



# Learn about **RETINA** & protect your vision

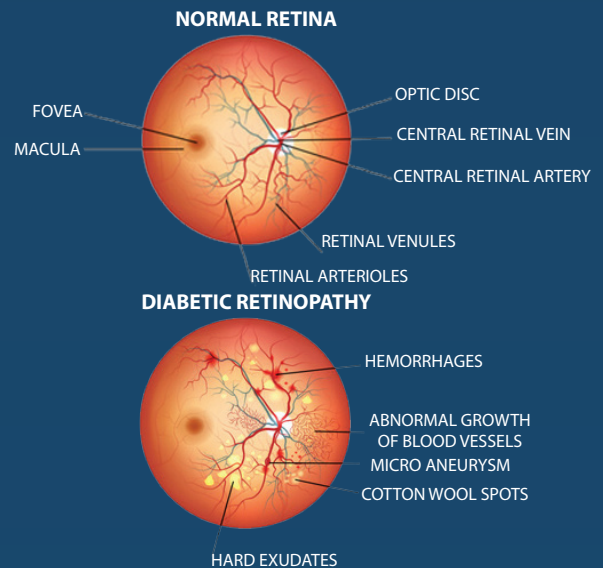


**The retina is a delicate layer at the back of the eye. It has special cells that turn light into signals that reach the brain. The retina plays a crucial role in vision, capturing and processing visual information to create perceived images.**

## DIABETIC RETINOPATHY

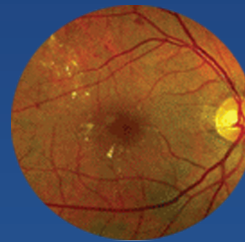
Diabetes mellitus is emerging as a major public health problem in India. It is a multisystem disorder which affects the heart, kidneys, peripheral nerves and the eyes. Involvement of the retina is called diabetic retinopathy, both type I and type II diabetes can cause retinopathy. In patients with more than twenty years of diabetes, nearly all patients with type I diabetes (insulin-dependent) and more than 60% of those with type II diabetes (non-insulin dependent) will have some degree of retinopathy. Retinopathy occurs when diabetes damages the tiny blood vessels in the retina. The weakened blood vessels may leak fluid and blood.

Narayana Nethralaya offers comprehensive facilities for the medical and surgical management of diabetic retinopathy. Additionally, we also provide counselling on lifestyle change and dietary modifications to reverse diabetes.

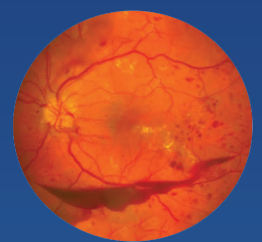


## WHAT ARE THE TYPES OF DIABETIC RETINOPATHY?

There are two forms of diabetic retinopathy: non-proliferative (NPDR) and proliferative (PDR). Non-proliferative diabetic retinopathy refers to the early stages of the disease, while proliferative diabetic retinopathy refers to the severe, progressive stage.



Moderate NPDR



Proliferative Diabetic Retinopathy

## WHAT ARE THE SYMPTOMS OF DIABETIC RETINOPATHY?

There may be **no symptoms in the early stages**, especially when the central portion of the retina is not involved. As the retinopathy progresses, you may have:

- ▶ Blurred vision
- ▶ Floaters (which can look like black spots, little threads, or cobwebs)
- ▶ Temporary or permanent loss of vision
- ▶ Pain is not a common feature of the disease.

## WHO IS AT RISK FOR DEVELOPING DIABETIC RETINOPATHY?

Those with poorly controlled blood sugar levels are at a high risk of developing diabetic retinopathy. Longer the duration of diabetes, higher the risk of diabetic retinopathy. In addition, high blood pressure, high cholesterol, anemia, kidney disease and pregnancy can all place a patient at greater risk of suffering from diabetic eye disease.

## HOW FREQUENTLY SHOULD I GET MY EYE EXAMINED?

If you have diabetes, you should get a yearly examination by your ophthalmologist. Once you develop diabetic retinopathy, your ophthalmologist may advise further investigations or treatment. A periodic follow up as advised by your ophthalmologist is mandatory. The frequency of these follow-up visits is decided based on the severity of the disease.



