Slit Lamp Biomicroscopy

"I Don't Like Using That Thing Because It Makes Me Look Like An Idiot"

That's an easy fix:
If you don't want to look like an idiot while using the slit lamp - then make sure that you don't!

* Practice on the machine
* Practice on your staff
* Know where your knobs are!

Know The Instrument

Learning the slit lamp is not going to happen by reading the manual or a book on illuminations. You need to sit down and move the levers - and see what happens!

Before you start

• Adjust for refractive error.
• Set the pupillary distance.
• Set on lowest illumination.

Set for refractive error correction.

Calibration Pole & Focusing Par Focal
**Horizontal light control**
- Decoupling knob
- Horizontal light control

**Vertical Control and Filters**
- Filters
- Vertical light control/apertures

**Filters**

**If I move this lever - what will happen?**
When you are using the slit lamp, it doesn’t matter what “type” of illumination gives you this view. What matters is that you now can see that the contact lens has a great deal of protein build up and needs to be replaced!

**And No One Is Going To Die!**
Using the slit lamp is *not* going to burn the patient, laser the patient, or hurt the patient even with prolonged usage! You may bother the patient, and if they are photophobic, you may irritate the patient - but you will *not* hurt them!

**What Are The Illuminations?**

1. **Diffuse**
2. **Direct Focal:**
   * Parallelepiped
   * Pinpoint (Tyndall's)
   * Tangential
   * Specular Reflection
3. **Indirect Retro Illumination**
   * Sclerotic Scatter
   * Indirect (Proximal)
   * Retroillumination
Diffuse: "Wide Beam"

Used primarily to get an overall, general view of the eye, lids, lashes, conjunctiva and to some degree, the iris. "Wide beam" illumination is the only type that has the light source set wide open.

Uses For Diffuse Illumination

* Using the cobalt blue filter and fluorescein dye (i.e. Fluress), you can evaluate movement and positioning of hard or gas permeable contact lenses. **Do not use dye with SCL!!!**
* Evaluate corneal abrasions.
* Evaluate tear break up time (TBUT)

Diffuse With Slit Beam

*BMC Ophthalmology*
Direct Focal: (Optical Sectioning)

An optical cross section is created by narrowing the slit to a very thin beam. Great for judging depth or height of lesions, abrasions/ulcers, anterior chamber depth or examining contact lenses.

- Diffuse, wide-beam, illumination with the red free (green) filter is great when trying to view blood or blood vessels.
- The red free filter makes small hemorrhages, micro-hemorrhages / hyphemas or early new blood vessels (pannus) stand out. This is also a great trick if doing photography!

- The oculars should be directly in front of the patient's eye
- Illumination angle at about 45°
- The slit width is almost closed and full length of the eye
- Medium to high power: 16 - 40 x
The corneal epithelium appears as a thin, optically empty (black) line at the surface of the optical section. The anterior chamber is normally "optically" empty.

**Focal Layers Of The Cornea**
1. Front surface bright zone is tear surface
2. Next darker gray line is epithelium
3. Next bright thin line is Bowman's
4. Wide grainy appearing gray area is stroma
5. Bright line on inside is the endothelium

**Van Herick's Anterior Chamber Depth Assessment**
- SC - Slit on cornea
- CA - Chamber angle
- BI - Slit on iris

- Van Herick Grade 4
  - SC to CA = 1 : 1 or higher

- Van Herick Grade 3
  - SC to CA = 1 : ½

- Van Herick Grade 1
  - SC to CA = 1 : < ½

**Direct Focal: Pinpoint (Tyndall's Phenomenon) or Conical Beam**

**Aqueous Flare - Tyndall's Phenomenon**
- Cells, pigment or proteins in the aqueous humor reflects the light like a light bulb. To visualize this, the slit illuminator is directed to the nodal; double beam axis is pro-
  -jected through the anterior chamber using a 45° - 60° angle. The strongest reflection is possible at 45°.
  - Hoag Street Manual
Looking For Cell & Flare

The best way to think of cell & flare, is "dust in the light".

What Are Cells & Flare?

Flare: protein that has escaped from dilated vessels. They give the normally clear anterior chamber a gray or milky appearance. Cells: white blood cells escaping from dilated vessels. They reflect the light and are seen as white dots.

What Causes Cell & Flare?

