Acetazolamide (a-set-a-zole-a-mide)

Classification: Therapeutic: anticonvulsants, antiglaucoma agents, diuretics, ocular hypotensive agent. Pharmacologic: carbonic anhydrase inhibitors

Pregnancy Category C

Indications

Unlabeled Use:
- Reduce cerebrospinal fluid production in hydrocephalus. Prevention of renal calculi composed of uric acid or cystine.

Action
- Inhibition of carbonic anhydrase in the eye results in decreased secretion of aqueous humor. Inhibition of renal carbonic anhydrase, resulting in self-limiting urinary excretion of sodium, potassium, bicarbonate, and water. CNS inhibition of carbonic anhydrase and resultant diuresis may prevent abnormal neuronal firing. Alkaline diuresis prevents precipitation of uric acid or cystine in the urinary tract.

Therapeutic Effects:

Pharmacokinetics
- Absorption: Dose dependent; erratic with doses >10 mg/kg/day.
- Distribution: Crosses the placenta and blood-brain barrier; enters breast milk.
- Protein Binding: 95%.
- Metabolism and Excretion: Excreted mostly unchanged in urine.
- Half-life: 2.4–5.8 hr.

TIME/ACTION PROFILE (lowering of intraocular pressure)

<table>
<thead>
<tr>
<th>ROUTE</th>
<th>ONSET</th>
<th>PEAK</th>
<th>DURATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>PO</td>
<td>1–1.5 hr</td>
<td>2–4 hr</td>
<td>8–12 hr</td>
</tr>
<tr>
<td>IV</td>
<td>2 min</td>
<td>15 min</td>
<td>4–5 hr</td>
</tr>
</tbody>
</table>

Contraindications/Precautions
- Contraindicated in: Hypersensitivity or cross-sensitivity with sulfonamides may occur; Renal disease or insufficiency; Concurrent use with sulfonamide carbonic anhydrase inhibitors (acetazolamide, dorzolamide) is not recommended; OB: Avoid during first trimester of pregnancy.

Use Cautiously in:
- Chronic respiratory disease; Electrolyte abnormalities; Gout; Renal disease (dose adjustment necessary for CrCl <50 mL/min); Diabetes mellitus; OB: Use with caution during second or third trimester of pregnancy; Lactation: Safety not established.

Adverse Reactions/Side Effects
- CNS: depression, fatigue, weakness, drowsiness.
- EENT: transient nearsightedness.
- GI: anorexia, metallic taste, nausea, vomiting, melena.
- GU: crystalluria, renal calculi.
- Derm: STEVENS-JOHNSON SYNDROME, rashes.
- Hemat: aplastic anemia, hemolytic anemia, leukopenia.
- Metab: weight loss, hyperuricemia.
- Neuro: paresthesias.
- Misc: allergic reactions including ANAPHYLAXIS.

Interactions
- Drug-Drug: Excretion of barbiturates, aspirin, and lithium is decreased and may lead to toxicity. Excretion of amphetamine, quinidine, procainamide, and possibly tricyclic antidepressants is increased and may lead to toxicity. May potentiate cyclosporine levels.

Route/Dosage
- PO (Adults): Glaucoma (open angle) — 250–1000 mg/day in 1–4 divided doses (up to 250 mg q 4 hr) or 500 mg extended-release capsule once daily. Epilepsy — 4–16 mg/kg/day in 1–4 divided doses (maximum 30 mg/kg/day or 1 g/day). Pseudotumor cerebri — 5 mg/kg/dose repeated 2–3 times over 24 hr.

- PO (Children): Glaucoma — 8–10 mg/kg (300–900 mg/m2/day) in 1 divided dose (oral range 10–15 mg/m2/day). Edema — 5 mg/kg once daily. Epilepsy — 4–16 mg/kg/day in 1–4 divided doses (maximum 30 mg/kg/day or 1 g/day).

- IV (Adults): Glaucoma (open angle) — 250 mg in 1–4 divided doses (up to 250 mg q 4 hr) or 500 mg extended-release capsule once daily. Epilepsy — 4–16 mg/kg/day in 1–4 divided doses (maximum 30 mg/kg/day or 1 g/day).

- IV (Children): Glaucoma — 8–10 mg/kg (300–900 mg/m2/day) in 1 divided dose (oral range 10–15 mg/m2/day). Epilepsy — 4–16 mg/kg/day in 1–4 divided doses (maximum 30 mg/kg/day or 1 g/day).

- IV: IM: IV push: 250 mg in 1–4 divided doses (maximum 30 mg/kg/day or 1 g/day).

- Incompatible with: May potentiate cyclosporine levels.

- Not interchangeable with:

- Dosing Interval: 24 hr

- Onset: 1–1.5 hr

- Peak: 2–4 hr

- Duration: 8–12 hr

- Allopurinol

- Amphotericin B

- Amoxicillin

- Beta blockers

- Cimetidine

- Cyclosporine

- Erythromycin

- Ibuprofen

- Indomethacin

- Probenecid

- Quinidine

- Salicylates

- Sodium bicarbonate

- Theophylline

- Warfarin

- Not established.

