

Diuretics And Drugs Affecting Renal Function, Water And Electrolyte Metabolism

Subcommittee:

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| Agents Affecting the Renal Conservation of Water | |
| Recommended Curriculum Equivalent: 1 hr. | |
| Drug Classes and Drugs to Consider | |
| Vasopressin Agonists | Vasopressin Antagonists |
| DESMOPRESSIN (dDAVP) Vasopressin | Conivaptan Demeclocycline |
| Learning Objectives | |
| Physiology and Pathophysiology Explain the mechanisms by which the kidney makes a concentrated or dilute urine. Describe the roles of vasopressin, aquaporins, V ₁ and V ₂ receptors, cyclic AMP and prostaglandins in regulating renal epithelial water permeability. | |
| Mechanisms of Action Describe how drugs can mimic or interfere with the cellular mechanisms of vasopressin. | |
| Actions on organ systems Compare and contrast the renal and extrarenal effects of vasopressin and desmopressin. | |
| Pharmacokinetics Explain how altering the structure of vasopressin affects its pharmacokinetics and pharmacodynamics. | |
| Adverse effects, drug interactions and contraindications Explain the mechanism of vasoconstriction produced by vasopressin. Explain how NSAIDs and clonidine can alter water reabsorption by the kidney. Describe the hazards of correcting hyponatremia with vasopressin antagonists too rapidly. Explain how drugs such as clonidine, chlorpropamide, demeclocycline, lithium, and NSAIDs can modify the action of vasopressin. Explain how blocking the V ₁ receptor can alter ACTH secretion. | |
| Therapeutic uses Compare and contrast the therapy of central and nephrogenic diabetes insipidus. Describe the pharmacological treatment of the syndrome of inappropriate ADH secretion. Explain the mechanisms of demeclocycline and lithium carbonate interference with renal water reabsorption. | |
| Notes Objectives for desmopressin-enhanced clotting factor release are covered in | |

Hematological Drugs.

Diuretics

Recommended Curriculum Equivalent: 2 hrs.

Drug Classes and Drugs to Consider

| Carbonic Anhydrase Inhibitor | Osmotic Diuretic | Loop Diuretics | Distal tubule Diuretics | K-sparing Diuretics | |
|------------------------------|------------------|---------------------------------------------------------|-----------------------------------------------------|------------------------------|--------------------------|
| | | | | Aldosterone antagonists | Na-Channel inhibitors |
| Acetazolamide | Mannitol | Bumetanide FUROSEMIDE Na Ethacrynate Torsemide | CHLORTHALIDONE HYDROCHLOROTHIAZIDE Metolazone | Eplerenone SPIRONOLACTONE | AMILORIDE TRIAMTERINE |

Learning Objectives

Physiology and Pathophysiology

Describe the location and function of major ion transporters and channels on renal epithelial membranes.
 Explain how sodium transport influences the reabsorption of other ions and water in the kidney.
 Explain how abnormal renal function can cause hypertension or edema.

Mechanism of Action

Describe the changes that occur with electrolyte transport, water reabsorption and hemodynamics when specific diuretics inhibit kidney function.

Actions on organ systems

Describe the hemodynamic, ion transport and excretory effects of different classes of diuretic drugs.

Pharmacokinetics

Explain the importance of the organic anion transporters and protein binding to the renal action of diuretics.
 Provide examples of how other drugs or diseases can interfere with the effects of diuretics.

Adverse effects, drug interactions and contraindications

Explain how thiazides and loop diuretics can cause a metabolic alkalosis.
 Explain how diuretic therapy can lead to hyponatremia.
 Describe the metabolic imbalances with diuretic therapy on glucose, urate, lipids, calcium, magnesium and potassium. Explain the underlying mechanisms involved.
 Describe the clinical consequences of interactions between diuretics and drugs such as cardiac glycosides, oral hypoglycemics, uricosurics, aminoglycosides, amphotericin, NSAIDs and angiotensin inhibitors.
 Describe why reduced renal perfusion can limit the use of thiazide diuretics.

Therapeutic uses

Explain the renal and extrarenal mechanisms by which diuretics are useful in treating hypertension and edema.
 Explain how osmotic drugs can reduce toxic nephropathy.

Notes

Objectives for diuretics as antihypertensive drugs are covered in Cardiovascular Drugs
 Objectives for renin inhibitors, ACE inhibitors and angiotensin-receptor blockers are covered in Cardiovascular drugs.