

Vitamin B₁ in Whole Blood by HPLC

FOR ASSESSMENT OF THIAMINE NUTRITIONAL STATUS

Test Highlights

- Measures the concentration of thiamine diphosphate (TDP) in whole blood.
- Distinguishes thiamine diphosphate from free thiamine and other thiamine phosphate esters.

Clinical Background

- The vitamin B₁ family consists of the pyrimidyl-substituted thiazole, thiamine, and its phosphate esters.
- The principal biologically active form of thiamine, TDP, is a coenzyme in several enzyme complexes that play vital roles in the metabolism of carbohydrates, fats, and alcohol.
- Approximately 90 percent of the total thiamine content of whole blood is present as TDP.
- Measurement of whole blood TDP provides a good indication of the adequacy of body stores.
- Insufficient thiamine stores may result from inadequate dietary intake or chronic alcoholism. Thiamine deficiency causes deleterious changes in the cardiovascular and nervous systems and leads to the disease beriberi.

Indications for Ordering

This test may be used by physicians to assess vitamin B₁ concentration in patients with suspected deficiency or to monitor vitamin B₁ concentration in patients receiving supplementation.

Additional Ordering Notes

- Whole blood is the preferred specimen for thiamine assessment.
- Specimens must be transported frozen. Incompletely frozen specimens will yield decreased TDP values due to incomplete cell lysis.

Interpretation

- The expected concentration of TDP in whole blood is 70–180 nmol/L.
- The reference interval was determined for healthy adults who were not taking vitamin supplements.

Methodology

- Proteins are precipitated from whole blood using trichloroacetic acid.
- Thiamine and its phosphate esters are derivatized by potassium ferricyanide to thiochromes, which are isolated by gradient elution on a reverse phase HPLC column and detected by fluorescence.

References

1. Bontemps J, et al. Determination of thiamine and thiamine phosphates in excitable tissues as thiochrome derivatives by reversed-phase high-performance liquid chromatography on octadecyl silica. *J Chromatogr* 1984; 307:283–94.
2. Lynch PL, Young IS. Determination of thiamine by high-performance liquid chromatography. *J Chromatogr A* 2000; 881:267–84.
3. Talwar D, et al. Vitamin B1 status assessed by direct measurement of thiamin pyrophosphate in erythrocytes or whole blood by HPLC: comparison with erythrocyte transketolase activation assay. *Clin Chem* 2000; 46:704–10.

Test Information

0080388 **Vitamin B₁ (Thiamine), Whole Blood**

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.