SpectraCell Laboratories

Nutritional testing

Nutrition is at the core of integrative health and SpectraCell's Micronutrient Testing is the most advanced diagnostic tool available.

Micronutrient testing measures how micronutrients are actually functioning within your patients' white blood cells. These tests allow nutritional assessment of your patients for a broad variety of clinical conditions, general wellness and the prevention of chronic diseases including arthritis, cancer, cardiovascular risk, diabetes, various immunological disorders and metabolic disorders.

Nutritional Status & Health

SpectraCell's Micronutrient test provides the most comprehensive nutritional analysis available by measuring functional deficiencies at the cellular level. It is an assessment of how well the body utilizes 33 vitamins, minerals, amino/fatty acids, antioxidants, and metabolites, while conveying the body's need for these micronutrients that enable the body to produce enzymes, hormones, and other substances essential for proper growth, development, and good health. This test provides the basis of a personalized, functional approach in addressing a broad variety of clinical conditions including arthritis, cancer, cardiovascular risk, diabetes, various immunological disorders, metabolic disorders and micronutrient deficiencies.

Clinical Applications - How will this help my patients?

Identifying the right patient is simple. Our diagnostic profiles offer a window to the cell that can provide improved healthcare for all patients. However, the potential for clinical benefit is particularly evident in these patient groups:

DISEASE THERAPY AND MANAGEMENT: Diagnose and treat nutritional risk factors that contribute to the therapy/management of many degenerative disease conditions.

FAMILY HISTORY: Provide prevention measures for patients with family history of common chronic disease conditions.

HIGH RISK GROUPS: Certain high risk groups are more susceptible to vitamin, mineral and antioxidant deficiencies that can affect treatment outcomes and overall health.

PROACTIVE RISK ASSESSMENT: Provide customized prevention by early detection of nutritional deficiencies for proactive patients.

CHALLENGING CASES: Gain insight into generalized complaints with no apparent specific disease source and to provide treatment options based on biochemical individuality.

SpectraCell's Micronutrient test includes:

Vitamins
- Vitamin A
- Vitamin B1
- Vitamin B2
- Vitamin B3
- Vitamin B6
- Vitamin B12
- Biotin
- Folate
- Pantothenate
- Vitamin C
- Vitamin D
- Vitamin K

Minerals
- Calcium
- Magnesium
- Manganese
- Zinc
- Copper

Amino Acids
- Asparagine
- Glutamine
- Serine

Fatty Acids
- Oleic Acid

Antioxidants
- Alpha Lipoic Acid
- Coenzyme Q10
- Cysteine
- Glutathione
- Selenium
- Vitamin E

Carbohydrate Metabolism
- Chromium
- Fructose Sensitivity
- Glucose-Insulin Metabolism

Metabolites
- Choline
- Inositol
- Carnitine

SPECTROX™
for Total Antioxidant Function

IMMUNIDEX™
Immune Response Score

SpectraCell's Tests Are More Advanced Than Other Laboratory Tests

Before the introduction of our tests, many diagnostic and risk assessments were based on clinical observation and measurements of static levels of certain nutrients in serum. Static serum levels are not always representative indicators for assessing cell metabolism and utilization.

SpectraCell's micronutrient testing offers a unique means to scientifically assess the intracellular requirements of micronutrients that play an important role in overall health and wellness of your patients. Our tests measure the biochemical function of vitamins, minerals, amino acids and antioxidants, providing a powerful clinical assessment tool for your practice.

Our panels are designed to provide you with the most comprehensive nutritional analysis available. As the only lab that can offer a truly functional intracellular testing, SpectraCell also provides you with targeted nutrient repletion recommendations for the deficiencies identified.

SpectraCell's Patented Technology

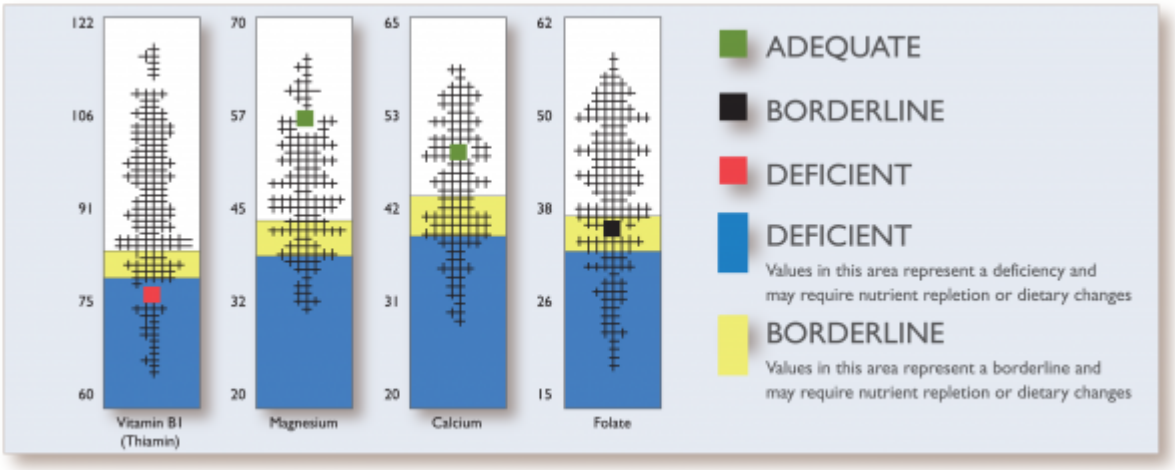
SpectraCell's patented, chemically-defined control media contains the minimal amount of each essential micronutrient that is needed to support optimal lymphocyte growth or mitogenic response. The functional intracellular status of micronutrients involved in cell metabolism is evaluated by manipulation of the individual micronutrients in the media followed by mitogenic stimulation and measurement of DNA synthesis.

The same technology also provides a total antioxidant function test (SPECTROX™) which assesses the ability of cells to resist damage caused by free radicals and other forms of oxidative stress. Due to the considerable number of cellular antioxidants with extensive interactions, redundancies, repair and recharging capabilities, measuring total function is the most accurate and clinically useful way to assess your patients' capacity to resist oxidative damage.

Since lymphocytes are produced in the bone marrow and stored in the peripheral locations for long periods of time (the average life span of a lymphocyte is approximately four to six months), SpectraCell's measurements provide a powerful portrait of each patients' long-term nutrient status. This is analogous to the use of a glycosylated hemoglobin test to evaluate blood glucose levels over a one to three month period.

Interpreting Test Results

SpectraCell provides easy-to-read test reports for the clinician and the patient. We've incorporated numerical and graphic representations for each result, and we offer repletion suggestions based on each patient's deficiencies. We've included easy-to-understand supplement information that explains the role of each nutrient found deficient, deficiency symptoms, how to obtain that nutrient in food and toxicity and RDI standards for adults.



IMMUNIDEX™ Immune Response Score - A unique Clinical Tool

A patient's IMMUNIDEX™ score is one measurement to evaluate a person's cell-mediated immune system performance. Specifically, it measures T-cell lymphocyte proliferation. Since immune function is a systemic measure of general health, a higher IMMUNIDEX™ score is generally desired since it means a person can respond efficiently not only to exogenous threats such as pathogens or allergens, but also to endogenous threats like tumors. The immune system, comprised of both cell-mediated (Th1) and humoral (Th2) components, when balanced and performing optimally, affords us critical protection and promotes health and wellness.

Micronutrient deficiencies will undermine a person's immune function, and thus lower the IMMUNIDEX™. Since the highly complex immune system is dependent on the intracellular availability of vitamins, minerals and antioxidants, correcting specific micronutrient deficiencies typically raises the IMMUNIDEX™ and contributes to tangible clinical benefits, such as reduced infections and may assist in achieving Th1/Th2 balance.

There is no additional charge for this calculated test result. Ordering instructions are the same – same kit, same blood draw instructions.

General Information

Test Results:

Easy-to-read, comprehensive test results are returned within three weeks.
Each report provides a scientific analysis of your patients' nutritional deficiencies.

Additional Resources:

Clinical Support: 800-227-5227
Web: www.spectracell.com

Confidentiality:

SpectraCell is dedicated to safeguarding patient privacy and the confidentiality of all patient information. For this reason, patient test results are only released to the ordering physician. Patient information is only utilized internally for company operational purposes and as required by law. Patient records, electronic and hard copy, will be maintained under a strict policy of confidentiality according to HIPAA guidelines.

CardioMetabolic Testing

Poor blood sugar regulation and unhealthy triglyceride and lipoprotein levels often present long before a diagnosis of Type 2 Diabetes. SpectraCell's CardioMetabolic, Pre-Diabetes, and LPP™ Plus Tests offer clinically relevant evaluation to help define risk for atherosclerotic cardiovascular disease (ASCVD), progression toward Type 2 Diabetes, and inflammation. These check points, along with a new **CardioMetabolic Risk Assessment** and **Type 2 Diabetes Risk Assessment**, help patients understand that not just one factor, but rather a constellation of factors, contributes to the genesis and progression toward cardiovascular disease including stroke, poor blood glucose control including Type 2 Diabetes, and/ or inflammation. Test results allow doctors to know when guidance, educational referral, and/ or treatment are necessary.

CardioMetabolic Risk

Poor blood sugar regulation and unhealthy triglyceride and lipoprotein levels often present long before a diagnosis of Type 2 Diabetes. SpectraCell's CardioMetabolic, Pre-Diabetes, and LPP™ Plus Tests offer clinically relevant evaluation to help define risk for atherosclerotic cardiovascular disease (ASCVD), progression toward Type 2 Diabetes, and inflammation. These check points, along with a new **CardioMetabolic Risk Assessment** and **Type 2 Diabetes Risk Assessment**, help patients understand that not just one factor, but rather a constellation of factors, contributes to the genesis and progression toward cardiovascular disease including stroke, poor blood glucose control including Type 2 Diabetes, and/ or inflammation. Test results allow doctors to know when guidance, educational referral, and/ or treatment are necessary. Key components of the CardioMetabolic Test are listed below.

CardioMetabolic Test

- Lipoprotein Fractionation
- Lipoprotein Particle Numbers
- Total Cholesterol
- HDL Cholesterol
- LDL Cholesterol
- Triglycerides
- hs-CRP
- Homocysteine
- Lipoprotein (a)
- Leptin
- Apolipoprotein A-1
- Apolipoprotein B
- Insulin
- Glucose
- Hemoglobin A1c
- C-peptide
- Adiponectin
- OmegaCheck™
- CardioMetabolic Risk Assessment
- Type 2 Diabetes Assessment
- Estimated Average Glucose (eAG)
- Homeostatic Model Assessment of Insulin Resistance (HOMA-IR)

Pre-Diabetes

The Pre-Diabetes biomarkers identify metabolic abnormalities that may progress into diabetes. Pre-Diabetes is a condition where the body cannot efficiently metabolize foods, especially carbohydrates, resulting in impaired glycemic (blood glucose) control, which may progress to diabetes when not properly treated or addressed through lifestyle changes.

PRE-DIABETES RISK

The Pre-Diabetes Biomarkers identify metabolic abnormalities that may progress into diabetes. Pre-diabetes is a condition where the body cannot efficiently metabolize foods, especially carbohydrates, resulting in impaired glycemic (blood sugar) control which may progress to diabetes when not properly treated or addressed through lifestyle changes.

SpectraCell's new Type 2 Diabetes Risk Assessment is an evaluation of specific risk factors that can indicate the presence of Pre-Diabetes and provide an assessment of a person's risk for developing Type 2 Diabetes (Low, Moderate, or High). This test can be especially useful for identifying people within higher risk groups that are most likely to benefit from early medical and/ or lifestyle intervention. Other factors that significantly affect a pre-diabetic risk but that are not included in this report include: weight, blood pressure, smoking, inflammation, and family history.

Pre-Diabetes Test

- Insulin
- Glucose
- HemoglobinA1c
- C-peptide
- Adiponectin
- Leptin
- hs-CRP
- Triglycerides
- HDL Cholesterol

Glucose - snapshot of blood sugar at time of blood draw

Insulin - correlates to the efficiency with which a person can metabolize carbohydrates; high fasting levels indicate insulin resistance and possible pre-diabetes

Hemoglobin A1C - long term (2-3 months) marker of glycemic control; also considered a marker of accelerated aging

C-peptide - a measure of endogenous insulin production; useful in distinguishing between type 1 and type 2 diabetes

Adiponectin - a hormone that ezymatically controls metabolism; high levels beneficial and indicate efficient cellular energy production

Leptin - called the “satiety” hormone because it regulates the appetite centers in the brain to decrease hunger; chronically high levels linked to obesity and can indicate leptin resistance (dysfunctional appetite regulation)

Metabolic syndrome traits - A diagnosis of metabolic syndrome is confirmed if any three of the following six traits exist in a patient: (1) high triglycerides (2) high glucose (3) low HDL (4) high blood pressure (5) high waist circumference or (6) increased small dense LDL

Advanced Lipoprotein Particle testing

Advanced Lipoprotein Particle testing for cardiovascular risk assessment.

