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# EyeArt Photography Manual

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ART-PHO-MAN-2.1j-US

**Rx Only**

**REF**

*EyeArt v2.1.0*

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*Operators should read this Photography Manual completely before using EyeArt.*

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## Symbol Definitions

Symbol	English
	Manufacturer
	Consult instructions for use
	Catalogue Number
	Caution, consult accompanying instructions
	Date of manufacture
<b>Rx Only</b>	Prescription use only

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## 1 Introduction

This document details the fundus photography procedure for capturing retinal fundus images for use with EyeArt for more than mild diabetic retinopathy (DR) and vision-threatening diabetic retinopathy (DR) detection. It is intended for the EyeArt operator who captures retinal fundus images for use with EyeArt.

This manual provides general instructions for photography and suggestions/recommendations based on current good practices for DR screening. Please read the user manual of the color retinal fundus camera you are using for specifics about using the camera.



**The *EyeArt User Manual* should be read completely prior to reading this document and before using EyeArt.**

**For questions, feedback, comments, and customer support, contact [support@eyenuk.com](mailto:support@eyenuk.com)**

### 1.1 EyeArt Description

EyeArt is a retinal diagnostic software device intended for use by healthcare providers to automatically detect more than mild diabetic retinopathy (DR) and vision-threatening diabetic retinopathy (DR) in eyes of patients with diabetes by analyzing digital retinal fundus images. EyeArt is comprised of three components: **EyeArt Client**, which is installed on end user's computer, **EyeArt Server** and **EyeArt Analysis Computation Engine**, which reside on a secure cloud. The EyeArt operator directly interacts with only the EyeArt Client for: creating a patient encounter, capturing retinal images using an indicated camera, submitting the images for analysis, and viewing/exporting results. For more details on the principles of operation see the *EyeArt User Manual*

### 1.2 Indications for Use

EyeArt is indicated for use by healthcare providers to automatically detect more than mild diabetic retinopathy and vision-threatening diabetic retinopathy (severe non-proliferative diabetic retinopathy or proliferative diabetic retinopathy and/or diabetic macular edema) in eyes of adults diagnosed with diabetes who have not been previously diagnosed with more than mild diabetic retinopathy. EyeArt is indicated for use with Canon CR-2 AF and Canon CR-2 Plus AF cameras in both primary care and eye care settings.

### 1.3 EyeArt Requirements for Cameras and Fundus Images

#### 1.3.1 Indicated Fundus Cameras

EyeArt is indicated for use with the following cameras:

- Canon CR-2 AF
- Canon CR-2 Plus AF



Both Canon CR-2 AF and Canon CR-2 Plus AF cameras have the same indications for use with the underlying technology, user interaction, and usability being identical for color fundus photography function that is used for operation with EyeArt.

### 1.3.2 Retinal Fundus Image Requirements

EyeArt is intended to be used with retinal, color (3 channel RGB) fundus images of resolution 1.69 megapixels or higher captured using one of the indicated color fundus cameras listed above in Section 1.3.1 with 45 degrees field of view. EyeArt is specified for use with color fundus image(s) that provide retinal coverage equivalent to the combined coverage of field 1 (optic nerve head (ONH) centered) and field 2 (macula centered) as described in this manual. The requirements are summarized in Table 1.

**Table 1: EyeArt Input Fundus Image Requirements.**

<b>Image Formats</b>	JPEG, PNG, TIFF*
<b>Original Image Resolution</b>	Minimum of 1300 x 1300 pixels (or 1.69 Megapixels)
<b>Maximum Image Compression</b>	Fundus camera manufacturer’s default compression
<b>Field of coverage</b>	One optic nerve head (ONH) centered and one macula centered retinal image per eye, four images per patient
<b>Field of view</b>	45 degrees
<b>Fundus Camera Type</b>	See Section 1.3.1

\*Multi-page TIFFs are not supported. Each TIFF file can have only one RGB color image.



Refer to the *EyeArt User Manual* for the complete list of EyeArt Requirements and Specifications.

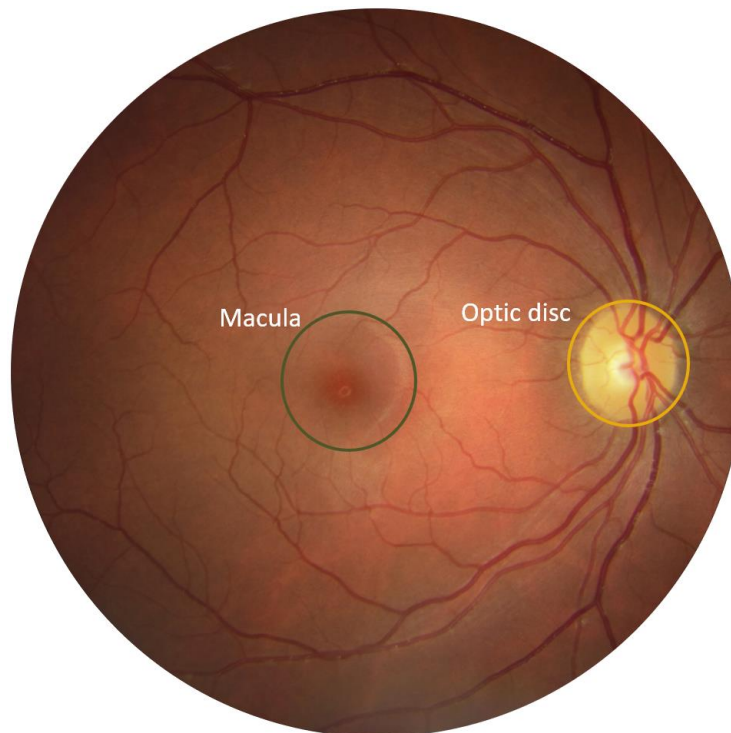
## 2 Eye Anatomy

The retina is a thin layer of tissue that lines the inside of the eye. It receives light focused by the lens and converts the light into neural signals that are sent to the brain for visual recognition.

The macula is a pigmented area near the center of the retina that is primarily responsible for detailed central vision.

The optic disc is the point of exit of nerve fibers leaving the eye to form the optic nerve that is responsible for the transfer of visual information from the retina to the brain. The optic disc is also the entry point for the major blood vessels that supply the retina. It is alternatively called the optic nerve head (ONH).

**Figure 1: Image of a normal retina showing the optic disc and macula**



### 3 2-field Fundus Photography

The EyeArt operator will obtain, at minimum, two (2) retinal fundus images from each eye in accordance with the EyeArt 2-field fundus imaging protocol. The images captured in a single patient visit is referred to as patient encounter or patient exam. For the 2-field protocol, each patient encounter will include an image centered at the macula and an image centered on the ONH for each of the 2 eyes for a total of 4 images: Right eye macula centered image, Right eye ONH centered image, Left eye macula centered image, Left eye ONH centered image. The ONH centered image is also alternatively called disc centered or optic disc centered image. The retinal images will have at least 45° field of view. For more details about image requirements see Section 1.2 and the EyeArt User Manual. The images shown in Figure 2 are a complete set of photos for an encounter (images from a single visit of a patient).



**While your camera model may vary, most retinal cameras have similar functionalities. Prior to operating a camera, please read the user manual for your specific retinal camera model.**

#### 3.1 Order of Images

It is recommended to capture images in the order provided below to avoid mistakes and achieve good quality images.

