

SOURCE NOTE: This topic was not included in your uploaded project notes. Content drawn from standard NGN NCLEX 2026 references: *Saunders Comprehensive Review for NCLEX-RN*, *ATI Pharmacology Made Easy*, *Lippincott Pharmacology for Nursing*, and current AHA/JNC hypertension guidelines.

PHARMACOLOGY

CARDIOVASCULAR

RENAL / FLUID-ELECTROLYTE

Thiazide & Thiazide-Like Diuretics

HCTZ · Methyclothiazide · Chlorthalidone · Indapamide · Metolazone — first-line agents for hypertension & mild-moderate edema

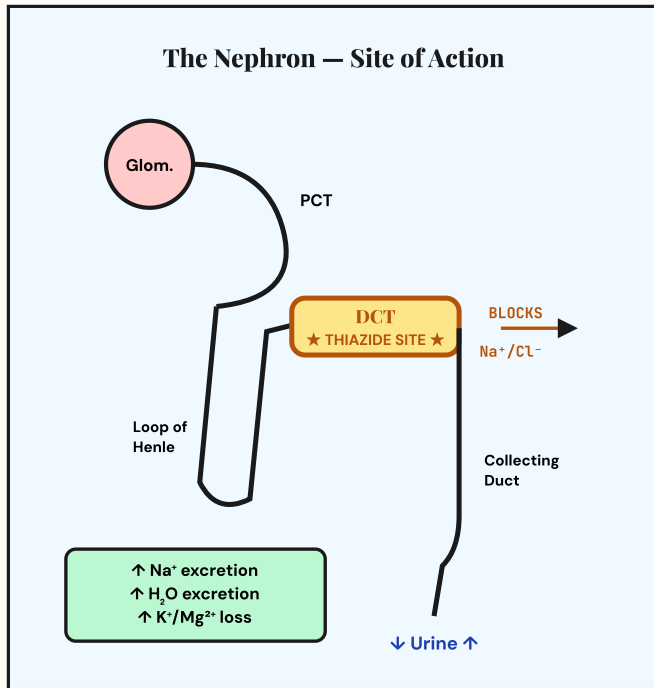
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Definition & Overview

- ▶ **Thiazide diuretics** are **sulfonamide-based** medications that act on the **distal convoluted tubule (DCT)** of the nephron to promote sodium and water excretion.
- ▶ Classified as **first-line therapy for primary hypertension** (JNC-8 / ACC-AHA guidelines) and used for **mild-to-moderate edema** from heart failure, hepatic, or renal disease.
- ▶ Considered "**low-ceiling**" **diuretics** — produce a modest diuresis compared to loop diuretics, but with longer duration and excellent BP control.
- ▶ Lose effectiveness when **CrCl < 30 mL/min** — except **Metolazone**, which still works in renal impairment and is often paired with loop diuretics for resistant edema.

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Mechanism of Action (Pathophysiology)



Step 1 — Site

Thiazides bind to the
Na⁺/Cl⁻ cotransporter (NCC)
in the early distal convoluted tubule.



Step 2 — Blockade

Inhibits Na⁺ and Cl⁻ reabsorption → more Na⁺ and water
stay in the tubule.



Step 3 — Diuresis

↑ Urine output, ↓ plasma volume, ↓ cardiac output →
↓ blood pressure.



Step 4 — Electrolyte Shift

↑ K⁺ & Mg²⁺ loss in urine | ↑ Ca²⁺ *reabsorption* (opposite
of loops!) | ↓ uric acid excretion.



Step 5 — Long-Term Effect

Vasodilation of arterioles develops with chronic use,
contributing to sustained BP reduction.

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Drug Comparison — The 5 Agents

DRUG	INDICATIONS	ROUTE	ONSET / PEAK / DURATION	USUAL DOSE	PEARL
Hydrochlorothiazide HCTZ • Microzide	HTN (1st line), edema, nephrogenic DI, Ca ²⁺ stone prevention	PO	Onset 2 hr Peak 4–6 hr Duration 6–12 hr	12.5–50 mg/day	Most-prescribed thiazide; combined with ACE-I / AR
Methyclothiazide Enduron	HTN, edema (HF, hepatic, renal disease)	PO	Onset 2 hr Peak ~6 hr Duration 24 hr	2.5–5 mg/day	Longer duration than HCT; once-daily dosing
Chlorthalidone Hygroton • Thalitone	HTN (preferred for CV risk reduction), edema	PO	Onset 2–3 hr Peak 2–6 hr Duration 24–72 hr	12.5–25 mg/day	Thiazide- <i>like</i> ; longest acti better outcomes data tha
Indapamide Lozol	HTN, edema in HF	PO	Onset 1–2 hr Peak 2 hr Duration ~36 hr	1.25–2.5 mg/day	Thiazide-like; less metabo effects; mild vasodilator
Metolazone ZaroxoLyn	Resistant edema (with loop diuretic), HF, HTN	PO	Onset 1 hr Peak ~2 hr Duration 12–24 hr	2.5–10 mg/day	Works when CrCl < 30! G min before loop for synerg