Lipoprotein Particle Testing™

DO CHOLESTEROL NUMBERS REALLY ASSESS CARDIOVASCULAR RISK? LIPOPROTEIN PARTICLE NUMBERS TELL THE STORY

LPP™ Testing is essential to identifying at-risk patients

Up to 50 percent of those who have suffered heart attacks had “normal” cholesterol numbers. How can the large discrepancy between accurate diagnosis and standard cholesterol testing be prevented? Simply by testing the LDL

(low density lipoprotein) particle numbers using the Lipoprotein Particle Profile™ (LPP™) from SpectraCell Laboratories.

LPP Plus

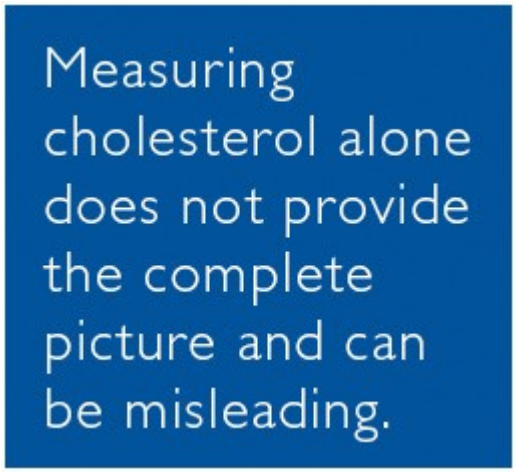
- Lipoprotein Fractionation
- Lipoprotein Particle Numbers
- Total Cholesterol
- HDL Cholesterol
- LDL Cholesterol
- Triglycerides
- hs-CRP
- Homocysteine
- Apolipoprotein A-1
- Apolipoprotein B
- Lipoprotein (a)
- Insulin

LPP Basic

- Lipoprotein Fractionation
- Lipoprotein Particle Numbers
- Total Cholesterol
- HDL Cholesterol
- LDL Cholesterol
- Triglycerides
- Lipoprotein (a)

Overview of lipoprotein particles and cholesterol

Cholesterol testing has historically been used as the standard indicator for cardiovascular disease classified as HDL (good) or LDL (bad). However, it is actually the lipoprotein particles that carry the cholesterol throughout the body, not necessarily the cholesterol within them, that are responsible for key steps in plaque production and the resulting development of cardiovascular disease.



Approximately 50 percent of people suffering from heart attacks have shown “normal” cholesterol numbers (NHLBI – The National Heart, Lung, and Blood Institute).

Now there is an advanced cholesterol testing technology which accurately measures both the density and number of lipoprotein particles. This test is the Lipoprotein Particle Profile™, or LPP™, from SpectraCell Laboratories.

Measuring the lipoprotein subgroups is the only way to evaluate new risk factors, which is crucial for an accurate assessment of cardiovascular risk – according to the National Cholesterol Education Program (NCEP).

NCEP Risk Factors:

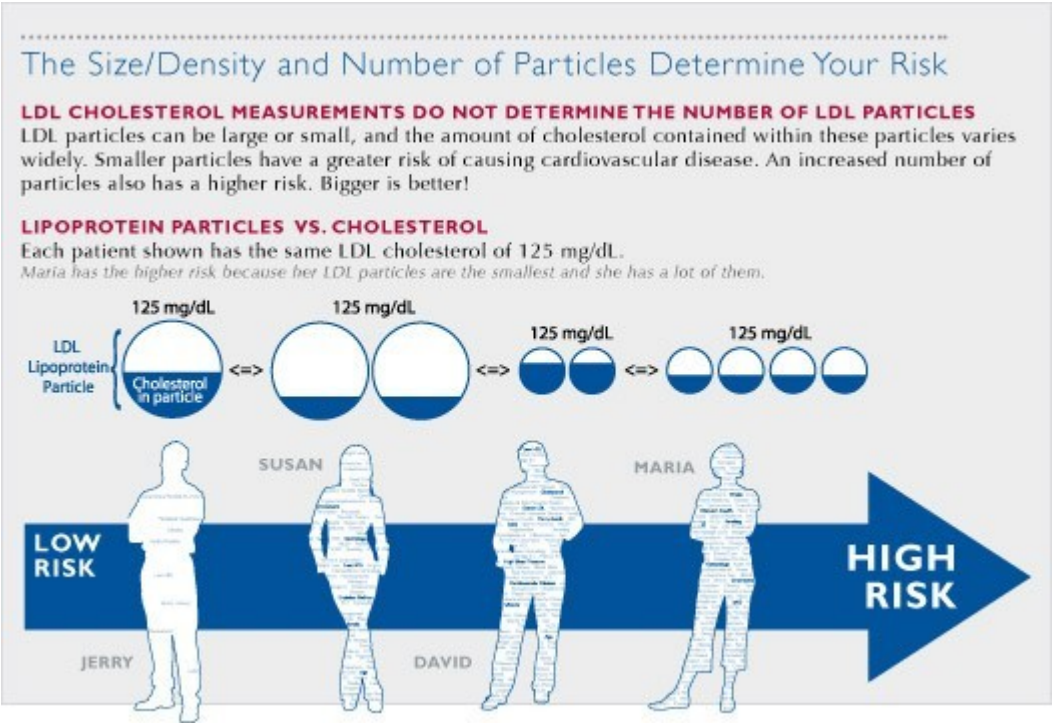
- Small, dense LDL: these atherogenic particles are easily oxidized and penetrate the arterial endothelium to form plaque
- Lp(a): this small, dense LDL is involved in thrombosis
- RLP (Remnant Lipoprotein): is very atherogenic, has a similar composition and density of plaque, is believed to be a building block of plaque and does not need to be oxidized like other LDL particle
- HDL2b: positively correlates with heart health because it is an indicator of how well excess lipids are removed

Why is it important to know lipoprotein numbers?

Cardiovascular risk increases with a higher LDL particle count. With a higher non-HDL lipoprotein count the probability of particle penetration of the arterial wall rises, regardless of the total amount of cholesterol contained in each particle. On average, the typical particle contains 50 percent cholesterol.

More than 30 percent of the population has cholesterol-depleted LDL, a condition in which a patient's cholesterol may be "normal" but their lipoprotein particle number, and hence their actual risk, could be much higher than expected. This is especially common in persons whose triglycerides are high or HDL is low. In the population with a cholesterol-depleted LDL, there can be up to a 40 percent error in risk assessment.

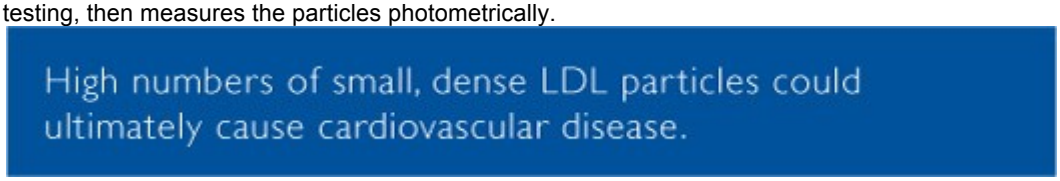
The LPP™ test from SpectraCell Laboratories provides physicians with the actual LDL particle count, allowing healthcare providers to accurately determine and diagnose cardiovascular risk in their practice.



Lipoprotein Particle Profile™ (LPP™)

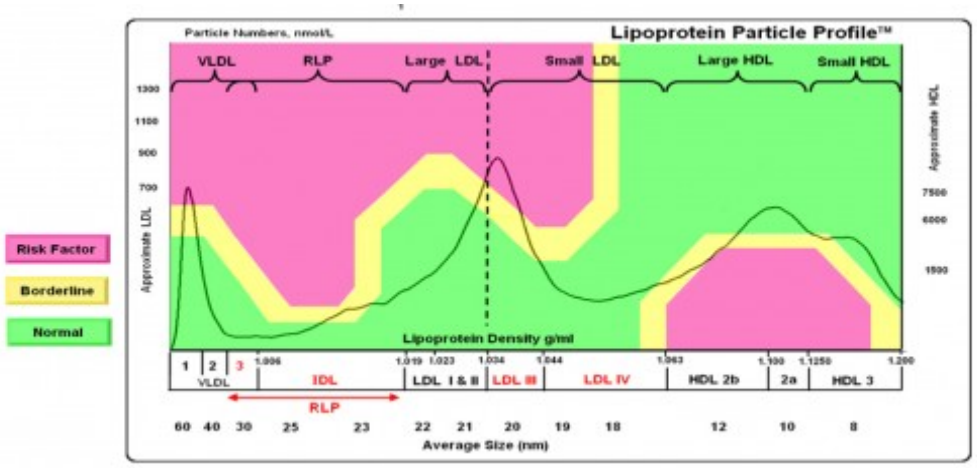
Providing a Complete Look at Lipoprotein Subgroups

SpectraCell's LPP™ test is a proprietary technology originally developed at Texas A&M University that separates the lipoproteins in blood serum by density using analytical ultracentrifugation, the CDC gold standard for lipoprotein testing, then measures the particles photometrically.



Use LPP™ in your practice for accurate atherogenic risk assessments

Traditionally, the standard lipid panel calculates LDL from measurements of the other lipoproteins. In contrast, the LPP™ method presents values for all of the lipoproteins from direct measurement. SpectraCell's LPP™ technology aids the physician in assessing a patient's cardiovascular risk. With LPP™, a physician can begin to treat patients with atherogenic lipoprotein profiles before overt dyslipidemia becomes apparent.



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Hormone & Thyroid Testing

SpectraCell Laboratories offers comprehensive male and female hormone panels that reveal the overall state of hormonal balance in a patient. Like nutrients, hormones influence all aspects of health and disease - mood, sleep, metabolism, immunity, heart health and appearance. An imbalance of one hormone can initiate cascade of events that alters other hormones, so a comprehensive look at hormone status is key.

Thyroid hormones directly regulate every cell in our body as most basic functions like metabolism, emotions and thinking. We also test several proteins that affect thyroid function as well as antibodies to thyroid which can detect autoimmunity (when the immune system attacks healthy tissue) and your levels of cortisol, the stress hormone.

HORMONAL BALANCE

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Hormones 101

Hormones are chemical messengers that are secreted directly into the blood, which carries them to organs and tissues of the body to exert their functions. There are many types of hormones that act on different aspects of bodily functions and processes.

Clinical Applications of Hormone Imbalance:

- Fatigue & energy levels
- Cardiovascular health (blood pressure, clotting, lipids)
- Neurology (migraines, sleep, pain)
- Mental health (depression, anxiety, cognitive function)
- Immunity (infections, autoimmune disease)
- Metabolism (blood sugar regulation, tissue repair)
- Bone density (osteoporosis)
- Physical appearance (skin, muscles, hair)

SPECTRACELL'S HORMONE PANELS INCLUDE THE FOLLOWING:

Sex (Steroid) Hormones

- Dehydroepiandrosterone sulfate (DHEAS) - the most abundant sex hormone in the body, DHEAS (the sulfated, or bioavailable for of DHEA), is produced by the adrenal glands is the precursor hormone to testosterone and estrogens. DHEAS enhances immunity, reduces autoimmunity, helps prevent cancer, and improves insulin sensitivity, bone health and cognitive function.[P,E]
- Androstenedione - precursor hormone to both testosterone and estrogens; occurs in equilibrium with testosterone so an increase in one also increases the other.[P]
- Testosterone - clinically associated with increased muscle mass, libido, bone health and a general sense of well being.[E]
- Estradiol (E2) - the strongest estrogen; protects blood vessels, increased high density lipoprotein-cholesterol (HDL), prevents bone loss, helps form collagen which benefits the appearance of the skin, improves cognitive function and increases the immune response. However, estradiol also exerts a strong proliferative effect on hormone sensitive tissues like the breast, uterus and ovary so it must be properly balanced with progesterone and other estrogens to prevent the clinical manifestation of estrogen dominance and related cancers.[E]
- Estrone (E1) - This estrogen has very strong tissue proliferative effects and may be linked to estrogen dominant conditions like fibrocystic breasts, endometriosis and uterine fibroids. It will create either dangerous or benefical metabolites, depending on a person's nutritional status.
- Estriol, unconjugated (E3) - weaker estrogen; protective against cancer as it opposes the proliferative effects on the uterus, breast and ovary from the stronger estrogens; particularly high during pregnancy.[E]
- Progesterone - selectively balances the effects of estrogen in hormonally sensitive tissue (breast, uterine) as well as in the brain and skin. Progesterone decreases the immune response, promotes bone formation, protects the brain and tends to have a calming effect on mood. It is also a precursor hormone for other sex hormones as well as cortisol and interacts with hormones to regulate metabolism.[P,E]

[P] - Precursor hormone - typically converted to other hormones
[E] - End point hormone - acts directly on tissues for physiologic effects
[R] - Regulating hormone - initiates the production or suppression of other hormones

Regulatory (Peptide) Hormones

- Follicle stimulating hormone (FSH) - stimulates the production of estrogens; marker of ovarian function in women and initiates sperm production in men.
- Luteinizing hormone (LH) - contributes to reproductive function in both men and women; responsible for ovulation in women and sperm production in men; works synergistically with FSH and largely affected by prolactin levels.
- Prolactin (PRL) - an inhibitory hormone that reduces the action of several other hormones; most known for its ability to stimulate milk production in lactating women but it also regulates calcium metabolism and plays a role in the synthesis of nerve cells and prostaglandins as well, in both men and women.
- Sex hormone binding globulin (SHBG) - produced in the liver and regulated by other hormones, SHGB is a protein that binds estrogens and testosterone in the bloodstream so they are biologically inactive.

