Vitamin D, 1,25-Dihydroxy and Vitamin D, 25-Hydroxy

Clinical Background

- Vitamin D, 1,25-dihydroxy [1,25(OH)2D] is the active form of vitamin D and is produced primarily in the kidney by the hydroxylation of vitamin D, 25-hydroxy [25(OH)D]. It is tightly bound to the transport protein DBP in circulation and has a half-life of four to six hours. Plasma levels of 1,25(OH)2D are increased in calcium-deficient individuals, children, and during pregnancy and lactation. Decreased levels of vitamin D 25(OH) are seen in the elderly due to malabsorption, decreased vitamin D intake, or lack of sun exposure. Since vitamin D is stored in the body, it may accumulate to toxic levels due to long-term therapeutic use or excessive self-medication, but this is rare.
- Vitamin D toxicity is rare.
- Although there are many disorders associated with abnormal plasma concentrations of 25(OH)D and 1,25(OH)2D, laboratory measurements are of value in only a few clinical conditions. These fall under one of three categories:
  - Intake is too little or too much
  - Altered synthesis
  - Altered sensitivity of target tissue

Indications for Ordering

- Vitamin D, 25-Hydroxy: order to diagnose vitamin D deficiency or sufficiency.
- Vitamin D, 1,25-Dihydroxy: order for patients with hypercalcemia or renal failure.

Additional Ordering Notes

Samples ordered for Vitamin D, 25-Hydroxy using test number 0080379 will be performed by the Diasorin® chemiluminescence immunoassay method, which measures both Vitamin D, 25 hydroxy D2 and D3 forms of vitamin D. The total with this method correlates highly with total vitamin D measured by LC/MS/MS.

Reference Interval

- For Vitamin D, 1,25-Dihydroxy (0080385): 15–75 pg/mL
- For Vitamin D, 25-Hydroxy (0080379): 30–57 ng/mL
- Samples ordered using test number 0080379 will still be performed by the Diasorin® Liason chemiluminescence immunoassay method. ARUP will continue to offer the RIA assay as an alternate method for patients on D2 therapy. Clients who wish to have samples performed by the RIA method can do so by ordering the Vitamin D 25-Hydroxy RIA test (0070277).
- If you have any questions or need to clarify a procedure, please contact ARUP Client Services at (800) 522-2787.

Methodology

- For Vitamin D, 1,25-Dihydroxy (0080385): Radioimmunoassay (RIA)
- For Vitamin D, 25-Hydroxy (0080379): Chemiluminescent Immunoassay

Table 210: Anticipated Vitamin D Levels in Hypocalcemic and Hypercalcemic Disorders

- Table 210 lists anticipated vitamin D levels in hypocalcemic and hypercalcemic disorders:

Clinical Disorder	25(OH)D	1,25(OH)2D
	Hypocalcemia	
Vitamin D deficiency	D	D, N, I
Severe hepatocellular disease	D	D, N
Nephrotic syndrome	D	D, N
Renal failure	N	D
Hyperphosphatemia	N	D
Hypoparathyroidism	N	D, N
Pseudohypoparathyroidism	N	D, N
Hypomagnesemia	N	D, N
Vitamin D-dependent rickets, type I (Pseudo vitamin D deficiency rickets)	N, I	D
Vitamin D-dependent rickets, type II (Pseudo vitamin D deficiency rickets)	N, I	D
	Hypercalcemia	
Vitamin D, 25(OH)D intoxication	I	D, N
$1,25(OH)_2D$ intoxication	N	I
Granulomatous diseases	N	N, I
Lymphoma	N	N, I
Hypercalcemia of malignancy	N	D, N
Hyperparathyroidism	N	N, I
Idiopathic hypercalciuria	N	N, I
D=Decreased, **N**=Normal, **I**=Increased		

- See also: Figure 50, "Algorithm for Evaluation of Hypercalcemia," and Figure 51, "Algorithm for Evaluation of Hypocalcemia," in Parathyroid Hormone (PTH), Bio-Intact, third feneration.

References

1. Holick M. Vitamin D Deficiency. *N Engl J Med* 2007; 357:266–81.
2. Binkley N, Krueger D. Evaluation and correction of low vitamin D status. *Curr Osteoporos Rep* 2008;6(3):95–9.
3. Adams JS, Hewison M. Update in Vitamin D. *J Clin Endocrinol Metab* 2010;95(2):471–8.
4. Kennel KA, Drake MT, Hurley DL. Vitamin D deficiency in adults: when to test and how to treat. *Mayo Clin Proc* 2010;85(8):752–7.

Test Information

0080379	**Vitamin D, 25-Hydroxy**
0080385	**Vitamin D, 1,25-Dihydroxy**

For specific collection, transport, and testing information, refer to the ARUP Web site at www.aruplab.com.

For information on test selection, ordering, and interpretation, refer to ARUP Consult® at www.arupconsult.com.