1. Right eye macula centered image
2. Left eye macula centered image
3. Right eye ONH centered image
4. Left eye ONH centered image

#### 3.2 Image Quality Aspects

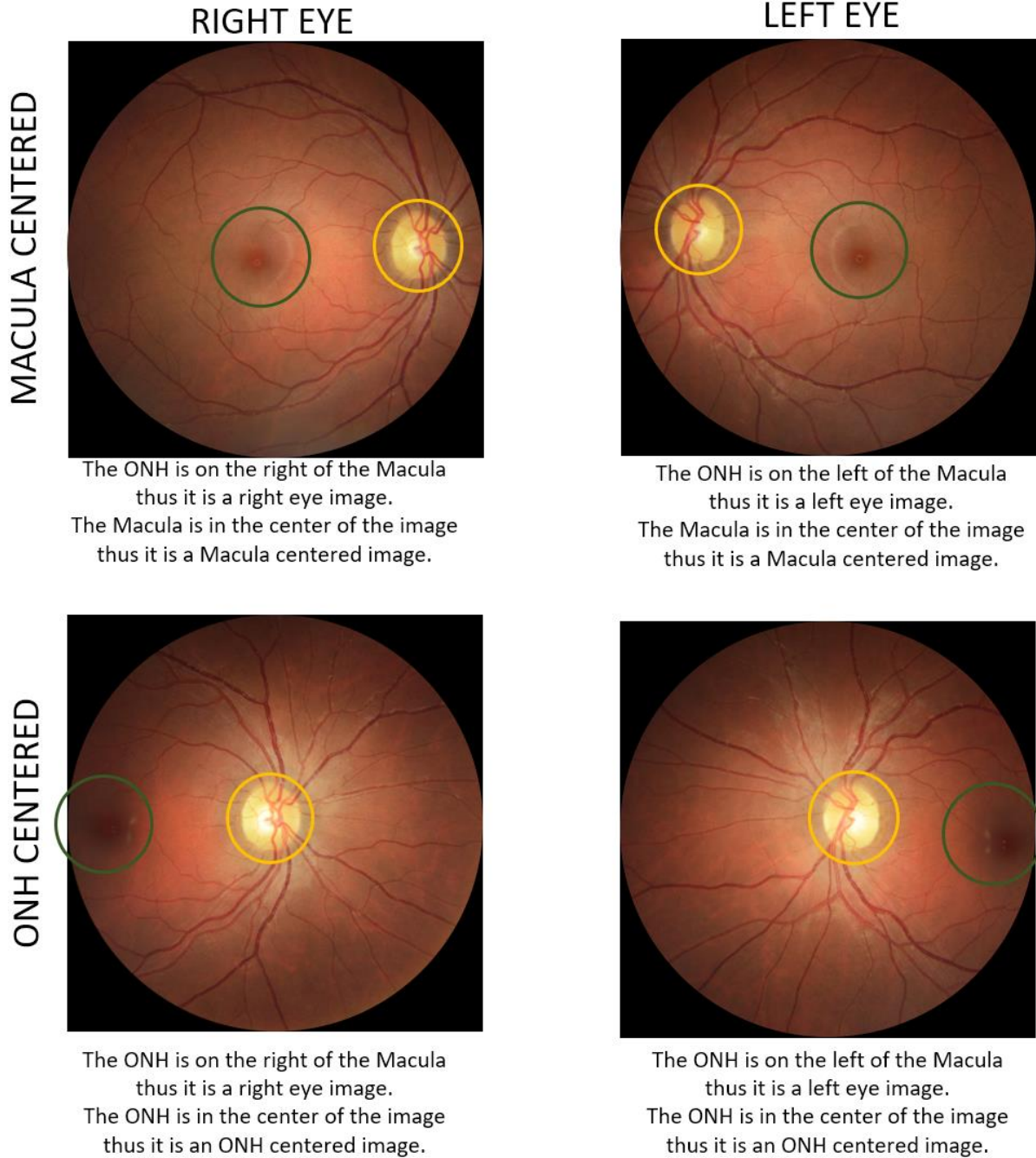
A good fundus photo should have the following quality aspects:

- Sharp vessel focus – able to see the tertiary vessels (see Figure 3)
- Proper illumination – not too bright or too dark (see *Exposure* part in Section 3.4)
- Correct positioning – macula and optic nerve head are in the correct location for 2-field fundus imaging protocol
- Free of artifacts – no dust, dirt, smudges, eyelashes, etc., reducing fundus visibility (see Section 3.4), small black spots (for lens cleaning, see Section 5.1)

The image shown in Figure 3 is a macula centered image from the right eye and is an ideal quality image for uploading to EyeArt. For some patients, the EyeArt operator may have to take multiple shots to ensure images of the desired quality are obtained. For troubleshooting poor quality images, see Section 3.4.



**Figure 2: Sample 2-field retinal images per the EyeArt imaging protocol**



\* The above images also provide hints on how to distinguish right eye images (ONH is to the right of macula) from a left eye images (ONH is to the left of macula), and on how to distinguish ONH centered images from macula centered images.

**Figure 3: Sample image with good image quality. Vessels are in sharp focus and tertiary vessels (indicated by arrows and 3's) are visible. Illumination is correct and sufficient. The macula center is correctly positioned at the center of the image and the image is free of artifacts.**



### 3.3 Pointers on Photography Techniques

- The EyeArt operator is strongly recommended to flag for emergency referral, patients with sudden visual loss, sudden onset of floaters/flashing, sudden swelling and redness in eye, or any general immediate concern.
- The EyeArt operator is recommended to review the images and retake images that are not of sufficient quality before the patient has left the clinic. If any images need to be retaken, the EyeArt operator should explain to the patient that more images need to be taken and then do so.
- If images of sufficient clarity cannot be taken or field position cannot be obtained, it may be due to small pupils in some patients that may diminish the view of the retina and hinder retinal photography. If pupil size of the patient is smaller than the minimum required per the camera specifications, undilated photography may not be feasible. In such cases,

the patients may be re-imaged (i.e. undergo repeat photography) immediately after pharmacological dilation. If dilation is not possible or if EyeArt still does not generate a mtmDR/vtDR detection result, such a patient should be referred to an eye care professional for evaluation since the patient may have vision-threatening diabetic retinopathy, or other abnormalities including cataract.

- It is recommended that the flash illumination on the fundus camera be adjusted using the Flash Illumination buttons, as necessary. For lighter-skinned patients, patients with a light-colored iris, or patients with big pupils, a lower flash illumination may be sufficient. For darker-skinned patients, patients with a dark-colored iris, or patients with small pupils, a higher flash illumination may be required.
- If dirt/smudge is observed on the anterior of the camera lens (see examples in Section 3.4), it is recommended that the camera lens be cleaned per the camera manufacturer instructions. A lens pen may be used to clean the camera lens as described in Section 5.1. To help identify such dirt/smudge, a test image may be taken before beginning imaging for the day or the camera lens may be illuminated with a flashlight/torch and observed.
- For cameras with manual joystick operation, it is recommended that the camera is pulled back towards the EyeArt operator before switching to a different eye, so as to avoid contact with the patient’s nose.
- It is recommended that the patient be instructed to take their chin away from the camera chin rest when adjusting the height of the chin rest. This is both for patient safety and for proper functioning of the camera equipment.

### 3.4 Troubleshooting to Improve Image Quality

This section lists common photography issues that might hinder the capture of good quality images and some recommendations to help address them.