THYROID HORMONES

- Free T3 (Free Triiodothyronine) – the more potent and biologically active thyroid hormone, T3 regulates growth and metabolism throughout the whole body.
- Free T4 (Free Thyroxine) – considered a precursor hormone, T4 is converted to T3 as required by cells throughout the body; levels of T4 are generally much higher than T3.

- Total T4 (Total Thyroxine) - Most T4 in the blood is bound to carrier proteins which make it biologically inactive. Total T4 includes unbound (free) T4 plus T4 that is bound to carrier proteins in the blood.
- rT3 - Reverse T3 (Reverse Triiodothyronine) - As the name implies, Reverse T3 opposes the biological action of T3. It slows metabolism and renders T3 in the body biologically inactive. The rate of rT3 production relative to T3 will increase in times of stress (high cortisol) and in the presence of nutrient deficiencies, inflammation or certain medications.
- Thyroid Stimulating Hormone (TSH) – produced by the pituitary gland, TSH tells the thyroid gland to increase or decrease production of T4 or conversion to T3 depending on the amounts circulating in the bloodstream via an efficient feedback system.
- Anti-TG (Antibodies to Thyroglobulin) – a precursor to T4. If Anti-TG are present in significant amounts, this suggests an abnormal immune response against your own body, also called autoimmunity.
- Anti-TPO (Antibodies to Thyroperoxidase) – is an enzyme that initiates the synthesis of T4. Antibodies to TPO indicate autoimmunity where the body is attacking normal proteins in the blood (in this case, TPO). People with anti-TPO have a higher chance of developing hypothyroidism that those who do not have antibodies to TPO.
- Tg (Thyroglobulin) – The main function of Tg is to store iodine, which is a necessary nutrient for the production of thyroid hormones T3 and T4. This test is particularly useful when monitored over time versus a single measurement and can sometimes be a useful tumor marker in patients with previous thyroid cancer.
- TBG (Thyroid Binding Globulin) – is a carrier protein for thyroid hormones so its role is to transport T4 and T3 through the bloodstream. The thyroid gland adjusts to changing levels of TBG in order to keep free T4 constant and it is particularly useful when thyroid (T4) levels do not necessarily correlate with clinical symptoms. TBG levels are largely affected by other hormones and many prescription drugs and is useful in diagnosing the reason behind abnormal thyroid hormone levels.

Telomere

elomeres are sections of genetic material at the end of each chromosome whose primary function is to prevent chromosomal “fraying” when a cell replicates. As a cell ages, its telomeres become shorter. Eventually, the telomeres become too short to allow cell replication, the cell stops dividing and will ultimately die - a normal biological process. SpectraCell’s Telomere Test can determine the length of a patient’s telomeres in relation to the patient’s age.

Telomere Testing

PRODUCT OVERVIEW

The first commercially available telomere analysis in the United States.
A window to your patient’s cellular health.

What does Telomere Testing measure?

Telomeres are sections of genetic material at the end of each chromosome whose primary function is to prevent chromosomal “fraying” when a cell replicates. As a cell ages, its telomeres become shorter. Eventually, the telomeres become too short to allow cell replication, the cell stops dividing and will ultimately die - a normal biological process. SpectraCell’s Telomere Test can determine the length of a patient’s telomeres in relation to the patient’s age.

How are the results reported?

The Patient Telomere Score is calculated based on the patient's average telomere length in peripheral whole blood cells. This average is then compared to telomere lengths from a population sample in the same age range as the patient to determine the patient's percentile score.

What do the results mean to the patient and the doctor?

Cellular attrition by analyzing the rate at which changes in average Telomere length occur over time. Cells are being lost and replaced. (Cellular attrition)

What are the nutritional implications on telomere length and repair?

An inflammatory diet, or one that increases oxidative stress, will shorten telomeres faster. This includes refined carbohydrates, fast foods, processed foods, sodas, artificial sweeteners, trans fats and saturated fats. A diet with a large amount and variety of antioxidants that improves oxidative defense and reduces oxidative stress will slow telomere shortening. Consumption of 10 servings of fresh and relatively uncooked fruits and vegetables, mixed fiber, monounsaturated fats, omega-3 fatty acids, cold water fish, and high quality vegetable proteins will help preserve telomere length. In addition, it is advised to reduce total daily caloric intake and implement an exercise program. Fasting for 12 hours each night at least 4 days per week is recommended.

What lifestyle modifications are likely to be helpful?

One should achieve ideal body weight and body composition with low body fat (less than 22 % for women and less than 16 % for men). Decreasing visceral fat is very important. Regular aerobic and resistance exercise for at least one hour per day, sleeping for at least 8 hours per night, stress reduction, discontinuation of all tobacco products are strongly recommended. Bioidentical hormone replacement therapy may decrease the rate of telomere loss.

When should retesting be considered?

Testing should be done once per year to evaluate the rate and direction of telomere changes and make adjustments in nutrition, nutritional supplements, weight management, exercise and other lifestyle modifications known to influence telomere length.

What role will nutritional supplements play in slowing telomere shortening?

Oxidative stress may shorten telomere length and cause aging in cellular tissue. Antioxidant supplements can potentially reduce oxidative stress very effectively, which will ultimately improve oxidative defenses, mitochondrial function, reduce inflammation and slow vascular aging. Targeted supplementation is key, as antioxidants work synergistically and must be balanced to work most effectively and avoid inducing a pro-oxidant effect. Increasing antioxidant capacity at the cellular level is critical to maintaining telomere length.

Recent evidence suggests that a high quality and balanced multivitamin will also help maintain telomere length. Specifically, studies have linked longer telomeres with levels of vitamin E, vitamin C, vitamin D, omega-3 fatty acids and the antioxidant resveratrol. In addition, homocysteine levels have been inversely associated with telomere length,

suggesting that reducing homocysteine levels via folate and vitamin B supplementation may decrease the rate of telomere loss. Similarly, conditions such as cardiovascular disease, insulin resistance, diabetes, hypertension, atherosclerosis and even dementia affect telomere length. Correcting subclinical nutritional deficiencies that may contribute to such diseases is crucial for telomere maintenance.

What pharmacologic treatments are known to slow telomere loss?

- Angiotensin converting enzyme inhibitors (ACEI)
- Angiotensin receptor blockers (ARB)
- Renin Inhibitors
- Statins
- Possibly Calcium channel blockers
- Possibly Serum aldosterone receptor antagonists
- Possibly metformin
- Aspirin
- Bioidentical Hormone Replacement Therapy

Control all known coronary heart disease risk factors to optimal levels

- Reduce LDL cholesterol to about 70 mg %, decrease
- LDL particle number and increase LDL particle size.
- Reduce oxidized LDL.
- Increase HDL to over 40 mg % in men and over 50 mg % in women and increase HDL 2 subfraction. Reduce inflammatory HDL and increase protective HDL.
- Reduce fasting blood glucose to less than 90 mg % and 2 hour post prandial or 2 hour GTT to less than 110 mg %. Keep Hemoglobin A1C to about 5.0% and keep insulin levels low.
- Reduce blood pressure to about 120/ 80 mm Hg
- Reduce homocysteine to less than 8 um/L
- Reduce HS-CRP to less than 1.0
- Maintain ideal body weight and composition.
- Stop smoking.
- Treat insulin resistance and metabolic syndrome.

Overall recommendations to maintain telomere length

Some clinicians have recommended reducing all known coronary risk factors, inflammation, oxidative stress, ADMA levels and angiotensin II levels or its action. At the same time, therapy should increase nitric oxide levels and nitric oxide bioavailability, increase arginine, increase endothelial progenitor cells, improve mitochondrial function and increase oxidative defenses. In addition, one should optimize hormone levels, exercise, sleep, nutrition and nutritional supplements. Fasting and caloric restriction should be part of the regimen as well.

COMPONENTS

Telomeres are sections of genetic material at the end of each chromosome whose primary function is to prevent chromosomal “fraying” when a cell replicates. As a cell ages, its telomeres become shorter. Eventually, the telomeres become too short to allow cell replication, the cell stops dividing and will ultimately die - a normal biological process. SpectraCell’s Telomere Test can determine the length of a patient’s telomeres in relation to the patient’s age.

SpectraCell's Telomere Test analyzes:

- Lysis of Cells
- DNA Extraction
- Amplification

COLLECTION/PACKAGING INSTRUCTIONS

*****Fasting is NOT required*****

1. Collect one 2.7 ml sodium citrate (blue top) tube of whole blood.
2. Gently invert 5 times to mix the blood thoroughly with the anticoagulant.
3. DO NOT SPIN or FREEZE the specimen.
4. Label tube with patient name and date and affix sticker from requisition.
5. Specimen may be sent in either the MicroNutrient test package or the LPP package. Follow packaging instructions provided with kit of choice.
6. Insert the box into the supplied Lab Pack envelope, seal tightly and affix the Fed Ex expanded billable stamp to the indicated spot. (Up to 4 MicroNutrient boxes or 3 LPP boxes may be placed in on Lab Pack envelope).
7. Complete the "Shipper" portion of the stamp.

SHIPPING INSTRUCTIONS

- DO NOT PLACE THE SHIPMENT IN A DROP BOX.
- DO NOT USE THE AUTOMATED SYSTEM WHEN CALLING FOR A PICKUP. SPEAK WITH A CUSTOMER SERVICE REPRESENTATIVE.
- Call **FedEx** for courier pickup **ASAP** at **800-463-3339**, but no later than **3:00PM**, Monday-Friday.
- **THE LABORATORY IS OPEN ON SATURDAYS TO RECEIVE SPECIMENS COLLECTED ON FRIDAYS.**

REPORT DELIVERY

Results are typically available within 7-10 business days.

Apolipoprotein E

ApoE test determines an individual’s genetic risk associated with the Apolipoprotein E gene. ApoE is involved in the metabolism of cholesterol and triglycerides, and variants in this gene can have clinically relevant implications for disease risk as well as one’s response to statin therapy, dietary fat, and other risk factors (eg., smoking and alcohol consumption). Approximately 45% of individuals carry one or more of the high risk variants within the ApoE gene. The results of the genotyping of Apolipoprotein E have important implications in the treatment strategies for individual patients in reducing cardiovascular disease risk.

OVERVIEW

This test determines an individual’s genetic risk associated with the Apolipoprotein E gene. ApoE is involved in the metabolism of cholesterol and triglycerides, and variants in this gene can have clinically relevant implications for disease risk as well as one’s response to statin therapy, dietary fat, and other risk factors (eg., smoking and alcohol consumption). Approximately 45% of individuals carry one or more of the high risk variants within the ApoE gene. The results of the genotyping of Apolipoprotein E have important implications in the treatment strategies for individual patients in reducing cardiovascular disease risk.

MTHFR

MTHFR is an enzyme responsible for converting 5,10-methylenetetrahydrofolate to the product 5-methyltetrahydrofolate - it is involved in the metabolism of folate and homocysteine. The product of the reaction catalyzed by MTHFR converts homocysteine (a potentially toxic amino acid) to methionine (a useful and necessary amino acid).

MTHFR Genotyping

OVERVIEW

MTHFR is an enzyme responsible for converting 5,10-methylenetetrahydrofolate to the product 5-methyltetrahydrofolate - it is involved in the metabolism of folate and homocysteine. The product of the reaction catalyzed by MTHFR converts homocysteine (a potentially toxic amino acid) to methionine (a useful and necessary amino acid).

Why is MTHFR Genotyping Important?

