

Getting the most out of the GP Vet ophthalmic diagnostics workshop.

During the workshop we will be using training models & human volunteers to practice ophthalmoscopy and smart phone ophthalmic photography techniques.

If you have your own ophthalmoscope, diagnostic lens or slit lamp please feel free to bring with you on the day however we will be providing diagnostics lenses and direct ophthalmoscopes.

To get the most out of the sessions on ophthalmic photography please follow the instructions below **before the course**. I will be bringing spare phones with apps already installed so please don't worry if you are unable to use your own. Please message Tim on WhatsApp with your name so he can add you to a WhatsApp chat group where you can ask questions both during and after the course.

Any questions before or after the course please WhatsApp Tim on +44 7782219868 or email timknott@rowevetgroup.com.

STEP1: Charge your phone and make sure you can keep it charged for the workshop.

Bring a charger and or battery pack with you if possible. Some phones are better than others for imaging the eye, your usual phone may not be the best so if you have an old iPod touch, an iPhone 4/s, 5/s, SE, 6/s, X or XS consider bringing it with you and putting an appropriate camera app on it before you get here as these are some of the easiest phones to image the inside of the eye with. We can help you decide which camera works best for you.

For android users, phones with cameras closer to the corner and where the light is close to the lens are best. If you're not sure, bring your old phone/s with you on the day.

I use an iPhone 13 pro or an 16pro but always try to keep my iPhone XS or iPhone 4S available as they take the best retinal images.

STEP 2: Download a camera app for imaging the eye:

Which is the best changes regularly, I try to keep my favourites listed on the web site www.theeyephone.com however my current top apps are:

Android:

1. **OpenCamera* (Free, Mark Harman) . PREFERRED and the one we will use on the course** find in the google play store or download at https://play.google.com/store/apps/details?id=net.sourceforge.opencamera&pcampaignid=web_share. Manual can be found at [Open Camera Help \(sourceforge.io\)](https://open-camera.sourceforge.io/)
2. Camera FV-5 lite (free) – try this one if Open camera doesn't work on your phone. Find in the google play store or download at https://play.google.com/store/apps/details?id=com.flavionet.android.camera.lite&pcampaignid=web_share



iOS*


1. **ProCamera* PREFERRED and the one we will use on the course.** Find in the app store or download at [ProCamera. Professional Camera on the App Store \(apple.com\)](https://apps.apple.com/gb/app/procamera-professional-camera/id1046703167) Adjustable LED intensity coupled with manual focus and exposure and an excellent focus assist mode make this app the best app I've found so far. Cost £14.99. Help file can be downloaded at [QuickStartGuide_en.pdf \(procamera-app.com\)](https://procamera-app.com/QuickStartGuide_en.pdf)
2. Camera+2 - the updated version of the original and very good – cost £49 or subscription.
3. Camera+ legacy - an old favourite, still the easiest app to use but as cannot adjust the LED brightness diffusing the LED with tape or paper is required. Try this one if you have an older iPhone which won't work with the newer apps. It's also the cheapest iPhone camera app for ophthalmic photography at £4.99

* Unfortunately, none of the useful iPhone camera apps are free.

NB if you have an Android then the camera app which comes with your phone may already be able to take pictures in “torch mode” (this allows you to take photos whilst the LED is continuously on which is the key feature in allowing you to use your phone like a digital ophthalmoscope. *For all phones your video mode will normally also allow you to have the LED on continuously without purchasing an app*, try and learn how to turn this on – this is your simplest tool for smart phone photography, the easiest to show clients and is free.

STEP 3 Set up the camera app.

Android users:

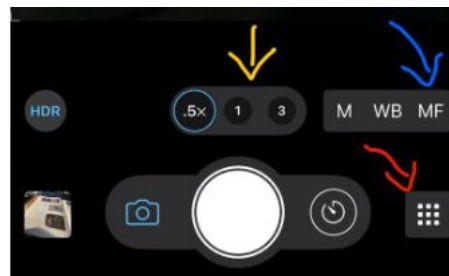
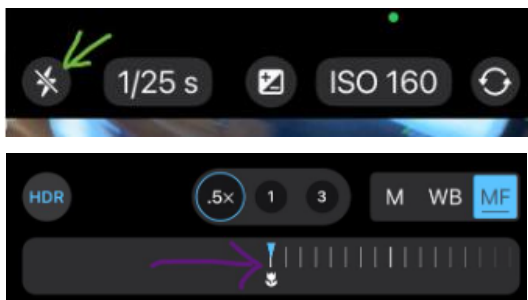
1. Download “open camera” app
https://play.google.com/store/apps/details?id=net.sourceforge.opencamera&pcampaignid=web_share
2. Select settings (cog wheel) , Camera API – select Camera2 API
3. Find out which cameras you can use with the app using the camera select button .
4. Find out which camera is which by covering each lens in turn
5. Making sure you are in camera not video mode, select manual focus (MF), select the 3 dots at the top of the screen to access. Repeat for all cameras you can control, not all of the cameras on your phone will allow this.
6. For each camera manually alter the focus to the closest setting using the large slider on the left of the screen to the bottom. Next move the camera until clearly in focus on some text and note this minimum focal distance for each camera (expect each camera to have a different minimum focal distance)- this will be vital for taking in-focus close up images of the eye.
7. For each camera see if you can select the torch mode (again, don't expect all of the cameras on your phone to allow this).



