💊 NCLEX-RN PHARMACOLOGY INFOGRAPHIC

LITHIUM

Generic: Lithium Carbonate / Lithium Citrate

Brand: Lithobid®, Eskalith®, Lithonate®

Class: Mood Stabilizer (Antimanic) | **System:** Psychiatric / CNS

⚠️ **HIGH-ALERT MEDICATION — NARROW THERAPEUTIC INDEX** ⚠️

1. DRUG OVERVIEW

Key Indications (WHY we give it):

- **Bipolar I disorder —** ACUTE MANIA (gold standard)
- **Maintenance therapy —** prevents recurrent manic/depressive episodes
- Bipolar depression (adjunct therapy)
- Treatment-resistant MDD (augmentation with antidepressants)
- **Reduces** suicide risk in bipolar disorder (unique benefit)

High-Yield Clinical Use:

→ First-line for long-term bipolar I management

→ Takes **1–3 weeks** for full effect — pair with benzodiazepines or antipsychotics for acute mania

→ Scheduled only — **NEVER PRN**

2. MECHANISM OF ACTION

Exact mechanism unknown — multiple effects on the brain:

- **Alters Na^+ transport** in nerve & muscle cells → stabilizes neuronal excitability
- **Modulates neurotransmitters** → ↓ norepinephrine | ↓ dopamine | ↑ serotonin | ↑ GABA
- Inhibits second-messenger systems (inositol / cAMP) → dampens overactive mood signaling
- Neuroprotective (↑ BDNF) — may prevent structural brain changes in bipolar

Excess mania → Lithium stabilizes neurons → Mood equilibrium

3. THERAPEUTIC EFFECTS

What Improvement Should Be Seen:

- ✓ ↓ Racing thoughts / pressured speech
- ✓ ↓ Grandiosity and impulsivity
- ✓ ↓ Euphoria, irritability, agitation
- ✓ Improved sleep (no longer sleepless for days)
- ✓ Stabilized mood / improved judgment
- ✓ ↓ Frequency & severity of mood episodes over time

How You Know It's Working:

- → **Serum lithium level in therapeutic range**
- → Acute mania: **1.0–1.5 mEq/L**
- → Maintenance: **0.6–1.2 mEq/L**
- → Clinical response typically seen at **1–3 weeks**

4. SIDE EFFECTS & ADVERSE REACTIONS

COMMON (Expected)

- Fine hand tremor
- Polyuria & polydipsia (↑ urine, ↑ thirst)
- Weight gain
- Mild GI upset (N/V/D)
- Metallic taste
- Mild fatigue / drowsiness
- Acne / rash
- Benign leukocytosis (↑ WBC)

SERIOUS / ADVERSE

- LITHIUM TOXICITY (>1.5 mEq/L)
- Nephrogenic diabetes insipidus
- Hypothyroidism / goiter
- Seizures, coma, death (>2.5)
- Cardiac arrhythmias / T-wave changes
- Nephrotoxicity (long-term)
- Pregnancy: Ebstein's anomaly (cardiac)
- Serotonin syndrome (w/ SSRIs)

⚠ LITHIUM TOXICITY — LEVEL-BY-LEVEL PROGRESSION ⚠

SEVERITY	LEVEL (mEq/L)	SIGNS & SYMPTOMS
✓ **Therapeutic**	**0.6 – 1.2**	No toxicity; mood stabilization
⚠ **Early Toxicity**	**1.5 – 2.0**	Coarse tremor, N/V/D, slurred speech, lethargy, confusion
Moderate	**2.0 – 2.5**	Ataxia, myoclonus, blurred vision, tinnitus, ↑ reflexes
☠ **SEVERE**	**>2.5**	SEIZURES, COMA, cardiovascular collapse, DEATH

5. PRIORITY NURSING CONSIDERATIONS

ASSESS / MONITOR:

- → Lithium level *(trough, drawn 12 hrs after last dose)*

→ Vital signs — BP, HR, temperature (fever = risk)
→ Hydration status, I&Os, daily weight
→ Renal function — BUN, creatinine, GFR
→ Thyroid function — TSH, T3/T4 (baseline + q6 months)
→ **Serum sodium — LOW Na^+ = ↑ lithium toxicity!**
→ Neurologic status — tremor, gait, LOC
→ Suicide risk / mood / sleep patterns

HOLD THE DRUG IF:

✗ **Level > 1.5 mEq/L**
✗ Signs of toxicity (coarse tremor, ataxia, confusion)
✗ Vomiting, diarrhea, excessive sweating, fever
✗ Dehydration or hyponatremia
✗ Before surgery / NPO status (typically held 24–72 hrs pre-op)