- Certain mutations in the gene coding for MTHFR produce an enzyme that has reduced activity.
- Reduced activity can lead to elevated levels of homocysteine (a.k.a. hyperhomocysteinemia), especially when folate levels are low.
- High homocysteine (>13umol/L) may double the risk of developing illness or complications.
- MTHFR genotyping can provide information about potential causes of elevated homocysteine and approaches for addressing it.
- Based on MTHFR and homocysteine results, physicians can develop dietary and medical recommendations - increased intake of folate alone or in combination with vitamins B6 and B12 are recommended.
- Based on results, recommendations for methotrexate dosage can be adjusted.

Risks Associated with MTHFR Variants/High Homocysteine:

- Cardiovascular Disease
- Cerebral Vascular Disease (Stroke)
- Venous and Arterial Thrombosis
- Methotrexate Toxicity for Cancer Therapy

Who Should be Tested?

- Those with high homocysteine levels.
- Those who have a familial history of cardiovascular disease, stroke or thrombosis.
- Those who are candidates for long-term methotrexate therapy.

COMPONENTS

What are the Variants?

C677T

- There is a mutation from cytosine to adenine at position 677 within gene.

A1298C

- There is a mutation from adenine to cytosine at position 1298 within gene.

These variants lead to amino acid differences in the protein that reduces its ability to function.

What are the possible genotypes?

677 - CC, CT, or TT

- CC - homozygous normal
  - Approximately 45% of the population
  - No increased risk associated
- CT - one variant copy
  - Approximately 45% of the population
  - Some reduced enzyme activity, but not alone associated with increased risk.
- TT - two variant copies
  - Approximately 10% of the population
  - Increased risk for hyperhomocysteinemia and associated complications

1298 - AA, AC, CC

- AA - normal homozygous
- AC or CC - one or two variant copies
  - Approximately 30% of the population
  - Not associated with increased risk
  - Associated with increased risk if found together with a 677 variant.

Factor V Leiden & Prothrombin

Genotyping indicate whether a person has an increased likelihood of forming blood clots (thrombosis). Presence of either gene increases the chance of deep vein thrombosis, and may also provide useful information on heart attack risk.

WHAT IS FACTOR V LEIDEN?

Factor V Leiden refers to a mutation in the gene that manufactures a protein called factor V which is involved in the process of blood coagulation. the factore V protein is also called coagulation factor V, and sometimes proaccelerin or labile factor.

Risks associated with factor V Leiden

- People with factor V Leiden gene have an increased risk of developing a type of blood clot called a deep venous thrombosis (DVT).
- The factor V protein functions as a cofactor that activates an enzyme called thrombin. Thrombin in turn cleaves fibrinogen to form fibrin, which functions to cross link and form the dense meshwork that makes up the majority of a blood clot when activated.
- Factor V Leiden thrombophilia also increases the risk that clots will break away from their original site and travel through the bloodstream. These clots can lodge in the lungs, where they are known as pulmonary emboli.
- Although factor V Leiden thrombophilia increases the risk of blood clots, only about 10 percent of individuals with the factor V Leiden mutation ever develop abnormal clots.
- Women with the factor V Ledien R506Q gene mutation (called R506Q) have increased risk of clotting in pregnancy in the form of deep vein thrombosis and pulmonary embolism. They also may have a small increased risk of preeclampsia, may have a small increased risk of low birth weight babies, may have a small increased risk of miscarriage and stillbirth due to either clotting in the placenta or umbilical cord. Please note: Many women with this mutation go through one or multiple pregnancies with no difficulties, while others may have complications or develop clots during pregnancy.
- If you have factor V Leiden and have developed blood clots, medications can lessen your risk of developing additional blood clots and help you avoid potentially serious complications.

Who should be tested?

- Those who have had an unexplained blood clot (thrombotic episode), especially under the age of 50.
- Those who have recurrent DVT/VTE (venous thrombo embolism) episodes.
- Those who have a strong family history of thrombosis.
- Women considering pregnancy.

WHAT IS PROTHROMBIN?

Prothrombin is a protein that causes blood to coagulate and form blood clots. A genetic mutation (called G20210A) in the production of this protein is a risk factor for thrombosis (blood clots) including deep venous thrombosis (DVT). This mutation in the gene encoding the clotting factor prothrombin is found in about 1 in 50 persons in the US. It raises the risk of thrombosis significantly for both males and females in all age groups. The Prothrombin G20210A mutation increases circulating prothrombin levels. This appears to create a hypercoagulable state.

Risks associated with Prothrombin

- This gene provides instructions for making a protein called prothrombin (also called coagulation factor II). Coagulation factors are essential proteins for normal blood clotting. After an injury, clots protect the body by sealing off damaged blood vessels, preventing additional blood loss.
- This mutation causes the gene to be overactive and leads to the excess production of prothrombin, which may lead to high rates of blood clot formation.
- People who have prothrombin mutation G20210A have a 2-to-3 fold increase in the risk of DVT (Deep Vein Thrombosis). Persons who have this mutation plus the factor V Leiden mutation have a 10-to-20 fold increase in thrombotic risk.
- Other factors also increase the risk of blood clots in people with prothrombin thrombophilia (a disorder that causes overcoagulation of the blood). These factors include increasing age, obesity, trauma, surgery, smoking, the use of oral contraceptives (birth control pills) or hormone replacement therapy, and pregnancy.

Who should be tested?

- Those who have had a blood clot in one of the deep veins of the body (also called deep vein thrombosis or DVT)
- Those who have have a blood clot that has traveled to the lung (called a pulmonary embolism or PE)
- Those who have had a blood clot in an unusual site (such as the mesenteric or cerebral sinus vein).
- Those who have suffered a heart attack or stroke at a young age
- Those who have a history of recurrent pregnancy loss or stillbirth

Genova Diagnostics

Comprehensive Stool Analysis for Optimal Clinical Utility

The Comprehensive Digestive Stool Analysis 2.0™ (CDSA 2.0) offers unique insight into overall and gastrointestinal health by assessing a combination of novel stool biomarkers.

This stool analysis evaluates:

- Digestion/Absorption Markers
- Immunology (Inflammation) Markers
    - Pancreatic Elastase 1 (PE1), a biomarker of exocrine pancreatic function Immunology (Inflammation) Markers
    - Calprotectin, an FDA-cleared biomarker that effectively differentiates between Irritable Bowel Syndrome (IBS) and Inflammatory Bowel Disease (IBD)
- Gut Metabolic Markers
- Gut Microbiology Markers
- Gold standard O&P (ova & parasite) technology as well as EIA (Enzyme Immunoassay) for identification of common parasites

This diagnostic stool analysis provides immediate, actionable clinical information for the estimated 50% of patients seen by primary care practitioners who have gastrointestinal complaints. For greater insight into the clinical utility of the CDSA 2.0, please read the Clinical Overview below.

CDSA 2.0 Stool Analysis Offers Insight into Common Gastrointestinal Conditions

Evidence suggests that both local and systemic health issues may begin as imbalances in gastrointestinal function. Some of the consequences of imbalanced gastrointestinal health are:

- Maldigestion
- Malabsorption
- Irritable Bowel Syndrome (IBS)
- Altered GI immune function
- Bacterial/fungal overgrowth
- Chronic dysbiosis

Clinical Overview

What is the Comprehensive Digestive Stool Analysis™ (CDSA 2.0)?

The Comprehensive Digestive Stool Analysis 2.0™ (CDSA 2.0) provides unique insight into overall and gastrointestinal health by assessing a combination of novel stool biomarkers. The CDSA 2.0 provides an informative and flexible screening of gastrointestinal function providing information on:

- Digestion/Absorption:
  - Pancreatic Elastase 1
  - Putrefactive Short–Chain Fatty Acids
  - Additional biomarkers available
    - Chymotrypsin
    - Fecal Fats
- Inflammation/Immunology:
  - Eosinophil Protein X (EPX)
  - Calprotectin
- Gut Metabolic Markers
  - Beneficial Short–Chain Fatty Acids (SCFA) with n–Butyrate
  - pH
  - Beta–Glucuronidase
  - Secondary Bile Acids
    - Lithocholic acid (LCA)
    - Deoxycholic acid (DCA)
    - LCA/DCA Ratio
- Gut Microbiology Markers
  - Beneficial Bacteria
  - Additional Bacteria
  - Mycology
  - Parasitology Microscopic
  - Parasitology EIA
    - Cryptosporidium
    - Giardia lamblia
    - Entamoeba histolyti

When Should the CDSA 2.0 be considered?

CDSA 2.0 can reveal important clinical information about many common symptoms such as gas, bloating, abdominal pain, diarrhea, and constipation. This stool analysis also provides assessment for a differential diagnosis between inflammatory bowel disease and irritable bowel syndrome, plus a reliable assessment of exocrine pancreatic function. In addition, patients with risk factors for parasite acquisition can be evaluated with the CDSA 2.0.

What advantage does the CDSA 2.0 offer compared to other diagnostics?

Traditional GI testing has required advanced imaging and inconvenient testing procedures that can be costly. The CDSA 2.0 stool analysis offers a user-friendly way to provide clinicians with valuable insight into GI imbalances

What can clinicians and patients expect from the CDSA 2.0 offer compared to other diagnostics?

Evidence suggests that both local and systemic health issues may begin as imbalances in Gastrointestinal function. The CDSA 2.0 stool test provides immediate, actionable clinical information for patients presenting with GI complaints. It aids clinicians in the identification of root cause(s) of digestive discomfort and supports identification of targeted treatments.

Test Type: Stool Analysis

DiagnosTechs.

Adrenal Stress Index (ASI)

The Adrenal Stress Index (ASI) panel was introduced in 1989 to evaluate stress, a leading cause of morbidity and mortality. Additional tests have been added to evaluate glycemic control using multiple salivary insulin measurements, and to evaluate adrenal capacity to produce cortisol using 17-Hydroxyprogesterone.

Bone Health Panel (BHP)

Aging is inevitable, and bone reflects the aging process by exhibiting gradual loss of mass. In susceptible individuals, this can cause osteoporosis. Bone metabolism is a continous, delicate process of balancing ongoing deposition and breakdown. Hormonal balance, nutrition, lifestyle and genetics are all contributing factors to bone metabolism. This panel provides measurements of six key hormones in saliva—progesterone, estradiol, testosterone, cortisol, FSH and DHEA/DHEA-S—as well as the bone marker DPD in urine. Urinary and salivary assays provide bone resorption markers for a complex patient report presented in an easy-to-read, customized format.

Female Hormone Panel (FHP)

The Female Hormone Panel (FHP) is a non-invasive test consisting of 11 saliva specimens collected during specified time periods throughout the menstrual cycle. The ovaries are a major component of the female reproductive cycle and they release hormones in a cyclical manner which is referred to as the menstrual cycle. The Female Hormone Panel provides a dynamic mapping of the free fraction levels of Estradiol (E2) and Progesterone (P) throughout one cycle. In addition, the cycle average of Testosterone (T) and DHEA are measured. The Female Hormone Panel includes: Estradiol (x11), Progesterone (x11), cycle average Testosterone and DHEA/DHEA-S, 3 Progesterone production indices, 4 Estradiol production indices, a full cycle P/E ratio graph and an example of a restorative plan. The expanded Female Hormone Panel (eFHP) includes an additional seven (7) FSH and seven (7) LH measurements.

Food Allergy (Sensitivity) Panel

The Female Hormone Panel (FHP) is a non-invasive test consisting of 11 saliva specimens collectedThe food Allergy panel tests for an immune response to four of the most common food allergens. Gluten, soy,milk and egg proteins. Antibodies to these foods can easily be tested for from a non-invasive saliva sample, providing information that can aid in successful treatment.

Gastrointestinal Health Panel™

Saliva-Based Testing

The Diagnos-Techs Gastrointestinal Health Panel™ provides non-invasive, early immuno- detection of parasites and sophisticated testing of inherited food allergies/sensitivities like those described below.

Stool-Based Testing

The Regular and Expanded Gastrointestinal Panels™ include comprehensive testing of three stool samples to ensure the most accurate results. We evaluate for pathogens, inflammatory markers, occult blood, and functional markers:

- Culture for yeast and fungi to screen for fungal dysbiosis
- Microscopic ova and parasite check
- Culture for bacteria and flora to identify pathogenic and commensal organisms
- Antigen testing for Giardia, Cryptosporidium, and Clostridium difficile
- Inflammatory biomarker levels (lysozyme, alpha anti-chymotrypsin, intestinal SIgA) to detect significant irritation of the small or large intestine
- Chymotrypsin measurement to assess pancreatic digestive strength
- Occult blood and fecal pH testing to further assess GI health

Food Allergy/Sensitivity Testing

Analyzes the antigen-specific secretory IgA in saliva to detect genetically inherited food allergies/sensitivities to the following:

- Wheat (gluten)
- Eggs (ovalbumin)
- Cow milk (casein)
- Soy protein

Predisposed individuals often experience intestinal inflammation after consumption of offending foods. Subsequently, the intestinal mucosa releases secretory IgA to neutralize the antigens. SIgA testing, unlike IgG, allows the detection of mild, subclinical and latent allergy/sensitivity cases. Furthermore, the short SIgA half-life ensures earlier and more effective compliance and follow-up assessments.

