

OPTOMETRIC CLINICAL PRACTICE RECOMMENDATIONS FOR MONITORING OCULAR TOXICITY OF SELECTED MEDICATIONS

Drug Classification & Generic (Brand Name)	Normal Therapeutic Dosage	Potential Visual or Sight Threatening Complications	Clinical Management Recommendations
<p>Anti-Arrhythmics ¹⁻¹⁸</p> <p>amiodarone (Pacerone, Cordarone)</p> <p>digoxin (Lanoxin)</p>	<p>600 – 800 mg QD for 1 month then 400 mg QD thereafter</p> <p>Depends upon blood concentration. Normal starting range 0.125 mg to 0.25 mg QD</p>	<p>Corneal degeneration, corneal depositions, photophobia, cataract, optic neuropathy, optic neuritis, papilledema</p> <p>Xanthopsia (Yellow vision), amblyopia</p>	<p>Initial Baseline Evaluation: Comprehensive eye examination,* detailed biomicroscopy, screening visual field, Amsler grid, color vision (blue-yellow, red-green)</p> <p>Patient Instructions: Weekly home Amsler grid to detect optic nerve involvement from amiodarone</p> <p>Recommended Follow-up Intervals/Testing: Every 6 months in first year of therapy, then annually thereafter or on an as-needed basis depending on clinical findings. Repeat visual acuity, screening visual field, Amsler grid, color vision, detailed biomicroscopy, funduscopy. Central threshold visual field, fundus photography for suspected optic neuropathy.</p> <p>Therapeutic Intervention/Management: Report these reversible adverse ocular side effects to cardiologist and/or primary care provider. Amiodarone most likely to result in corneal depositions with mild visual acuity reduction and photophobia. Protective sunwear may be indicated for photophobia. Digitalis toxicity may result in reduced visual acuity/amblyopia and color vision disturbance.</p>
<p>Anti-Malarial ^{4-10, 18-26}</p> <p>chloroquine (Aralen)</p> <p>hydroxychloroquine (Plaquenil)</p>	<p>500 mg QD</p> <p>200 - 400 mg QD</p>	<p>Blurred vision, headache, accommodative dysfunction, nyctalopia, scotomata, phototoxicity, vortex keratopathy, irreversible retinal damage in patients on long-term high dose therapy (e.g., Bull's eye maculopathy)</p>	<p>Initial Baseline Evaluation: Comprehensive eye examination,* central threshold visual field, Amsler grid, color vision testing (blue-yellow), fundus photography</p> <p>Patient Instructions: Weekly home Amsler grid to detect maculopathy</p> <p>Recommended Follow-up Intervals/Testing: Every 6 months repeat visual acuity, central threshold visual field, Amsler grid, color vision testing, funduscopy. Repeat fundus photography periodically, as indicated.</p> <p>Therapeutic Intervention/Management: Report adverse ocular side effects to rheumatologist and/or primary care provider. Protective sunwear to reduce risk of ocular phototoxicity. Eyeglasses as needed for blurred vision and accommodative dysfunction. Electroretinogram (ERG) testing is optional; may consider if clinical findings are progressive, equivocal or unreliable.</p>

