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Diseases:

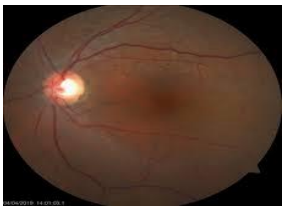
Reticular Drusen

Debatic Retinopathy

Mascular Digeneration(Age Related)

What is Reticular Drusen :

Reticular drusen are small yellow or white deposits that form under the retina, specifically in the area called the retinal pigment epithelium (RPE). They are typically associated with age-related macular degeneration (AMD), a common eye condition that can lead to vision loss.



Types of Reticular Drusen :

- **Hard Drusen**: Small, distinct deposits with sharp edges, typically considered less concerning. However, an increase in number can elevate the risk of AMD.
- **Soft Drusen**: Larger, less defined edges, often linked to a higher risk of progressing to advanced AMD.
- **Reticular Pseudodrusen**: Located above the retinal pigment epithelium, these have a net-like or reticular pattern and are strongly associated with late-stage AMD, particularly geographic atrophy or choroidal neovascularization.

How Common is Reticular Drusen :

Reticular drusen, also known as subretinal drusenoid deposits (SDD), are less common than the typical soft drusen found in age-related macular degeneration (AMD). They are primarily seen in people with advanced stages of AMD, particularly in individuals over 60. Reticular drusen are estimated to be present in 7-15% of people with AMD, though this prevalence may vary based on the population studied and diagnostic methods.

Unlike typical drusen, which are located beneath the retinal pigment epithelium (RPE), reticular drusen are found between the RPE and photoreceptors, and their presence is associated with a higher risk of progression to late-stage AMD, especially geographic atrophy.

Symptoms of Reticular Drusen:

Common symptoms of reticular drusen include:

1. **Blurred or distorted vision**: A gradual loss of sharpness in central vision, making it difficult to read or see fine details.
2. **Difficulty seeing in low light**: Problems with night vision or seeing in dimly lit environments may arise as the condition progresses.
3. **Visual distortions**: Straight lines may appear wavy or distorted, and objects might seem to change shape or size.
4. **Dark spots in central vision (scotomas)**: You may notice small dark areas or blind spots in the center of your vision.
5. **Slow progression of symptoms**: The loss of vision is usually gradual and may not be noticeable in the early stages.
6. **Increased sensitivity to glare**: Bright lights or glare from headlights at night can become more bothersome.

Causes of Reticular Drusen:

- **Aging**: The risk of reticular drusen increases with age, and they are more commonly found in individuals over 60. As the retina ages, waste products can accumulate under the retinal layer, forming drusen.
- **Genetics**: A family history of age-related macular degeneration (AMD) or other retinal diseases can increase the likelihood of developing reticular drusen. Specific genetic mutations, such as those in the **CFH (complement factor H)** gene and the **ARMS2/HTRA1** gene, have been linked to AMD and the formation of drusen.
  - **Inflammation**: Chronic inflammation in the retina may play a role in the development of reticular drusen. Inflammation can lead to the accumulation of cellular waste products beneath the retina.
  - **Oxidative Stress**: The retina is highly susceptible to oxidative stress due to constant light exposure and high metabolic activity. Damage from oxidative stress can lead to retinal cell dysfunction and the buildup of drusen.
  - **Vascular Factors**: Impaired blood flow or abnormalities in the choroid (the blood vessel layer beneath the retina) may contribute to the formation of reticular drusen. Poor circulation may prevent efficient removal of waste products, leading to their accumulation under the retina.
  - **Environmental Factors**: Smoking, poor diet (low in antioxidants), and exposure to harmful UV light can increase oxidative stress and inflammation in the retina, contributing to the development of drusen.

Reticular Drusen Risk Factors:

- Age
- Genetics
- Smoking
- Cardiovascular Disease
- Obesity
- High Cholesterol
- Poor Diet
- Light Exposure

Reticular Drusen Risk Factors:

1. Comprehensive Eye Exam

- An ophthalmologist or optometrist begins with a standard eye exam to assess visual acuity and examine the retina for any abnormalities. While drusen might not cause symptoms early on, regular eye checkups are crucial, especially for older adults or those with risk factors for AMD.

