doxercalciferol (dox-er-kal-sif-e-role)
Hectorol, vitamin D2

Classification
Therapeutic: vitamins
Pharmacologic: fat-soluble vitamins

Pregnancy Category B

Indications
Treatment of secondary hyperparathyroidism in patients undergoing chronic renal dialysis (IV and PO). Treatment of secondary hyperparathyroidism in patients with Stage 3 or 4 chronic kidney disease (PO only).

Action
Requires activation in the liver to create the active form of vitamin D2. Promotes the absorption of calcium and decreases parathyroid hormone concentrations. Therapeutic Effects: Treatment and prevention of deficiency states, particularly bone manifestations. Improved calcium and phosphorous homeostasis in patients with chronic kidney disease.

Pharmacokinetics
Absorption: IV administration results in complete bioavailability; well absorbed following oral administration.
Distribution: Unknown.
Metabolism and Excretion: Converted by the liver to the active form of vitamin D2.
Half-life: 32–37 hr (up to 96 hr).

TIME/ACTION PROFILE (effects on serum calcium)
ROUTE ONSET PEAK DURATION
PO unknown 8 wk 1 wk
IV unknown 8 wk 1 wk

Contraindications/Precautions
Contraindicated in: Hypersensitivity; Hypercalcemia; Vitamin D toxicity; Lactation: Lactation; Concurrent use of magnesium-containing antacids or other vitamin D analogues.
Use Cautiously in: Patients receiving digoxin; OB: Safety not established.

Adverse Reactions/Side Effects

Interactions
Drug-Drug: Cholestyramine, colestipol, or mineral oil ↓ absorption of vitamin D analogues. Use with thiazide diuretics may result in hypercalcemia. Corticosteroids effect of vitamin D analogues. Use with digoxin ↑ risk of arrhythmias. Concurrent use of magnesium-containing drugs may lead to hypermagnesemia. Calcium-containing drugs may ↑ risk of hypercalcemia. Concomitant use of other Vitamin D supplements ↑ risk of hypercalcemia. Agents that induce liver enzymes (phenobarbital, rifampin) and agents that inhibit liver enzymes (atazanavir, clarithromycin, erythromycin, indinavir, itraconazole, ketoconazole, nefazodone, nelfinavir, ritonavir, saquinavir, verapamil, voriconazole) may alter requirements for doxercalciferol (monitoring of calcium and phosphorus recommended). Drug-Food: Ingestion of foods high in calcium content may lead to hypercalcemia.

Route/Dosage
PO (Adults): Dialysis patients—10 mcg 3 times weekly (at dialysis); dose may be adjusted by 2.5 mcg at 8-wk intervals based on intact PTH concentrations (maximum dose 20 mcg 3 times weekly). Non-dialysis patients—1 mcg/day; dose may be adjusted by 0.5 mcg at 2–wk intervals based on intact PTH concentrations (maximum dose 3.5 mcg/day).
IV (Adults): 4 mcg 3 times weekly at the end of dialysis; dose may be adjusted by 1–2 mcg at 8-wk intervals based on intact PTH concentrations (maximum dose 6 mcg 3 times weekly).

NURSING IMPLICATIONS
Assessment
● Watch for signs of vitamin deficiency prior to and periodically during therapy.

Contraindicated in: Hypervitaminosis; Hypocalcemia. Vitamin D toxicity: Lactation: Lactation; Concurrent use of magnesium containing antacids or other vitamin D analogues.

Use Cautiously in: Patients receiving digoxin; OB: Safety not established.

Adverse Reactions/Side Effects

Interactions
Drug-Drug: Cholestyramine, colestipol, or mineral oil ↓ absorption of vitamin D analogues. Use with thiazide diuretics may result in hypercalcemia. Corticosteroids effect of vitamin D analogues. Use with digoxin ↑ risk of arrhythmias. Concurrent use of magnesium-containing drugs may lead to hypermagnesemia. Calcium-containing drugs may ↑ risk of hypercalcemia. Concomitant use of other Vitamin D supplements ↑ risk of hypercalcemia. Agents that induce liver enzymes (phenobarbital, rifampin) and agents that inhibit liver enzymes (atazanavir, clarithromycin, erythromycin, indinavir, itraconazole, ketoconazole, nefazodone, nelfinavir, ritonavir, saquinavir, verapamil, voriconazole) may alter requirements for doxercalciferol (monitoring of calcium and phosphorus recommended). Drug-Food: Ingestion of foods high in calcium content may lead to hypercalcemia.

Route/Dosage
PO (Adults): Dialysis patients—10 mcg 3 times weekly (at dialysis); dose may be adjusted by 2.5 mcg at 8-wk intervals based on intact PTH concentrations (maximum dose 20 mcg 3 times weekly). Non-dialysis patients—1 mcg/day; dose may be adjusted by 0.5 mcg at 2–wk intervals based on intact PTH concentrations (maximum dose 3.5 mcg/day).
IV (Adults): 4 mcg 3 times weekly at the end of dialysis; dose may be adjusted by 1–2 mcg at 8-wk intervals based on intact PTH concentrations (maximum dose 6 mcg 3 times weekly).

