

# Injectable Medications in Eye Care

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# Financial disclosures

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- No financial disclosures



# Injections by OD's

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- Allowed in 36 states
- 22 of those allow for counteraction of anaphylaxis only
- 14 allow for varying degrees of diagnostic and therapeutic use

# Types of injections

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- Subcutaneous
- Intramuscular
- Intravenous
- Periocular
- Intraocular
  
- Always ask about allergies!



# NBEO

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- Injections now a permanent NBEO Part III station
- Sterile technique
- IM
- IV
- Model arms only



# Sterile draw technique

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- Gloves
- Alcohol swab cleaning of vial top
- Always inject an amount of air in to vial first that is equal to amount of desired fluid removal: Vacuum sealed
- After draw, remove any air from syringe before use

# Sharps

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- All needles disposed of in a sharps container



# One hand scoop technique : NBEO

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- Needle used only for the drawing up of a fluid (a “fill” needle) to be capped (FL) using the “one hand scoop technique”
- Fill needles are large, 19 gauge

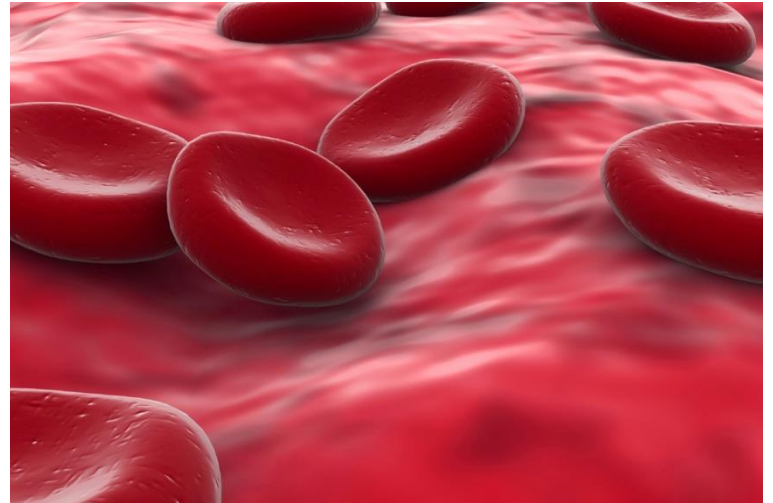




# Re-capping needles

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- Needles that have been used on people are never re-capped before discarding them
- High risk of “stick” with contamination



# Syringe basics

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- 1ml (TB)
- 3ML
- 5ML
- Larger (less common except for blood draws)



# Needles / Syringes

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# Needle basics

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- Bevel (angled slice)
- Gauge: larger number = smaller needle
- 19, 23, 25, 27, 30
- May have second # indicating length (inches): 27 ½ G





# General Injection sites

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- Subcutaneous
- Intramuscular
- Intravenous
- Intradermal



# Subcutaneous

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- Deposits medication below the skin
- Can use any site that is not over a bony structure and is free of large blood vessels and nerves
- Typical sites include the thigh, back of the arm, and abdomen
- CPT code 96372

# Subcutaneous technique

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- Clean site
- Pinch skin
- Insert needle at 90 degree angle, but tangential for chalazion / TB type
- Inject medication
- Release skin



# Subcutaneous technique

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# Subcutaneous

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- Medication absorbed more slowly when injected in this manner than with intramuscular or intravenous injections
- Requires small, thin needles which are short
- Used with insulin, anesthetics, PPD testing, copaxone
- Good for small doses of non-irritating solutions. Bad for larger volumes and irritating solutions

# Intramuscular

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- Deposits medication into muscular tissue free of major vessels and nerves
- Typically given in the deltoid or gluteus muscles ( outer buttocks )
- Much more rapid onset of action than SQ route due to the greater blood supply of the tissue
- Good for concentrated or oily substance
- Requires thick, long needles (epipen and obesity?)
- CPT code 96372

# Intramuscular technique

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- Clean site
- Pull skin taught
- Insert needle at 90 degree angle
- Inject medication



# Intravenous

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- Utilized in eye care for IVFA, ICG angiography, and laser assisted macular surgery (visudyne, etc. )
- Very rapid onset of action
- Greater chance of early onset allergic response
- Remember.....once a medication is injected by any means it can not be retrieved!

# IV injections: tools

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- Must first fill 3 or 5 CC syringe with fluorescein using large needle
- Then discard that needle and attach butterfly tubing: the shorter the better!

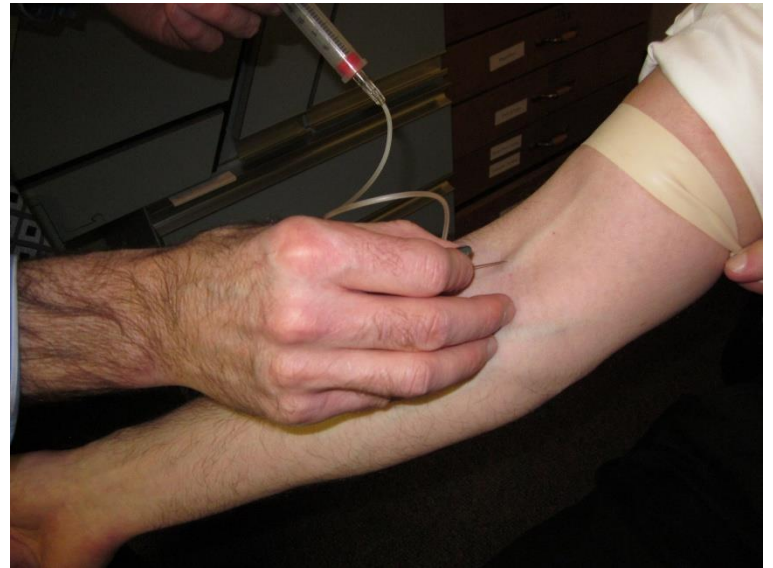
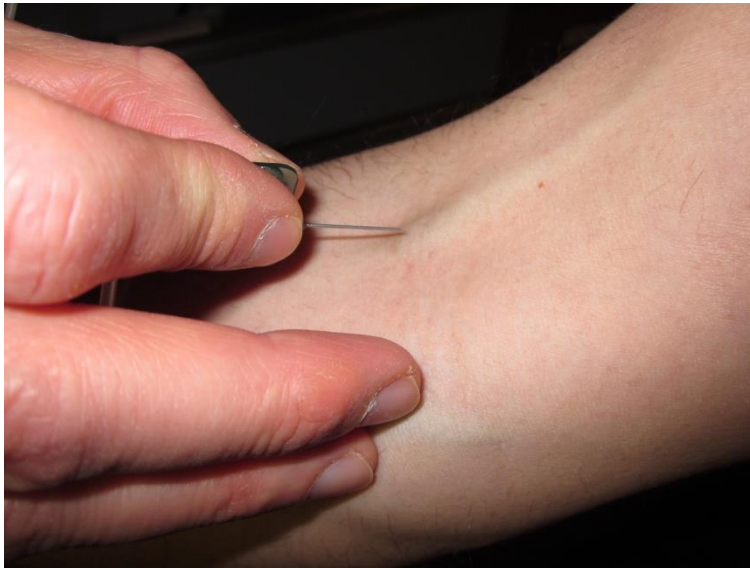
## IV Injections: technique

