SIMON Fundic Exam Simulator (Veterinary)

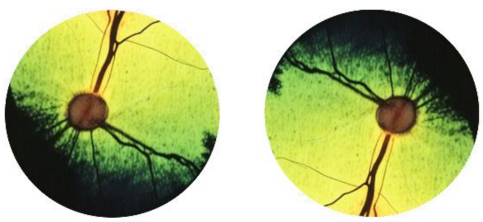
Information Packet

Before you start…

Indirect ophthalmoscopy (also called a “fundic exam”) allows us to visualize the fundus.

The “fundus” refers to the “back of the eye”, which contains the retina and the optic disc.

Crucial Concept #1 – With indirect ophthalmoscopy, the ophthalmic lens results in your image being “reversed and inverted” (in other words, “backwards and upside down”).



Normal

Indirect Ophthalmoscopy
Backwards and upside-down

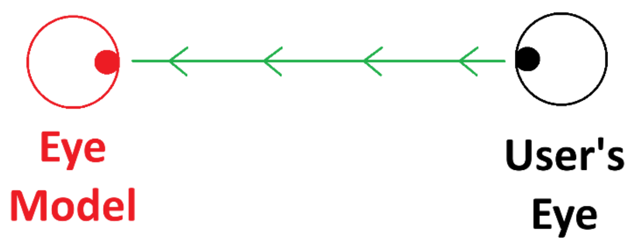
This is important to understand because the image you see through the lens is not actually how the fundus is oriented in the animal’s eye. For example, a dog’s “tapetal region” (the green region) sits above (dorsal) to the “non-tapetal region” (black region) as seen in the picture above. However, on indirect ophthalmoscopy, the tapetal region appears beneath the non-tapetal region, because the image is inverted, as well as backwards.

Crucial Concept #2 - The pupil is not a solid object, it’s actually a hole! Consider it the “entrance into the eye”. While performing a fundic exam, the pupil is what we look through and allows us to visualize the fundus.

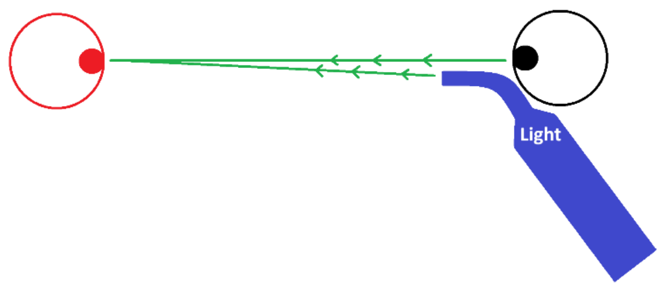
Above all, keep in mind that even the most experienced doctors struggle with fundic exams. Mastering this diagnostic technique takes a lot of practice and gets even harder when you perform it on a real patient! For those reasons, when learning this skill, just be patient with yourself. It will come with time! Experiment with different angles and distances to see what works best for you.

How to perform Indirect Ophthalmoscopy (AKA a "fundic exam")

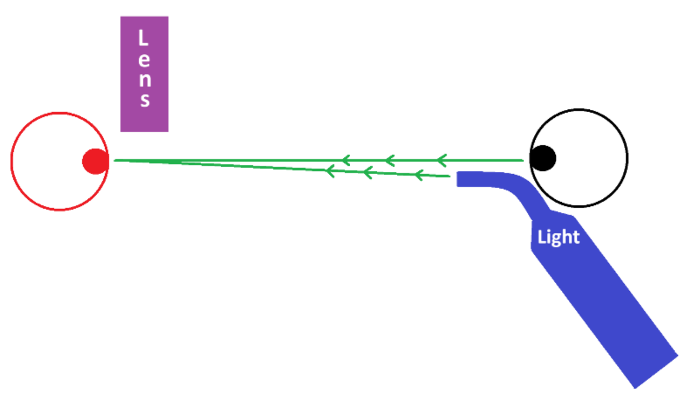
- To start, position yourself directly in front of the eye model that you wish to visualize.



