

# Nutritional Status



## Insight into a Wide Range of Symptoms and Conditions

- Urine and Plasma Amino Acids
- Fatty Acids, Erythrocytes
- Plasma Methylation
- Urine Halides (Iodine, Bromine and Fluoride)



SCIENCE + INSIGHT

# Nutritional Status

Proper nutritional intake is essential to overall health and provides the raw materials the body needs to function in the form of carbohydrates, proteins, fats, vitamins and minerals.

Carbohydrates are broken down into sugars and used as energy. Protein is broken down into individual amino acids and used to build and repair muscles, the immune and nervous systems, hormones and organs. The body requires fats which function within the membranes that surround all the body's cells and are needed to signal hormones. Vitamins and minerals typically function as co-enzymes and have protective anti-inflammatory and antioxidant effects.

Doctor's Data offers a wide range of tests used to assess nutritional status and to monitor patient response to nutritional interventions.

## Vitamin D (25OH D2 & D3)



25-Hydroxyvitamin D, known for its role in bone health and calcium absorption, also appears to affect immune function, neurodegenerative and cardiovascular diseases, and other conditions. Vitamin D occurs in two forms—D3 is obtained from animal diet sources and through sun exposure, and D2 is obtained through vegetable diet sources. Both forms of the vitamin are used to fortify various foods and in supplements.

Doctor's Data uses the gold standard LC/MS method to measure Vitamin D2, D3, and total Vitamin D. Vitamin D status is also available via a blood spot profile.

Vitamin D deficiency is recognized as  
**a worldwide concern**

and is a contributing factor of many chronic debilitating diseases.

**DD**  
DOCTOR'S DATA

LAB #: Sample Report  
PATIENT: Sample Patient  
ID:   
SEX: Male  
DOB: 01/01/1971

CLIENT #: 12345  
DOCTOR: Sample Doctor  
Doctor's Data, Inc.  
3755 Illinois Ave.  
St. Charles, IL 60174

Vitamin D; serum

	RESULT ng/mL	REFERENCE INTERVAL	OPTIMAL				
			LOW	MOD-	NEAR	MOD+	HIGH
25-Hydroxyvitamin D Total	23	40 - 80					
25-Hydroxyvitamin D <sub>2</sub>	2						
25-Hydroxyvitamin D <sub>3</sub>	21						

25-Hydroxyvitamin D is the major circulating form of vitamin D, occurs in 2 forms: vitamin D<sub>2</sub> (ergocalciferol) and vitamin D<sub>3</sub> (cholecalciferol), and is the precursor of the active form (1,25-dihydroxyvitamin D). Because of its long half-life, measurement of total 25-Hydroxyvitamin D (D<sub>2</sub> plus D<sub>3</sub>) provides the best assessment of patient vitamin D status and includes vitamin D derived from diet, supplements and exposure to UVB light (e.g. sunlight). Vitamin D is best known for its role in calcium and bone metabolism but emerging research indicates that low levels of vitamin D may be associated with increased risk of some cancers, type 2 diabetes mellitus, multiple sclerosis, cardiovascular disease, rheumatoid arthritis, depression, Alzheimer's disease, infections, preeclampsia, cesarean deliveries and neurocognitive dysfunction. Vitamin D regulates the expression of a vast array of genes in tissues including immune cells, the vasculature, muscle and reproductive organs. Vitamin D insufficiency is common and deficiency can have adverse health effects at any stage of life.

Many testing methods do not differentiate between the 2 forms of Vitamin D and only total concentrations are reported. This LC/MS QQQ method is sensitive and specific for both Vitamin D<sub>2</sub> and D<sub>3</sub>, and each form is measured and reported independently.

**Reference Intervals**

Due to geographic location, ethnic background, and seasonal variation, population-based reference values for vitamin D do not correlate well with clinically relevant vitamin D effects and are of limited clinical value. The following reference intervals are similar to those of the 2011 Endocrine Society Practice Guidelines and apply to males and females of all ages.