- Not recommended.

- Onset: 2 min

- Peak: 15 min

- Duration: 4–5 hr
PO (Neonates): Hydrocephalus—5 mg/kg/dose q 6 hr to a maximum of 25 mg/kg/day.

PO (Adults): Glaucoma (closed angle)—250–500 mg, may repeat in 2–4 hr to a maximum of 1 g/day. Edema—250–375 mg/day.

PO (Children): Glaucoma—5–100 mg/kg/day, not to exceed 1 g/day. Edema—150–375 mg/day.

PO (Neonates): Hydrocephalus—5 mg/kg/dose q 6 hr to a maximum of 100 mg/kg/day.

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NURSING IMPLICATIONS

Assessment

- Observe for signs of hyponatremia (muscle weakness, malaise, fatigue, ECG changes, vomiting).
- Assess for allergy to sulfonamides.
- Intraocular Pressure: Assess for eye discomfort or decreased visual acuity.
- Seizures: Monitor neurologic status in patients receiving acetazolamide for seizures. Initiate seizure precautions.
- Altitude Sickness: Monitor for decrease in severity of symptoms (headache, nausea, vomiting, fatigue, dizziness, drowsiness, shortness of breath). Notify health care professional immediately if neurologic symptoms worsen or if patient becomes more dyspneic and rales or crackles develop.
- Edema: Monitor intake and output ratios and daily weight during therapy.
- Lab Test Considerations: Serum electrolytes, complete blood counts, and platelet counts should be evaluated initially and periodically during prolonged therapy. May cause increased or decreased potassium, bicarbonate, WBCs, and RBCs. May cause increased serum chloride.
- May cause a transient increase in serum glucose and in serum and urine glucose concentrations.
- May cause false positive results for urine protein and 17-ketosteroids.
- May cause a transient increase in serum ammonia, urea, uric acid, serum phosphorus, and calcium. May cause a transient increase in serum cholesterol.

Potential Nursing Diagnoses

- Disturbed sensory perception (visual) (Indications)

Implementation

- Do not confuse acetazolamide with acetohexamide. Do not confuse Dia- comox with Diabinese.
- Encourage fluids to 2000–3000 mL/day, unless contraindicated, to prevent crystalluria and stone formation.
- A potassium supplement without chloride should be administered concurrently with acetazolamide.
- PO: Give with food to minimize GI irritation. Tablets may be crushed and mixed with fruit-flavored syrup to minimize bitter taste for patients with difficulty swallowing. Extended-release capsules may be opened and sprinkled on soft food, but do not crush, chew, or swallow contents dry. Extended-release capsules are only indicated for glaucoma and altitude sickness, do not use for epilepsy or edema.
- IV: Extremely painful, avoid if possible.

IV Administration

- pH: 9.2.
- Solution: Reconstitute 500 mg of acetazolamide in at least 5 mL of sterile water for injection. Use reconstituted solution within 24 hr. Concentration: 100 mg/mL. Rate: Not to exceed 25 mg/min.
- Intermittent Infusion: Diluent: Further dilution in 50–100 mL of D10W, 0.9% NaCl, 5% D5W, LR, or combinations of dextrose and saline or dextrose and LR solutions. Concentration: 5–10 mg/mL. Rate: Infuse over 15–30 min.

Patient/Family Teaching

- Instruct patient to take as directed. Take missed doses as soon as possible unless almost time for next dose. Do not double doses. Patients on anticonvulsant therapy may need to gradually withdraw medication.
- Advise patient to report numbness or tingling of extremities, weakness, rash, sore throat, unusual bleeding or bruising, fever, or signs/symptoms of a sulfonamide adverse reaction (Stevens-Johnson syndrome [flu-like symptoms, spreading red rash, or skin/mucous membrane blistering], toxic epidermal necrolysis [widespread peeling/blistering of skin]) to health care professional. If hematopoietic reactions, fever, rash, hepatitis, or renal problems occur, acetazolamide should be discontinued.
- May occasionally cause dizziness. Caution patient to avoid driving and other activities that require alertness until response to the drug is known.
- Caution patient to use sunscreen and wear protective clothing to prevent photosensitivity reactions.
- Advise patient to notify health care professional of all Rx or OTC medications, vitamins, or herbal products being taken and to consult with health care professional before taking other medications.
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● Intraocular Pressure: Advise patient of the need for periodic ophthalmologic exam; loss of vision may be gradual and painless.

Evaluation/Desired Outcomes

● Decrease in intraocular pressure when used for glaucoma. If therapy is not effective or patient is unable to tolerate one carbonic anhydrase inhibitor, using another may be effective and more tolerable.
● Decrease in the frequency of seizures.
● Reduction of edema.
● Prevention of altitude sickness.
● Prevention of uric acid or cystine stones in the urinary tract.

Why was this drug prescribed for your patient?