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- Place tourniquet on upper arm (downstream from injection site)
- Locate vein in antecubital space (preferred) or back of hand (if you must)
- With bevel up, inject butterfly needle (23 – 25 gauge) in to vein at an angle of around 30 degrees

# IV technique

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No good!

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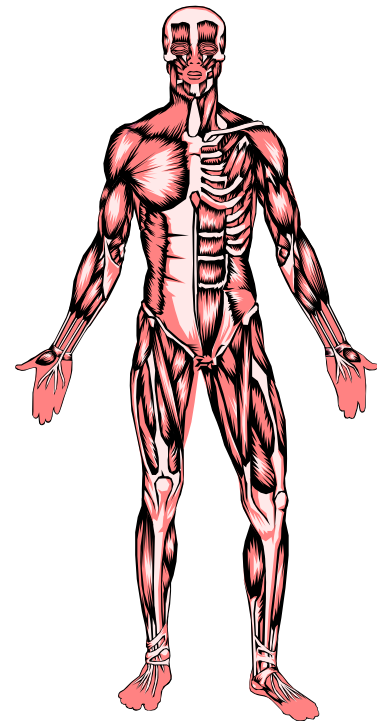




# IV Injections

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- When blood seen, draw back slightly on syringe to get blood flow in to tubing (saline vs. 10% dye vs. empty tubing\*)
- Remove tourniquet and inject 3-5 cc of dye depending upon %



# Periocular injections

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- Intralesional
- Subconjunctival
- Subtenons
- Peribulbar/local anesthetic blocks
- Specialty uses-botulinum toxin





# Intralesional injections

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- Utilized in the treatment of chalazia and less frequently pyogenic granulomas. Form of subdermal/SQ injection
- Inject steroids into the lesion to hasten resolution
- Typically will use kenalog 10 or 40 mg/ml (triamcinolone)



# Intralesional injection

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- Utilize a 1 cc (TB) syringe with a 27 or 30 gauge needle
- Bevel up
- Inject approximately .2 cc of steroid (usually kenalog) in to lesion
- Can do skin side or palpebral side; skin side more comfortable. Can't really pinch skin
- Lesion may be too hard, may have to go near it instead of in it

# Intralesional injections

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- Contraindications/adverse reactions include allergic responses and skin depigmentation with kenalog (infrequent-personal experience )
- Follow up in two weeks.....some lesions will require a second injection
- Billable procedure with its own CPT code 11900, 11901 if more than seven!

# Intralesional injection

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# Subconjunctival injections

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- Utilized to deliver high dose of long acting steroid or antibiotic to the anterior segment
- Main uses include steroid delivery in cases of recalcitrant inflammation or CME
- Can give antibiotic injection for severe corneal ulcers or in endophthalmitis cases



# Subconjunctival injections

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- Adverse reactions include allergic response and increased IOP with steroids
- IOP elevation can be difficult to control because med can not be “discontinued” like with topical steroids
- Can occur weeks to months after the injection
- Can occur with long history of not pressure responding to topical steroids
- Dexamethasone or Durezol trial?



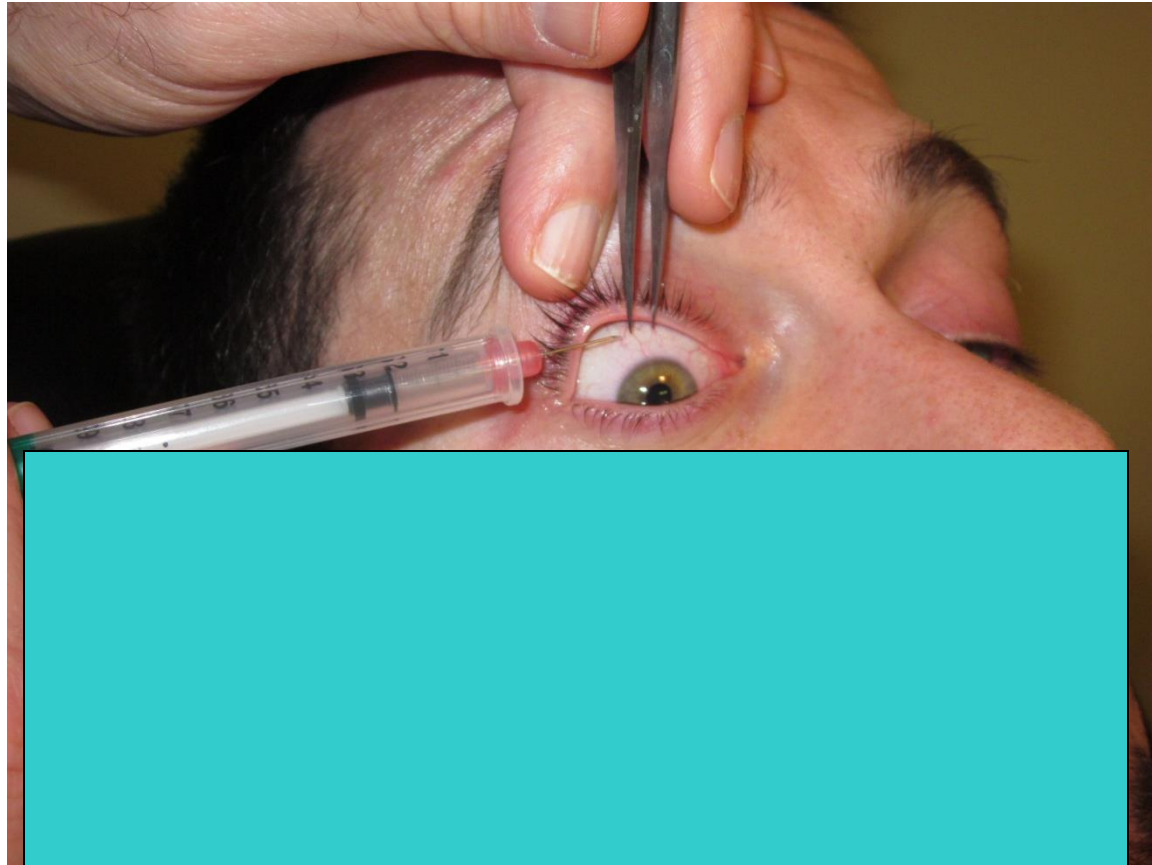
# Subconjunctival injections

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- Perform on bulbar conjunctiva under upper lid or lower lid (hides any subconj. heme)
- Use jewelers / colibri forceps to tent conjunctiva and create potential space
- Insert small gauge needle (27 or 30) on a 1 cc syringe bevel up in to space, release conjunctiva, and inject .1-.2 cc of medication
- CPT code 68200