**< 10 ng/ml (< 25 nmol/L) - severe deficiency.** May be associated with osteomalacia or rickets (children). Serum calcium and phosphate may be low and, parathyroid hormone and serum alkaline phosphatase may be abnormally high.

**< 20 ng/ml (< 50 nmol/L) - deficiency.** Increased risk of osteoporosis and secondary hyperparathyroidism.

**20 - < 40 ng/ml (50 - < 100 nmol/L) - moderate deficiency to suboptimal.** In addition to insufficient intake and exposure to UVB light, consider malabsorption syndromes (e.g. pancreatic insufficiency, Celiac or Crohn's disease), hepatic or kidney disease, and prolonged use of medications such as antifungals, antiseizure drugs, cholestyramine and glucocorticoids.

**40 - 80 ng/ml (100 - 200 nmol/L) - optimal levels in a healthy population.**

**> 100 ng/ml (> 250 nmol/L) - elevated.** Toxicity is usually associated with vitamin D levels > 150 ng/ml (> 375 nmol/L) for prolonged periods of time.

**References**

Patel M, Gross HS. Vitamin D and calcium deficiency-related chronic diseases: an emerging world-wide public health problem. *Int J Environ Res Public Health*. 2009;6:2585-2607.

Holick MF, Binkley MC, Bischoff-Kram H, et al. Evaluation, Treatment, and Prevention of Vitamin D Deficiency: An Endocrine Society Clinical Practice Guideline. *J Clin Endocrinol Metab*. 2011;93(4):1153-56.

Institute of Medicine (US) Committee to Review Dietary Reference Intakes for Calcium and Vitamin D. Washington, DC: The National Academies Press; 2011.

Saebøe S, Bely J, Luge M, et al. Vitamin D and Musculoskeletal Health. Cardiovascular Disease, Autoimmunity and Cancer: Recommendations for Clinical Practice. *Autoimmun Rev*. 2019;18(1):109-15.

Chen P, Hu P, Xie D, et al. Meta-analysis of Vitamin D, Calcium, and the Prevention of Breast Cancer. *Breast Cancer Res Treat*. 2019;172(1):249-77.

Comments:

Date Collected: 02/19/2022  
Date Received: 02/20/2022  
Date Completed: 02/21/2022

Time Collected: 08:35 AM  
Fasting:

Methodology: LC/MS QQQ

05-12

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## Fatty Acids, Erythrocytes



The typical Western diet contains too many carbohydrates and saturated fats, and is often imbalanced with respect to essential and non-essential fatty acid intake. Erythrocyte fatty acid analysis is used to assess levels of and balance among the essential and non-essential fatty acids required for optimal health and wellness. Essential fatty acids regulate cell membrane integrity, blood pressure and coagulation, lipid levels, immune response, tumor growth and inhibition, and the inflammatory response to injury and infection.

Erythrocyte Fatty Acid analysis aids in developing the most efficacious dietary and supplemental treatment program to restore appropriate ratios among fatty acids.



LAB #: Sample Report  
PATIENT: Sample Patient  
ID:  
SEX: Female  
AGE: 64

CLIENT #: 12345  
DOCTOR: Sample Doctor  
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### Fatty Acids; Erythrocytes

