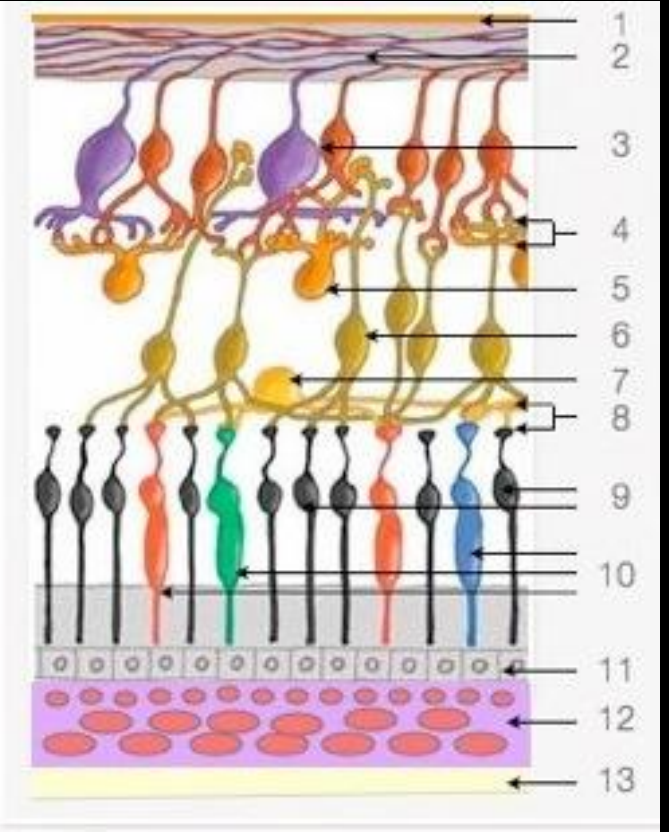
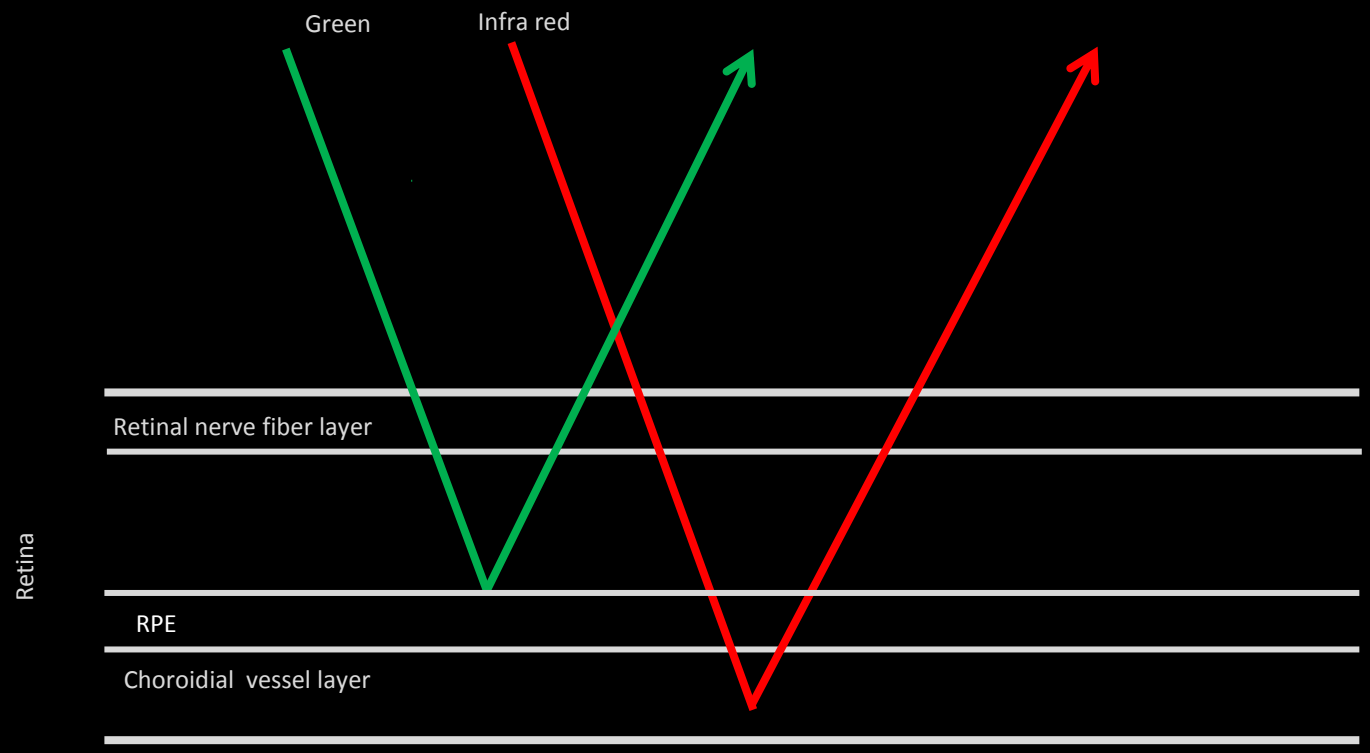
Clinical Atlas
3rd Edition

1 internal limiting membrane
2 nerve fiber layer
3 ganglion cells
4 inner plexiform layer
5 amacrine cells
6 bipolaire cells
7 horizontal cells
8 outer plexiform layer
9 rods
10 cones (blue, green en red)
11 pigment epithelium
12 choroid
13 sclera

image: retina, choroid, sclera
stanford center for image systems engineering (modified)

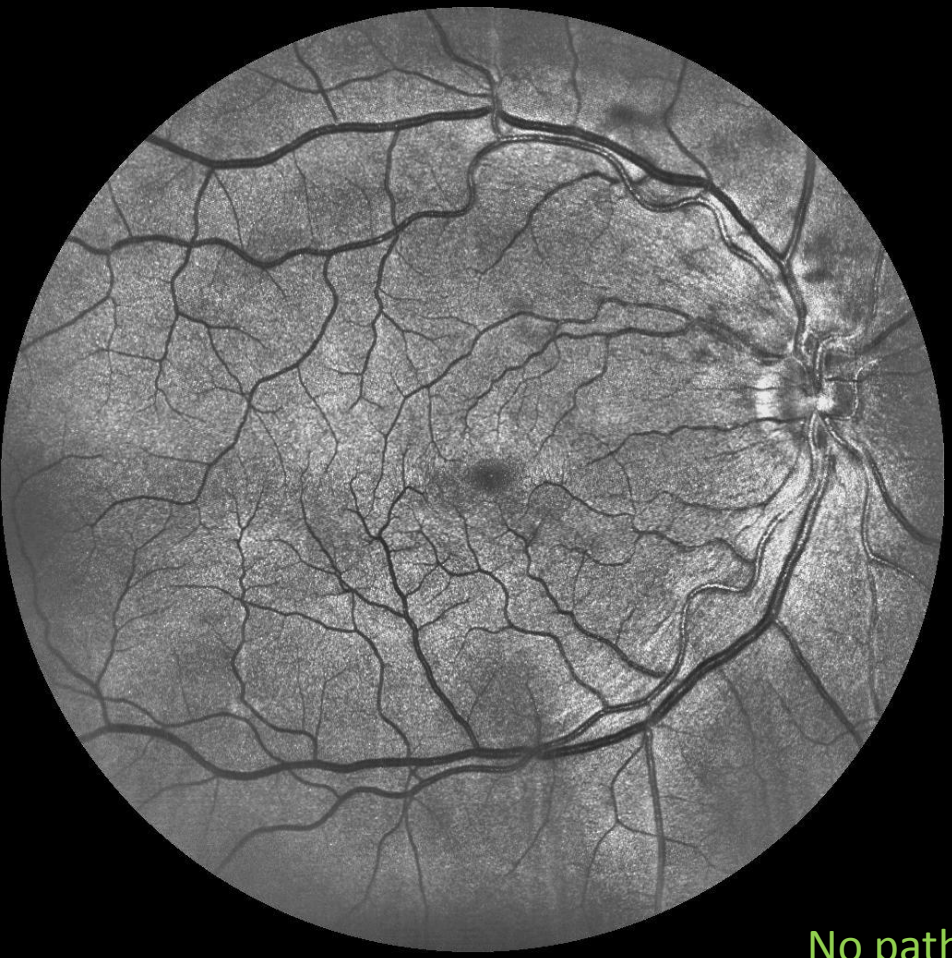


With SLO it is possible to visualize the different structures present in the various layers of the fundus. (Sharp and Manivannan, 1995)



The EasyScan is using two laser colors: infrared and green.
Different colors means different penetration depth.

Easyscan 45º Green



Easyscan 45º IR

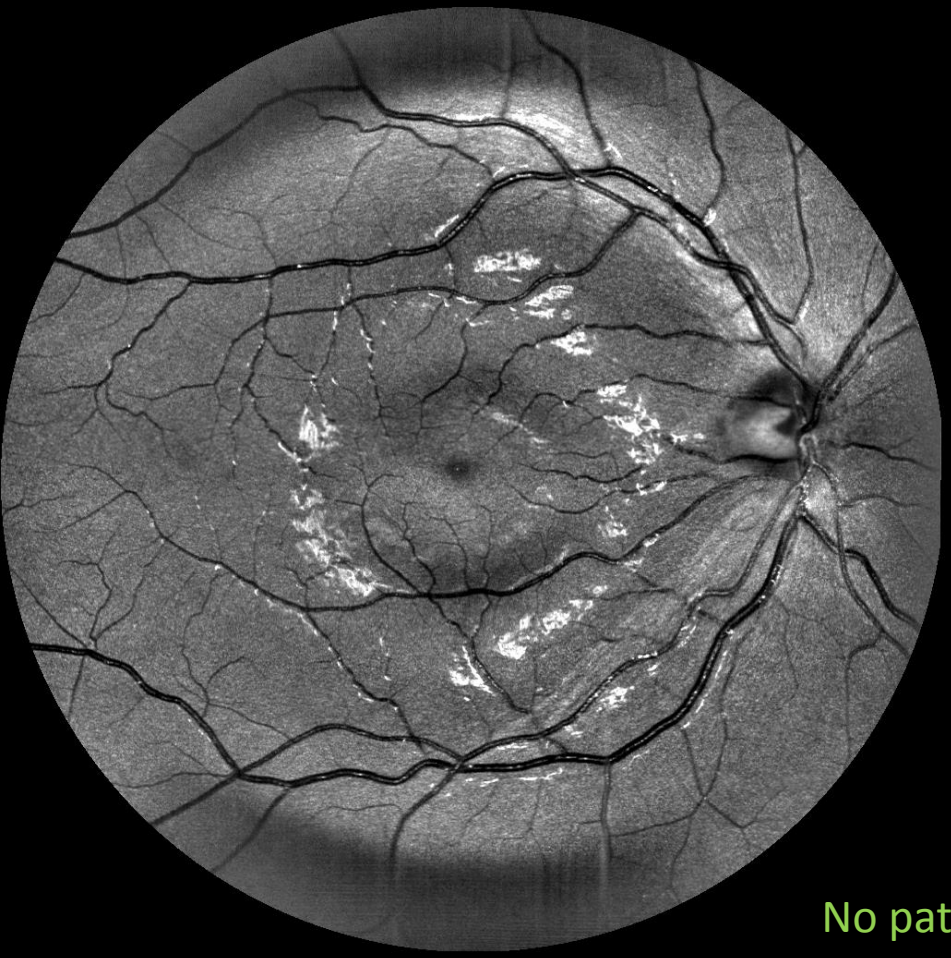
No pathology

The EasyScan is a dual color cSLO: Infrared (785 nm) and pure green (532 nm). The different colors are related to different penetration depth.

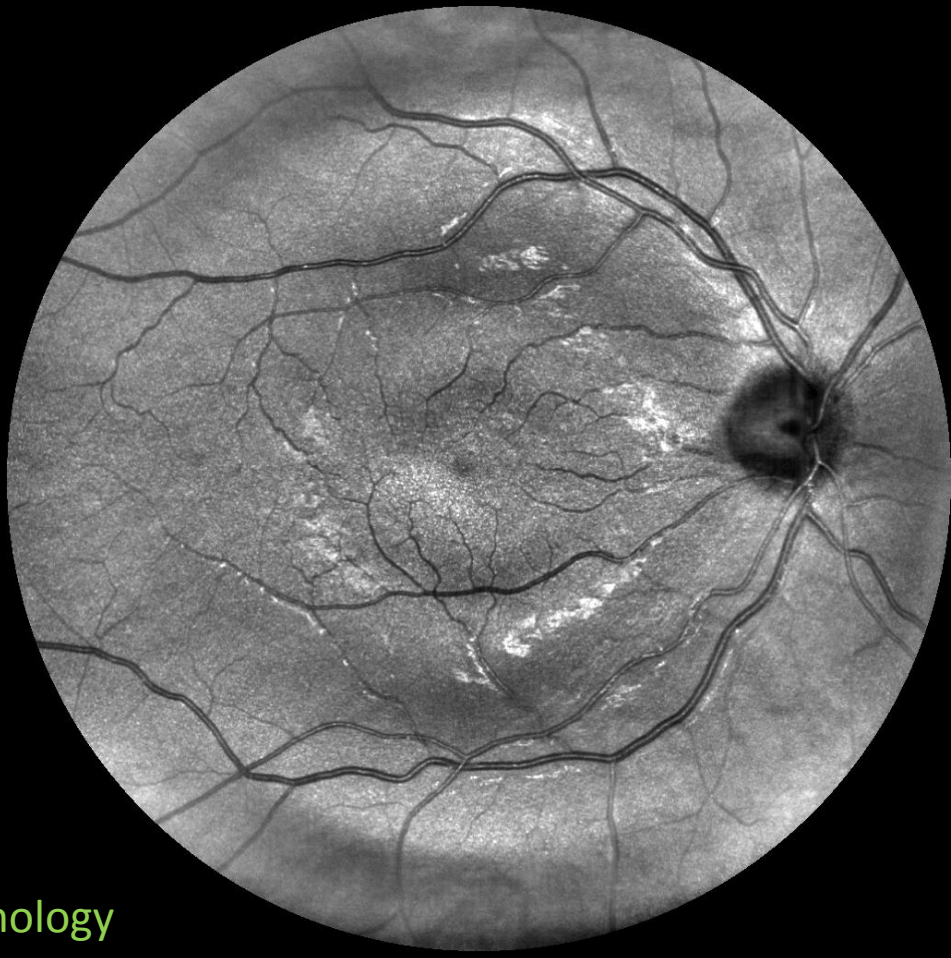
The green image is reflected at the RNFL (retinal nerve fiber layer) showing the microvascular structure up to the 4th bifurcation.

The infrared light is reaching the choroidal vessel layer.

Easyscan 45º Green



Easyscan 45º IR



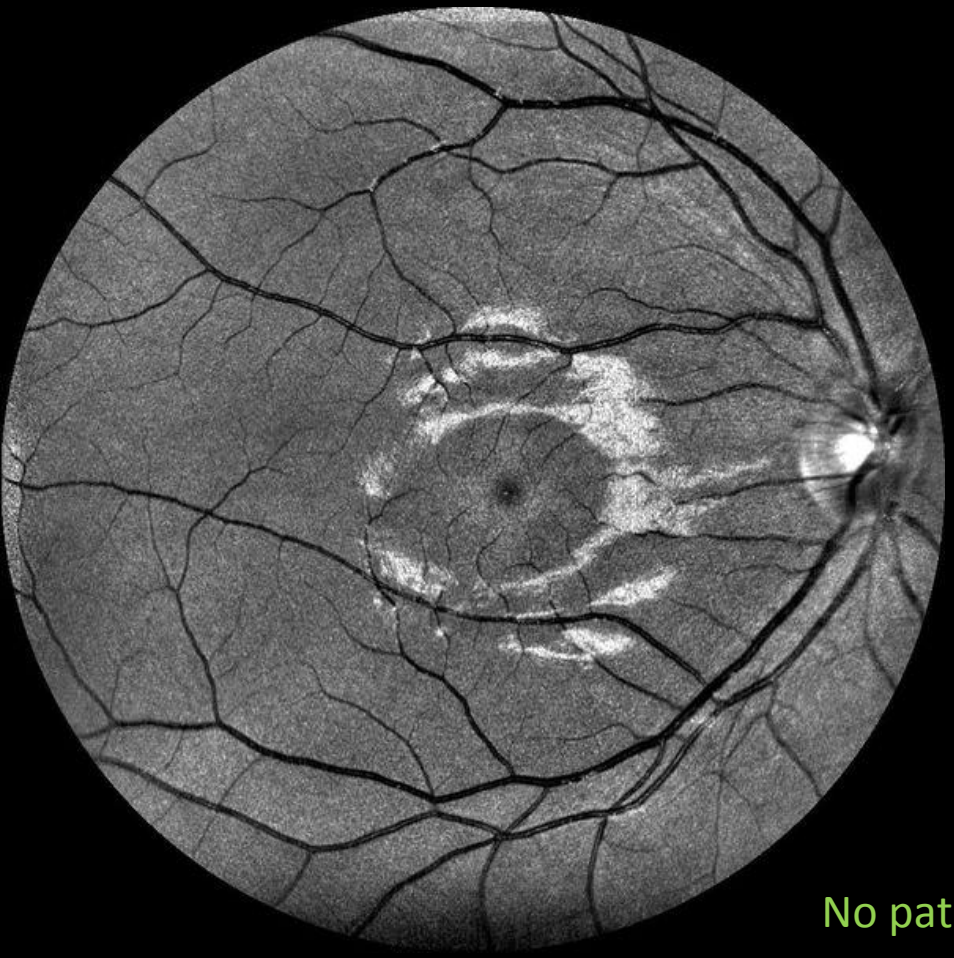
No pathology

Compared to traditional fundus imaging, cSLO is more sensitive to reflected light from the ILM (Internal limiting membrane).

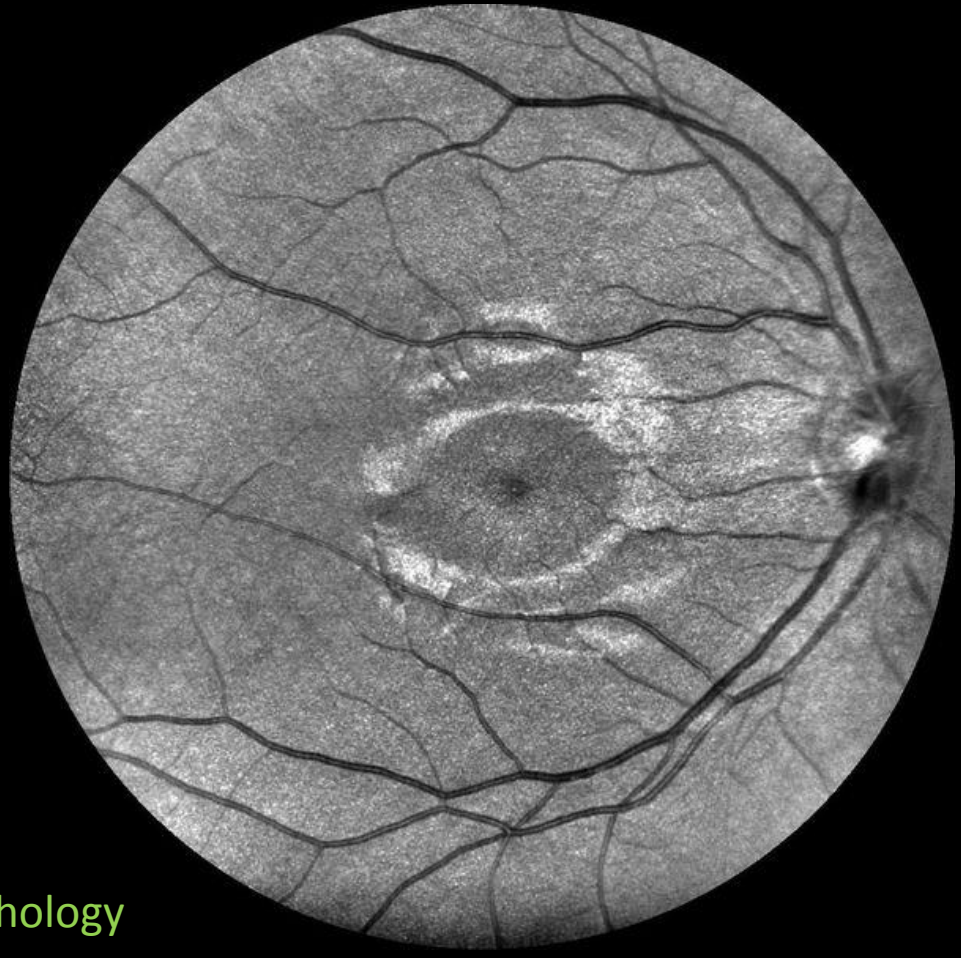
These reflections appear as bright white spots in the green image and appear slightly dimmed in the infrared image.

The ILM is the top layer of the retina and represents the structural interface between the retina and the vitreous.

Easyscan 45º Green



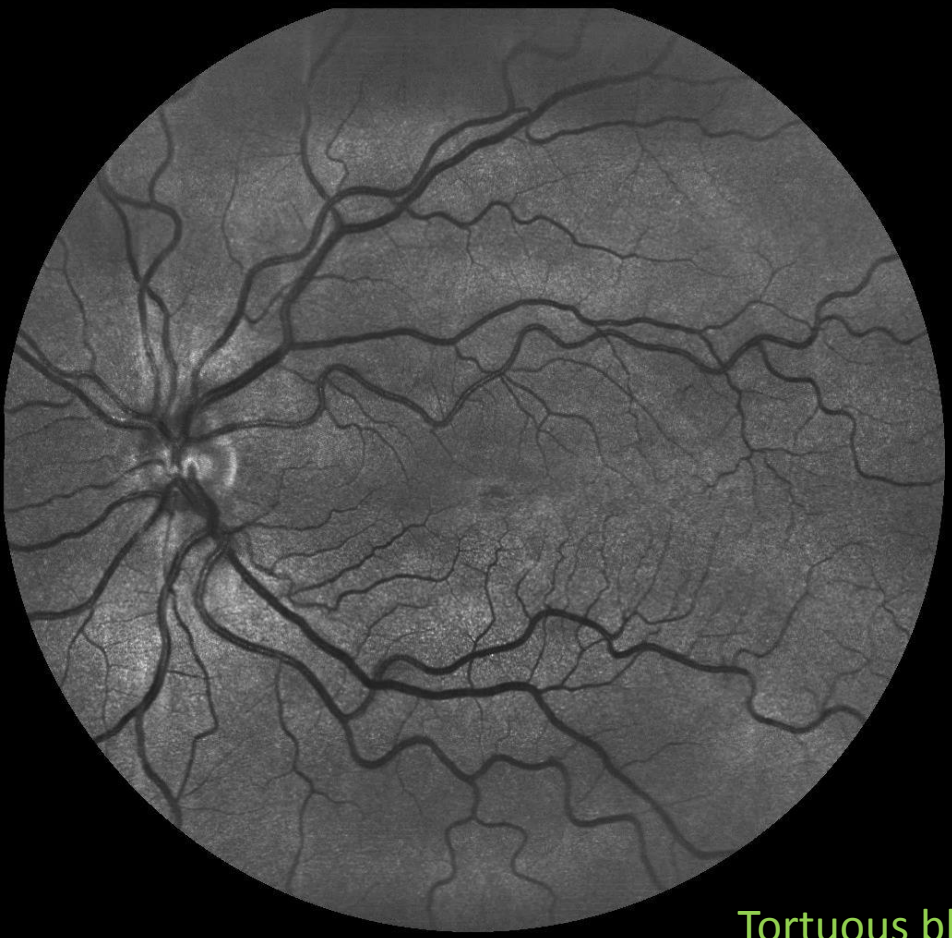
Easyscan 45º IR



No pathology

Again a set of images to show the ILM reflections appearing as bright white spots in the green image and appear slightly dimmed in the infrared image.

