

Acetazolamide (*Diamox*)

Acetazolamide is a potent, sulfa-based drug which inhibits the enzyme carbonic anhydrase. In the eye, this results in a decrease in the production of aqueous, the clear fluid inside the eye. A decline in aqueous production leads to a lower pressure inside the eye. The drug also causes the kidneys to excrete bicarbonate, resulting in acidification of the bloodstream, thought to further depress aqueous production. It also causes loss of sodium and potassium in urine resulting in diuresis (excess urine).

Non-ophthalmic use: Treatment and prevention of altitude sickness; treatment of idiopathic intracranial hypertension (pseudotumor cerebri); Less commonly used for treatment of metabolic or respiratory alkalosis, congestive heart failure, central sleep apnea, cystinuria, epileptic seizures

Ophthalmic use: Short term treatment of high intraocular pressure in acute glaucoma or treatment of acute ocular hypertension following surgical procedures; As an adjunct to maximal topical medical therapy prior to surgery for glaucoma; uncommonly used for treatment of chronic glaucoma when surgery is refused, delayed or not possible. Treatment of idiopathic intracranial hypertension, (high pressure of the fluid around the brain and spinal cord), usually in conjunction with a neurologist.

Side effects: paresthesias (numbness and tingling) in fingers and toes, metallic taste to carbonated beverages, polyuria, anorexia (loss of appetite), weight loss, nausea, vomiting, diarrhea, drowsiness, confusion, malaise, depression, dehydration, hyponatremia (low blood sodium), hypokalemia (low blood potassium), metabolic acidosis (acidic blood), increases risk of kidney stones. Rare blood dyscrasias (abnormalities in blood cells), Stevens Johnson syndrome. May aggravate acidosis in COPD (emphysema). May disrupt glucose (blood sugar) metabolism in diabetes. May elevate Dilantin levels. May increase excretion of Lithium. May decrease excretion of Quinidine leading to cardiac arrhythmias. May cause hypokalemia when used with other diuretics.

Contraindications: sickle cell anemia, sulfa allergy, liver or kidney disease, high dose aspirin therapy, pregnancy, adrenal gland failure.

PDR recommendation: "Monitor for signs/symptoms of severe sulfonamide reaction (eg, Stevens-Johnson syndrome, toxic epidermal necrolysis, fulminant hepatic necrosis, anaphylaxis, agranulocytosis, aplastic anemia, and other blood dyscrasias). Monitor with concomitant high-dose ASA therapy for signs/symptoms of anorexia, tachypnea, lethargy, metabolic acidosis, and coma. Monitor for decrease in diuresis and increase in drowsiness when dose is increased. Perform periodic monitoring of CBC, platelet counts, and serum electrolytes."

- **Ophthalmic conditions (severe uncontrolled glaucoma, acute glaucoma, idiopathic intracranial hypertension) severe enough to require Acetazolamide are uncommon.**
 - *It is unlikely that an optometrist would have gained sufficient training and experience to manage these patients and safely use this medicine.*
 - *The PDR recommendation does not describe the practice of an optometrist*
- **Acute glaucoma is an ophthalmic emergency that ultimately requires a surgical procedure by an ophthalmologist.**
 - *Given that referral to an ophthalmologist is mandatory for this surgical procedure, prompt referral to an ophthalmologist is important, and management, including prescription of acetazolamide, should be undertaken by an ophthalmologist.*
 - *Both emergency room physicians and primary care physicians are also able to prescribe this medication emergently if needed.*
- Acetazolamide has significant systemic side effects. The general medical training of an ophthalmologist allows a thorough assessment of the patient's systemic health prior to prescription of this medicine as well as monitoring for side effects. In medical school and residency, ophthalmologists receive supervised training in internal medicine needed to monitor for and manage these side effects.
 - *Optometrists lack the general medical training and experience to prescribe this medicine and monitor for its numerous systemic side effects.*

Methotrexate (*Rheumatrex, Trexal*)

Methotrexate is a potent drug that inhibits the enzyme required to make DNA, and thus inhibits the synthesis of DNA, RNA and proteins. It has a greater toxic effect on rapidly dividing cells which replicate their DNA more frequently. Methotrexate also inhibits enzymes leading to the inhibition of T- cell lymphocyte (white blood cell) activation.

Non-ophthalmic use: Cancer chemotherapy for breast, lung, bladder and head and neck cancers, lymphoma and leukemia; Treatment of autoimmune diseases: rheumatoid arthritis, psoriasis, psoriatic arthritis, lupus, Crohns disease, vasulitis etc.

