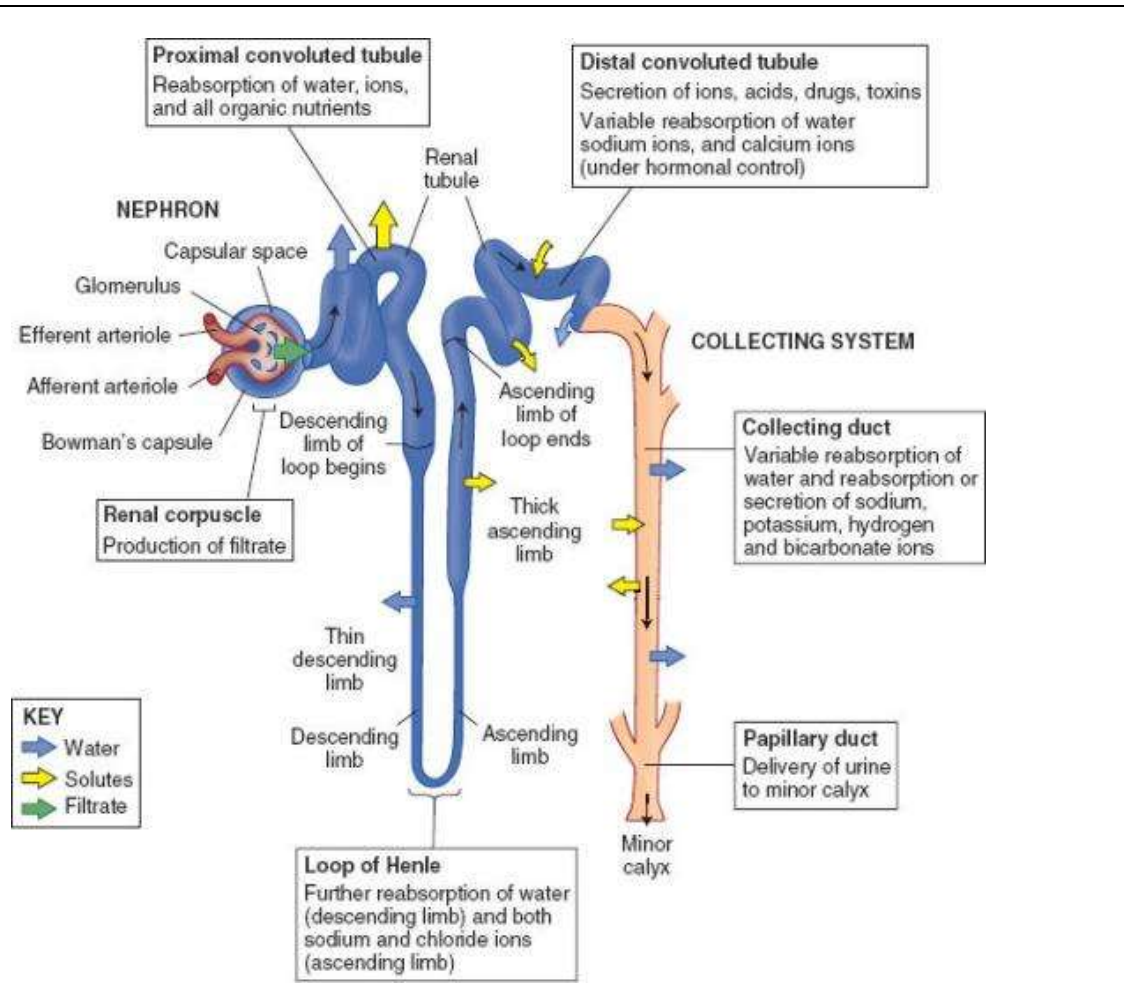


## WHAT IS GLOMERULONEPHRITIS?

- Glomerulonephritis is the name for a family of diseases which affect the kidney.
- Glomerulo- refers to the glomeruli, or the tiny filters in the kidney, and **nephritis means inflammation in the kidney.**