## HOW IS DIABETIC RETINOPATHY TREATED?

You may need treatment for diabetic retinopathy if it has affected the center (macula) of the retina, abnormal new blood vessels have started to appear (proliferative retinopathy), or peripheral vision has been severely damaged.

### Treatment options

- ▶ Medical treatment includes laser photocoagulation and intravitreal injections.
- ▶ Surgical treatment includes Vitrectomy.

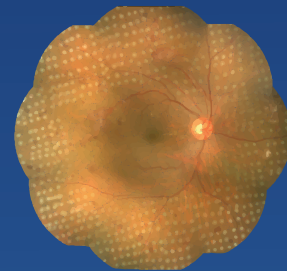
## WHAT IS LASER TREATMENT? WILL I REGAIN MY VISION AFTER LASER TREATMENT?

The aim of this treatment is to protect central vision. It does not restore lost vision, but it can prevent further deterioration, which is why early diabetic retinopathy diagnosis through periodic eye examination is imperative.

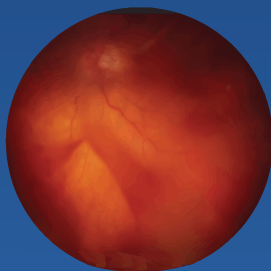
Laser photocoagulation involves tiny burns to seal the capillaries. This may cause small spots to appear in your field of vision after the procedure. These spots generally fade and disappear with time.

## HOW MANY SITTINGS OF LASER TREATMENT ARE REQUIRED?

Usually Panretinal Photocoagulation (PRP) is done in 2-3 sittings, But with the PASCAL® (Pattern Scan Laser), the entire session can be completed in 1 sitting. It may however vary from patient to patient. The severity of diabetic retinopathy plays an important role in deciding the number of sittings required.



Pascal laser



Vitreous hemorrhage

## WHAT ARE ANTI VEGF AGENTS, AND WHAT IS THEIR ROLE IN MANAGING DIABETIC RETINOPATHY?

Anti VEGF agents are emerging as the new modality of treatment for various stages of diabetic retinopathy. These agents are injected into the eye (intravitreal injection). They are commonly used in diabetic maculopathy and proliferative diabetic retinopathy. They may also be used as an adjunct before surgery for diabetic vitreous hemorrhage and retinal detachments.

## WHAT CAN I DO TO PREVENT DIABETIC RETINOPATHY?

Managing your diabetes is the best way to lower your risk of diabetic retinopathy. Lifestyle changes, eating healthy, regular physical activity and carefully following your doctor's instructions on insulin and medication are the best practices that are helpful in management of diabetes.

High blood pressure or high cholesterol along with diabetes increases your risk for diabetic retinopathy. So, controlling your blood pressure and cholesterol can also help lower your risk for vision loss.

Additionally, a change in the regular diet to a healthy low carb high fat (LCHF) diet can help reverse diabetes, control blood pressure and reduce the progression of diabetic complications such as retinopathy.

## WHAT IS LCHF DIET AND DOES IT HELP IN DIABETIC RETINOPATHY ?

A LCHF diet includes foods low in carbohydrates and rich in healthy fats and proteins. The diet provides you with the energy you need by burning fat instead of relying on glucose. For a complete list of foods that can be taken and avoided in the diet, please refer to our RDC brochure or visit our RDC clinic for counselling.

Diabetic patients with retinopathy may benefit from the LCHF diet by reducing the development and progression of the disease.