2. Dilated Fundus Examination

- During a **dilated eye exam**, the doctor uses special drops to widen the pupils, allowing a better view of the retina and macula. With the use of an ophthalmoscope or slit-lamp, the eye care professional can look for the presence of drusen deposits under the retina. However, small reticular drusen may be difficult to detect with this method alone.

3. Optical Coherence Tomography (OCT)

- **OCT** is a non-invasive imaging test that uses light waves to create cross-sectional images of the retina. This allows the eye doctor to see the layers of the retina and detect reticular drusen more clearly. OCT is especially useful for distinguishing between reticular drusen and other types of retinal deposits. It provides a detailed view of the thickness and structure of the retina, making it easier to identify the small, yellowish subretinal drusen.

4. Fundus Autofluorescence (FAF)

- **FAF** is an imaging technique that captures the natural fluorescence of the retina. Reticular drusen tend to show a distinctive autofluorescent pattern, which helps differentiate them from other types of drusen. This test can highlight the extent of retinal damage and help monitor disease progression.

5. Fluorescein Angiography

- In **fluorescein angiography**, a fluorescent dye is injected into the bloodstream, and a special camera takes images of the retina as the dye flows through the retinal blood vessels. This test can help detect changes in the retinal blood vessels and identify areas where drusen are affecting retinal function.

6. Infrared Imaging

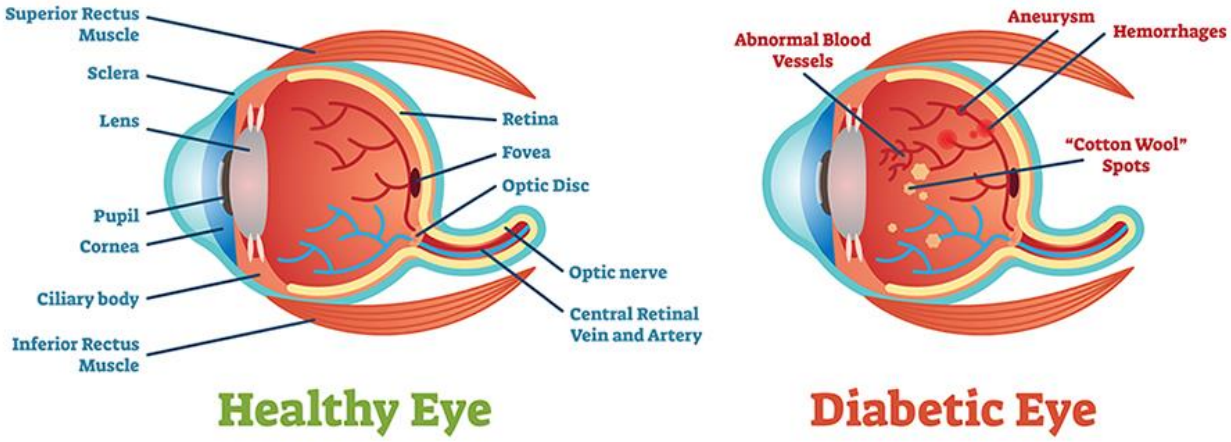
- **Infrared imaging** can be used to capture subtle changes in the retina that are not easily visible with standard imaging techniques. Reticular drusen often show up more clearly with infrared light than with traditional visible-light imaging.

7. Visual Field Testing

- **Visual field tests** may be used to assess the extent of any visual loss caused by reticular drusen or AMD. This can help the doctor understand how the deposits are affecting central vision or creating blind spots (scotomas).

What is Debetic Retinopathy:

Diabetic retinopathy is an eye condition that affects people with diabetes. It occurs when high blood sugar levels cause damage to the blood vessels in the retina, the light-sensitive tissue at the back of the eye. Over time, this damage can lead to vision problems, and in severe cases, it can cause blindness. Diabetic retinopathy is one of the leading causes of vision loss worldwide among people with diabetes



Types of Diabetic Retinopathy:

1. Non-Proliferative Diabetic Retinopathy (NPDR)

(Early Stage)

- NPDR is the **milder form** of diabetic retinopathy and is often referred to as the **early stage** of the disease. It can range from mild to severe depending on the amount of damage to the retinal blood vessels.