# Subconjunctival injection

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# Colibri forceps

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# Subtenons injections

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- Similar to subconjunctival in uses and indications
- Only difference in procedure is that the needle penetrates Tenon's capsule
- Indications include pars planitis or other forms of intermediate uveitis and CME
- In the majority of cases this technique holds little advantage over a more simple subconjunctival injection
- New glaucoma meds?



# Subtenons injection

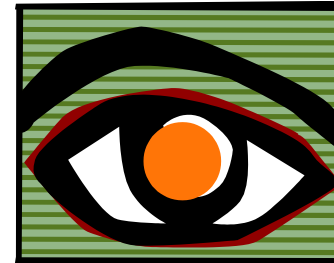
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- Utilizing small needle (27 or 30 gauge), insert needle in to lower fornix where bulbar and palpebral conjunctiva meet
- Move needle laterally and observe globe to ensure no movement
- Inject approximately .2 cc
- CPT code 67515

# Intravitreal injections

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- Generally not performed by OD's
- Kenalog, Lucentis, Avastin, Macugen, Eylea, Jetrea
- Many uses



# Anesthetic application

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- Done to prepare for surgical procedures such as lid lesion removal, chalazion excision, etc.
- Often give block that numbs the entire lid





# Specialty uses-Botulinum

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- Botulinum toxin is derived from the organism that is responsible for botulism
- It is a very powerful neurotoxin and its use results in paralysis of muscles
- It is utilized in the management of blepharospasm and strabismus
- Also used by plastic surgeons and dermatologists to temporarily remove wrinkles



# Botulinum

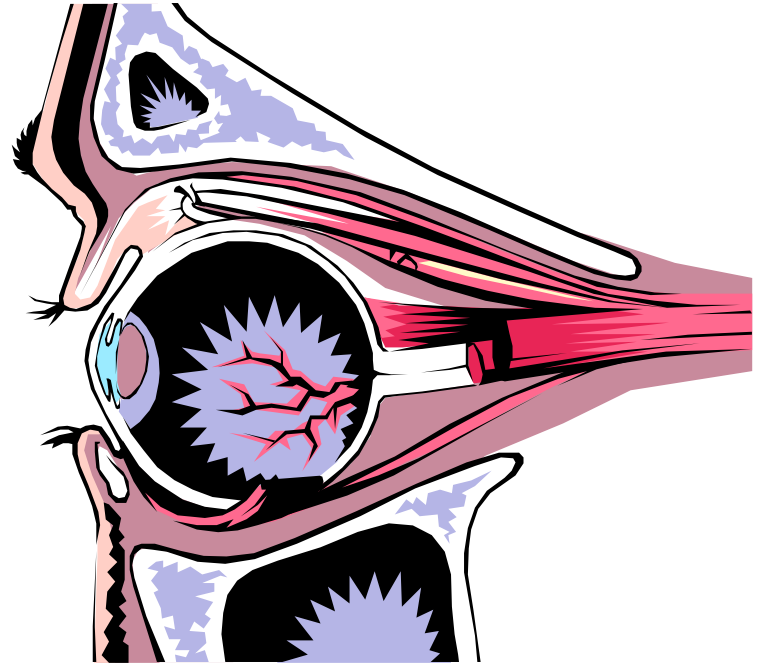
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- In blepharospasm cases, it is injected SQ at several locations to paralyze affected muscles and eliminate or decrease the spasm
- Has to be repeated every few months
- Complications include ptosis and exposure problems secondary to incomplete lid closure

# Botulinum

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- In strabismus, the injection is directed into the muscle to be weakened (the overacting muscle)





# Pharmacokinetics

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- Absorption dependent upon several factors.....
- 1) route of administration
- 2) concentration of medication
- 3) solution / suspension (sol. Is more rapidly absorbed and shorter acting)



# Steroids

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- One of the most common medications delivered via injection when it comes to eye care
- Uses include chalazia, recalcitrant iritis, CME, pars planitis, and others



# Injectable steroids

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- Three main injectable steroids
- 1) Dexamethasone
- 2) Kenalog (Triamcinolone)
- 3) Depo-medrol  
(methylprednisolone)



# Dexamethasone

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- Dexamethasone 4.0 or 2.0 mg/ml
- Water soluble and very short acting
- Clear solution, not milky suspension like kenalog
- Duration of action is often too short to be utilized effectively with uveitis or long-standing chalazia

# Kenalog

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- Triamcinolone 10 or 40 mg/ml
- Suspension: slow absorption and moderately long acting
- Great choice for chalazia, sub-conjunctival / sub-tenons treatment of uveitis (usually 40 mg/ml)
- Watch for IOP increase and PSC!

# 10 mg/ml Kenalog

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# Depo-medrol

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- Depo (long acting) version of methylprednisone
- Very slowly absorbed and very long acting
- Duration of action is often too long to be practical ( increased IOP, etc)

# Lucentis / Avastin

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- Both designed to fight cancer, only Lucentis FDA approved for the eye
- Both work by blocking VEGF and stopping vessel growth
- Avastin very cost effective compared to Lucentis
- AMD, CRVO, DBM other causes of CNV, etc. What about geographic atrophy?
- Also Eylea (VEGF trap)

# Intravitreal injections

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- Not routinely performed by OD's right now in any state
- What about nurses? Eye 2014; 28 (6):734-740. Retinal specialists in England trained NP's to give intravitreal shots. Out of 4000 shots, the only complication was SCH (5.7%)

# Contrast dyes

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- Fluorescein and Indocyanine Green
- Fluorescein is an inert, vegetable based dye that is yellow-orange in color (10% or 25%)
- Absorbs blue wavelengths and fluoresces at 520-530 nm
- Inject 3cc of 25% or 5cc of 10%



