Crown to Cortex

Pharmacology

Diuretics and Antidiuretics

The Unhackables Medical

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How to read this topic

Diuretics and Antidiuretics is a high-yield Pharmacology topic for NEET PG and INI-CET. The safest preparation approach is to organize it by mechanism, classification, prototype drugs, indications, adverse effects, contraindications, interactions, and emergency use. This PDF is designed as a compact final-revision note, not a textbook chapter.

Classify

Place the drug in the correct class before reading the clinical stem.

Mechanism

Convert receptor, enzyme, or pathway action into expected benefit.

Patient filter

Apply pregnancy, renal/hepatic disease, ECG, electrolyte, allergy, and interaction filters.

Exam answer

Choose the drug that fits the indication and avoids the hidden contraindication.

Classification map

Class / axis	High-yield details
Carbonic anhydrase inhibitors	acetazolamide
Loop diuretics	furosemide, torsemide, bumetanide, ethacrynic acid
Thiazides	hydrochlorothiazide, chlorthalidone, indapamide
K-sparing	spironolactone, eplerenone, amiloride, triamterene
Osmotic	mannitol
ADH drugs	desmopressin, vaptans, demeclocycline

Prototype drug map

Prototype	What to remember
Furosemide	edema, pulmonary edema, hypercalcemia
Thiazide	HTN, nephrogenic DI, calcium stone prevention
Spironolactone	HF, cirrhosis ascites, hyperaldosteronism
Mannitol	raised ICP; avoid pulmonary edema

Prototype	What to remember
Desmopressin	central DI, vWD, hemophilia A

Mechanism to clinical use

1. Carbonic anhydrase inhibitors

Mechanism anchor: acetazolamide. In NEET PG style questions, this becomes important when the stem asks for drug choice, mechanism of toxicity, resistance, organ-specific effect, or a contraindication. Always connect the class to the expected physiological change rather than memorizing the name alone.

Clinical conversion: ask whether the desired effect is immediate symptom relief, disease modification, prophylaxis, reversal of toxicity, or long-term prevention. The same class can be correct or wrong depending on timing, route, patient risk, and monitoring feasibility.

2. Loop diuretics

Mechanism anchor: furosemide, torsemide, bumetanide, ethacrynic acid. In NEET PG style questions, this becomes important when the stem asks for drug choice, mechanism of toxicity, resistance, organ-specific effect, or a contraindication. Always connect the class to the expected physiological change rather than memorizing the name alone.

Clinical conversion: ask whether the desired effect is immediate symptom relief, disease modification, prophylaxis, reversal of toxicity, or long-term prevention. The same class can be correct or wrong depending on timing, route, patient risk, and monitoring feasibility.

3. Thiazides

Mechanism anchor: hydrochlorothiazide, chlorthalidone, indapamide. In NEET PG style questions, this becomes important when the stem asks for drug choice, mechanism of toxicity, resistance, organ-specific effect, or a contraindication. Always connect the class to the expected physiological change rather than memorizing the name alone.

Clinical conversion: ask whether the desired effect is immediate symptom relief, disease modification, prophylaxis, reversal of toxicity, or long-term prevention. The same class can be correct or wrong depending on timing, route, patient risk, and monitoring feasibility.

4. K-sparing

Mechanism anchor: spironolactone, eplerenone, amiloride, triamterene. In NEET PG style questions, this becomes important when the stem asks for drug choice, mechanism of toxicity, resistance, organ-specific effect, or a contraindication. Always connect the class to the expected physiological change rather than memorizing the name alone.

Clinical conversion: ask whether the desired effect is immediate symptom relief, disease modification, prophylaxis, reversal of toxicity, or long-term prevention. The same class can be correct or wrong depending on timing, route, patient risk, and monitoring feasibility.

5. Osmotic

Mechanism anchor: mannitol. In NEET PG style questions, this becomes important when the stem asks for drug choice, mechanism of toxicity, resistance, organ-specific effect, or a contraindication. Always connect the class to the expected physiological change rather than memorizing the name alone.

