

# Retinal Photography Demystified

**A single retinal photograph paints a thousand words. Dr Yeo Kim Teck, Senior Consultant Ophthalmologist of Apple Eye Centre, explains.**

Retinal photography is a common way of documenting the state of the retina and has also been used as a tool for screening the retina in those with diabetes for well over a decade in Singapore. Ever so often, other eye conditions apart from diabetic retinopathy are 'uncovered' in these photographs. These conditions include

- Cataract
- Glaucoma
- Age-related macular degeneration
- Retinal vein occlusion
- Macular conditions such as macular hole and epiretinal membrane

## Cataract

Cataracts are due to clouding of the natural lens of the eye and can cause blurred retinal photographs that would be obvious to a trained reader. The vision (Snellen visual acuity) that is recorded will also be a good guide to the severity of the cataract.

### Management

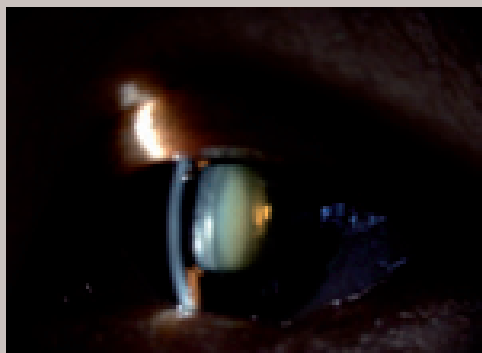
The lens opacities in cataracts are not reversible. Surgery is indicated if the quality of vision affects one's daily activities. Surgery is seldom urgent except when an overly "ripe" (hypermaturation) cataract causes a sudden form of "lens-induced glaucoma". Surgery is commonly done as a day surgery procedure using an ultrasound technique (phacoemulsification) and sutureless method under topical (eye drop) anaesthesia.

### Fast Facts

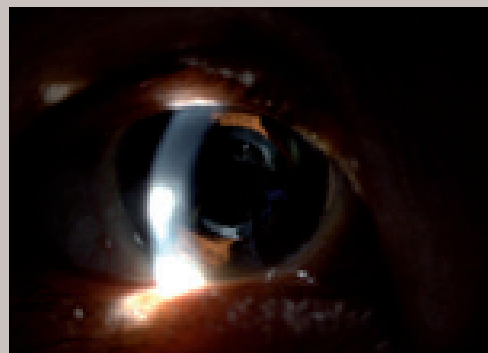
- Usually age-related although there are other causes including trauma and inflammation (uveitis)
- Age-related cataracts usually affect those 60 years and above
- In diabetes, cataracts can have an earlier onset

### Typical symptoms include

- Gradual blurring of vision
- Glare
- Reduced contrast sensitivity
- Night vision problem



*Photograph showing the cataract prior to surgery*



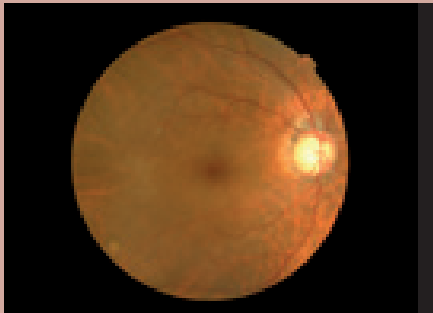
*A post-operation photograph where the cataract has been removed and replaced with an internal (intraocular) lens*

## Chronic “Open angle” Glaucoma

Chronic glaucoma is diagnosed by measuring the eye pressure (intraocular pressure), how wide the field of vision is (visual field) and, importantly, the appearance of the optic disc and the optic cup (the central white circular structure in the optic nerve). A single (non-stereoscopic) retinal photograph showing an enlarged optic disc cup (the cup-disc ratio or the ratio of the diameter of the optic nerve versus the optic cup) is not by itself definite evidence of the presence of chronic glaucoma. It is, however, highly suspicious of glaucoma and points to the need for further examination and evaluation.

### Management

Treatment comprises initial medical therapy (i.e. eye drops), argon laser (when associated with narrow drainage angles) and in advancing and ‘late’ eyes - drainage surgery (trabeculectomy).



The optic nerve shows an enlarged optic disc cup (the white area) from advanced chronic glaucoma.