Ocular Issue*	Recommendations to resolve or manage in order of preference
Insufficient natural dilation (greater likelihood with older age and longer diabetes duration)	<ol style="list-style-type: none"> <li>1. Darken exam room, if possible (e.g. by covering windows, closing doors, and decreasing the brightness of computer screens)</li> <li>2. Wait longer between images. Ask the patient to close eyes, wiggle their toes, and take deep breaths.</li> <li>3. Consider pharmacological dilation.</li> </ol>
Insufficient pharmacological dilation	<ol style="list-style-type: none"> <li>1. Alternate between eyes when imaging.</li> <li>2. Wait sufficient dilation time (15-30 min), place one additional drop in each eye and retry imaging.</li> </ol>
Eye lashes	<ol style="list-style-type: none"> <li>1. Ask patient to open their eye wider/ allow them to wipe their eye.</li> <li>2. Wash hands and using/wearing personal protective equipment (PPE), gently lift the eye lid.</li> </ol>

Non-Ocular Issue	Recommendations to resolve or manage in order of preference
Fixation/positioning	<p>This could be because the patient is unable to see or follow the internal fixation target of the camera.</p> <ol style="list-style-type: none"> <li>1. Ask patient to follow an external fixation target or finger to achieve correct fixation/positioning for the macula-centered image and/or ONH-centered image.</li> </ol>
Adverse lighting conditions	<p>Darken the room, if possible (e.g. by covering windows, closing doors, and decreasing the brightness of computer screens). Recommence imaging when the room is sufficiently dark.</p>
Dirt / dust / artifacts present	<p>Clean the lens following the Objective Lens Cleaning instructions (see Section 5.1) and retry imaging.</p>
No internet connectivity	<p>Internet connectivity is required to use EyeArt.</p> <ol style="list-style-type: none"> <li>1. Contact clinic IT personnel to resolve the issue, if possible.</li> <li>2. Contact Eyenuk support (see Section 1), if possible.</li> <li>3. If a patient is waiting, image the patient, while ensuring that the images saved on the computer are appropriately identified. These saved images can be separately submitted to EyeArt once internet connectivity issues are resolved.</li> </ol>
Technical failure	<ol style="list-style-type: none"> <li>1. Contact clinic IT personnel to resolve the issue, if possible.</li> <li>2. Contact Eyenuk support (see Section 1), if possible.</li> <li>3. If patient imaging is completed, retry submitting the images to EyeArt.</li> <li>4. If patient is waiting and imaging is incomplete, complete imaging the patient while ensuring that the images saved on the computer are appropriately identified. These saved images can be separately submitted to EyeArt once technical issues are resolved.</li> </ol>

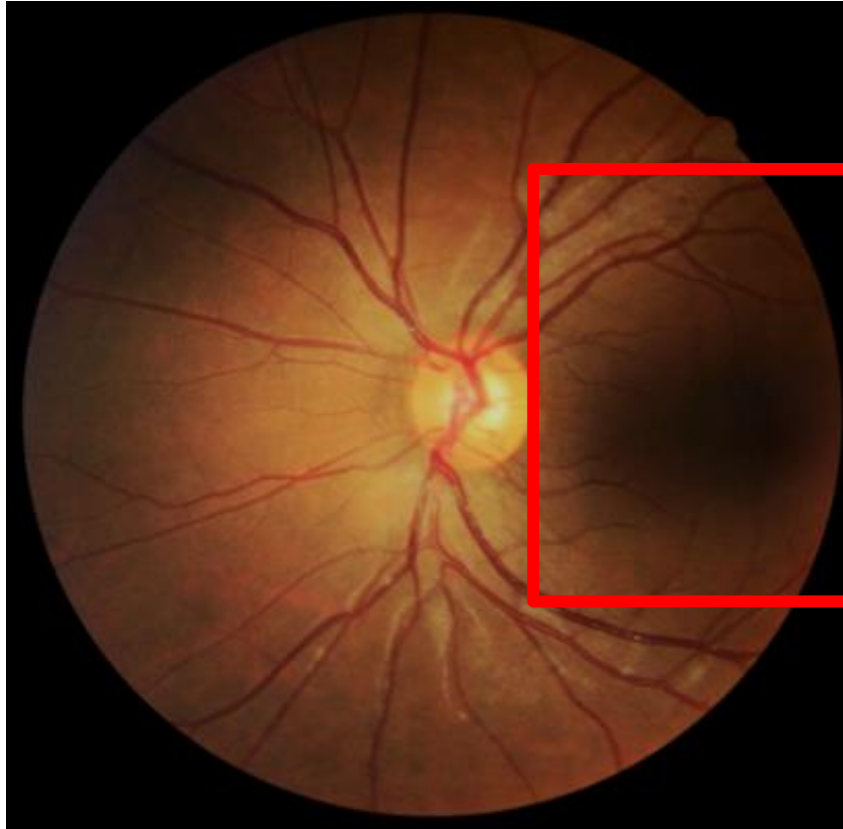
The table below shows example images with image quality issues and some troubleshooting tips.



### Positioning

Based on 2-field fundus photography (Section 3), the positioning of this image is incorrect. This image is neither ONH centered nor macula centered.

1. Ensure that the internal fixation is in the correct position and ask the patient to follow the fixation point.
2. Ask the patient to cover the other eye (i.e. the one that is not being imaged) lightly without pressing on that eye or closing the eyelid.
3. Realign the camera with the center of the pupil and ask the patient to locate the fixation point.
4. If the patient is unable to locate the fixation point for an ONH-centered image, start with the fixation point at the center (like for the macula-centered image) and then ask the patient to follow the point as it is moved for the ONH-centered image.
5. If the patient is still unable to follow the fixation point, ask patient to follow an external fixation target or finger to achieve correct fixation/positioning for the macula-centered image and/or ONH-centered image.

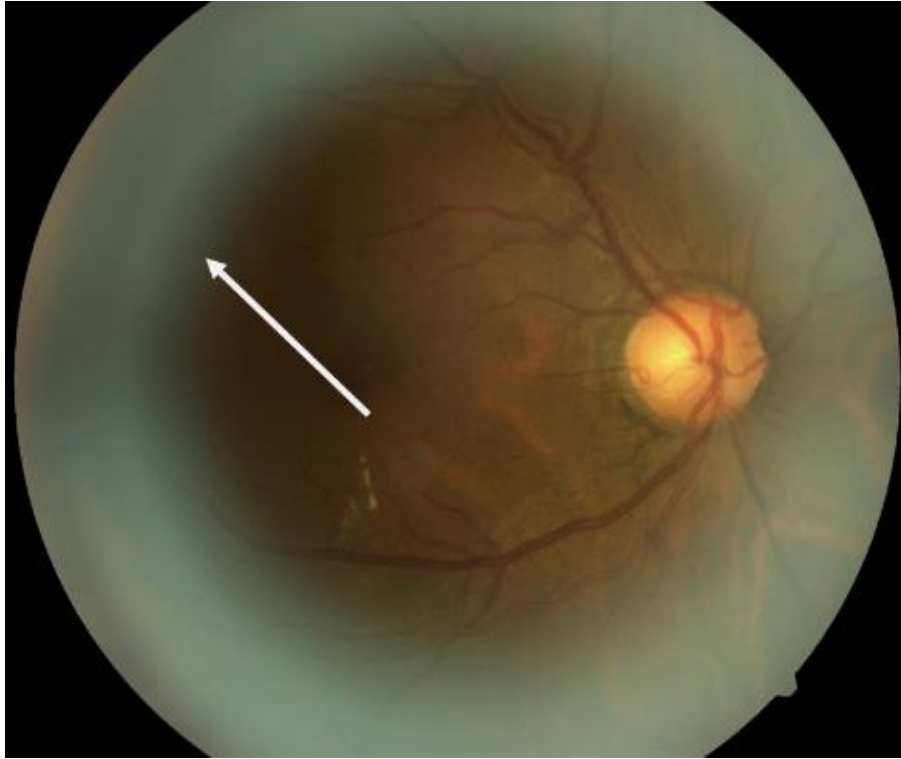


### Dark Shadow

The camera flash can cause a shadow over the macula due to the pupils not being adequately dilated.