Clinical conversion: ask whether the desired effect is immediate symptom relief, disease modification, prophylaxis, reversal of toxicity, or long-term prevention. The same class can be correct or wrong depending on timing, route, patient risk, and monitoring feasibility.

6. ADH drugs

Mechanism anchor: desmopressin, vaptans, demeclocycline. In NEET PG style questions, this becomes important when the stem asks for drug choice, mechanism of toxicity, resistance, organ-specific effect, or a contraindication. Always connect the class to the expected physiological change rather than memorizing the name alone.

Clinical conversion: ask whether the desired effect is immediate symptom relief, disease modification, prophylaxis, reversal of toxicity, or long-term prevention. The same class can be correct or wrong depending on timing, route, patient risk, and monitoring feasibility.

Drug signatures

Drug / class	Mechanism cue	Use cue	Toxicity cue
Furosemide	edema, pulmonary edema, hypercalcemia	Know preferred indication	Know signature adverse effect
Thiazide	HTN, nephrogenic DI, calcium stone prevention	Know preferred indication	Know signature adverse effect
Spironolactone	HF, cirrhosis ascites, hyperaldosteronism	Know preferred indication	Know signature adverse effect
Mannitol	raised ICP	Know preferred indication	Know signature adverse effect
Desmopressin	central DI, vWD, hemophilia A	Know preferred indication	Know signature adverse effect

Clinical edges

- Electrolytes: loops lose Ca/Mg/K; thiazides retain Ca; K-sparing cause hyperkalemia
- Ototoxicity: loops, especially ethacrynic acid and aminoglycoside combination
- Metabolic: thiazides cause hyperuricemia, hyperglycemia, hyperlipidemia
- SIADH: fluid restriction, hypertonic saline if severe, vaptans in selected cases
- For Diuretics and Antidiuretics, start every clinical question by identifying the syndrome, patient risk factors, organ function, pregnancy status, and interacting drugs.
- Prototype drugs are more important than long drug lists; know one clean example for each mechanism.
- Adverse-effect signatures often identify the drug even when the stem hides the class name.
- When two drugs look similar, compare onset, route, elimination, monitoring, and toxicity.

Adverse effects and contraindication logic

Furosemide

Expected exam cue: edema, pulmonary edema, hypercalcemia. When this drug or class appears in a clinical vignette, actively look for allergy, pregnancy risk, renal or hepatic impairment, ECG abnormality, electrolyte disturbance, bleeding risk, respiratory disease, CNS depression, or interacting medicines.

How to eliminate options: reject drugs that worsen the dominant clinical danger in the stem, even if their mechanism seems suitable. This is especially important in pharmacology questions where the wrong option is often a contraindicated first-line drug.

Thiazide

Expected exam cue: HTN, nephrogenic DI, calcium stone prevention. When this drug or class appears in a clinical vignette, actively look for allergy, pregnancy risk, renal or hepatic impairment, ECG abnormality, electrolyte disturbance, bleeding risk, respiratory disease, CNS depression, or interacting medicines.

How to eliminate options: reject drugs that worsen the dominant clinical danger in the stem, even if their mechanism seems suitable. This is especially important in pharmacology questions where the wrong option is often a contraindicated first-line drug.

Spironolactone

Expected exam cue: HF, cirrhosis ascites, hyperaldosteronism. When this drug or class appears in a clinical vignette, actively look for allergy, pregnancy risk, renal or hepatic impairment, ECG abnormality, electrolyte disturbance, bleeding risk, respiratory disease, CNS depression, or interacting medicines.

How to eliminate options: reject drugs that worsen the dominant clinical danger in the stem, even if their mechanism seems suitable. This is especially important in pharmacology questions where the wrong option is often a contraindicated first-line drug.

