PATIENT JOURNEY IN DEEP LEARNING FUNDUS IMAGE ANALYSIS ON DIABETIC RETINOPATHY:

Diabetic retinopathy is a widely recognized disease, with its most common subsequent health risk well known to the public. However, diabetic retinopathy, an eye disease diabetic are vulnerable to, is not as well-recognized as other diabetic complications, often leading to many cases of preventable blindness.

Nearly all patients with type 1 diabetes and more than 60 percentage of the people with the type 2 diabetes have some form of retinopathy. The disease has four main stages that are more easily treat6able when detected early on, especially though preventative measures.

Retinopathy is an eye disease that occurs when high blood sugar levels causes damage to blood vessels in the retina. The affected blood vessels can sometimes swell and leak, or they can close, which causes a blockage and prevents blood from passing through.

Early detection is vital to a patient's eye health and to avoid the most severe stages of diabetic retinopathy. The ability to efficiently and effectively detect the disease makes an immense difference. Below is a look at this risks that come with diabetic retinopathy stages, how each stage manifests itself, and what medical solutions exist to prevent this from occurring.

PATIENT JOURNEY:

In this diabetic retinopathy patient's can overcome four stages, Patients with NPDR generally present with hemorrhages of varying sizes, microaneurysms (MAs), hard exudates, soft exudates (cotton wool spots) intraretinal microvascular abnormalities (IRMAs), and venous looping or beading.

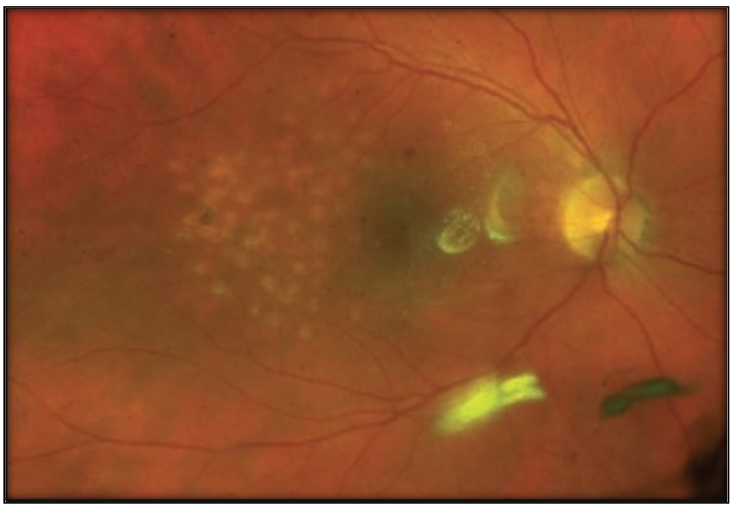
MAs are saccular outpouchings of retinal capillaries that have been weakened by a loss of intramural pericytes. The weakened capillary walls can leak or rupture, causing hemorrhages.

IRMAs are either new vessel growth within the retina or preexisting vessels with proliferative endothelial cells that are moving through areas of nonperfusion. Presence of IRMA indicates ischemia and is a precursor to neovascularization.

Venous looping and beading are caused by severe retinal hypoxia and indicate an increased risk for progression to neovascularization.[2] When patients with diabetes are in your chair, it's important to gather as much information about their condition as possible.

STAGE 1: MILD NPDR

These patients should have a dilated eye examination every 12 months.There is a 5% risk that mild NPDR will progress to PDR within 1 year.



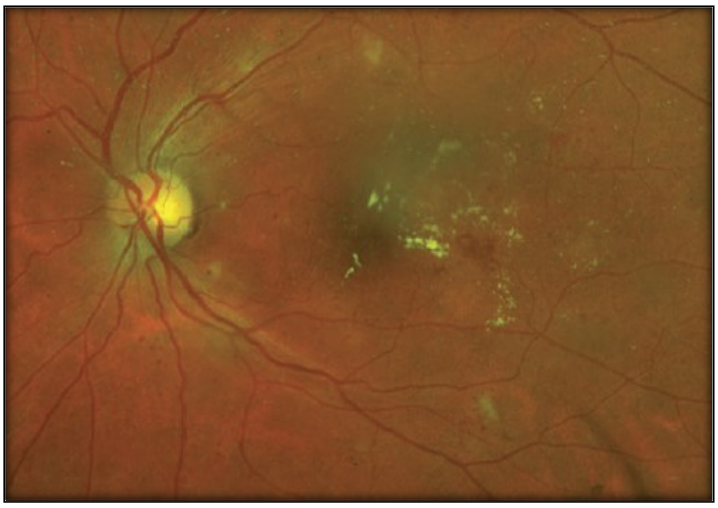
If one or more MAs are present in the eye of a patient not yet diagnosed with diabetes, he or she should be considered a diabetes suspect and should see his or her PCP for further testing. Documenting subtle findings and noting their exact locations will help you to monitor patients for disease progression. Use fundus photography, if available, for easier future comparison.