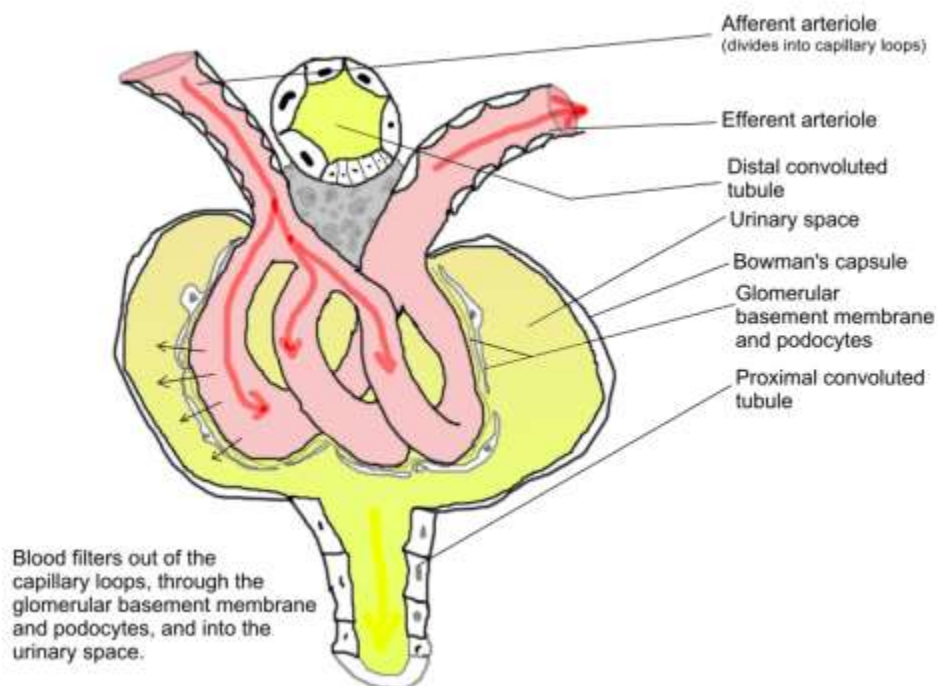
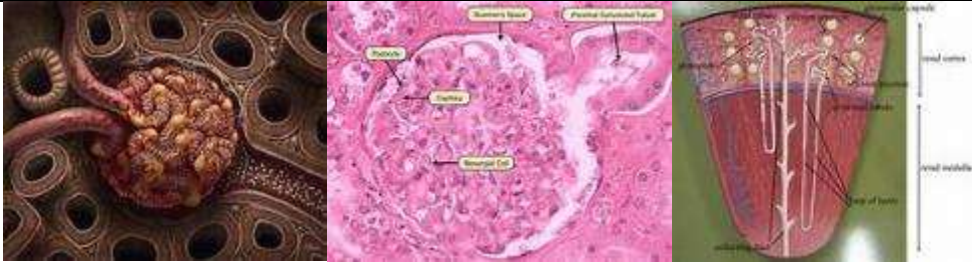
## WHAT ARE THE COMPONENTS OF THE KIDNEY

1. The filter = **glomeruli**
2. **The tubules**
  - Proximal
  - Distal
  - Collecting
3. **the interstitial tissues**
4. **the blood vessels**