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<p>Anti-Rheumatologic ^{3-10, 26-32} aurothiogluco (Solganal)</p> <p>hydroxychloroquine (Plaquenil)</p> <p>methotrexate (Methotrexate)</p>	<p>Topical ointment, apply as directed</p> <p>200 - 400 mg QD</p> <p>15 mg – 30 mg Q 5 to 7 days</p>	<p>Visual disturbances, conjunctivitis, gold deposits in ocular tissues, keratopathy, iritis, Guillian Barre (CN VII palsy), retinopathy secondary to blood dyscrasia, disc edema secondary to encephalopathy, non-arteritic ischemic optic neuropathy (Toxicity greatest after 300-500 mg).</p> <p>See Anti-Malarial section.</p> <p>Visual disturbances, ocular irritation, retinopathy secondary to blood dyscrasia, non-arteritic ischemic optic neuropathy.</p>	<p>Initial Baseline Evaluation: Comprehensive eye examination,* detailed biomicroscopy, screening visual field, Amsler grid, color vision (blue-yellow, red-green), fundus photography</p> <p>Patient Instructions: Weekly home Amsler grid testing to detect optic nerve involvement</p> <p>Recommended Follow-up Intervals/Testing: Every 6 months repeat visual acuity, screening visual field, Amsler grid, funduscopy. Central threshold visual field for suspected optic neuropathy, repeat fundus photography periodically, as indicated. Annual comprehensive eye examination.*</p> <p>Therapeutic Intervention/Management: Consult rheumatologist and/or primary care provider if evidence of retinopathy and/or optic neuropathy. Consult neurologist and/or primary care provider for cranial nerve VII palsy secondary to Guillian Barre that may require neuroimaging studies and hospitalization. Prescribe ocular lubricants as indicated. Consider neurologist or neuro-ophthalmologist consultation for possible neuroimaging study of brain for suspected disc edema secondary to encephalopathy.</p> <p>See Anti-Malarial section.</p> <p>Initial Baseline Evaluation: Comprehensive eye examination,* detailed biomicroscopy, screening visual field, Amsler grid, color vision (blue-yellow, red-green), fundus photography</p> <p>Patient Instructions: Weekly home Amsler grid testing to detect optic nerve involvement</p> <p>Recommended Follow-up Intervals/Testing: Every 6 months repeat visual acuity, screening visual field, Amsler grid, funduscopy. Central threshold visual field for suspected optic neuropathy. Repeat color vision and fundus photography periodically, as indicated. Annual comprehensive eye examination.*</p> <p>Therapeutic Intervention/Management: Consult rheumatologist and/or primary care provider if evidence of retinopathy and/or optic nerve involvement. Consider electroretinogram (ERG) testing for unexplained visual acuity reduction.</p>

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<p>Antipsychotic ^{3-10, 29-50} chlorpromazine (Thorazine)</p> <p>haloperidol (Haldol)</p> <p>lithium (Eskalith, Lithobid)</p>	<p>100 mg – 200 mg QD (800 mg dosing is not uncommon to patients with mental illness)</p> <p>Up to 10 mg QD</p> <p>450 mg extended release Q AM then 900 mg QHS (1350 mg daily)</p>	<p>Blurred vision, accommodative dysfunction, cataract, scleral icterus, facial movement/tics secondary to tardive dyskinesia, pupillary miosis and mydriasis, pigmentation deposition on the lens and cornea (toxicity greatest at dosage > 300 mg daily), corneal epitheliopathy, retinopathy secondary to blood dyscrasia, pigmentary retinopathy, transient ischemic attack (TIA) from hypotensive effects.</p> <p>Blurred vision, accommodative dysfunction, oculogyric crisis (eyeballs fixed in position for hours), facial movement/tics secondary to tardive dyskinesia, headache, hallucination, cataract and pigmentary retinopathy – rare.</p> <p>Blurred vision, myokymia, scotomata, downbeat nystagmus, hallucination, transient ischemic attack (TIA) secondary to syncopal episodes, myasthenia gravis, proptosis/exophthalmos secondary to thyroid dysfunction, disc edema</p>	<p>Initial Baseline Evaluation: Comprehensive eye examination,* detailed biomicroscopy, central threshold visual field, Amsler grid, color vision (blue-yellow), fundus photography</p> <p>Patient Instructions: Weekly home Amsler grid to detect maculopathy</p> <p>Recommended Follow-up Intervals/Testing: Every 6 months repeat visual acuity, central threshold visual field, Amsler grid, color vision, funduscopy. Repeat fundus photography periodically, as indicated.</p> <p>Therapeutic Intervention/Management: Report adverse ocular side effects to psychiatrist and/or primary care provider. Protective sunwear to reduce risk of ocular phototoxicity. Eyeglasses as needed for blurred vision and accommodative dysfunction. Electroretinogram (ERG) testing is optional; may consider if clinical findings are progressive, equivocal or unreliable. Transient ischemic attacks (TIAs) may warrant consultation for vascular work-up.</p> <p>Initial Baseline Evaluation: Comprehensive eye examination*</p> <p>Recommended Follow-up Intervals/Testing: Annual comprehensive eye examination.* Dependent on ocular signs, symptoms and other clinical findings for more frequent periodic care.</p> <p>Therapeutic Intervention/Management: Report adverse ocular findings to psychiatrist and/or primary care provider. Eyeglasses for blurred vision and accommodative dysfunction, as indicated.</p> <p>Initial Baseline Evaluation: Comprehensive eye examination,* central threshold visual field, Amsler grid, color vision (blue-yellow, red-green), fundus photography.</p> <p>Patient Instructions: Weekly home Amsler grid testing to detect optic nerve involvement</p> <p>Recommended Follow-up Intervals/Testing: Every 6 months repeat visual acuity, Amsler grid testing, ocular alignment, funduscopy. Repeat central threshold visual field, as indicated.</p> <p>Therapeutic Intervention/Management:</p>