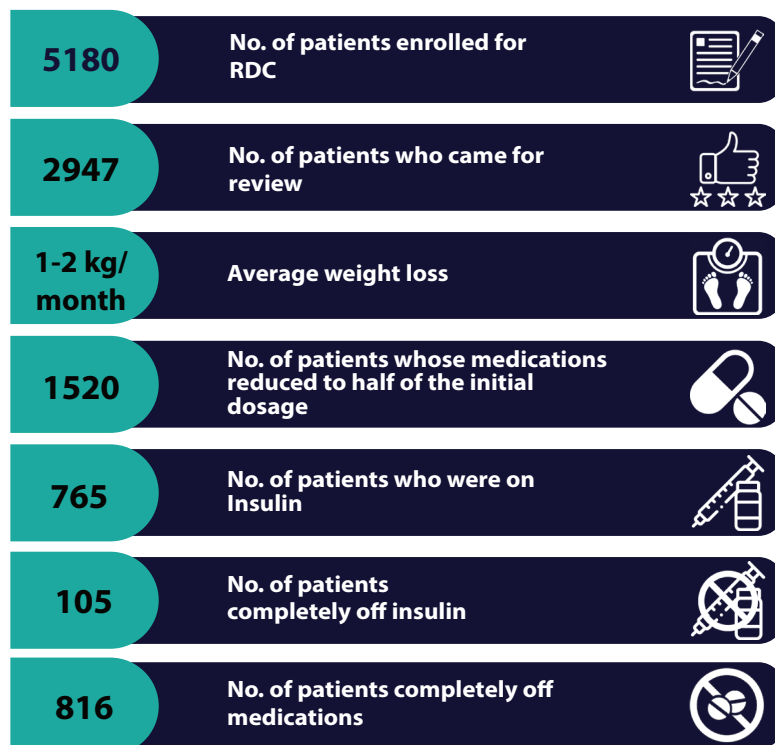
**Narayana Nethralaya's initiative-Reversing Diabetes clinic has a primary goal to free people from diabetes by adopting healthy lifestyle changes and embracing food as medicine.**

**The clinic consists of a team of highly skilled doctors, dieticians and counsellors with deep knowledge in the field of medicine.**

**Professional and personalized guidance along with periodic check-ups and gradual withdrawal of medicines over a period of 6-12 months with our experts ensures best results based on the patient's medical history.**

## Statistics at a glance

October 2021 to April 2023





# Let food be thy medicine

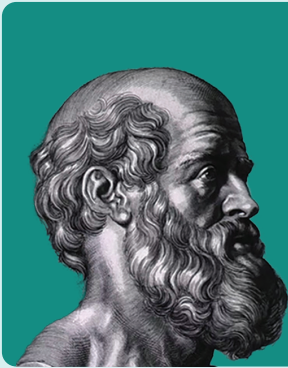
Prioritise Protein  
Energy (25%)

Eat to your  
heart's content  
Energy (10-15%)

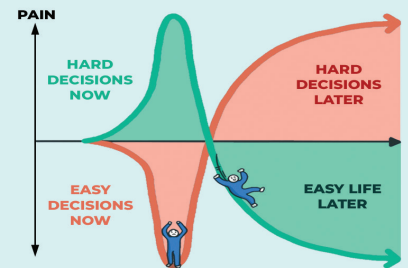


Don't fear good fats  
Energy (60%)

## NO GAIN WITHOUT PAIN



**BEFORE YOU HEAL  
SOMEONE, ASK HIM IF  
HE'S WILLING TO  
GIVE UP THE THINGS  
THAT MADE HIM SICK.**



## DISCLAIMER

The information in this brochure is to build general awareness only and does not substitute for professional medical advice. Readers are advised to consult a medical professional if they are seeking medical advice, diagnosis or treatment.

Reversing Diabetes Clinic

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## AGE RELATED MACULAR DEGENERATION (AMD)

Age-related macular degeneration (AMD) is an eye disease that can blur your central vision. It happens when aging causes damage to the macula — the part of the eye that controls sharp, straight-ahead vision.

### WHAT ARE THE SYMPTOMS OF AMD?

- ▶ Early dry AMD doesn't cause any symptoms.
- ▶ In intermediate dry AMD, you may still have no symptoms or may experience blurring of vision or trouble seeing in low lighting.
- ▶ In late AMD (wet or dry type), you may notice that straight lines start to look wavy or crooked, blurry area near the center of your vision, blank spots and trouble seeing in low lighting.

### WHAT ARE THE TYPES OF AMD?

#### • DRY AMD

With dry macular degeneration, vision loss is usually gradual. It happens in 3 stages: early, intermediate, and late. It usually progresses slowly over several years. This happens when the macula gets thinner with age. While there is no definitive treatment for dry macular degeneration, some people may benefit from vitamin supplements (anti-oxidants).