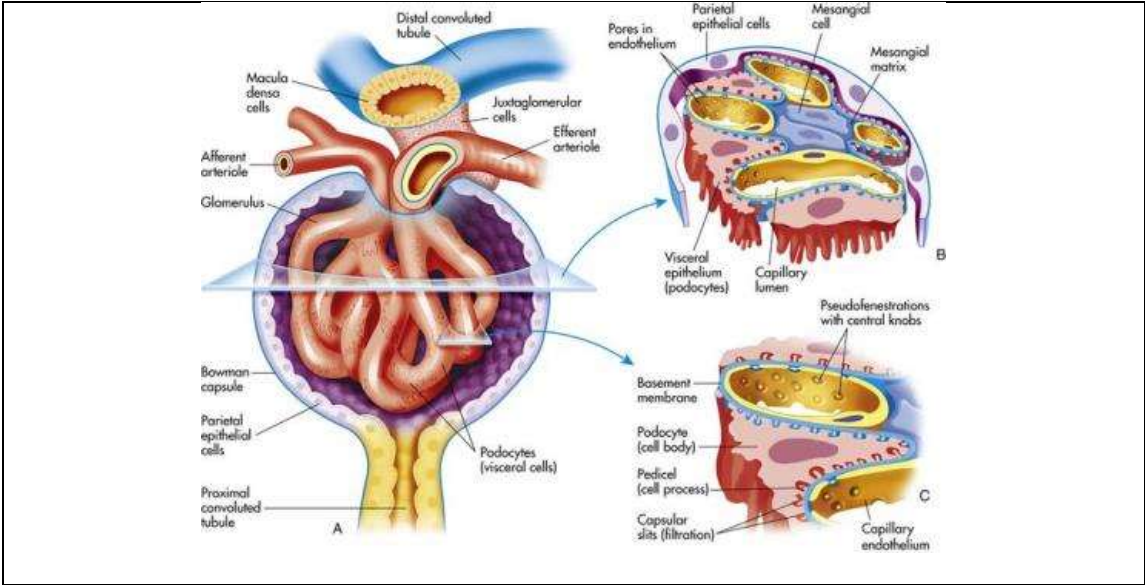


## WHAT ARE THE GLOMERULI, OR FILTERS, IN THE KIDNEY?

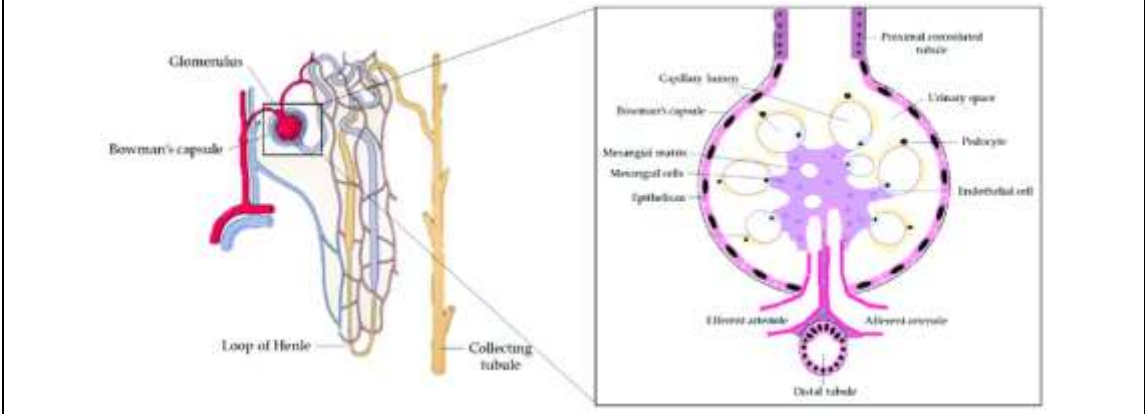
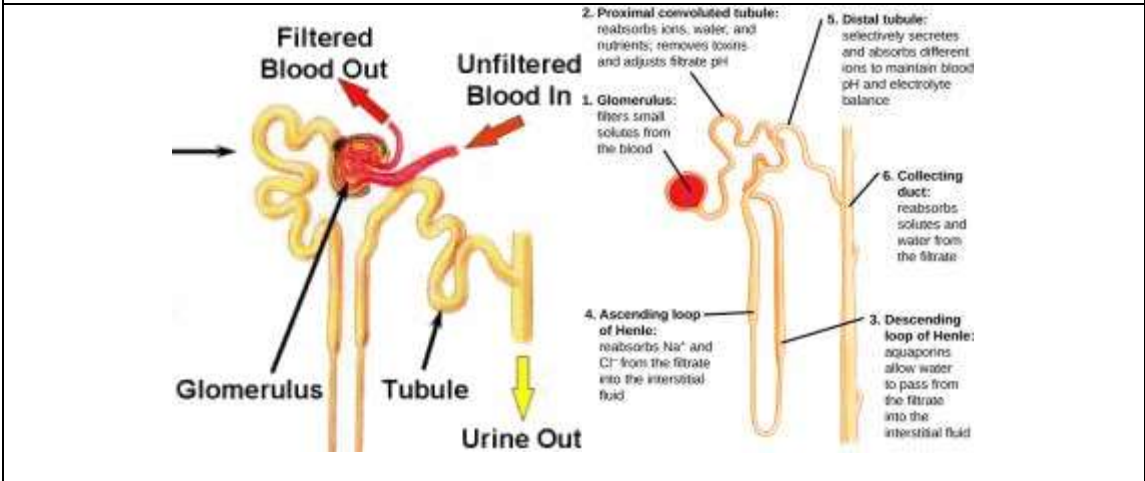
- Each kidney has about 1 million filters, each about the size of a pinhead.
- The glomerulus consists of a small ball of tiny blood vessels inside a bag, and the bag has a drainage tube running out of it.