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<p>thioridazine (Mellaril)</p> <p>trifluoperazine (Stelazine)</p>	<p>200 mg – 800 mg divided into 2 to 4 doses QD</p> <p>Starting dose 2 mg – 5 mg bid then titrate according to effect to dosages that approach 15 mg – 40 mg QD</p>	<p>secondary to Pseudotumor cerebri (PTC) and optic atrophy</p> <p>Blurred vision, photophobia, dry eye, epithelial keratopathy, pupillary miosis, pupillary mydriasis, ptosis, angle closure glaucoma, cataract (more frequent with trifluoperazine), pigmentary retinopathy (more likely with thioridazine).</p>	<p>Report adverse ocular side effects to psychiatrist and/or primary care provider. For proptosis/exophthalmos from suspected thyroid disease, consider obtaining thyroid function tests. Prescribe ocular lubricants as indicated. Consult neurologist or neuro-ophthalmologist for neuroimaging studies of brain for suspected disc edema/papilledema/disc pallor and/or testing for ptosis and/or diplopia from suspected myasthenia gravis, e.g., tensilon, Ach – r testing. Dependent on neurologic findings, consult with prescribing provider to consider alternative medical therapy.</p> <p>Initial Baseline Evaluation: Comprehensive eye examination,* central threshold visual field, Amsler grid, color vision (blue-yellow), fundus photography</p> <p>Patient Instructions: Weekly home Amsler grid to detect maculopathy</p> <p>Recommended Follow-up Intervals/Testing: Every 6 months repeat visual acuity, central threshold visual field, Amsler grid, color vision test, funduscopy. Repeat fundus photography periodically, as indicated.</p> <p>Therapeutic Intervention/Management: Report adverse ocular side effects to psychiatrist and/or primary care provider. Manage glaucoma as recommended in AOA Optometric Clinical Guideline: Care of the Patient with Open Angle Glaucoma. Ocular lubricants for dry eye, treatment of conjunctivitis as indicated. Protective sunwear for photophobia and to reduce risk of ocular phototoxicity. Eyeglasses for blurred vision as indicated. Consider neurologist or neuro-ophthalmologist consultation for recent onset ptosis or diplopia.</p>
<p>Anti-inflammatories^{3-10,26,51-75}</p> <p>acetylsalicylic acid (Aspirin)</p>	<p>325 mg – 650 mg Q4H (no more than 12 tablets daily: 3900 mg)</p>	<p>May increase bleeding tendencies secondary to antiplatelet properties (e.g., subconjunctival hemorrhage, hemorrhagic retinopathy – rare).</p>	<p>Initial Baseline Evaluation: Comprehensive eye examination*</p> <p>Follow-up Intervals/Testing: As recommended in AOA Clinical Practice Guideline: Comprehensive Adult Eye and Vision Examination for routine care. Dependent on ocular signs, symptoms and other clinical findings for more frequent periodic care.</p> <p>Therapeutic Intervention/Management: Report adverse ocular side effects to primary care and/or prescribing provider. Avoid analgesics containing aspirin immediately following any surgical procedure, fresh blunt trauma, and/or hyphema. Prescription aspirin may be contraindicated for persons with known gastro-intestinal disorders or bleeding abnormalities.</p>