4 Adverse Effects & Red Flags

Common / Expected

- **Hypokalemia** (#1 — muscle cramps, weakness)
- Hyponatremia (confusion, dizziness)
- Hypomagnesemia
- **Hypercalcemia** (opposite of loops)
- **Hyperglycemia** — caution in DM
- **Hyperuricemia** → may trigger gout
- Hyperlipidemia (↑ LDL, triglycerides)
- Orthostatic hypotension
- Photosensitivity
- Erectile dysfunction

RED FLAGS — Notify HCP

- ❗ Severe muscle weakness, arrhythmias ($K^+ < 3.0$)
- ❗ Confusion, seizures ($Na^+ < 125$)
- ❗ Severe gout attack with chest pain
- ❗ Stevens-Johnson rash / blistering skin
- ❗ Pancreatitis (severe epigastric pain)
- ❗ Anaphylaxis — **sulfa cross-reactivity!**
- ❗ Digoxin toxicity (yellow halos, N/V) — ↓ K^+ ↑ dig effect
- ❗ Lithium toxicity (tremor, confusion) — thiazides ↓ Li^+ clearance

HyperGLUC

Thiazides raise: **G**lucose · **L**ipids · **U**ric acid · **C**alcium

5 Priority Nursing Interventions (ABC + Safety)

A

AIRWAY / ALLERGY

- ✓ Screen for **sulfa allergy** before first dose
- ✓ Monitor for anaphylaxis, angioedema
- ✓ Assess respiratory effort if SOB develops

B

BREATHING / BP

- ✓ Monitor **BP supine & standing** (orthostasis)
- ✓ Lung sounds — fluid status
- ✓ Apical pulse before dose

C

CIRCULATION / CHEMISTRIES

- ✓ **Daily weight** (same time, same scale)
- ✓ Strict **I & O**
- ✓ Monitor **K^+ , Na^+ , Mg^{2+} , Ca^{2+} , glucose, uric acid, BUN/Cr**
- ✓ Cardiac rhythm if K^+ low

PRIORITY

Give in the morning to prevent nocturia. **Hold and notify HCP** if SBP < 90 mm Hg or $K^+ < 3.5$ mEq/L. Always check the most recent **potassium level** before administering — this is the #1 NCLEX safety check.

6 NCLEX Test Traps ⚠️

✗ **WRONG:** Thiazides and loop diuretics affect calcium the same way.

✓ **RIGHT:** **Loops LOSE** calcium (hypocalcemia). **Thiazides TAKE BACK** calcium (hypercalcemia) — that's why thiazides prevent kidney stones.

✗ **WRONG:** Give HCTZ at bedtime for 24-hour coverage.

✓ **RIGHT:** Give thiazides in the **morning** — bedtime dosing causes nocturia and sleep disruption.

✗ **WRONG:** A patient on HCTZ and digoxin needs no extra monitoring.

✓ **RIGHT:** Hypokalemia from thiazide **potentiates digoxin toxicity**. Watch for yellow/green halos, N/V, bradycardia. Monitor K⁺ closely.

✗ **WRONG:** Thiazides are safe for all renal patients.

✓ **RIGHT:** Thiazides become **ineffective when CrCl < 30 mL/min** — switch to a loop diuretic. **Exception:** Metolazone still works.

✗ **WRONG:** A patient with a sulfa allergy can take HCTZ.

✓ **RIGHT:** Thiazides are **sulfonamide derivatives** — cross-sensitivity is possible. Document allergy status & clarify with HCP.

✗ **WRONG:** Lithium and HCTZ are a safe combo.

✓ **RIGHT:** Thiazides ↓ **lithium excretion** → high risk of **lithium toxicity** (tremor, N/V, confusion). Avoid combo or monitor lithium levels closely.

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Patient & Family Education



Timing

Take in the *morning* with food. If twice daily, take the second dose no later than 6 PM.



Eat Potassium-Rich Foods

Bananas, oranges, potatoes, spinach, avocados, tomatoes, raisins, beans. Do *not* use salt substitutes (often KCl) without HCP approval.



Daily Weight

Same scale, same time, same clothing. Report a gain of

> 2 lb in 24 hr

or

> 5 lb in a week

.



Slow Position Changes

Sit on the bed edge for 1–2 minutes before standing to prevent orthostatic dizziness and falls.



Sun Precautions

Wear sunscreen (SPF 30+) and protective clothing — thiazides cause photosensitivity.