		RESULT %/TOTAL	REFERENCE INTERVAL	PERCENTILE				
OMEGA 3 FATTY ACIDS				2.5 <sup>th</sup>	16 <sup>th</sup>	50 <sup>th</sup>	84 <sup>th</sup>	97.5 <sup>th</sup>
Eicosapentaenoic (EPA) 20:5ω3		0.4	0.5 - 5					
Docosahexanoic (DHA) 22:6ω3		5.1	3 - 8					
OMEGA 6 FATTY ACIDS								
Linoleic 18:2ω6		14	7 - 15					
Dihomo-γ-linolenic (DGLA) 20:3ω6		2.3	1.2 - 4					
Arachidonic (AA) 20:4ω6		19	11 - 20					
MONOUNSATURATED FATTY ACIDS								
Oleic 18:1ω9		15	12 - 20					
Palmitoleic 16:1ω7		0.43	0.12 - 0.65					
SATURATED FATTY ACIDS								
Palmitic 16:0		25	17 - 28					
Stearic 18:0		19	14 - 20					
				66 <sup>th</sup> 95 <sup>th</sup>				
TRANSISOMER FATTY ACIDS								
Palmitelaidic 16:1ω7t		0.012	< 0.05					
Elaidic 18:1ω9t		0.1	< 0.4					
RATIOS								
OMEGA 3 AND OMEGA 6 RATIOS		RESULT	REFERENCE INTERVAL	PERCENTILE				
				2.5 <sup>th</sup>	16 <sup>th</sup>	50 <sup>th</sup>	84 <sup>th</sup>	97.5 <sup>th</sup>
AA/EPA		47	2 - 28					
EPA/DHA		0.08	0.14 - 1.2					
AA/DGLA		8.1	5 - 14					
EPA/DGLA		0.2	0.2 - 1.6					
DESATURASE ENZYME MARKERS								
Linoleic/DGLA (Δ6)		6.1	2.5 - 10					
Stearic/Oleic (Δ9)		1.29	0.8 - 1.4					
DGLA/AA (Δ5)		0.12	0.065 - 0.16					
FATTY ACID DISTRIBUTION								
	TOTAL	OMEGA 3	OMEGA 6	MONO	SATURATED	TRANS		
Patient Distribution	4310 μmol/L	6 %	35 %	15 %	44 %	0.1 %		
Average Distribution	5200 μmol/L	9 %	29 %	18 %	44 %	0.3 %		
SPECIMEN DATA								
Comments:								
Date Collected:		02/05/2022						
Date Received:		<dl:	less than detection limit					
Date Completed:		02/15/2022						
Method:		Gas Chromatography (GC)						
v07.10								

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Fatty acid levels and key ratios are presented in a clear, easy-to-understand report which graphically highlights areas of concern. Result-specific commentary is also provided.

## Urine and Plasma Amino Acids



Many people have hidden amino acid (AA) impairments that go undiagnosed. Rather than being associated with specific symptoms, they may be related or increase susceptibility to a degenerative disease. Because this test provides a wealth of valuable information, a complete AA analysis is recommended any time a thorough nutritional and metabolic workup is called for. Plasma is traditionally used to assess the status of essential AA, while urine analysis provides more information regarding AA wasting and aberrant metabolism associated with co-factor insufficiencies.

### AA analysis aids in

- Dietary protein adequacy and AA balance
- Gastrointestinal dysfunctions
- Forms of protein intolerance
- Vitamin and mineral deficiencies
- Renal and hepatic dysfunction
- Psychiatric abnormalities
- Susceptibility to inflammatory response and oxidative stress
- Reduced detoxification capacity
- And many other inherent and acquired disorders in AA metabolism



PATIENT: Sample Patient  
LAB#: Sample Report  
DATE COLLECTED: 02/11/2022  
PAGE: 2

GASTROINTESTINAL MARKERS							
	RESULT	REFERENCE	PERCENTILE				
	μM/g creatinine	INTERVAL	2.5 <sup>th</sup>	16 <sup>th</sup>	50 <sup>th</sup>	84 <sup>th</sup>	97.5 <sup>th</sup>
Ammonia (NH <sub>4</sub> )	25900	9000 - 39000					
Ethanolamine	210	120 - 330					
Alpha-Aminoadipitate	18	7 - 50					
Threonine	66	48 - 275					
Tryptophan	15	20 - 75					
Taurine	270	170 - 1200					
				68 <sup>th</sup>		95 <sup>th</sup>	
Beta-alanine	4.7	< 20					
Beta-aminoisobutyrate	27	< 300					



LAB #: Sample Report  
PATIENT: Sample Patient  
ID:  
SEX: Male  
DOB: 01/01/1976

CLIENT #: 12345  
DOCTOR: Sample Doctor  
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St. Charles, IL 60174 U.S.A.