Characterstics:

- **Microaneurysms**: Tiny bulges form in the blood vessels of the retina, which can leak blood and fluid into the retinal tissue.

- **Retinal Swelling (Edema)**: The leakage of fluid can cause the retina to swell, particularly in the **macula**, the central part of the retina responsible for sharp vision. This is called **macular edema**, which is the most common cause of vision loss in people with diabetic retinopathy.
- **Hemorrhages**: Small hemorrhages or bleeding can occur in the retina due to weakened blood vessels.
- **Exudates**: As fluid leaks out of damaged vessels, fatty deposits, called exudates, can form in the retina.
- **Capillary Blockages**: In more severe cases, the small blood vessels in the retina become blocked, depriving parts of the retina of nutrients and oxygen (ischemia).

Severity Levels of NPDR:

- **Mild NPDR**: The earliest stage with tiny microaneurysms but no vision impairment.
- **Moderate NPDR**: Blood vessels become more damaged, causing more bleeding and leakage, possibly leading to vision problems.
- **Severe NPDR**: Many retinal blood vessels are blocked, causing significant retinal damage and increasing the risk of progressing to the more advanced stage, proliferative diabetic retinopathy.

NPDR can progress to more advanced stages if blood sugar levels and other risk factors, such as high blood pressure, are not well controlled.

2. Proliferative Diabetic Retinopathy (PDR)

(Advanced Stage)

- PDR is the **more severe, advanced stage** of diabetic retinopathy. It is characterized by the growth of **abnormal new blood vessels** on the surface of the retina and into the vitreous gel, a process called **neovascularization**

Characterstics:

- **Neovascularization**: The retina responds to poor blood supply (ischemia) by growing new, fragile blood vessels. These new vessels can leak blood into the **vitreous** (the gel-like substance in the center of the eye), leading to **vitreous hemorrhage** and sudden vision loss.
- **Scar Tissue Formation**: As the abnormal vessels bleed and heal, scar tissue can form on the surface of the retina. This scarring can cause the retina to pull away from the back of the eye, leading to a condition called **tractional retinal detachment**, which can result in severe vision loss or blindness.
- **Vitreous Hemorrhage**: Bleeding into the vitreous humor can cloud the vision or cause a sudden loss of vision.

- **Neovascular Glaucoma**: New blood vessels can grow in the front part of the eye, blocking fluid drainage and causing **glaucoma**, which further damages the optic nerve.

PDR is more likely to cause significant vision loss or blindness if not treated promptly.

3. Macular Edema (Can Occur in Both NPDR and PDR)

- **Diabetic macular edema (DME)** is a complication of both NPDR and PDR that specifically affects the **macula**, the central part of the retina responsible for sharp, straight-ahead vision.
- DME occurs when damaged blood vessels leak fluid into the macula, causing swelling and blurry vision. It is the most common cause of vision loss in people with diabetic retinopathy.

There are two types of DME:

- **Focal DME**: Occurs when specific areas of blood vessel leakage cause localized swelling.
- **Diffuse DME**: Caused by widespread leakage and swelling across a larger area of the macula.

How Common is Diabetic Retinopathy:

Global Prevalence:

- **Worldwide**, an estimated **1 in 3** people with diabetes has some degree of diabetic retinopathy, and approximately **1 in 10** may develop vision-threatening forms of the disease.
- As of 2020, it is estimated that **103 million** people globally had diabetic retinopathy, and this number is projected to increase with the growing prevalence of diabetes.

United States:

- In the U.S., about **40-45%** of people with diabetes show signs of diabetic retinopathy.
- It affects approximately **7.7 million** Americans aged 40 and older.
- Around **1 in 5 adults** with diabetes has diabetic retinopathy, and about **5.4%** of people with diabetes develop vision-threatening diabetic retinopathy (such as proliferative diabetic retinopathy or diabetic macular edema).