Easyscan 45º Green

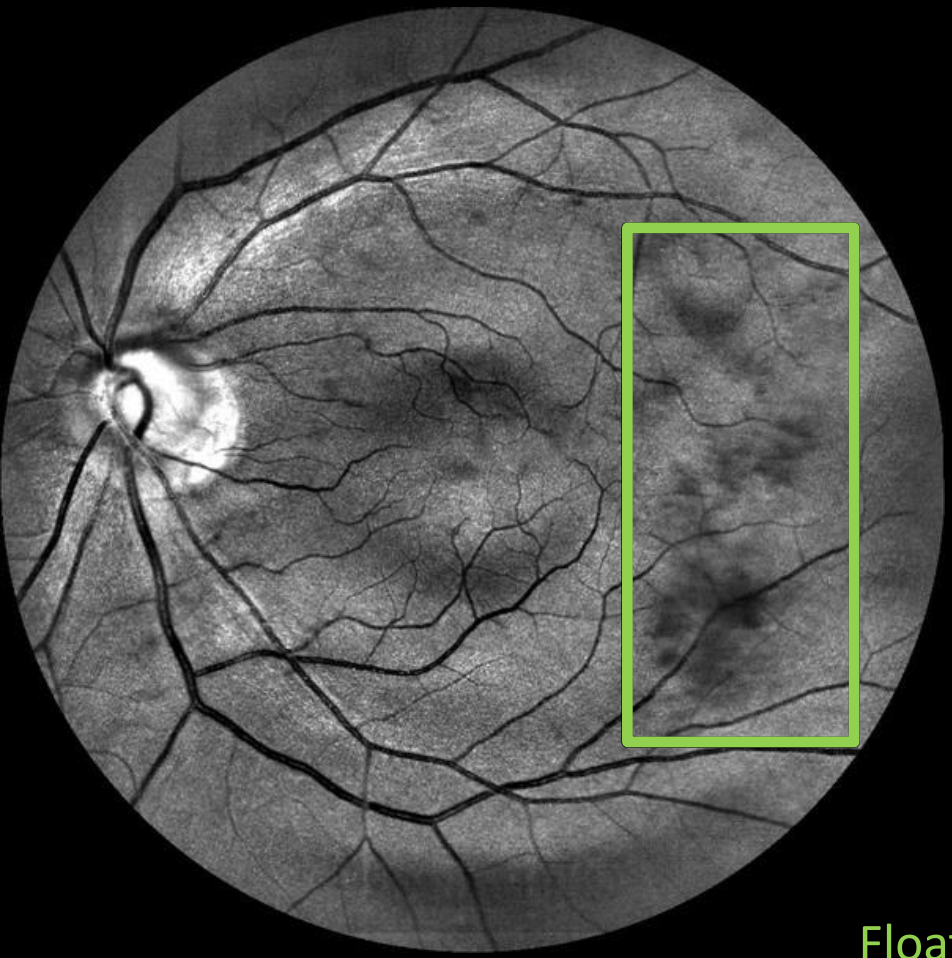


Easyscan 45º IR

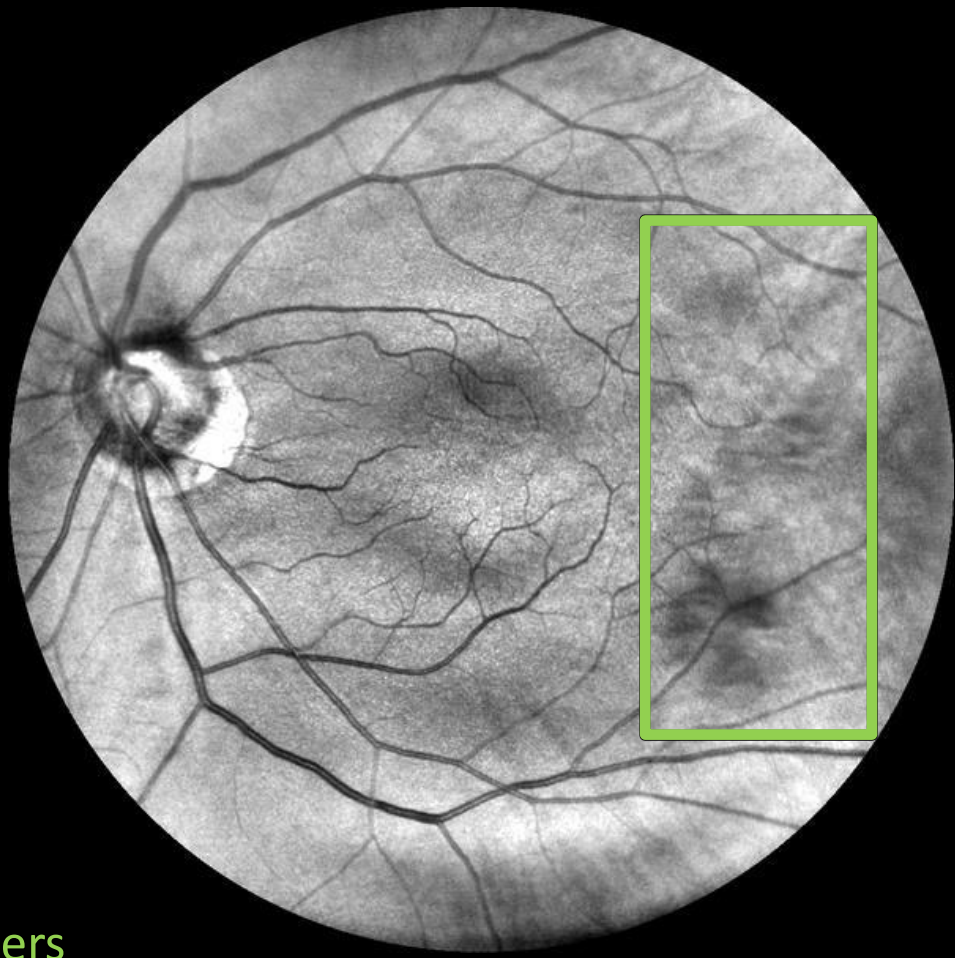
Tortuous blood vessels

Tortuous (or wavy) blood vessels in the retina can be a sign of raised blood pressure, but not always. For some people it is normal. Optometrists usually suggest a check on blood pressure if this is found.

Easyscan 45º Green



Easyscan 45º IR

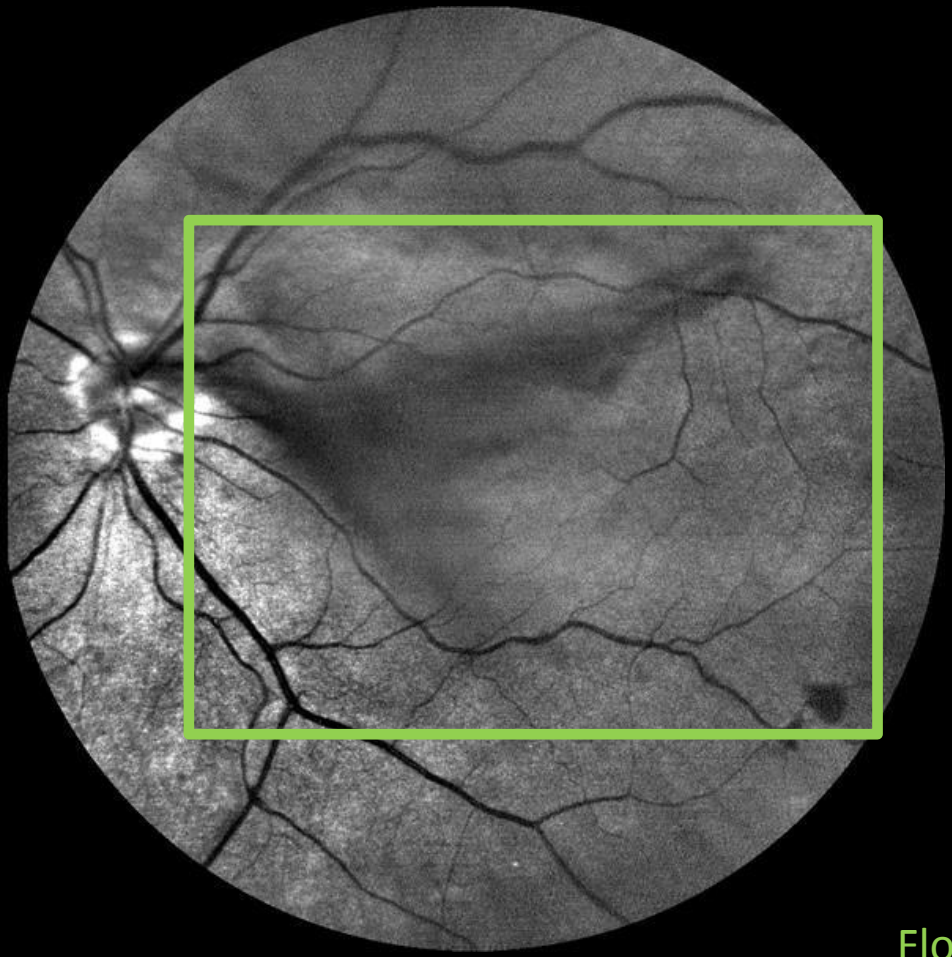


Floaters

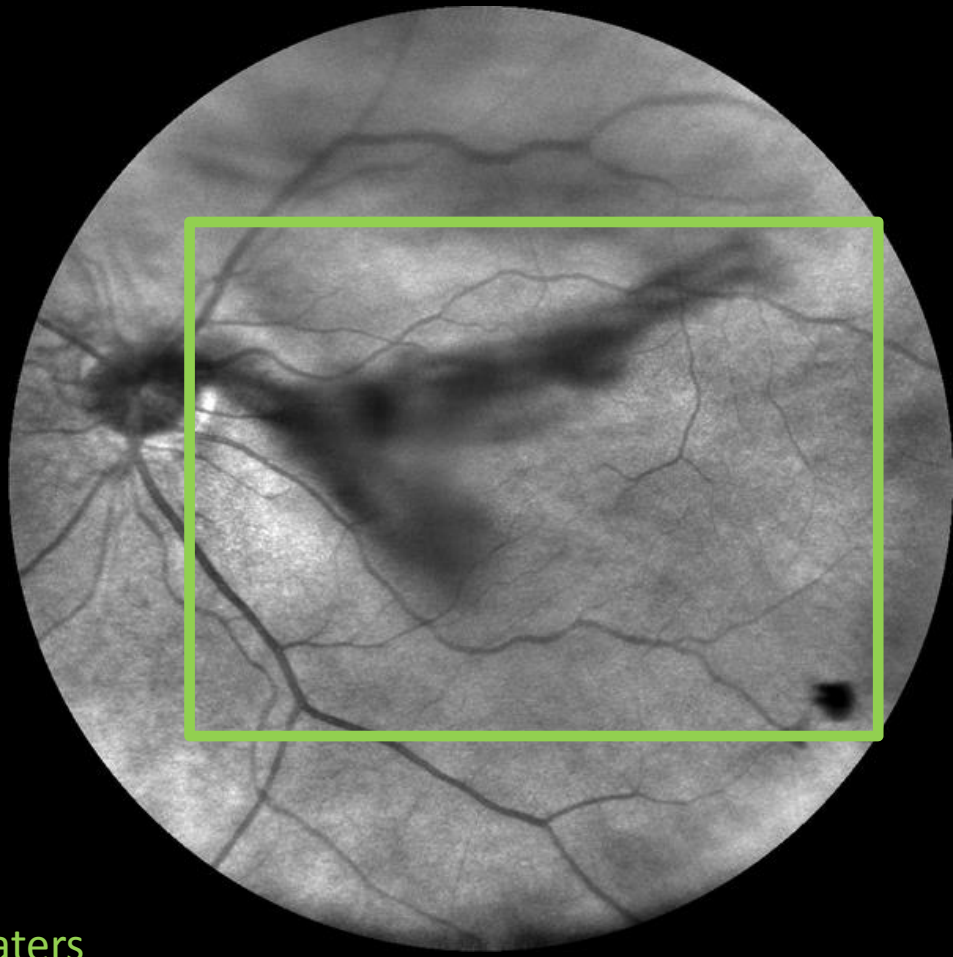
Floaters are deposits of various size, shape, consistency, refractive index, and motility within the vitreous humor, which is normally transparent.

When we are young, the vitreous is perfectly transparent, but when we get older, imperfections gradually develop. The common type of floater, which is present in most people's eyes, is due to degenerative changes of the vitreous humor.

Easyscan 45º Green



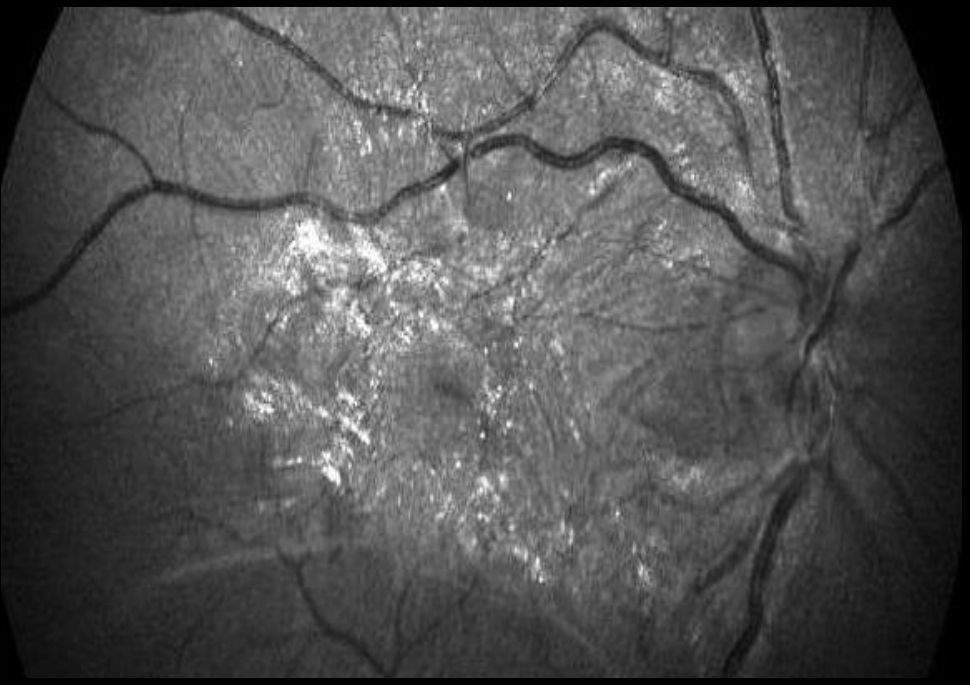
Easyscan 45º IR



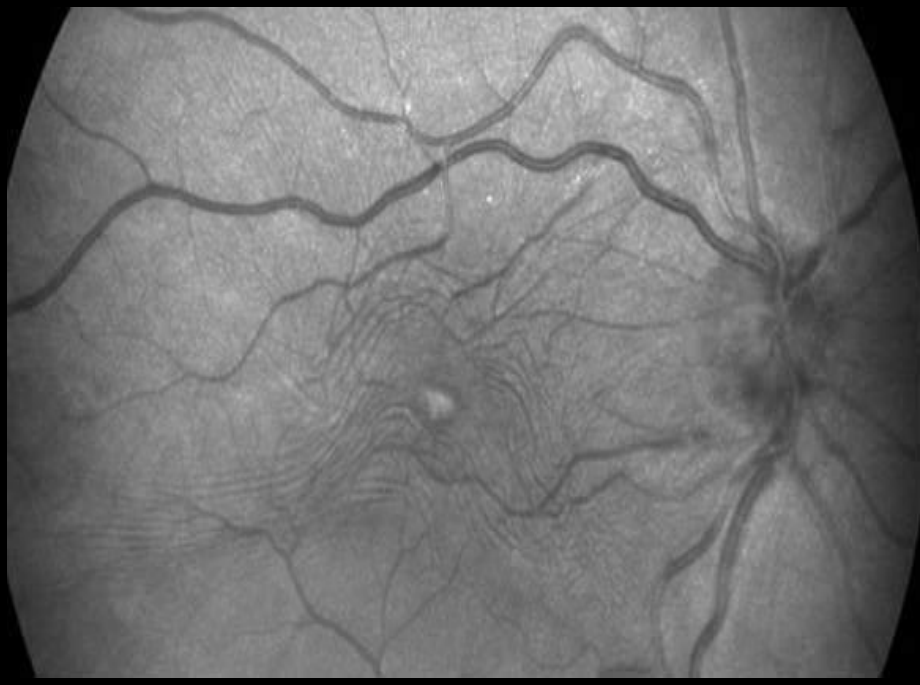
Floaters

Floaters are visible because of the shadows they cast on the retina. They may appear as spots, threads, or cobwebs, that drift around in your field of vision

Easyscan 45º Green



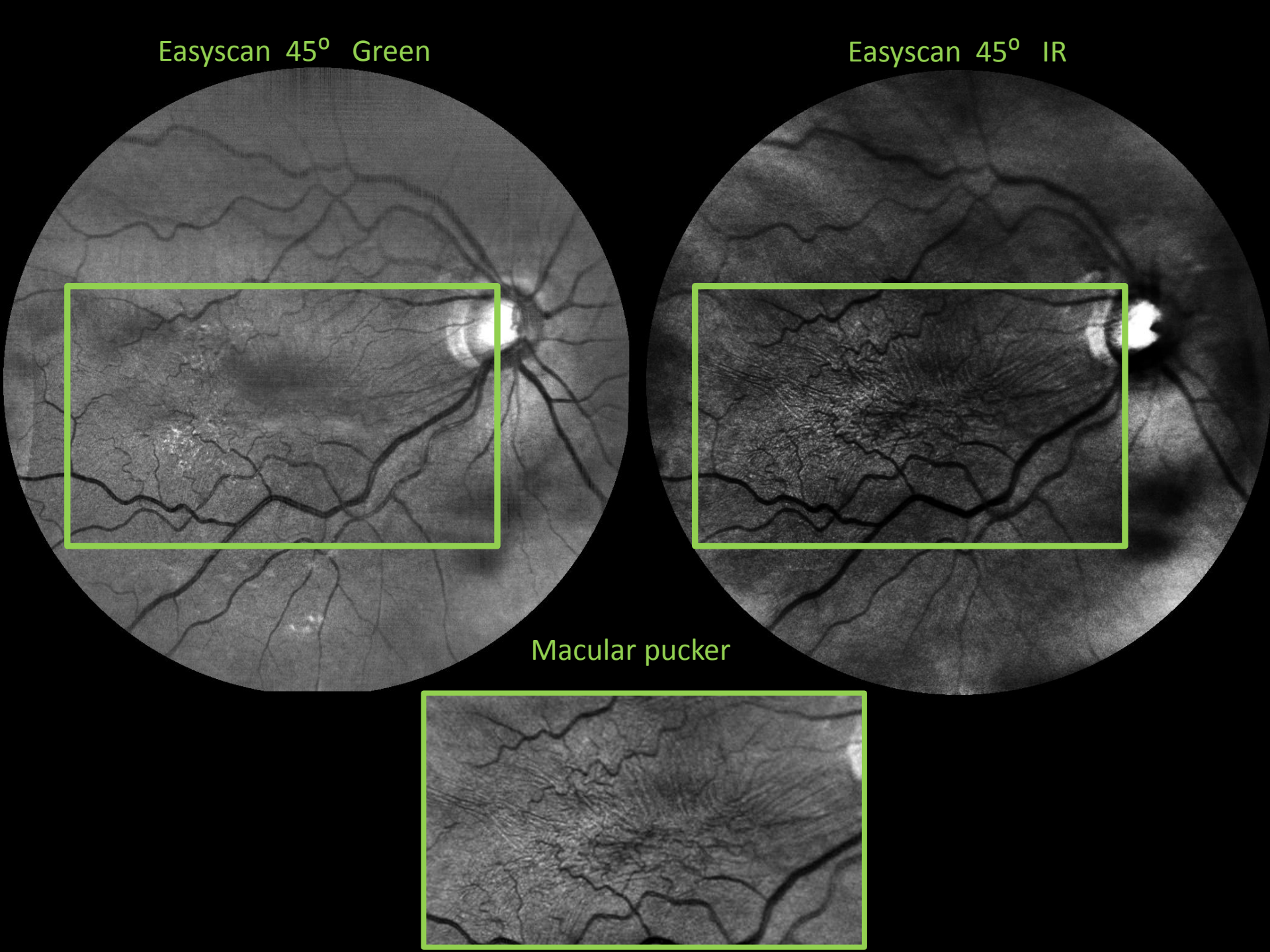
Easyscan 45º IR



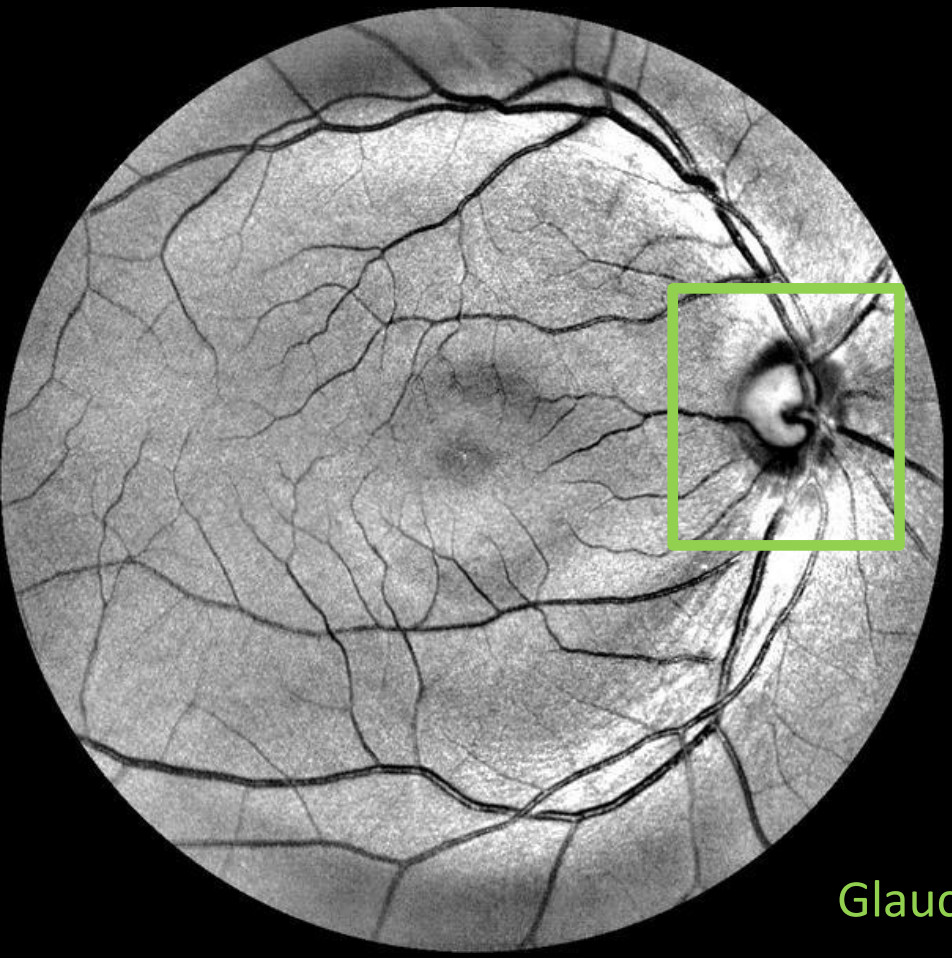
A macular pucker (also called an epiretinal membrane) is a layer of scar tissue that forms on the surface of the macula

As we grow older, the vitreous humor begins to shrink and pull away from the macula. As the vitreous humor pulls away, scar tissue may develop on the macula.

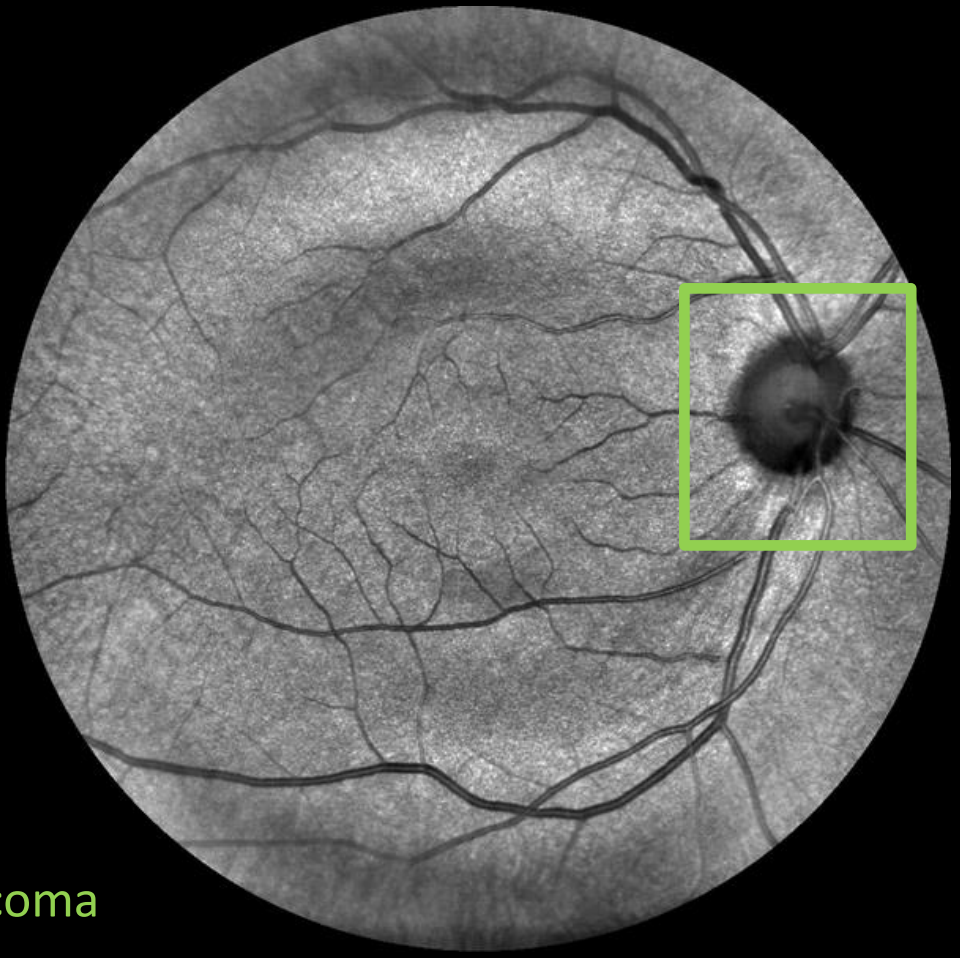
When this pulling makes the macula wrinkle, it is called macular pucker. In some eyes, this will have little effect on vision, but in others it can be significant leading to distorted vision.