### Amino Acids; Urine

ESSENTIAL / CONDITIONALLY INDISPENSABLE AMINO ACIDS							
	RESULT μM/g creatinine	REFERENCE INTERVAL	PERCENTILE				
			2.5 <sup>th</sup>	16 <sup>th</sup>	50 <sup>th</sup>	84 <sup>th</sup>	97.5 <sup>th</sup>
Methionine	7.1	7 - 35					
Lysine	24	35 - 500					
Threonine	66	48 - 275					
Leucine	21	10 - 65					
Isoleucine	7	4 - 28					
Valine	23	12 - 50					
Phenylalanine	19	25 - 75					
Tryptophan	15	20 - 75					
Taurine	270	170 - 1200					
Cysteine	37	20 - 57					
Arginine	13	8 - 50					
Histidine	150	270 - 1150					

NONESSENTIAL AMINO ACIDS							
	RESULT μM/g creatinine	REFERENCE INTERVAL	PERCENTILE				
			2.5 <sup>th</sup>	16 <sup>th</sup>	50 <sup>th</sup>	84 <sup>th</sup>	97.5 <sup>th</sup>
Alanine	93	100 - 500					
Aspartate	3.4	6 - 30					
Asparagine	45	40 - 180					
Glutamine	180	145 - 580					
Glutamate	14	8 - 45					
Cystine	27	20 - 90					
Glycine	430	280 - 2800					
Tyrosine	22	23 - 113					
Serine	200	110 - 450					
Proline	4.7	1 - 45					

SPECIMEN DATA		
Comments:		
Date Collected: 02/11/2022	Collection Period: Random	Methodology: LC MS/MS
Date Received: 02/14/2022	Volume:	NH <sub>4</sub> , Urea, Creatinine by Automated Chem Analyzer
Date Completed: 02/21/2022		

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PATIENT: Sample Patient  
LAB#: Sample Report  
DATE COLLECTED: 02/11/2022  
PAGE: 3

DETOXIFICATION MARKERS					
	RESULT	REFERENCE	PERCENTILE		
	μM/g creatinine	INTERVAL	2.5 <sup>th</sup>	16 <sup>th</sup>	50 <sup>th</sup> 84 <sup>th</sup> 97.5 <sup>th</sup>
Methionine	7.1	7 - 35			
Cysteine	37	20 - 57			
Taurine	270	170 - 1200			
Glutamine	180	145 - 580			
Glycine	430	280 - 2800			
Aspartate	3.4	6 - 30			

#### NEUROLOGICAL MARKERS



PATIENT: Sample Patient  
LAB#: Sample Report  
DATE COLLECTED: 02/11/2022  
PAGE: 4

SUPPLEMENTATION SCHEDULE		PRESUMPTIVE NEEDS / IMPLIED CONDITIONS
L-configured Amino Acids	Total Daily Oral Dose	
Tryptophan	430 mg	NEED FOR VITAMIN B6
Arginine	710 mg	
Histidine	1135 mg	
Isoleucine	710 mg	NEED FOR FOLATE, VITAMIN B12
Leucine	970 mg	
Lysine	1305 mg	
Methionine	805 mg	
Phenylalanine	1240 mg	NEED FOR MAGNESIUM
Threonine	610 mg	
Valine	980 mg	
Pyridoxal-5-phosphate	30 mg	SUSCEPTIBILITY TO VASCULAR DISEASE
Alpha-ketoglutarate	650 mg	
Taurine	145 mg	
The supplement schedule is not intended for use by pregnant females and is strictly contraindicated for individuals with suspected or known renal insufficiency or renal failure.		ABNORMAL INTESTINAL MICROFLORA
		MALDIGESTION / MALABSORPTION
		IMPAIRED DETOXIFICATION
		NEUROLOGICAL DISORDERS
		NITROGEN INSUFFICIENCY
		EXCESSIVE PROTEIN
		OXIDATIVE STRESS

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Results are presented in a clear, easy-to-understand report which graphically illustrates target ranges and areas of concern. Result-specific commentary and a supplement schedule are provided.

