

Diabetes Mellitus and Diabetic Retinopathy

WHAT IS DIABETES MELLITUS?

Diabetes mellitus, or simply diabetes, is a disorder that disrupts the way your body uses sugar. The cells in your body need sugar in order to work normally and sugar gets into the cells with the help of a hormone called insulin. Diabetes is a disease in which a person does not produce enough insulin, or because their body does not respond to the insulin that is produced. Insulin is a hormone that controls the amount of glucose (sugar) in the blood. Diabetes leads to high blood sugar levels, which can lead to damage of blood vessels, organs, and nerves.

THERE ARE THREE MAIN TYPES OF DIABETES MELLITUS (DM):

Type 1 Diabetes: This results from not making insulin. People with type 1 diabetes need insulin and are treated with either insulin injections or an insulin pump. Type 1 DM is the most common form of diabetes in children and are typically diagnosed at a younger age.

Type 2 Diabetes: This results from insulin resistance, where cells fail to use insulin properly. Patients are treated with a combination of diet, exercise and oral medication. Patients with Type 2 DM are usually obese and are diagnosed after puberty.

Type 3: Gestational Diabetes: Diabetes during pregnancy.

HOW IS DIABETES MELLITUS DIAGNOSED?

Diabetes may present with symptoms in some people, and no symptoms in others. Generally, people with Type 1 DM have increased thirst (polydipsia), frequent urination (polyuria), and weight loss. Symptoms may develop over weeks to months. Untreated, this condition may cause a person to lose



consciousness and become very ill (diabetic ketoacidosis). People with Type 2 DM may have no symptoms or they may have polydipsia and polyuria.

Diabetes is diagnosed by a blood test to measure the amount of sugar (glucose) in your blood. Hemoglobin A1c can also be measured with a blood test and gives information about average blood glucose over the past 3 months. Your doctor will help you determine if you have diabetes.

WHAT ARE THE RISK FACTORS FOR EYE DISEASE?

- Disease duration – The length of time that a patient is diagnosed with diabetes is one of the most important risk factors for the development of diabetic complications of the eye. Most people do not develop diabetic retinopathy before 8-10 years from time of diagnosis.
- Age – The effect of age on the development of diabetic retinopathy is linked to the duration of disease (patients with longer durations are typically older). Children younger than 10 years old are at minimal risk of developing significant eye problems from diabetes.
- Puberty – Hormonal changes associated with puberty may increase the risk of diabetic problems.
- Pregnancy – Pregnancy can increase a person's risk of developing diabetic eye problems.

Some risk factors are lessened depending on treatment including: monitoring and good glucose control, smoking cessation, and losing weight when recommended by your doctor. Other risk factors cannot be changed including patient age, duration of disease, puberty and pregnancy.

HOW IS DIABETES MELLITUS TREATED?

Diabetes mellitus is a chronic disease for which there is treatment but no known cure. Treatment is aimed at keeping blood glucose levels as close to normal as possible. This is achieved with frequent blood sugar measurements and a combination of diet, exercise, and insulin or oral medication. People with type 1 diabetes may need to be hospitalized right after they are diagnosed especially if they have diabetic ketoacidosis to get their glucose levels down to an acceptable level.

HOW IMPORTANT IS IT TO CONTROL BLOOD SUGAR LEVELS?

Studies show that good control of blood sugar levels decreases the risk of complications from diabetes. Patients with better control of blood sugar have reduced rates of diabetic eye disease, kidney disease, and nerve disease. It is very important for patients to measure their blood glucose levels.

WHAT ARE COMPLICATIONS OF DIABETES MELLITUS?

Diabetes increases the risk of cardiovascular disease, stroke, and peripheral vascular disease. Small blood vessel (capillary) damage can affect the eyes, kidneys and nerves.

HOW CAN DIABETES MELLITUS AFFECT THE EYES?

1. **Blurred vision-** If a person's blood glucose is very high, the lens within the eye can swell and temporarily cause blurred vision. This type of blurred vision will usually get better after the blood glucose level comes back to normal.
2. **Retinopathy-** Diabetes may cause blood vessels in the retina (the layer of light sensitive nerve cells lining the back wall inside the eye) to become leaky, blocked, or grow abnormally [Figure 1]. Diabetic retinopathy (DR) is a progressive disorder that follows a fairly predictable course. Most people develop the mildest form of retinopathy (nonproliferative diabetic retinopathy [NPDR]) the longer they have diabetes. NPDR can progress to an intermediate stage (pre-proliferative) and to proliferative retinopathy, which carries a high risk of visual loss when untreated. Routine screening can help detect DR in the early, nonproliferative stages and can be reversed with strict glycemic control. In patients with more advanced disease, injections and laser applied in a timely manner can prevent further progression of the disease and visual loss. All patients with diabetes are at risk for developing retinopathy, but the risk is higher for patients with worse blood sugar control and longer disease duration.
3. **Cataract-** Cataract is a clouding of the lens of the eye and can occur at a younger age in patients with diabetes. If the clouding is significant enough to blur vision, it may require surgery.
4. **Glaucoma-** Glaucoma is damage to the optic nerve due to elevated eye pressure, which can lead to vision loss. People with diabetes are more likely to develop glaucoma than the general population.



Fig. 1: Retinopathy may cause blood vessels in the retina to become damaged or grow abnormally.

HOW OFTEN SHOULD I HAVE MY EYES EXAMINED IF I HAVE DIABETES MELLITUS?

The first screening eye exam is recommended at the time of diagnosis for Type 2 DM and follow-up is then determined based upon the findings on exam. With Type 1 Dm, the first eye exam is typically recommended 3-5 years after diagnosis if the patient is older than 9 years of age and then follow up will be determined based on the exam findings. With increasing age and duration of disease, screening exams are recommended yearly. The goal of regular dilated eye exams is to identify and treat patients before the development of vision-threatening complications.

WHAT SHOULD I EXPECT DURING MY EYE EXAM?

Your eyes will be dilated on each eye exam in order to visualize the retina. Your doctor may take pictures of your retina if DR is identified. There are many different types of pictures that can help your doctor determine the severity of your DR.

WHERE CAN I FIND MORE INFORMATION REGARDING DIABETES IN CHILDREN?

- [Juvenile Diabetes Research Foundation](https://www.jdrf.org) <https://www.jdrf.org>
- [American Diabetes Association](https://www.diabetes.org/diabetes) <https://www.diabetes.org/diabetes>
- [Endocrine Society](https://www.endocrine.org/topics/diabetes) <https://www.endocrine.org/topics/diabetes>
- [Beyond Type 1](https://beyondtype1.org/) <https://beyondtype1.org/>
- [American Academy of Pediatrics policy statement: Eye examination in infants, children, and young adults by pediatricians](#)



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