#### • WET AMD

About 10% of people who have macular degeneration have the wet form. This can cause more damage to your central vision than the dry form. Wet macular degeneration occurs when abnormal blood vessels begin to grow underneath the retina. These new blood vessels may leak fluid or blood, blurring or distorting central vision.

Vision loss from this form of macular degeneration may be faster and more noticeable than dry AMD.



### WHO IS AT RISK OF AMD?

The following are at a risk of AMD:

- ▶ Aged >55 years
- ▶ Family history of AMD
- ▶ Smoking

### CAN AMD BE PREVENTED?

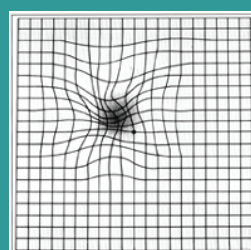
The exact cause of AMD is unknown. A healthy life style without smoking and a good diet may reduce the risk.

### CAN AMD BE TREATED?

Treatment for AMD depends on the stage and type. There's currently no treatment for early AMD. Regular eye exams help to keep track of the disease. Lifestyle modifications like healthy diet, regular exercise and quitting smoking may be useful. If you have intermediate or late AMD, dietary supplements (vitamins and minerals) may be advised. If you have wet AMD, there are other treatments that may be able to stop further vision loss such as thermal laser, photodynamic therapy, certain anti-VEGFs or combination of these.

### HOW WILL I KNOW I HAVE AMD?

Early reporting of new distortion or blurred vision should be reported to the eye doctor. The earlier the disease is detected, the more amenable it is to treat. The earliest symptom is distortion of straight lines, making a grid pattern appear distorted. This simple test can be done at home using Amsler Grid.



**Amslers with distorted image in AMD**

## INTRAVITREAL INJECTIONS

An intravitreal (into the vitreous cavity) injection is a way of delivering medications to the retina in the back of the eye. Certain medications will not reach the retina if given as eye drops or pills, and therefore needed to be injected directly into the eye.

### INTRAVITREAL INJECTION PROCEDURE

- ▶ All intravitreal injections are given in operation theater under aseptic precaution. Your eyes and the skin around your eyes will be cleaned with antiseptic solution. Your face will be covered with the sterile cloth.
- ▶ Anaesthetic drops will be instilled. An instrument is used to help keep your eyes open, to prevent blinking and reduce the risk of infection.
- ▶ The medication will be injected into the white part of the eyes. You may feel mild pressure during the procedure.

### WHEN WILL YOU BE ADVISED FOR THESE INJECTIONS?

- ▶ Neovascular age-related macular degeneration (AMD) or wet age-related macular degeneration (AMD).
- ▶ Diabetic macular edema (DME).
- ▶ Macular edema secondary to retinal vein occlusion (RVO), including branch retinal vein occlusion and central retinal vein occlusion.
- ▶ Abnormal growth of blood vessels in the macula due to pathologic myopia, injury to the eye, or unknown reasons.
- ▶ Infection or inflammation in the eye, such as uveitis, endophthalmitis after an accident or surgery or spreading from another part of the body.

### POSTOPERATIVE INSTRUCTIONS INCLUDE

- ▶ You should avoid getting water in the eye for the first 3 days after the injection.
- ▶ Do not rub your eyes and avoid getting anything in your eyes.
- ▶ Please see your doctor immediately if you experience eye pain, redness, and/or discharge or blurry vision after the injection.
- ▶ There are no restrictions on watching TV or working on the computer after the injection.
- ▶ Regular follow up and compliance to treatment plans aids in better results.

### WHICH MEDICATIONS CAN BE GIVEN BY THIS TECHNIQUE?

- ▶ Anti-VEGF medications interrupt the production of the abnormal blood vessels in the retina and choroid. These drugs help in reducing the fluid leakage from the blood vessels and decrease swelling of the macula. They include Avastin, Razumab, Eyelea, Accentrix, Oceva and Pagenax to name a few.
- ▶ Steroids, such as ozurdex, triamcinolone, and dexamethasone. The steroid helps in reducing the inflammation and fluid leakage.
- ▶ Antibiotics, such as anti-bacterial, anti-fungal, and anti-viral medications. These drugs are used to treat the infection in the eye such as endophthalmitis and retinitis.