### Fast Facts

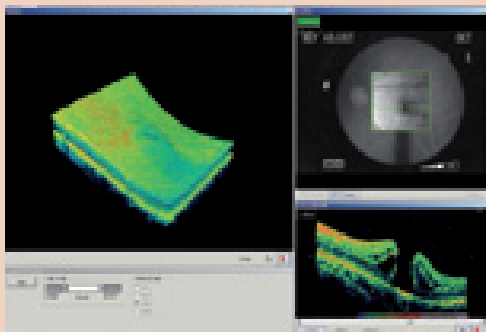
- Chronic glaucoma affects mainly the older age group although no age group is spared
- Risk factors include advancing age (affects 5 % of patients aged 65 years and above), a positive family history, high myopia and, according to some reports, is associated with diabetes
- No symptoms in the early stages. By the time the optic nerve head is severely affected, there will be permanently impaired vision as well as a narrowed visual field (tunnel vision)
- Screening for those in the at-risk group is very important
- Another form of glaucoma (the acute form) presents with sudden blurring of vision, a red painful eye and constitutional symptoms such as headaches and vomiting

## Macular Hole

The macular is the area of the retina that is most important for sharp vision. The edges of the vitreous gel in the back vitreous cavity of the eye are attached to the edges of the macula. Contraction of this gel attachment associated with advancing age or in myopia can result in traction on the macula and a macular hole (see photograph).

### Management

Macular hole requires surgery (vitrectomy). A form of long acting gas is typically used to tamponade or “push” the hole against the retina thus allowing the hole to be reattached.



Optical scan showing a macular hole

### Fast Facts

- Sudden blurring of the centre portion of one's field of vision
- Often associated with high myopia (> 5 dioptres or 500 “degrees”)
- It is bilateral in about 10 % of patients

## Age-related macular degeneration (ARMD)

ARMD is a leading cause of visual impairment in those in the retirement age group. There are two forms of ARMD that. In the “dry” form of ARMD, the features are dull yellow spots of metabolic deposits (drusen), often misdiagnosed as that due to diabetic retinopathy (hard exudates) to the untrained eye. Hard exudates appear as brighter yellow spots and often are associated with other features of diabetic retinopathy such as spots of haemorrhage. In the “wet” form of ARMD, yellow spots (hard exudates) and/or areas of haemorrhage may be seen. In later stages of the wet ARMD, pigmented areas and scars may be seen.

### Fast Facts

- Typically affects those age 65 years and above
- May cause sudden blurring of the central vision (wet ARMD)
- On average, 9 out of 10 affected eyes have the dry form of ARMD

## Epiretinal Membrane (ERM)

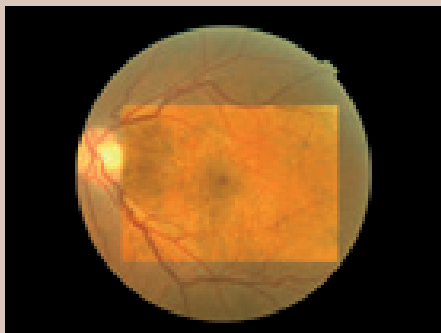
In this condition, there is a membrane over the macular resulting in blurring and distortion of the central vision. Most are age-related although it is associated with a wide variety of causes including diabetic retinopathy, retinal detachment, trauma, inflammation (uveitis), retinal surgery, retinal laser, cryotherapy and others.

### Management

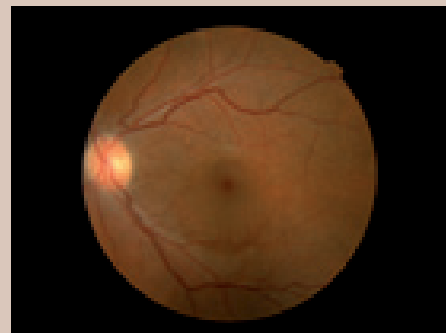
Eyes that are mildly affected with good vision not affecting activities of daily living need not be operated on. When the vision is blurred or distorted, a vitrectomy operation to remove the membrane is the typical technique.

### Fast Facts

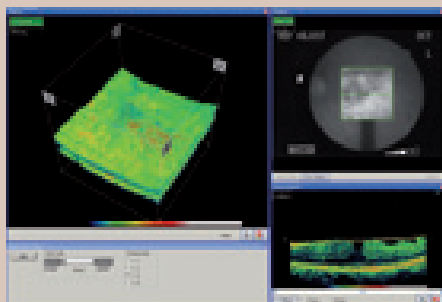
- Usually affects the older age group unless it is associated with other eye diseases
- Common symptoms include blurring of central vision
- Distortion of vision causing straight lines to appear crooked occurs when the ERM is more advanced.



