edetate calcium disodium

(Calcium Disodium Versenate, calcium EDTA, calcium disodium edetate)

**Classification**

Therapeutic: chelating agents

**Pharmacology:** chelating agents

**Pregnancy Category:** B

**Indications**

Management of acute and chronic lead poisoning, including encephalopathy and nephropathy.

**Action**

Removes toxic amounts of lead or other divalent or trivalent cations by their displacement of calcium in edetate calcium disodium. Result is a soluble complex that is excreted by the kidneys.

**Therapeutic Effects:** Removal of toxic amounts of lead from the blood and other tissues.

**Pharmacokinetics**

- **Absorption:** Well absorbed following IM administration.
- **Distribution:** Distributed to extracellular fluid. Does not cross the blood-brain barrier.
- **Metabolism and Excretion:** Rapidly excreted by the kidneys as unchanged drug or lead complex.
- **Half-life:** 20–60 min.

**TIME/ACTION PROFILE (urinary lead excretion)**

<table>
<thead>
<tr>
<th>ROUTE</th>
<th>ONSET</th>
<th>PEAK</th>
<th>DURATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>IM</td>
<td>unknown</td>
<td>unknown</td>
<td>unknown</td>
</tr>
<tr>
<td>IV</td>
<td>1 hr</td>
<td>24–48 hr</td>
<td>unknown</td>
</tr>
</tbody>
</table>

**Contraindications/Precautions**

- **Contraindicated in:** Sensitivity, Active hepatitis.

**Use Cautiously in:** Underlying renal disease (dose reduction required if serum creatinine 2–3 mg/dL), Cardiac arrhythmia, OB, Lactation: Pregnancy or lactation (safety not established); Lead encephalopathy (should be used with concurrent d-penicillamine).

**Adverse Reactions/Side Effects**

- **CNS:** Headache.
- **EENT:** Lacrimation, nasal congestion, sneezing.
- **CV:** Arrhythmia, ECG changes (inverted T waves), hypotension, GI: anorexia, nausea, vomiting, GI: sepsis, pneumonia, F and E: Hypocalcemia, mucolipidosis, seizures, coma.
- **GI:** Anorexia, nausea, vomiting.
- **GU:** Nephrotoxicity, glycosuria, proteinuria.
- **Hemat:** Anemia.
- **Local:** Pain at IM site, phlebitis at IV site.
- **MS:** Arthralgia, myalgia.
- **Neuro:** Numbness, tingling, tremor, Mastic: chills, excessive drowsiness.

**Interactions**

- **Drug-Drug:** Prolong duration of action of zinc insulin preparations.

**Route/Dosage**

Various other regimens are used.

**IM, IV (Adults and Children):** 1000 mg/m²/day for 5 days (not to exceed 2 g/day). May be repeated after 2–4 day rest period. May be given as an infusion over 8–12 hr or divided doses IM every 8–12 hr.

**Renal Impairment**

**IM, IV (Adults):** The following regimens may be repeated at monthly intervals until lead excretion is reduced toward normal.

- Serum creatinine 2–3 mg/dL—500 mg/m²/day for 5 days. Serum creatinine 3–4 mg/dL—500 mg/m² every 48 hr for 3 doses.
- Serum creatinine >4 mg/dL—500 mg/m²/week.

**NURSING IMPLICATIONS**

- **Assess patient and family members for evidence of lead poisoning prior to and periodically throughout therapy.** Acute lead poisoning is characterized by a metallic taste, colicky abdominal pain, vomiting, diarrhea, edema, and coma. Symptoms of chronic poisoning vary with severity and include anemia, a blue-black line along the gums, intermittent vomiting, paresthesia, edema, and coma.
- **Monitor intake and output and daily weight.** Report discrepancies. If patient is anuric, edetate calcium disodium should be held until urine flow is established by IV hydration.
- **Monitor neurologic status closely (level of consciousness, pupillary response, movement).** Notify health care professional immediately of any changes. Infuse slowly; administration must be under constant supervision.

**Cautions**

- **Discontinue** if toxicity occurs.
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rapid infusion rate may increase intracranial pressure. Restricting fluids may decrease risk of increased intracranial pressure.

- Monitor vital signs and EEG frequently. Notify health care professional if hypotension or T-wave inversion or fever, chills, malaise, or rash occurs. This histamine-like response usually resolves in 48 hr.

- Lab Test Considerations: Monitor serum and urine lead levels prior to and periodically during therapy. Wait at least 1 hr after infusing edetate calcium disodium before drawing serum lead level.

- Monitor urinalysis daily and serum creatinine, BUN, alkaline phosphatase, calcium, and phosphorus levels and hepatocellular enzymes. Both lead and edetate calcium disodium are nephrotoxic. Notify health care professional if hematuria, proteinuria, or large renal epithelial cells are present.

- May cause an increase in serum glucose.

Potential Nursing Diagnoses

Risk for poisoning (Indications) (Patient/Family Teaching)

Impaired home maintenance (Indications)

Deficient knowledge, related to medication regimen (Patient/Family Teaching)

Implementation

- Do not confuse with edetate disodium.

- Administer IM or IV; oral administration may increase absorption of lead.

- Patients with serum lead levels of 70 mcg/dL or more or those with lead encephalopathy should also be treated with dimercaprol (BAL). Administer these medications at separate sites.

- IM: In the preferred route for children and patients with lead encephalopathy. Lidocaine or procaine 1% should be added to minimize pain at injection site (1 mL procaine or lidocaine to 1 mL edetate calcium disodium ratio, for a final concentration of 0.5% procaine or lidocaine). Administer deep IM into well-developed muscle; massage well. Rotate sites.

IV Administration

- Continuous Infusion: Dilute in 250–500 mL 0.9% NaCl or D5W. Administer daily dose over 8–12 hr.

- Y-Site Compatibility: epinephrine.

- Additive Incompatibility: D10W, LR

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Patient/Family Teaching

- Home Care Issues: Discuss need for follow-up appointments to monitor lead levels. Additional treatments may be necessary.

- Consult public health department regarding potential sources of lead poisoning in the home, workplace, and recreational areas.

Evaluation/Desired Outcomes

- Decrease in symptoms of lead poisoning.

- Decrease in serum lead levels to below 20 mcg/dL, although the normal upper limit is 10 mcg/dL.

Why was this drug prescribed for your patient?