Male Hormone Panel™ (MHP™) and Expanded Male Hormone Panel™ (eMHP™)

The aging process is inevitable. However, restoring lost male vitality is within reach. The hormones involved in this restoration can now be collectively measured in one salivary sample using the regular or expanded Male Hormone Panels™ (MHP™ and eMHP™).

Postmenopause Panel™ (PostM™) and Perimenopause Panel™ (PeriM™)

Menopause is a natural and usually gradual change in glandular function in women resulting in substantial shifts in hormone levels.
The Postmenopause Panel™ provides measurements of six key hormones:

1. Estrone (E1)
2. Estradiol (E2)
3. Estriol (E3)
4. Progesterone (P)
5. Testosterone (T)
6. DHEA, DHEA-S (pooled)

The Perimenopause Panel™ contains the same components as the Postmenopause Panel™ but sampled twice, 13-15 days apart.
The inclusion of FSH and LH in the expanded Postmenopause Panel™ (ePostM™) and expanded Perimenopause Panel™ (ePeriM™), extends the interpretation to include pituitary involvement.

Flexi-Matrix™ *Customized Test Panels*

Note: Diagnos-Techs, Inc. also offers several standard pre-defined test panels at very reasonable fees. Flexi-Matrix™ cannot be used for the DPD Bone Marker Test, FHP, eFHP, PeriM or ePeriM Panels.

All Saliva Tests Below

(Blue H vial x4, Green F/L vial x1)

Male and Female Hormones

- FSH
- LH
- Estrone
- Estradiol
- Estriol
- Progesterone
- Testosterone
- Androstenedione
- DHT

Adrenal and Stress Hormones

- Cortisol 6am-8am
- Cortisol 11am-Noon
- Cortisol 4pm-5pm
- Cortisol 10pm-Midnight
- 17-OH Progesterone
- DHEA + DHEA/S Pooled

Metabolism Module

- Insulin (Fasting)
- Insulin (Non-Fasting)

Food Intolerance and Immunity

- Egg (Albumin)
- Cow's Milk (Casein)
- Soy Protein
- Gluten (Gliadin)
- Total Salivary SIgA

Parasitic and GI Diseases I

- Amoeba Histolytica
- Toxoplasma Gondii
- Helicobacter pylori
- Roundworm–Ascaris
- Tissue worm–Trichinella
- Tapeworm–T. solium

All Stool Tests Below
(Brown A vial x1, Brown B vial x2)

Parasitic and GI Diseases II

- 1 x Ova and Parasites*–Stool
- 2 x Ova and Parasites*–Stool
- Cryptosporidium Antigen
- Giardia Antigen
  **Microscopic test for all visible parasites*

Infectious Diseases

- Stool Culture, Yeast and Fungi
- Stool Culture, Bacteria and Flora
- Clostridium difficile Toxins

GI Functional Markers

- Intestinal Lysozyme
- Intestinal Alpha Anti-Chymotrypsin
- Total Intestinal SIgA
- Chymotrypsin
- Occult Blood
- Stool PH

CYREX Laboratories

Cyrex™ is a Clinical Immunology Laboratory Specializing in Functional Immunology and Autoimmunity. Cyrex™ offers multi-tissue antibody testing for the early detection and monitoring of today's complex autoimmune conditions. Cyrex™ develops innovative arrays through continuous collaboration with leading experts in medical research and clinical practice.

Intestinal Antigenic Permeability Screen

Intestinal Antigenic Permeability Screen

Wheat/Gluten Proteome Reactivity & Autoimmunity

Gluten-Associated Cross-Reactive Foods and Foods Sensitivity

Multiple Autoimmune Reactivity Screen

Diabetes Autoimmune Reactivity Screen

Neurological Autoimmune Reactivity Screen

Joint Autoimmune Reactivity Screen

Multiple Food Immune Reactivity Screen

Chemical Immune Reactivity Screen

Pathogen-Associated Immune Reactivity Screen

Blood Brain Barrier Permeability

Chromosomal Labs

DNA relationship Testing and DNA Forensic Testing

Paternity, Maternity Test

What is it?

Paternity and maternity tests prove biological parenthood.

When should I use it?

A paternity or maternity test can be used to establish the parenthood of an individual for a court case such as child support or child custody. The test can also be used to support placing a parent's name on a birth certificate.

LabCorp places the highest emphasis on following legal chain of custody with your sample, so your sample will be valid evidence in a legal setting. We employ the latest technology to provide the most accurate results for you. Our highly accurate tests exclude, on average, 99.99% of non-fathers. We provide safe, secure, and efficient transportation of your samples.

What kind of sample is tested?

The most common sample type is a buccal swab. This sample is collected using a cotton swab that is gently rubbed on the inside of your cheek. Blood samples are also acceptable.

Immigration Test

What is it?

A DNA immigration test is a paternity, maternity or kinship test conducted at the request of the US Embassy or the Department of Homeland Security, United States Citizenship and Immigration Services (USCIS).

Why should I use it?

You need to legally authenticate your family to aid them in obtaining a visa and eventually citizenship. The results will be submitted to the immigration authorities. You do not need an attorney to purchase this test.

What happens next?

Please complete our Call Back form and a representative will reach out to you and help you select the appropriate test below for your unique immigration needs.

Immigration tests typically require one of the following:
DNA Maternity Test. A DNA maternity test will test the relationship between a child and his/her alleged mother.

DNA Paternity Test. A DNA paternity test will test the relationship between a child and his/her alleged father.
DNA Kinship Test. A DNA kinship test will test the relationship between two or more individuals to assess if they are biologically related (i.e., to confirm relatedness to an aunt, uncle, or grandparent). Note the US Embassy may not accept this type of test. Please check with your Department of State/Embassy official.

Adaption Test

What is an adoption test?

If you were adopted and think you have found your birth parents, a DNA test may provide evidence of your biological relationship.

The DNA test may also aid in a current adoption case. In this case, a DNA test can confirm the relationship of the birth parents to the child who is being adopted. In certain international adoptions, this is required by the child's birth country.

Why should I use it?

This test may help you learn more about your personal history.

Tribal Enrollment

What is it?

Tribal enrollment tests are DNA tests that can aid a person who is seeking to be added to membership registry of an American Indian tribe. Each tribe sets its own enrollment criteria, but in general, it is necessary to prove one's heritage with a tribe. This can be shown through DNA testing of the person seeking enrollment and a person who is already on the tribe's enrollment list.

Why should I use it?

This testing is performed to help gain enrollment on the membership registry of an American Indian tribe.

Estate Test

What is it?

Estate tests or probate tests help prove family relationships in cases of estate settlement.

Why should I use it?

If you want to be included in the process of settling a family member's estate, a DNA test can be used to show a relationship to the deceased person.

DOCTOR'S DATA

Clinical Microbiology

Clinical microbiology plays a crucial role in individual and community health. Because most microbes living on or within the body are beneficial, distinguishing those that are disease-producing is a critical function of a clinical microbiology laboratory.

Doctor's Data bridges traditional clinical microbiology with complementary medicine, providing world-class diagnostic microbiology testing that helps you assess digestive and absorptive functions, detect pathogens or parasites and identify specific bacteria and yeast. Through specimens collected from a variety of body sites and the use of advanced assays and technology, Doctor's Data determines what microorganisms are present and which may be causing infection. Our painstaking approach can help you select the most appropriate antimicrobial therapy and the comprehensive nature of our testing represents real value for your patients and practice.

Bacteriology Culture

The Bacteriology Culture profile can identify the presence of beneficial flora, imbalanced flora including *Clostridium* species, and dysbiotic flora, as well as detect infectious pathogens. Antimicrobial susceptibility testing is also performed for appropriate bacterial and species at no additional charge.
Learn more »

Turnaround Time

6 to 8 days

Analytes Tested

Click any analyte name for additional clinical information, including reference ranges, specimen collection, stability and rejection criteria.

Analyte	CPT	ABN Required
Additional Pathogens culture; stool	87046	No
Bacteriology culture, Aerobic; stool	87045	No

List price applies when filing with insurance or Medicare, or when billing a patient directly.

Prompt payment pricing applies when billing to a physician account or prepayment is received with the test.

Doctor's Data offers profiles containing multiple analytes. *Multiple analytes may be billed under a single CPT code. Many analytes can be ordered individually. Pricing may vary. Click on a specific analyte for more information or read our detailed billing and payment policies.

The CPT codes listed on our website are for informational purposes only. This information is our interpretation of CPT coding requirements and may not necessarily be correct. You are advised to consult the CPT Coding Manual published by the American Medical Association. Doctor's Data, Inc. takes no responsibility for billing errors due to your use of any CPT information from our website.

Sign in at the top of any page to view pricing and order tests. Or click here to create an account. You may also contact us for assistance placing an order.

This test is useful for

- Gastrointestinal Symptoms

- Autoimmune Disease
- IBD/IBS
- Inflammation
- Food Sensitivities
- Nutritional Deficiencies
- Skin Conditions (Atopic Dermatitis)
- Joint Pain

Detailed Information

The Bacteriology Culture profile can identify the presence of beneficial flora, imbalanced flora including *Clostridium* species, and dysbiotic flora, as well as detect infectious pathogens.

A good balance of beneficial microflora has been known to be associated with health benefits since the turn of the century. At that time Metchnikoff drew attention to the adverse effects of dysbiotic gut microflora on the host and suggested that ingestion of fermented milks ameliorated what he called "autointoxication." He proposed that the consumption of large quantities of *Lactobacillus* species would reduce the number of toxin-producing bacteria and result in better health and increased lifespan.

Over the past 90-plus years there has been extensive scientific research demonstrating that a good balance of *Lactobacilli*, *Bifidobacteria* and beneficial *E. coli* bacteria are important to the functional health of the gut, and as a consequence, to the whole organism. The benefits identified include inhibition of microbial pathogens, prevention and treatment of antibiotic-associated diarrhea, prevention of travelers' diarrhea, reduction of lactose intolerance symptoms, reduction in serum cholesterol levels, enhancement of the immune system, and inhibition of the proliferation of *Candida albicans*. Research has shown that improved biological value of food can be achieved through the activity of *Lactobacilli* and *Bifidobacteria* which have been reported to produce folic acid, niacin, thiamin, riboflavin, pyridoxine, biotin and vitamin K.

The mechanisms by which these benefits are derived are not yet fully understood. However, research suggests that some of the beneficial effects may be due to the following activities of beneficial bacteria:

- Release of substances antagonistic to enteropathogenic microorganisms such as:
  lactocidin
  lactobicillin and
  acidolin
- Competition with pathogens for adhesion receptors
- Production of lactase
- Production of short chain fatty acids (SCFAs) such as butyrate, propionate and acetate

In a healthy balanced state of intestinal flora, the beneficial bacteria make up a significant proportion of the total microflora. However, in many individuals we see an imbalance of beneficial bacteria and an overgrowth of non-beneficial or even pathogenic microorganisms—dysbiosis. This can be due to a variety of factors including:

- Daily exposure to chemicals in our drinking water that are toxic to friendly bacteria
- The use of antibiotics
- Chronic consumption of highly processed foods (low in fiber, high in sugar)
- High stress levels

Patients may present with chronic symptoms such as irritable bowel syndrome, autoimmune diseases such as rheumatoid arthritis, fatigue, chronic headaches and allergies to a variety of foods.

Antimicrobial susceptibility testing to prescriptive and natural agents is also performed for appropriate bacterial species at no additional charge. This provides the clinician with important and specific clinical information to help plan an appropriate treatment protocol.

Calprotectin Stool

Calprotectin is a reliable noninvasive marker for differentiating gastrointestinal inflammation associated with Inflammatory Bowel Disease (IBD) from inflammation that may be associated with Irritable Bowel Syndrome (IBS). Such differentiation is very important because IBD can be life threatening. Monitoring the levels of fecal calprotectin can play an essential role in determining the effectiveness of clinical interventions, and is a good predictor of IBD remission and relapse. Calprotectin provides clinicians with a valuable tool, not only for differentiating IBD from IBS, but also allowing them to monitor and predict treatment outcomes and enabling better management of IBD flare ups.

Learn more »

Turnaround Time

4 to 6 days

Analytes Tested

Click any analyte name for additional clinical information, including reference ranges, specimen collection, stability and rejection criteria.