Easyscan 45º Green
Easyscan 45º IR
Macular pucker

Easyscan 45º Green



Easyscan 45º IR



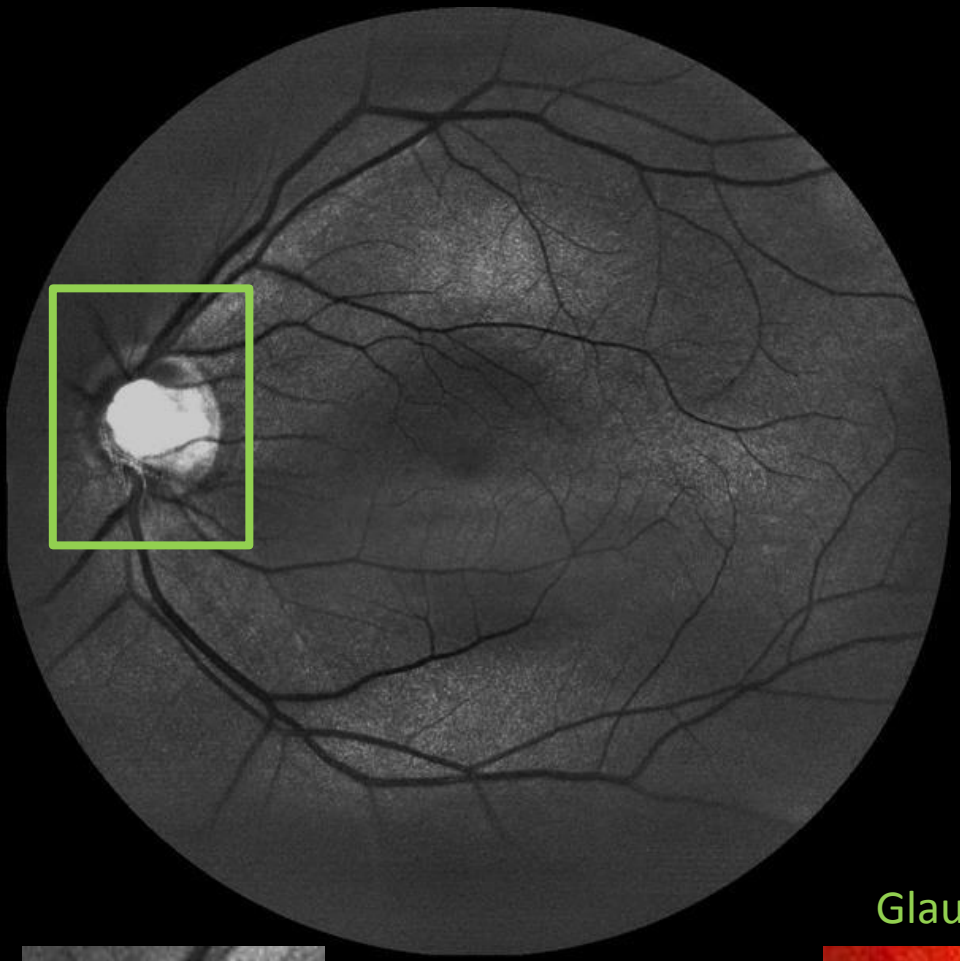
Glaucoma

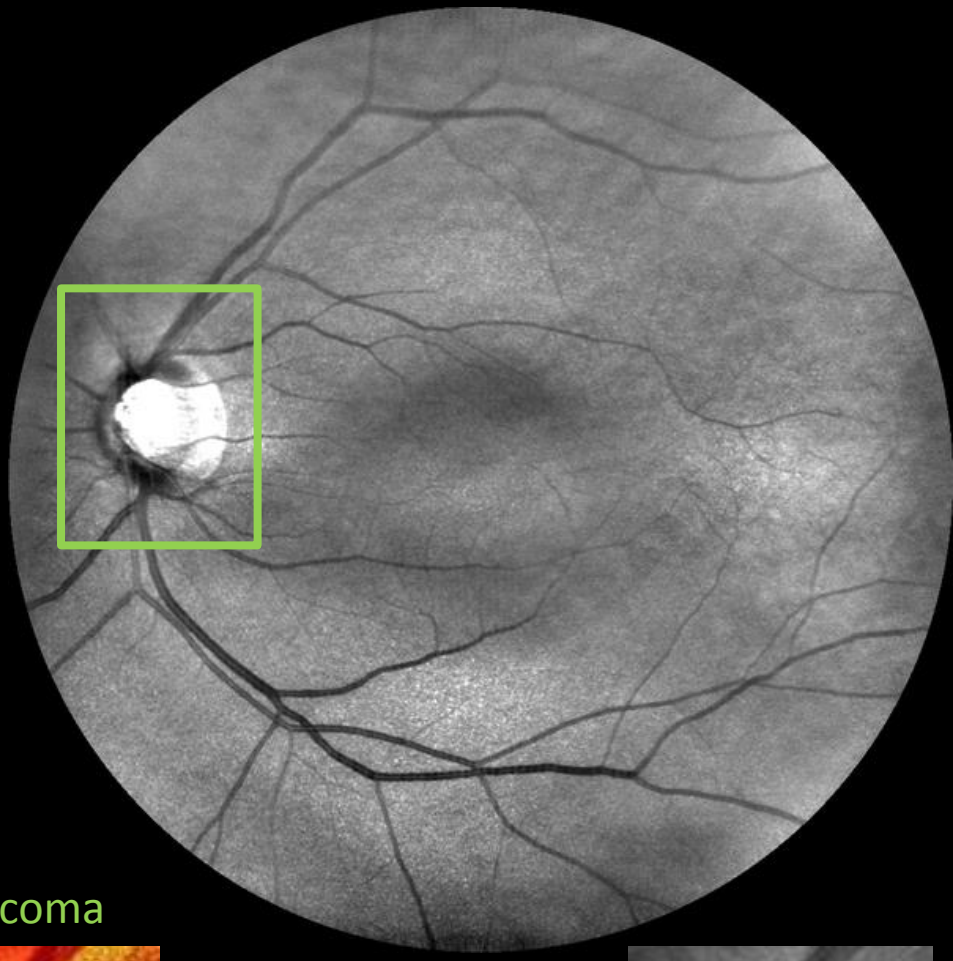
Glaucoma is an eye disease in which the optic nerve is damaged in a characteristic pattern. This could permanently damage vision in the affected eye(s) and lead to blindness if left untreated. It is normally associated with increased fluid pressure in the eye.

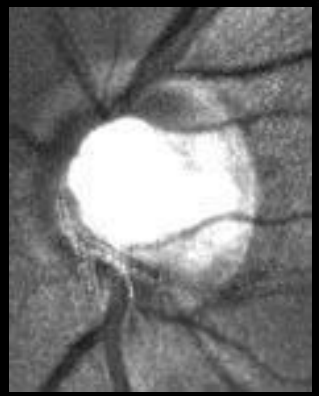
We speak of glaucoma when: The eye pressure is too high (for that eye)
There are blind spots in the vision field test.
The optic nerve head is suspect changed or damaged.