iPhone users:

1. Download “ProCamera” app from <https://apps.apple.com/us/app/procamera-professional-camera/id694647259> - note this is a paid for app however you don't need to pay extra for the pro version.
2. Find out which camera is which by covering each camera lens in turn, switch between cameras using the camera select buttons above the shutter button (yellow arrow below)
3. Select settings menu (red arrow), select manual mode by touching the A Auto button..
4. Select advanced settings (cog lower left of screen when in settings menu) – focus settings – turn focus peaking on, manual focus on, “always active” on.
5. Go back to camera app main screen and turn on manual focus (MF, blue arrow below).
6. For each camera alter the focus to the closest setting (slide to the left, marked with a flower icon, purple arrow), move camera until clearly in focus on something and note this minimum focal distance for each camera (expect each camera to have a different minimum focal distance and not all cameras allow MF mode)


Turn on the torch mode by touching and holding the flash button on the top left (green arrow below) until the light comes on. Note you will then be able to alter the brightness of the light.



STEP 4: Understand your app. Learn how to:

Change cameras

Most phones will have multiple cameras, it is important to know how to select each camera and to work out which camera is closest to the LED.

Android users (Open Camera) – note that you are unlikely to be able to use all of your cameras and that only certain cameras allow the use of flash. Use the  button to change. iPhone users will be able to use all of their cameras.

Find out which camera is which

Select each camera in turn and then cover each camera lens until you know which is which.

Control the LED

- turn on continuously using the “torch mode” or “continuous flash mode “. With ProCamera and Camera + on iPhones you can also change LED intensity

Focus

- work out how to control it (manual vs tap to focus vs autofocus)



- force the minimum focal distance, - this helps with “distant direct photography “ of lens and corneal lesions and usually can be selected using the “macro” setting indicated by a flower icon
- force focussing at infinity - this helps with fundus photography and is usually indicated either by a mountain or an infinity icon (∞)
- adjust and lock focus manually - this helps with difficult image lesions such as KPs, small cataracts etc

Measure and alter sensitivity to light & amount of light entering camera

As most smartphone cameras have a fixed aperture (or f stop) they can only alter exposure by changing shutter speed and/or altering the sensor's sensitivity to light (ISO). Forcing your camera app to display both shutter speed and ISO will help you to get the very best images by helping you understand why an image is suboptimal. High ISO settings will allow image capture in low light conditions e.g. when imaging a slit beam with your macro lens but will add grain and loss of fine detail. Low shutter speeds will lead to camera shake affecting your all-important focus.

In general aim for:

- the lowest possible ISO (usually 25) and try and avoid using ISO >400.
- a shutter speed of 1/50th second or faster

NB you can also usually change the image exposure using the “exposure compensation” sliders – this is usually labelled with a “+/-“ and is really helpful when trying to photograph cataracts and corneal lesions against a bright fundic reflection.

Appendix: additional app optimisation settings for those delegates with an interest in photography (optional).

Available customisation settings vary between apps however the following are useful to consider:

- File format - JPG (100%) and RAW or DNG if available
- Set maximum image capture resolution
- Save location - save to camera roll and **not to app**
- Manual focus - turn on, this will allow you to set your focus at infinity (for fundus) or at the Minimum Focal Distance (for distant direct cornea and lens photography). This setting will also stop the camera “hunting” for the right focal point.
- “touch/tap to focus” and “touch/tap to set exposure” - turn on
- “Volume snap” –turn on, this allows you to press the volume buttons to take images.
- “live exposure” – turn on, this will display your ISO and shutter speed and help you decide if your LED illumination needs to be altered
- Focus peaking - turn on
- Geotagging - turn on, always remember where you were when you took the image – a real help when trying to locate images if you work at different locations
- EXIF and social tags - turn on and put your name / clinic
- Shutter sound - turn off

and remember – WhatsApp Tim if any problems setting up your camera app before the course on +447782219868.

