

# Anti-VEGF Injection Therapy

*A patient's guide to the drugs and treatment regimens used for retinal disease*

## What Is VEGF and Why Does It Matter?

Vascular Endothelial Growth Factor (VEGF) is a naturally occurring chemical that stimulates the formation of new, abnormal blood vessels (a process called neovascularisation) and increases leakage of fluid from existing capillaries (increased vascular permeability). Elevated VEGF levels are found in a number of retinal conditions, including diabetic retinopathy, wet age-related macular degeneration, and retinal vein occlusion.

In particular, the VEGF-A form is raised in this kind of abnormal blood vessel growth, which is why drugs designed to block VEGF-A — known as anti-VEGF agents — have become the mainstay of treatment for these conditions.

## Anti-VEGF Drugs

Several anti-VEGF agents have been developed since the first was approved in 2004, each differing in molecular structure, mechanism, and duration of effect:

| Drug (Brand)                             | Class / Mechanism                                                | Year / Notes                                                                                                           |
|------------------------------------------|------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|
| <b>Pegaptanib sodium (Macugen)</b>       | RNA aptamer targeting VEGF                                       | First approved 2004; largely superseded by more potent drugs                                                           |
| <b>Ranibizumab (Lucentis, Accentrix)</b> | Antibody fragment (Fab) blocking all active VEGF-A forms         | Approved 2006; more effective than pegaptanib                                                                          |
| <b>Bevacizumab (Avastin)</b>             | Full-length humanised monoclonal antibody vs. VEGF-A             | Originally approved for colorectal cancer (2004); widely used off-label, similar efficacy to ranibizumab at lower cost |
| <b>Aflibercept (Eylea)</b>               | VEGF-receptor fusion protein (traps VEGF-A, VEGF-B and PlGF)     | Broader binding profile; extensively used                                                                              |
| <b>Biosimilars</b>                       | Same active molecules as above, manufactured by Indian companies | Comparable efficacy and safety; lower cost, wider availability                                                         |
| <b>Faricimab (Vabysmo)</b>               | First bispecific antibody — blocks both VEGF and Ang-2           | Latest agent; often allows longer intervals between injections. Dose: 6 mg/0.05 ml intravitreal                        |
| <b>Brolucizumab (Pagenax)</b>            | Small (26 kD) single-chain antibody fragment, high molar dose    | Maintenance often every 8–12 weeks; carries a higher risk of intraocular inflammation. Dose: 6 mg/0.05 ml intravitreal |

### A Note on Brolucizumab

While its small molecular size allows higher molar dosing and longer intervals between injections, brolucizumab carries a higher risk of serious intraocular inflammation, retinal vasculitis and retinal vascular occlusion, which can affect vision. For this reason it is not used as a first-line treatment in many practices.

## Treatment Regimens

Anti-VEGF injections can be administered on different schedules, depending on the drug, the disease being treated, and the patient's ability to attend follow-up visits:

| Regimen            | How It Works                                                                                                                                                           | Key Consideration                                                 |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| Monthly injections | Fixed monthly dosing, as used in the original clinical trials for ranibizumab and aflibercept                                                                          | Rarely followed in routine practice today outside trial protocols |
| PRN (as needed)    | 2–3 monthly loading doses, then follow-up visual acuity and OCT checks with treatment only when disease activity is found                                              | Depends heavily on patient compliance with follow-up visits       |
| Treat and Extend   | After 2–3 monthly loading doses, follow-up intervals are progressively extended (6, 8, 10, up to 12 weekly) if disease is stable; an injection is given at every visit | Most commonly followed regimen in current practice                |

## Comparative Efficacy

In general, aflibercept, brolucizumab and faricimab are considered more effective than bevacizumab and ranibizumab, with brolucizumab regarded as the most potent agent among those currently available. The choice of drug and regimen for an individual patient is made by the treating retina specialist, balancing efficacy, durability, safety and cost.