CONTRAINDICATIONS:

- Severe renal impairment
- Severe cardiovascular disease / recent MI
- Severe dehydration or sodium depletion
- Pregnancy (Category D) — **Ebstein's anomaly**
- Breastfeeding

DRUG INTERACTIONS (↑ Toxicity Risk):

↑ **NSAIDs** (ibuprofen, naproxen) — use acetaminophen instead
↑ **Thiazide & loop diuretics** (HCTZ, furosemide)
↑ ACE inhibitors & ARBs
↑ **SSRIs** → serotonin syndrome risk
↑ **Antipsychotics** → ↑ neurotoxicity (esp. haloperidol)
↓ **Caffeine & theophylline** (lower levels — may under-treat)

6. LABS & DIAGNOSTICS

LAB / TEST	NORMAL / TARGET	CLINICAL MEANING
Lithium Level (trough)	**0.6 – 1.2 mEq/L**	Narrow therapeutic index. >1.5 = toxicity; >2.0 = severe. Draw 12 hr post-dose.
Serum Sodium	**135 – 145 mEq/L**	Low Na^+ → kidneys retain lithium → TOXICITY. Keep intake consistent.
BUN / Creatinine	**BUN 7–20 / Cr 0.6–1.2**	Kidneys excrete lithium. Impaired renal function = ↑ toxicity risk.
TSH / Free T4	**TSH 0.5–5.0 mIU/L**	Lithium ↓ thyroid hormone → hypothyroidism / goiter. Check q6 months.

LAB / TEST	NORMAL / TARGET	CLINICAL MEANING
CBC (WBC)	**4,500 – 11,000/mm³**	Mild leukocytosis is common & BENIGN — not an infection.
ECG	**NSR**	Baseline if >40 y/o or cardiac hx. May see T-wave flattening/inversion.
Pregnancy Test (hCG)	**Negative**	CATEGORY D — cardiac malformations (Ebstein's anomaly) in 1st trimester.

7. ADMINISTRATION & SAFETY

Route & Formulations:

- **ORAL ONLY —** tablets, capsules, extended-release (Lithobid), oral solution (citrate)
- No IV, IM, or SubQ formulation exists

Timing & Administration:

- → **Give with food or milk** to ↓ GI upset
- → **Swallow ER tablets whole** — do NOT crush or chew
- → Doses typically divided 2–3 times daily
- → **If dose missed: skip if >4 hrs late — NEVER double-dose**

HIGH-ALERT PRECAUTIONS:

- ⚠ **NARROW THERAPEUTIC INDEX** — small dose changes = toxicity
- ⚠ **Keep sodium intake consistent** — salt loss = lithium retention
- ⚠ Maintain 2–3 L fluid intake per day
- ⚠ **Independent double-check** required per many facility policies
- ⚠ **Do NOT stop abruptly** — taper under provider guidance

8. PATIENT EDUCATION

The Patient MUST Know:

- ✓ Take medication **exactly as prescribed** — do not skip or double
- ✓ Maintain **consistent salt intake** — do NOT start a low-sodium diet
- ✓ Drink **2–3 liters of water daily** (avoid dehydration)
- ✓ Use **acetaminophen (Tylenol)** for pain — **AVOID NSAIDs**
- ✓ Limit caffeine (sudden changes affect lithium levels)
- ✓ **Effective contraception** — lithium causes birth defects
- ✓ Effect takes **1–3 weeks** — be patient, continue taking even when feeling better
- ✓ **Keep all lab appointments** — levels and thyroid/kidney monitoring are non-negotiable

🚨 CALL PROVIDER / SEEK HELP IF:

- ☎️ Coarse tremor, slurred speech, confusion
- ☎️ Persistent vomiting, diarrhea, or fever
- ☎️ Ringing in ears, blurred vision, ataxia
- ☎️ Excessive thirst / urination (possible DI)
- ☎️ Fatigue, cold intolerance, weight gain (possible hypothyroidism)
- ☎️ Thoughts of self-harm or return of manic symptoms

🟨 9. NCLEX TEST TRAPS

⚠️ HIGH-FREQUENCY NCLEX TRAPS:

TRAP #1 — Electrolyte Confusion

- ✗ **WRONG:** "Low potassium causes lithium toxicity"
- ✓ **RIGHT: LOW SODIUM** causes lithium retention → toxicity

TRAP #2 — Tremor Interpretation

- ✗ **Any tremor ≠ toxicity.** FINE tremor = expected.
- ✓ **COARSE tremor = TOXICITY** — hold dose, draw level, notify provider