Mannitol

Expected exam cue: raised ICP; avoid pulmonary edema. When this drug or class appears in a clinical vignette, actively look for allergy, pregnancy risk, renal or hepatic impairment, ECG abnormality, electrolyte disturbance, bleeding risk, respiratory disease, CNS depression, or interacting medicines.

How to eliminate options: reject drugs that worsen the dominant clinical danger in the stem, even if their mechanism seems suitable. This is especially important in pharmacology questions where the wrong option is often a contraindicated first-line drug.

Desmopressin

Expected exam cue: central DI, vWD, hemophilia A. When this drug or class appears in a clinical vignette, actively look for allergy, pregnancy risk, renal or hepatic impairment, ECG abnormality, electrolyte disturbance, bleeding risk, respiratory disease, CNS depression, or interacting medicines.

How to eliminate options: reject drugs that worsen the dominant clinical danger in the stem, even if their mechanism seems suitable. This is especially important in pharmacology questions where the wrong option is often a contraindicated first-line drug.

Exam traps

- Do not choose a drug only because it belongs to the right class; contraindications can reverse the answer.
- Do not ignore renal or hepatic impairment in dosing questions.
- Drug interactions are commonly tested through enzyme induction, enzyme inhibition, additive toxicity, or pharmacodynamic opposition.
- Emergency therapy depends on speed and route, not only mechanism.
- In Diuretics and Antidiuretics, do not memorize a class without its route, onset, elimination, and monitoring.
- Toxicity questions often hide the drug name and reveal the answer through one adverse-effect signature.
- Contraindications are tested more often than rare mechanisms.
- A drug can be first-line in one patient and dangerous in another.

Last-day revision grid

Question	Answer to recall quickly
Best prototype?	Furosemide, Thiazide, Spironolactone, Mannitol
Most tested danger?	toxicity, contraindication, interaction, and monitoring
Emergency angle?	route, onset, antidote, supportive care
Do-not-miss filter?	pregnancy, renal/hepatic failure, ECG/electrolytes, bleeding or respiratory risk

High-yield definitions

Term	Definition / exam meaning
Carbonic anhydrase inhibitors	acetazolamide
Loop diuretics	furosemide, torsemide, bumetanide, ethacrynic acid
Thiazides	hydrochlorothiazide, chlorthalidone, indapamide
K-sparing	spironolactone, eplerenone, amiloride, triamterene
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Furosemide	edema, pulmonary edema, hypercalcemia
Thiazide	HTN, nephrogenic DI, calcium stone prevention
Spironolactone	HF, cirrhosis ascites, hyperaldosteronism
Mannitol	raised ICP; avoid pulmonary edema
Desmopressin	central DI, vWD, hemophilia A

How this helps in Diuretics and Antidiuretics: this page is meant to convert memorized pharmacology into option elimination. Read the left column first, then force yourself to say the mechanism, clinical use, toxicity, and reason another option is wrong.

Drug-by-drug comparison

Comparison	How to separate them in an exam stem	Most useful discriminator
Furosemide vs Thiazide	Furosemide is recalled by: edema, pulmonary edema, hypercalcemia. Thiazide is recalled by: HTN, nephrogenic DI, calcium stone prevention.	Indication, toxicity pattern, route/onset, or contraindication hidden in the stem.
Spironolactone vs Mannitol	Spironolactone is recalled by: HF, cirrhosis ascites, hyperaldosteronism. Mannitol is recalled by: raised ICP; avoid pulmonary edema.	Indication, toxicity pattern, route/onset, or contraindication hidden in the stem.