- If this occurs on the first image captured, darken exam room, if possible
- Wait longer for the pupil to naturally dilate before recapturing image. Ask the patient to close eyes, wiggle their toes, and take deep breaths.
- Adjust the operation lever to move the shadow away from macula.
- Consider pharmacologic dilation.

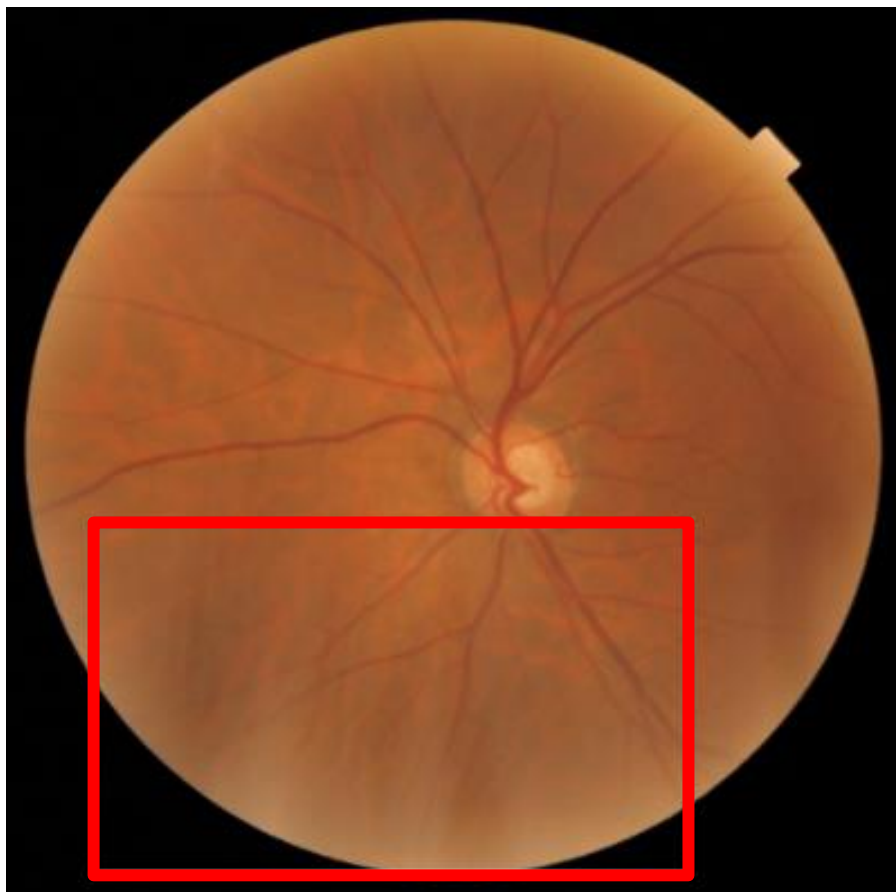
Note: Increasing the flash may cause a larger shadow.

**White/Blue Haze**

The retinal camera is too far from the patient's eye or the small pupil feature is in use.

- Ensure the small pupil feature is off since it can reduce the field of view of the image.
- Check that the patient's forehead is touching the forehead rest.

Move the camera closer to the patient until the retina fills the circular field of view.



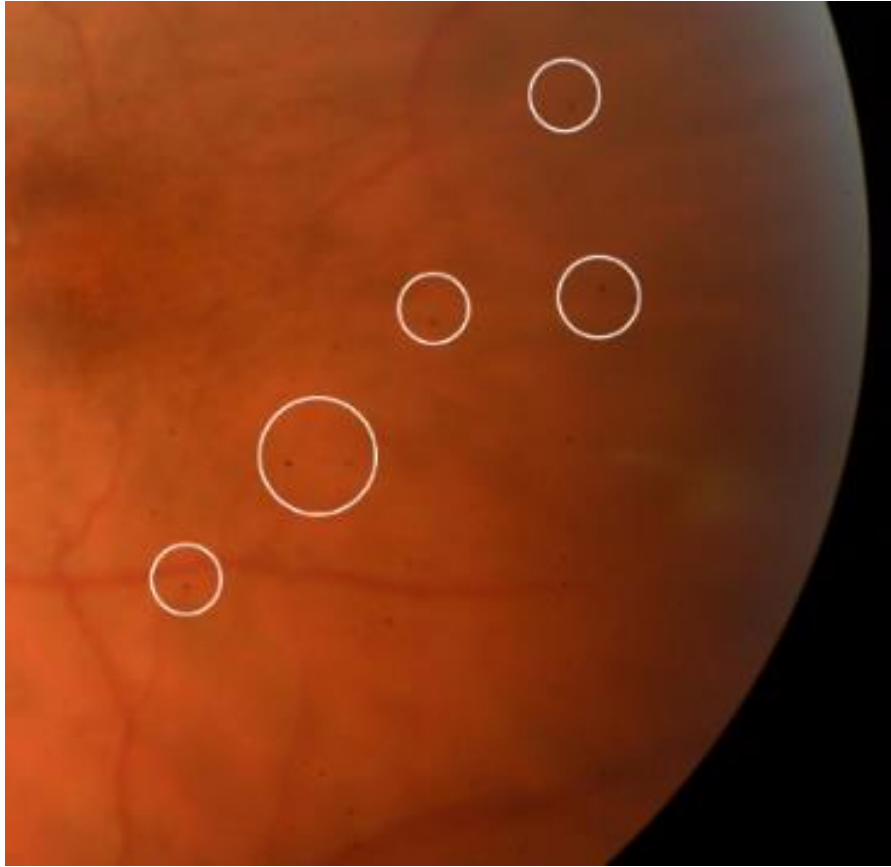
### Pale Vertical Lines

The pale vertical lines at the bottom of this example image are the patient's upper eyelashes.

- Ensure patient has both eyes open
- Instruct patient to open their eyes wider
- Ask the patient to hold their eye open with their hand