### WHAT ARE THE RISKS OF THIS PROCEDURE?

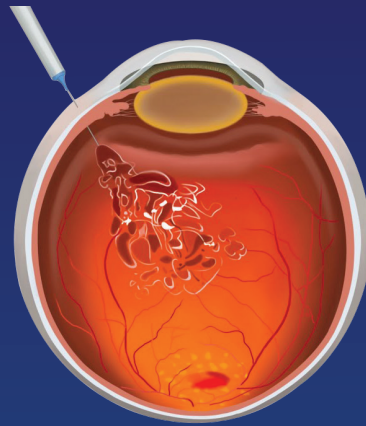
- ▶ Mild irritation
- ▶ Glaucoma
- ▶ Bleeding inside the eye
- ▶ Retinal detachment
- ▶ Cataract
- ▶ Infection
- ▶ Temporary increase in pressure inside the eye.
- ▶ Moving circular black spots in your vision (floaters) may be noticeable immediately following the injection and can last up to 24 hours.
- ▶ A small red area or hemorrhage at the site of injection in the first few days after injection. This occurs as a result of a capillary being punctured and is nothing to be concerned about. It is similar to a bruise on the outside of your eye, and will resolve completely over 1-2 weeks.



# Anti VEGF

## WHAT ARE ANTI-VEGF MEDICINES?

Anti-VEGF medicines stop the abnormal blood vessels leaking, growing and then bleeding under the retina. Vascular endothelial growth factor (VEGF) is a protein that promotes the growth of new blood vessels. It also makes the blood vessels more leaky. Anti- VEGF medicines stop the growth of these new blood vessels. This prevents damage to the retinal light receptors and loss of central vision.



## WHAT EYE CONDITIONS ARE TREATED WITH ANTI-VEGF MEDICINE?

Anti-VEGF medicines are used by ophthalmologists to treat the following eye problems:

- ▶ Wet age-related macular degeneration (AMD)- Abnormal blood vessels grow under the retina, leading to vision loss.
- ▶ Macular edema- Swelling of the macula, often associated with diabetic retinopathy or retinal vein occlusion.
- ▶ Diabetic retinopathy- Damage to blood vessels in the retina caused by diabetes.
- ▶ Retinal vein occlusion- Blockage in the veins that carry blood away from the retina.

## LIMITATIONS OF ANTI VEGFS

The Anti VEGFs effect lasts for a limited period of time (4-6 weeks) in the eye and hence, repeat injections may be needed. The visual acuity may not improve in all patients after the injections.

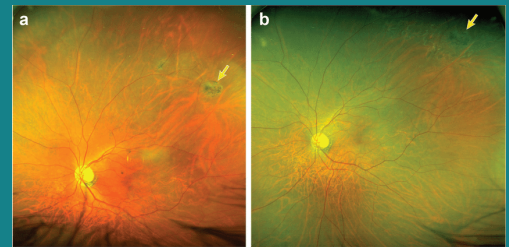
## RISK FACTORS ASSOCIATED WITH ANTI VEGFS (INTRAVITREAL INJECTION)

Though relatively uncommon, some of the complications associated with Anti-VEGF include :

- ▶ Bleeding into the eye
- ▶ Infection
- ▶ Retinal detachment
- ▶ Trauma to the lens can cause cataract
- ▶ Certain anti VEGFs are relatively contraindicated in patients having or suffering from vascular stroke in last 3 months

## WHAT IS VITRECTOMY?

Vitrectomy is a surgical procedure in which cloudy, blood filled vitreous and scar tissue causing tractional retinal detachments are removed from the eye.