Patients with mild NPDR do not need to be referred to a retina specialist unless you are concerned about or have confirmed a diagnosis of DME. It is important to discuss findings with patients, especially those who were recently diagnosed with diabetes, to ensure that they understand that MAs indicate early end organ damage from their disease and that they are educated on its possible ramifications.

Encourage them to monitor their blood sugar and diet. Send a detailed report to the patient's PCP and/or endocrinologist so that they are aware of the findings, which will aid their decision making on treatment.

STAGE 2: MODERATE NPDR

Patients with moderate NPDR should be seen every 6 to 8 months.There is a 12% to 27% risk that they will develop proliferative diabetic retinopathy (PDR) within 1 year.



The use of fundus photography is suggested for these patients, and you may obtain macular OCT images at your discretion if you suspect DME. These patients do not need to be referred to a retina specialist unless you have confirmed DME or you believe OCT imaging is warranted but do not have access to this technology.

Again, it is important to educate these patients on the findings and what they suggest about the disease process. Depending on their recent blood sugar control and last diabetes examination with their PCP or endocrinologist, it may be necessary to refer patients back to those providers sooner than scheduled so that they can consider changes in treatment.

STAGE 3: SEVERE NPDR

Patients with severe NPDR should be monitored using both macular OCT and fluorescein angiography to detect any DME or early neovascularization.

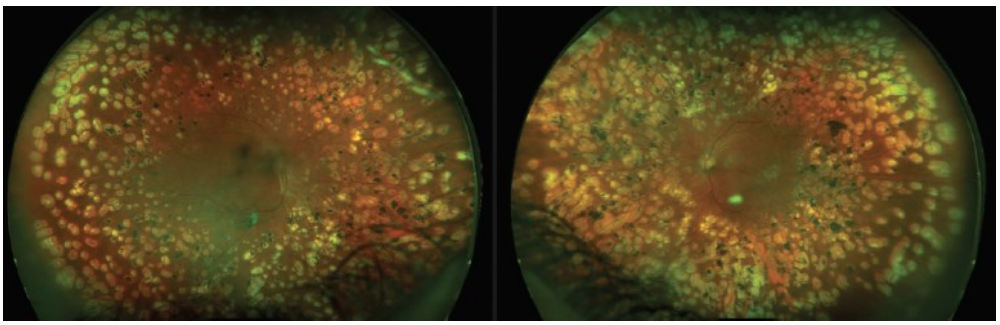
Referral to a retina specialist is recommended, and patients should be monitored every 3 to 4 months with dilated fundus examination. You may be able to work with a retina specialist by alternating appointments to monitor these patients.

Patients with severe NPDR have a 52% risk of developing PDR within 1 year, so it is important to discuss with them the importance of blood sugar control and close observation.A call to the patient's PCP or endocrinologist to discuss retinal findings is also warranted. These patients are at a high risk of disease progression and permanent vision loss, and they are most likely experiencing neuropathy elsewhere at this point.

STAGE 4: PROLIFERATIVE DIABETIC RETINOPATHY

These patients require immediate referral to a retina specialist for further testing and treatment. Peripheral neovascularization is usually treated with laser panretinal photocoagulation.

They also often receive anti-VEGF intravitreal injections that may be performed in conjunction with PRP.



Until their disease stabilizes, these patients need to be monitored monthly by a retina specialist.Thereafter, they may be seen every 6 to 12 months.

Communicate all findings to the patient's PCP and/or endocrinologist. A phone call is warranted if the patient has new-onset PDR.