What we see is made in the brain from signals given to it by the eyes.

What we see is in fact made in the brain. The brain makes sight from signals given to it by the eyes.

What is the normal structure of the eye?

The eye is made of three parts.

- A light focussing bit at the front (cornea and lens).
- A light sensitive film at the back of the eye (retina).
- A large collection of communication wires to the brain (optic nerve).

A curved window called the cornea first focuses the light. The light then passes through a hole called the pupil. A circle of muscle called the iris surrounds the pupil. The iris is the coloured part of the eye. The light is then focused onto the back of the eye by a lens. Tiny light sensitive patches called photoreceptors cover the back of the eye. These photoreceptors collect information about the visual world. The covering of photoreceptors at the back of the eye forms a thin film known as the retina. Each photoreceptor sends its signals down very fine wires to the brain. The wires joining each eye to the brain are called the optic nerves. The information then travels to many different special ‘vision’ parts of the brain. All parts of the brain and eye need to be present and working for us to see normally.

What Is Retinopathy Of Prematurity? (Also called retrolental fibroplasia)

A premature (born before their expected due date) baby's retina is prone to scarring and detachment. This leads to visual impairment. Retinal detachment is when the thin retinal film
peels off from the back of the eye. Scarring and detachment of the retina in a premature baby is called Retinopathy of Prematurity. This was previously known as retrolental fibroplasia – this is the same condition.

**Why Does The Retina Scar And Detach?**

Because the baby has been born early, before they were expected to be due, some parts of the body have not had time to grow fully. The blood supply has not usually spread fully to all areas of the retina. Quite often areas of the retina around the edges do not have any blood supply when a premature baby is born. The blood supply normally grows to the edges of the retina over the first few weeks of life. During these few weeks the retina can become damaged because it is starved of blood. The damage can lead to scarring. The scar tissue can then shorten and pull the retina off the back of the eye. This is called a retinal detachment and causes visual impairment. Damage is more likely the more premature the baby is and the smaller their birth weight.

**How Does Retinopathy Of Prematurity Affect The Way A Child Sees?**

The symptoms that a child might complain of depend on:

- The age of the child
- Which bit of the retina has detached
- Whether it is affecting only one eye or both
- Whether the child has any other conditions that might affect vision

In Retinopathy of Prematurity the retinas of both eyes may detach when the child is very young. They are likely to initially feel their vision to be ‘normal’ as they have never known anything else but their own visual world. They will assume that everyone else has vision the same as their own. They will not realise that other people see things differently.

Later most young children will only complain of poor vision when the centre bit of the retina has detached. This will cause the centre bit of vision to become very blurred and ‘grey’. Most children will notice this, especially if it happens in their better eye. Younger children do not usually notice smaller areas of detached retina that are away from the central bit of vision.
Sometimes premature babies also have a form of brain damage. This may also cause visual impairment. This kind of visual impairment is called Cerebral Visual Impairment.

How Is Retinopathy Of Prematurity Diagnosed?

An eye doctor can usually diagnose Retinopathy of Prematurity during an examination. All babies who are born at least 8 weeks early or weigh less than 1500 grammes (less than about three pounds) need to be examined every 2 weeks. Examinations should start 6 weeks after the child is born. Examinations can stop when the blood supply to the retina has near fully grown. This is usually a couple of weeks before the date the baby was supposed to be due.

About half an hour before the examination a nurse will usually place drops in the baby’s eyes. The drops will make the pupils go bigger. This lets the eye doctor see all of the back of the eye. By looking into the eye using a special lens and torch the retina can be seen. The eye doctor can say how much of the retina does not yet have a blood supply. They can also see if any scarring or retinal detachment has started. Based on the examination the eye doctor can decide if any treatment is needed.

What can be done to help?

Most babies with Retinopathy of Prematurity do not need any treatment. If the baby’s eyes do need treatment this is usually organised by the eye doctor. The treatment reduces the chance of a child developing visual impairment by between one half and one quarter.