Pre op

Post op

OCT of a patient with taut posterior hyaloid and vitreomacular traction- pre and post vitrectomy

## When is vitrectomy done?

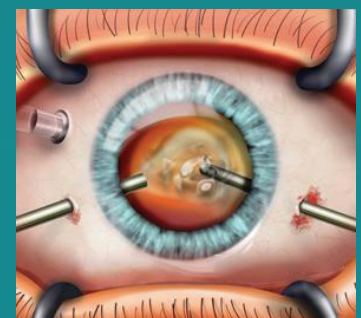
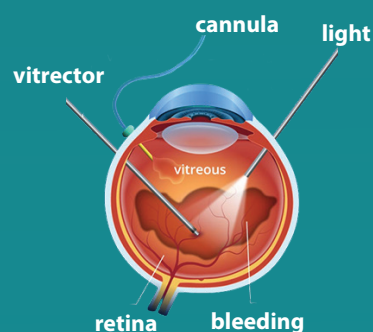
Your ophthalmologist may recommend a vitrectomy if you have one or more of these conditions:

- Diabetic retinopathy, with bleeding or scar tissue affecting the retina or vitreous gel
- Some forms of retinal detachment (when the retina lifts away from the back of the eye)
- Macular hole (a hole or tear in the macula)
- Macular pucker (wrinkles or creases in the macula)
- An infection in the eye called endophthalmitis
- Severe eye injury
- Certain problems during cataract surgery

Vitrectomy is a surgical procedure undertaken by a specialist where the vitreous humor gel that fills the eye cavity is removed to provide better access to the retina. This allows for a variety of repairs, including the removal of scar tissue, laser repair of retinal detachments and treatment of macular holes. Once surgery is complete, saline, a gas bubble or silicone oil may be injected into the vitreous gel to help hold the retina in position.

The retina surgeon uses state of the art instrumentation and equipment to provide the best outcomes and minimise risks. Many vitrectomy procedures can now be performed with **self-sealing, sutureless (no-stitch) incisions** approximately one half of a millimeter in size, which is about the width of an eyelash.

Unless the patient is in poor health or has severe disease, nearly all vitrectomies are outpatient procedures performed either in a hospital or in a dedicated ambulatory surgery center; they involve little or no pain and require only minimal anesthesia.



## RETINAL DETACHMENT

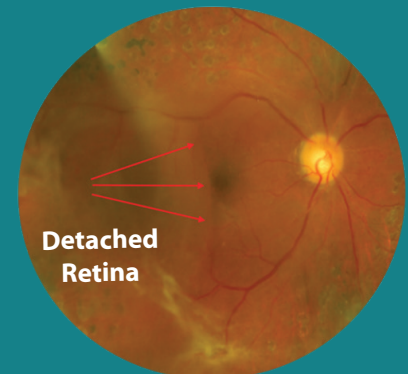
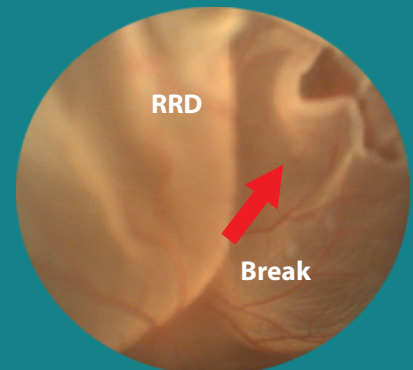
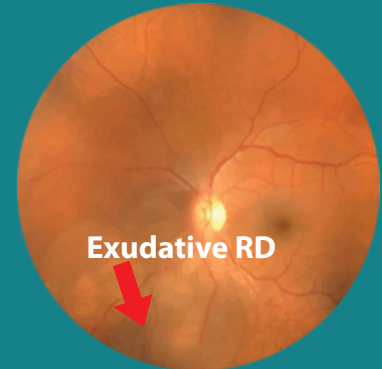
The retina is the neurosensory tissue that lines the back inside wall of the eye, just like wall paper on a wall. Just like the film in a camera, the retina transfers the light coming into our eye into vision. The center of the retina is called the macula and is the only part capable of fine detailed vision, i.e. reading vision, recognizing faces, etc. The remainder of the retina, the peripheral retina, is for side vision.

