Retinal Toxicity

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Where is it toxic?

- Retina and RPE – pigment changes/bulls-eye
- Vascular – CWS, heme, CRVO, arterial occlusion
- CME – petaloid or OCT findings
- Retinal folds – AC narrows vit traction on macula
- Crystalline retinopathy – crystals
- Uveitis - snowbanks/balls, cell/flare, chorioretinal exudates
Retinal/RPE Toxicity

- Chloroquine (Aralen) & Hydroxychloroquine (Plaquenil)
- Thioridazine (Mellaril) –
- Quinine - <2g a day recommended, cinchonism
- Cisplatin/carmustine- for glioma/breast ca, profound vision loss in 65%, more rare if monotherapy
- Clofazimine for leprosy/lupus/psoriasis, 200mg/day, corneal crystals, bulls eye, mild vision loss
- Deferoxamine – vitelliform like/greying of macula
- Isotretinoin - impairment of dark adaptation
- Steroid vehicles – BAK, Celestone, Soluspan
Chloroquine/Hydroxychloroquine

- Binds to melanin in RPE
- Early signs
  - Bilateral paracentral VF changes best seen with red test object
  - Subtle granular depigmentation of paracentral RPE
- Late signs
  - Bull’s eye maculopathy
  - Widespread retinal atrophy
  - +/- corneal verticillata
Chloroquine/Hydroxychloroquine

- Hydroxy risk low if less than 6.5 mg/kg/day
- Chloro risk low if less than 3 mg/kg/day
- Higher risk if
  - Obesity
  - Renal or liver disease
  - Older (60 years)
  - High cumulative dose 500g-800g for hydroxy but low daily dose is protective
- May occur/progress despite these rules even after cessation
Chloroquine/Hydroxychloroquine

- Evaluation – complete exam, color vision, red amsler, HVF, for baseline and f/u
- Fundus Autofluorescence and multifocal ERG useful
Plaquenil:
Now use 10-2HVF and one of: SD-OCT, ERG, or, Autofluorescence. At start of medicine and then annually five years after use.
Toxicity / Normal

A

First Eye

Right Eye

Left eye

Temporal Field

Nasal
Phenothiazines

- Chlorpromazine (Thorazine) and thioridazine (mellaril) also bind to melanin granules
- Chlorpromazine pigments all over eye but rarely causes retinal toxicity
- Thioridazine can be debilitating in weeks.
Thioridazine

- Toxicity rare at doses less than 800 mg/day
- Initial complaint of blurred vision then VF loss and night blindness
- Coarse retinal pigment stippling in the posterior pole
- Nummular pattern of involvement resembles
  - Choroideremia
  - Bietti crystalline corneoretinal dystrophy
- Retina may continue to decompensate after stopping
Accutane (isotretinoin)

- Poor night vision
- Abnormal dark adaptation on ERG
- Usually repetitive courses
- One of the few reversible effects
Deferoxamine

- Pigment changes
- Macular edema
Vascular Damage

- Quinine sulfate
- Aminoglycoside - Gent > Tobra > Amikacin
- Cisplatin
- Interferon for hepatitis/melanoma/renal cell carcinoma: cws, cme, crvo
- Ergot alkaloids
- Talc – IV use of oral drugs, sickle-cell appearance late
- Phenylpropanolamine
- Oral Contraceptives - CRVO
Quinine – nerve pallor, art. atten antimalarial (2nd line) or tonic water

- Cinchonism seen after overdose or therapeutic dose
  - Vision, hearing, cardiac neuro, GI

- Rare cases of allergy after consuming tonic water
Gentamicin

- Macular necrosis
- Especially if intraocular
Discuss findings with treating physician. Interferon
CXR for pulmonary fibrosis, BP, EKG, eval for organ damage
Consider FA, may need prp or eventual rd repair
CME

- Epinephrine
- Latanoprost
- Nicotinic acid
CME - Niacin

- Benefit:
  - Proven to lower cholesterol and triglycerides

- Side effects:
  - CME at 3g/day dose; resolves within 2 weeks of D/C
  - Dry eye, eyelid edema, proptosis
What are 3 other causes of CME besides surgery, vascular damage or drugs?
Goldman-Favre
Retinitis Pigmentosa
X-linked retinoschisis
Uveitis

- Rifabutin (antimicrobial)
- Biphosphonates (inhibit bone resorption)
- Sulfonamides (UTI treatment)
- Diethylcarbamazine (antifilarial)
- Oral contraceptives (hormonal agents)
- Metipranolol
- Glucocorticosteroids
- Cholinesterase inhibitors
- Antibiotics
- Urokinase (plasminogen activator)
- Cidofovir (cytomegalovirus treatment)
- Bacille Calmette-Guerin vaccine (BCG)
- Tuberculin (purified protein derivative) skin test
- Influenza vaccine
Drugs possibly associated with uveitis

- Ibuprofen
- Reserpine
- Quinidine
- Trifluoperazine
- Betaxolol
- Measles vaccine
Uveitis - Pneumonic

- Really: Rifabutin
- Cruddy: Cidofovir
- Meds: Metipranolol
- Cause: Contraceptives
- Snow: Sulfa (steroids)
- Balls: Bisphosphonates
Retinal folds

- Sulfa
- Hydrochlorothiazide
- Acetazolamide
- Triamterene
- Ethoxyzolamide
- Metronidazole
- Chlorthalidone
Crystalline Retinopathy
Crystalline Retinopathy-Systemic

- Systemic disease
  - Primary hereditary hyperoxaluria
  - Cystinosis
  - Secondary oxalosis (CRF, dialysis)
  - Sjogren-Larsson syndrome
Crystalline Retinopathy - Ocular

- Ocular
  - Bietti Crystalline dystrophy
  - Calcific drusen
  - Gyrate atrophy
  - Retinal telangiectasia
Crystalline Retinopathy-Drugs

- Drug Induced
  - Tamoxifen
  - Canthaxanthine
  - Talc
  - Nitrofurantoin
  - Methoxyflurane anesthesia or Ethylene glycol ingestion leading to secondary oxalosis
Tamoxifen

- Rare toxicity at usual dose
- Crystalline deposits or macular edema
  - 200 mg daily
  - 100g cumulatively
Canthaxanthine

- Carotinoid found in pink-fleshed fish
- Artificial suntan
- Deposits in macular retinal layers
  - May decrease V.A.
  - 37g dose: toxic ½ the time
  - 60g dose: always toxic
  - Slowly reversible
Misc

- Digitalis/Digoxin
- Viagra
- Methanol
Colors

- **Digitalis** – xanthopsia - yellow (also blurred vision or paracentral scotoma) reversible

- **Sildenafil** – blue - occurs in 50% ingesting 100 mg
Methanol: greater than 20 mg/dl.
Tx: dialysis, ethanol/ fomepizole
Thank You