Easyscan 45º Green

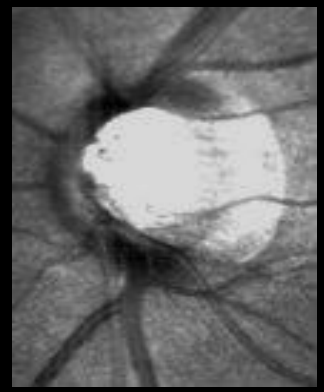
Easyscan 45º IR





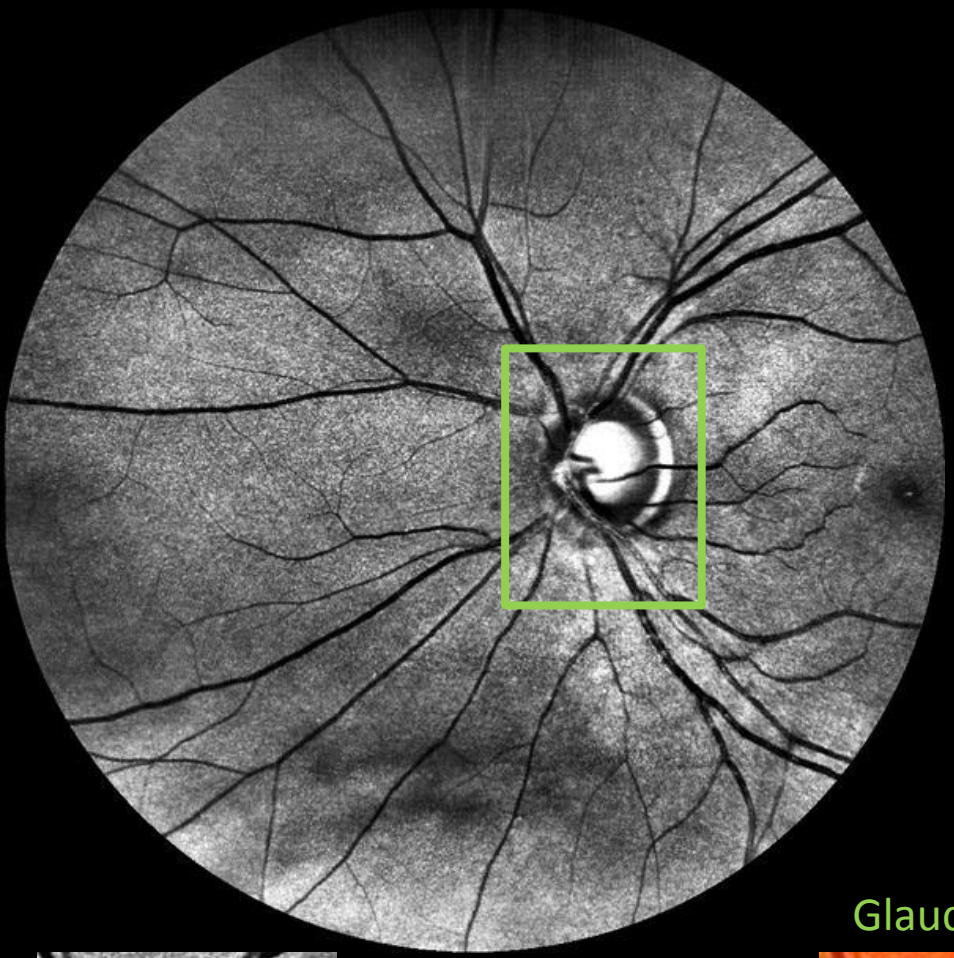


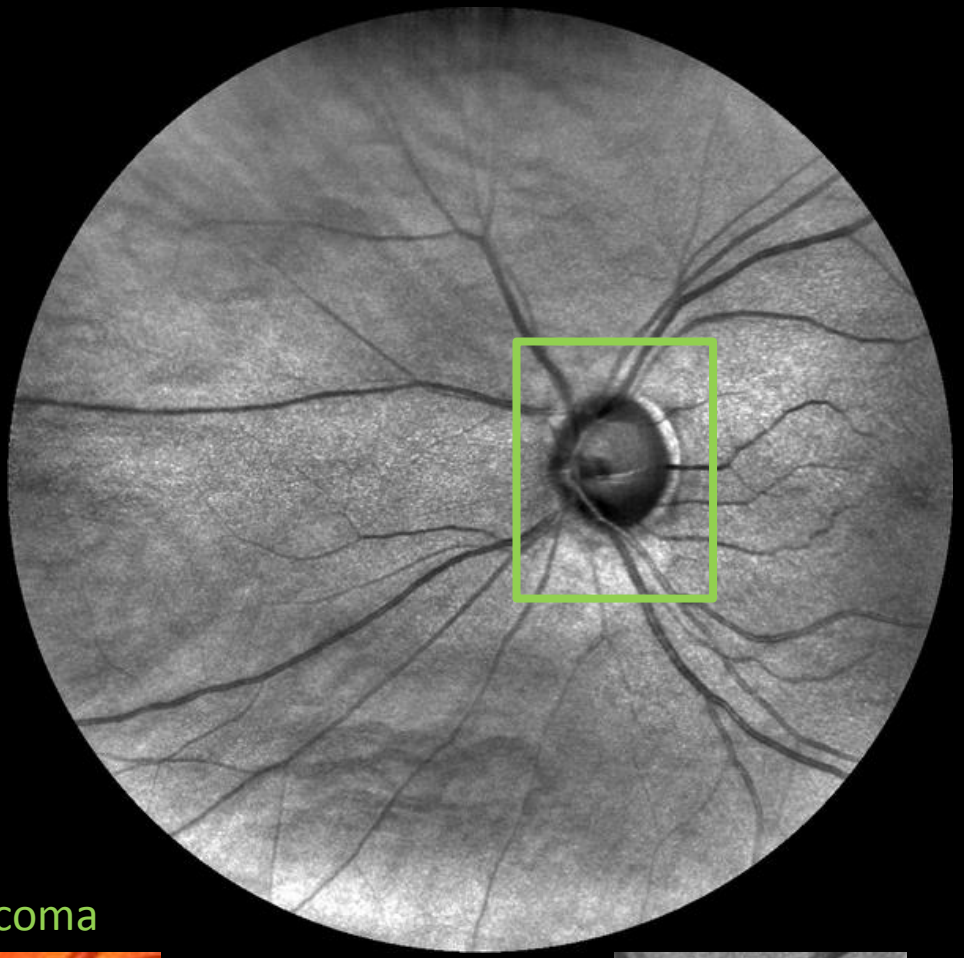
Glaucoma

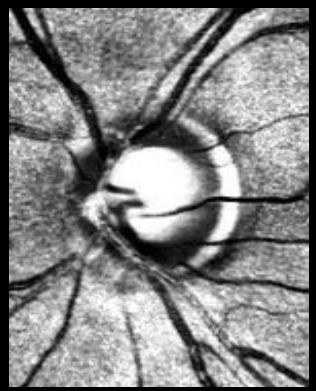


Easyscan 45º Green

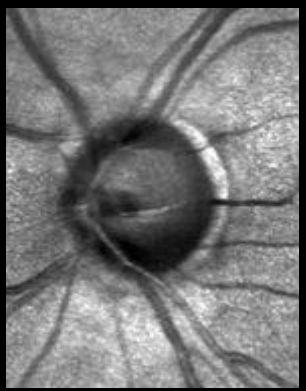
Easyscan 45º IR





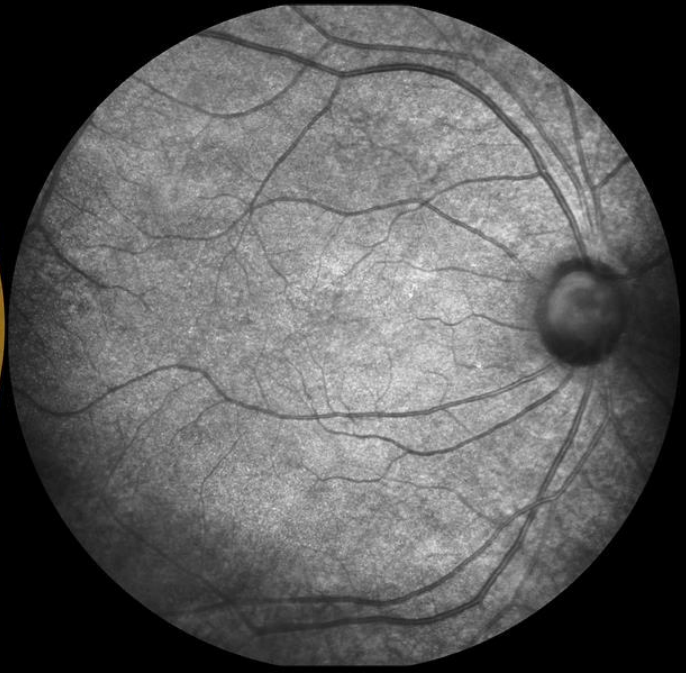


Glaucoma



Easyscan 45º Green

Traditional funduscamera

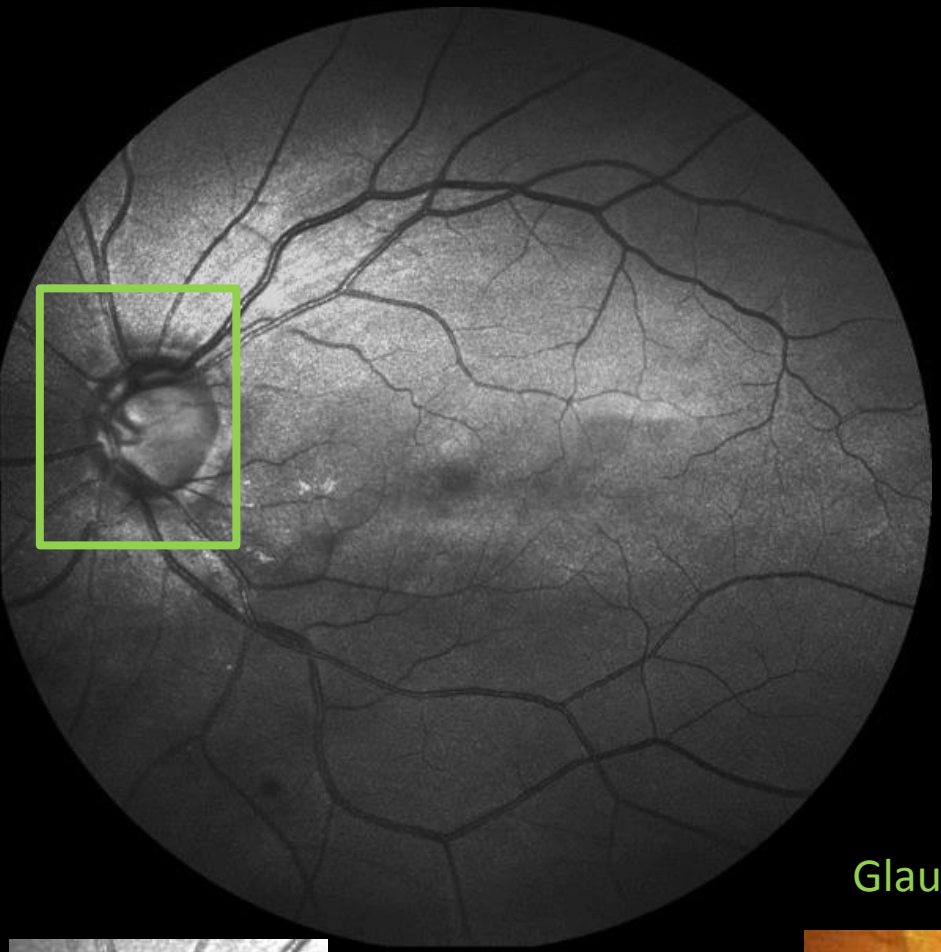


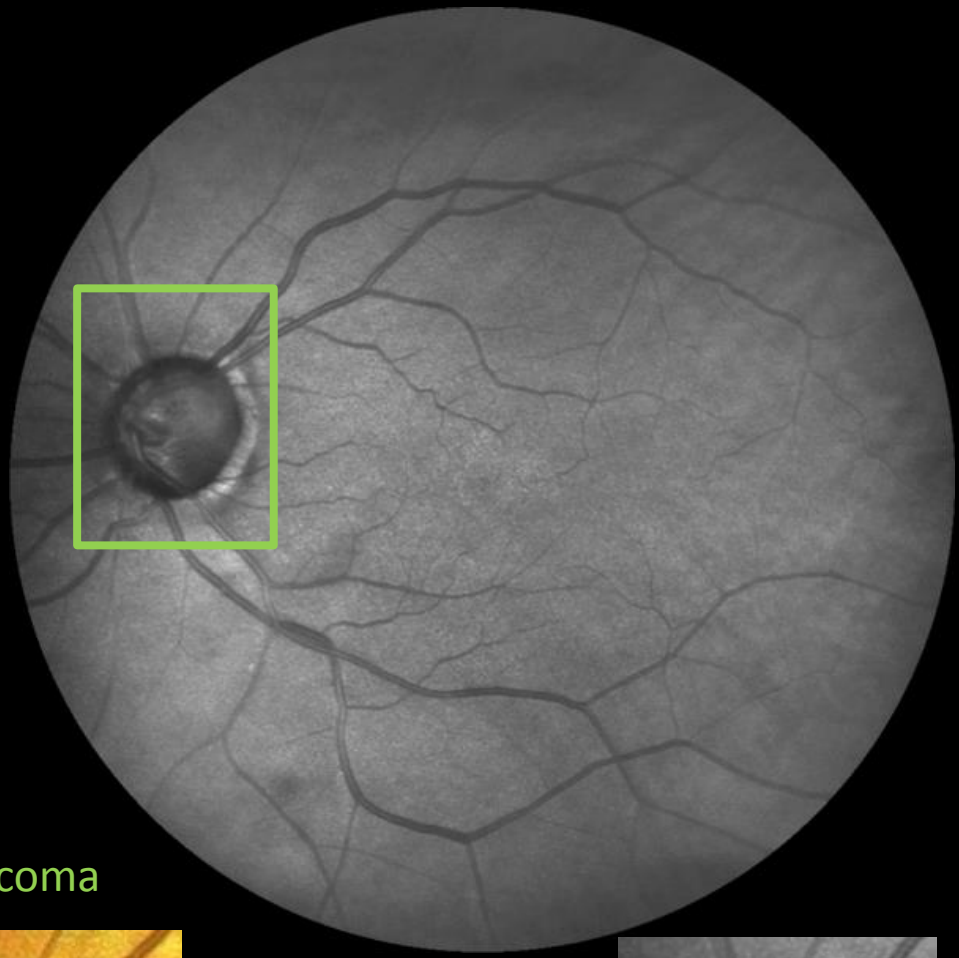
Easyscan 45º IR

Glaucoma

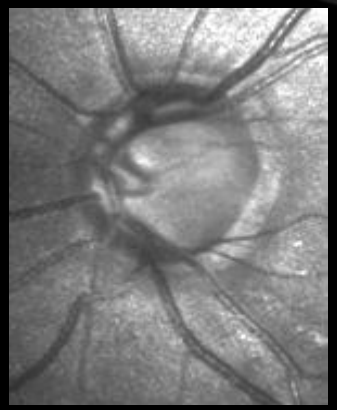
Easyscan 45º Green

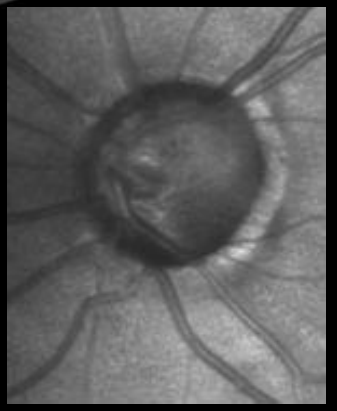
Easyscan 45º IR





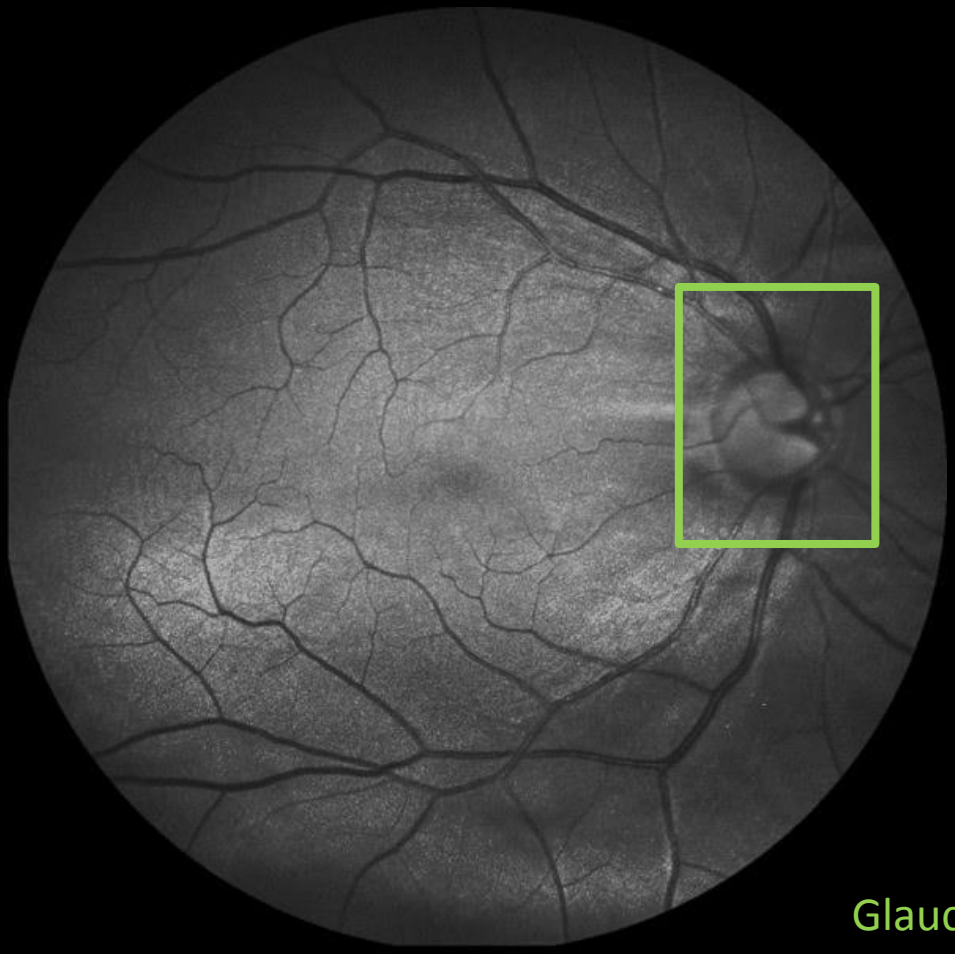
Glaucoma

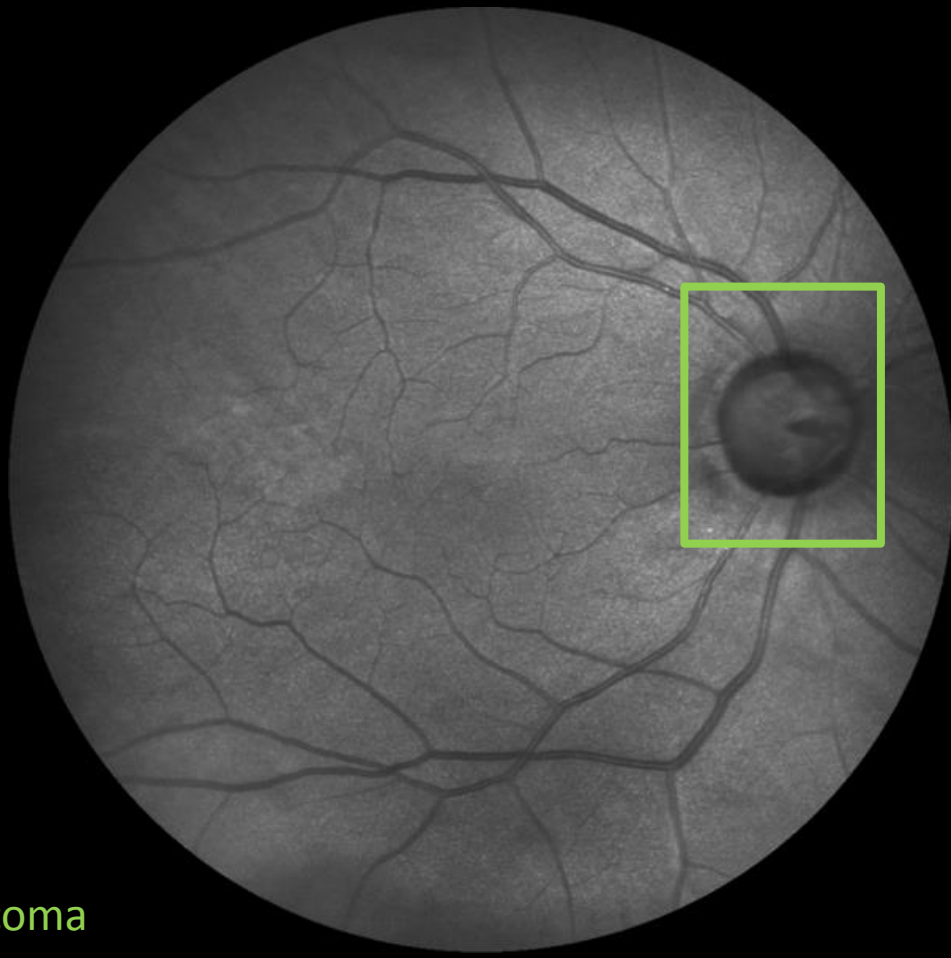




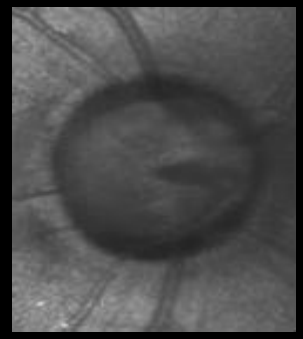
Easyscan 45º Green

Easyscan 45º IR

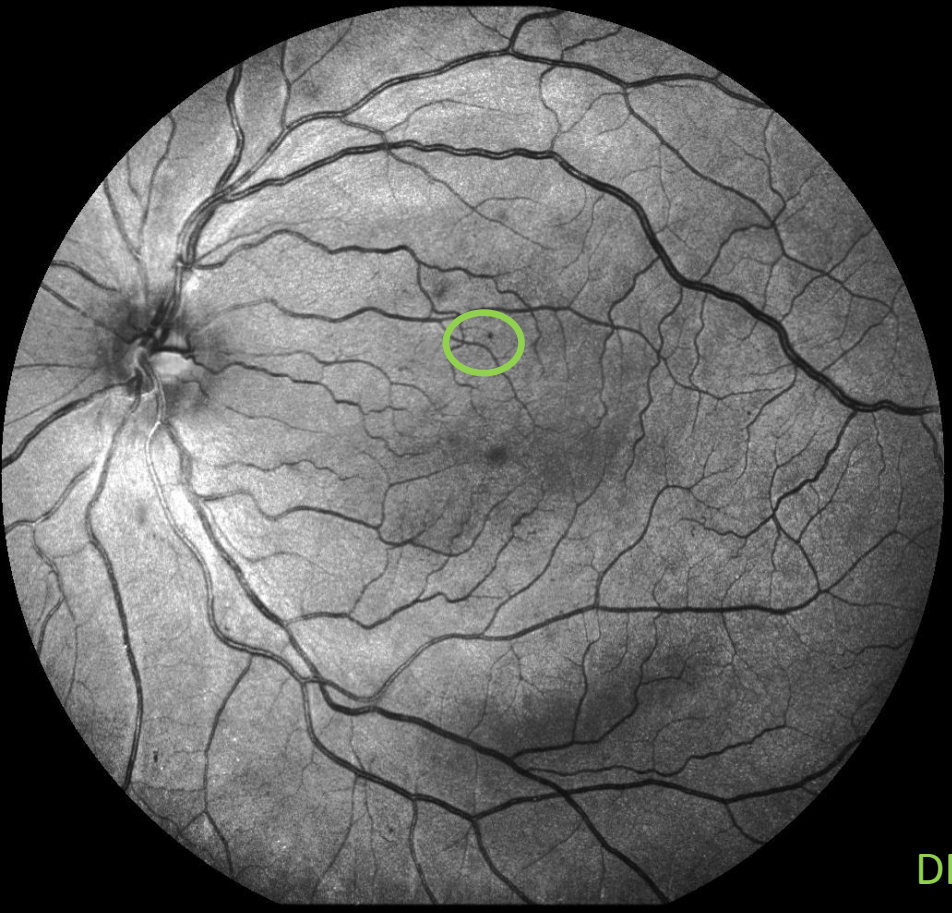




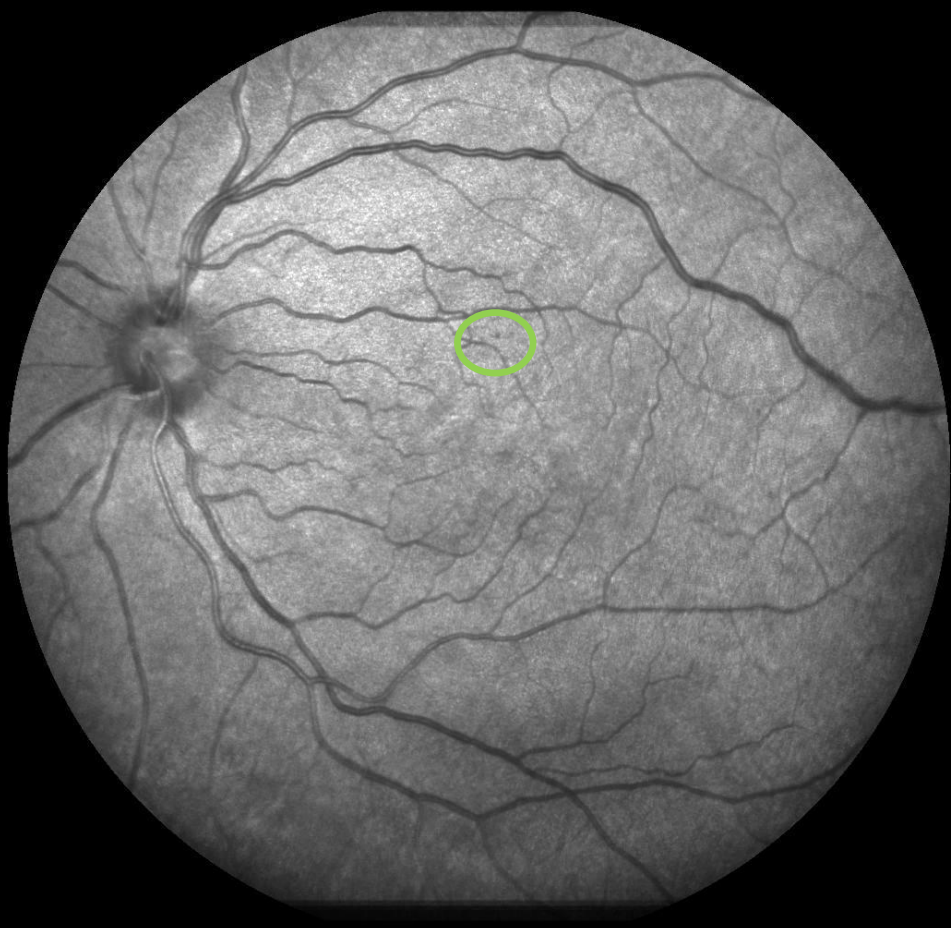
Glaucoma



Easyscan 45º Green



Easyscan 45º IR



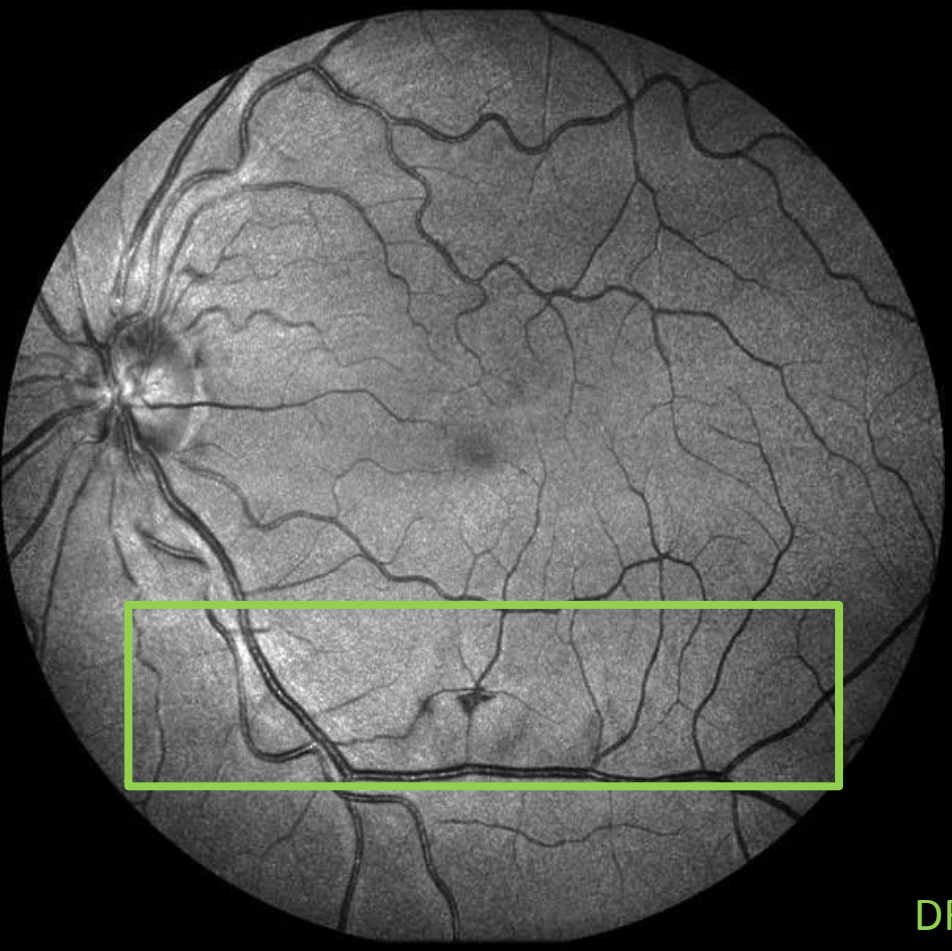
DR

Diabetic retinopathy is retinopathy (damage to the retina) caused by complications of diabetes which can eventually lead to blindness. It occurs when blood vessels in the retina change.

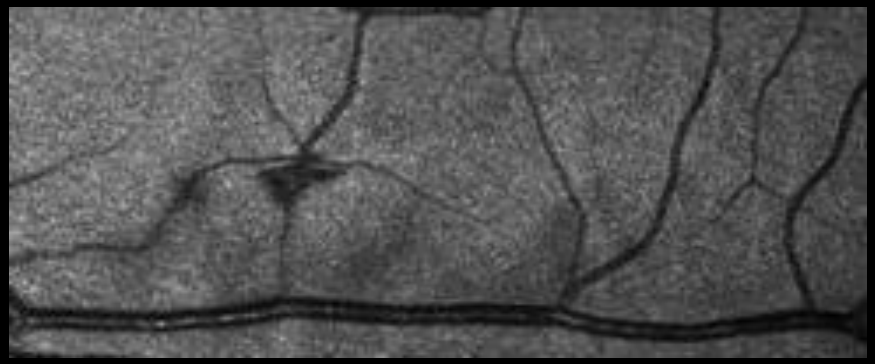
Microaneurysms: The earliest clinical sign of diabetic retinopathy; they appear as small, black dots in the superficial retinal layers .

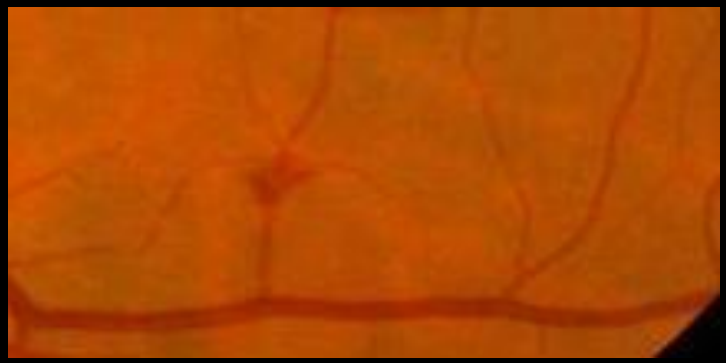
Easyscan 45° Green

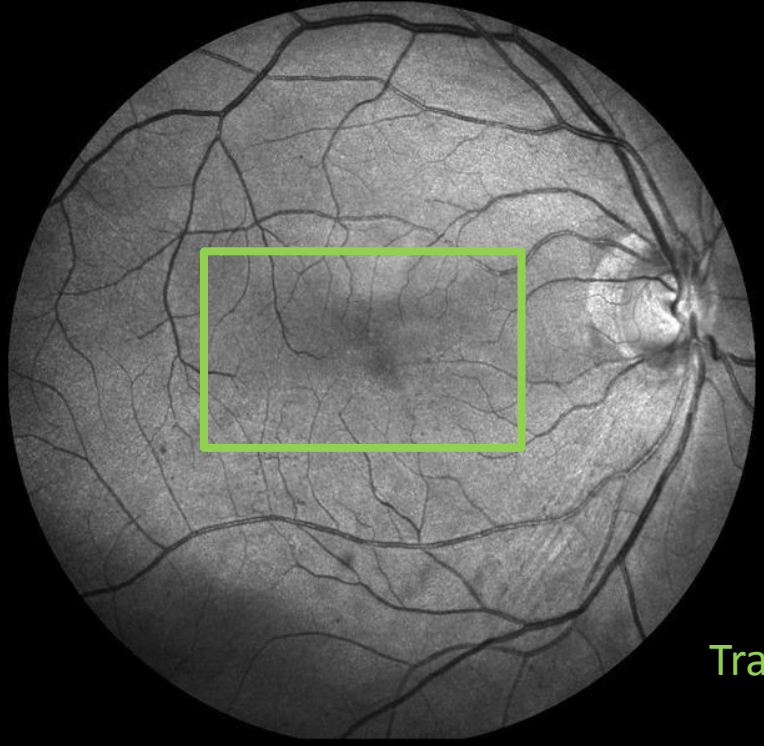
Traditional funduscamera



DR



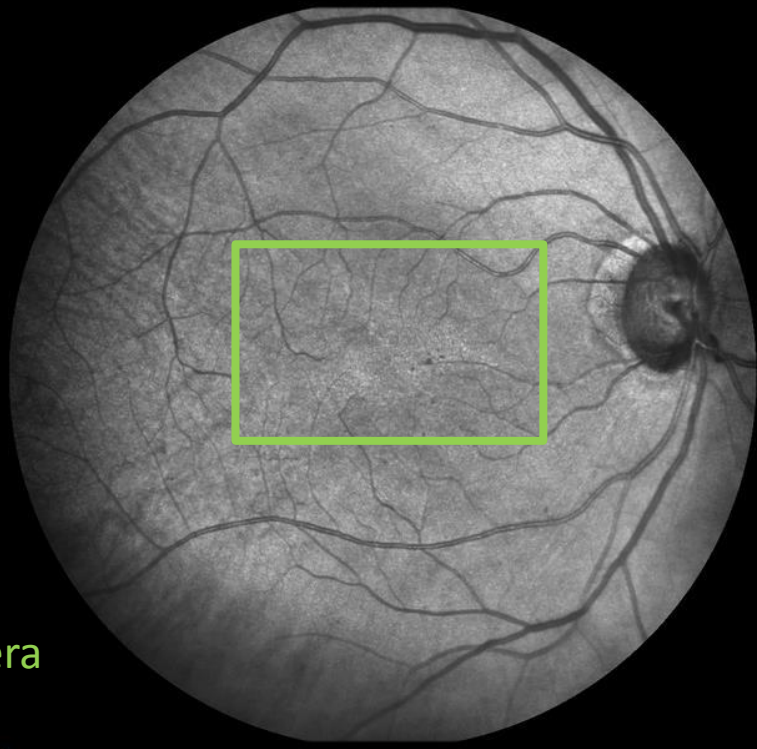




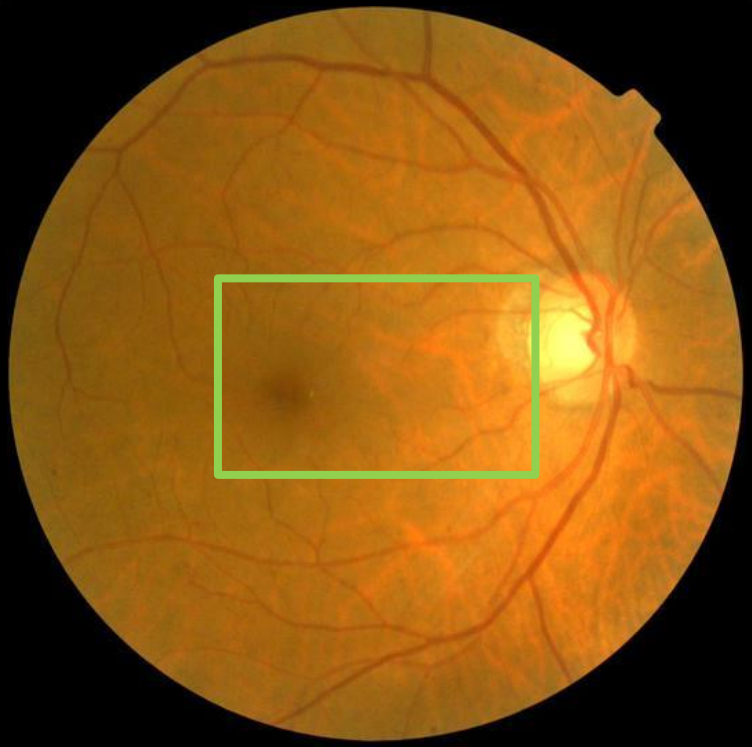
Easyscan 45º Green

DR

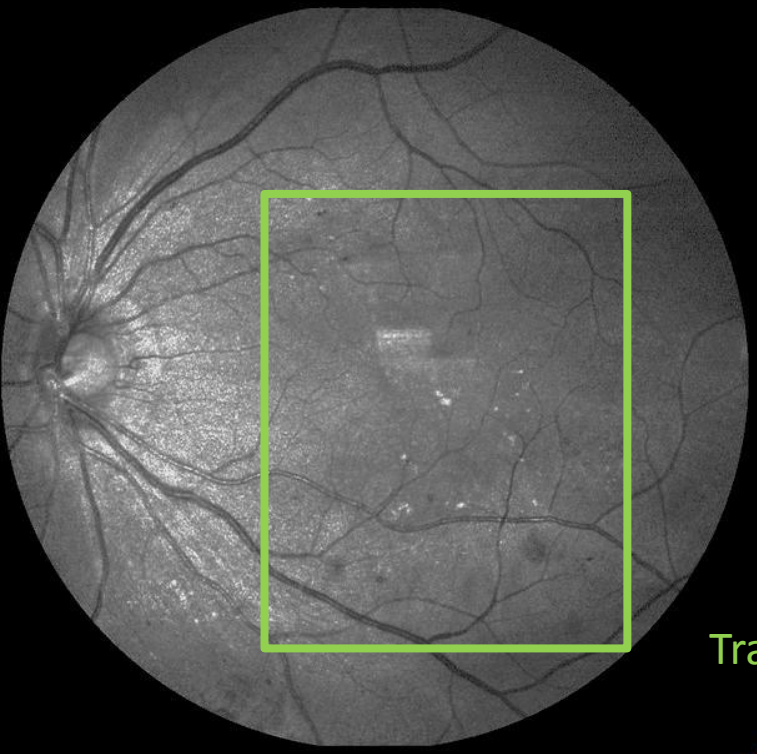
Traditional funduscamera



Easyscan 45º IR



Dot and blot hemorrhages: Appear similar to micro-aneurysms if they are small; they occur as micro-aneurysms rupture in the deeper layers of the retina