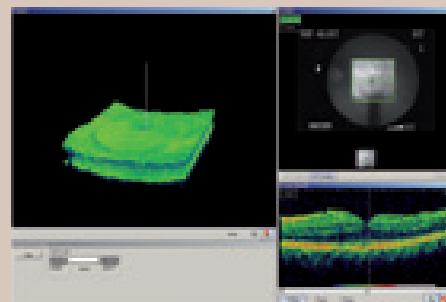
Photograph showing the epiretinal membrane



The post operation picture after surgical removal of the epiretinal membrane



The epiretinal membrane (the yellow line) is attached to the underlying retinal and macular



The membrane removed via a vitrectomy surgery procedure

## Vein Occlusion

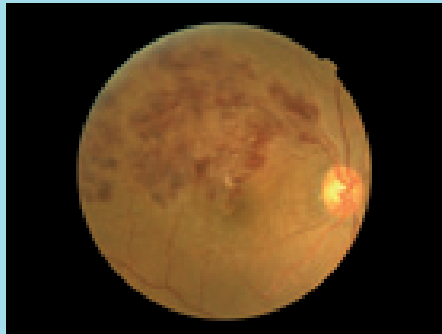
This is more often associated with high blood pressure but is also seen in diabetics. A single branch of the retinal veins may be affected (Branch Retinal Vein Occlusion) or the main central vein may be affected (Central Retinal Vein Occlusion). The features of these conditions are typically blood spots (haemorrhages) and exudates (yellow spots) arranged in a whorl-like pattern around the upper retinal vein (most common site) or affecting the whole retina (CRVO).

### Management

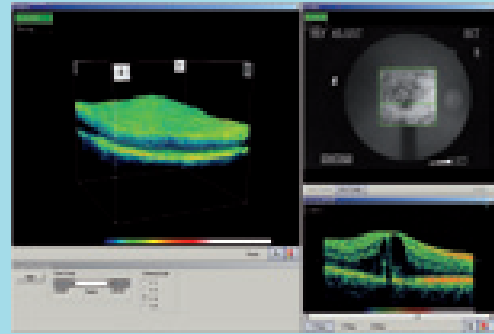
Treatment methods include argon laser, injection of special drugs (commonly Avastin, Lucentis and Triamcinolone Acetonide) into the cavity of the eye (intravitreal injection) and infrequently vitrectomy surgery (arteriovenous sheathotomy).

### Fast Facts

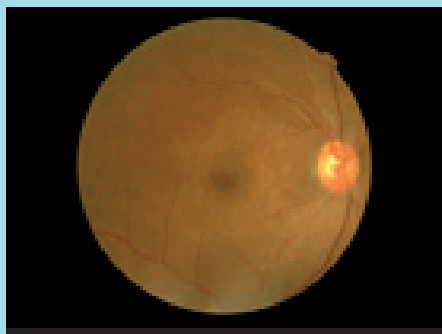
- Typically affects those in the older age group
- Associate with hypertension
- Outcome for vision depends on the extent of involvement of the 'centre' of the retina responsible for sharp vision (the macula)



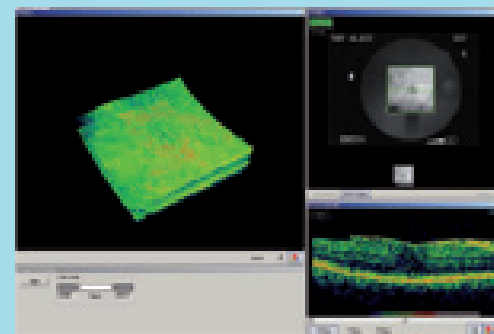
The large area of haemorrhage (blood) is due to an obstruction of a branch of the retinal vein.



There is swelling or edema (seen as the dark areas in the optical coherence tomography scan) of the macular (area of the eye responsible for fine vision) region.



Post-treatment photograph showing resolution of the area of haemorrhage and macular edema.



Optical scans (coherence tomography) showing that the macular edema has resolved.

All the photographs and optical scans are for illustration only and are not derived from the diabetic retinopathy screening programme. They are courtesy of Apple Eye Centre.