If you have to assist, retract the eyelid with gloved finger or cotton swab



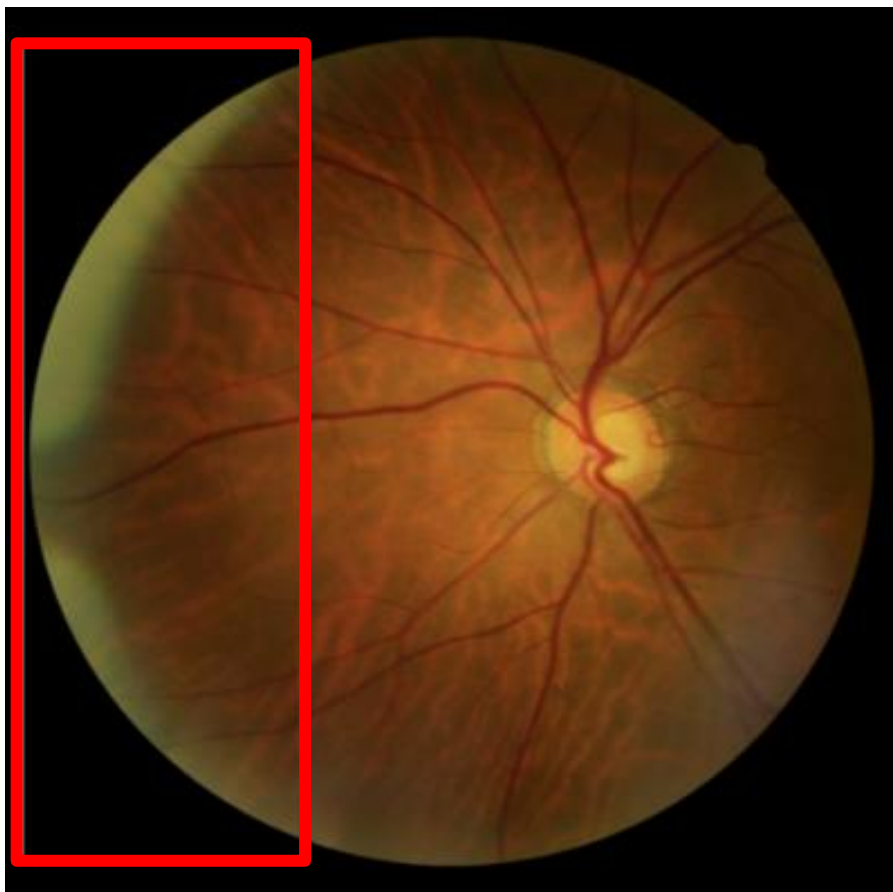


### Small Black Spots

If black spots appear in the same place in every captured image there is either dust/dirt on the objective lens or camera sensor. This is indicated by the white circles in the example image.

- Clean the objective lens (see Section 5.1). Take test image.
- If there is no improvement, use camera self-cleaning sensor feature (if available).

If there is no improvement, contact your camera distributor.

**Pale Yellow Crescent**

The camera may be misaligned, slightly too close to patient's eye, or patient's pupil is not adequately dilated.

- Adjust the camera with slight motions until the crescent is gone.
- Realign the camera with the center of the pupil.
- Wait for pupils to adequately dilate.

Note: This artifact may not be visible on the observation monitor prior to capture.



### **Yellow/Orange Flare**

The retinal camera is extremely close to the patient and misaligned. This image is an example of what you may see after the image is captured and may be visible on the monitor prior to capture.

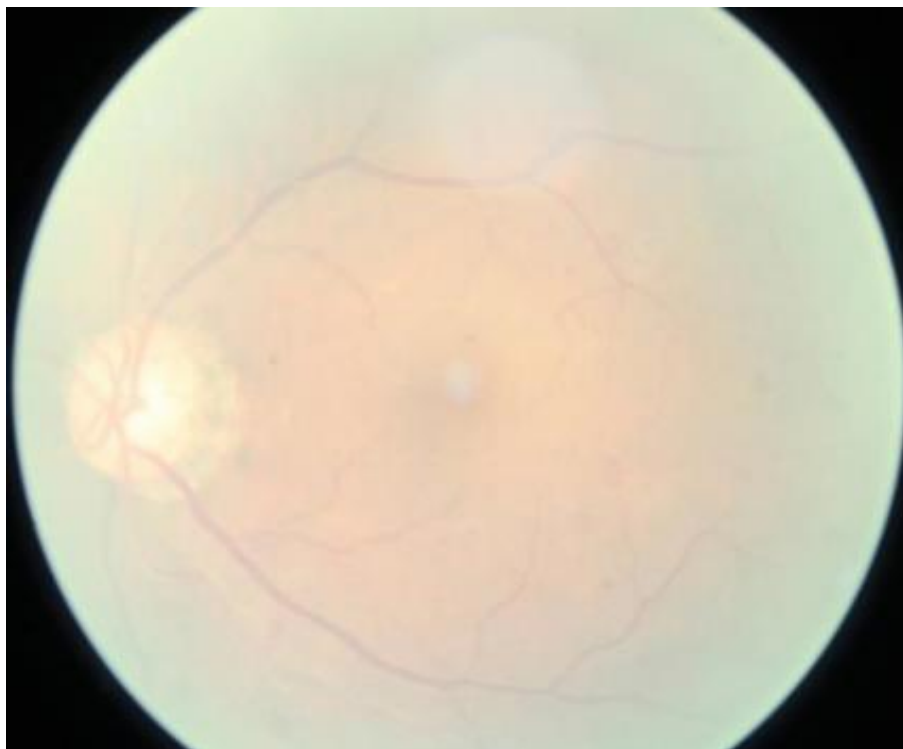
- Pull the camera away from the patient.
- Move the camera away from the artifact (in this case to the left).

**Warning:** Be careful not to strike the patient with the camera.

**Blurred or Cloudy**

The patient may have a media opacity causing a blurred image (right). If this is the case, auto features may not work.

- Manually adjust the focus ring/knob
- Confirm patient's ophthalmic history to help identify a possible reason for the inadequate image quality
- Use the diopter compensation settings
- Clean the camera lens

**Exposure**

Incorrect exposure can render an image ungradable. This image (right) displays overexposure. A similar image can be a result of media opacity.

- Turn down the flash illumination
- Confirm patient's ophthalmic history to help identify a possible reason for the inadequate image quality

If underexposed, increase the flash illumination for darker skinned patients

### 3.5 Dilation

Dilation may be required to capture images of sufficient quality in some patients. Specifically, for patient cases where EyeArt more than mild DR and/or vision-threatening DR results are *Ungradable*, fundus photography may need to be retried after dilation. Dilation, or mydriasis, is pharmacological enlargement of the pupil, causing the pupil to remain enlarged despite change in ambient light. Tropicamide Ophthalmic Solution, USP 0.5% or 1.0% is commonly used to produce dilation.

Before administering dilation medication, please review the medication package insert/labelling for complete details, including contraindications, warnings, precautions, and adverse reactions. It is also recommended to ensure that the patient can make safe travel arrangements, as they may not be able to drive until the effects of mydriasis medication wear off, which might take several hours.



**WARNING:** If EyeArt is not able to generate a mtmDR/vtDR detection result on a patient due to poor quality of images, such a patient may be retested immediately after pharmacologic dilation. If dilation is not possible or if EyeArt still does not generate a mtmDR/vtDR detection result, such a patient should be referred to an eye care professional for evaluation since the patient may have vision-threatening diabetic retinopathy, or other abnormalities including cataract.

### 3.6 EyeArt Client



**It is recommended that you read the *EyeArt User Manual* completely for detailed information about operation of EyeArt Client.**

The EyeArt operator can use the EyeArt Client software along with indicated cameras to capture retinal fundus images for more than mild DR and vision-threatening DR detection. Briefly, this involves the following steps, in sequence:

[Once after opening software]

- *Login*

[Once before first patient encounter]

- Setup the shared folder with Canon CR-2 AF and Canon CR-2 Plus AF for use with the EyeArt Client.