Factors Affecting Prevalence:

1. **Duration of Diabetes**: The longer someone has diabetes, the more likely they are to develop diabetic retinopathy. After 20 years of living with diabetes:
    - Nearly **100%** of people with **Type 1 diabetes** will have some form of diabetic retinopathy.
    - Up to **60%** of people with **Type 2 diabetes** will develop diabetic retinopathy.
2. **Type of Diabetes**:
    - People with **Type 1 diabetes** are at a higher risk of developing diabetic retinopathy earlier in life since their condition usually begins in childhood or adolescence.

    - People with **Type 2 diabetes** are also at risk, but it is often detected later in life, making screening and management crucial.
3. **Control of Diabetes**:
    - Proper control of blood sugar, blood pressure, and cholesterol significantly reduces the risk of developing diabetic retinopathy or slows its progression.
4. **Geography and Healthcare Access**:
    - The prevalence of diabetic retinopathy is generally higher in **low- and middle-income countries** where access to healthcare and diabetic management may be more limited.
    - **Developing countries** with rising diabetes rates have experienced increasing numbers of diabetic retinopathy cases as populations grow older and diabetes becomes more prevalent.

Symptoms of Diabetic Retinopathy:

1. **Early Symptoms (Non-Proliferative Diabetic Retinopathy – NPDR) :**

- **Blurred vision**: Early signs may include blurred or fluctuating vision due to swelling in the retina (macular edema).
- **Floaters**: Tiny dark spots, strings, or cobweb-like shapes (floaters) can appear in the field of vision as small amounts of blood leak into the eye.
- **Difficulty with color vision**: Colors may appear washed out or less vibrant.
- **Dark or empty spots** in the center of vision: These occur when areas of the retina are damaged due to blocked blood vessels.
- **Difficulty seeing at night** or in low light.

2. **Advanced Symptoms (Proliferative Diabetic Retinopathy – PDR) :**

- **Sudden vision loss**: This can happen if abnormal blood vessels leak large amounts of blood into the vitreous (the gel-like substance inside the eye).
- **Complete blindness**: This may occur due to severe retinal damage or retinal detachment, which happens when scar tissue pulls the retina away from the back of the eye.
- **Distorted vision**: Vision may appear wavy or distorted due to retinal swelling.
- **Flashes of light**: This can indicate a possible retinal detachment.
- **Glare**: Bright lights may cause more glare than usual.

Causes of Diabetic Retinopathy

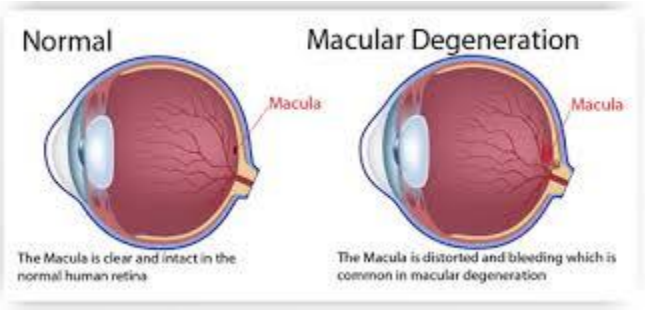
Diabetic retinopathy is caused by the damage to the blood vessels in the retina due to high blood sugar levels over time. The retina requires a constant supply of blood to function properly, and prolonged periods of high blood sugar can weaken and damage the delicate blood vessels in this area.

Mechanisms Behind Causes:

1. **High Blood Sugar (Hyperglycemia)**
    - Chronic high blood sugar levels damage the small blood vessels (capillaries) in the retina, causing them to weaken, swell, and leak fluid or blood into the retina. Over time, this can cause significant damage to retinal tissue, leading to vision loss.
2. **Blood Vessel Damage**
    - In early diabetic retinopathy (non-proliferative stage), the weakened blood vessels develop tiny bulges known as **microaneurysms**. These microaneurysms can rupture and leak blood or fluid into the retina.
    - As the disease progresses, more blood vessels become blocked, depriving parts of the retina of oxygen (ischemia). This lack of oxygen can trigger the growth of new, abnormal blood vessels in advanced stages (proliferative diabetic retinopathy).
3. **Neovascularization (Abnormal Blood Vessel Growth)**
    - In advanced stages, the retina tries to compensate for the poor blood flow by growing new blood vessels. However, these new vessels are weak and prone to leaking, leading to **vitreous hemorrhage** (bleeding into the vitreous) or **retinal detachment** due to scar tissue formation.
4. **Macular Edema**
    - Fluid can leak into the macula (the central part of the retina responsible for sharp, detailed vision), causing swelling. This condition, called **diabetic macular edema (DME)**, is a common cause of vision loss in people with diabetic retinopathy.

What is Mascular Digenaration:

Macular degeneration, also known as **age-related macular degeneration (AMD)**, is an eye condition that primarily affects the **macula**, the central part of the retina responsible for sharp, detailed vision needed for tasks like reading, driving, and recognizing faces. It leads to the gradual deterioration of central vision, while peripheral vision remains unaffected. Macular degeneration is a major cause of vision loss in older adults, especially those over the age of 50.



Types of Macular Degeneration:

There are two main types of AMD:

1. **Dry Macular Degeneration** (Non-Exudative or Atrophic):
    - This is the more common form, accounting for **85-90%** of cases.
    - It occurs when **drusen** (small yellow deposits) form under the macula, leading to thinning and atrophy of the retinal cells.
    - Over time, the macula gradually deteriorates, causing blurry central vision.
    - Vision loss is generally slower in dry AMD than in the wet form.
2. **Wet Macular Degeneration** (Exudative or Neovascular):
    - This is the more severe and less common form, accounting for about **10-15%** of cases.
    - It occurs when **abnormal blood vessels** grow beneath the retina and macula. These vessels are fragile and can leak blood or fluid, causing rapid damage to the retinal cells.
    - Wet AMD leads to more sudden and severe central vision loss compared to dry AMD.

Symptoms of Macular Degeneration:

- **Blurry central vision**: A gradual loss of clarity in the center of your visual field, making it hard to see fine details.
- **Dark or empty areas** in the center of vision.
- **Distorted vision**: Straight lines may appear wavy or crooked (a condition known as metamorphopsia).
- **Difficulty reading** or recognizing faces.

- **Colors may appear less vibrant** or faded.

In early stages, macular degeneration may not cause noticeable symptoms, but over time, it can significantly impact everyday activities such as reading, driving, and recognizing faces.

Risk Factors for Macular Degeneration:

- **Age**: The risk increases significantly after the age of 50.
- **Family history and genetics**: A family history of AMD increases the risk.
- **Smoking**: Smoking doubles the risk of developing macular degeneration.
- **Obesity**: Being overweight can accelerate the progression of the disease.
- **High blood pressure (hypertension)**: Hypertension can increase the risk of developing AMD.
- **Diet**: A diet low in nutrients such as antioxidants and high in unhealthy fats may contribute to AMD.
- **Light exposure**: Long-term exposure to ultraviolet (UV) light may increase the risk.

Diagnosis:

- **Comprehensive eye exam**: An eye doctor can detect early signs of AMD during a dilated eye exam.
- **Amsler grid test**: A simple test that checks for distortion in the visual field.
- **Optical coherence tomography (OCT)**: Imaging that provides detailed cross-sections of the retina to detect damage.
- **Fluorescein angiography**: A diagnostic test that uses dye to examine abnormal blood vessels in wet AMD.

Treatment:

- **Dry AMD**: There is currently no cure for dry AMD, but certain lifestyle changes, nutritional supplements (AREDS2 formula), and low-vision aids can help slow progression.
- **Wet AMD**: Treatments like **anti-VEGF injections** (medications that inhibit the growth of abnormal blood vessels), **laser therapy**, or **photodynamic therapy** can slow the progression and, in some cases, restore some vision.

Summary:

Macular degeneration is a common, age-related condition that leads to loss of central vision. Early diagnosis and treatment can help slow its progression, particularly in wet AMD, but there is currently no cure.