## Urine Halides (Iodine, Bromine and Fluoride)



Providing comprehensive assessment of iodine sufficiency and antagonistic halides in a single test, the Urine Halides test assesses iodine as well as exposure to and retention of bromide and fluoride.

Iodine is an essential element required for normal function of the thyroid gland and immune system, and the integrity of breast tissue. Bromide and fluoride are non-essential, antagonistic halides that can disrupt iodine homeostasis and function.

The test can be performed using conventional random or 24-hour urine collection or after administration of a loading dose of iodide/iodine. Iodine and bromine are measured by ICP-MS, as is used by the CDC.

### This test is useful for

- Fatigue
- Immune response
- Thyroid function
- Estrogen metabolism



LAB#: Sample Report  
PATIENT: Sample Patient  
ID:  
SEX: Female  
AGE: 47

CLIENT#: 12345  
DOCTOR: Sample Doctor  
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St. Charles, IL 60174 U.S.A.

### Urine Halides; Pre & Post Loading

Iodine	µg/mg cr	mg/24 hr	Reference Range	Iodine levels include iodine and iodide oxidized to iodine. Excretion percentage is calculated by dividing the patient's mg/24hour iodine result by the iodine/iodide dosage (in mg) recorded on the requisition form, then multiplying by 100.
Sample 1 PRE	0.27		0.1- 0.45 µg/mg cr	
Sample 2 POST	25	30	0.1- 0.45 mg/24 hr	
% Excretion/24 hr		60%		

Bromine	µg/mg cr	mg/24 hr	Reference Range	Bromine levels represent total bromine plus bromide, as measured by ICP-MS. Bromide is antagonistic to iodide, and is abundant in commercially produced baked goods, soft drinks, pesticides, brominated chemicals and some medications.
Sample 1 PRE	3.2		< 7 µg/mg cr	
Sample 2 POST	5.4	6.4	< 7 mg/24 hr	

Fluoride	µg/mL	mg/24 hr	Reference Range	Fluoride in urine is measured using an ion specific electrode. Fluoride is neurotoxic, compromises integrity of bone, and interferes with iodide metabolism. Primary sources of fluoride include fluoridated water, beverages, toothpaste/mouth washes, dental treatments and some medications.
Sample 1 PRE	0.33		< 1.1 µg/mL	
Sample 2 POST	0.29	0.78	< 1.3 mg/24 hr	

Creatinine	Result	Reference Range	Urine Creatinine is used to account for urinary dilution effects in less than 24-hour collections and to assess the collection completeness in 24-hour collections. For estimation of glomerular filtration rate (GFR), a Creatinine Clearance test is recommended.
Sample 1 PRE	57.6	30- 225 mg/dL	
Sample 2 POST	1200	600- 2100 mg/24hr	

Comments:  
#1 Date Collected: 01/04/2022 #2 Date Collected: 01/05/2022 Date Received: 01/12/2022  
#1 Collection Period: Random #2 Collection Period: 24 Hr/Col1 Date Reported: 01/18/2022  
#2 Volume: 2700 mL  
#2 Loading Dosage: 50 MG  
Method: I, Br by ICP-MS/ F by ISE  
Creatinine by Jaffe method

Reference ranges are representative of a healthy population under non-challenge or non-loading conditions. V04.07

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Results are presented in a clear, easy-to-understand report.

## Plasma Methylation Profile



Normal metabolism of methionine is critical for cellular transmethylation of DNA, proteins and neurotransmitters. Aberrant methionine metabolism can occur in anyone—at any age—and can be associated with a variety of conditions, including cardiovascular disease and cancer.