NURSING IMPLICATIONS
Assessment
● Watch for signs of vitamin deficiency prior to and periodically during therapy.

Contraindicated in: Hypervitaminosis; Hypocalcemia. Vitamin D toxicity: Lactation: Lactation; Concurrent use of magnesium containing antacids or other vitamin D analogues.

Use Cautiously in: Patients receiving digoxin; OB: Safety not established.

Adverse Reactions/Side Effects

Interactions
Drug-Drug: Cholestyramine, colestipol, or mineral oil ↓ absorption of vitamin D analogues. Use with thiazide diuretics may result in hypercalcemia. Corticosteroids effect of vitamin D analogues. Use with digoxin ↑ risk of arrhythmias. Concurrent use of magnesium-containing drugs may lead to hypermagnesemia. Calcium-containing drugs may ↑ risk of hypercalcemia. Concomitant use of other Vitamin D supplements ↑ risk of hypercalcemia. Agents that induce liver enzymes (phenobarbital, rifampin) and agents that inhibit liver enzymes (atazanavir, clarithromycin, erythromycin, indinavir, itraconazole, ketoconazole, nefazodone, nelfinavir, ritonavir, saquinavir, verapamil, voriconazole) may alter requirements for doxercalciferol (monitoring of calcium and phosphorus recommended). Drug-Food: Ingestion of foods high in calcium content may lead to hypercalcemia.

Route/Dosage
PO (Adults): Dialysis patients—10 mcg 3 times weekly (at dialysis); dose may be adjusted by 2.5 mcg at 8-wk intervals based on intact PTH concentrations (maximum dose 20 mcg 3 times weekly). Non-dialysis patients—1 mcg/day; dose may be adjusted by 0.5 mcg at 2–wk intervals based on intact PTH concentrations (maximum dose 3.5 mcg/day).
IV (Adults): 4 mcg 3 times weekly at the end of dialysis; dose may be adjusted by 1–2 mcg at 8-wk intervals based on intact PTH concentrations (maximum dose 6 mcg 3 times weekly).

NURSING IMPLICATIONS
Assessment
● Watch for signs of vitamin deficiency prior to and periodically during therapy.
Assess patient for bone pain and weakness prior to and during therapy.

Observe patient carefully for evidence of hypocalcemia (paresthesia, muscle twitching, carpopedal spasm, cardiac arrhythmias, and Chvostek's or Trousseau's sign). Protect symptomatic patient by raising and padding side rails; keep bed in low position.

**Lab Test Considerations:** Monitor serum ionized calcium, phosphorus, and intact PTH concentrations prior to initiation of therapy and then weekly during the first 12 wk of therapy. Following this, these labs can be monitored periodically. The serum calcium times phosphorus product (Ca X P) should be maintained at <55 mg²/dL².

Monitor alkaline phosphatase concentration periodically.

**Toxicity and Overdose:** Toxicity is manifested as hypercalcemia, hypercalciuria, and hyperphosphatemia. Assess patient for appearance of nausea, vomiting, anorexia, weakness, constipation, headache, bone pain, and musculoskeletal pain. Later symptoms include polyuria, polydipsia, photophobia, rhinorrhea, pruritus, and cardiac arrhythmias. Notify health care professional immediately if these signs of hypervitaminosis D occur. Treatment usually consists of discontinuation of doxercalciferol, a low-calcium diet, use of low-calcium dialysate in peritoneal dialysis patients, or administration of a laxative. IV hydration and loop diuretics may be ordered to increase urinary excretion of calcium. Hemodialysis may also be used.

**Potential Nursing Diagnoses**

-  **Imbalanced nutrition: less than body requirements (Indications)**
-  **Implementation**
  - **PO:** Doses usually given during dialysis sessions.
  - **Direct IV:** Administer by rapid injection through the catheter at the end of a hemodialysis period.

**Patient/Family Teaching**

-  **Advise patient that medication may be given during their dialysis sessions.**
-  **Review diet modifications with patient.**
-  **Encourage patient to comply with dietary recommendations of health care professional.**
-  **Explain that the best source of vitamin D is a well-balanced diet with foods from the 4 basic food groups and the importance of sunlight exposure.**
-  **Patients self-medicating with vitamin supplements should be cautioned not to exceed RDA. The effectiveness of megadoses for treatment of various medical conditions is unproved and may cause side effects.**
-  **Advise patients to avoid concurrent use of antacids containing magnesium.**
-  **Review symptoms of overdose and instruct patient to report these promptly to health care professional.**
-  **Emphasize the importance of follow-up exams to evaluate progress.**

**Evaluation/Desired Outcomes**

-  **Normalization of serum calcium and parathyroid hormone levels.**
-  **Why was this drug prescribed for your patient?**

© 2015 F.A. Davis Company