Diabetic Macular Edema (DME) — Comprehensive KB Entry

1 — Short Definition

Diabetic Macular Edema (DME) is a vision■threatening retinal condition caused by fluid accumulation within the macula due to breakdown of the blood–retinal barrier in diabetic retinopathy. It leads to intraretinal cysts, retinal thickening, and sometimes subretinal fluid, all visible on OCT.

2 — Pathophysiology

- Chronic hyperglycemia damages retinal capillary endothelial cells and pericytes.

- Loss of pericytes → microaneurysms and capillary leakage.

- Increased VEGF and inflammatory cytokines promote vascular permeability.

- Breakdown of the inner blood–retinal barrier causes fluid entry into retinal layers.

- Fluid accumulates as intraretinal cystoid spaces, spongiform thickening, and occasionally subretinal fluid.

- Chronic DME results in photoreceptor layer disruption and poor visual prognosis.

3 — Key OCT Imaging Features (Layer■Level)

- **Intraretinal cystoid spaces (IRF):** Hyporeflective, round pockets mainly in inner nuclear layer and outer plexiform layer.

- **Diffuse retinal thickening:** “Spongiform” appearance with loss of normal retinal layer definition.

- **Subretinal fluid (SRF):** Hyporeflective space beneath the neurosensory retina in more severe cases.

- **Hard exudates:** Hyperreflective foci, often located in outer plexiform layer.

- **Ellipsoid zone and ELM disruption:** Indicates photoreceptor injury → poorer prognosis.

- **Foveal contour changes:** Flattening or focal elevation depending on edema pattern.

- **Vitreomacular traction (VMT):** Occasionally contributes to persistent edema.

4 — Classification / Patterns of DME (OCT■Based)

- **Diffuse retinal thickening (DRT):** Spongiform swelling.

- **Cystoid macular edema (CME):** Presence of well■formed cysts.

- **Serous retinal detachment (SRD):** SRF without RPE detachment.

- **Mixed type:** Combination of the above.

- **Tractional / VMT■associated:** Structural traction contributes to edema persistence.

5 — Diagnosis

Diagnosis is based on:

- OCT showing intraretinal cysts, thickening, or SRF.

- Evidence of diabetic retinopathy on fundus examination.

- Symptoms: blurred central vision, fluctuating vision, difficulty reading.

6 — Treatment Overview (Detailed)

DME treatment is individualized based on OCT findings, visual acuity, systemic factors, and patient-specific considerations.

A. First■Line: Anti■VEGF Intravitreal Injections

These agents reduce vascular permeability and improve edema.

1. **Aflibercept (Eylea)**

- Dose: 2 mg (0.05 mL) intravitreal.

- Protocol: Monthly for 5 injections → then every 8 weeks or treat-and-extend.

- Particularly effective for patients with poor baseline vision.

2. **Ranibizumab (Lucentis)**

- Dose: 0.3 mg (US) or 0.5 mg (global) intravitreal.

- Protocol: Monthly until stable → then PRN or T&E.;

- Well-studied in DME with robust visual gains.

3. **Bevacizumab (Avastin)** (Off-label but widely used)

- Dose: 1.25 mg intravitreal.

- Cost-effective option; commonly used in resource-limited settings.

B. Steroid Therapy (for chronic or anti■VEGF non■responders)

Useful for inflammatory components of DME.

1. **Dexamethasone intravitreal implant (Ozurdex)**

- Provides sustained release.

- Effective for ~3–4 months; repeat dosing needed.

2. **Fluocinolone acetonide implant (Iluvien)**

- Long-acting (up to 36 months).

- For chronic, recurrent DME insufficiently responsive to other treatments.

Side effects of steroids: IOP rise, cataract progression → monitor closely.

C. Focal / Grid Laser Photocoagulation

- Historically first-line; now adjunctive.

- Used in non■center involving DME or when microaneurysms are focal sources of leakage.

- Helps stabilize edema rather than improve vision significantly.

D. Surgical Approaches

- **Vitrectomy** indicated for tractional DME or significant VMT.

7 — Systemic Management (Important for Chatbot)

DME outcomes heavily depend on systemic control:

- Tight blood glucose control (HbA1c optimization).
- Control blood pressure and lipids.
- Renal disease management.
- Lifestyle modifications (diet, exercise, smoking cessation).

8 — Patient Precautions & Advice

- Regular follow-up visits with OCT imaging are essential.
- Report sudden vision loss or new floaters immediately.
- Do not skip diabetes medications; coordinate with primary care.
- Understand that treatment often requires repeated injections; long-term therapy is common.

9 — Injection Procedure Precautions (Safety)

- Topical povidone-iodine is essential antisepsis.
- Sterile technique: gloves, mask, eyelid retraction.
- Avoid routine topical antibiotics before/after injection.
- Warn patients about endophthalmitis symptoms (pain, vision loss, redness).
- Mild irritation or foreign-body sensation is normal for 24 hours.

10 — Prognosis

- Anti■VEGF therapy improves or stabilizes vision in many patients.
- Poor prognostic markers include:
- Chronic edema
- Photoreceptor layer disruption
- Presence of large cysts or SRF
- Severe ischemia on angiography
- Early detection and consistent treatment improve outcomes.

11 — Decision Flow (For Chatbot Response Logic)

- OCT shows IRF/SRF with diabetic history → suggest active DME → needs retina specialist and anti■VEGF therapy.
- No center involvement and mild leakage → may be observed or treated with focal laser.
- Anti■VEGF non-responder → consider steroids or evaluate for tractional components.
- If VMT present → surgical opinion needed.

12 — KB Snippets (Ready for Embedding)

- “DME is swelling in the central retina caused by diabetes-related leakage. It creates intraretinal cysts visible on OCT.”
- “Most cases require anti■VEGF injections; some chronic cases respond better to steroid implants.”
- “Tight blood sugar and blood pressure control greatly improve DME outcomes.”

- “Report sudden vision loss immediately—may indicate worsening edema or hemorrhage.”

13 — Disclaimer

This information is educational only and not a substitute for personalized medical advice. Treatment plans vary; consult a retina specialist for individualized care.