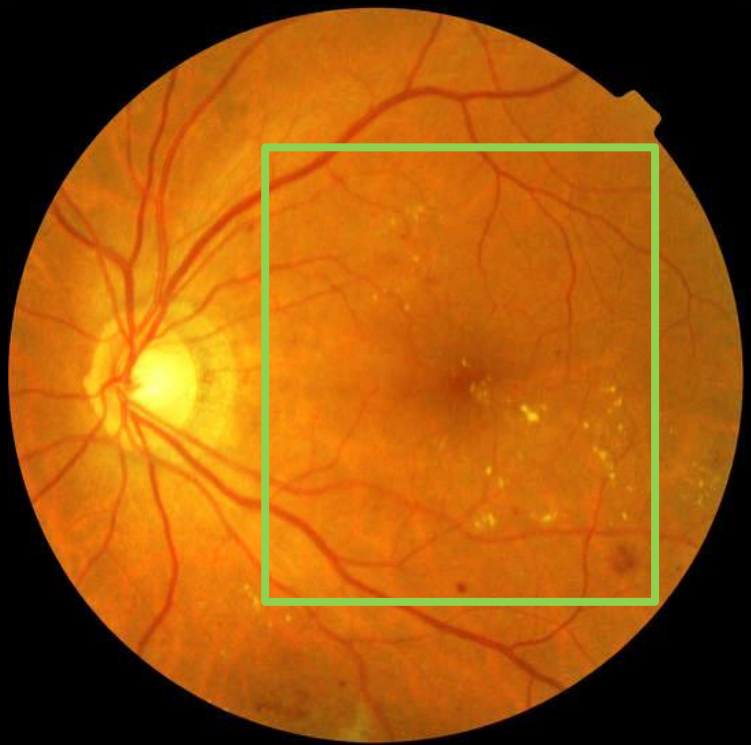


Easyscan 45º Green

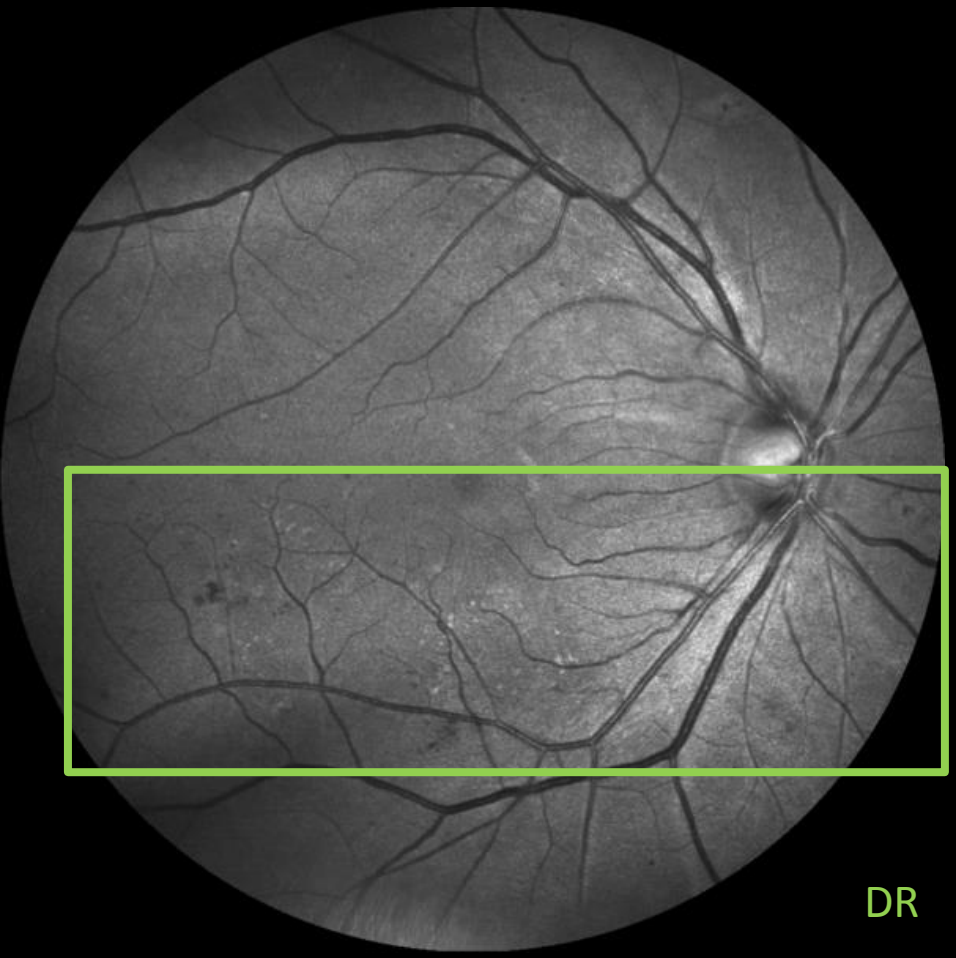
DR

Traditional funduscamera

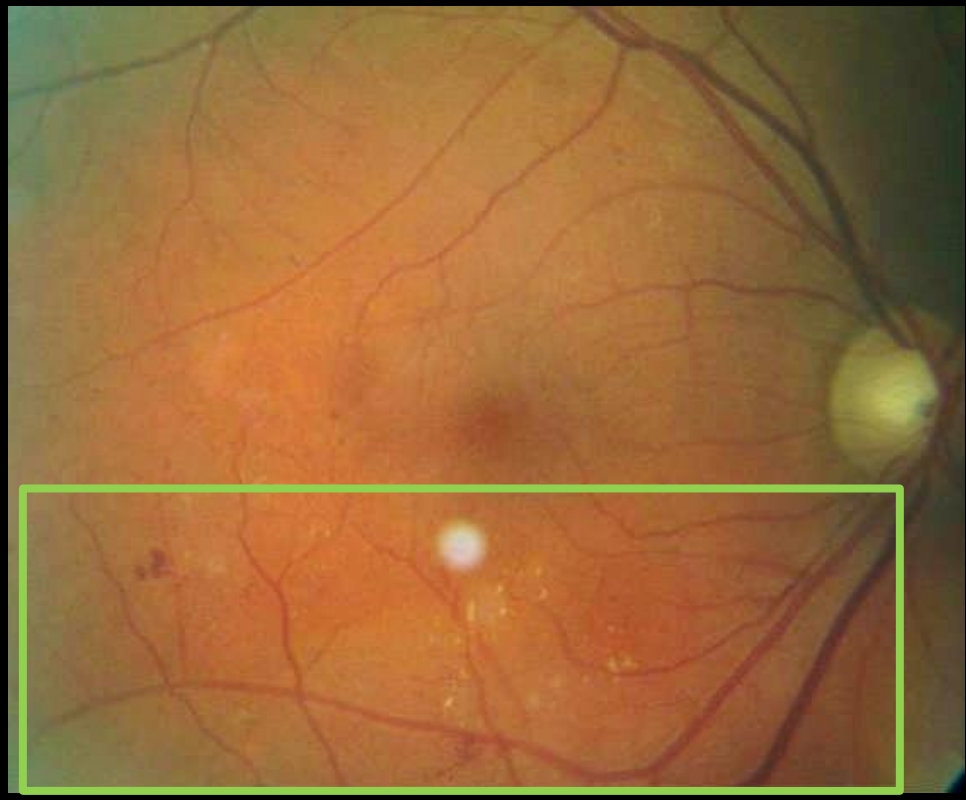
Easyscan 45º IR



Easyscan 45º Green



Traditional funduscamera

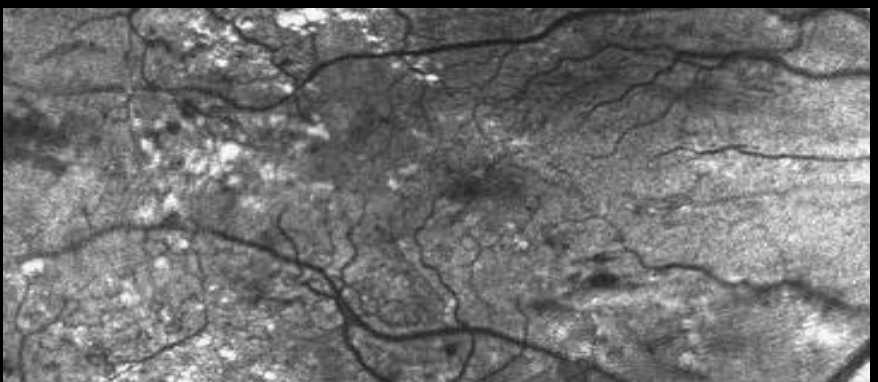


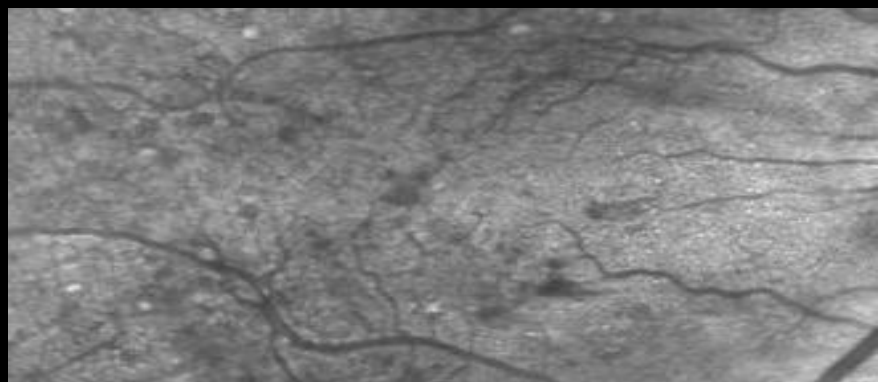
DR

Easyscan 45º Green

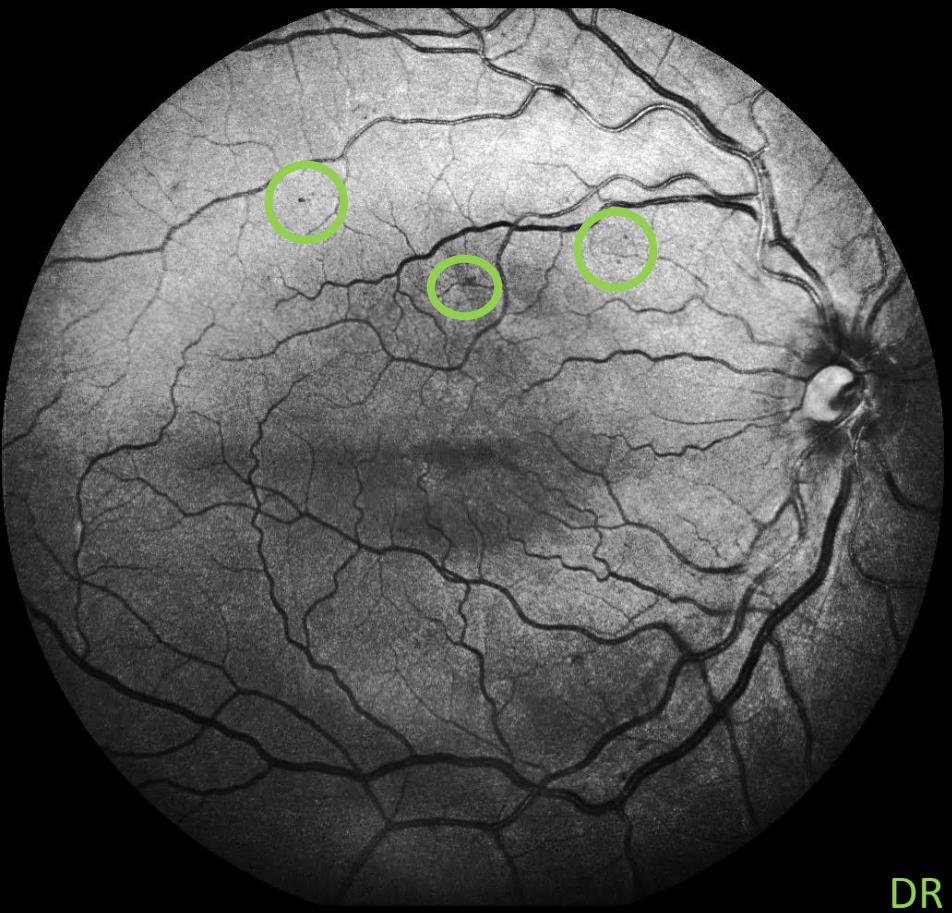
Easyscan 45º IR

DR



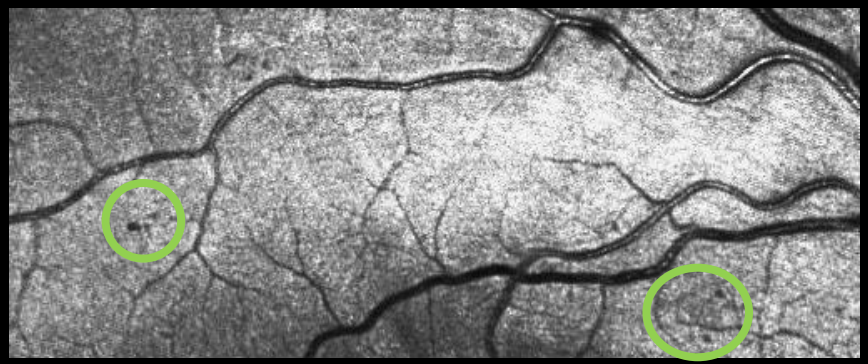


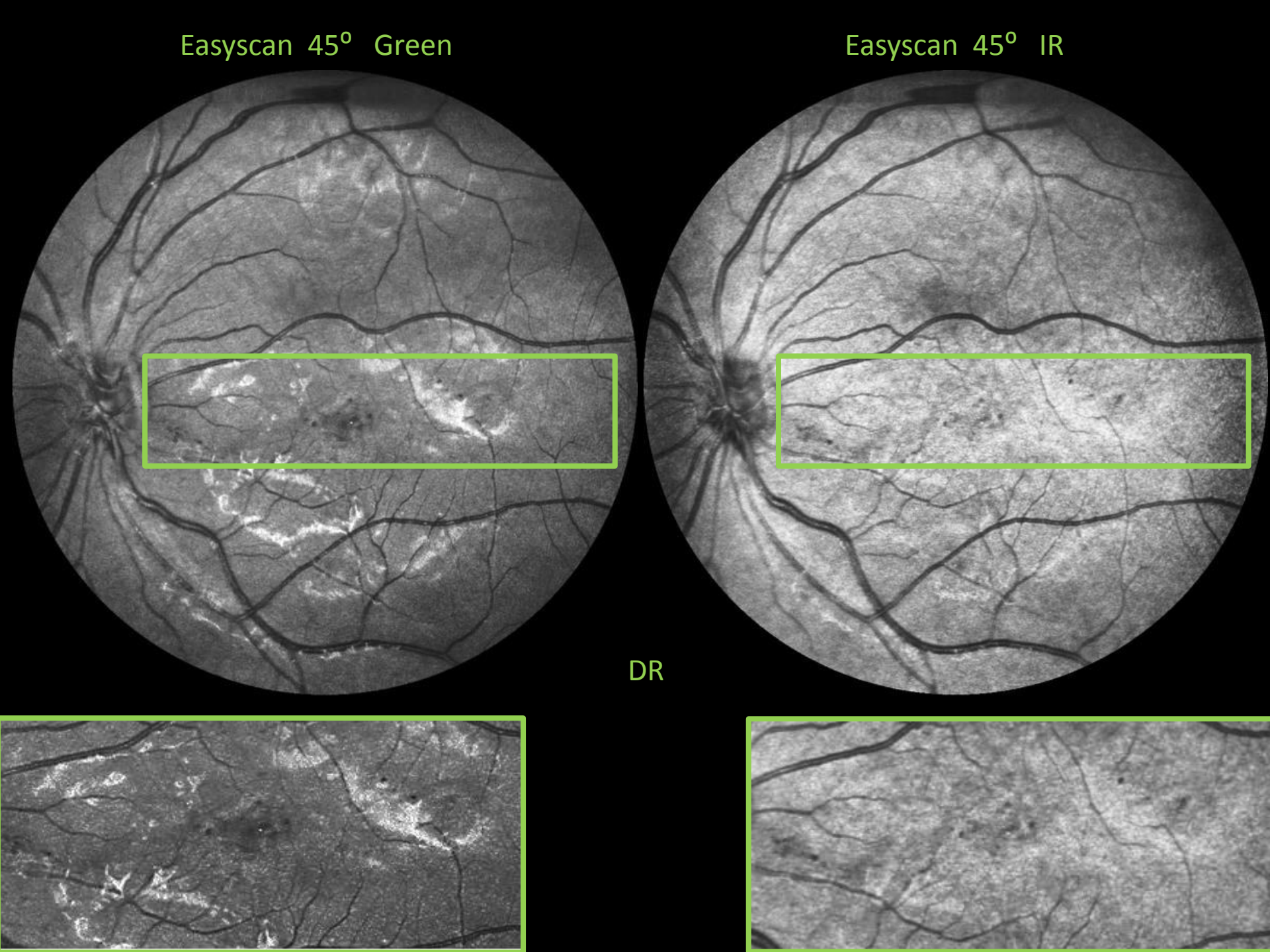
Easyscan 45º Green



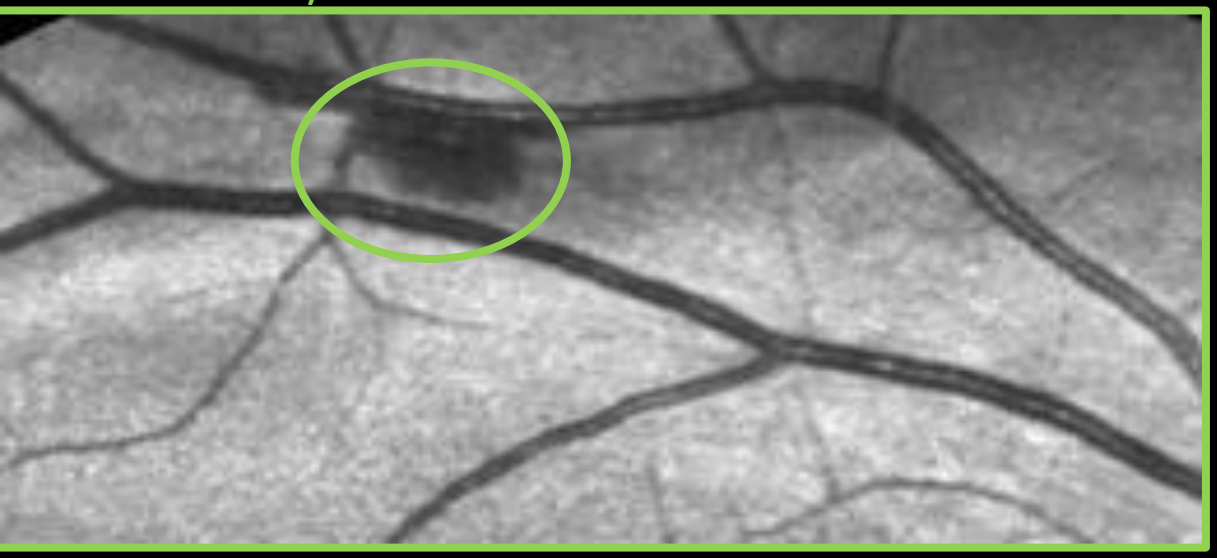
Easyscan 45º IR

DR




Easyscan 45º Green
Easyscan 45º IR
DR

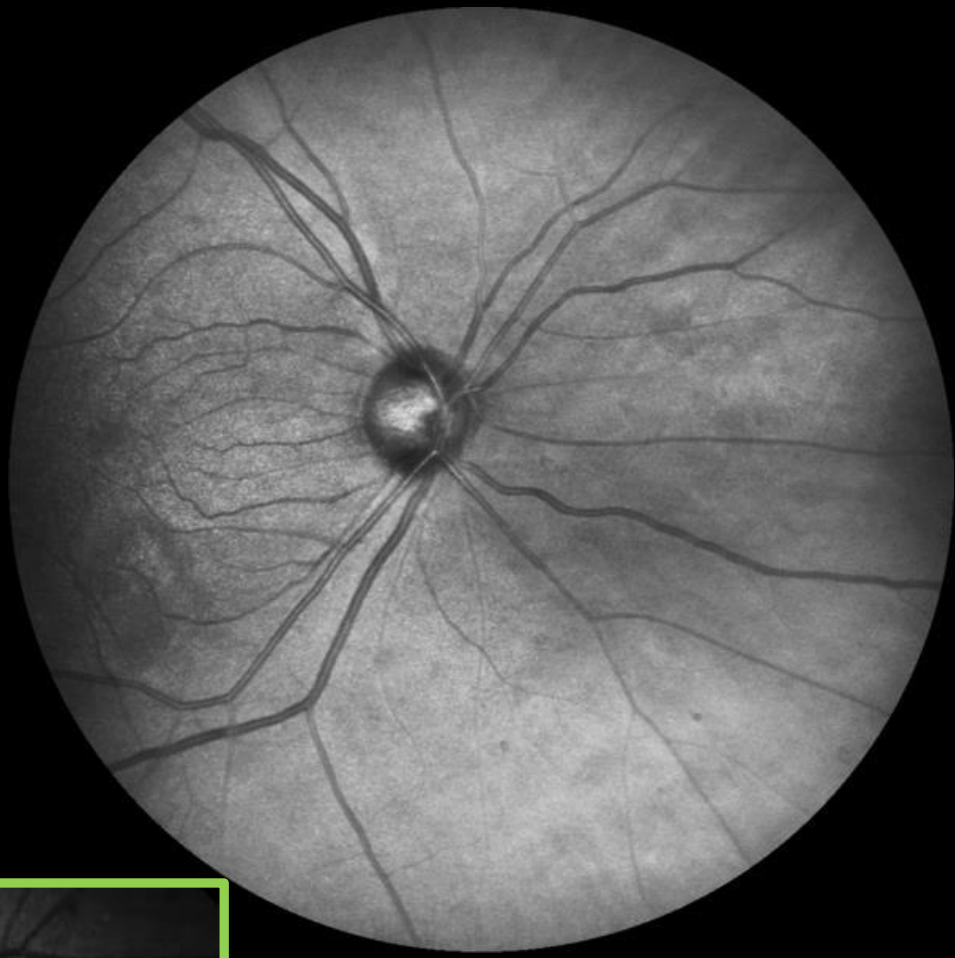
Easyscan 45º Green

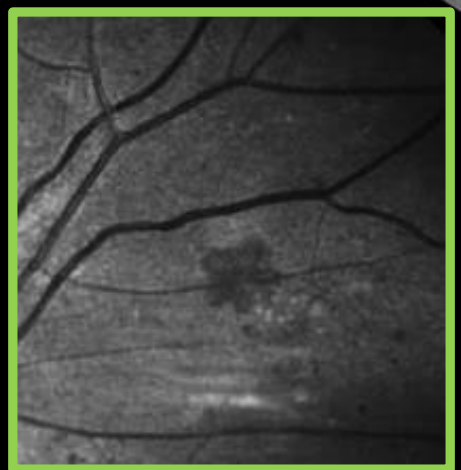


Traditional funduscamera

Easyscan 45º Green

Easyscan 45º IR

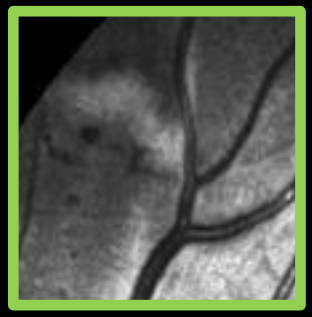




Proliferative diabetic retinopathy.
New abnormal blood vessels may grow from damaged blood vessels.
These new vessels are delicate and can bleed easily.

Easyscan 45° Green

Easyscan 45° IR



Cotton wool spots appear as fluffy white patches on the retina. They are caused by damage to nerve fibers. The nerve fibers are damaged by swelling in the surface layer of the retina. Diabetes and hypertension are the two most common diseases that cause these spots

Easyscan 45º Green

Easyscan 45º IR

Laserspots

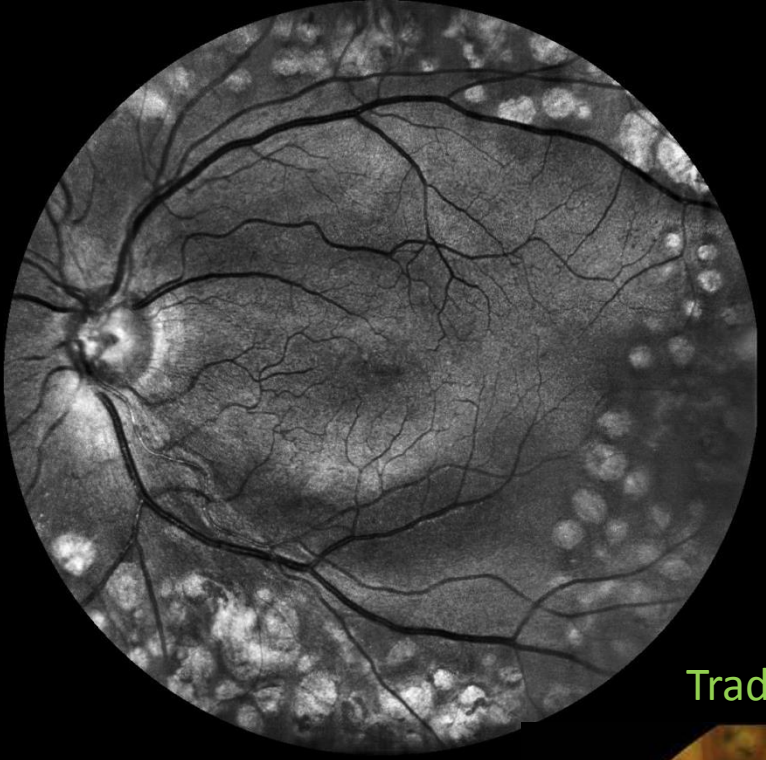
Proliferative retinopathy is treated with laser. This procedure is called scatter laser treatment. The laser treatment helps to shrink the abnormal blood vessels and scar. Although this may result in some loss of side (peripheral) vision, it may be necessary to sacrifice some side vision to preserve central vision.