# Fluorescein

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- Leaks from all vessels except those in the central nervous system (retina)
- 80% binds to plasma proteins leaving only 20% free to fluoresce
- Allergic reactions are rare but can cause hives (.05%) and even death (.00045%). Must have injectable epinephrine on hand



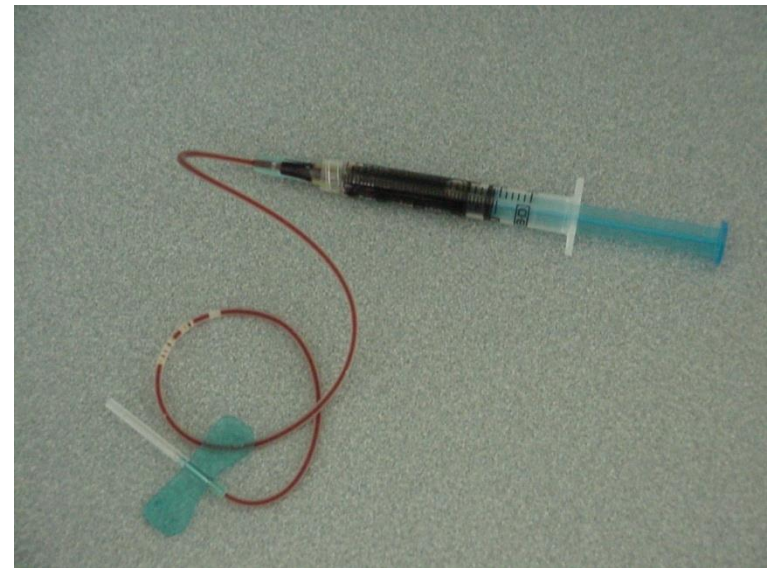
# Fluorescein

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- Nausea in 15%, vomiting in a small number of those
- Contraindicated in pregnancy or nursing
- Yellowing of skin and urine
- Extravasation of dye causes local pain
- IVFA CPT code of 92235