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Toxicity signatures

Drug / class	Toxicity pattern to actively search for	Immediate exam response
Furosemide	Link the prototype clue to organ toxicity, laboratory change, ECG change, bleeding, CNS depression, allergy, or pregnancy risk. Cue: edema, pulmonary edema, hypercalcemia	Stop/avoid the drug if the stem contains the danger sign; choose antidote or safer alternative when asked.
Thiazide	Link the prototype clue to organ toxicity, laboratory change, ECG change, bleeding, CNS depression, allergy, or pregnancy risk. Cue: HTN, nephrogenic DI, calcium stone prevention	Stop/avoid the drug if the stem contains the danger sign; choose antidote or safer alternative when asked.
Spironolactone	Link the prototype clue to organ toxicity, laboratory change, ECG change, bleeding, CNS depression, allergy, or pregnancy risk. Cue: HF, cirrhosis ascites, hyperaldosteronism	Stop/avoid the drug if the stem contains the danger sign; choose antidote or safer alternative when asked.
Mannitol	Link the prototype clue to organ toxicity, laboratory change, ECG change, bleeding, CNS depression, allergy, or pregnancy risk. Cue: raised ICP; avoid pulmonary edema	Stop/avoid the drug if the stem contains the danger sign; choose antidote or safer alternative when asked.
Desmopressin	Link the prototype clue to organ toxicity, laboratory change, ECG change, bleeding, CNS depression, allergy, or pregnancy risk. Cue: central DI, vWD, hemophilia A	Stop/avoid the drug if the stem contains the danger sign; choose antidote or safer alternative when asked.
Diuretics and Antidiuretics	Any severe allergy, organ failure, pregnancy risk, or dangerous interaction can override first-line status.	Do not pick a drug only because it is famous.

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Contraindication filters

Clinical filter	What it changes	Exam habit
Pregnancy/lactation	Avoid teratogenic, fetal-toxic, or neonatal-toxic drugs; prefer established safer options.	Always scan age/sex/history lines.
Renal impairment	Accumulation increases toxicity for renally cleared drugs; dose interval may need extension.	Look for creatinine, oliguria, CKD, elderly patient.
Hepatic disease	Reduced metabolism, low albumin, and bleeding risk can change drug choice.	Check jaundice, cirrhosis, INR, albumin.
ECG/electrolytes	QT prolongation, heart block, hypokalemia, and hyperkalemia decide many answers.	Never ignore ECG and potassium.
Respiratory disease	Bronchospasm or respiratory depression risk can make a familiar drug unsafe.	Asthma/COPD/sleep apnea are not decorative details.
Bleeding risk	Antiplatelets, anticoagulants, thrombolytics, NSAIDs, and marrow-toxic drugs need caution.	Check ulcer, surgery, stroke, platelets, INR.
Furosemide	edema, pulmonary edema, hypercalcemia	Ask: where is this drug dangerous?
Thiazide	HTN, nephrogenic DI, calcium stone prevention	Ask: where is this drug dangerous?
Spironolactone	HF, cirrhosis ascites, hyperaldosteronism	Ask: where is this drug dangerous?

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Drug interaction map

Interaction type	Mechanism	Common exam expression
CYP induction	Increases metabolism of substrate drugs and can cause treatment failure.	Rifampicin/carbamazepine/phenytoin reducing OCP, warfarin, antiretroviral, or steroid effect.
CYP inhibition	Raises substrate levels and toxicity.	Macrolide/azole/ritonavir/cimetidine/grapefruit toxicity stem.
Additive toxicity	Two drugs injure the same organ or pathway.	QT plus QT, bleeding plus bleeding, nephrotoxic plus nephrotoxic, CNS depressant plus CNS depressant.
Pharmacodynamic opposition	One drug blocks the desired effect of another.	NSAID reducing antihypertensive effect; beta blocker opposing beta agonist.
Furosemide	edema, pulmonary edema, hypercalcemia	Check whether the vignette adds another drug that amplifies toxicity or reduces benefit.
Thiazide	HTN, nephrogenic DI, calcium stone prevention	Check whether the vignette adds another drug that amplifies toxicity or reduces benefit.
Spironolactone	HF, cirrhosis ascites, hyperaldosteronism	Check whether the vignette adds another drug that amplifies toxicity or reduces benefit.
Mannitol	raised ICP; avoid pulmonary edema	Check whether the vignette adds another drug that amplifies toxicity or reduces benefit.

