

Vitreoretinal Staining Solutions

Expert perspectives on the use of vital dyes by retina surgeons.

Part one of a three-part series in which surgeons share pointers on the optimal use of vital dyes in retina surgery.

Membrane Staining Options

by Brian C. Joondeph, MD, MPS

There are not a vast number of options from which to choose when it comes to the use of vital dyes for retinal membrane staining during surgery. It is important, however, to know about those that we have at our disposal so that we can make intelligent decisions regarding their use. This article reviews the current landscape of membrane staining options.

BRILLIANT BLUE G

Although no commercial formulation is approved by the US Food and Drug Administration (FDA), brilliant blue G (BBG) is available from compounding pharmacies. BBG is an excellent stain for visualizing the internal limiting membrane (ILM), but it does not effectively stain the epiretinal membrane (ERM). As a routine,

At a Glance

- Because of potential toxicity, ICG should be used at the lowest possible concentration.
- Although triamcinolone is not a vital dye, it can be used as an effective stain.
- A combination of BBG and trypan blue stains both the ILM and ERM, but no commercial formulation is available in the United States.

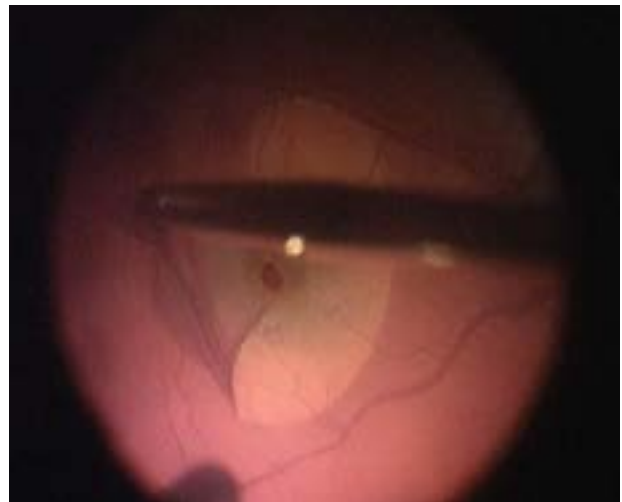


Figure 1. Photograph of ILM peeling using compounded BBG.

I tend to peel the ILM in virtually all ERM cases. This way, I am sure that the ERM is removed without leaving behind any residual membranes that may lead to residual traction or serve as a scaffold for recurrent ERM. I have found BBG to be a safe and effective ILM stain that provides good quality membrane staining (Figure 1).

The color contrast using BBG varies from patient to patient; sometimes there is a prominent blue effect, and other times there is a faint blue contrast, but it is always sufficient to visualize the contrast between peeled and unpeeled ILM, making it easy to grasp and peel the ILM flap. Overlying ERM does not stain with BBG, providing sharp contrast with the ILM because of its “negative staining.” BBG compounded with dextrose,

Image courtesy Brian C. Joondeph, MD

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Figure 2. Photograph of ERM peeling using a combination of 0.15% trypan blue, 0.025% BBG, and 4.00% PEG.

polyethylene glycol (PEG), or heavy water will sink to the back of the eye where the staining is needed. Otherwise, the stain can disperse due to infusion, particularly if nonvalved cannulas are used.

INDOCYANINE GREEN

Indocyanine green (ICG; IC-Green, Akorn) can also be used as a posterior stain for ILM peeling, but there have been reports of toxicity. Thus, it is important to use the lowest possible concentration. Unfortunately, however, at a low concentration there is a limited staining effect and diminished visualization.

TRIAMCINOLONE

The corticosteroid triamcinolone acetonide is another staining option that is considered acceptable, although it is not a true stain. I have used triamcinolone in cases when ICG or BBG have not been available, and it works.

Triamcinolone particles tend to settle on the ILM. As the ILM is peeled, one can see triamcinolone particles adhering to it with a clean area beneath it. A disadvantage of using triamcinolone for staining is that it does not present a strong color contrast difference, which means it is possible to leave behind a section of ILM and not realize it. Two commercial ophthalmic preparations are available: Trivaris injectable suspension 80 mg/mL (Allergan), and Triesence injectable suspension 40 mg/mL (Alcon).

TRYPAN BLUE

Trypan blue 0.15% (Membrane Blue, DORC International) is commercially available in the United

States. It stains ERM but not ILM, making it suitable for ERM peeling but not ILM peeling. For reasons noted earlier, I prefer to peel ILM with ERM, and, as such, BBG is preferable to trypan blue. If one uses trypan blue, one must be aware that it is also available in a 0.06% concentration (VisionBlue, DORC International), which is used for staining the anterior lens capsule during cataract surgery. This lower concentration will not stain ERM, so if poor staining is encountered with trypan blue, be sure the OR staff did not erroneously provide the lower-concentration version.

TRYPAN BLUE + BBG

The combination 0.15% trypan blue, 0.025% BBG, and 4.00% PEG (MembraneBlue-Dual, DORC International) stains both the ILM and the ERM (Figure 2). Unfortunately, this combination stain is not commercially available in the United States. Therefore, in the United States, we must stick with using BBG, which serves its purpose and is available, albeit only from compounding pharmacies.

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PREFERRED APPROACH

I prefer to use BBG for vitreoretinal surgery staining. I let it settle over the macula for at least 1 minute to achieve a brighter stain. If needed, one can always restain during the case to ensure a complete ILM peel without residual remnants. I also find the use of valved cannulas helpful to minimize fluid currents and keep the BBG settled over the macula. ■

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