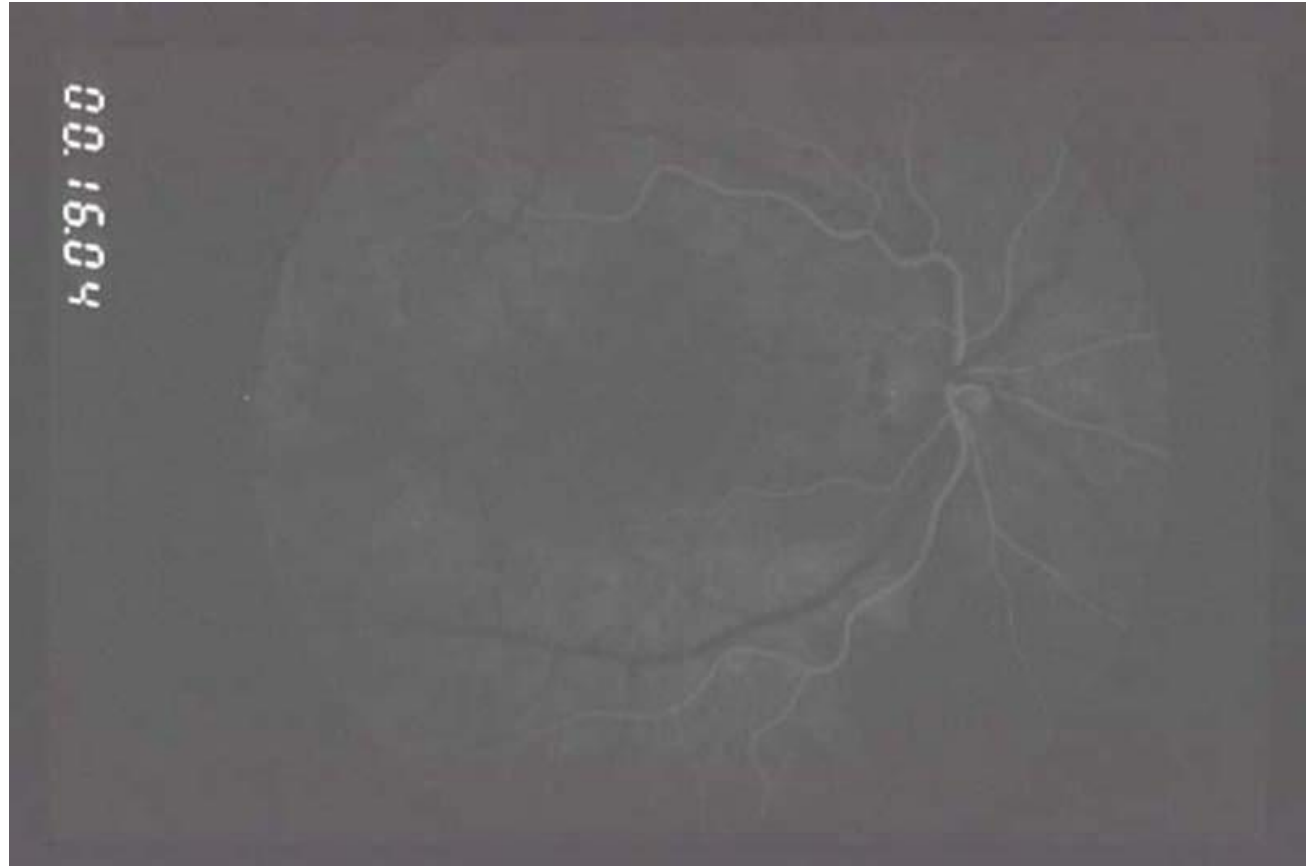
# Fluorescein Dye

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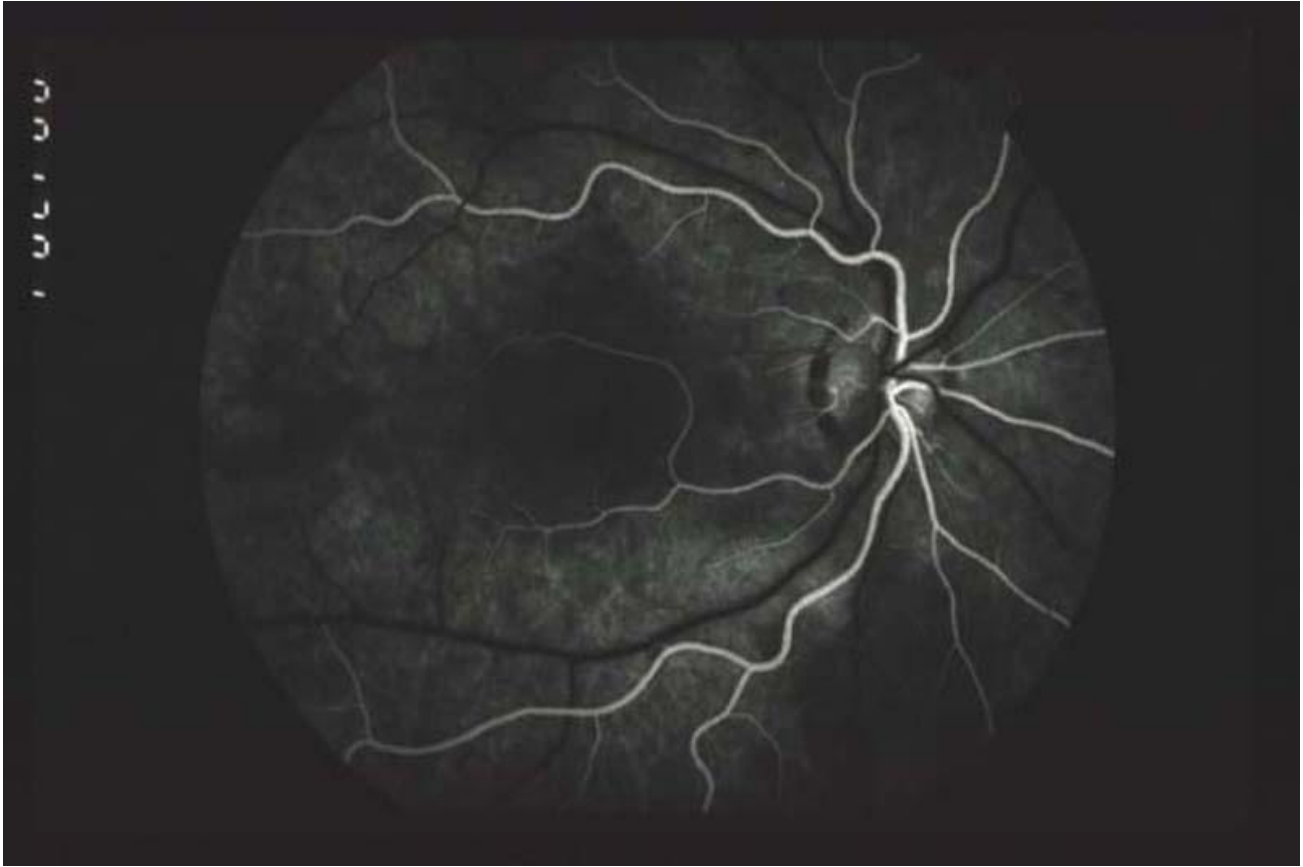