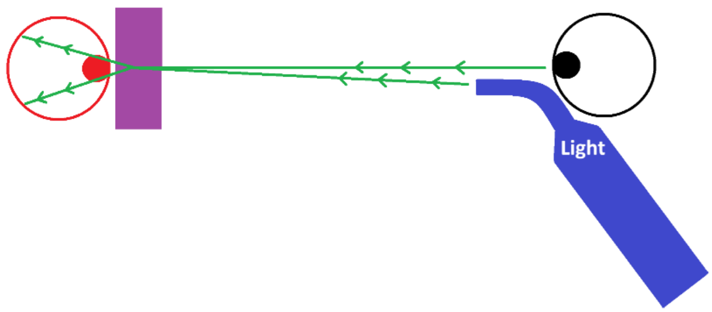
- Using your right hand, position the ophthalmic light directly beneath your own eye, such that the light beam shines directly into the pupil of the eye model.



- Using your left hand, hold the 20D ophthalmic lens just above the eye model with your thumb and pointer finger.

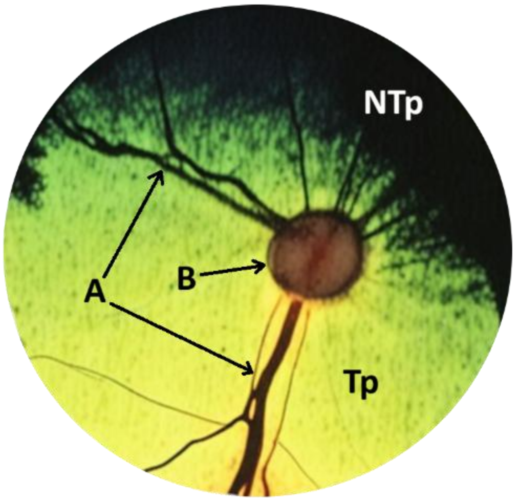


- As you shine the light into the pupil, once you see a glimpse of green at the back of the eye, move the lens down and directly in front of the pupil of the eye model. There should be about an inch of space between the eye model and your lens.



<u>Common Problems & How To Fix Them…</u>

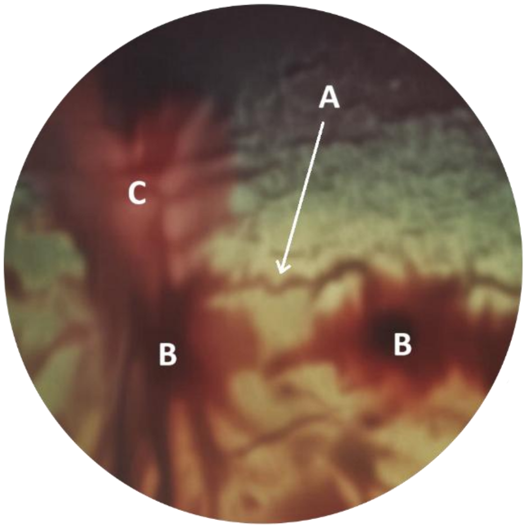
- If the lens is positioned correctly, a magnified view of the retina will appear in your lens.
    - **If the fundus appears too large and/or distorted**, try moving the lens further away from the eye.
    - **If the fundus appears too small,** try moving the lens closer to the eye.
    - **If the fundus appears too bright or "shiny"**, try moving the light source (and yourself) further away from the eye.
    - **If you only see a piece of the fundus**, try moving your lens "up and down" or "side to side" to centralize the image.
    - Once you have a good view of the fundus, explore the full fundus by rotating the light, the lens, and yourself together around the eye (while keeping them in line with each other).
        - However, keep in mind the "inverse and backwards" rule still applies, so moving left will show you more of the right side, moving up will show you more of the bottom, etc.



<u>Eyeball #1 – Normal</u>

In a dog, this is how the fundus should normally look on indirect ophthalmoscopy.

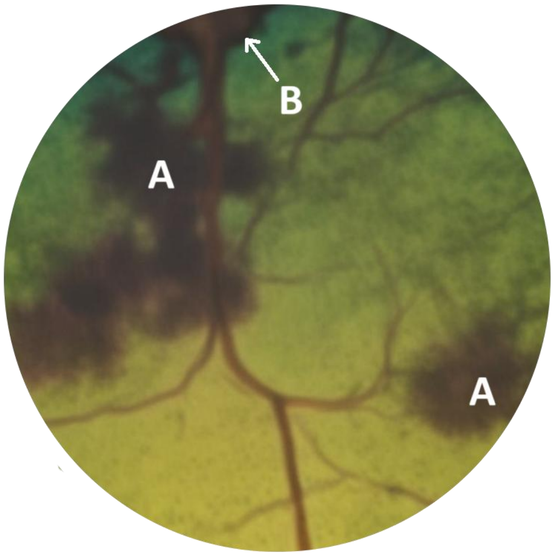
- The optic vessels **(A)** provide nutrients and oxygen to the eye. Normally, they should appear thin and travel in a smooth direction.
- The optic disc **(B)** is where the optic nerve exits the eye to transmit visual information from the retina to the brain. Normally, it should appear smooth, round, and well-defined.
- The tapetal region **(Tp)** also known as the "tapetum lucidum" is an evolutionary structure that reflects light that enters the eye, making it easier for animals to see in the dark.
    - *Fun fact, the tapetal region is why animal eyes "glow" against a flashlight!*
- The non-tapetal region **(NTp)** is a pigmented region of the eye that absorbs excessive light, preventing too much light from entering the retina, which enhances the clarity of vision.