Easyscan 45º Green

Laserspots

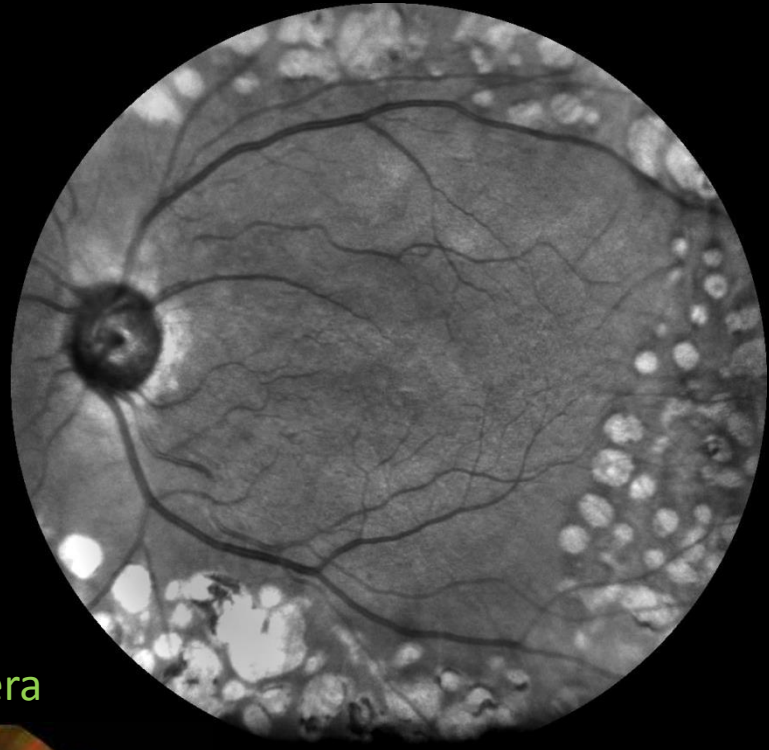
Easyscan 45º IR

Traditional funduscamera



Easyscan 45º Green

Laserspots

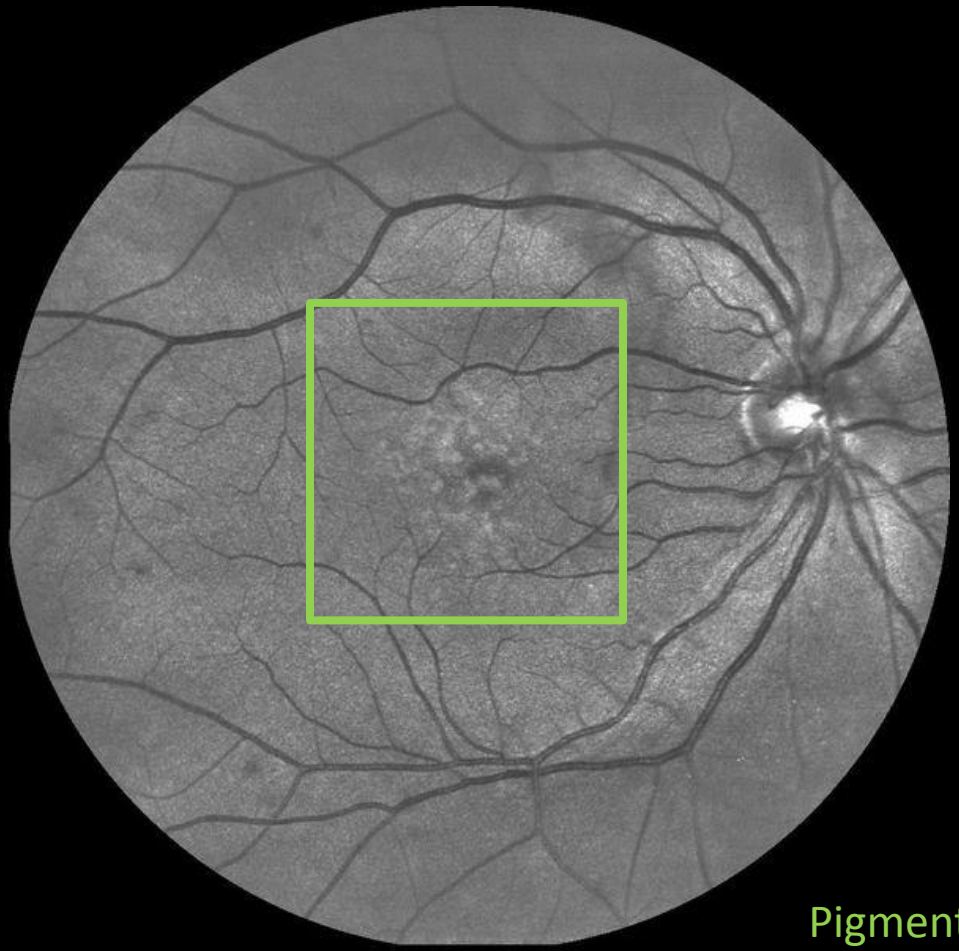


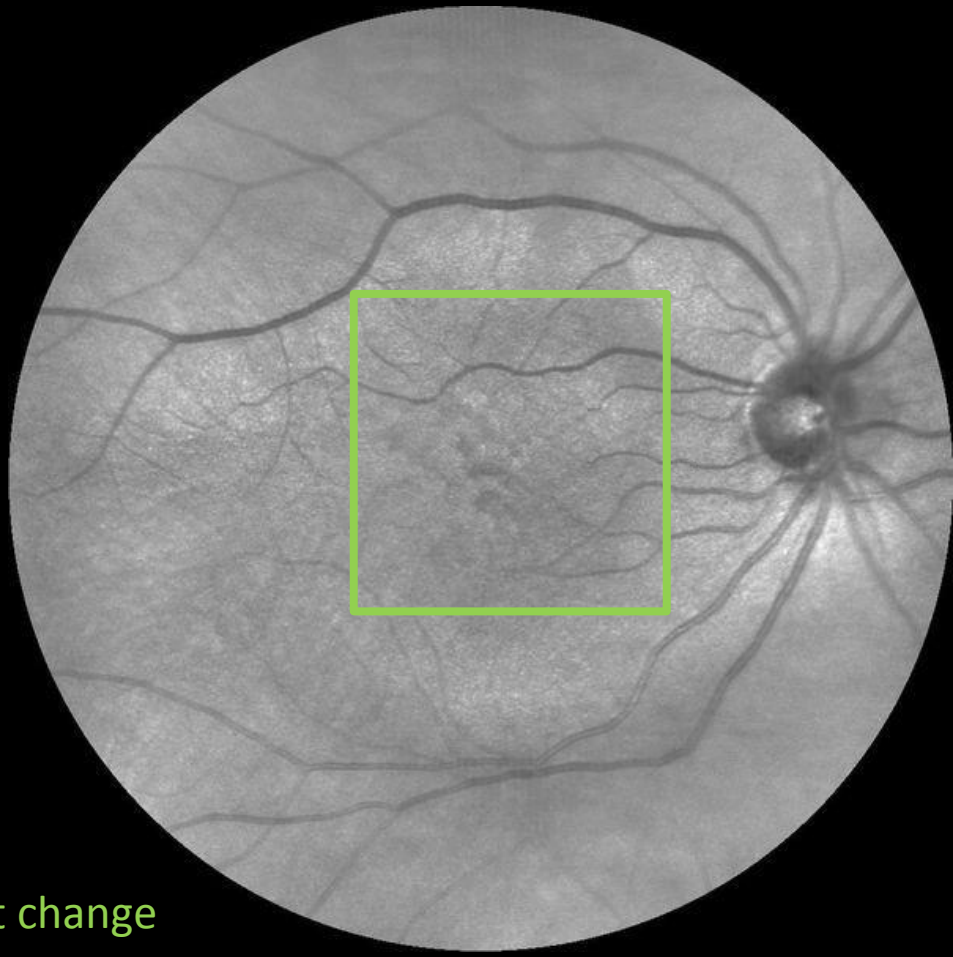
Easyscan 45º IR

Traditional funduscamera

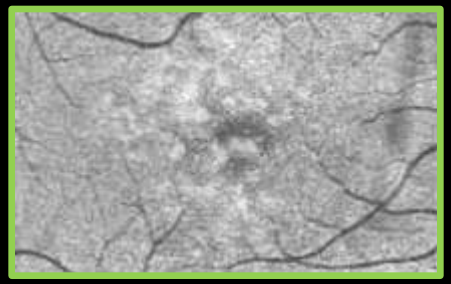
Easyscan 45º Green

Easyscan 45º IR

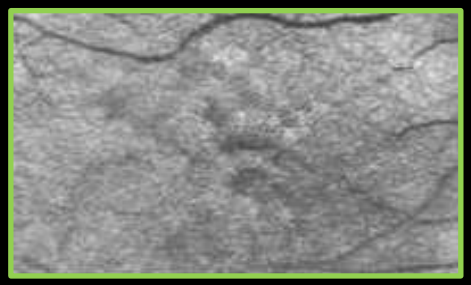


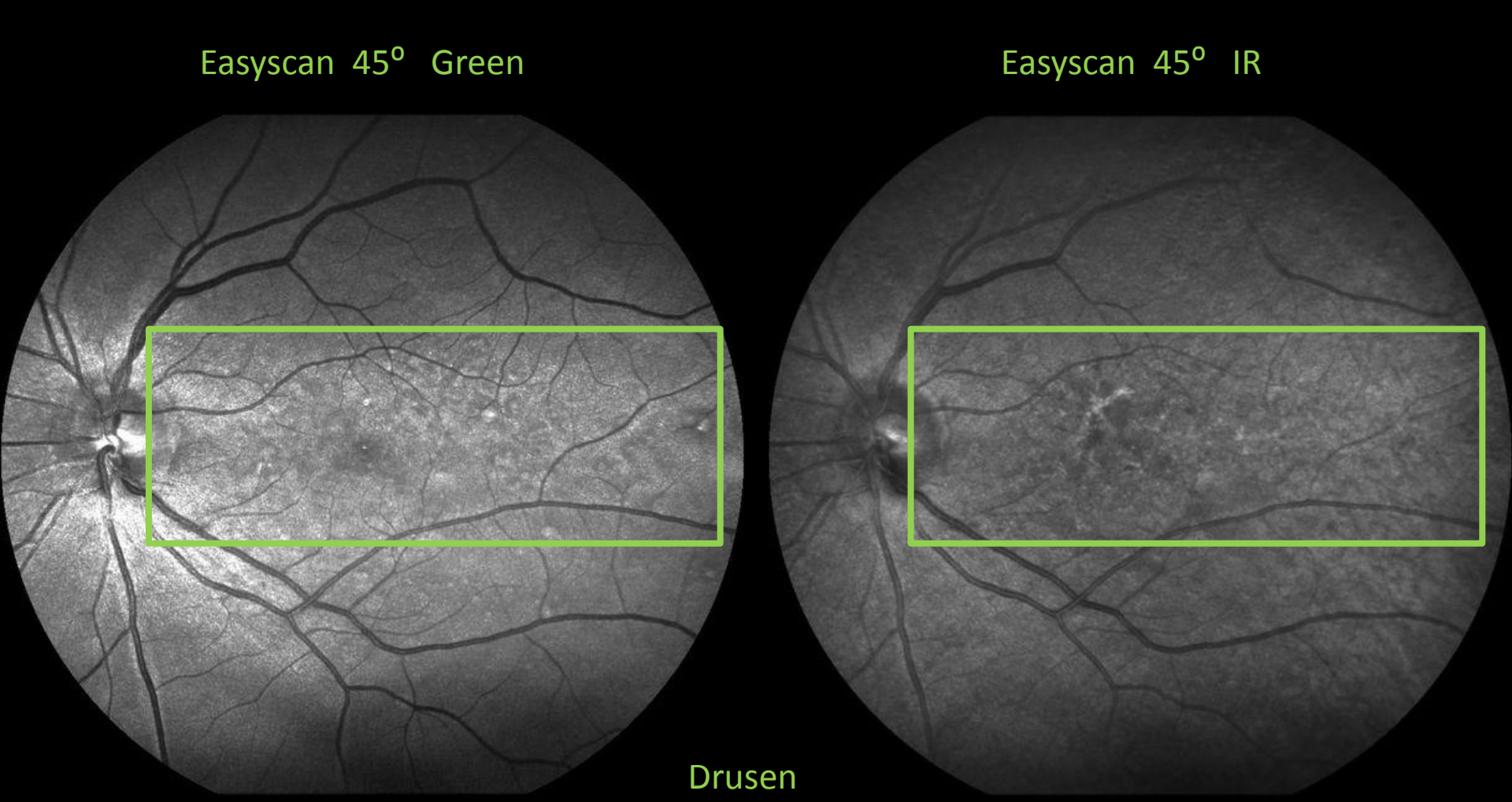


Pigment change



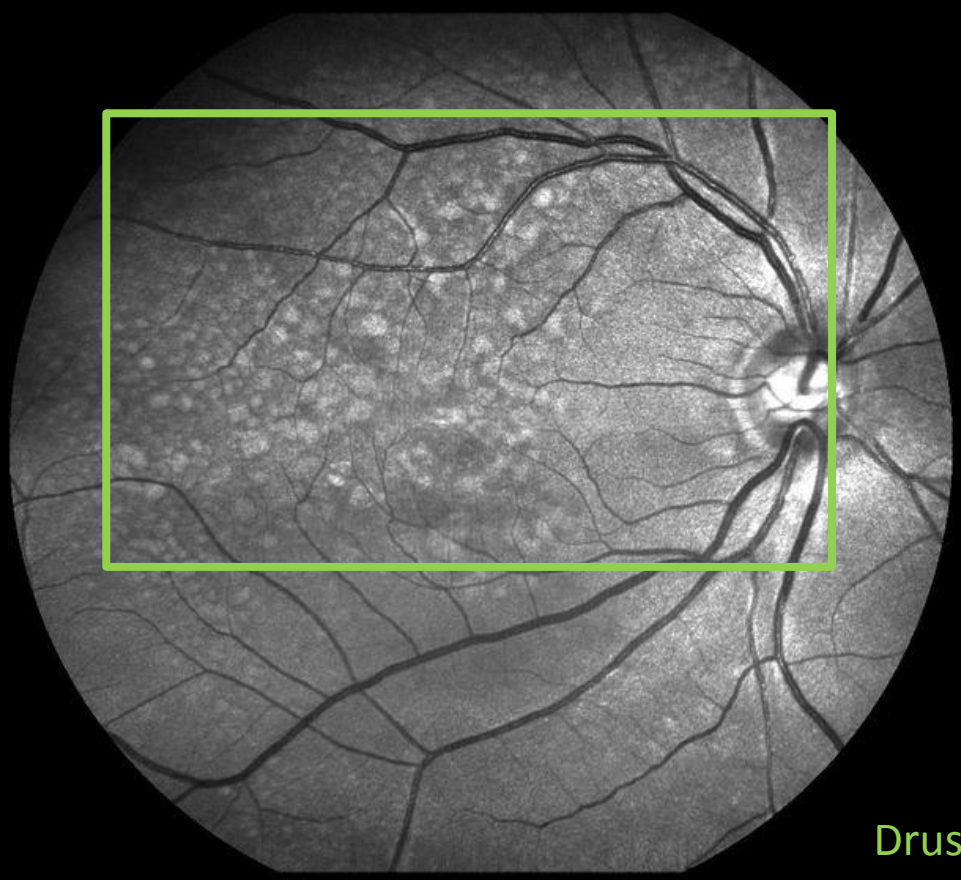
Changes in the RPE

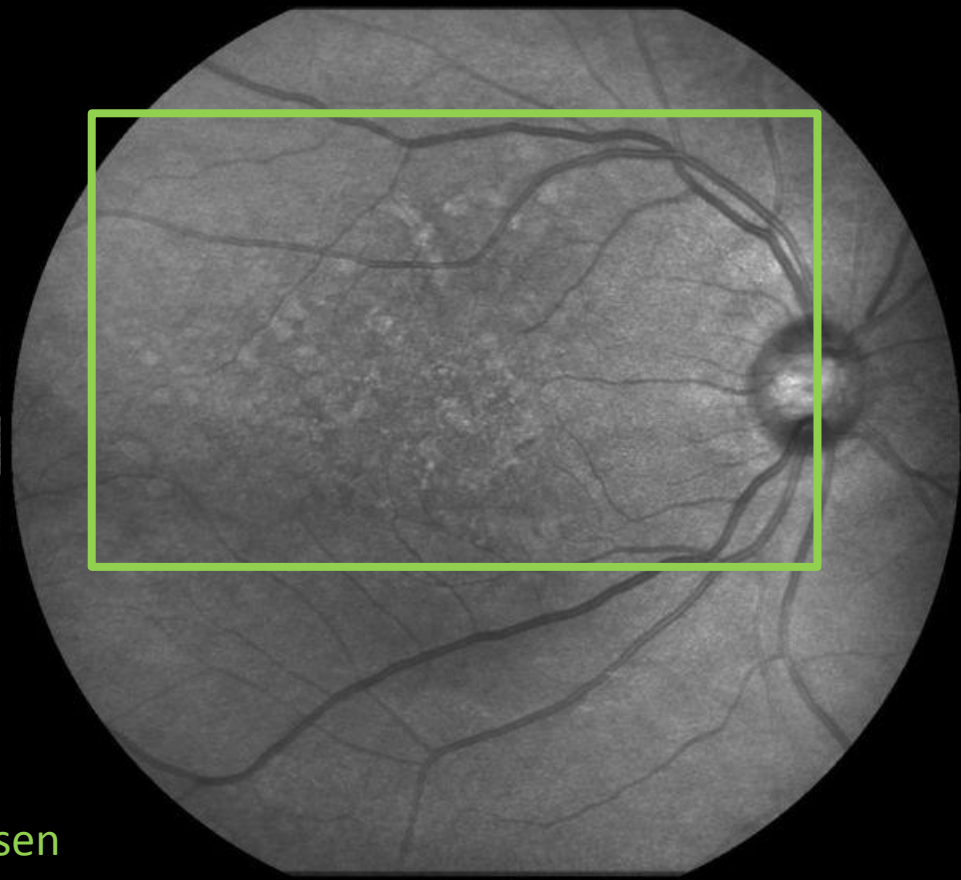




Drusen

Drusen are yellow deposits under the retina and are made up of lipids, a fatty protein.. The presence of a few small hard drusen is normal with advancing age, and most people over 40 have some hard drusen.



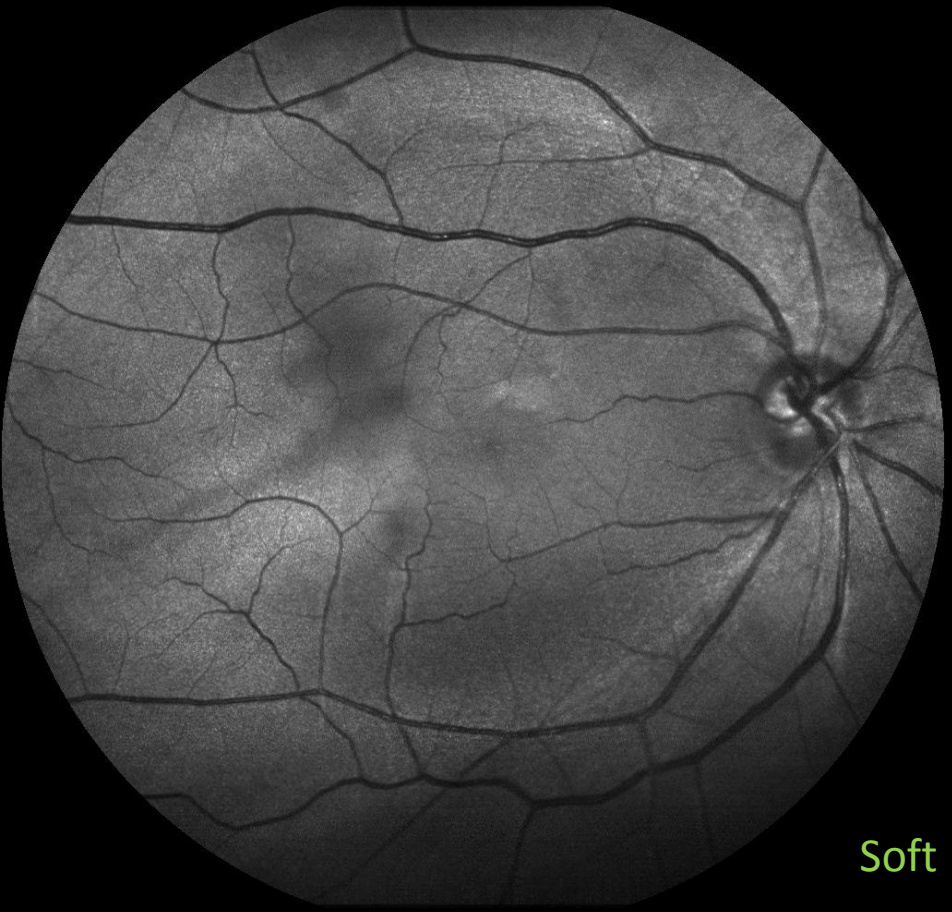


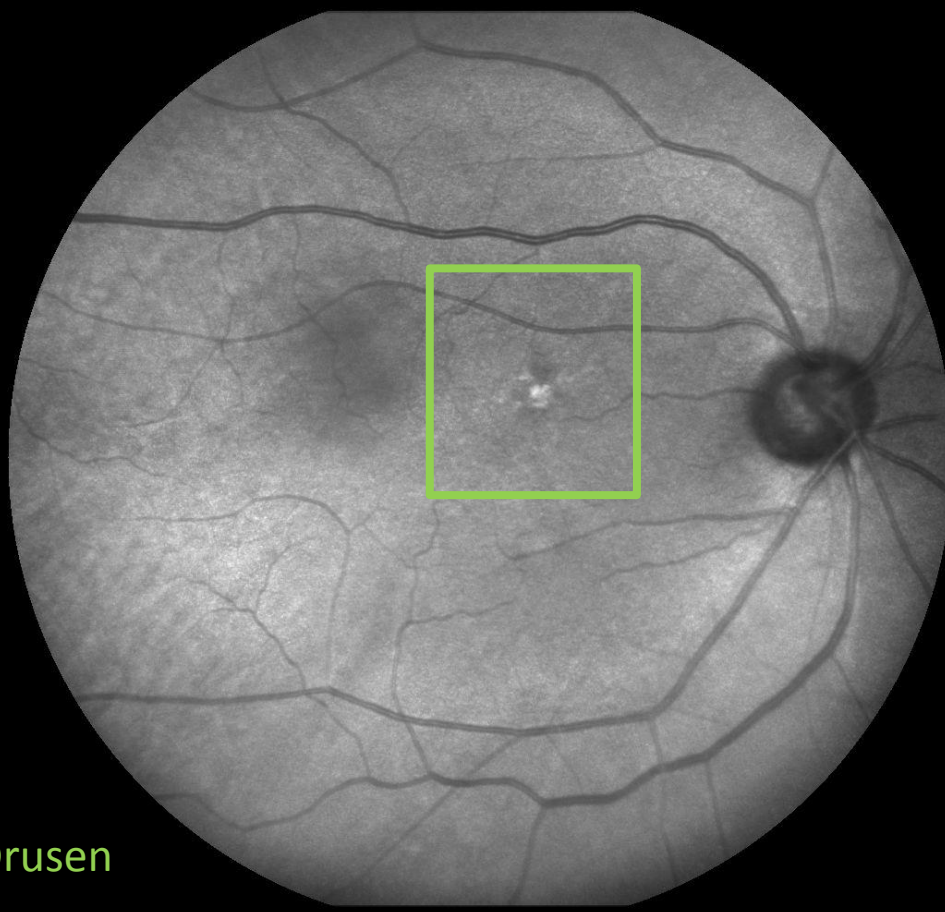
Drusen

Peripheral retinal drusen and reticular drusen are associated with AMD.
While drusen likely do not cause age-related macular degeneration (AMD), their presence increases a person's risk of developing AMD

Easyscan 45º Green

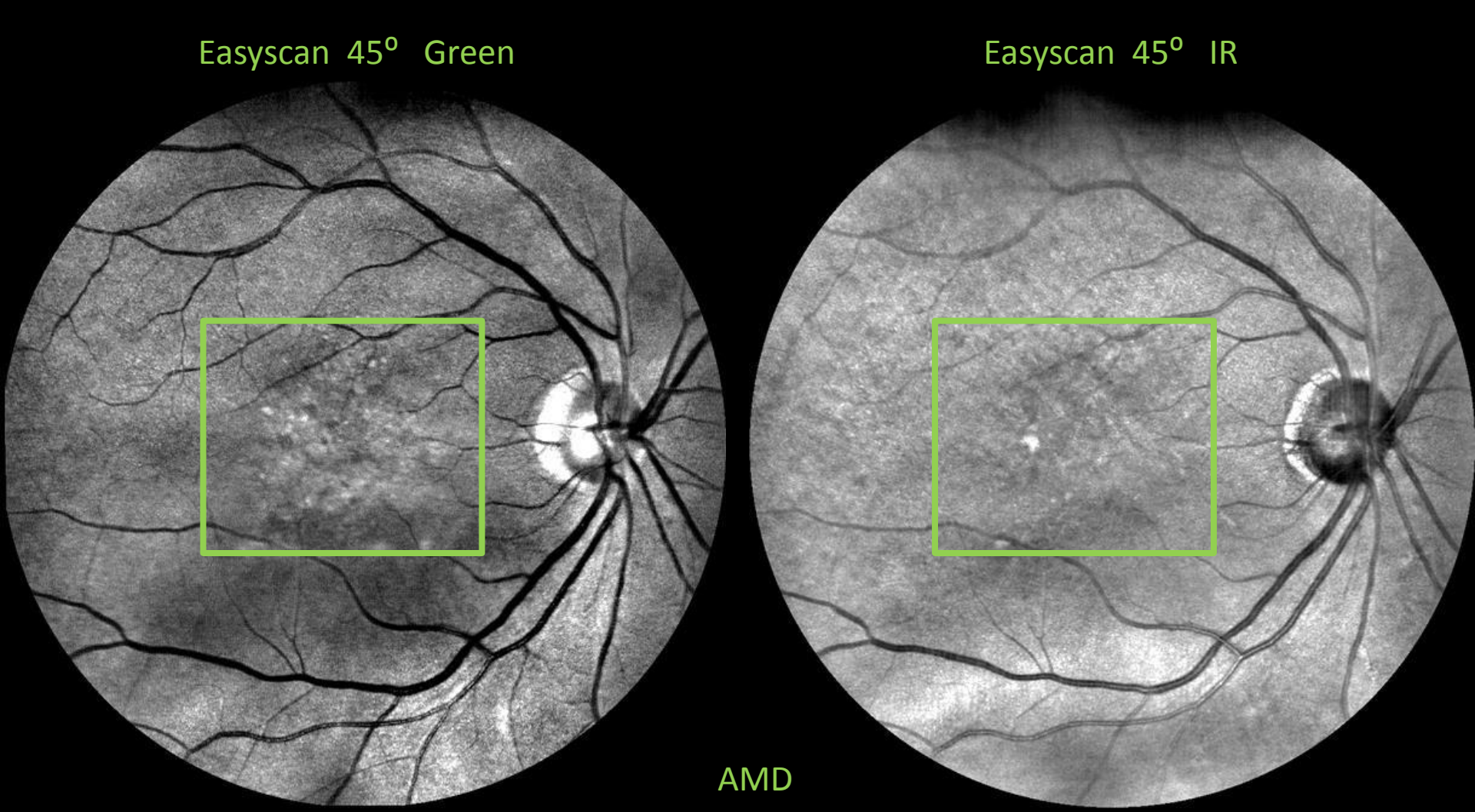
Easyscan 45º IR





Soft Drusen

Soft drusen are large and cluster closer together. Their edges are not as clearly defined as hard drusen.