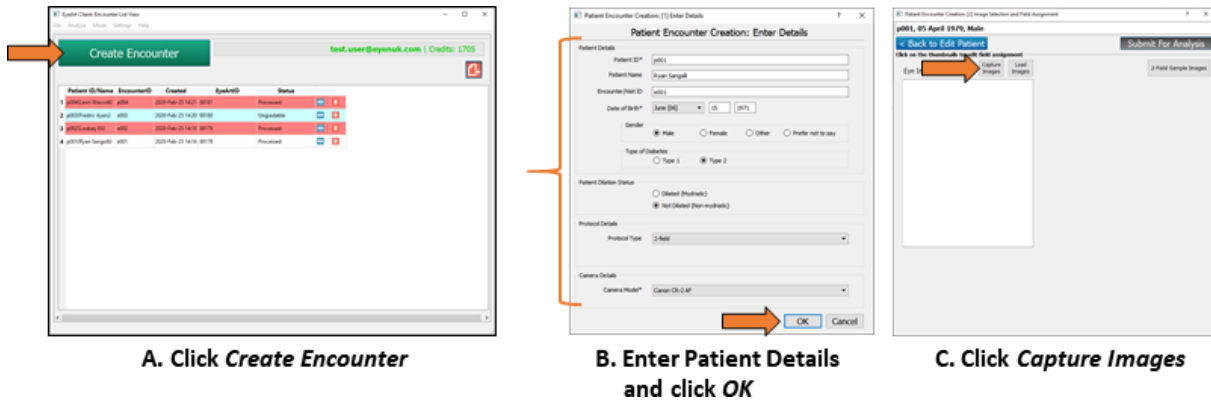
[For every patient encounter]

- *Create Patient Encounter (Enter patient details, Capture Images, Submission)*
- *View and Save EyeArt Results (Save Printable Analysis Reports).*

Please refer to the *EyeArt User Manual* section on *EyeArt Standard Operation* for details of each of these steps. The steps for 2-field photography, to be done for every patient encounter, are briefly described in the sections below.

### 3.7 2-field photography with EyeArt Client

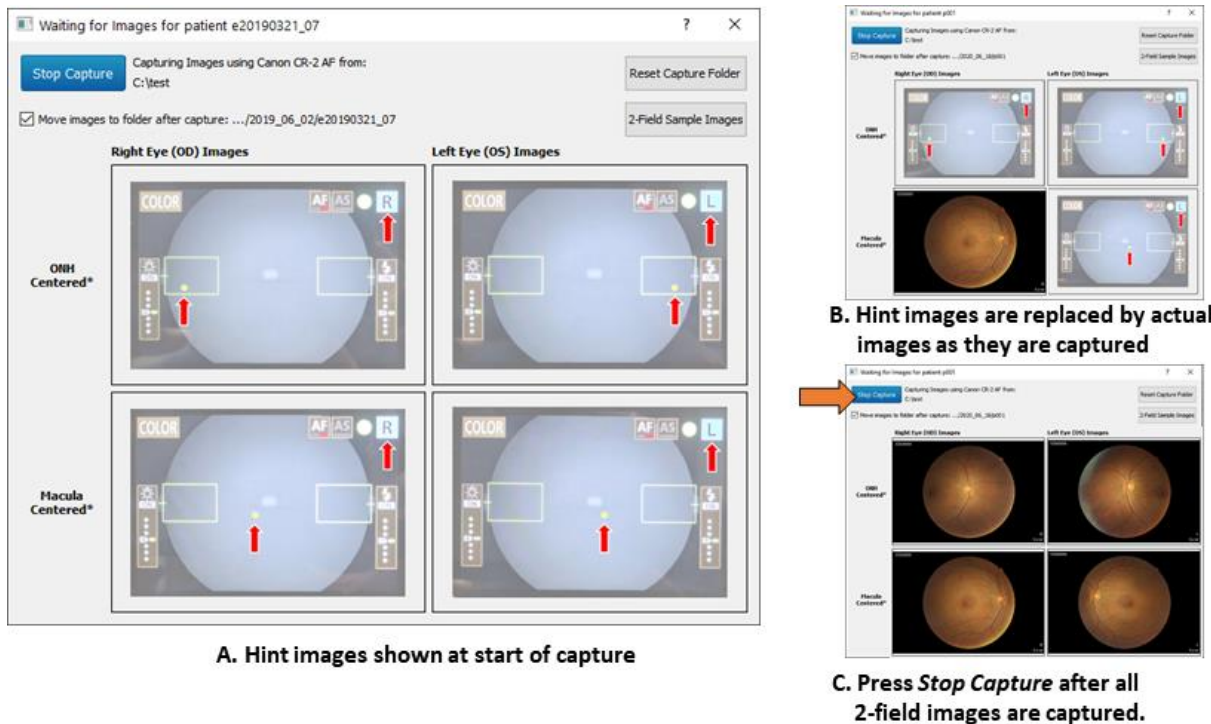
**Figure 4: Common steps performed for creation of patient encounter in EyeArt Client. For larger screenshots and detailed steps see *EyeArt User Manual*.**



This section describes the common steps to be done for every patient encounter irrespective of the camera used for capture. As shown in Figure 4 do the following steps in sequence:

- Click the *Create Encounter* button in *Encounter List View*.
- *Enter Patient details* (including selecting the appropriate *Camera Model*), click *OK* button
- Click *Capture Images*

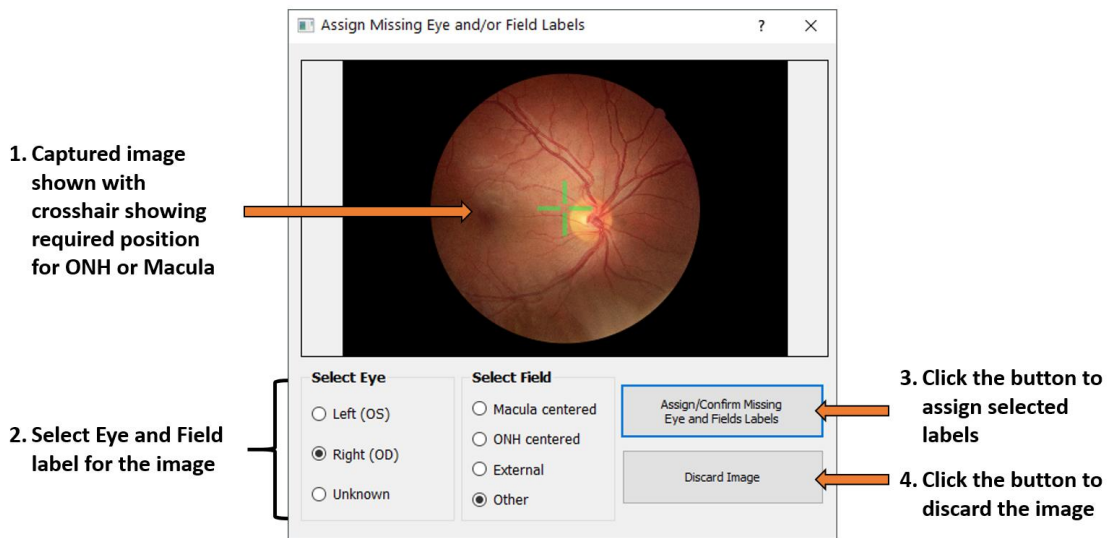
**Figure 5: Capture Window showing hint images for Canon CR-2 AF and Canon CR-2 Plus AF. The hint images are replaced as actual images are captured. EyeArt operator needs to click on *Stop Capture* after completion, to proceed.**



