

# Illumination Angle in Iris Photography

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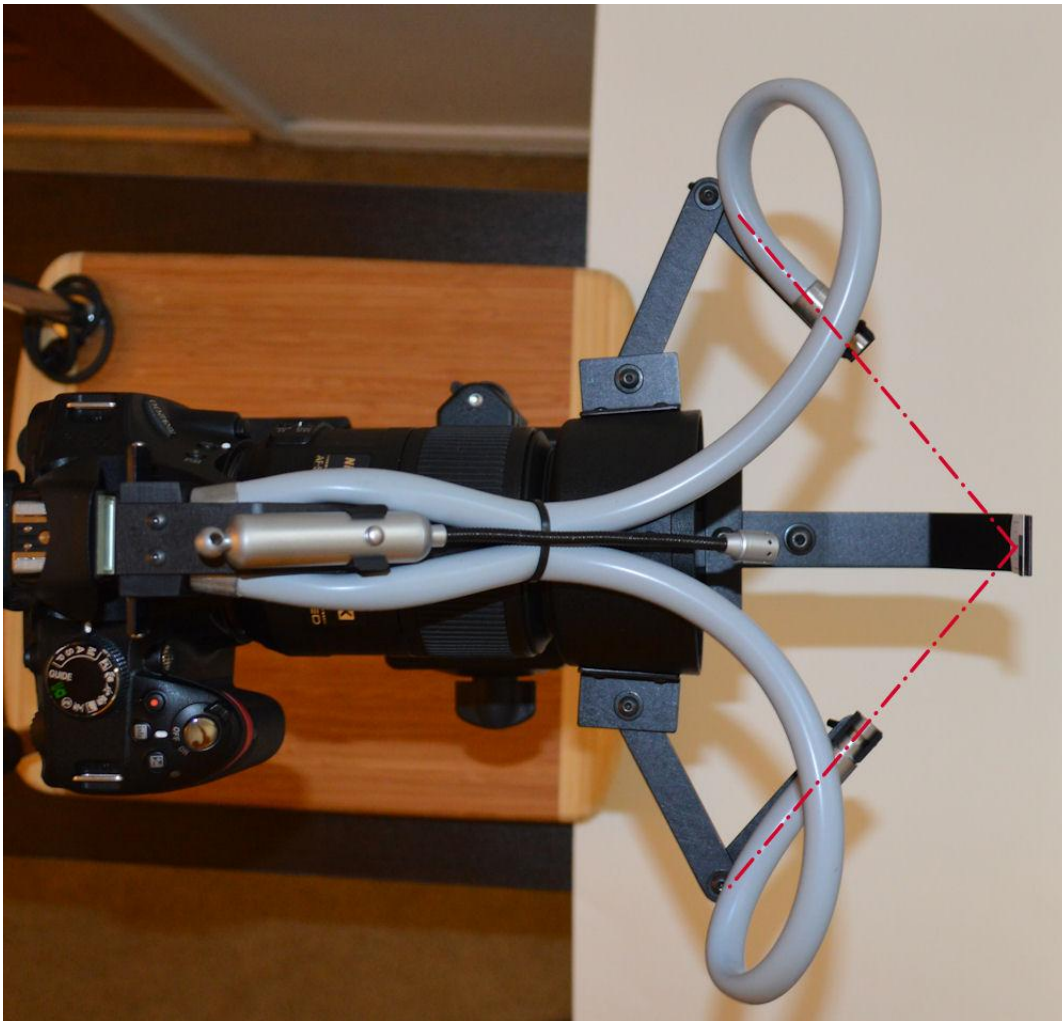
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When imaging the iris, **control of the light is critical**, and various lighting conditions can achieve different effects. For standard biometric imaging, it is normally best to have central lighting so as to have a uniform illumination of the entire iris surface with no shadows cast.

However by using an **Adjustable Side Lighting Illuminator**, one can get additional information on the iris by selecting specific lighting angles to use.