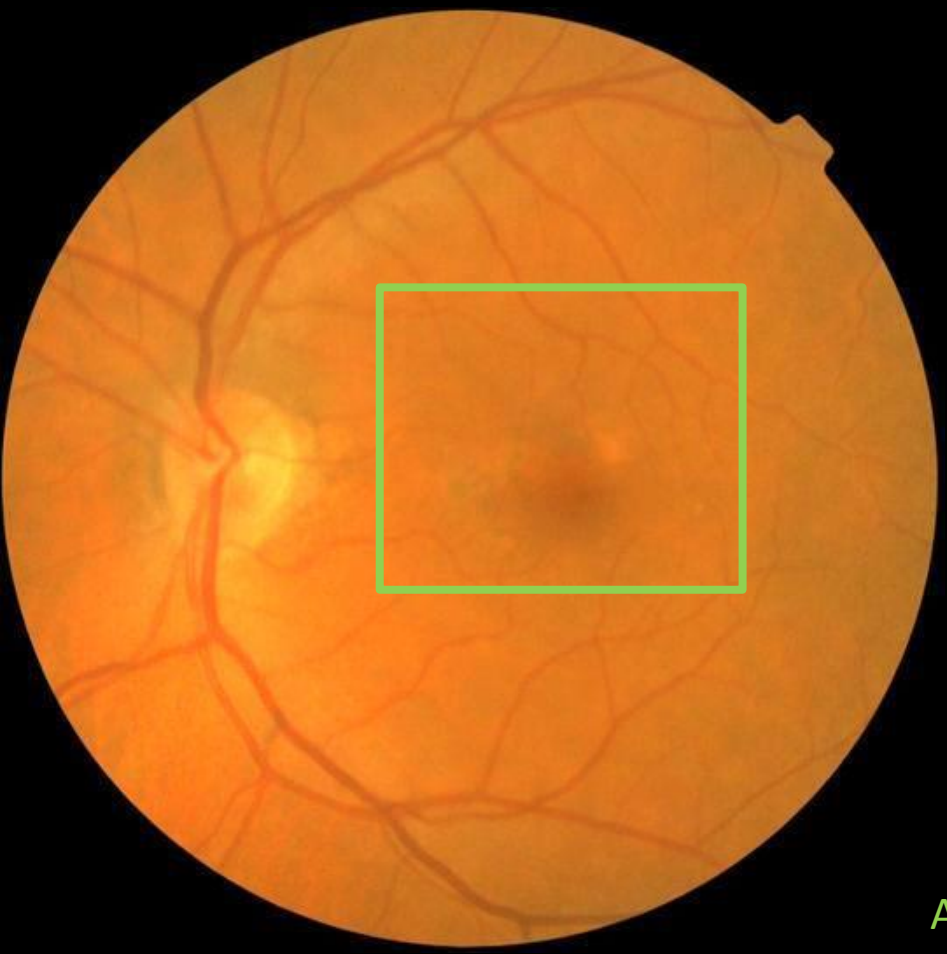


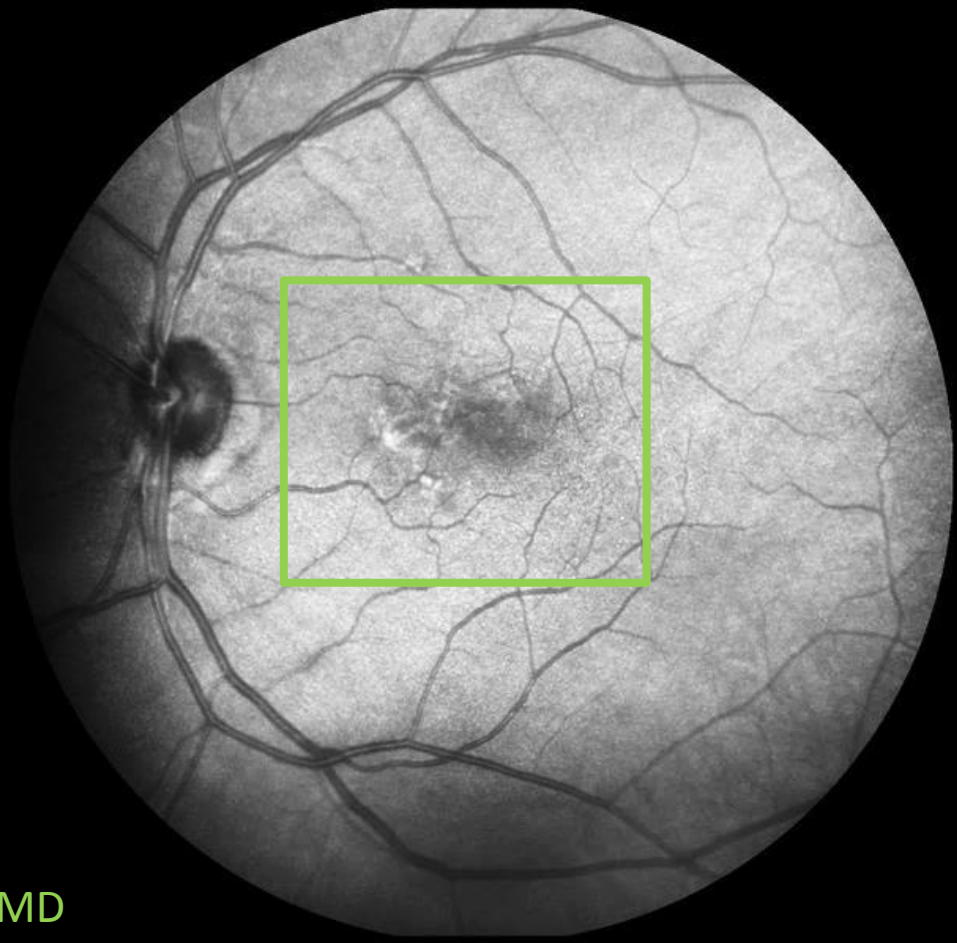
AMD

Age-related macular degeneration the dry form, there is a breakdown or thinning of the layer of retinal pigment epithelial cells (RPE) in the macula. These RPE cells support the light sensitive photoreceptor cells (rods and cones)

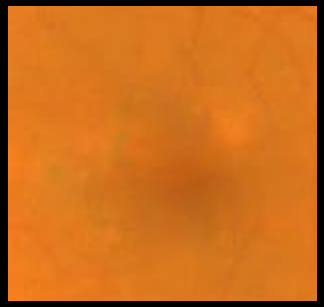
Traditional funduscamera

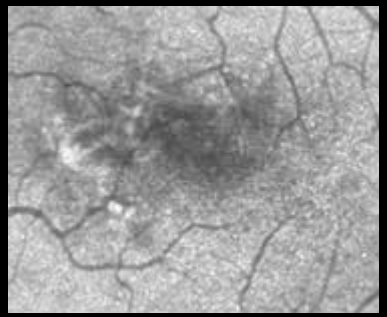
Easyscan 45º IR





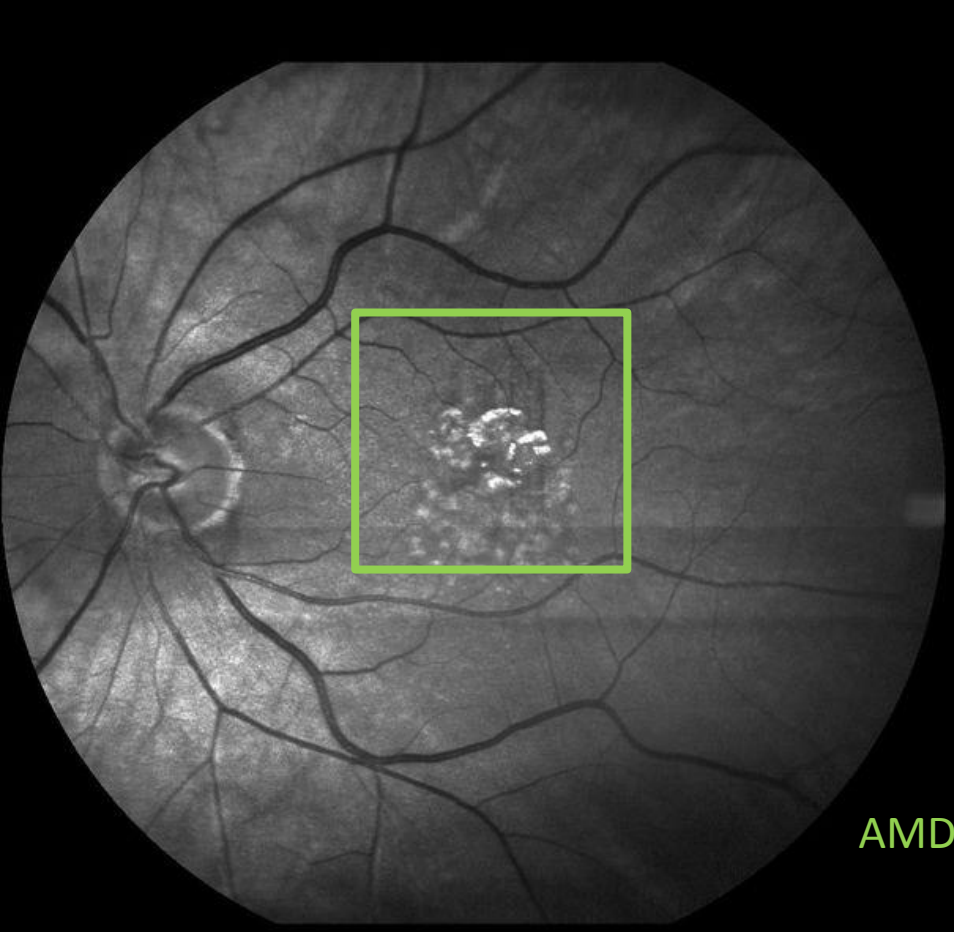
AMD

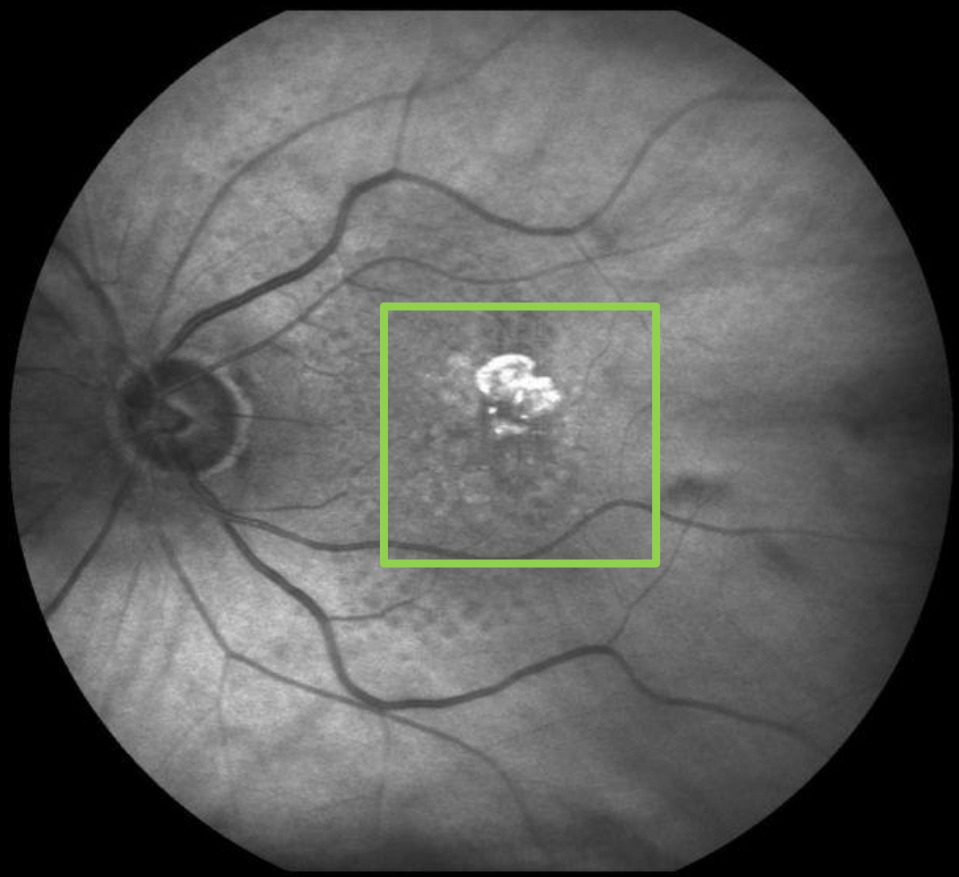




Easyscan 45º Green

Easyscan 45º IR



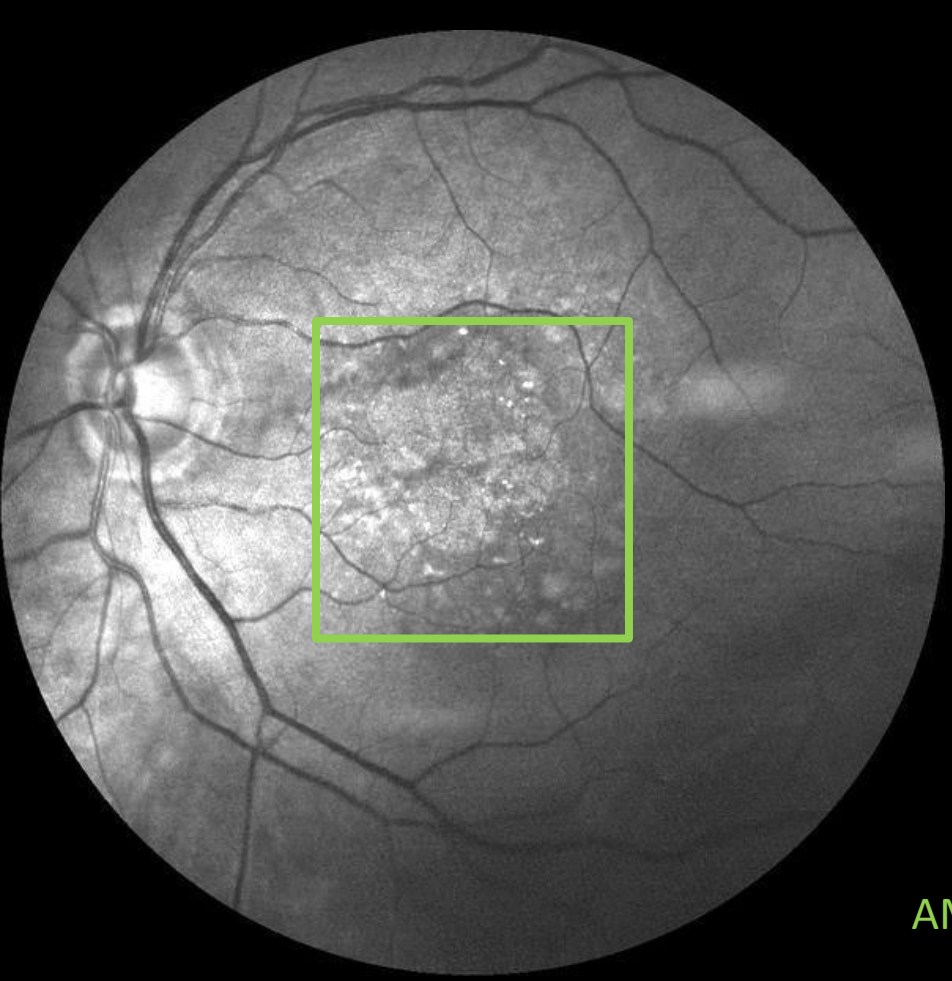


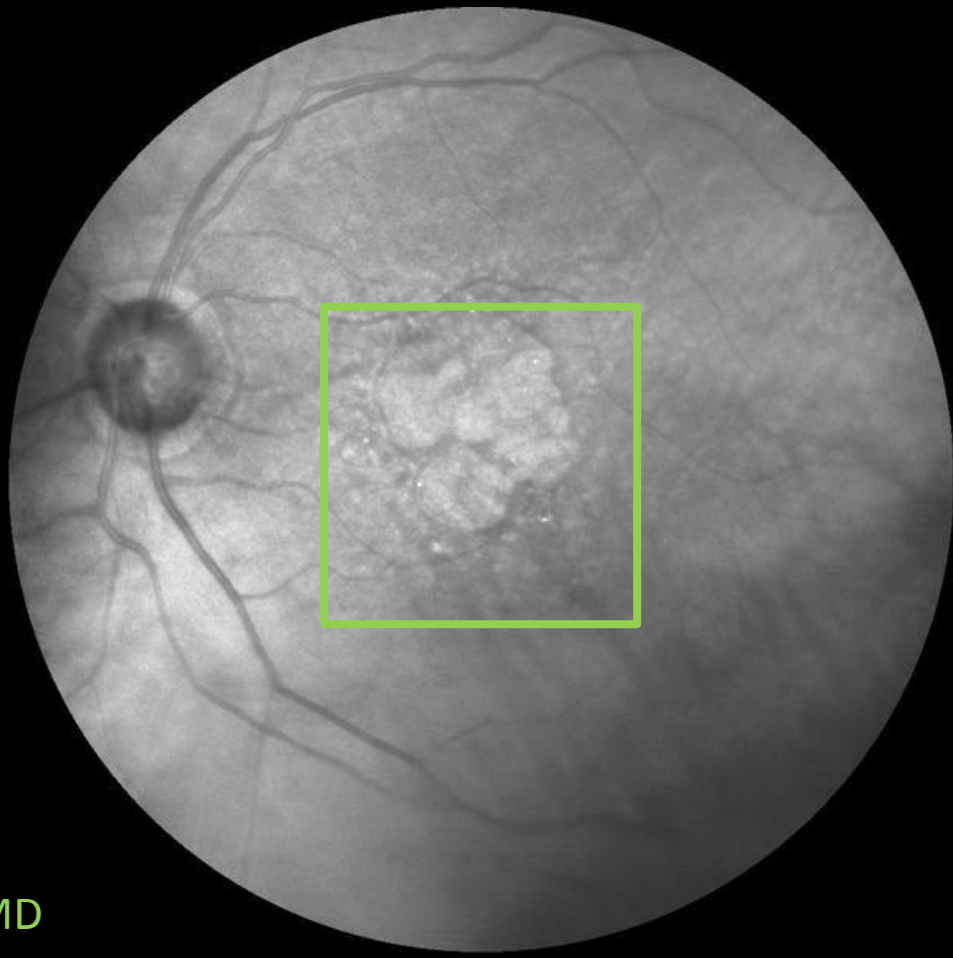
AMD

No medical or surgical treatment is available for dry AMD; however, vitamin supplements with high doses of antioxidants, lutein and zeaxanthin, have been suggested to slow the progression.

Easyscan 45º Green

Easyscan 45º IR



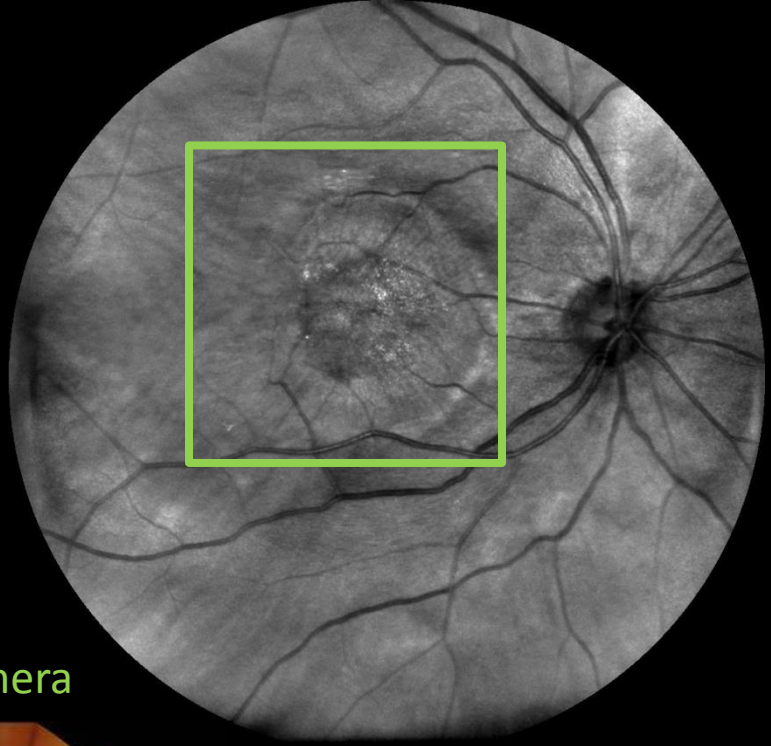


AMD

Central atrophy, advanced dry AMD. The death or degeneration of the photoreceptor cells (rods and cones)

Wet AMD

Easyscan 45º Green

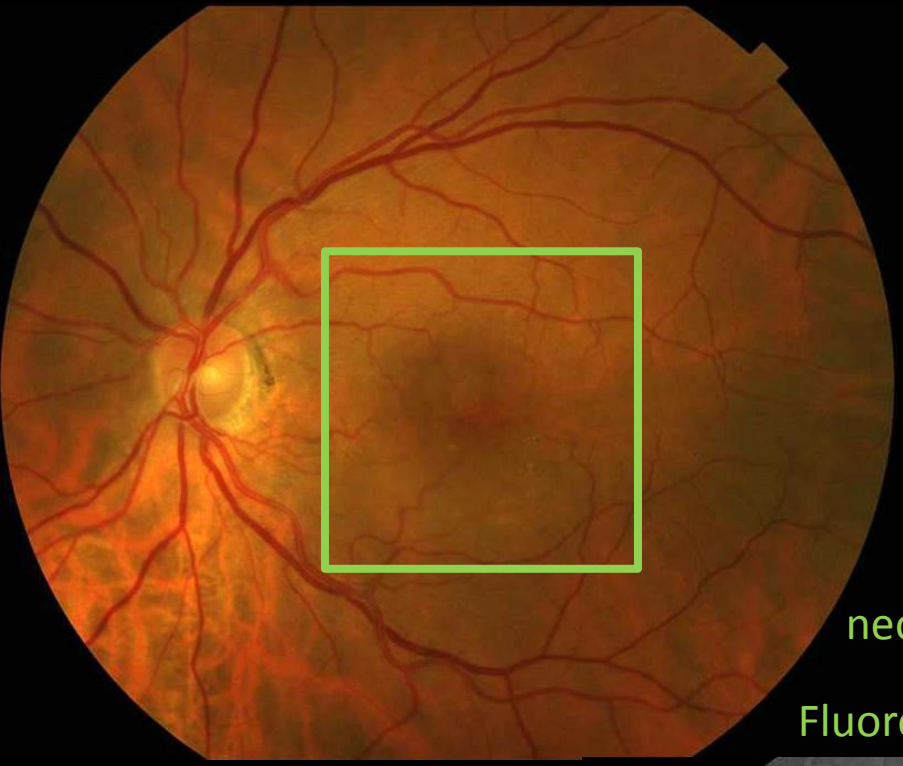


Easyscan 45º IR

Traditional funduscamera

Neovasculair or exudative AMD, the "wet" form of AMD, causes vision loss due to abnormal blood vessel growth. The blood vessels begin to grow from the choroid , up into the RPE layer , through Bruch's membrane.