The aim of treatment is to ‘switch-off’ the bits of retina at the edges that do not have a blood supply. Scarring happens in Retinopathy of Prematurity because these bits of retina at the edges try to make their own new blood vessels to overcome the lack of blood. The new blood vessels do not end up helping at all. They cause scarring and inflammation. This leads to retinal detachment and visual impairment. If the retina is ‘switched-off’ then there is no need to make the new blood vessels and retinopathy of prematurity does not develop.

These bits of retina at the edges, away from the important central part of vision, can be ‘switched-off’ in two ways.
• By putting a very cold piece of metal on to the outside of the eye (cryotherapy)
• By shining a hot laser into the eye, directly on to the retina

Both treatments cause the retina that lacks a good blood supply to ‘switch-off’. This reduces the chance of retinopathy of prematurity developing. The bits of retina that are treated usually no longer work. Despite this most children are unaware that they are missing bits of vision away at the edges. As long as their central vision remains clear it does not affect the child.

Laser is becoming the more common way to treat Retinopathy of Prematurity. Sometimes the laser can cause burns to the cornea or lens. These do not normally cause visual impairment and usually settle without any problems. Both types of treatment can be sore. It is often done with the child asleep under a general anaesthetic.

Many children sadly, despite treatment still develop visual impairment from retinopathy of prematurity.

What Other Eye Problems Might Develop?

Sometimes children with Retinopathy of Prematurity can develop other problems with their vision. These may include:

• Short-sightedness (Myopia)
• Squint
• Retinal Detachment
• Glaucoma
• Cataract
• Corneal Scarring
• Cerebral Visual Impairment

Short-sightedness (Myopia)

Short-sight is more common in babies that are born premature. The more premature the baby the more likely they will be short-sighted. This means they will often need spectacles to see clearly.
Squint

Squint is when a child’s eyes do not appear to point in the same direction. This is more common in children who are born premature. There are different ways to treat squint. Initially wearing spectacles and covering the better eye with a patch may help. If this does not straighten the eyes then sometimes an operation may help.

Retinal Detachment

If the retina has detached then an operation may help. A surgeon would try to drain the water from underneath the retina, cut the scar tissue and then ‘stick’ the retina back down on to the back of the eye. This may not work first time and a second operation may have to be done. Often it is not possible to fix a retinal detachment caused by retinopathy of prematurity.

Glaucoma

Eyes keep their shape by being pumped up with water. It is a bit like a football being pumped up and inflated with air. You can feel the ‘pressure’ in your own eyes by gently feeling them through your closed eyelids. The amount of pressure depends on the flow of water in and out of the eye. If the flow of water out of the eye becomes blocked the pressure goes up. High pressure in the eye can cause damage to the optic nerve. Glaucoma is when the optic nerve is damaged by high pressure in the eye. This condition often needs a small operation and drops to treat.

Cataract And Corneal Scarring

If the lens in the eye or the cornea becomes hazy vision can be further impaired. These two conditions can sometimes develop in children with retinopathy of prematurity.

Cerebral Visual Impairment

Cerebral Visual Impairment (CVI) is a condition where some of the special ‘vision’ parts of the brain are damaged and not working properly. This causes reduced vision, even though the eyes may be normal. In most cases, once the damage has happened it does not get worse.
As the child grows the vision may even sometimes slowly improve. Babies that are born premature are more likely to also have Cerebral Visual Impairment.

**How can parents, family, friends and teachers make a difference?**

We use our vision to get around, learn new things and to meet other people and make friends.

Most children with Retinopathy of Prematurity have few problems getting around. The way they act can give the impression that their vision is normal. It is important however to be aware of their own special problems with vision.

Problems at school may be due to some of the reading books being hard to see. This often means it takes longer and more effort to do the work. If the size of print is increased most children will find schoolwork easier.

It is worth watching carefully to find out what the smallest toys are that a child can see and play with. Then try to only play with toys that are the same size or bigger.

Recognising facial expressions can often be difficult. It is worth trying to find out at what distance facial expressions can be seen and responded to. Then always try to talk and smile from within this distance. This helps a child to learn what facial expressions mean and to copy them.

Children with Retinopathy of Prematurity may have a part of the vision missing with the rest normal. It is important to recognise which part is missing to avoid placing objects in these areas.

Even if a child has very poor vision many useful and practical things can be done to help.