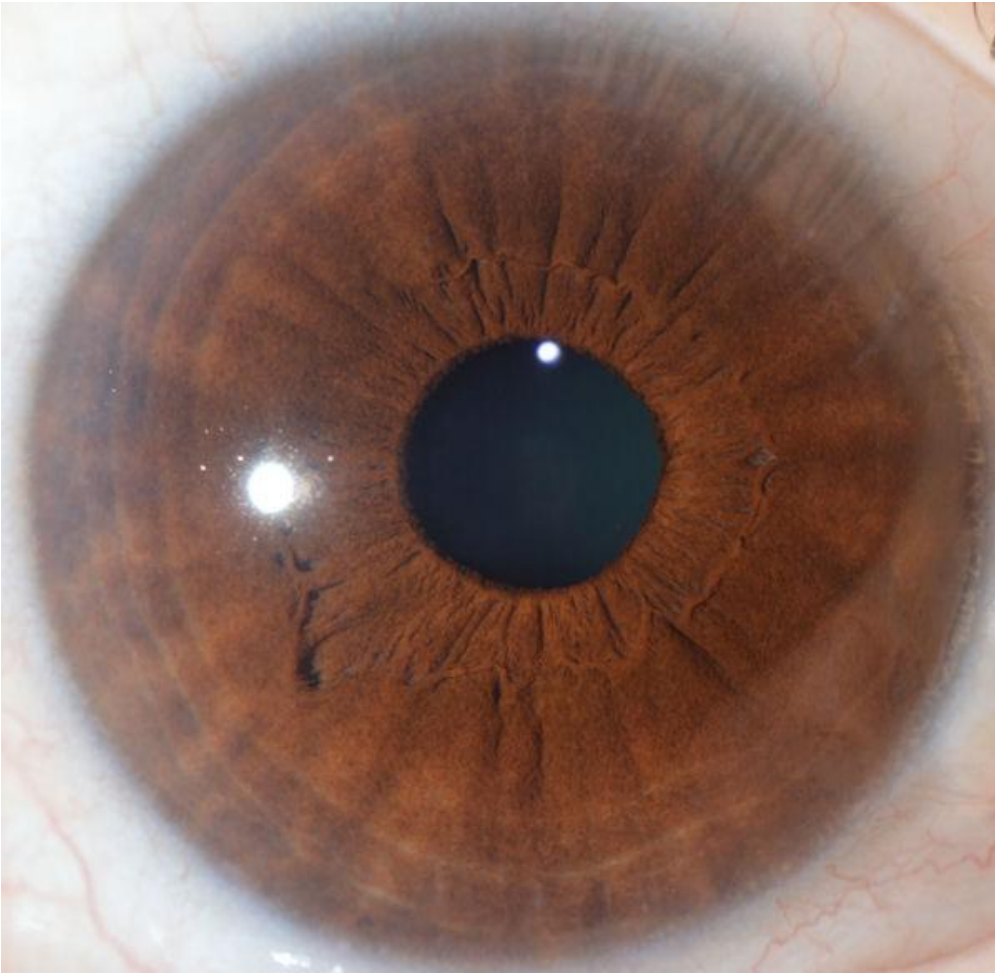
## The Adjustable Side Lighting (ASL) Illuminator

The standard angle of illumination for side lighting of the iris is 45 degrees:



Normally the light is directed at the iris from the lateral side only. With the above configuration, one can switch the light channels on or off so as to have the light only coming from the lateral or medial directions (or both).