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ibuprofen (Motrin) naproxen (Naprosyn, Anaprox, Naprelan) oxaprozin (Daypro) piroxicam (Feldine)	200 mg – 800 mg Q4H. Do not exceed 3200 mg daily Maximum dosage not to exceed 1500 mg daily 1200 mg once daily 20 mg once daily not to exceed usage for more than 7 to 12 days without blood work	Blurred vision, changes in color vision, photophobia, conjunctivitis, Stevens-Johnson syndrome, vertigo. May increase bleeding tendencies secondary to antiplatelet properties, (e.g., subconjunctival hemorrhage, hemorrhagic retinopathy – rare).	<p>Initial Baseline Evaluation: Comprehensive eye examination,* color vision (blue-yellow)</p> <p>Recommended Follow-up Intervals/Testing: Annual comprehensive eye examination* Dependent on ocular signs, symptoms and other clinical findings for more frequent periodic care. Central threshold visual field, color vision and funduscopy may be indicated for changes in visual acuity or color vision.</p> <p>Therapeutic Intervention/Management: Report adverse ocular side effects to prescribing provider. Avoid analgesics containing aspirin immediately following any surgical procedure, fresh blunt trauma and hyphema. Stevens-Johnson syndrome may require topical supportive agents, topical and/or oral steroids and anti-histamines depending on severity of presentation; referral to primary care provider and/or dermatologist may be indicated. Consider neurologist, neuro-ophthalmologist, and/or ear, nose and throat (ENT) specialist consultation for symptoms of persistent vertigo. Prescription may be contraindicated in persons with known gastro-intestinal disorders or bleeding abnormalities.</p>
indomethacin (Indocin)	25 mg – 50 mg bid to tid (doses of more than 150 mg – 200 mg are not significantly more helpful)	Blurred vision, Stevens-Johnson syndrome, diplopia, corneal deposits, retinal changes, maculopathy for patients on long-term therapy.	<p>Initial Baseline Evaluation: Comprehensive eye examination,* screening visual field, color vision (blue-yellow)</p> <p>Recommended Follow-up Intervals/Testing: Annual comprehensive eye examination* Dependent on ocular signs, symptoms and other clinical findings for more frequent periodic care. Perform central threshold visual field and repeat color vision with complaint of visual acuity or color vision changes. Perform fundus photography, as indicated.</p> <p>Therapeutic Intervention/Management: Report adverse ocular side effects to prescribing provider. Avoid analgesics containing aspirin immediately following any surgical procedure, fresh blunt trauma and hyphema. Stevens-Johnson syndrome may require topical supportive agents, topical and/or oral steroids and anti-histamines depending on severity of presentation; referral to primary care provider and/or dermatologist may be indicated. Consider neurologist or neuro-ophthalmologist consultation for neuroimaging studies of brain for persistent diplopia. Consider retinal specialist or ophthalmologist experienced in management of retinal disease consultation with observation of retinopathy. If</p>

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			visual acuity is reduced from corneal deposits that fail to resolve after discontinuing medication, consider corneal specialist consultation. Prescription may be contraindicated in persons with known gastro-intestinal disorders or bleeding abnormalities.
<p>Oral prednisone (Deltasone)</p> <p>Inhaled fluticasone propionate (Flovent) flunisolide (Aerobid)</p> <p>triamcinolone (Azmacort)</p>	<p>Dosage is dependent on the patient and disease. Typically 5 mg – 60 mg daily</p> <p>Recommended two puffs BID (total dosage of 1 mg) Maximum dosage of 4 puffs BID (total dosage of 2 mg)</p> <p>Do not exceed 16 inhalations QD (total dosage of 1600 mcg)</p>	<p>Herpes simplex keratitis recurrence, posterior subcapsular cataract, increased intraocular pressure, open angle glaucoma, proptosis/exophthalmos.</p>	<p>Baseline Initial Evaluation: Comprehensive eye examination,* visual field screening</p> <p>Recommended Follow-up Intervals/Testing: Dependent on ocular signs, symptoms and other clinical findings, e.g., cataract, glaucoma suspect, glaucoma. For glaucoma suspect or glaucoma, fundus photography/imaging of optic nerve/nerve fiber layer, gonioscopy, intraocular pressure measurement, central threshold visual field with frequency of examination and testing dependent upon level of optic neuropathy as delineated in AOA Optometric Clinical Practice Guideline: Care of the Patient with Open Angle Glaucoma. Annual comprehensive eye examinations*</p> <p>Therapeutic Intervention/Management: Report adverse ocular side effects to allergist, pulmonary specialist, primary care and/or prescribing provider. Manage glaucoma according to AOA Optometric Clinical Practice Guideline: Care of the Patient with Open Angle Glaucoma (Note: topical prostaglandin anti-glaucoma agents may be contraindicated due to propensity to propagate inflammation). For proptosis/exophthalmos from suspected thyroid disease, consider obtaining thyroid function tests. Prescribe ocular lubricants as indicated.</p>
<p>Antineoplastic <small>3-10, 82-87, 88-94</small> tamoxifen (Nolvadex)</p>	<p>20 mg – 40 mg QD (If 40 mg is required, should be given in 2 equal doses)</p>	<p>Cataract, crystalline retinopathy, macular edema, bird shot choroidopathy, optic neuritis, keratopathy.</p>	<p>Initial Baseline Evaluation: Comprehensive eye examination,* detailed biomicroscopy, Amsler grid, color vision (blue-yellow), fundus photography</p> <p>Patient Instructions: Weekly home Amsler grid to detect maculopathy</p> <p>Recommended Follow-up Intervals/Testing: Every 6-12 months, visual acuity, Amsler grid testing, color vision, funduscopy. Repeat fundus photography periodically, as indicated.</p> <p>Therapeutic Intervention/Management: Report adverse ocular findings to oncologist, gynecologist, primary care, and/or prescribing provider. Consider retinal specialist or ophthalmologist experienced in management of retinal disease consultation with observation of retinopathy.</p>