Bleeding, leaking, and scarring from these blood vessels eventually cause irreversible damage to the photoreceptor cells and will give a rapid vision loss if left untreated.

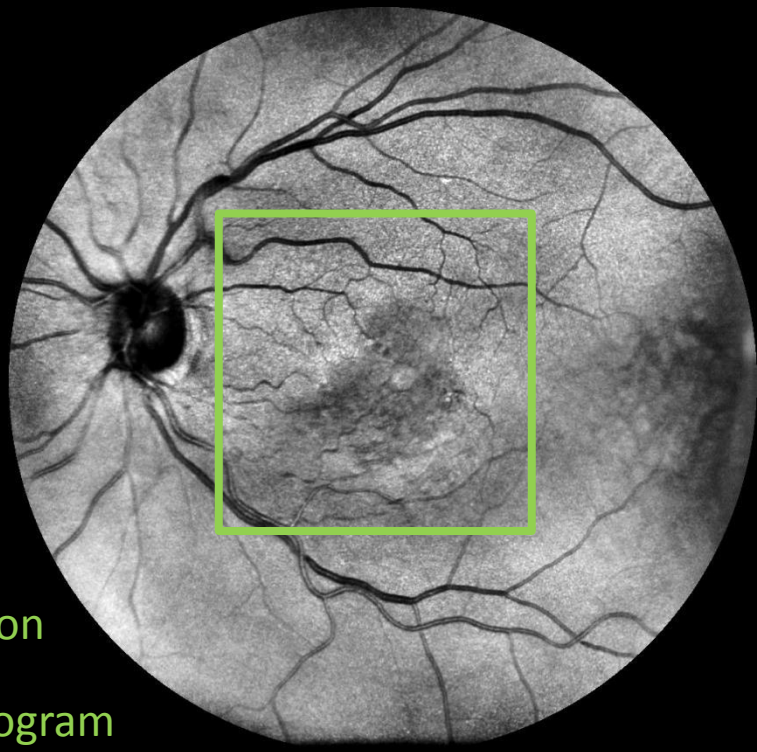


Traditional funduscamera

Wet AMD

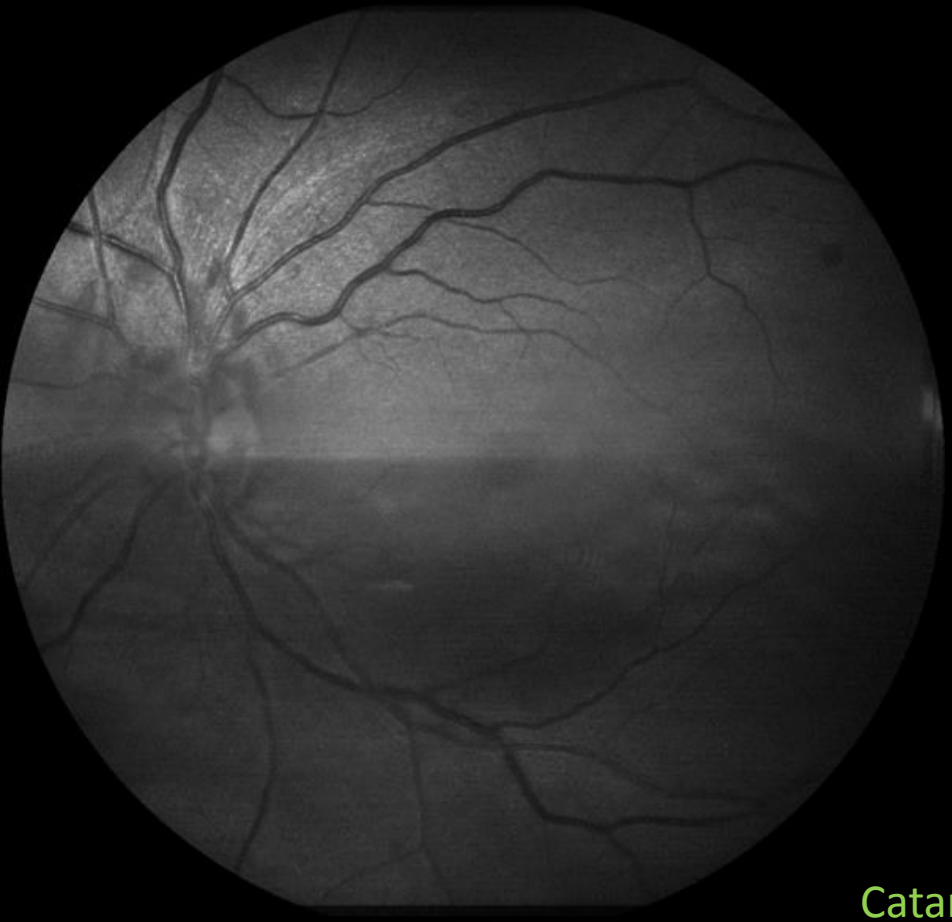
neovascularization

Fluorescentie angiogram



Easyscan 45° IR

Easyscan 45º Green



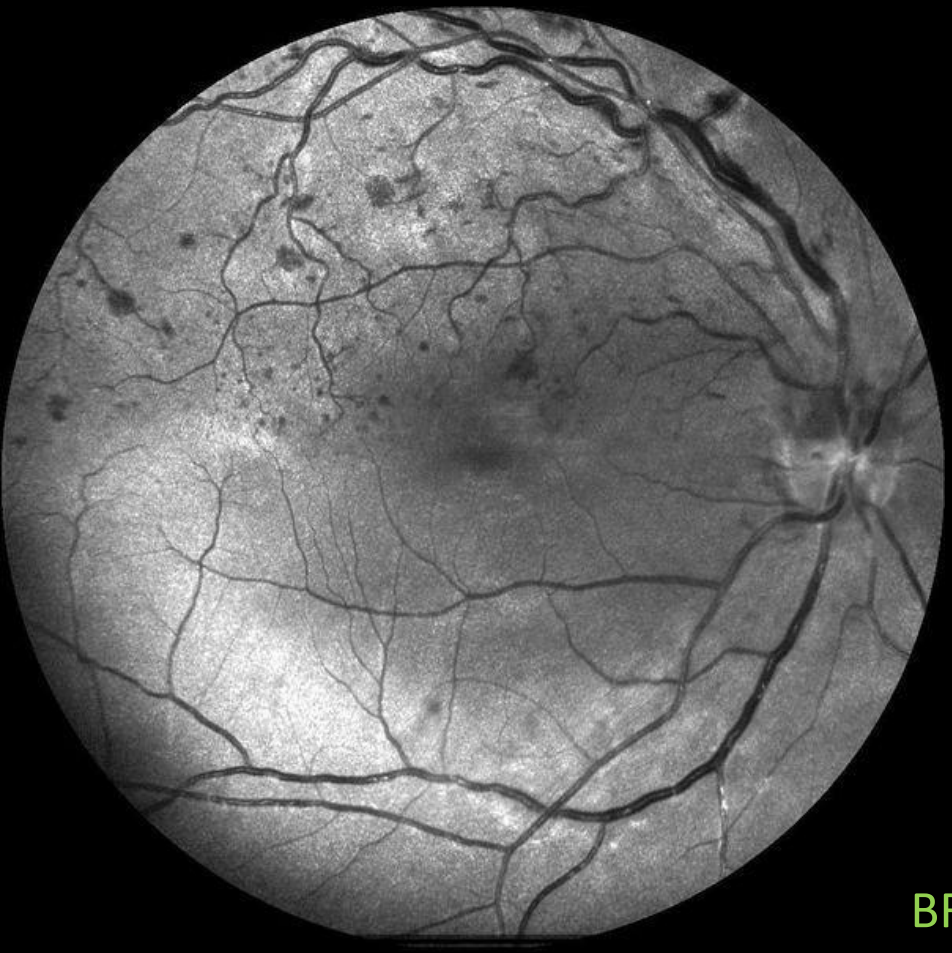
Easyscan 45º IR

Cataract

Cataract is a clouding of the lens which will lead to a decrease in vision. It can only be treated with surgery. Cataracts occur when there is a buildup of protein in the lens that makes it cloudy. This prevents light from passing clearly through the lens. Since new lens cells form on the outside of the lens, all the older cells are compacted into the center of the lens resulting in to cataract

Infrared light goes through cataract, but the green light will be blocked and gives a blurry image

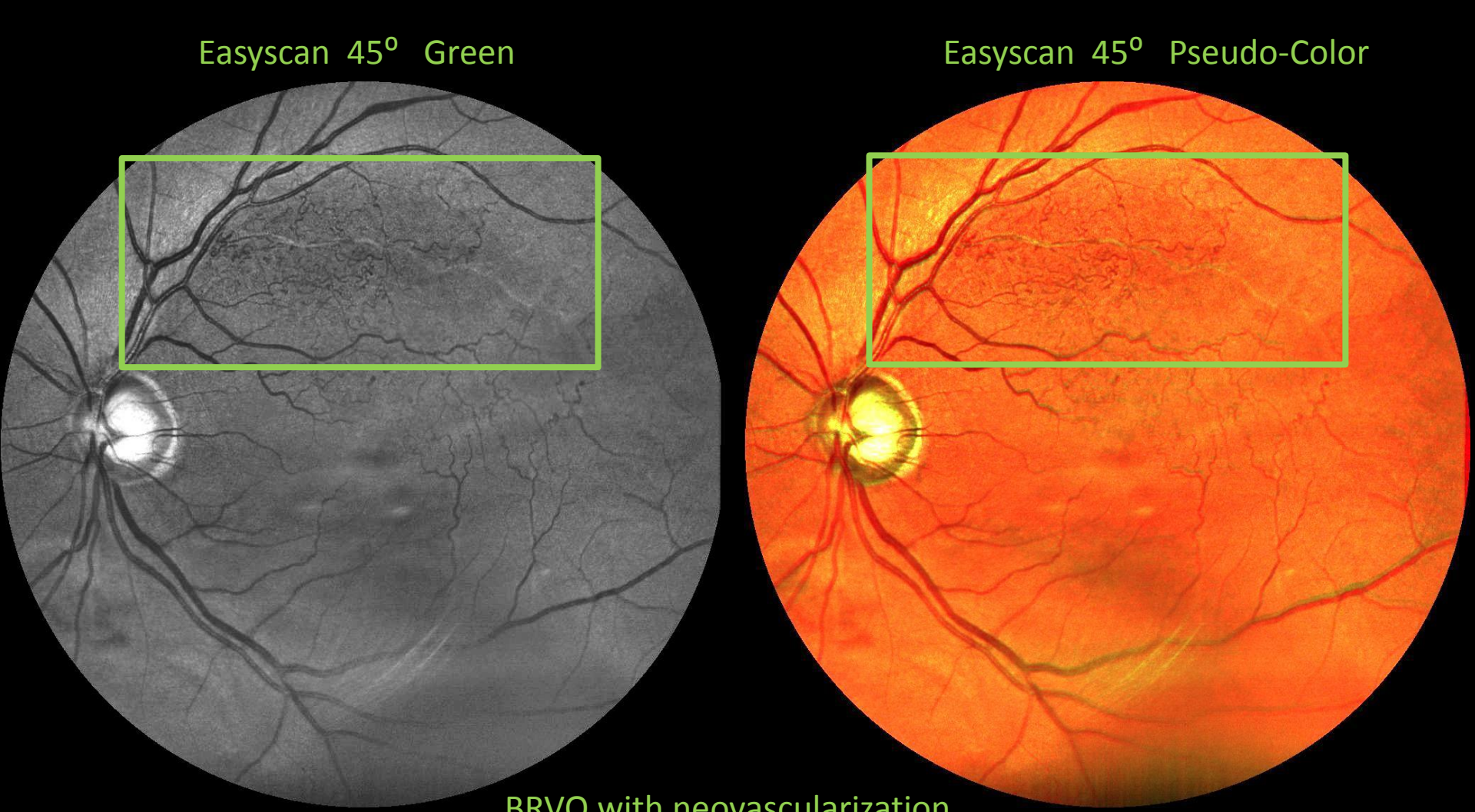
Easyscan 45º Green



Traditional funduscamera

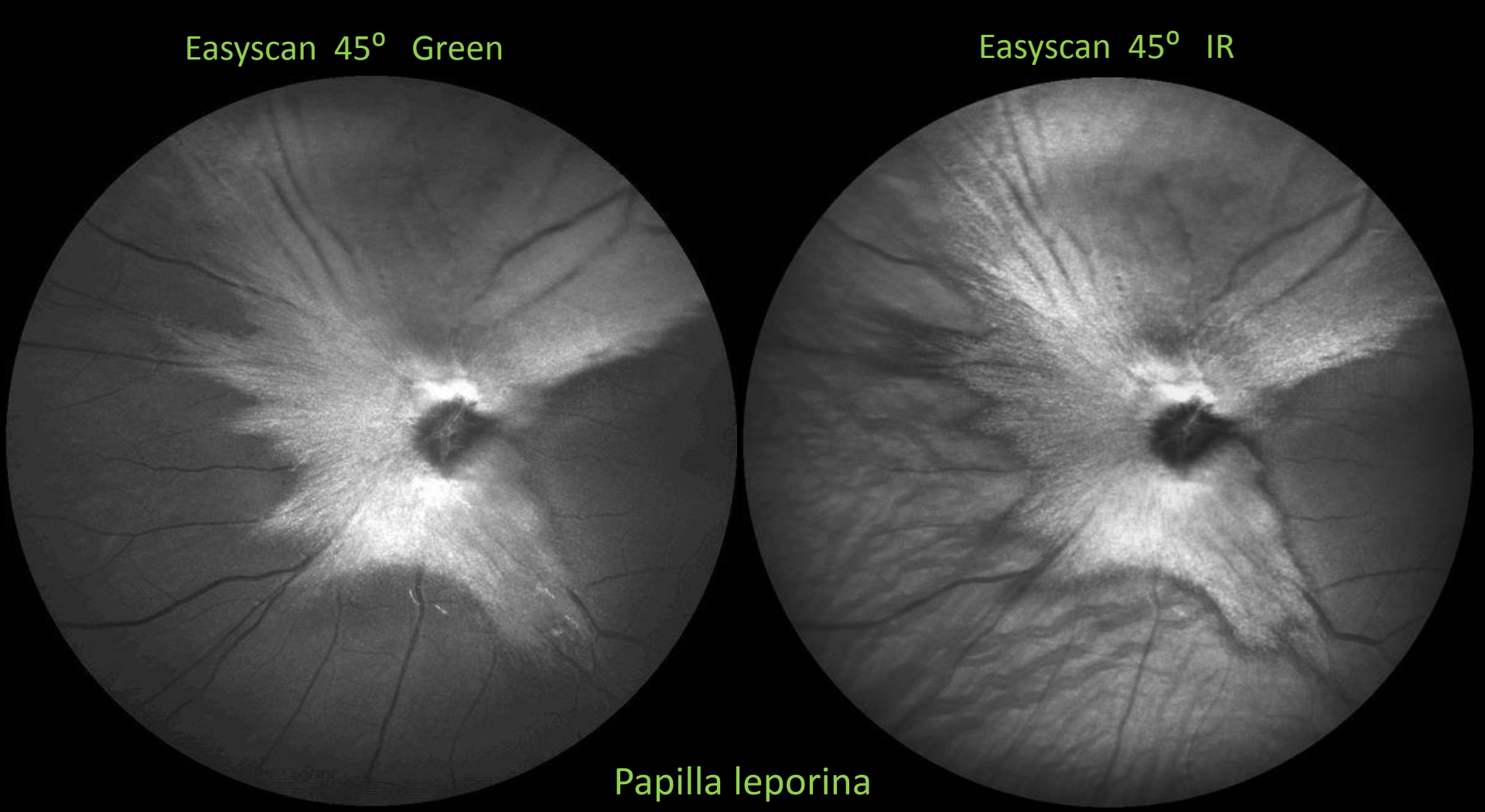
BRVO

Branch retinal vein occlusion; BRVO (part of one eye)
Blockage (thrombus) development of smaller veins in the retina often occurs when retinal arteries that have been thickened by atherosclerosis or cross over and place pressure on a retinal vein(high blood pressure)
Because the risk of these disorders increases with age, retinal vein occlusion most often affects people who are aged 50 and older. Aspirin or other blood thinners may help prevent blockages



BRVO with neovascularization

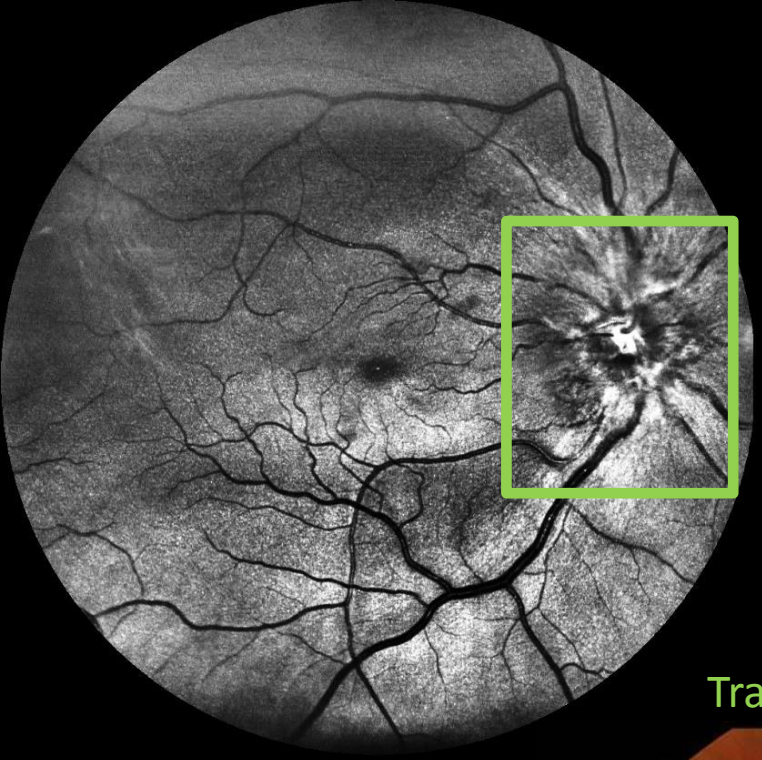
Another serious potential problem in branch retinal vein occlusion is retinal neovascularization. Neovascularization only occurs in about one in five BRVO patients. Abnormal blood vessels grow from the retina into the vitreous humor. These vessels are very fragile and can lead to major bleeding (vitreous hemorrhage)



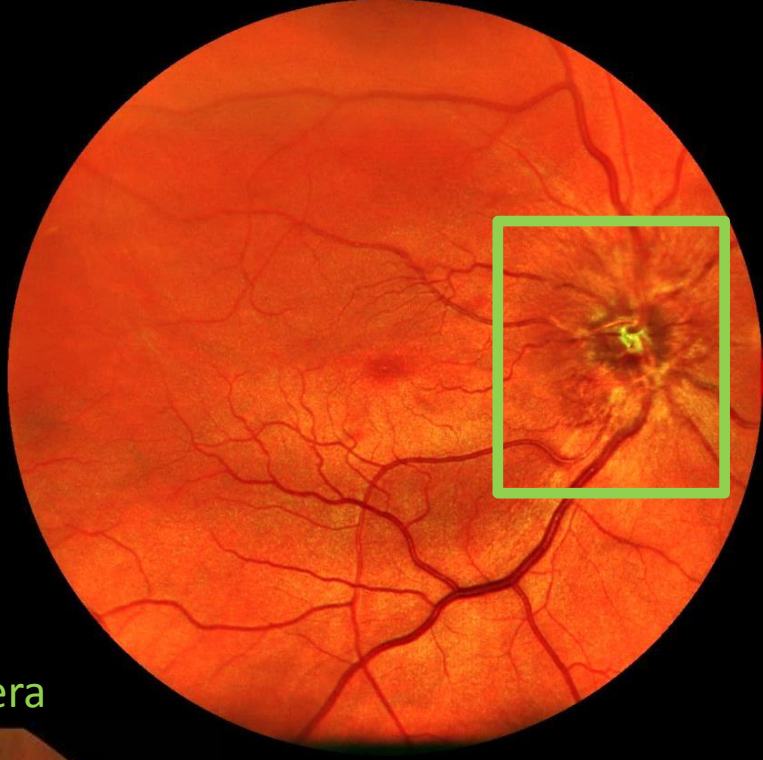
Papilla leporina

Myelinated retinal nerve fibers have been referred to as “papilla leporina” and are often detected incidentally as isolated asymptomatic white grey lesions obscuring retinal details. A visual loss associated with myelinated nerve fibers is uncommon

Papilledema

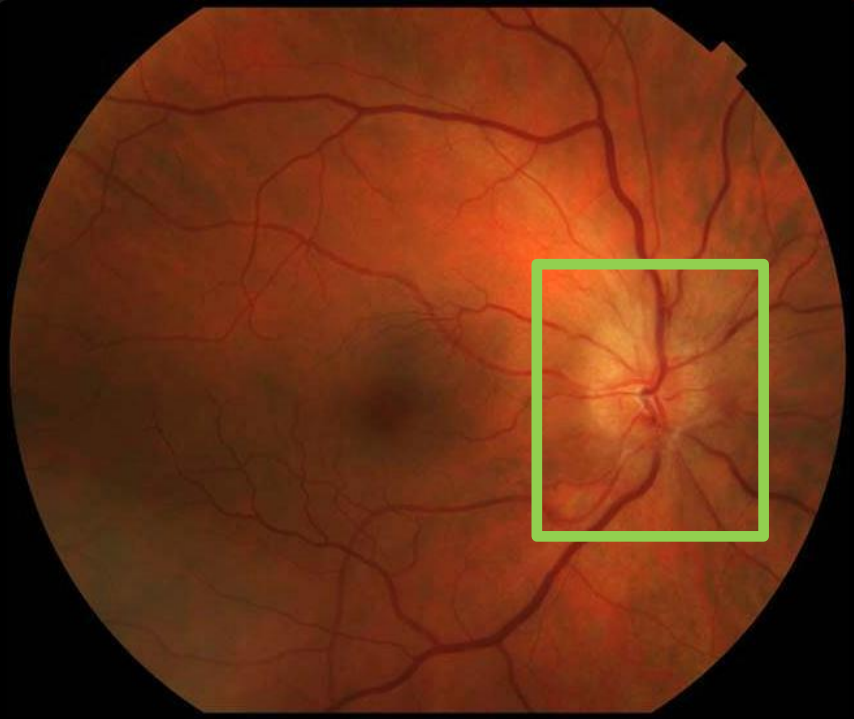


Easyscan 45º Green



Easyscan 45º pseudo-color

Traditional funduscamera



Papilledema is optic disc swelling that is caused by increased intracranial pressure. Papilledema is mostly seen as a symptom resulting from another pathophysiological process.

Further evaluation with a CT or MRI of the brain and/or spine is usually performed. Unilateral papilledema can suggest orbital pathology, such as an optic nerve glioma.

Disclaimer

This document is intended to show SLO generated images.

It cannot be used for diagnostic purposes.

Colophon

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