Analyte	CPT	ABN Required
Calprotectin; stool	83993	Yes

List price applies when filing with insurance or Medicare, or when billing a patient directly.

Prompt payment pricing applies when billing to a physician account or prepayment is received with the test.

Doctor's Data offers profiles containing multiple analytes. *Multiple analytes may be billed under a single CPT code. Many analytes can be ordered individually. Pricing may vary. Click on a specific analyte for more information or read our detailed billing and payment policies.

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Sign in at the top of any page to view pricing and order tests. Or click here to create an account. You may also contact us for assistance placing an order.

Detailed Information

Calprotectin is a calcium-binding protein produced by neutrophils and monocytes, and it may be involved in inflammatory signaling. Elevated Calprotectin and fecal Lactoferrin levels indicate the presence of neutrophils and inflammation in the gastrointestinal (GI) mucosa. Calprotectin and Lactoferrin differentiate between irritable bowel syndrome (IBS) and inflammatory bowel disease (IBD). IBD includes autoimmune conditions such as Crohn’s disease and ulcerative colitis (UC); these conditions may become life-threatening and require lifelong treatment.

Multiple studies have shown fecal Calprotectin and Lactoferrin to be equivalent with respect to clinical sensitivity and specificity. Studies suggest that Calprotectin may correlate more closely with histological (cell microscopy) findings. Lactoferrin may correlate better to macroscopic (endoscopy) findings, and may be the better indicator of impending

relapse, elevating 2-3 weeks prior to clinical symptoms.

Chronic inflammation of the gastrointestinal mucosa contributes to symptoms of IBD. Chronic stress is known to contribute to symptom flare-ups and increased inflammation. Liver disease or the use of aspirin or nonsteroidal anti-inflammatory (NSAID) medications may elevate Calprotectin levels. Fecal Calprotectin levels may also be increased in newborns.

Comprehensive Clostridium Culture

To aid in the identification and differentiation of *Clostridium* species, our specialized anaerobic culture optimized for Clostridium detects nearly 40 beneficial and pathogenic species, including *C. botulinum*, *C. tetani* and *C. perfringens*, as well as *C. difficile*, which is often present in healthy individuals, but can be associated with antibiotic-associated diarrhea. If *C. difficile* is cultured at any level, the sample is automatically tested for all known toxigenic strains using an FDA-cleared, molecular diagnostic DNA assay at no additional charge.
Learn more »

Turnaround Time

14 to 21 days

Analytes Tested

Click any analyte name for additional clinical information, including reference ranges, specimen collection, stability and rejection criteria.

Analyte	CPT	ABN Required
Comprehensive Clostridium Culture; stool	87075	Yes

List price applies when filing with insurance or Medicare, or when billing a patient directly.

Prompt payment pricing applies when billing to a physician account or prepayment is received with the test.

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This test is useful for

- Antibiotic-Associated Diarrhea
- Autism Spectrum Disorders

Detailed Information

Clostridium is a diverse genus of bacteria, many of which are abundant and normal inhabitants of the human gastrointestinal tract (GIT). Many of the *Clostridium* species can have beneficial effects on the metabolism and health of the GIT in part by breakdown of polysaccharides, saccharolytic fermentation of carbohydrates to short chain fatty acids, and regulation of immune function. While non-pathogenic *Clostridium* species are predominantly saccharolytic,

toxin-producing species tend to be strongly proteolytic. Proteolytic fermentation produces toxic metabolites such as ammonia, amines, volatile phenols and indoles which are pharmacologically active and affect a variety of physiological functions—including adverse effects in the central nervous system.

Aside from the well-established pathogenic *Clostridium* species such as *C. botulinum, C. tetani, C. perfringens* and *C. difficile*, other species may have yet-to-be-elucidated roles in health and disease. For example, they may be involved as mediators in the gut-brain connection in the evolution of psychiatric neurodevelopmental delay such as autism and autism spectrum disorders. *Clostridium* species that produce neurotoxins and potentially toxic metabolic byproducts have been reported to be more prevalent in autistic children compared to neurotypical controls—most notable were greater quantities of *C. bolteae* and members of the *C. hystolyticum* group.

Clostridia are anaerobic Gram-positive bacteria that do not grow in the more aerobic environment of the distal colon. However Clostridia produce extremely durable endospores as a means of proliferation—the spores are resistant to air, antibiotics, heat, drying and disinfectants. Doctor's Data uses growth media optimally suited for growth of Clostridium species and anaerobic culture conditions to germinate the spores to metabolically active bacteria that are sub-cultured for positive identification (speciation). If *C. difficile* is cultured at any level, the sample is automatically tested for all known toxigenic strains using an FDA-cleared, molecular diagnostic DNA assay at no additional charge.

Clostridia generally are resistant to antibiotics and treatment of an overgrowth of *C. difficile*, especially in asymptomatic carriers and infants under age two, is usually not warranted. Additionally, since plasmids have a potential role in transferring various capacities, including antibiotic resistance, from one organism to another, the use of antibiotics in the treatment of clostridia overgrowth should be considered carefully.

Comprehensive Parasitology x3

The Comprehensive Parasitology profile is an important tool for identifying imbalances in intestinal microflora. It includes comprehensive bacteriology and yeast cultures to identify the presence of beneficial flora, imbalanced flora including Clostridium species, and dysbiotic flora, as well as detection of infectious pathogens and evaluation for the presence of parasites. Antimicrobial susceptibility testing to prescriptive and natural agents is also performed for appropriate bacterial and fungal species at no additional charge. Parasitology testing can include one-, two- or three-day collection, based on practitioner preference.
Learn more »

Turnaround Time

6 to 8 days

Analytes Tested

Click any analyte name for additional clinical information, including reference ranges, specimen collection, stability and rejection criteria.

Analyte	CPT	ABN Required
Additional Pathogens culture; stool	87046	No
Bacteriology culture, aerobic; stool	87045	No
Cryptosporidium; stool	87328	No

Day 2 Parasitology, trichrome; stool	87209	No
Day 3 Parasitology, trichrome; stool	87209	No
Giardia lamblia; stool	87329	No
Parasitology, concentrate; stool	87177	No
Parasitology, trichrome; stool	87209	No
Yeast culture; stool	87102	No

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This test is useful for

- Gastrointestinal Symptoms
- Autoimmune Disease
- Fatigue
- IBD/IBS
- Inflammation
- Food Sensitivities
- Nutritional Deficiencies

Detailed Information

The Comprehensive Parasitology profile is an important tool for identifying imbalances in intestinal microflora. It includes comprehensive bacteriology and yeast cultures to identify the presence of beneficial flora, imbalanced flora including Clostridium species, and dysbiotic flora, as well as detection of infectious pathogens and evaluation for the presence of parasites.

Bacteriology
A good balance of beneficial microflora has been known to be associated with health benefits since the turn of the century. At that time Metchnikoff drew attention to the adverse effects of dysbiotic gut microflora on the host and suggested that ingestion of fermented milks ameliorated what he called "autointoxication." He proposed that the consumption of large quantities of *Lactobacillus* species would reduce the number of toxin-producing bacteria and

result in better health and increased lifespan.

Over the past 90-plus years there has been extensive scientific research demonstrating that a good balance of *Lactobacilli*, *Bifidobacteria* and beneficial *E. coli* bacteria are important to the functional health of the gut, and as a consequence, to the whole organism. The benefits identified include inhibition of microbial pathogens, prevention and treatment of antibiotic-associated diarrhea, prevention of travelers' diarrhea, reduction of lactose intolerance symptoms, reduction in serum cholesterol levels, enhancement of the immune system, and inhibition of the proliferation of *Candida albicans*. Research has shown that improved biological value of food can be achieved through the activity of *Lactobacilli* and *Bifidobacteria* which have been reported to produce folic acid, niacin, thiamin, riboflavin, pyridoxine, biotin and vitamin K.

The mechanisms by which these benefits are derived are not yet fully understood. However, research suggests that some of the beneficial effects may be due to the following activities of beneficial bacteria:

- Release of substances antagonistic to enteropathogenic microorganisms such as:
  lactocidin
  lactobicillin and
  acidolin
- Competition with pathogens for adhesion receptors
- Production of lactase
- Production of short chain fatty acids (SCFAs) such as butyrate, propionate and acetate

In a healthy balanced state of intestinal flora, the beneficial bacteria make up a significant proportion of the total microflora. However, in many individuals we see an imbalance of beneficial bacteria and an overgrowth of non-beneficial or even pathogenic microorganisms—dysbiosis. This can be due to a variety of factors including:

- Daily exposure to chemicals in our drinking water that are toxic to friendly bacteria
- The use of antibiotics
- Chronic consumption of highly processed foods (low in fiber, high in sugar)
- High stress levels

Patients may present with chronic symptoms such as irritable bowel syndrome, autoimmune diseases such as rheumatoid arthritis, fatigue, chronic headaches and allergies to a variety of foods.

Antimicrobial susceptibility testing to prescriptive and natural agents is also performed for appropriate bacterial species at no additional charge. This provides the clinician with important and specific clinical information to help plan an appropriate treatment protocol.

Yeast

Infection with yeast species can cause a variety of symptoms, both intra- and extra-gastrointestinal, and in many cases, may escape suspicion as a pathogenic agent. Controversy remains as to the relationship between Candida infection and episodes of recurrent diarrhea. However, episodes of yeast infection after short-term and long-term antibiotic use have been identified in patients with both gastrointestinal and vaginal symptoms.

There is some evidence linking yeast infections with more chronic extra-gastrointestinal conditions. Studies suggest that the production of antibodies against *Candida albicans* may contribute to atopic dermatitis in young adults. Other studies have identified the potential role of candidiasis in chronic fatigue syndrome.

Identification of abnormal levels of specific yeast species in the stool is an important diagnostic step in therapeutic planning for the patient with chronic gastrointestinal and extra-gastrointestinal symptoms.

Antimicrobial susceptibility testing to prescriptive and natural agents is also performed for appropriate fungal species at no additional charge. This provides the clinician with useful clinical information to help plan an appropriate treatment protocol.

Parasitology
According to Dr. Hermann R. Bueno of the Royal Society of Tropical Medicine and Hygiene in London, "parasites are the missing diagnosis in the genesis of many chronic health problems, including diseases of the gastrointestinal tract and endocrine system."

While parasitic infection may be an underlying etiological factor in several chronic disease processes, doctors often do not consider the potential for parasitic involvement because signs and symptoms of parasitic infection often resemble those of other diseases. However, it has been shown that parasite testing is a reasonable approach to the detection of causative agents for chronic gastrointestinal disorders.

Most Americans are inclined to believe that parasitic infection is a rare and exotic occurrence, limited to those who have traveled to distant, tropical lands. However, for a number of reasons, there has been an increase in the incidence of parasitic infection in this country. These may include:

- Contamination of the water supply
- Increased use of daycare centers
- Increased travel to, and visits from, countries where parasitic infection is endemic
- Household pets
- Consumption of exotic and uncooked foods
- Antibiotic use
- Changing sexual mores

Signs and symptoms of parasitic infection vary from one individual to another. The more common are constipation, diarrhea, bloating, gas, symptoms of irritable bowel syndrome, arthralgias, myalgias, anemia, increased allergic reactions, skin lesions, agitation and anxiety, difficulty with sleep, decreased energy, malnutrition and decreased immune function. Infection can occur by four different pathways. These routes include:

- Contaminated food or water
- Insect vectors
- Sexual contact
- Passage through the skin and nose

A thorough patient history will help assess the possibility of parasitic infection and the need for appropriate testing to confirm the suspicion. Parasitology testing can include one-, two- or three-day collection, based on practitioner preference.

Comprehensive Stool Analysis

Gastrointestinal complaints are among the most common reasons that patients seek medical care. Symptoms associated with GI disorders include persistent diarrhea, constipation, bloating, indigestion, irritable bowel syndrome and malabsorption. The Comprehensive Stool Analysis can help assess digestive and absorptive functions, the presence of opportunistic pathogens and to monitor the efficacy of therapeutic remediation of GI disorders.

Antimicrobial susceptibility testing to prescriptive and natural agents is also performed for appropriate bacterial and fungal species at no additional charge.
Learn more »

Turnaround Time

6 to 8 days

Analytes Tested

Click any analyte name for additional clinical information, including reference ranges, specimen collection, stability and rejection criteria.