The Plasma Methylation Profile provides a functional assessment of the phenotypic expression of common SNPs (MTHFR, MS, CBS) by evaluating the plasma levels of methionine, cysteine, SAM, SAH, homocysteine and cystathionine, and provides the key methylation index, a ratio of SAM to SAH. The results can be used to determine appropriate nutritional support to normalize methionine metabolism.

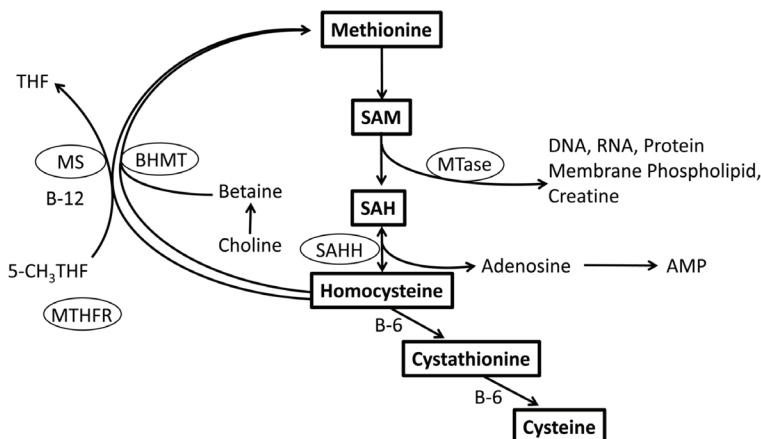


LAB #: B000000-0000-0  
PATIENT: Sample Patient  
ID: PATIENT-S-00000  
SEX: Female  
AGE: 49

CLIENT #: 12345  
DOCTOR:  
Doctor's Data, Inc.  
3755 Illinois Ave.  
St. Charles, IL 60174 USA

### Methylation Profile; plasma

PRIMARY & INTERMEDIATE METABOLITES							
	RESULT/UNIT	REFERENCE INTERVAL	PERCENTILE				
			2.5 <sup>th</sup>	16 <sup>th</sup>	50 <sup>th</sup>	84 <sup>th</sup>	97.5 <sup>th</sup>
Methionine	1.4 μmol/dL	1.6 - 3.6					
Cysteine	28 μmol/dL	20 - 38					
S-adenosylmethionine (SAM)	76 nmol/L	86 - 145					
S-adenosylhomocysteine (SAH)	18.6 nmol/L	10 - 22					
					68 <sup>th</sup>	95 <sup>th</sup>	
Homocysteine	4.7 μmol/L	< 11					
Cystathionine	0.01 μmol/dL	< 0.05					
METHYLATION INDEX							
	RESULT	REFERENCE INTERVAL	PERCENTILE				
			68 <sup>th</sup>	95 <sup>th</sup>			
SAM : SAH	4.1	> 4					



SPECIMEN DATA	
Comments:	
Date Collected:	01/23/2022
Date Received:	01/25/2022
Date Completed:	01/27/2022
Method:	LCMS

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Results are presented in a clear, easy-to-understand report which graphically illustrates target ranges and areas of concern. Result-specific commentary is provided.

# OUR MISSION:

To research, develop and offer innovative specialty tests that help doctors identify health risks and improve outcomes for patients with chronic conditions.

To educate and support healthcare professionals.

To improve lives through science.



SCIENCE + INSIGHT

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**doctorsdata.com**

## About Doctor's Data

Doctor's Data, Inc. has provided innovative specialty testing to healthcare practitioners around the world from our advanced, CLIA-licensed clinical laboratory since 1972.

As a pioneer in the laboratory testing industry, Doctor's Data provides a wide array of testing solutions to aid in decision making and better patient outcomes. Choose Doctor's Data to help you assess and treat heavy metal burden, nutritional deficiencies, gastrointestinal function, hormone status, cardiovascular risk, liver and metabolic abnormalities, and more.