- As blood passes through the glomerulus, some fluid is forced through **the walls of the blood vessels, which are very thin and delicate**, into the bag, which acts as a collecting space.
- This fluid then passes along **the drainage tubes inside the kidney**, which **concentrate the waste products** by removing excess water, so **eventually producing urine**.

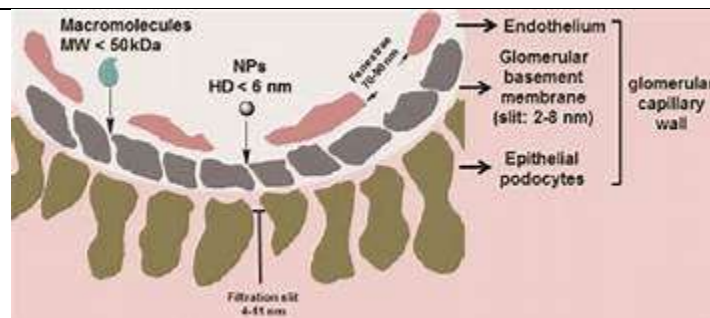
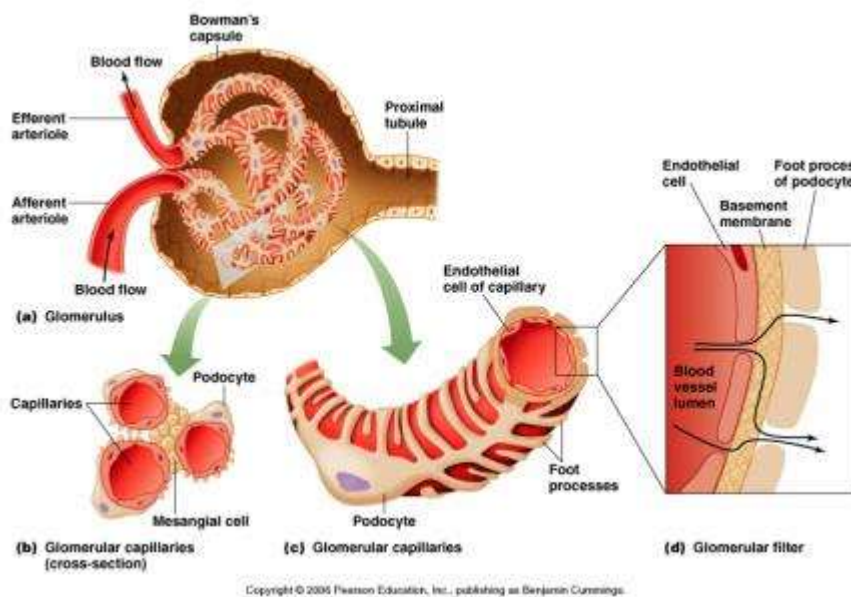


- The urine then runs down to a funnel-like area in each kidney, and drains down to the bladder.



