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# Biolab Medical Unit

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## Vitamin D

Biolab now offer a chromatographic vitamin D assay which separates and quantifies vitamin D<sub>3</sub> (cholecalciferol) and vitamin D<sub>2</sub> (ergocalciferol), the vitamers of most interest in the assessment of vitamin D status in humans. While many commercial, antibody-based vitamin D assays do not distinguish between these two forms of the vitamin, variations in the cross-reactivity of the antibodies has led to some confusion over the results, especially in subjects who may be receiving either vitamin D<sub>3</sub> or vitamin D<sub>2</sub> supplementation.

### Indications

Most humans depend on sun exposure to satisfy their requirement for vitamin D. Solar ultraviolet B photons are absorbed by 7-dehydrocholesterol in the skin, leading to its transformation to pre-vitamin D<sub>3</sub>, which is then converted to vitamin D<sub>3</sub> (cholecalciferol), which can also be obtained nutritionally from animal products. Season, latitude, time of day, skin pigmentation and ageing all influence cutaneous production of vitamin D<sub>3</sub>. Once formed, vitamin D<sub>3</sub> is metabolized in the liver to 25-hydroxyvitamin D<sub>3</sub> and then in the kidney to its biologically active form, 1,25-dihydroxy vitamin D<sub>3</sub> (1,25-dihydroxycholecalciferol or 1,25 DHCC).

Currently there are few indications for the measurement of 1,25-dihydroxy vitamin D, which is unstable in plasma and whose levels are much more variable than those of 25-hydroxy vitamin D.

1. In the elderly, vitamin D deficiency causes osteomalacia with subsequent osteoporotic fractures, while children with vitamin D deficiency can develop infantile rickets.
2. Failure to adequately convert 25-hydroxy vitamin D to 1,25-dihydroxy vitamin D has been reported in osteoporosis.
3. Subjects with malabsorption, those on anti-convulsants, individuals consuming a high phytate diet or those avoiding sun exposure are also at risk from vitamin D deficiency.
4. As well as its action in relation to calcium and bone structure, there is strong evidence for vitamin D having important roles in relation to immunity and the inhibition of cancer tumourigenesis.

### Synonyms

Vitamin D, 25-hydroxy vitamin D<sub>3</sub>, 25-hydroxy cholecalciferol, calcidiol.

### Patient preparation

No special preparation is required and the patient can continue to take nutritional supplements and medication before the collection of the sample.

### Specimen requirements

Serum separator tubes (plain gel tubes - available from Biolab on request). If posted, samples must reach Biolab within 24 hours.

**Price:** £40.00

## **Methodology**

High pressure liquid chromatography (HPLC), quantitating both vitamin D3 and vitamin D2 (if present).

## **Turn around time**

3-5 working days.

## **Interpretation**

The serum concentration of 25-hydroxy vitamin D is the most sensitive and useful index of vitamin D status and correlates with the plasma parathyroid hormone concentration and alkaline phosphatase activity. There is a two-fold seasonal variation in 25-hydroxy vitamin D in temperate regions of the globe.

For healthy subjects, with no medical condition and normal sun exposure, the serum reference interval for 25-hydroxy vitamin D is 75 – 200 nmol/L (30 – 80 µg/L).

The treatment target for subjects with medical conditions that may be associated with vitamin D deficiency is a serum range of 125 – 150 nmol/L (50 – 60 µg/L).

Vitamin D levels in supplemented individuals should be monitored carefully during the summer, when endogenous synthesis of vitamin D is at its maximum.

The level of vitamin D2, which is of plant origin and is the form contained in certain supplements, is reported separately. Total 25-hydroxy vitamin D can be taken as the sum of 25-hydroxy D3 and 25-hydroxy D2. Most subjects have very low levels of vitamin D2 in comparison to D3.

## **References**

1. Holick MF. Deficiency of sunlight and vitamin D. *BMJ* 2008;336:1318–1319.
2. Holick MF. Vitamin D and sunlight: strategies for cancer prevention and other health benefits. *Clin J Am Soc Nephrol* 2008;June 11.
3. Holick MF. Sunlight and vitamin D for bone health and prevention of autoimmune diseases, cancers, and cardiovascular disease. *Am J Clin Nutr* 80:1678-1688S, 2004.
4. Mawer EB, Davies M. Vitamin D nutrition and bone disease in adults. *Reviews in Endocrine & Metabolic Disorders* 2001; 2; 153-164.
5. Morris HA. Vitamin D: a hormone for all seasons – how much is enough? *Clin Biochem Rev* 2004; 26: 21-32.