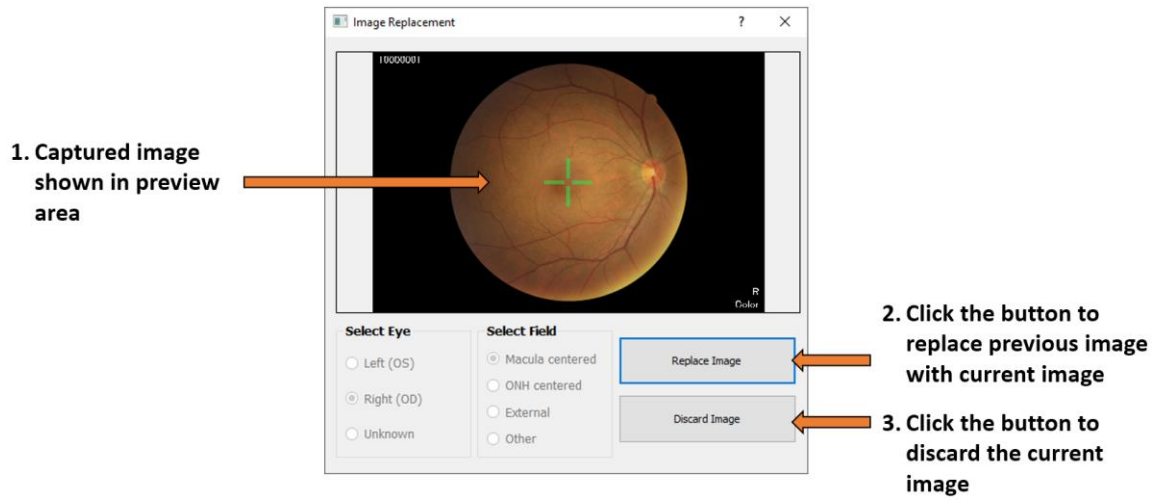


- With Canon CR-2 AF and Canon CR-2 Plus AF selected as *Camera Model*, *Capture Window* in Figure 5 is shown with hint images displayed in the slots for 4 retinal fundus images to be captured. See Section 3.7.1 on how to capture the 2-field images on the Canon CR-2 AF and Canon CR-2 Plus AF cameras.
- As the images are captured on the camera, the hint image in the corresponding slot of the *Capture Window* will be replaced by the image captured.
  - If you want to discard & replace a previously captured eye/field image, simply re-take the image using the camera. An *Image Replacement Window* is displayed (Figure 7). In this window, the EyeArt operator can click on *Replace Image* to replace old image with newly captured image or *Discard Image* to keep old image and discard newly captured image.
  - If images do not conform to the eye/field label (as inferred from image metadata) expected in 2-field imaging, a *Protocol Deviation Window* is displayed (Figure 6). In this window, the EyeArt operator can either choose to discard the image and make necessary adjustments on the camera to re-capture an image conforming to the protocol or assign the eye/field label manually and accept the image.
- Press *Stop Capture* after all 4 images have been captured. See Section 3.8 for next steps on how to complete submission of captured images

**Figure 6: Protocol deviation window – shows crosshair to indicate correct position of Optic Nerve Head (ONH) and Macula for 2-field imaging protocol.**



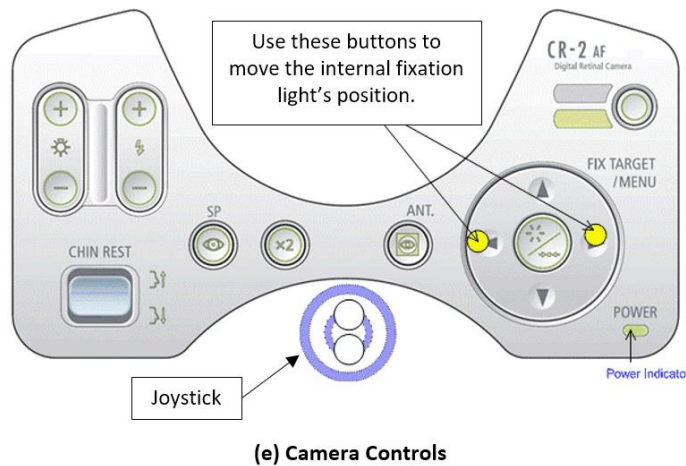
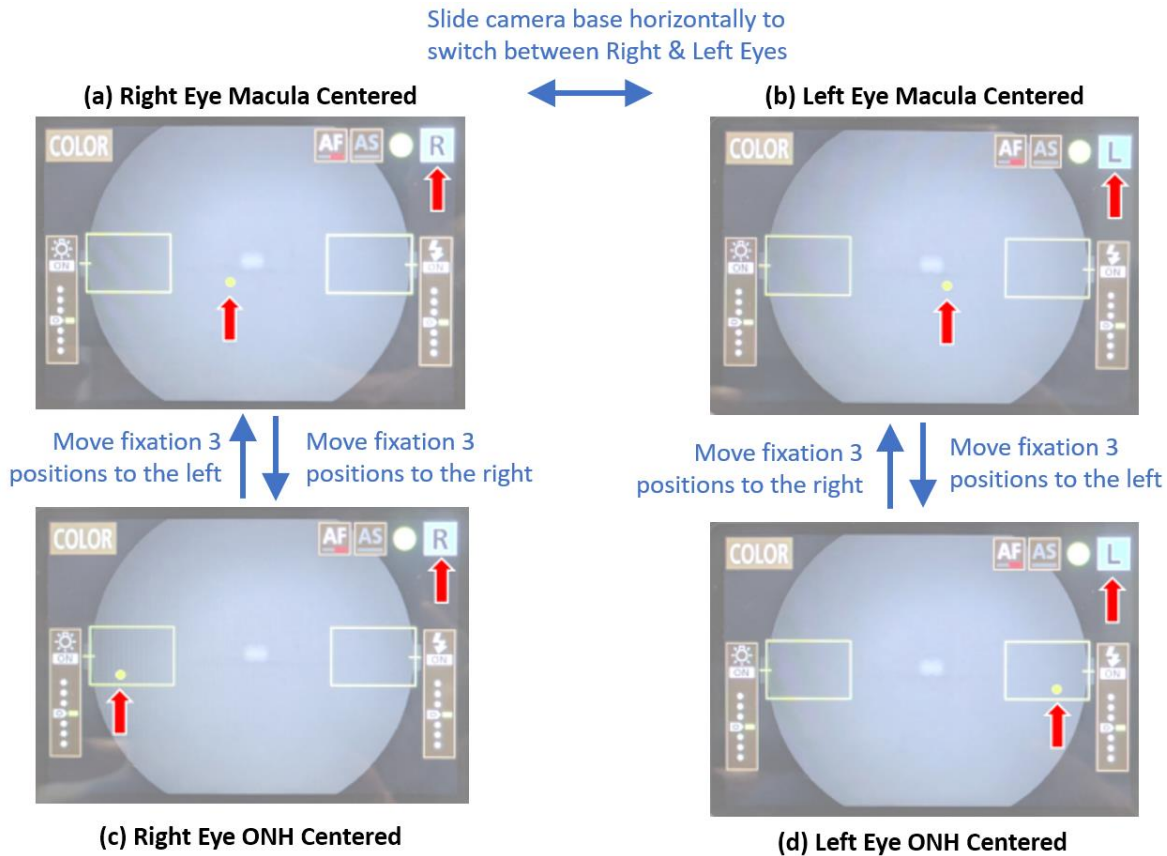
**Figure 7: Image replacement window – allows EyeArt operators to replace previously captured image with a new image.**



### 3.7.1 Capturing Images with Canon CR-2 AF and Canon CR-2 Plus AF

In this section we briefly describe the steps for capturing the 2-field retinal images on Canon CR-2 AF and Canon CR-2 Plus AF during the *Capture Images* step.

**Figure 8: Positioning of internal fixation light and camera base for capturing 2-field images on Canon CR-2 AF and CR-2 Plus AF. Red arrow in (a)-(d) show the position of fixation light indicator and R/L eye indicator for the different eye/field images. \*Camera Controls illustration has been taken from the Canon CR-2 AF manual. Same also applies to Canon CR-2 Plus AF for color fundus photography function.**



Please refer to the Canon CR-2 AF and Canon CR-2 Plus AF manual that came with your camera for detailed operation instructions and for explanation of terminology used below.