## WHY DO THE GLOMERULI, OR FILTERS GET DAMAGED?

- The glomeruli are very delicate structures and can become damaged quite easily.
- Glomerulonephritis is a term most commonly used by doctors for a family of diseases **where damage to the glomeruli is caused by the body's immune (natural defense) system.**
- The usual job of the immune system is to fight invaders into the body.
- These might be germs or bugs, or foreign objects such as splinters.
- The body recognizes these invaders and tries to eliminate them from the body.



## Response of the glomeruli to injuries

### Injury of Glomerular Structures

■ **The glomerular basement membrane** is composed of type IV collagen molecules and other matrix proteins.

These proteins can be the target of antibodies in some types of glomerulonephritis; genetic abnormalities in their composition are the basis for some forms of hereditary nephritis.

■ **Visceral epithelial cells (podocytes)** are a critical component of the glomerular filtration barrier, and injury to these cells leads to leakage of proteins into the urinary space, clinically manifest as proteinuria.

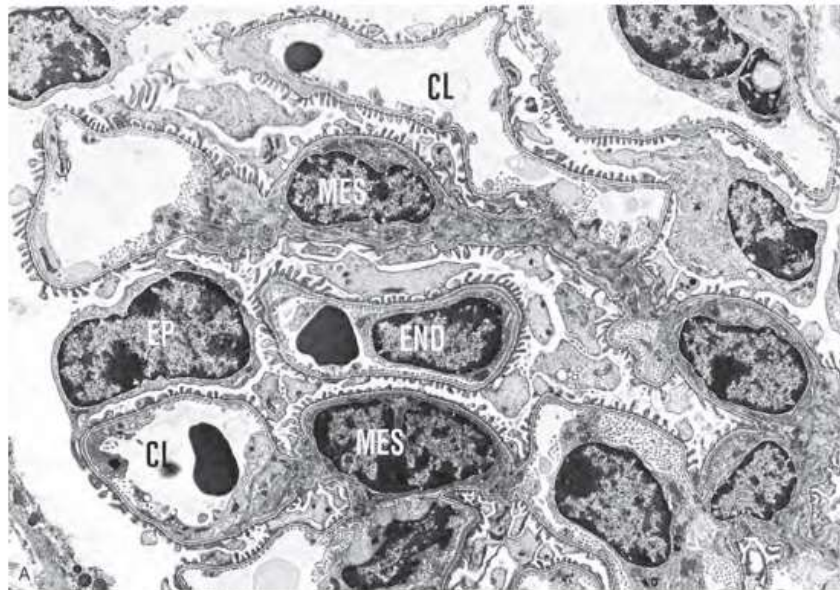
■ **The acute glomerular response to injury includes**

