

## FUNDOSCOPY

### HOW TO PERFORM FUNDOSCOPY

To evaluate the macula (an area of the sensory retina temporal to the optic disc) well, Mydriatic drops (e.g. **Tropicamide**) are used to dilate the eye. **Do not** use a mydriatic drop if there is suspicion of glaucoma. Switch on the ophthalmoscope light.

Adjust to the large round beam of white light.

Turn the lens disc to 0 dioptres.

Keep your finger on the lens disc so that you can focus the ophthalmoscope.

\*Large round beam – used for large pupils

Small round beam – used for small pupils

Slit-like beam – assess elevations or concavities in the retina

Green/red free beam to detect small red lesions.

Grid – for making measurements

For most purposes, a darkened room will cause enough dilation of the pupil.

Use your right hand and right eye for the patient's right eye.

Use your left hand and left eye for the patient's left eye.

Start 15 inches away and  $15^\circ$  lateral to the patient's eye.

Ask the patient to stare straight ahead or fix their gaze on a specific point on the wall.

Shine the beam of light on the pupil and note the orange glow (**red reflex**)

Red reflex is absent in **lens opacity** (cataract), **detached retina** or artificial eye examiners favourite!).

Approach the eye. If you have approached 15 inches away and  $15^\circ$  lateral, you should now be seeing the retina in the vicinity of the optic disc. Bring it in to sharp focus.

\*Short sighted patient (myopic) = long eyeball = use minus dioptres on the ophthalmoscope

Long sighted patient (= short eyeball = use plus dioptres on the ophthalmoscope).

When the patient's eye as well as your eye is normal in size, you can focus clearly on the retina with a lens of 0 dioptres. The lens normally magnifies the back of the eye. When the lens has been surgically removed, this magnifying effect is lost. You can then see a much larger expanse of fundus.

If you can't find the optic disc, find any vessel and follow it centrally to the disc.

Now, from the optic disc, follow the vessels peripherally in all four directions. Note size and character of vessels and arteriovenous crossings.

Identify any lesions. Note their size shape colour and distribution.

As you search the retina, move your head and ophthalmoscope as one unit.

Next, ask the patient to look directly at the light OR, direct your light beam laterally. This will bring the macula into view.

## **MACULA**

This is an avascular area with no distinct margins. It is important for central vision.

**Senile macular degeneration** is an important cause for impaired central vision in elderly people. Senile macular degeneration may take the form of haemorrhages, exudates, and cysts.

## **DIABETIC RETINOPATHY**

### **1. Background Retinopathy**

Micro aneurysms (dots) Micro haemorrhages (blots) Hard exudates

### **2. Pre-proliferative Retinopathy**

Cotton Wool Exudates (small retinal infarcts) and extensive Micro haemorrhages

### **3. Proliferative Retinopathy**

New Vessels Form

### **4. Maculopathy**

Suspect if visual acuity ↓

## **HYPERTENSIVE RETINOPATHY**

**Grade 1** Generalised arteriolar narrowing

**Grade 2** More marked generalised narrowing with irregular points of focal constriction

**Grade 3** Generalised and focal narrowing plus cotton wool spots, retinal haemorrhages, hard exudates, arteriovenous nipping.

**Grade 4** As grade 3 but with swelling of the optic disc (papilloedema)

### **ARTERIOSCLEROSIS**

- 1 Decreased venous visibility at arteriovenous crossing points, slight broadening of the arteriolar light reflex
- 2 Deflection of the vein at arteriovenous crossing points
- 3 ‘Copper wire’ arterioles, marked venous narrowing and deflection at crossing points
- 4 ‘Silver wire’ arterioles

### **SOME TERMS**

#### **Silver Wires and Copper Wires**

The normal arteriolar wall is invisible. What you see is the column of blood within it. There is a normal light reflex off of the vessel. Since the arteriolar wall is transparent, a vein crossing beneath the artery will be seen, right up to the column of arteriolar blood on either side.

In hypertension, arterioles may narrow or go into spasm. This makes the column narrower. The light reflex is also narrowed.

After years of hypertension, the arteriolar wall becomes less transparent and more opaque, such that no blood is visible within it. This is a **silver wire** arteriole.

Sometimes the arterioles become full and tortuous and develop an increased light reflex with a bright metallic cluster. This vessel is a **copper wire** arteriole.

#### **Arteriovenous Nipping**

The vein appears to stop abruptly on either side of the arteriole. Associated with thickened arteriolar walls.

#### **Flame haemorrhages**

These are located in the nerve fibre layer and result from capillary damage. Dot and blot haemorrhages can also develop. Non specific and linear, often found in hypertension

#### **Cotton wool spots**

Small feathery white spots consisting of swollen axonal endings are caused by focal ischaemia.

#### **Exudates**

Well-defined yellow-white intra-retinal collections of lipid are derived from vascular leakage and vary in size. At the macula, a 'star' may develop, consisting of exudates arranged in a bicycle spoke-like pattern radiating from its centre

### **Optic disc swelling**

This is thought to be caused by local ischaemia. Rarely there is raised intracranial pressure (true papilloedema).

### **Optic Atrophy**

Death of optic nerve fibres – leads to loss of the tiny disc vessels. Leaves disc white with absent vessels.

### **Papilloedema**

Venous stasis – leads to engorgement and swelling. Leaves disc pink and hyperaemic. Swollen disc, blurred margins, more numerous vessels seen curving over the disc borders.

### **Macroaneurysms**

These localised arteriolar dilations are strongly associated with hypertension and arteriolosclerosis. Macroaneurysms are prone to leak blood and serous fluids. Symptomatic lesions at the macula are ablated using laser.

### **Microaneurysms**

Lesions occurring in diabetic retinopathy and are well-defined red dots

## **Piccies!**

*I found some piccies with explanations on the following site so enjoy!*

[eyelearn.med.utoronto.ca/ClinicalSkills/Fundoscopy.htm](http://eyelearn.med.utoronto.ca/ClinicalSkills/Fundoscopy.htm)