Introduction to Fundus Photography

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Special thanks to Laura Savage, COMT, CRA

What’s Fundus photography’s purpose?

- To document the retina
- Photographers role to show the retina
- Document other ocular structures

Why do we take them?

- We as photographers help the MD with documenting diseases and aiding in treatment

Why do we do it?

- Providing a baseline image and documenting the disease process throughout follow-up

Why do we do it?

- We can provide pre and post treatment images for the physicians

Why do we do it?

- Can provide education
- Legal Documentation
- Images for publication

Images provided by Laura Savage
The parts of a fundus camera

Subject plane

Receiving plane

Mirror

Flash and viewing lamp

Filters

Image courtesy of ophthalmic photography: Saine, Patrick, Tyler, Marshall

The anatomy of the Eye

The anatomy of the Eye

Subject plane

Receiving plane

Mirror

Flash and viewing lamp

Filters

Image courtesy of ophthalmic photography: Saine, Patrick, Tyler, Marshall

Some retinal landmarks

* Ophthalmic Photography. Saine, Patrick, Tyler, Marshall. Image used with permission

Documenting Seven Standard Fields

*Textbook of Ophthalmic Photography. Wong, D. Image used with permission

What are the retinal layers?

* Ophthalmic Photography. Saine, Patrick, Tyler, Marshall. Image used with permission

Following photography procedures

- Determine what the doctor ordered
- Look through the patient’s chart
- Look for past photo history
- Obtain the patient’s information
Determine the plan

- See what images you need to take
  - Is one magnification better than the other
  - 20,30,50 degree?

- What are the images you should take?
- Do you know what area of the retina?
- Do you need more than one image to tell the story
- Make your plans based on the disease

Focusing your eyepiece

- Turn eyepiece all the way to the left
- Relax accommodation (stare at infinity)
- Now turn eyepiece slowly to right until reticle is SHARP!
- Make note of the mark
- Redo this 3 times

Documenting the procedure

- Prepare your camera
  - Set the eyepiece
  - Check the filters
  - Set your magnification

- Prepare your patient
  - Make sure your patient is adequately dilated
  - Wait at least 30 minutes for dilation
  - Use a second set if needed
Prepare your patient

- Put patient in a comfortable position
- Explain what you are doing to the patient
- Recheck the orders from the physician
- Adjust your plan

Lining up your camera

- Put your patient into the chinrest
- Center the donut of light on the patient’s lid
- Have your patient open the eye

Using fixation

- Present the internal OR external target to the patient
  - Which is going to work better?
  - Depends on patient
  - Do they have a prosthetic eye?

Aligning camera position

- Moving in vs moving out
- Left vs Right
- Moving up and down
- Lining up images vertically

*Textbook of Ophthalmic Photography, Wong, Don.

We can review in workshop what to look for too!

Image courtesy of Laura Savage
Aligning the camera

- Here is even illumination

When focusing on the retina

- Use the illumination until you can just see retinal landmarks
- Inform patient light will get brighter
- After focus is complete turn light back down for comfort
- A happy patient is a compliant patient!

Focus the retina

- Focus on the appropriate layer of the retina

Make some adjustments

- Is diopter compensation necessary?
- High refractive error
- Aphakic patients
- Focusing on vitreous or anterior chamber

Make adjustments

- Is the media clear?
  - Corneal issues (cataract, scar)
  - Vitreous issues (asteroid, vitreous hemorrhage)

Make adjustments

- Does patient have an astigmatism?
Make adjustments

- Small pupil setting needed?

Make adjustments

- Is the fundus very dark or very light?
  - Use flash to increase or decrease exposure

Take a picture now!!

- Everything is ready
- Recheck alignment
- Tell the patient “blink, then open real wide!”
- Press the trigger!

Repeat

- In digital photography setting
  - Evaluate image on screen
  - Adjust the settings
  - Shoot until you have completed the order
  - Follow up on the other eye

Repeat

- On film
  - Shoot extra frames!!!
  - Try to bracket the exposures
  - Evaluate quality when slides are returned

Presenting the images
**Stereo Photography**

- Shooting two images from slightly different points of view to fuse them together creating a 3D image.

![Stereo Photography](image)

**Stereo Technique**

- Ensure maximum dilation.
- Move laterally on the same plane.

![Stereo Technique](image)

**Take Note**

- Patient must maintain fixation for both images.
- Digital is Left to Right.
- Film is Right to Left.

![Take Note](image)

**Photographing the Peripheral Retina**

- Images can be obtained by a combination of movements of the camera and having patient fixate off center.

![Photographing the Peripheral Retina](image)

**Which way do they look?**

- Superior - looks up.
- Inferior - looks down.
- OD Nasal - looks Left.
- OS Nasal - looks Right.
- OD temporal - looks Right.
- OS Temporal - looks Left.

![Which way do they look?](image)
Adjust height of camera and vertical and horizontal movement

- Superior - Lower the camera and point up
- Inferior - Raise camera and point down
- Right and Left - swing camera from side to side

Using filters

- Black and white imaging (red free)
- Green, blue and red filters can be used
- Filters lighten own color and darken the complementary color

How filters work

- Varying wavelengths of light penetrate the retina at different depths

Monochromatic Green

- "Red Free"
- Highlights vasculature and blood
- Focus on central retina

Blue filter

- The fluorescein exciter filter
- Shows the nerve fiber layer
- Focus on uppermost layer of the retina

Monochromatic Red

- Highlights details in choroid

Images provided by Laura Savage
Autofluorescence

- Mainly optic nerve head drusen
- Retinal disorders
- ARMD
- NO FLUORESCEIN !!!

The whole story

- Document different angles and locations

The whole story

- Focus on different pathology

Photographing Lesions

- Try to obtain the whole lesion

Maintaining your equipment

- Images provided by Laura Savage

Archiving your images

- Slide pages
- CD/DVD
Special Tips

- **Lids and Lashes**
  - Use a qtip to move the lids up or down out of the way
  - Use your finger and pull the lid up
  - Tape the lids (takes longer, keep cornea lubricated often)
  - Ask a coworker for help

- **Small Pupils**
  - Use small pupil setting
  - Make the camera off center
  - Use different angle of view (30 degree helps)
  - Brighten the illumination to see it better

- **The difficult patient**
  - A patient technician!
  - Being empathetic
  - Explaining
  - Laughter works!

- **The Hearing Impaired**
  - Talk to patient in lit conditions first
  - Use touch codes in dark
  - Do they have an interpreter?

- **Children**
  - Make them at ease
  - Explain
  - Let them take a picture!
  - Stand on stool, in parents lap
  - Try to get the ONE shot you need!

- **Get perfection if it is obtainable!**
  - If it’s not perfect document it
    - (blinking, small pupils, compliance, light sensitive)
  - Take an anterior segment photo if view into retina is compromised
Questions???

Thank you!

Special thanks to Laura Savage, COMT, CRA

Special thanks to Sarah Moyer, CRA, OCT-C