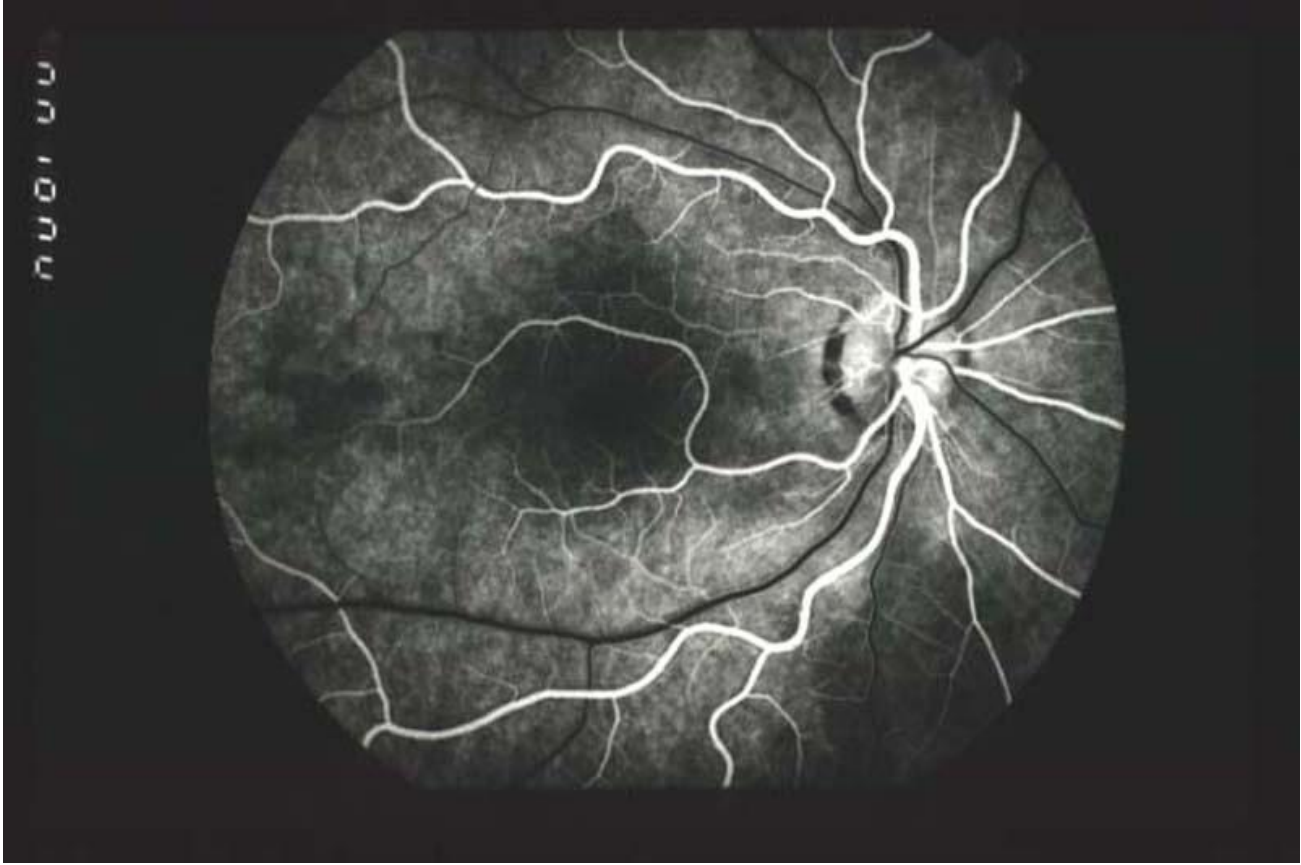
# Normal IVFA

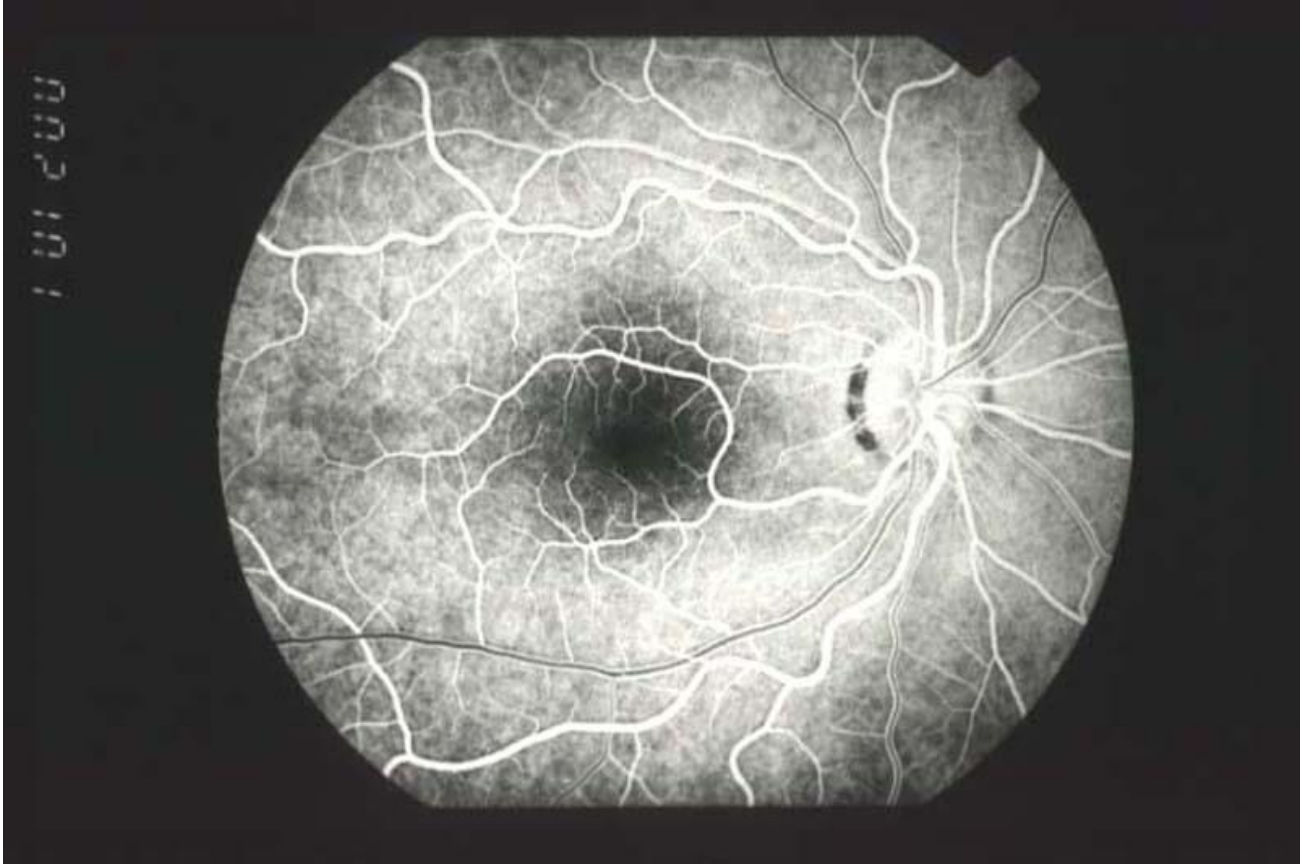
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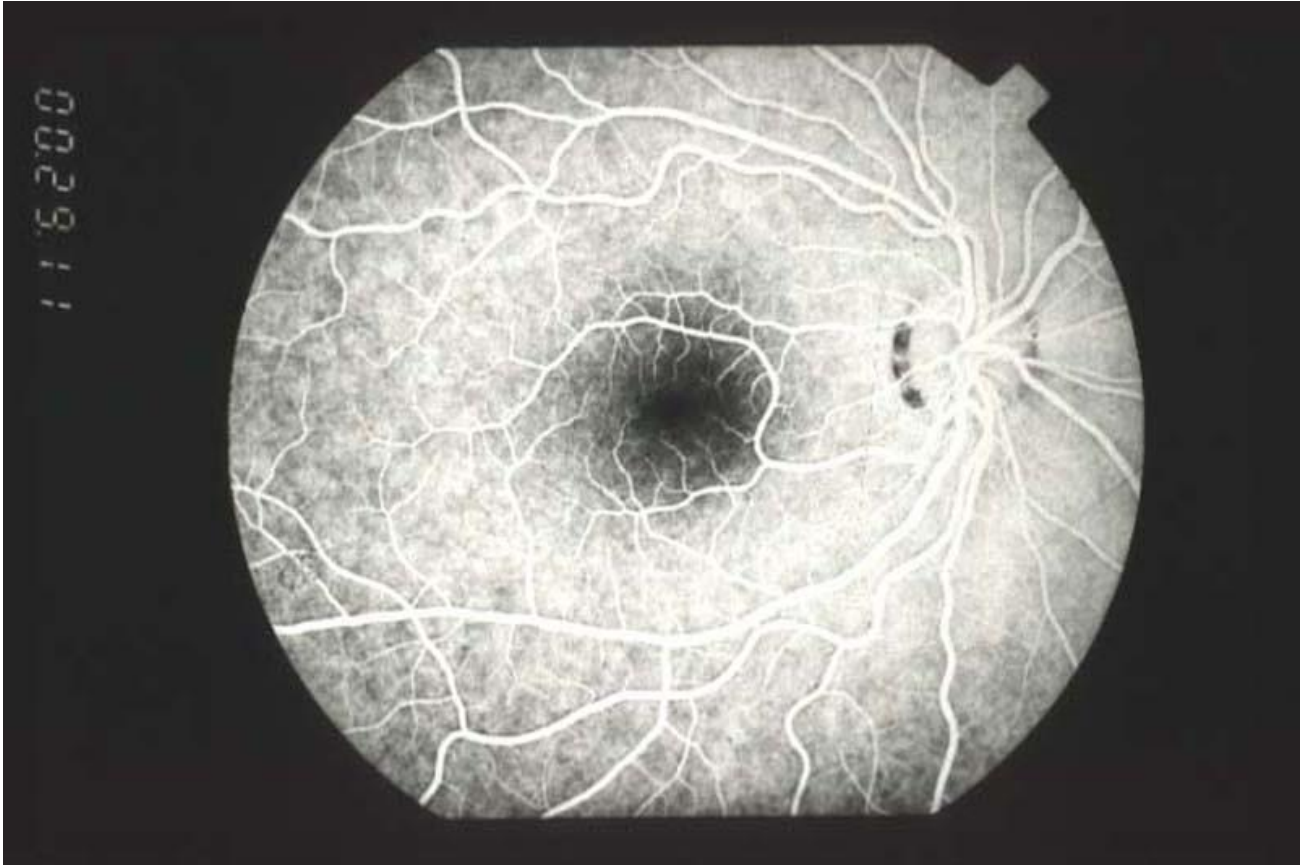