Analyte	CPT	ABN Required
Acetate; stool	82542	Yes
Additional pathogens culture; stool	87046	No
Bacteriology culture, aerobic; stool	87045	No
Butyrate; stool	82542	Yes
Calprotectin; stool	83993	Yes
Carbohydrates; stool	*	No
Elastase; stool	82656	No
Fat Stain; stool	89125	No
Lactoferrin; stool	83631	No
Lysozyme; stool	85549	Yes
Mucus; stool	*	No
Muscle Fibers; stool	89160	No
Occult Blood; stool	82272	Yes

Propionate; stool	82542	Yes
Red Blood Cells; stool	*	No
Valerate; stool	82542	Yes
Vegetable Fibers; stool	89160	No
White Blood Cells; stool	*	No
Yeast culture; stool	87102	No
ph; stool	83986	No
sIgA; stool	83520	Yes

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This test is useful for

- Gastrointestinal Symptoms
- Autoimmune Disease
- Joint Pain
- IBD/IBS
- Inflammation
- Food Sensitivities
- Nutritional Deficiencies
- Skin Conditions (Atopic Dermatitis)

Detailed Information

The Comprehensive Stool Analysis is an invaluable non-invasive diagnostic assessment that permits practitioners to objectively evaluate the status of beneficial and imbalanced commensal bacteria including Clostridium species,

pathogenic bacteria and yeast/fungus. Precise identification of pathogenic species and susceptibility testing greatly facilitates selection of the most appropriate pharmaceutical or natural treatment agents.

Important information regarding the efficiency of digestion and absorption can be gleaned from the measurement of the fecal levels of elastase (pancreatic exocrine sufficiency), fat, muscle and vegetable fibers, and carbohydrates.

Inflammation can significantly increase intestinal permeability and compromise assimilation of nutrients. The extent of inflammation, whether caused by pathogens or inflammatory bowel disease (IBD), can be assessed and monitored by examination of the levels of biomarkers such as lysozyme, lactoferrin, white blood cells and mucus. These markers can be used to differentiate between inflammation associated with potentially life-threatening inflammatory bowel disease (IBD), which requires lifelong treatment, and less severe inflammation that can be associated with irritable bowel syndrome (IBS) which is frequently due to the presence of enteroinvasive pathogens. Lactoferrin is only markedly elevated prior to and during the active phases of IBD, but not with IBS. Monitoring fecal lactoferrin levels in patients with IBD can therefore facilitate timely treatment of IBD, and the test can be ordered separately. Since the vast majority of secretory IgA (sIgA) is normally present in the GI tract, where it prevents binding of pathogens and antigens to the mucosal membrane, it is essential to know the status of sIgA in the gut. sIgA is the only bona fide marker of humoral immune status in the GI tract.

Cornerstones of good health include proper digestion of food, assimilation of nutrients, exclusion of pathogens and timely elimination of waste. To obtain benefits from food that is consumed, nutrients must be appropriately digested and then efficiently absorbed into portal circulation. Microbes, larger-sized particles of fiber, and undigested foodstuffs should remain within the intestinal lumen. Poor digestion and malabsorption of vital nutrients can contribute to degenerative diseases, compromised immune status and nutritional deficiencies. Impairment of the highly specific nutrient uptake processes, or compromised GI barrier function, as in "leaky gut syndrome," can result from a number of causes including:

- Low gastric acid production
- Chronic maldigestion
- Food allergen impact on bowel absorptive surfaces
- Bacterial overgrowth or imbalances (dysbiosis)
- Pathogenic bacteria, yeast or parasites and related toxic irritants
- The use of NSAIDs and antibiotics

Impairment of intestinal functions can contribute to the development of food allergies, systemic illnesses, autoimmune disease, and toxic overload from substances that are usually kept in the confines of the bowel for elimination. Efficient remediation of GI dysfunctions incorporates a comprehensive guided approach that should include consideration of elimination of pathogens and exposure to irritants, supplementation of hydrochloric acid, pancreatic enzymes and pre- and probiotics, and repair of the mucosal barrier.

The Comprehensive Stool Analysis does not include analysis for parasites. For assessment of the presence for parasites, consider the Comprehensive Stool Analysis with Parasitology.

Comprehensive Stool Analysis w/Parasitology x3

Gastrointestinal complaints are among the most common in medical care. This comprehensive profile helps pinpoint the causes of gastrointestinal symptoms and chronic systemic conditions, and measures key markers of digestion, absorption and inflammation. Using growth-based culture, the standard of practice in clinical microbiology, as well as sensitive biochemical assays and microscopy, this thorough profile evaluates the status of beneficial and pathogenic microorganisms including aerobic and anaerobic bacteria, yeast and parasites. Antimicrobial susceptibility testing to prescriptive and natural agents is also performed for appropriate bacterial and fungal species at no additional charge. Parasitology testing can include one-, two- or three-day collection, based on practitioner preference.
Learn more »

Turnaround Time

6 to 8 days

Analytes Tested

Click any analyte name for additional clinical information, including reference ranges, specimen collection, stability and rejection criteria.

Analyte	CPT	ABN Required
Acetate; stool	82542	Yes
Additional pathogens culture; stool	87046	No
Bacteriology culture, aerobic; stool	87045	No
Butyrate; stool	82542	Yes
Calprotectin; stool	83993	Yes
Carbohydrates; stool	*	No
Cryptosporidium; stool	87328	No
Day 2 Parasitology, trichrome; stool	87209	No
Day 3 Parasitology, trichrome; stool	87209	No
Elastase; stool	82656	No
Fat Stain; stool	89125	No
Giardia lamblia; stool	87329	No
Lactoferrin; stool	83631	No
Lysozyme; stool	85549	Yes

Mucus; stool	*	No
Muscle Fibers; stool	89160	No
Occult Blood; stool	82272	Yes
Parasitology, concentrate; stool	87177	No
Parasitology, trichrome; stool	87209	No
Propionate; stool	82542	Yes
Red Blood Cells; stool	*	No
Valerate; stool	82542	Yes
Vegetable Fibers; stool	89160	No
White Blood Cells; stool	*	No
Yeast culture; stool	87102	No
pH; stool	83986	No
sIgA; stool	83520	Yes

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This test is useful for

- Gastrointestinal Symptoms
- Autoimmune Disease
- IBD/IBS
- Inflammation
- Food Sensitivities
- Nutritional Deficiencies
- Joint Pain

Detailed Information

The Comprehensive Stool Analysis with Parasitology x1, 2, or 3 is an invaluable non-invasive diagnostic assessment that permits practitioners to objectively evaluate the status of beneficial and imbalanced commensal bacteria, pathogenic bacteria, yeast/fungus and parasites. Precise identification of pathogenic species and susceptibility testing greatly facilitates selection of the most appropriate pharmaceutical or natural treatment agents.

Important information regarding the efficiency of digestion and absorption can be gleaned from the measurement of the fecal levels of elastase (pancreatic exocrine sufficiency), fat, muscle and vegetable fibers, and carbohydrates. Inflammation can significantly increase intestinal permeability and compromise assimilation of nutrients. The extent of inflammation, whether caused by pathogens or inflammatory bowel disease (IBD), can be assessed and monitored by examination of the levels of biomarkers such as lysozyme, lactoferrin, white blood cells and mucus. These markers can be used to differentiate between inflammation associated with potentially life-threatening inflammatory bowel disease (IBD), which requires lifelong treatment, and less severe inflammation that can be associated with irritable bowel syndrome (IBS) which is frequently due to the presence of enteroinvasive pathogens. Lactoferrin is only markedly elevated prior to and during the active phases of IBD, but not with IBS. Monitoring fecal lactoferrin levels in patients with IBD can therefore facilitate timely treatment of IBD, and the test can be ordered separately. Since the vast majority of secretory IgA (sIgA) is normally present in the GI tract, where it prevents binding of pathogens and antigens to the mucosal membrane, it is essential to know the status of sIgA in the gut. sIgA is the only bona fide marker of humoral immune status in the GI tract.

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- Low gastric acid production
- Chronic maldigestion
- Food allergen impact on bowel absorptive surfaces
- Bacterial overgrowth or imbalances (dysbiosis)
- Pathogenic bacteria, yeast or parasites and related toxic irritants
- The use of NSAIDs and antibiotics

Impairment of intestinal functions can contribute to the development of food allergies, systemic illnesses, autoimmune disease, and toxic overload from substances that are usually kept in the confines of the bowel for elimination. Efficient remediation of GI dysfunctions incorporates a comprehensive guided approach that should include consideration of elimination of pathogens and exposure to irritants, supplementation of hydrochloric acid, pancreatic enzymes and pre- and probiotics, and repair of the mucosal barrier.

Comprehensive Vaginosis Profile

While common, diagnosis of vaginal infections by symptoms alone is not reliable. Properly identifying the cause is critical to successfully treating the infection. Based on a self-collected sample, the Comprehensive Vaginosis Profile differentiates between bacterial vaginosis, vulvovaginal candidiasis and Trichomonas vaginalis (a sexually transmitted parasite) to guide effective treatment. A bacterial vaginosis score based upon the Nugent Scoring System is provided. Antimicrobial susceptibility testing to prescriptive and natural agents is also performed for appropriate bacterial and fungal species at no additional charge.
Learn more »

Turnaround Time

6 to 8 days

Analytes Tested

Click any analyte name for additional clinical information, including reference ranges, specimen collection, stability and rejection criteria.

Analyte	CPT	ABN Required
Bacteriology, vaginal swab	87070	No
Gram stain, vaginal swab	87205	No
Trichomonas culture, vaginal swab	87070	No
Yeast culture, vaginal swab	87102	No

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This test is useful for

- Vaginal Discomfort
- Vaginal Discharge
- Persistent Yeast Infection

Detailed Information

Symptoms of vaginitis may be responsible for 10% of all visits by women to their healthcare practitioners. Typical symptoms include vaginal discomfort, itching, burning, discolored malodorous discharge and sometimes pain.

The three general categories of vaginitis are hormonal imbalance, irritation and infection. Of these, infectious vaginitis is the most common in women of reproductive age and is usually a result of alterations in the vaginal microflora. One of the major causes of infectious vaginitis is bacterial vaginosis and, although bacterial vaginosis may be an antecedent to vaginitis, this disorder is often underestimated since 50% of women with bacterial vaginosis are asymptomatic.

Bacterial vaginosis, distinct from bacterial vaginitis, is not necessarily an inflammatory process but the bacterial constituents that may be responsible for a bacterial vaginosis are capable of causing serious infections. Instead of the normal predominance of Lactobacillus bacteria, increased numbers of anaerobic organisms (Gardnerella vaginalis, Mobiluncus, Mycoplasma hominis, Prevotella and Peptostreptococcus) may be found in vaginal secretions of women with bacterial vaginosis.

Vulvovaginal candidiasis, another condition often responsible for symptoms of vaginitis, is the nomenclature designated for specific vaginal yeast infection. Although the exact causes of bacterial vaginosis or vulvovaginal candidiasis are not clear, the probable causes may be related to changes in the microfloral environment which result in abnormal proliferation of harmful bacteria or yeast. The microfloral balance may be disrupted by any combination of poor diet, poor hygiene, toxic bowel, overuse of antibiotics, abnormal menstrual flow, use of corticosteroids or oral contraceptives, pregnancy, sexual contact, douching, use of perfumed soaps or deodorant sprays or use of an intrauterine contraceptive device. Bacterial vaginosis can increase a woman's susceptibility to sexually transmitted diseases, including Trichomonas infection. Other associated complications may include upper genital urinary tract infection, preterm delivery and postoperative pelvic infections.

Diagnosis of vaginal infections by symptoms alone, or self-diagnosis with use of over-the-counter products, are common practices but can result in misdiagnosis and treatment failure. Identification of factors which might upset vaginal microflora balance, as well as finding the causative organism, are crucial to diagnosing and treating the infection.

Facilitated by Gram staining, specimens are carefully examined microscopically for the presence of curved and small Gram-negative bacteria, lactobacilli, yeast, clue cells and red and white blood cells. Clue cells are the most specific confirmatory criterion for a diagnosis of bacterial vaginosis and the presence of white blood cells indicates the degree of inflammation. Eosinophils are often present in allergic vaginitis.

Trichomonas vaginalis is a pathogenic parasite (flagellate) that is acquired by sexual contact. Males with Trichomonas infection are usually asymptomatic and women are likely reinfected if all sexual partners are not treated. It is estimated that worldwide there are 180 million cases of trichomoniasis each year, including about five million cases in women in the United States. Incidence is likely higher because trichomoniasis is currently not a reportable disease. Culture of vaginal secretions is considered the gold-standard method for diagnosis of trichomoniasis.

Samples are cultured for yeast overgrowth and dysbiotic bacteria, as well as normal vaginal bacteria (Lactobacillus spp). Antimicrobial susceptibility testing to prescriptive and natural agents is also performed for appropriate bacterial and fungal species at no additional charge.