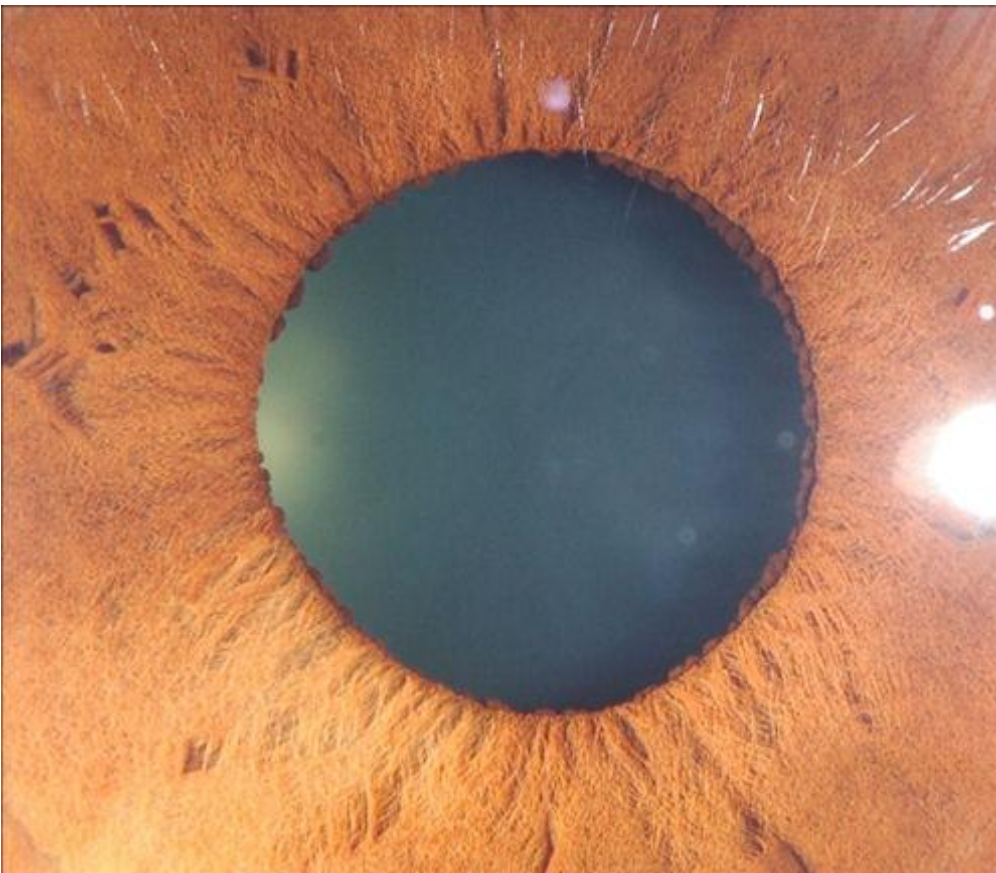
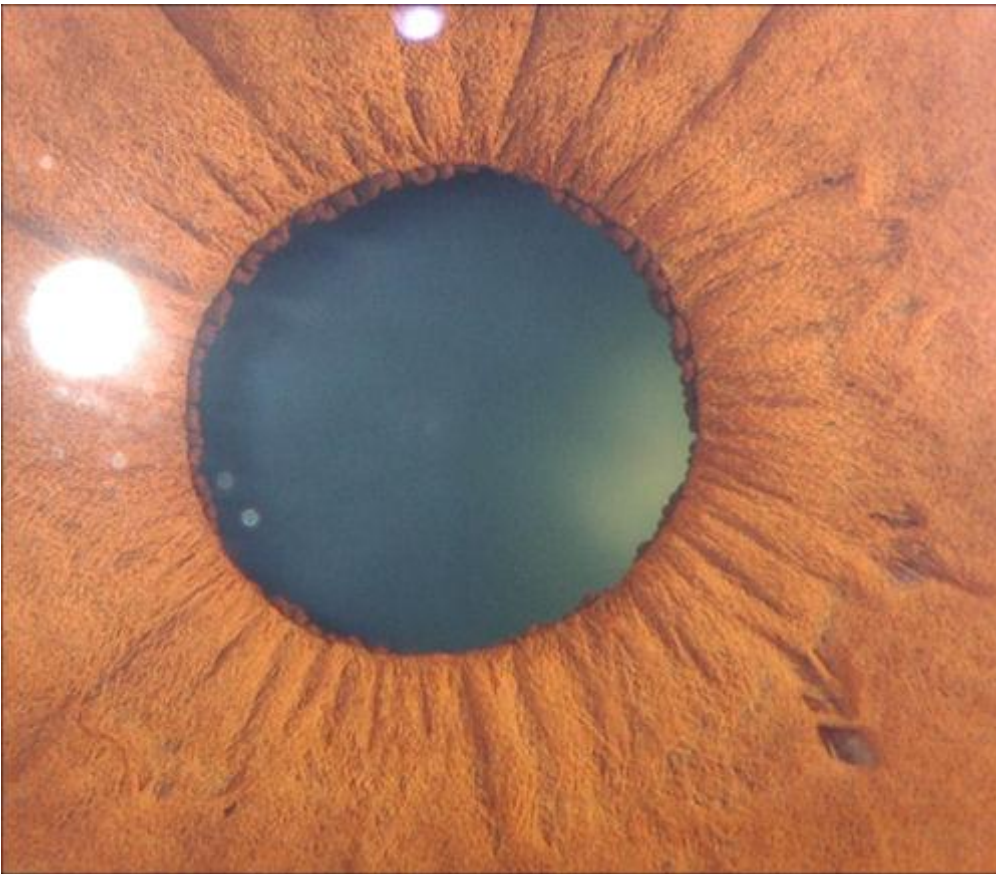
The illustration above shows the **Alignment Target** being used to ensure correct 45-degree angle of lighting.



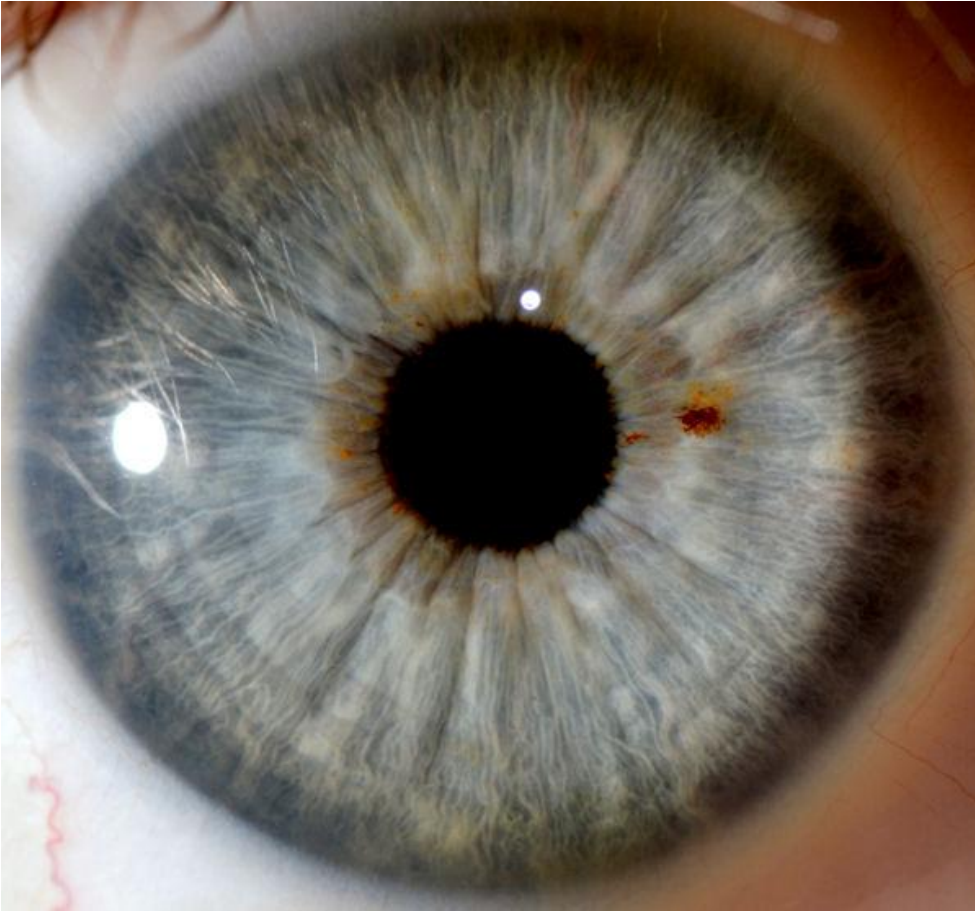
For bringing out the detail in the inner pupil border area, the recommended approach is the LoRito method of **Extreme Side Lighting**, where the lateral light is at 80 to 90 degrees from the axis and the medial light is at about 20 degrees:



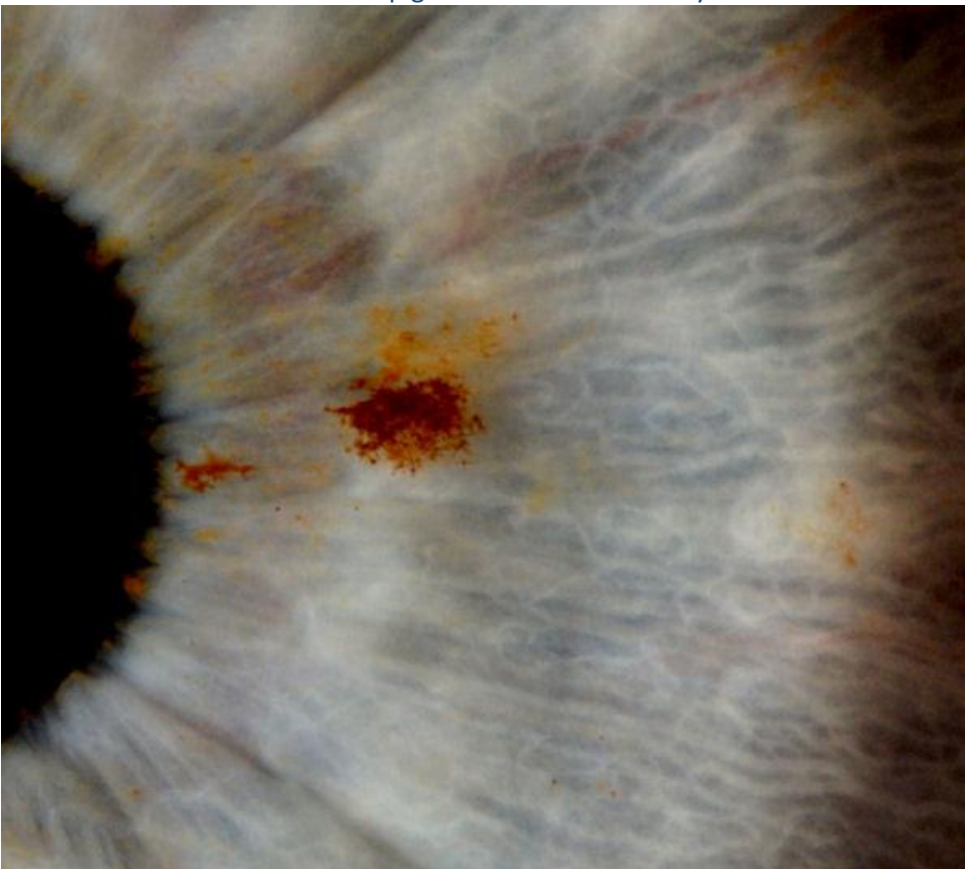
Example of IPB imaging using the LoRito ESL method:



Example image using 90-degree ESL:



ESL can sometimes illustrate the pigment in an unusual way:

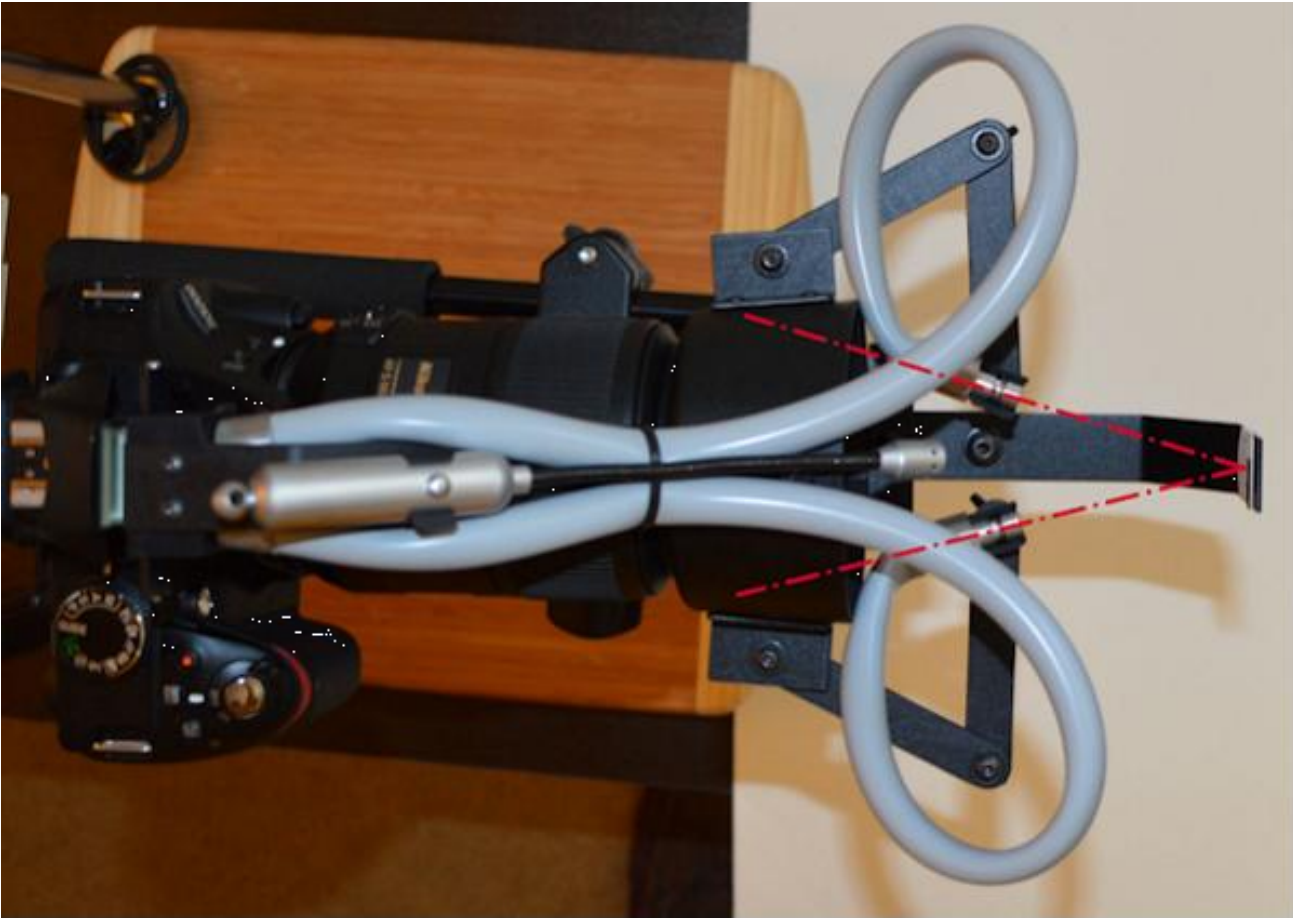


## Obscuration of the Iris by the Corneal Reflection of the Illuminator (Purkinje 1)

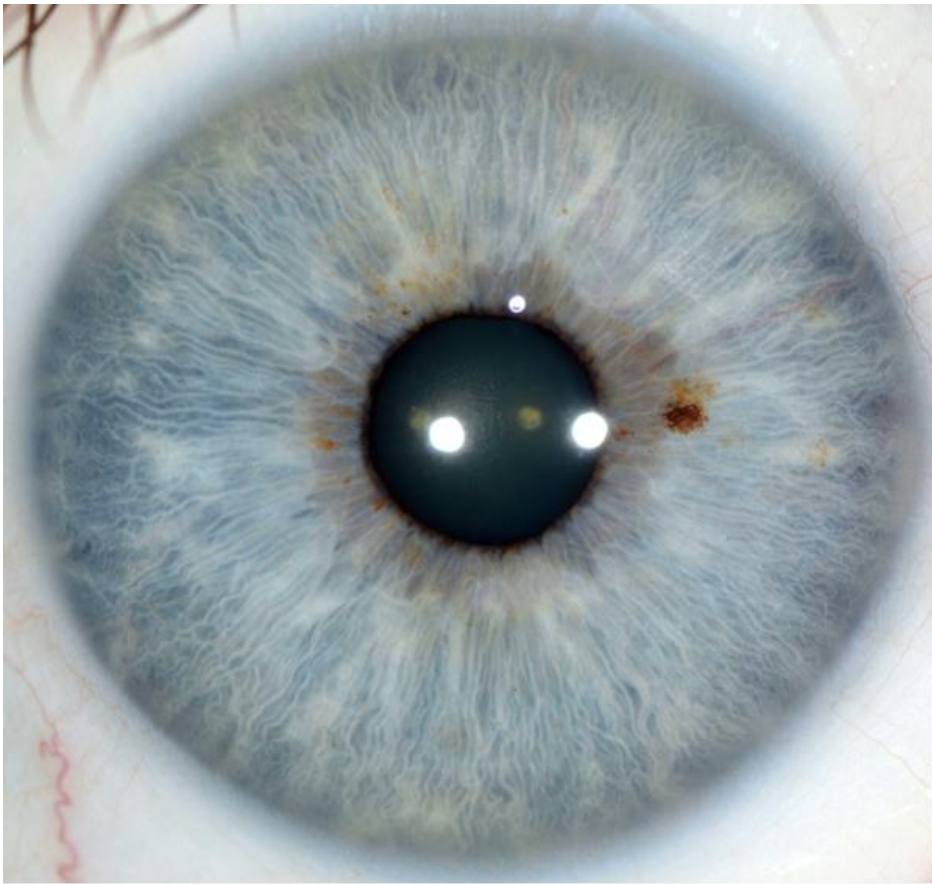
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ANY side-lighting illumination will block a small portion of the iris. Most people just ignore the missing area, but it is true that some people who use side lighting often will take photos using both left-only & right-only illumination so nothing is missing. But most people do not have the time to work with two views of each iris. It is not a bad idea though! On the other hand, an iris evaluation is a primarily a constitutional assessment and small details at individual positions are not an essential part of the evaluation.