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interferon alfa-2b (Intron, Rebetrone)	3 – 20 million units/day, usually 3 times a week	Ischemic retinopathy (cotton wool spots, hemorrhages) – common; capillary non-perfusion, cystoid macular edema, retinal vein occlusion, non-arteritic ischemic optic neuropathy.	<p>Initial Baseline Evaluation: Comprehensive eye examination,* detailed biomicroscopy, Amsler grid, color vision (blue-yellow), fundus photography</p> <p>Patient Instructions: Weekly home Amsler grid to detect maculopathy</p> <p>Recommended Follow-up Intervals/Testing: Every 3 months, visual acuity, Amsler grid testing, color vision, funduscopy. Repeat fundus photography periodically, as indicated. (Patients usually discontinue medication after 6-12 months)</p> <p>Therapeutic Intervention/Management: Report adverse ocular side effects to infectious disease specialist, oncologist, primary care and/or prescribing provider. If mild retinopathy present and good visual acuity, it is usually not necessary to discontinue the medication. Consider retinal specialist or ophthalmologist experienced in management of retinal disease consultation with observation of significant retinopathy or reduced visual acuity. There may be a higher risk for retinopathy if patient has diabetes mellitus and/or hypertension.</p>
Antipsoriatic ^{3-10, 30, 95-101} methotrexate (Methotrexate)	15 mg – 30 mg Q 5 to 7 days	See Anti-Rheumatologic section.	See Anti-Rheumatologic section.
Anti-tubercular ^{3-10, 102-106} ethambutol (Myambutol)	Dosage is weight dependent (15 mg – 25 mg/Kg)	Typically reversible visual fluctuation and/or reduction of visual acuity related to dosage (> 15 mg/kg daily) and duration of therapy, secondary to optic neuritis and optic atrophy.	<p>Initial Baseline Evaluation: Comprehensive eye examination,* screening visual field, Amsler grid, color vision (blue-yellow, red-green), fundus photography</p> <p>Patient Instructions: Weekly home Amsler grid to detect optic nerve involvement</p> <p>Recommended Follow-up Intervals/Testing: Every month or on an as-needed basis depending on clinical findings. Repeat visual acuity, screening visual field, Amsler grid, color vision, and funduscopy. Central threshold visual field for suspected optic neuropathy. Repeat fundus photography periodically, as indicated.</p> <p>Therapeutic Intervention/Management: Report adverse ocular side effects, including two lines or more of visual acuity reduction, to infectious disease specialist, pulmonary specialist and/or primary care provider to consider medication review and possible change in treatment regimen.</p>