TRAP #3 — Timing of Level Draws

- ✗ **Peak levels** are NOT used
- ✓ **Always draw TROUGH —** 12 hrs after last dose, usually morning before AM dose

TRAP #4 — Acute Mania Pharmacology

- ✗ Do not expect lithium alone to control acute mania — it takes 1–3 weeks
- ✓ **Acute mania:** antipsychotic or benzodiazepine + lithium for bridging

TRAP #5 — Polyuria Misinterpretation

- ✗ Polyuria ≠ "good hydration"
- ✓ **Can indicate nephrogenic diabetes insipidus** — report it

TRAP #6 — OTC Medications

- ✗ **Patient taking ibuprofen daily for arthritis?** DANGER — NSAID + lithium = toxicity
- ✓ **Teach:** acetaminophen is the safe OTC analgesic

TRAP #7 — Scheduling

- ✗ **Lithium is NEVER PRN**
- ✓ Scheduled dosing only — steady-state required for effect

🟩 10. MEMORY BOOSTERS & MNEMONICS

🧠 Mnemonic: "LITHIUM" — Adverse Effects

- **L** — Leukocytosis (benign ↑ WBC)
- **I** — Insipidus (nephrogenic diabetes insipidus)
- **T** — Tremor (fine = ok, coarse = toxic)
- **H** — Hypothyroidism / Heart (arrhythmia)
- **I** — Increased urination & thirst
- **U** — Unsteady gait (ataxia = toxicity sign)
- **M** — Metallic taste / Mania control

🧂 Mnemonic: "SALT" — Toxicity Triggers

- **S** — Sweating / Sickness (fever, vomiting)
- **A** — Acute dehydration
- **L** — Low-Sodium diet
- **T** — Thiazides / NSAIDs (drug interactions)

⚡ Quick Recall Patterns

- 🔷 **"Lithium follows sodium."** ↓ Na^+ → kidney reabsorbs lithium → toxicity
- 🔷 *"0.6 to 1.2 keeps you free; over 1.5 is trouble for thee."*
- 🔷 *"Fine is fine, coarse is a curse."* (Tremor interpretation)
- 🔷 **"Trough at 12"** — draw 12 hrs after last dose
- 🔷 *"Ebstein's = E for Embryo + E for Early pregnancy"*

🧠 CLINICAL JUDGMENT SNAPSHOT

NGN / NCJMM — Prioritization Readiness

? What is the #1 PRIORITY RISK with Lithium?

➤ **LITHIUM TOXICITY** — rapid progression to seizures, coma, cardiovascular collapse, and death. The narrow therapeutic index (0.6–1.2 mEq/L) means small physiologic changes (dehydration, ↓ Na^+, NSAIDs, diuretics) can rapidly push the patient to dangerous levels.

? What will HARM the patient FIRST?

➤ **DEHYDRATION or SODIUM LOSS** — vomiting, diarrhea, fever, sweating, or a sudden low-salt diet. These cause the kidneys to reabsorb lithium along with sodium, rapidly escalating serum levels into the toxic range — often before the patient recognizes symptoms.

? What is the FIRST NURSING ACTION if toxicity is suspected?

➤ **HOLD the next dose** immediately, then **draw a STAT serum lithium level** and **notify the provider.** Concurrently: assess ABCs, airway & LOC, obtain Na^+ and renal labs, initiate IV fluids (NS) if ordered, institute seizure precautions, and prepare for possible hemodialysis if level > 2.5 mEq/L or severe symptoms.

🎯 **PRIORITY HIERARCHY: Safety → Airway → Circulation → Toxicity Reversal → Education**

⭐ MOST TESTED MOOD STABILIZERS ⭐

DRUG	USE	SIGNATURE TOXICITY	KEY MONITORING
Lithium	Bipolar I — gold standard; ↓ suicide	**Tremor, DI, hypothyroid, seizures >2.5**	Li level (trough), Na^+, BUN/Cr, TSH
Valproic Acid (Depakote)	Bipolar, mixed episodes, seizures	**Hepatotoxicity, pancreatitis, thrombocytopenia**	LFTs, amylase/lipase, platelets, ammonia
Carbamazepine (Tegretol)	Bipolar, trigeminal neuralgia, seizures	**Agranulocytosis, SJS (HLA-B*1502), aplastic anemia**	CBC w/ diff, LFTs, Na^+ (SIADH)
Lamotrigine (Lamictal)	Bipolar depression, maintenance	**STEVENS-JOHNSON SYNDROME (titrate slowly)**	Skin — STOP at rash; no routine level