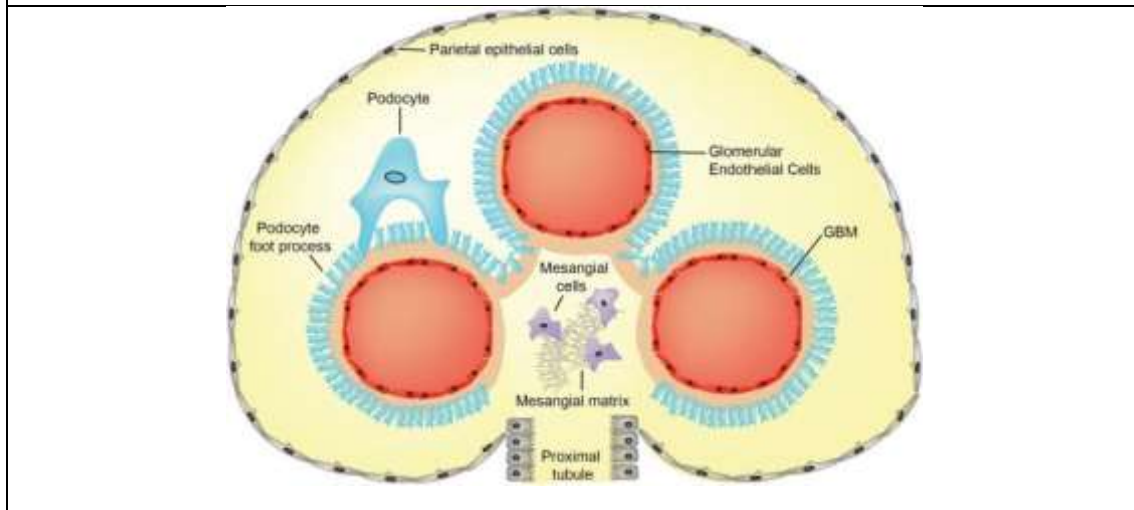
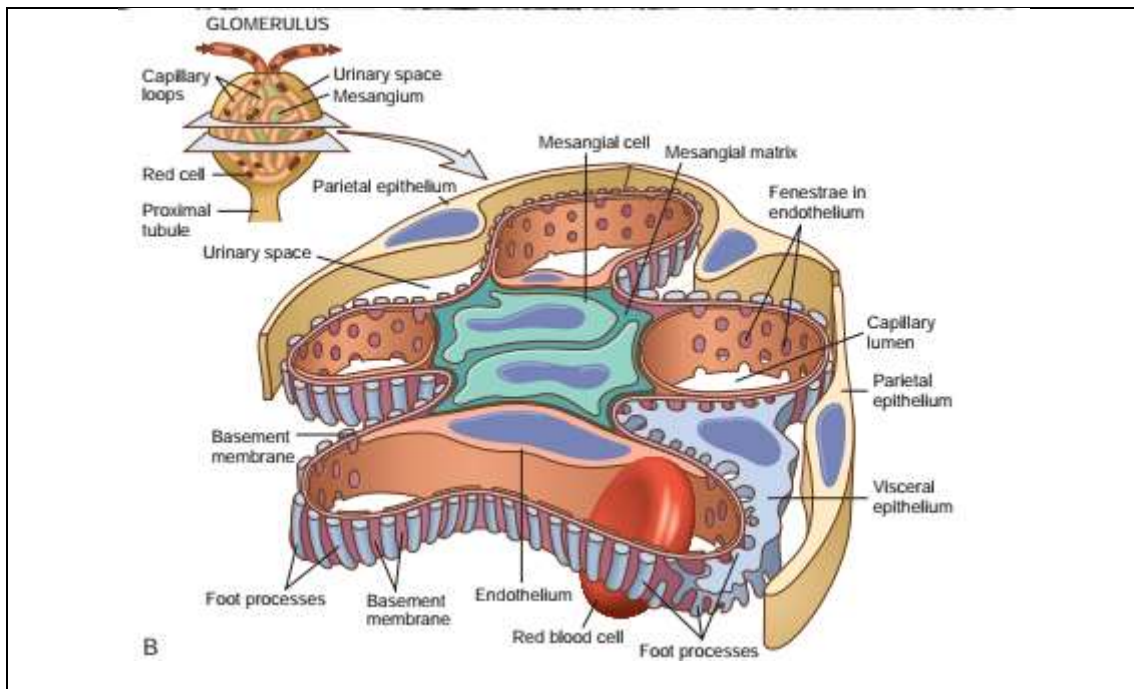
1. **Hypercellularity** with proliferation of mesangial and/or endothelial cells,
2. **Influx of leukocytes**, and, in severe injuries,
3. **Formation of crescents.**

■ Chronic glomerular responses to injury include

**basement membrane**

1. Thickening,
2. Hyalinosis, and
3. Sclerosis





- The blood contains two main types of defence system.
- **One is white blood cells**, which stick to germs and kill them.
- The other type of defence **is antibodies**, which are smaller than the white blood cells and, by sticking onto germs, either make them burst apart or help the white blood cells to stick to them.
- The immune system is very powerful and is normally very good at recognizing what is part of the body and what is not.
- **However, sometimes it makes a mistake and attacks the body as if that part of the body was an invader.**
- There are many different diseases caused by the immune system, and they can affect any part of the body.
- There are several kidney diseases caused by the immune system.
- Some of them affect only the kidneys, some can affect other parts of the body as well as the kidneys.
- It is not clear why the immune system causes diseases such as

glomerulonephritis.