With the adjustable lighting, you can have the reflection anywhere you want, including right near the center, as shown in the example iris photo below, by the reflection on the left side (that light is incoming from the lateral side). Here is the ASL set up for central lighting:

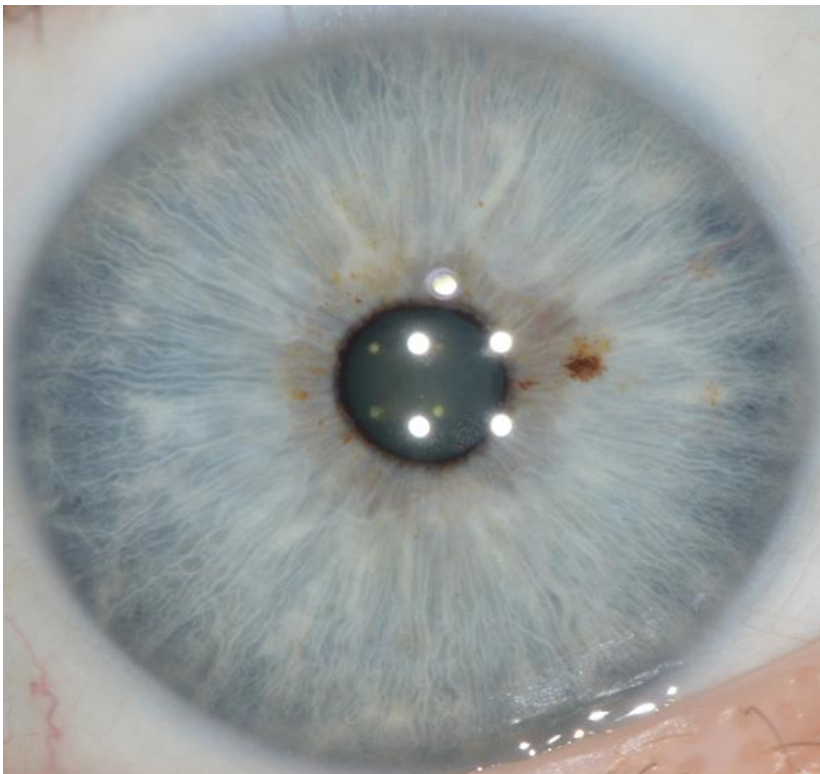


Here is the resulting iris photo:



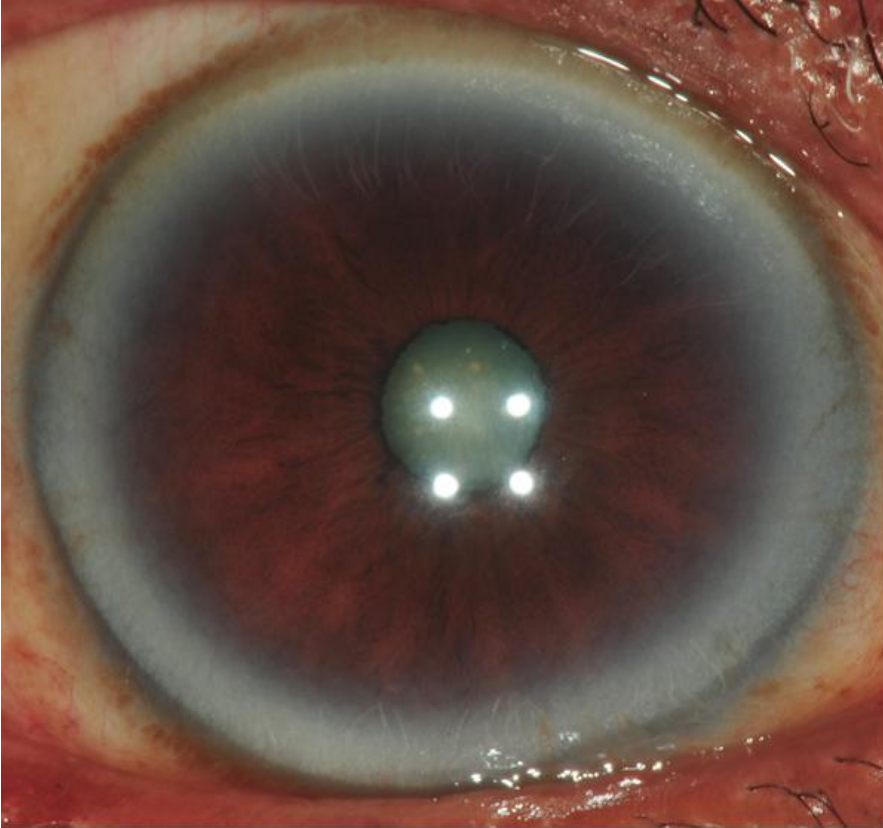
Normally you would not have them both on, just the lateral one, which in the above example would make only the reflection dot on the left show up.

