the adrenal gland can be very difficult to diagnose. The hospital specialist will ask you about your general health and any previous medical problems before examining you.

Blood and urine tests

Samples of blood and urine are checked for the presence of certain hormones. A sample of urine may be collected over a 24-hour period.

X-rays and scans

A combination of x-rays and scans will be taken to find where the tumour is and whether it has spread.

Abdominal ultrasound

This test uses sound waves to build up a picture of the abdomen and surrounding organs. It is done in the hospital scanning department. The sound waves are converted into a picture using a computer. The test is completely painless and takes about 15-20 minutes.

CT (computerized tomography) scan

A CT scan takes a series of x-rays that build up a three-dimensional picture of the inside of the body. The scan is painless and takes 10-30 minutes. It may be used to find out where the cancer started (the primary tumour) or to check for any spread of the disease (metastases).

MRI (magnetic resonance imaging) scan

This test is similar to a CT scan but uses magnetism instead of x-rays to build up a detailed picture of areas of your body.

I-123-MIBG scan

A chemical called I-123-MIBG (meta-iodobenzylguanidine) may be used to show up the site of a pheochromocytoma on a scan. I-123-MIBG contains mildly radioactive iodine and is taken up by adrenal cells. The scan takes place over two consecutive days.

Biopsy

A small sample of cells is taken from the tumour to be examined under a microscope. The biopsy may be carried out under a local or general anesthetic.

Angiogram

An angiogram is a technique used to assess the flow of blood through the blood vessels of the adrenal glands. An injection is given into a vein in the arm and a scan of the adrenal glands is then taken.

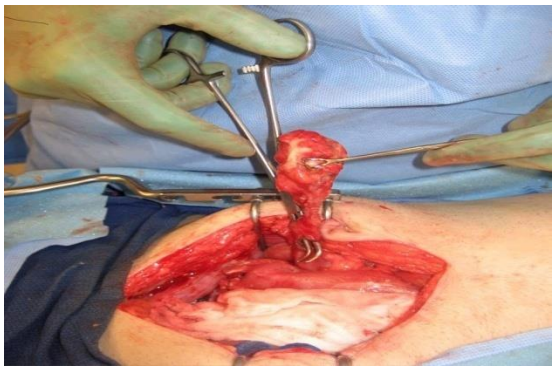
TREATMENT FOR ADRENAL GLAND TUMUORS.

Surgery

If the tumour is contained in one area, or if there has been only limited spread, surgery is usually the first choice of treatment. If it is possible to remove the tumour completely, you might not need any other treatment.

Adrenalectomy - an operation to remove the adrenal gland. There are two types of adrenalectomy: -***open*** and ***laparoscopic adrenalectomy***. Open adrenalectomy uses a large incision. The laparoscopic or minimally invasive approaches use multiple small incisions and a camera to remove the adrenal gland.

Laparoscopic adrenalectomy.



Open adrenalectomy.

What are the Advantages of Laparoscopic Adrenal Gland Removal/ adrenalectomy?

In the past, making a large 6 to 12 inch incision in the abdomen, flank, or back was necessary for removal of an adrenal gland tumor.

Today, with the technique known as ***minimally invasive surgery***, removal of the adrenal gland (also known as "laparoscopic adrenalectomy") can be performed through three or four 1/4-1/2 inch incisions. Patients may leave the hospital in one or two days and return to work more quickly than patients recovering from open surgery. Results of surgery may vary depending on the type of procedure and the patients overall condition.

Chemotherapy

This is the use of anti-cancer (cytotoxic) drugs to destroy cancer cells. Chemotherapy may sometimes be used to treat adrenal tumours that have spread. The aim of the chemotherapy is to shrink the tumour and reduce the amount of hormones it is producing.

Radiotherapy

This is the use of high-energy rays to destroy cancer cells. Sometimes it is given following an operation to destroy any remaining cancer cells. Radiotherapy may also be given to treat symptoms such as pain.

Radionuclide therapy

Some types of tumour may take up large amounts of particular chemicals such as MIBG (meta-iodobenzylguanidine). To treat these tumours, the chemical can be attached to a dose of a radioactive substance. As the cancer takes up the chemical, it also takes in the radioactivity.