Avoid Alcohol

Alcohol potentiates hypotension and dehydration.



Diabetics

Monitor blood glucose more frequently — thiazides can raise blood sugar. Report fasting glucose > 180.



Call HCP if...

Muscle cramps, severe weakness, irregular heartbeat, rash, joint pain (gout flare), or signs of dehydration.

8 Memory Boosters & Mnemonics

G · L · U · C

"HYPERGLUC"

Thiazides RAISE: **G**lucose, **L**ipids, **U**ric acid, **C**alcium

L · L · T · T

"LOOPS LOSE, THIAZIDES TAKE"

Loops Lose calcium (hypocalcemia) · Thiazides Take it back (hypercalcemia)

D · C · T

"DISTAL CONVOLUTED TUBULE"

Site of action — **D**own goes BP, **C**alcium up, **T**hin out the blood volume

M · O · R · N

"MORNING ONLY — RESTFUL NIGHTS"

Always dose in the **AM** to avoid nocturia and falls

K · L · D

"K LOSS + LITHIUM + DIG"

Three drug interactions to memorize: **K**⁺ loss potentiates **Dig** · ↓ Lithium clearance

S · A · D

"SULFA ALLERGY DANGER"

All thiazides are sulfa-based — screen allergies **before** the first dose

9 NGN Clinical Judgment Scenario (NCJMM 6-Step)

SCENARIO

Mrs. R, a 72-year-old female with HTN, type 2 DM, and HF, has been taking hydrochlorothiazide 25 mg PO daily

for 6 months. She presents to the clinic reporting "My legs feel like jelly, I keep getting cramps in my calves at night, and my heart skipped a few times yesterday." She also mentions she's been "eating clean — no bananas because of carbs." VS: BP 102/64, HR 58 irregular, RR 18, Temp 98.4°F. Labs: K⁺ 2.9 mEq/L, Na⁺ 132, Glucose 168, Mg²⁺ 1.5, Digoxin level 2.4 ng/mL.

1 Recognize Cues

- **Subjective:** Muscle weakness ("legs like jelly"), nocturnal calf cramps, palpitations ("heart skipped"), restrictive diet (no high-K⁺ foods)
- **Objective:** BP 102/64 (low), HR 58 irregular (bradycardia + dysrhythmia), K⁺ 2.9 (hypokalemia), Na⁺ 132 (mild hyponatremia), Mg²⁺ 1.5 (low), **Dig 2.4 ng/mL (toxic — >2.0)**

2 Analyze Cues

HCTZ has caused **hypokalemia and hypomagnesemia** — worsened by patient's avoidance of potassium-rich foods. Low K⁺ has **potentiated digoxin toxicity** (dig 2.4) → bradycardia, irregular pulse, risk of life-threatening arrhythmia. The mild hyponatremia and borderline BP suggest volume depletion. Clinical picture = **hypokalemia + digoxin toxicity + dehydration**.

3 Prioritize Hypotheses

- **#1 priority (life threat):** Digoxin toxicity from HCTZ-induced hypokalemia → dysrhythmia risk
- **#2:** Symptomatic hypokalemia & hypomagnesemia
- **#3:** Volume depletion / orthostasis & fall risk
- **#4:** Patient teaching gap — dietary K⁺ misconception

4 Generate Solutions

- Hold next HCTZ *and* digoxin dose; notify HCP STAT
- Continuous cardiac monitoring / 12-lead ECG
- Anticipate IV potassium replacement (cardiac monitor required) and IV magnesium
- Anticipate **digoxin immune Fab (Digibind)** if symptomatic dysrhythmia / level > 2.5
- Fall precautions; orthostatic VS
- Dietary consult — clarify K⁺ misconceptions

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Take Action

- **Now:** Hold HCTZ & digoxin · place on telemetry · IV access · STAT 12-lead ECG · call HCP
- **Per HCP order:** KCl 40 mEq IV in 100 mL NS over 1 hr via pump (never IV push) · MgSO₄ 2 g IV · Digoxin immune Fab if ordered
- Reassess apical pulse, rhythm, K⁺, and digoxin levels q1–2h
- Teach: "Bananas are fine — the small amount of carbs is far less risky than low potassium with your heart medication."

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Evaluate Outcomes

- **Expected (resolved):** K⁺ 3.5–5.0 · Mg²⁺ ≥ 1.8 · Dig level < 2.0 ng/mL · HR > 60 regular · resolved cramps & palpitations · BP > 110/70
- **Unresolved / escalate:** Persistent dysrhythmia, ongoing weakness, worsening confusion, falling BP — repeat labs & consider Digibind
- **Long-term:** Reassess regimen — may switch to a K⁺-sparing combination (HCTZ–triamterene) or change agent · confirm dietary teaching retained at follow-up