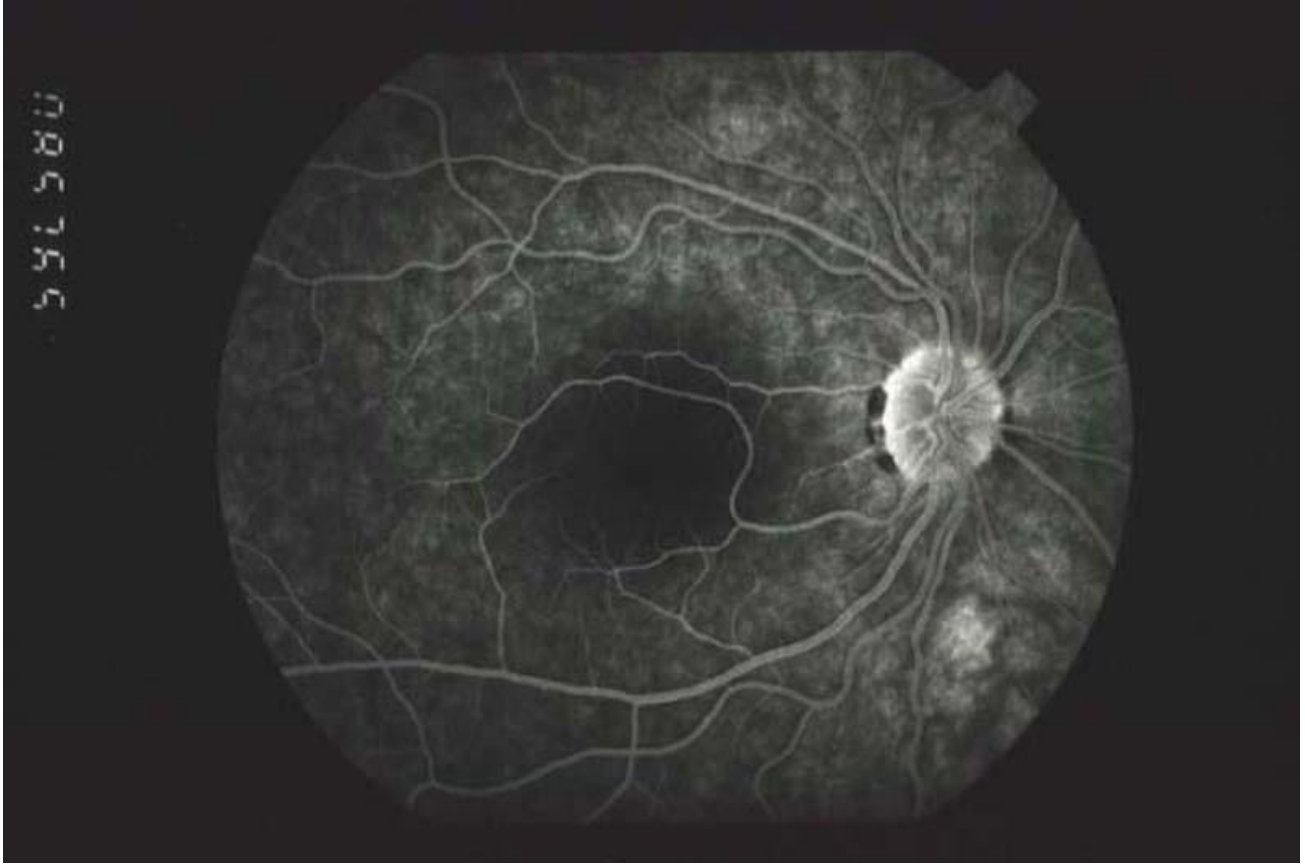






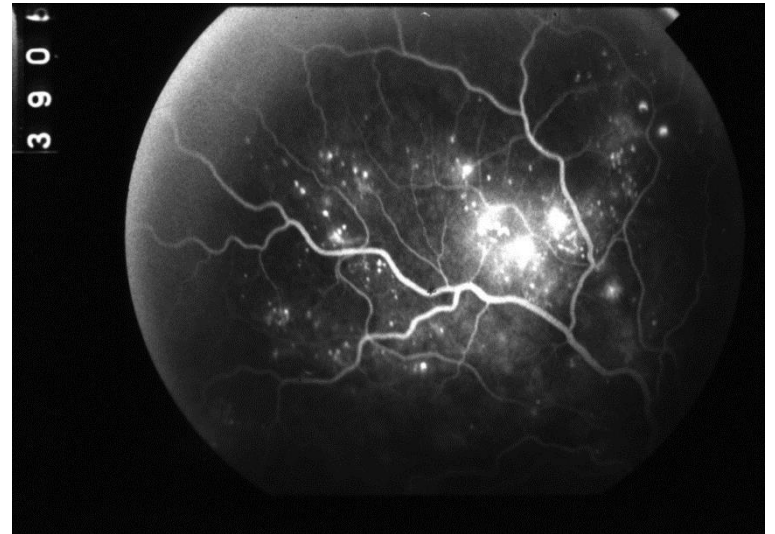
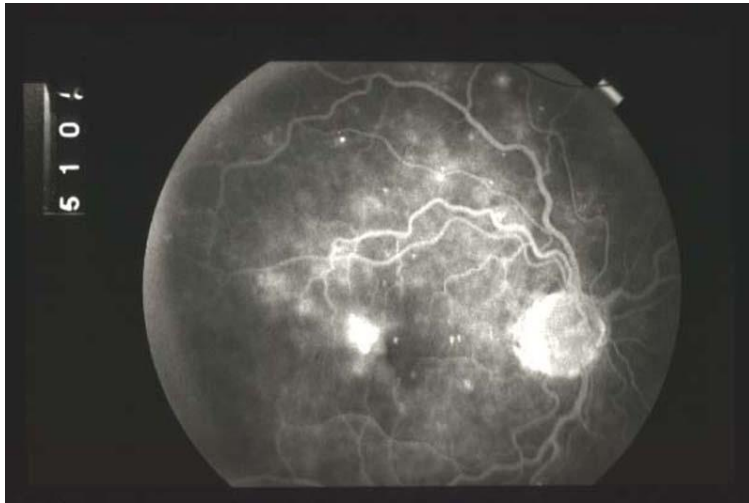






