Systemic drugs and ocular toxicity: Acquired optic neuropathy

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Hmm…Decreased acuity, decreased color vision, and a central/ceco-central VF defect. Putting it all together, what specific portion of the optic nerve is being affected in an acquired toxic optic neuropathy?
The papillomacular bundle (PMB)
Acquired optic neuropathy

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The papillomacular bundle (PMB)

Why are fibers of the PMB affected preferentially?

Think of the PMB fibers as the canary in the coal mine. These fibers are small, have high metabolic activity rates, and are unmyelinated. Taken together, these characteristics make them highly vulnerable to toxins.
Systemic drugs and ocular toxicity:
Acquired optic neuropathy--The ‘Big 8’

Hints forthcoming…
**Systemic drugs and ocular toxicity:**

*Acquired optic neuropathy--The ‘Big 8’*

- These four are used primarily to treat TB
  - These two are ‘big gun’ antibiotics
    - This is a ‘big gun’ acne med
    - This is an immunosuppressive
**Systemic drugs and ocular toxicity: Acquired optic neuropathy--The ‘Big 8’**

- Ethambutol
- Rifampin
- Isoniazid
- Streptomycin
- Linezolid
- Chloramphenicol
- Isotretinoin
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As you consider this list, what factoid jumps off the screen at you? Most of the offending agents are **antibiotics**
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**What is it about antibiotics that makes them more likely to cause a toxic optic neuropathy?**

Cells that are highly active metabolically (such as the ganglion cells comprising the PMB) typically contain a lot of mitochondria. Recall that mitochondria are like ‘little bacterium’ living within cells. (This is more than a metaphor--mitochondrial DNA are similar to that of certain bacterial species. One theory holds that mitochondria originated as independent prokaryotes that entered eukaryotic cells early in evolution.)

Because they share many features with bacteria, mitochondria can be vulnerable to the effects of antibiotics. Thus, mitochondrial-rich tissues (such as the PMB) are at risk for antibiotic-related injury.

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Does nutrition status play a role in optic neuropathy secondary to drug toxicity?
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Does nutrition status play a role in optic neuropathy secondary to drug toxicity? Yes. Marginal nutritional status makes the PMB fibers vulnerable to damage at drug levels that otherwise might not be significant. Given this, any pt with a suspected toxic optic neuropathy (or any bilateral optic neuropathy, for that matter) should be asked about their dietary habits and relevant GI history.
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Which dietary components are thought to be especially critical in this regard?
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What dietary habits place a pt at risk?
- Strict veganism
- Fad diets
- Eating disorders

(There are plenty of others, of course)
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*Because they are so closely associated, *M avium* and *M intracellulare* are collectively referred to by what term?*
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25 mg/kg/d:
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How (ie, via what system) is ethambutol cleared by the body?
Renally

Does impaired renal function increase the risk of ethambutol optic neuropathy? 
Yes

What parameter of renal function is relevant; ie, what measure of renal function should be assessed in this regard?
Glomerular filtration rate (GFR)
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