Usually anterior uveitis (iritis and iridocyclitis).

Usually trauma related.

First episode of uveitis without trauma is often idiopathic: but future occurrences may be ocular manifestations of an underlying systemic illness.

What Is A Parallelepiped?

Rhomboid

Direct Focal: Parallelepiped

Another form of optical sectioning. Narrow your beam so it is as wide as the cornea is thick. The depth, width and position of small abnormalities can be evaluated with this. When the beam is further narrowed, it forms an optical section. Cornea infiltrates.

Parallelepiped illumination is one of most common types of illumination. The oculars should be directly in front of the patient's eye. The slit width is greater (2.0 - 4.0 mm) while the beam height can vary. This illumination gives more of a (3) dimensional view of the cornea or the lens. Illumination source should be approx. 45 degrees.
Good For

**Corneal nerves** : white vessel like structures located within the cornea.
**Blood filled vessels** extend from the limbus onto or into the cornea. Indicates chronic or acute inflammation.
**Ghost vessels** extend from the limbus onto or into the cornea. Empty of blood, they indicate a past corneal inflammation.

When Do I Move The Light?

**Direct Illumination**:
- Beam is pointed directly at the area of interest.
- Good for gross pathology.

**Retroillumination**:
- Beam is decentered to illuminate behind the area of interest bringing out subtle changes such as vascularization or corneal dystrophies.

Indirect & Retro-Illumination

- Retro-illumination
- Sclerotic Scatter
- Direct Retro-illumination
- Indirect Retro-illumination
- Retro-illumination of the Fundus
- Specular Reflection
- Tangential

Retro-illumination

Uses a parallelepiped to bounce unfocused light off one structure while you are back lighting another (the object of interest).
- Use low to medium magnification (7-10x).
- Slit beam 1-2 mm wide and 4-5 mm high.
- Great for cornea precipitates (KP's) and other cornea issues, as well as iritis.

Sclerotic Scatter

Indirect illumination is created by decentering the slit beam and then aiming a wide beam on the temporal sclera at the limbal edge. Causes the bright light to be directed onto the sclera, which in turn back glows the cornea.
- Use low to medium magnification.
You can see the "glow" from the limbal area when the illumination is aligned correctly. The beam will always be overexposed in a picture because of the beam of light reflecting off the opaque sclera. The indirect light highlights subtle corneal changes such as scarring, cornea dystrophies, and lens changes.

**Indirect Retro-illumination**

A moderate slit beam is now decentered more and angled to project onto the iris adjacent to the area behind the area of interest. The background is dark and will illuminate the edges of the non-pigmented lesions will be defined by the diffuse light reflecting from the iris.

**Direct Retro-illumination**

In this example, the iris is illuminated and the back glow highlights corneal thinning. The slit beam is de-centered and angled to project lights directly behind the area of interest. The light reflects and backlights the cornea.

Here we see pannus. Once again the iris is backlight which enables us to see blood vessels encroaching onto the cornea.

**Direct Focal: Specular Reflection**

A short parallelepiped, or the smallest circle possible is used. Used primarily to see the endothelium. Light source should be continuous using medium to high lighting. Use higher magnifications for best detail.

**Tangential**

Specular Reflection is the reflection of light from a surface. It can be defined as light reflected from a smooth surface at a given angle. Diffuse Reflection occurs when light is reflected from rough surfaces causing the light to be reflected in all directions.

Had enough yet?? Smiley face. Slit beam is shown so it strikes the object without illuminating the surfaces that are in front of it!
A wide slit beam is shone at an oblique angle of 80° - 90° onto the iris. This illumination creates strong **shadows** which enhances the surface texture.

**“Across The Beam”**
Detail is enhanced by providing shadows.

**Transillumination Defects**
The slit illuminator is positioned coaxially to the oculars and adjusted to provide a small circle of light. The beam is projected through the pupil which should, if possible, be at mid dilation. The light reflects from the fundus and backlights the iris. The iris pigment usually absorbs the light, but if there are pigmentation defects, the red reflex from the fundus will shine through the "holes".

**Retro-illumination Of The Fundus**
Using a wide slit beam that is de-centered, adjusted the beam to a half circle. You can do this by adjusting the beam height and width controls. Project the de-centered slit beam near the pupil/iris through a the dilated pupil.

**Patency Of An Iridotomy**

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