Ophthalmic use: Treatment of refractory uveitis (severe eye inflammation) not completely responsive to corticosteroid medicines or other immunosuppressive drugs; as a steroid-sparing agent to allow prednisone dose to be reduced or eliminated

Side effects: Nausea, vomiting, liver toxicity or cirrhosis, leucopenia (low white blood cells), bone marrow suppression, mouth sores, rash, diarrhea, cough, shortness of breath, (acute pneumonitis, pulmonary fibrosis) hair loss. Alcohol significantly increases the risk of liver damage. This drug is highly teratogenic (can cause birth defects and fetal loss.)

PDR Boxed Warning: “Should be used only by physicians with knowledge and experience in the use of antimetabolite therapy. Use only in life-threatening neoplastic diseases, or in patients with psoriasis or rheumatoid arthritis (RA) with severe, recalcitrant, disabling disease not adequately responsive to other forms of therapy. Deaths reported in the treatment of malignancy, psoriasis, and RA. Closely monitor for bone marrow, liver, lung, and kidney toxicities. Patients should be informed of the risks involved and be under physician's care throughout therapy. Fetal death and/or congenital anomalies reported; ... Unexpectedly severe (sometimes fatal) bone marrow suppression, aplastic anemia, and GI toxicity reported with therapy (usually high dosage) coadministered with some NSAIDs. Causes hepatotoxicity, fibrosis, and cirrhosis (generally only after prolonged use); ... Acutely, liver enzyme elevations frequently seen. Drug-induced lung disease (eg, acute/chronic interstitial pneumonitis) may occur acutely at any time during therapy and reported at low doses... Malignant lymphomas, ... Severe, occasionally fatal, skin reactions reported. Potentially fatal opportunistic infections, especially *Pneumocystis carinii* pneumonia, may occur...”

- **Ophthalmic conditions (refractory uveitis) severe enough to require Methotrexate are rare.**
 - *It is unlikely that an optometrist would have gained sufficient training and experience to manage these patients and safely use this medicine.*
 - *The PDR box warning above does not describe an Optometry practice.*
- During their general medical training, ophthalmologists receive experience in internal medicine, rheumatology and oncology that are requisite for prescribing immunosuppressant medications. This experience involves supervised treatment of patients and monitoring for side effects with physical examination and laboratory and other testing. During residency and fellowship, ophthalmologists manage rare and unusual conditions under the guidance of subspecialists in academic institutions.
 - *Optometrists lack general medical training as well as direct patient experience working with antimetabolite medications under the guidance and supervision of specialists.*
- With the exception of some academic-based uveitis specialists, **it would be exceptionally rare for an ophthalmologist to prescribe this medicine.** Nearly always an oncologist or rheumatologist is consulted when this medicine is considered. These specialists usually have extensive experience with this medicine including monitoring for its toxic side effects with physical exam and laboratory testing.

Mycophenolate mofetil (CellCept)

A reversible inhibitor of an enzyme required to manufacture DNA, necessary for the growth of B and T cell lymphocytes (white blood cells). Suppressing T and B cell lymphocytes stops them from attacking healthy cells but also weakens their ability to defend against infection.

Non-ophthalmic use: Immunosuppression for organ transplantation (liver, kidney heart) to prevent rejection; treatment of autoimmune diseases (Rheumatoid Arthritis, Lupus, Behcet's disease, vasculitis, Crohns Disease)

Ophthalmic use: treatment of refractory uveitis (eye inflammation) not completely responsive to corticosteroid medicines or other immunosuppressant drugs; as a steroid sparing agent in the treatment to allow Prednisone dose to be reduced or eliminated.

Side effects: hyperglycemia (high blood sugar), hypercholesterolemia (high cholesterol level), hypomagnesemia, hypocalcemia, hyperkalemia, (changes in blood levels of magnesium, calcium and potassium) increase in BUN (kidney dysfunction), leucopenia (low white blood cells), anemia (low red blood cells), cough (pleural effusions-fluid collection around lungs), back and abdominal pain, headache, nausea, diarrhea. Cancer: melanoma, lymphoma. Progressive multifocal leukoencephalopathy (fatal brain infection)

PDR Boxed Warning: "Immunosuppression may lead to increased susceptibility to infection and possible development of lymphoma. Only physicians experienced in immunosuppressive therapy and management of renal, cardiac or hepatic transplant patients should use CellCept. Patients receiving the drug should be managed in facilities equipped and staffed with adequate laboratory and supportive medical resources...Female users of childbearing potential must use contraception. Use of Cellcept during pregnancy is associated with increased risk of pregnancy loss and congenital malformations."