When the retina detaches, it separates from the back wall of the eye and is removed from its blood supply and source of nutrition. The retina will degenerate and lose its ability to function if it remains detached. Central vision will be lost if the macula remains detached. The causes of retinal detachment can be divided into three main categories:

**Exudative retinal detachment:** This detachment is due to leakage of fluid from under the retina. The fluid is called exudate. Tumors and inflammatory disorders can cause Exudative detachments.

**Rhegmatogenous Retinal detachment:** This is the most common type of retinal detachment and usually occurs when the vitreous separates from the back wall of the eye. The vitreous is the clear gel that fills the central cavity of the eye. The formed vitreous gel liquefies with age and eventually falls away or separates from the retina. This is called a posterior vitreous detachment (PVD) and is a normal event occurring in most people sometime between 40-70 years of age. A retinal detachment can occur once there is a retina break. The liquid vitreous passes through the break and goes under the retina. The retina will then start to detach from the underlying tissue. Since most tears occur in the peripheral retina, the detachment will first cause loss of a portion of the side vision. This can be seen as a curtain or dark shadow involving the peripheral vision. As the detachment extends towards the macula, the shadow will also enlarge. Central vision will be lost if the macula detaches. Without surgical repair, most rhegmatogenous detachments will eventually involve the entire retina and all vision will be lost.

**Tractional Retinal Detachment:** occurs in Proliferative diabetic retinopathy.



## REPAIR OF RHEGMATOGENOUS RETINAL DETACHMENT

Fortunately, over 90% of retinal detachments can be repaired surgically. The type of surgery is decided by the surgeon based on several factors including type, location, duration of the detachment, age of the patient etc.



## RETINAL VEIN OCCLUSIONS

The retina is the nerve tissue in the back of the eye that requires healthy blood circulation for visual function. Blood enters the retina through the central retinal artery and drains out of the retina through the central retinal vein. Retinal vein occlusion occurs due to blockage of retinal vein. The severity of the blockage correlates with the severity of the vision loss.

### WHO IS AT RISK FOR DEVELOPING RVO?

**Risk factors for retinal vein occlusion include those with:**

- ▶ A history of glaucoma
- ▶ Systemic hypertension
- ▶ Smoking
- ▶ Hyperlipidemia (high cholesterol and triglycerides)
- ▶ Diabetes mellitus
- ▶ Atherosclerosis (often characterized by prior coronary artery disease or stroke)
- ▶ Problems with blood clotting
- ▶ Blood vessel inflammation (vasculitis)
- ▶ Increased blood viscosity
- ▶ Certain medications

### WHAT ARE THE TYPES OF RVO?

There are two types of retinal vein occlusion:

**Complete:** Central retinal vein occlusion (CRVO) is a blockage of the main vein responsible for draining blood from the retina. This blockage causes the walls of the vein to leak blood and excess fluid into the retina, which collects in the macula – the part of the eye responsible for detailed central vision – and causes vision to become cloudy and blurred.

**Partial:** Branch Retinal Vein Occlusion (BRVO) is a blockage of one or more branches of the central retinal vein, which runs through the optic nerve.

### WHAT ARE THE SYMPTOMS OF RVO?

**Symptoms:**

- ▶ Blurring of vision
- ▶ Painless sudden loss of vision
- ▶ The appearance of floaters. These shapes resemble small hair or spots of dust that float within your field of vision

## WHAT ARE THE INVESTIGATIONS AND TREATMENT OPTIONS FOR RVO?

It can be diagnosed through a slit-lamp examination and dilated eye exam. Additional diagnostic testing using Optical Coherence Tomography, Fundus photo and Fluorescence angiography may be required in order to evaluate the formation of abnormal blood vessels, leakage of these blood vessels, and the presence of any other retinal conditions and a detailed physician evaluation to determine the underlying cause.

## DEPENDING ON THE COMPLICATIONS YOU HAVE, YOU MAY BE ADVISED

- ▶ Panretinal photocoagulation laser treatment to reduce growth of new blood vessels.
- ▶ Intravitreal injections to reduce macular swelling.
- ▶ Systemic management and lifestyle modifications to reduce your risk of developing further eye conditions in the future.

# RETINA

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