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<p>isonicotinic acid hydrazide (Isoniazid: component of anti-tubercular preparations sometimes referenced as INH)</p> <p>rifampin (Rifadin)</p>	<p>Adult – 5 mg/Kg up to 300 mg in a single dose or 15 mg/Kg up to 900 mg QD for 2 to 3 times a week</p> <p>Adults – 600 mg QD Children – weight dependent – 10 mg – 20 mg/Kg (not to exceed 600 mg/day)</p>	<p>Headache, conjunctivitis, scleral icterus, subconjunctival hemorrhage and hemorrhagic retinopathy associated with coagulopathy.</p> <p>Visual disturbances such as intermittent blurred vision.</p>	<p>Initial Baseline Evaluation: Comprehensive eye examination*</p> <p>Recommended Follow-up Intervals/Testing: Annual comprehensive eye examination* or more frequent examinations dependent upon ocular signs and symptoms.</p> <p>Therapeutic Intervention/Management: Report adverse ocular side effects to infectious disease specialist, pulmonary specialist and/or primary care provider. Most of the ocular findings are indirect sequelae related to the oculo-systemic side effects that are dosage dependent. Ocular treatment is primarily supportive. Consider retinal specialist or ophthalmologist experienced in retinal disease consultation for retinopathy.</p> <p>See Isoniazid section.</p>
<p>Antibiotics^{3-10, 107-125}</p> <p>penicillins cephalosporins macrolides fluorinated quinolones</p>	<p>250 mg – 500 mg QID. Other dosages are dependent upon the medication selected. Consult the Physician's Desk Reference (PDR) or other drug compendium</p>	<p>Direct ocular side effects are rare. The most common side effect associated with this class of medication is Stevens-Johnson syndrome.</p>	<p>Initial Baseline Evaluation: Comprehensive eye examination*</p> <p>Recommended Follow-up Intervals/Testing: As recommended in AOA Optometric Clinical Practice Guideline: Comprehensive Adult Eye and Vision Examination for routine care. Dependent on ocular signs, symptoms and other clinical findings for more frequent periodic care.</p> <p>Therapeutic Intervention/Management: Report adverse ocular side effects to prescribing provider. Treatment of ocular irritation, conjunctivitis and/or scleral injection, as indicated. Most side effects are reversible with discontinuing medication. Stevens-Johnson syndrome may require topical supportive agents, topical and/or oral steroids and anti-histamines depending on severity of presentation. Referral to primary care provider and/or dermatologist may be indicated.</p>

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Sulfa class sulfamethoxazole (Bactrim DS)	1 tablet Q12 H for 10 to 14 days	Stevens-Johnson syndrome, conjunctival and scleral injection.	<p>Initial Baseline Evaluation: Comprehensive eye examination*</p> <p>Recommended Follow-up Intervals/Testing: As recommended in AOA Optometric Clinical Practice Guideline: Comprehensive Adult Eye and Vision Examination for routine care. Dependent on ocular signs, symptoms and other clinical findings for more frequent periodic care.</p> <p>Therapeutic Intervention/Management: Report adverse ocular side effects to prescribing provider. Treatment of ocular irritation, conjunctivitis and/or scleral injection as indicated. Most side effects are reversible with discontinuing medication. Stevens-Johnson syndrome may require topical supportive agents, topical and/or oral steroids and anti-histamines depending upon severity of presentation. Referral to primary care provider and/or dermatologist may be indicated.</p>
Tetracyclines minocycline (Minocin) tetracycline (Symycin) doxycycline (Vibramycin)	50 mg BID or 100 mg QD 1 – 2 gm divided into 2 to 4 equal doses 100 mg QD	Visual disturbances, scleral pigmentation, myasthenic syndrome and pseudotumor cerebri (PTC) in patients on long-term therapy.	<p>Initial Baseline Evaluation: Comprehensive eye examination*</p> <p>Recommended Follow-up Intervals/Testing: As recommended in AOA Optometric Clinical Practice Guideline: Comprehensive Adult Eye and Vision Examination for routine care. Dependent on ocular signs, symptoms and other clinical findings for more frequent periodic care.</p> <p>Therapeutic Intervention/Management: Report adverse ocular side effects to prescribing provider. Treatment of ocular irritation, conjunctivitis and/or scleral injection as indicated. Most side effects are reversible with discontinuing medication. Stevens-Johnson syndrome may require topical supportive agents, topical and/or oral steroids and anti-histamines depending upon severity of presentation. Referral to primary care provider and/or dermatologist may be indicated. Consult neurologist or neuro-ophthalmologist for neuroimaging studies of brain and possibly lumbar puncture for suspected papilledema from pseudotumor cerebri and/or testing for ptosis and/or diplopia from suspected myasthenia gravis, e.g., tensilon, Ach – r testing. Dependent on neurologic findings, consult with prescribing provider to consider alternative medical therapy.</p>

* Comprehensive eye examination should be performed according to AOA Optometric Clinical Practice Guideline: Comprehensive Adult Eye and Vision Examination, 1994 (revised September 1997).

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Authored by:

Andrew S. Gurwood, O.D., F.A.A.O., Diplomate
The Eye Institute
Pennsylvania College of Optometry
1201 W. Spencer Street
Philadelphia, PA 19141

Reorganized & Revised by:
John C. Townsend, O.D., F.A.A.O.