

## **Information on AntiVEGF drugs**

In certain conditions such as

- Diabetes leading to swelling in the retina (Diabetic macular edema) or bleeding at the back of the eye (Proliferative diabetic retinopathy)
- Blockage in a vessel at the back of the eye (Vascular occlusion) due to hypertension or some other cause
- Age related macular degeneration leading to a membrane at the back of the eye (choroidal neovascular membrane)
- Abnormal vessels at the back of the eye (macular neovascularization) due to other causes
- Swelling in the retina (macular edema) due to other causes

There is a chemical called Vascular endothelial growth factor (VEGF) produced at the back of the eye. As a treatment, drugs called as antiVEGF agents are injected inside the eye. These drugs are injected once a month. You may require only 1 injection/ 3 injections (1 injection a month for 3 months)/ 10 injections or more number of injections depending on your condition.

We perform the procedure of injecting this medicine at the back of the eye in our operating theatre. We make your eyes numb by instilling some drops (topical anaesthesia) and use a needle to inject the drug. After the drug is injected, we patch your eye for 2 hours. You can take of the patch in 2 hours and start putting antibiotic drops in that eye (three times a day for 3 days)

### **Choice of antiVEGF agents**

There are 3 drugs

- 1) Lucentis (Ranibizumab)
- 2) Eylea (Aflibercept)
- 3) Avastin (Bevacizumab)

There is a difference in the price of the three, Eylea costing the highest and Avastin the lowest.

### **Avastin (Bevacizumab)**

This drug is actually approved for use in cancer patients to be injected in the vein (intravenous use) but is not approved by FDA (US Food and Drugs Administration) for use in the eye (intravitreal use). However, it is being used worldwide by the ophthalmologists as an “off label” drug with good efficacy. However, there are certain risks:

- It is available as a big vial (many doses in a single vial). This means that the drug is withdrawn in syringes for multiple patients. 1 syringe is used for 1 patient. This means that there is a risk of contamination and hence infection in the eye. There have been rare instances in the world when 7 or 10 or more patients who were given the injection from a single vial, all got a very severe infection in the eye due to contamination. We take good precautions to avoid this problem, however, it cannot be completely eliminated. This is because avastin is not available as a single dose vial for a single patient.
- In some studies, avastin produced higher risk of systemic side effects (stroke, heart attack) as compared to lucentis. These side effects are rare.

### **Lucentis (Ranibizumab)**

- Approved by FDA for use inside the eye.
- Available as a single dose vial for a single patient. And hence the chances of infection is lower.
- Lucentis is administered in the form of smaller molecules, which is thought to give Lucentis an advantage over Avastin in its ability to penetrate the eye's retina and halt abnormal blood vessel growth. Pharmacologically, Lucentis has a greater binding affinity for VEGF than Avastin, and Eylea has a greater binding affinity than Lucentis.
- Studies have shown lesser systemic side effects (stroke or heart attack) with Lucentis compared to Avastin

### **Eylea (Aflibercept)**

- Approved by FDA for use inside the eye.
- Available as a single dose vial for a single patient. And hence the chances of infection is lower

Studies have shown that

- If the vision is worse at the beginning of treatment in diabetic macular edema; then eylea was associated with greater vision benefit as compared to avastin or lucentis at the end of 1 year.
- Apart from superiority in vision, the requirement for number of injections in the second year, was lower in patients who were given Eylea.
- The systemic side effects such as stroke and heart attack was the lowest in those receiving Eylea (when comparison was made between the 3 drugs)

(Heier et al. Comparison of Aflibercept, Bevacizumab, and Ranibizumab for Treatment of Diabetic Macular Edema: Extrapolation of Data to Clinical Practice. JAMA Ophthalmol 2016 Jan;134(1):95-9)

Low et al. Comparative effectiveness and harms of intravitreal anti-vascular endothelial growth factor agents for three retinal conditions: a systematic review and meta-analysis. Br J Ophthalmol 2019 Apr;103(4):442-451)

To summarize:

- All the 3 drugs are effective in treating your condition.
- The difference between the 3 drugs is in cost, infection in the eye (higher chance with avastin), systemic side effects (stroke and heart attack) (lowest with Eylea)
- Eylea may be superior if your vision is worse at the beginning.

It is also important to note that patients may differ in how their eyes respond to one treatment versus another. Additionally, after discussion with you, the doctor may want to switch you from one drug to the other depending on how your eye is responding to the medicine.

### **Risks of the procedure of intravitreal injection**

Any surgical procedure has some risks. We take utmost care to minimize these risks. These include but are not limited to: rise in pressure of the eye (intraocular pressure), retinal detachment, bleeding in the eye (vitreous haemorrhage), infection in the eye (endophthalmitis).

### **Effect of AntiVEGF agents**

The aim of treatment is to improve your condition (vision/ swelling in retina/ bleeding in the eye) but we cannot guarantee an improvement. The effect of treatment also depends on your systemic condition (control of BP, blood sugar, kidney status, cholesterol status). For example, if your Blood sugar or Blood pressure remains uncontrolled, no matter how many injections we may give, your disease may not improve. You may require other treatments such as laser or surgery along with these drugs.