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Monitoring and dose adjustment

Monitoring target	Why it matters	What to remember
Clinical endpoint	Symptom relief or prevention outcome confirms benefit.	Pain, BP, seizure control, infection response, glucose, dyspnea, psychosis, bleeding.
Laboratory endpoint	Detects efficacy and silent toxicity.	Renal function, liver enzymes, CBC, electrolytes, coagulation, glucose, drug levels.
ECG	Many drugs alter conduction, QT, or rhythm.	QT prolongation, AV block, QRS widening, torsades risk.
Therapeutic drug monitoring	Needed when therapeutic window is narrow.	Lithium, digoxin, phenytoin, valproate, aminoglycosides, vancomycin, tacrolimus.
Furosemide	Monitoring depends on the toxicity implied by its mechanism and elimination.	edema, pulmonary edema, hypercalcemia
Thiazide	Monitoring depends on the toxicity implied by its mechanism and elimination.	HTN, nephrogenic DI, calcium stone prevention
Spironolactone	Monitoring depends on the toxicity implied by its mechanism and elimination.	HF, cirrhosis ascites, hyperaldosteronism

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Emergency decision table

Emergency scenario	First pharmacology decision	Common mistake
Shock/anaphylaxis/severe acute state	Choose route and onset before elegance of mechanism.	Choosing an oral chronic drug for an emergency.
Poisoning/toxicity	Stabilize airway, breathing, circulation, then antidote if indicated.	Giving antidote while ignoring supportive care.
Severe infection or organ-threatening disease	Start rational empirical therapy promptly, then narrow when data arrives.	Waiting for perfect information in an unstable patient.
Withdrawal or rebound	Recognize dependence physiology and taper/replace appropriately.	Abruptly stopping clonidine, beta blockers, steroids, opioids, alcohol, or benzodiazepines.
Diuretics and Antidiuretics: Furosemide	edema, pulmonary edema, hypercalcemia	Wrong route, delayed onset, or ignored contraindication.
Diuretics and Antidiuretics: Thiazide	HTN, nephrogenic DI, calcium stone prevention	Wrong route, delayed onset, or ignored contraindication.
Diuretics and Antidiuretics: Spironolactone	HF, cirrhosis ascites, hyperaldosteronism	Wrong route, delayed onset, or ignored contraindication.
Diuretics and Antidiuretics: Mannitol	raised ICP; avoid pulmonary edema	Wrong route, delayed onset, or ignored contraindication.

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INI-CET stem decoding

Stem clue	What it is trying to test	Answer strategy
Age, pregnancy, renal/liver disease	Safety filter rather than diagnosis.	Eliminate unsafe drugs first.
New symptom after drug start	Adverse-effect signature.	Name the drug from toxicity.
Drug added recently	Interaction question.	Check CYP, QT, bleeding, CNS depression, nephrotoxicity.
Emergency wording	Route/onset question.	Prefer fast, titratable, evidence-based acute therapy.
Chronic prevention wording	Outcome benefit question.	Prefer disease-modifying therapy over only symptomatic relief.
Carbonic anhydrase inhibitors	acetazolamide	Place this under Diuretics and Antidiuretics, then compare with nearby alternatives.
Loop diuretics	furosemide, torsemide, bumetanide, ethacrynic acid	Place this under Diuretics and Antidiuretics, then compare with nearby alternatives.
Thiazides	hydrochlorothiazide, chlorthalidone, indapamide	Place this under Diuretics and Antidiuretics, then compare with nearby alternatives.
K-sparing	spironolactone, eplerenone, amiloride, triamterene	Place this under Diuretics and Antidiuretics, then compare with nearby alternatives.

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Rapid pathway

Read the stem

Disease, severity, age, pregnancy, organ function, emergency status.

Name the class

Mechanism and prototype before option elimination.

Apply exclusions

Contraindications, interactions, and toxicity signatures.

Pick final answer

Most specific safe drug for that exact stem.