- **Ophthalmic conditions (refractory uveitis) severe enough to require CellCept are rare.**
 - *It is unlikely that an optometrist would have gained sufficient training and experience to manage these patients and safely use this medicine.*
 - *The PDR boxed warning above does not describe an Optometry practice.*
- During their general medical training, ophthalmologists receive experience in internal medicine, rheumatology and oncology that are requisite for prescribing immunosuppressant medications. This experience involves supervised treatment of patients and monitoring for side effects with physical examination and laboratory and other testing. During residency and fellowship, ophthalmologists manage rare and unusual conditions under the guidance of subspecialists in academic institutions.
 - *Optometrists lack general medical training as well as direct patient experience working with immunosuppressant medications under the guidance and supervision of specialists.*
- With the exception of some academic-based uveitis specialists, **it would be exceptionally rare for an ophthalmologist to prescribe this medicine.** Nearly always an oncologist or rheumatologist is consulted when this medicine is considered. These specialists usually have extensive experience with this medicine including monitoring for its toxic side effects with physical exam and laboratory testing.

Prednisone (*Deltasone*)

Prednisone is a powerful drug with immunosuppressive and anti-inflammatory actions. It is similar to the hormone cortisone, produced by the adrenal gland.

Non-ophthalmic use: Treatment of exacerbation (worsening) and maintenance therapy of autoimmune diseases (Rheumatoid arthritis, Lupus, Ulcerative colitis, Crohns disease, vasculitis, sarcoidosis etc.), treatment of exacerbation of chronic obstructive pulmonary disease, asthma, multiple sclerosis, adjunctive management of lymphoma and leukemia, treatment of dermatologic disease, treatment of adrenocortical insufficiency, severe osteoarthritis, and many other inflammatory and allergic conditions.

Ophthalmic use: Treatment of refractory uveitis (eye inflammation) not completely responsive to topical (eye drop) or local (injected) corticosteroid medicines; Treatment of other severe inflammatory conditions of the eyes: scleritis, chorioretinitis, sympathetic ophthalmia, orbital inflammatory syndrome, optic neuritis

Side effects: hyperglycemia (high blood sugar) or diabetes, hypertension (high blood pressure), weight gain, fluid retention, depression, mania, psychosis, anxiety, confusion, insomnia, peptic ulcer, osteoporosis, avascular necrosis, adrenal suppression, fat redistribution, muscle weakness, growth retardation in children, easy bruising, skin thinning, cataracts, glaucoma, increased susceptibility to infection, exacerbation of viral and fungal infection, impaired wound healing

PDR Recommendation: "Monitor for adrenocortical insufficiency, salt/water retention, new infections, change in thyroid status, posterior subcapsular cataracts, glaucoma, optic nerve damage, secondary ocular infections, Kaposi's sarcoma, psychiatric derangements, emotional instability or psychotic tendencies aggravation, and other adverse reactions. Monitor IOP, BP, serum K⁺ and calcium levels. Monitor growth and development of infants/children on prolonged therapy (including bone growth) and for hypoadrenalism in infants born to mothers who received substantial doses"

- **Ophthalmic conditions severe enough to require Prednisone are uncommon.**
 - *It is unlikely that an optometrist would have gained sufficient training and experience to manage these patients and safely use this medicine.*
 - *The PDR recommendation above does not describe a typical optometric practice.*
- During their general medical training, ophthalmologists receive experience in internal medicine and rheumatology that are requisite for prescribing prednisone. This experience involves supervised treatment of patients and monitoring for side effects with physical examination and laboratory and other testing. During residency and fellowship, ophthalmologists manage rare and unusual conditions under the guidance of subspecialists in academic institutions.
 - *Optometrists lack general medical training as well as direct patient experience working with prednisone under the guidance and supervision of specialists.*
- Ophthalmologists do not prescribe prednisone frequently and conditions requiring its use are uncommon. Nearly always an internist or rheumatologist is consulted when this medicine is prescribed, and often the patient's primary care physician assists in the monitoring of patients on this medicine. These specialists usually have extensive experience with this medicine including monitoring for its numerous side effects with physical exam and laboratory testing.