<u>Eyeball #2 – Retinal Hemorrhage</u>

When retinal vessels become damaged, they can sometimes leak or rupture, leading to the appearance of retinal hemorrhage.

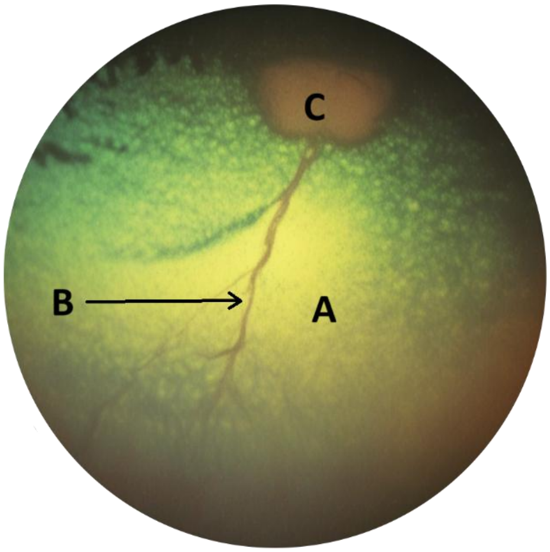
- Depending on the cause, retinal vessels **(A)** may appear thickened and tortuous.
- Areas of severe hemorrhage **(B)** can be visible on the fundus and may partially or fully obstruct your view of the optic disc **(C)**.
- Differentials for this condition include:
    - Systemic hypertension
    - Platelet disorders
    - Clotting factor disorders
    - Von Willebrand's Disease
    - Trauma
    - Infections leading to vasculitis (bacterial, viral, etc.)



Eyeball #3 – Fungal Granuloma

When a dog has a fungal infection, if the fungus enters the bloodstream, these organisms can reach other parts of the body, including the eye! If this happens, the fungus creates a very characteristic appearance that can be observed on fundic exam, like “black clouds”. When this happens, it can be quite painful and may eventually cause the dog to go blind.

- “Black cloud” appearance **(A)** representing a fungal infection in the eye.
- For reference, the optic disc **(B)** is labeled.
- Differentials for this condition include:
    - Blastomycosis dermatitidis
    - Histoplasmosis capsulatum
    - Aspergillus fumigatus
    - Cryptococcus neoformans *(more likely in cats)*



Eyeball #4 – Progressive Retinal Atrophy (PRA)

Progressive Retinal Atrophy (PRA) must be on your list of differentials for a dog that has gone blind. This condition is caused by genetic mutations of genes responsible for the development of photoreceptors in the eye. In classic cases of PRA, owners initially notice "night blindness", where the dog has trouble seeing in the dark. Then, as the condition progresses, the dog becomes fully blind, even in daylight. The reason for this observation is because rod photoreceptors, which are responsible for low-light vision, degenerate before cone photoreceptors, which are responsible for daylight vision. Unfortunately, this condition cannot be cured, but blind dogs can thankfully still do very well, given their strong sense of hearing and smell!

- Tapetal hyperreflectivity **(A)** can be observed, characterized by a tapetal region that is much brighter than normal.
- Vascular attenuation **(B)** can be observed as the vessels get smaller due to retinal degeneration, as well as reduced retinal metabolic demand.
- Optic disc pallor **(C)** can be observed in advanced cases due to degeneration of the optic nerve.

Eyeball #5 – Taurine Deficiency

This condition is primarily seen in cats because they cannot synthesize taurine, therefore they rely on their diet as a source of taurine. When cats are fed an inappropriate diet, this can lead to several problems, including FCRD (feline central retinal degeneration) as pictured here.

- Region of central retinal degeneration **(A)** characterized by an elliptical, well-circumscribed lesion in the middle of the retina.