Notice that even with the smallest light pattern - the **Coaxial Biometric**, that if the pupil is small there will be some obscuration of the iris:



In this case, it is sometimes helpful to switch off the focus light right after taking this photo, then immediately take another before client moves, and then you will get a photo with a larger pupil (due to no focus light).

One benefit in the use of side lighting is that it can sometimes give a better image of the dark brown iris by illustrating the texture of the brown iris surface (the blue iris does not really have a texture). For example compare this central lighting of an African iris:



to this side-lighting of an African iris:



In the above photo, it would be pretty easy to slide the shutter to the other position for a quick secondary shot of the iris using only the left channel. The standard 45-degree lighting angle will put the reflection dot right over the lateral area - 9:00 Right Eye, and 3:00 Left Eye. But with the brown iris, the top layer is **so pigmented that one cannot see the individual radial fibers** underneath what appears like a brown carpet throughout the ciliary (outer) zone, from collarette to the far periphery of the iris. So for this type of pure brown iris, one primarily evaluates the inner zone and the collarette. Since the surface of the true brown iris is opaque, it has a **texture that can be illustrated by lighting at an angle**, unlike the blue iris. The surface of the blue iris in the ciliary zone is like a clear plastic wrap laid on top of the radial fibers (which are collagen-clad capillaries). This is why autofocus works better on the blue iris the subject has inherently more contrast (all blue iris photos above were done with autofocus).

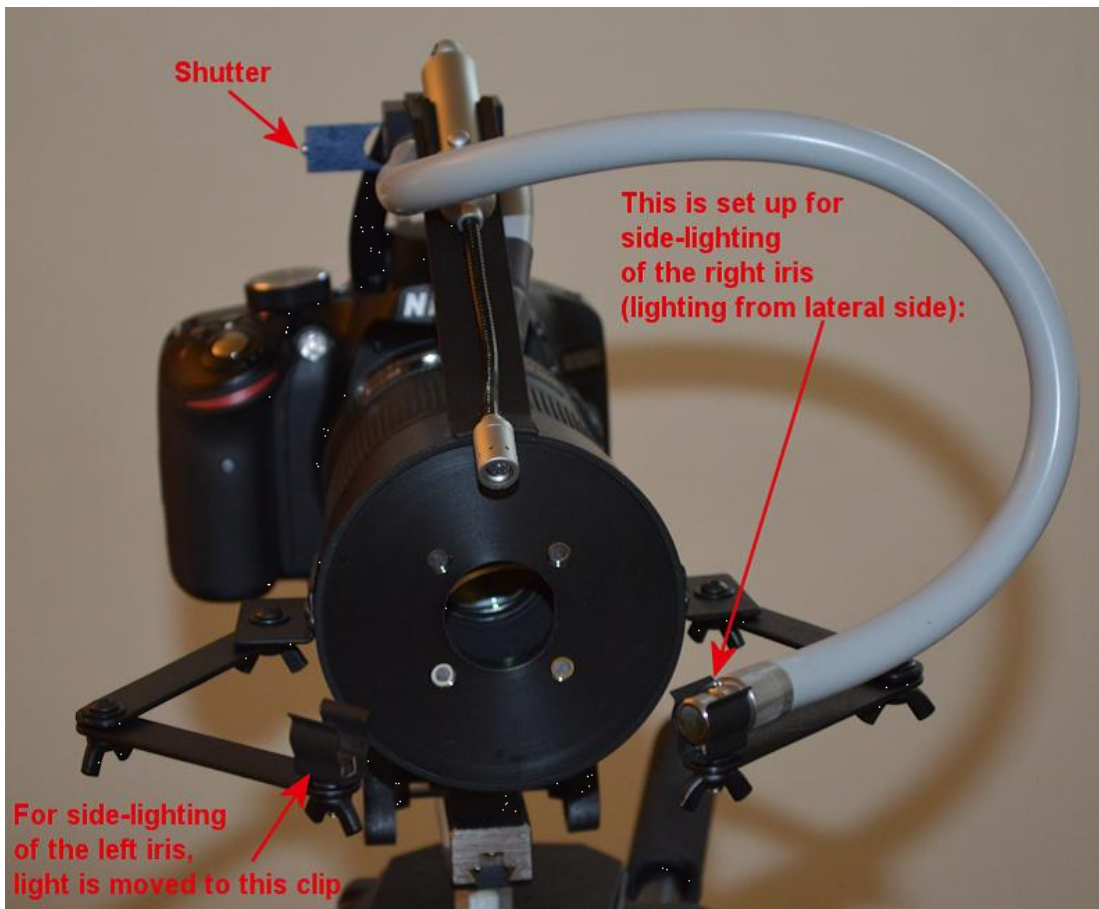
### Combo Illuminator: the Central and Side Lighting (CSL)