- Capture the images in the order recommended in Section 3.1. **It is recommended that you wait at least 2-4 minutes between each image capture** (even if retaking an image) and instruct the patient to keep their eyes closed during this time to allow their eyes to naturally dilate.
- To start, slide the base and position the camera stage to take an image of the patient's right eye (camera Observation monitor will indicate **R** at the top right as shown in Figure 8(a)).
- Adjust the vertical movement ring to unify the top and bottom image of the pupil & focus it in the pupil alignment circle, so the camera automatically switches to fundus mode.
- Use the *Fix Target/Menu* arrow buttons (Figure 8(e)) to move the internal fixation light to the correct position for right macula centered image as shown in Figure 8(a).
  - **Instruct the patient to follow the fixation light at all times during photography.**
- Ensure the macula is centered and proceed to capture the image.
  - Use the joystick to move the camera base with better control when aligning or focusing.
  - To capture the image, move the operation lever until the working distance dots are inside the Auto-Shot (AS) guide boxes and look sharp. Images should capture automatically. If the dots are sharp and inside the boxes and the image does not capture, press the shutter release button to capture the image manually.
- Wait for the image to appear in EyeArt Client's *Capture Window* (Figure 5). After this, ask the patient to keep their eyes closed for a few minutes. Retake the image if needed or proceed to the next eye/field.
- Proceed to position the camera stage in front of the patient's left eye (camera Observation monitor will indicate **L** at the top right as shown in Figure 8(b)). Adjust the stage to unify the top and bottom portions to enter the funds view and then adjust the internal fixation light for left macula centered image. As before, ensure macula is centered and capture the image.
- Once the image appears in the EyeArt Client *Capture Window*, wait for few minutes and move camera stage back to right eye. Again, adjust the stage to unify the top and bottom portions to enter the funds view. Move the fixation light for right optic disc center (Figure 8(c)). Instruct the patient to follow the light to their left. Ensure the optic disc is centered. Capture image  
*Note: To the patient, the fixation light appears outside of the camera approximately over the your (EyeArt operator's) right shoulder. If required, please use your finger to help guide patient to the correct position.*
- Once the image appears in the EyeArt Client *Capture Window*, wait for few minutes, move the camera stage back to the left eye, and again adjust the stage to unify the top and bottom portions to enter the funds view. Move the fixation light for left optic disc center (Figure 8(d)). Instruct the patient to follow the light to their right. Again, ensure the optic disc is centered. Capture image.

*Note: To the patient, the fixation light appears outside of the camera approximately over your (EyeArt operator's) left shoulder. If required, please use your finger to help guide patient to the correct position.*

### 3.8 Submission of captured images

After *Stop Capture* has been pressed in the Capture Window (Figure 5), the captured images are loaded as shown in Figure 9.

- Scroll through the images list to view and confirm the eye and field labels assigned. Assign alternate labels if needed.
- Press the *Submit For Analysis* button, and click OK on the confirmation box that appears.
- The EyeArt Client now proceeds to securely submit the patient encounter and the images to the EyeArt Server for analysis and you are taken back to the *Encounter List View* (see Figure 4).

**Figure 9: Confirm/Assign eye and field labels.**

**Captured images appear here**

**1. Confirm images were assigned proper labels.**

**2. If needed, choose the appropriate field.**

- 1 for ONH centered
- 2 for Macula

**3. If needed, choose the appropriate eye.**

**4. Submit encounter for analysis**

Please see the *EyeArt User Manual* for further instructions on how to view and save the results after analysis.

## 4 Pointers on Photography Room and Equipment Preparation

### 4.1 Photography Room Condition

It is suggested that the EyeArt operator ensure that the photography room is clean & tidy (free from unnecessary clutter that could hinder photography), and that there are no impediments to the free movement of patients, especially for those with limited visual acuities and those with disabilities.

The photography room should be dimly lit for photography of patients and use of EyeArt Client software. If the room lighting cannot be dimmed, this may be accomplished with blackout blinds. Lighting should be sufficient to guide the patient within the room and instill drops (if needed and possible). At the point of photography, also consider turning the laptop screen(s) or computer monitor(s) away from the direction that patient faces during photography.

### 4.2 Camera Preparation

It is recommended that the EyeArt operator ensure that the equipment which is used for examination purpose, especially the chin rest, forehead rest and any other part of the equipment which comes in direct contact with the patient, is regularly disinfected with appropriate cleaning material (e.g. cleaning wipes).

The EyeArt operator should ensure that all equipment is clean at the start of the session and, thereafter, in between every patient. If needed, the camera lens can be cleaned as described in Section 5.1.

#### 4.2.1 Daily Equipment Check

It is suggested that the EyeArt operator ensures that all necessary equipment is in working order and correctly calibrated. Before beginning imaging for the day, the EyeArt operator is advised to turn on the camera, computer/laptop and other equipment used for screening purposes, check the camera lens for dirt with a flashlight/torch, clean the camera lens (if necessary and following the steps outlined in Section 5.1) and initiate taking a test image to ensure the camera lens has no smears or dust which may affect the quality of the picture.



**For more information on camera operation, please refer to your specific retinal camera model user manual.**

## 5 Appendices

### 5.1 Appendix A – Tips on Cleaning the Objective Lens Using a LensPen

The following steps are suggested to clean the objective camera lens.

1. Darken the room. Inspect the lens with a flashlight/torch to check for dirt, dust or smudges. Lightly brush the lens to remove any particles with the retractable brush on the 'Lenspen'. Recheck the lens with the flashlight/torch.
2. If smudges are visible use the gold 'Lenspen' (concave tip). With light circular motions, clean the lens from the outer edge inwards. This will help prevent moving artifacts to the outer edge.
3. If smudges persist, breathe gently on the lens and wipe again. Cap the 'Lenspen' and give a couple twists to redeposit carbon on the cleaning tip. Continue wiping until the smudges are gone.
4. After usage, cap the pen and give a couple twists to redeposit carbon on the cleaning tip.

*Note: Do not touch the carbon tip with your fingers. This will lessen the amount of cleaning sessions (about 500).*

**Figure 10: Lens Cleaning using Lens pen**



## Document Revisions

Date	Version Number	Software version Number
2017-02-23	ART-PHO-MAN-2.1-US	EyeArt v2.1.0
2017-06-21	ART-PHO-MAN-2.1a-US	EyeArt v2.1.0rev002
2017-09-06	ART-PHO-MAN-2.1b-US	EyeArt v2.1.0rev002
2018-10-12	ART-PHO-MAN-2.1c-US	EyeArt v2.1.0rev003
2019-03-21	ART-PHO-MAN-2.1d-US	EyeArt v2.1.0rev005
2020-03-06	ART-PHO-MAN-2.1e-US	EyeArt v2.1.0rev006
2020-06-23	ART-PHO-MAN-2.1f-US	EyeArt v2.1.0rev007 <i>Release Candidate</i>
2020-07-30	ART-PHO-MAN-2.1g-US	EyeArt v2.1.0rev007 <i>Release Candidate</i>
2020-08-03	ART-PHO-MAN-2.1h-US	EyeArt v2.1.0rev007 <i>Release Candidate</i>
2020-10-19	ART-PHO-MAN-2.1i-US	EyeArt v2.1.0rev007
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*or higher versions unless noted otherwise		