- There may be some trigger that makes the immune system go wrong, such as an infection.
- **Often it is not known why glomerulonephritis occurs.**
- Many other conditions can cause the glomeruli to be damaged. High blood pressure or diabetes are common examples, so your kidney specialist will ask a lot of questions and perform lots of blood tests if glomerulonephritis is suspected.

### **WHAT ARE THE SYMPTOMS OF GLOMERULONEPHRITIS?**

- Most commonly there are no symptoms, in other words someone with glomerulonephritis feels completely well.
- The only sign of damage to the glomeruli may be
  - **Small amounts of blood or protein that have passed through the damaged filters into the urine**, and
  - Can only be detected when tests are performed by a doctor or nurse.
- Sometimes there can be greater loss of blood through the filters, so the urine turns red (blood in the urine is called **haematuria**).
- Sometimes there can be **greater loss of protein** through the filters, and the urine can become very frothy.
- There may also be retention of water in the body, called **nephrotic syndrome**.
- That is, there is a buildup of waste in the body because the kidneys are not removing the waste.
- **Kidney failure** may have no symptoms in its early stages but, in advanced cases, there may be tiredness, sickness, vomiting and itching.
- In some cases the damage to the kidney can be so severe that there is kidney failure.

### **HOW IS GLOMERULONEPHRITIS DIAGNOSED?**

- Doctors consider glomerulonephritis in anyone with kidney disease, but problems such as infection are much commoner.
- If glomerulonephritis is suspected, some **blood tests** will be performed to look for abnormal antibodies in the blood.
- However, it is not possible to make an accurate diagnosis in most cases by blood tests alone.

- To be sure of making a diagnosis, a **Kidney biopsy** must be performed.
- A biopsy is the removal of a fragment of kidney to examine under the microscope.
- This test carries a **small risk of bleeding**, and not everyone with possible glomerulonephritis requires a biopsy.

### **WHAT ARE THE DIFFERENT TYPES OF GLOMERULONEPHRITIS?**

1. **Focal and segmental glomerulosclerosis**
2. **IgA glomerulonephritis**
3. **IgM glomerulonephritis**
4. **Membranoproliferative Glomerulonephritis (MPGN) (also called mesangiocapillary)**
5. **Minimal change nephropathy**
6. **Vasculitis (Including Wegener's granulomatosis)**

### **WHAT WILL HAPPEN IN THE LONG TERM?**

- Glomerulonephritis is commonly a minor illness, but many persist for many years.
- In some cases the condition clears up completely, but in others kidney failure may develop.
- A **Kidney biopsy** can provide quite good information to help predict the outcome in individual cases.

### **WHAT IS THE TREATMENT FOR GLOMERULONEPHRITIS?**

- Treatment varies according to the type of glomerulonephritis.
- Some types of glomerulonephritis will respond to treatment that reduces the action of the immune system, but other types are very difficult to treat.
- Many treatments, because they attack the whole immune system and not just the abnormal part, can cause serious side effects.



## **WHAT ARE THE COMPLICATIONS OF GLOMERULONEPHRITIS?**

This varies according to the type of glomerulonephritis.

1. **Pain** - Most patients with glomerulonephritis do not get pain over the kidneys, but in a few cases it can be severe.
2. **Disease in other internal organs** - In many patients, glomerulonephritis affects only the kidneys. However, in some cases, the immune system that damages the kidneys can also affect other parts of the body, perhaps giving a blotchy red rash on the skin or some pain in the joints.
3. **High blood pressure** - This is a common complication of glomerulonephritis, because the kidneys control the level of blood pressure in the body. Many people with glomerulonephritis are prescribed blood pressure tablets. It is important to take these to protect the kidneys against further damage and also to reduce the risks of heart disease and stroke.