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The **ASL** is recommended for normal clinical use; the Combo unit (**CSL = Central and Side Lighting**) is not as efficient to operate in a clinical setting unless you are **primarily** doing central lighting imaging (the type of iris pictures with the 4 reflection dots in the pupil). If you use side-lighting much, it is better to have the two-channel shutter used to select between right & left channels, with the lightguides already on each side at the same time so there is no repositioning needed. With the combo unit, the two channels are allocated to the central lighting (channel 1) and just one side-lighting fiber-optic (channel 2) which then needs to be moved from left-side to right-side when you switch from photographing the first iris (right eye) to the second iris (left eye).

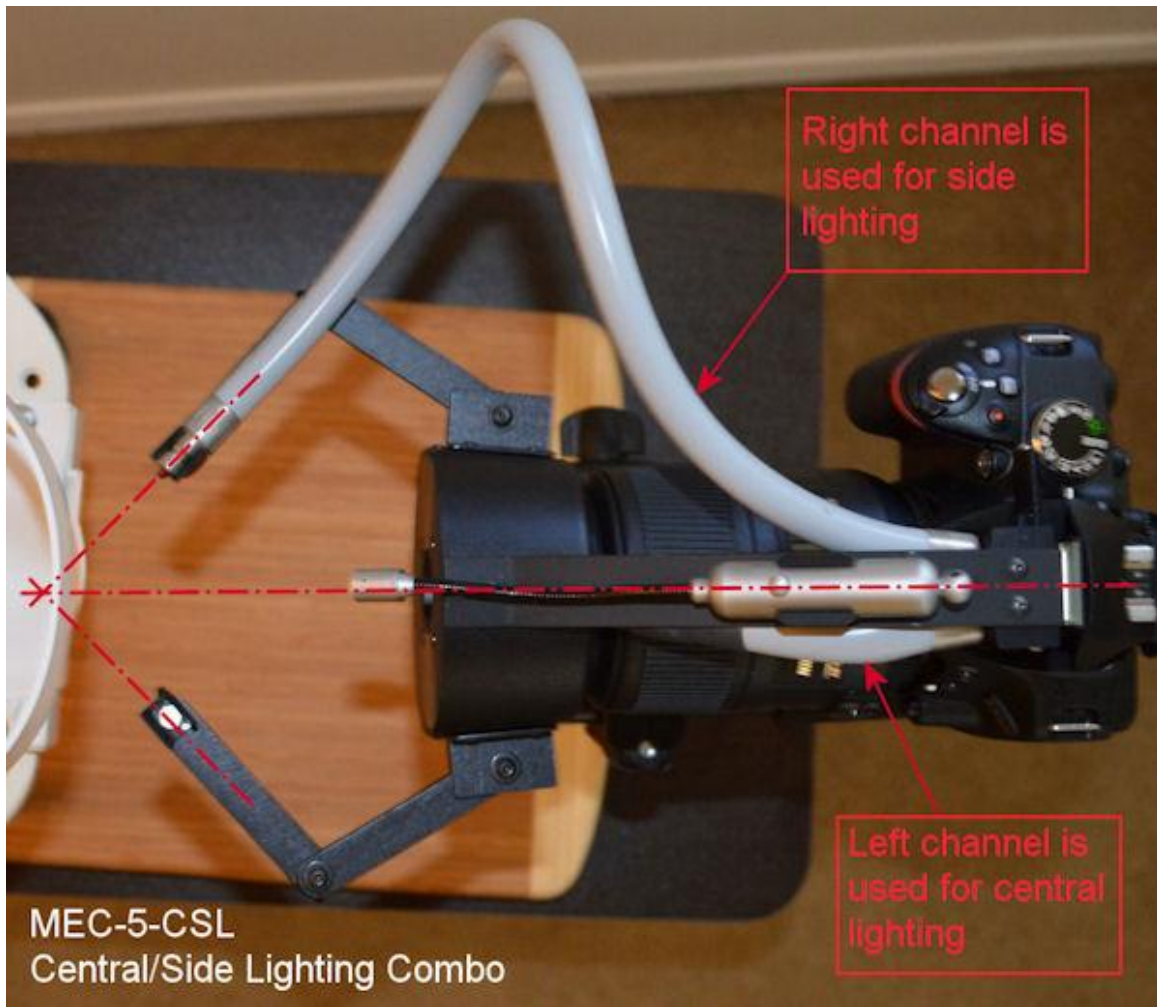
The **combo unit** is mainly for when you do not use side-lighting very much; if you use side-lighting every day then you would be better off with the ASL so you can easily and quickly change between the right & left sides by moving the shutter switch and not having to reposition either light.

This is the CSL model - if your primary imaging is central lighting and you sometimes want to have side lighting, then this is the best choice:





The CSL is priced at \$250 above the ASL model.



Source of this document: <http://tinyurl.com/eye-photography>