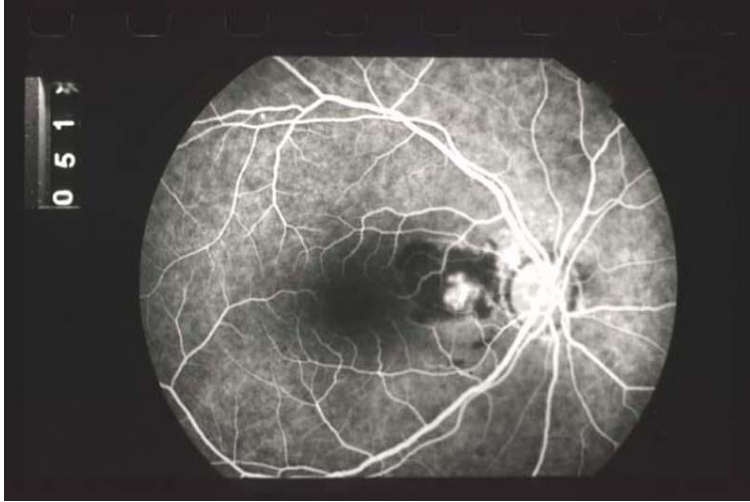
# Diabetic edema

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# SRNVM

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# Indocyanine Green

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- Water soluble tricyanocyanine dye (5% sodium iodide) that is better suited for choroidal pathology
- 98% binds to plasma proteins
- Contraindicated in pregnancy, lactation and allergy to iodine or shellfish but lower adverse reaction rate than fluorescein dye





# Indocyanine Green

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- Iodine free version known as infracyanine 25 can be formulated but is only stable for 12 hours
- Used for choroidal pathology: does not leak as readily from choroidal vessels and RPE blocks the fluorescence less
- CPT code 92240

# Anesthetics

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- Utilized to prep for lid lesion removal, etc.
- Injected subcutaneously/intradermally at the site (not really any subcutaneous space on the eyelid)
- Marcaine .25% and Lidocaine (Xylocaine) .5%, 1.0%, or 2% solutions with or without 1:100,000 epinephrine
- Epi decreases bleeding and loss of effect through systemic absorption (thus approximately doubling the duration of action)

# Anesthetics

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- Can have allergic response, but Marcaine and lidocaine are amides, not esters like novacaine or tetracaine. No cross allergy
- Other side effects include ptosis if injected in to Mueller's muscle
- Use .5 to 1cc (ml) of medication
- Inject while withdrawing needle to spread coverage



# Anesthetics

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- Injection stings! Acidic
- Mix one part sodium bicarbonate with 9 parts anesthetic to significantly decrease the stinging



# Anesthetics: Lidocaine

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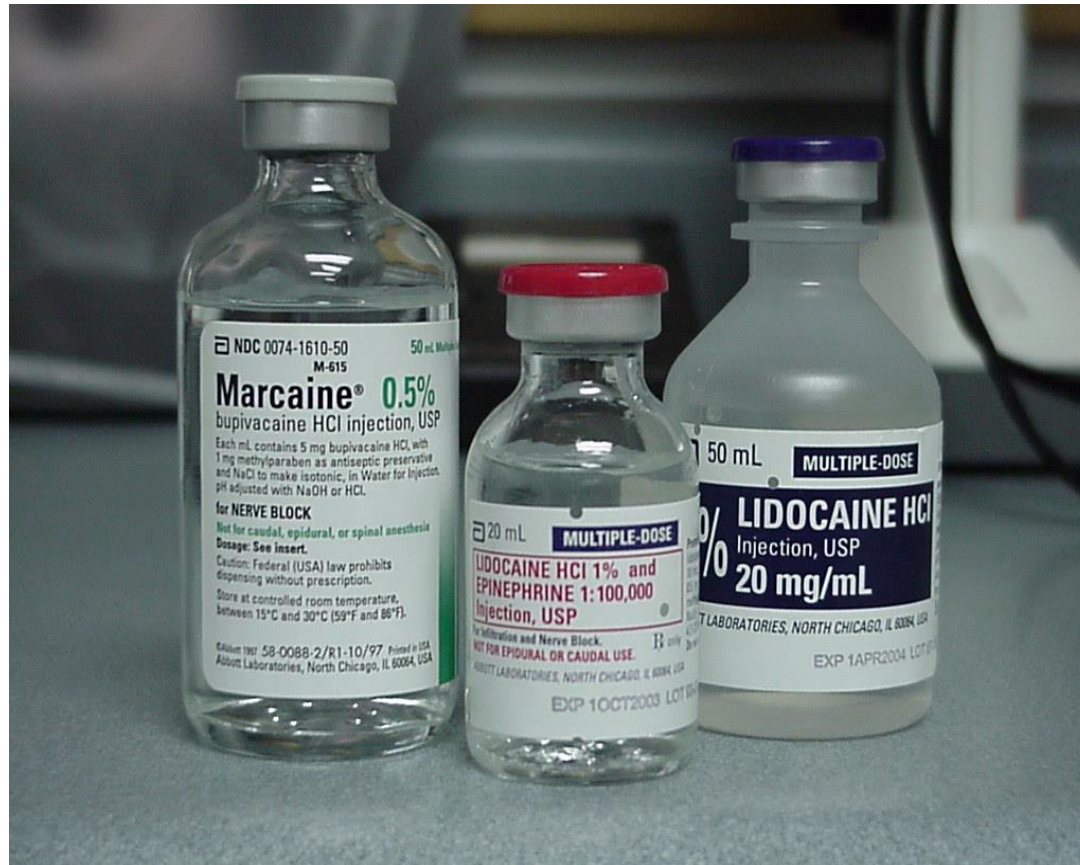
- Fast acting, about one minute or less
- Duration of 30-60 minutes without epinephrine
- Most commonly used for eyelid anesthesia

# Anesthetics: Bupivacaine (Marcaine)

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- Onset about 5 minutes
- Duration up to 2 hours
- Less commonly used

# Anesthetics



# Botulinum toxin

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- Purified neurotoxin complex made from Botulinum toxin type A (Clostridium Botulinum ) : Botox
- Comes in 100 unit vials, powder that is reconstituted with saline
- Used for blepharospasm, strabismus, cosmesis
- Side effects include ptosis, exposure
- Must be used within a few hours