Comprehensive Vaginosis Profile

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Learn more »

Turnaround Time

6 to 8 days

Analytes Tested

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Analyte	CPT	ABN Required
Bacteriology, vaginal swab	87070	No
Gram stain, vaginal swab	87205	No
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This test is useful for

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- Persistent Yeast Infection

Detailed Information

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Vulvovaginal candidiasis, another condition often responsible for symptoms of vaginitis, is the nomenclature designated for specific vaginal yeast infection. Although the exact causes of bacterial vaginosis or vulvovaginal candidiasis are not clear, the probable causes may be related to changes in the microfloral environment which result in abnormal proliferation of harmful bacteria or yeast. The microfloral balance may be disrupted by any combination of poor diet, poor hygiene, toxic bowel, overuse of antibiotics, abnormal menstrual flow, use of corticosteroids or oral contraceptives, pregnancy, sexual contact, douching, use of perfumed soaps or deodorant sprays or use of an intrauterine contraceptive device. Bacterial vaginosis can increase a woman's susceptibility to sexually transmitted diseases, including Trichomonas infection. Other associated complications may include upper genital urinary tract infection, preterm delivery and postoperative pelvic infections.

Diagnosis of vaginal infections by symptoms alone, or self-diagnosis with use of over-the-counter products, are common practices but can result in misdiagnosis and treatment failure. Identification of factors which might upset vaginal microflora balance, as well as finding the causative organism, are crucial to diagnosing and treating the infection.

Facilitated by Gram staining, specimens are carefully examined microscopically for the presence of curved and small Gram-negative bacteria, lactobacilli, yeast, clue cells and red and white blood cells. Clue cells are the most specific confirmatory criterion for a diagnosis of bacterial vaginosis and the presence of white blood cells indicates the degree of inflammation. Eosinophils are often present in allergic vaginitis.

Trichomonas vaginalis is a pathogenic parasite (flagellate) that is acquired by sexual contact. Males with Trichomonas infection are usually asymptomatic and women are likely reinfected if all sexual partners are not treated. It is estimated that worldwide there are 180 million cases of trichomoniasis each year, including about five million cases in women in the United States. Incidence is likely higher because trichomoniasis is currently not a reportable disease. Culture of vaginal secretions is considered the gold-standard method for diagnosis of trichomoniasis.

Samples are cultured for yeast overgrowth and dysbiotic bacteria, as well as normal vaginal bacteria (Lactobacillus spp). Antimicrobial susceptibility testing to prescriptive and natural agents is also performed for appropriate bacterial and fungal species at no additional charge.

Elastase, stool

Fecal Elastase is a specific marker for pancreatic function and maintains a high diagnostic accuracy among patients with small intestinal diseases. This Elastase marker allows for the diagnosis or exclusion of pancreatic exocrine insufficiency and degree of severity, which can be caused by chronic pancreatitis, cystic fibrosis, pancreatic tumor, cholelithiasis or diabetes mellitus. This test does not differentiate between pancreatic insufficiency due to chronic pancreatitis and that due to pancreatic cancer.

Turnaround Time

4 to 6 days

Analytes Tested

Click any analyte name for additional clinical information, including reference ranges, specimen collection, stability and rejection criteria.

Analyte	CPT	ABN Required
Elastase; stool	82656	No

List price applies when filing with insurance or Medicare, or when billing a patient directly.

Prompt payment pricing applies when billing to a physician account or prepayment is received with the test.

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GI Pathogen Profile, multiplex PCR

Viruses, parasites, and bacteria—now you can receive 22 results with 1 test.

Overlapping symptoms—compounded by the lack of testing methods that could identify a full range of viruses, parasites, and bacteria—have historically made GI infections difficult to diagnose. The GI Pathogen Profile, an FDA-cleared molecular test, uses the FilmArray multiplex PCR system to identify 22 viruses, parasites, and bacteria with up to 98.5% overall sensitivity and 99.3% overall specificity.

Get to diagnosis—and targeted treatment—faster.

Most results can be provided within one business day of receiving a sample. As a result, you can begin targeted treatment immediately, for greater therapeutic efficacy and reduced risk of complications and side effects associated with incorrect treatment or unwarranted antimicrobial administration.

Use the GI Pathogen Profile as a stand-alone test, or as a complement to our Comprehensive Stool Analysis, to test for the presence of viral infections or to differentiate between possible diarrheagenic strains of E. coli.
Learn more »

Turnaround Time

0 to 1 days

Analytes Tested

Click any analyte name for additional clinical information, including reference ranges, specimen collection, stability and rejection criteria.

Analyte	CPT	ABN Required
Adenovirus F40&41	87507	No
Astrovirus	*	No
Campylobacter (jejuni, coli and upsaliensis)	*	No
Clostridium difficile (Toxin A&B)	*	No
Cryptosporidium	*	No

Cyclospora cayetanensis	*	No
E. coli O157	*	No
Entamoeba histolytica	*	No
Enteroaggregative E. coli (EAEC)	*	No
Enteropathogenic E. coli (EPEC)	*	No
Enterotoxigenic E. coli (ETEC) lt&st	*	No
Giardia duodenalis	*	No
Norovirus GI&GII	*	No
Plesiomonas shigelloides	*	No
Rotavirus A	*	No
Salmonella	*	No
Sapovirus (I, II, IV and V)	*	No
Shiga-like toxin-producing E. coli (STEC) stx1&stx2	*	No
Shigella&Enteroinvasive E. coli (EIEC)	*	No
Vibrio (parahaemolyticus, vulnificus and cholerae)	*	No
Vibrio cholerae	*	No
Yersinia enterocolitica	*	No

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This test is useful for

- Chronic or acute diarrhea
- Bloody stool
- Travelers diarrhea
- Abdominal pain
- Fever & vomiting
- Immuno-compromised patients
- Geriatric patients
- Chronic disease patients (heart disease, aortic grafts, diabetes, chronic renal disease)
- Observed cluster or suspected outbreak of diarrheal illness

Detailed Information

The GI Pathogen Profile, using the FilmArray multiplex PCR system, tests for 22 Viruses, parasites, and bacteria, and offers new opportunities for the rapid, accurate diagnosis and prompt treatment of diarrheal illnesses which can improve patient outcomes and clinical success.

While bacteria and parasites are the primary cause of food & water-borne diarrheal illness (48 million infections/year), the vast majority of acute diarrheal illness is caused not by bacteria or parasites, but by viral infections. In fact, Norovirus is the primary gastrointestinal infection occurring in the United States. Even though testing for pathogenic bacteria and parasite is commonly available, there has been limited availability of viral testing until recently.

Acute gastroenteritis may contribute to patient morbidity and even mortality, if the illness progresses to severe dehydration. Also, the identification of reportable diseases is imperative to prevent large outbreaks, especially for highly contagious or food-borne illnesses, and many gastrointestinal illnesses have very similar clinical presentations.

If your patient has diarrheal illness, you need accurate results quickly. Most GI Pathogen Profile results can be provided within one business day of sample receipt with up to 98.5% overall sensitivity and 99.3% overall specificity. As a result, you can begin targeted treatment immediately, for greater therapeutic efficacy and reduced risk of complications & side effects associated with incorrect treatment or unwarranted antimicrobial administration.

Rapid diagnosis allows for better treatment decisions, as antimicrobial agents have no effect on viral illness, and the indiscriminate use of antibiotics may increase bacterial resistance. Certain pathogenic bacterial and parasitic infections may require antimicrobial treatment, while other infections warrant rehydration and supportive therapies. Knowing the difference allows the treating physician to practice good antimicrobial stewardship.

Use the GI Pathogen Profile as a stand-alone test, or as a complement to our Comprehensive Stool Analysis, to test for the presence of viral infections or to differentiate between possible diarrheagenic strains of *E. coli*.

H. Pylori Antigen, stool

This microorganism, which can be found on the stomach mucosa of infected people, causes very frequent and mostly silent infections that can produce gastritis, gastric ulcers and other serious pathologies. This FDA-cleared, non-invasive test directly measures the antigen in stool (not antibodies) and is used for diagnosing *Helicobacter pylori* infections. It is also used for monitoring therapeutic efficacy during and after treatment.
Learn more »

Turnaround Time

5 to 7 days

Analytes Tested

Click any analyte name for additional clinical information, including reference ranges, specimen collection, stability and rejection criteria.

Analyte	CPT	ABN Required
H. Pylori; stool	87338	Yes

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Detailed Information

The awareness of *Helicobacter pylori* in gastrointestinal diseases has increased greatly since Marshall and Warren described the presence of Campylobacter-like organisms in the antral mucosa of patients with histological evidence of antrum gastritis and peptic ulcers, especially duodenal ulcers. The strong correlation between the presence of *H. pylori* and histologically confirmed gastritis, peptic ulcer disease and gastric carcinoma, as well as disease resolution after *H. pylori* eradication, indicates a causative relationship.

The ecological niche in humans appears to be restricted to the stomach and duodenum. Patients who harbor the organism are divided into two basic groups: a) colonized and b) infected. Patients who test positive for *H. pylori* yet have no signs or symptoms of gastrointestinal disease are considered "colonized." Patients who test positive for *H. pylori* and present with signs or symptoms of gastrointestinal disease are considered "infected." The process by which a colonized individual becomes infected remains unclear. The process by which patients become colonized is also still under investigation.

Direct detection requires that an invasive biopsy be taken from the upper gastrointestinal tract. The presence of *H. pylori* is then confirmed by direct microscopic examination, rapid urease testing or culturing of the organism from the biopsy material. This strategy has the advantage of being able to detect active infections while being highly specific with a very high positive predictive value. The invasive approach subjects the patient to unnecessary risk and discomfort.

In contrast, Doctor's Data, Inc. offers the non-invasive HpSA enzyme immunoassay (EIA), an *in vitro* qualitative procedure for the detection of *H. pylori* antigens in human stool. Test results can be used to diagnose *H. pylori* infection, and to monitor patient response during and post therapy. Current scientific literature indicates that testing to confirm eradication should be performed at least four weeks after the completion of therapy.

Intestinal Permeability

This test measures the ability of two sugar molecules, lactulose and mannitol, to permeate the intestinal epithelial barrier. Ordinarily, mannitol is efficiently absorbed but lactulose, a larger molecule, is not. This test can help to identify malabsorption and "leaky gut" syndrome (abnormal intestinal permeability), which is often associated with inflammation specifically in the gastrointestinal tract. This test requires a baseline urine collection followed by a six-hour timed urine collection after ingesting a lactulose and mannitol solution.

Turnaround Time

5 to 7 days

Analytes Tested

Click any analyte name for additional clinical information, including reference ranges, specimen collection, stability and rejection criteria.

Analyte	CPT	ABN Required
Lactulose	84379	No
Mannitol	84379	No

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This test is useful for

- Gastrointestinal Symptoms
- Food Sensitivities
- Inflammation
- Malabsorption
- Nutritional Deficiencies

Lactoferrin, stool

Inflammatory bowel disease (IBD) and irritable bowel syndrome (IBS) are two chronic conditions associated with diarrhea and abdominal pain, and these symptoms are among the most common reasons that patients seek medical advice.
Learn more »

Turnaround Time

5 to 7 days

Analytes Tested

Click any analyte name for additional clinical information, including reference ranges, specimen collection, stability and rejection criteria.

Analyte	CPT	ABN Required
Lactoferrin; stool	83631	No

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This test is useful for

- Differentiating between IBD and IBS
- Montitoring treatment and disease activity in patients with IBD

Detailed Information

Fecal lactoferrin is a biomarker of serious gastrointestinal inflammation. Fecal lactoferrin is elevated in association with Inflammatory Bowel Disease (IBD) such as Ulcerative Colitis (UC) or Crohn's Disease (CD), but NOT Irritable Bowel Syndrome (IBS). Therefore, assessment of fecal lactoferrin levels enables distinction between IBD and non-inflammatory IBS. Such distinction is critical because, although both IBD and IBS may share some common symptoms such as diarrhea, abdominal cramping and weight loss, the diseases are treated quite differently. IBD may become life threatening, requires life-long treatment and possibly surgery. In contrast, IBS is often effectively treated with dietary restrictions, stress reduction and medication.

Gastrointestinal inflammation associated with IBD is associated with increased infiltration of activated neutrophils into the mucosa and increased release of lactoferrin into the gut. Patients with inflammation of the GI tract, such as IBD (but not IBS), exhibit elevated lactoferrin concentrations in the feces.

Clinical studies have shown that fecal lactoferrin levels of healthy persons are similar to IBS patients, but markedly increased in patients with active IBD. Patients with IBD oscillate between active and inactive disease states, and fecal

lactoferrin levels increase 2-3 weeks prior to onset of clinical symptoms. During remission and effective treatment, fecal lactoferrin decreases significantly. Therefore disease activity, and efficacy of treatment can be monitored by following fecal lactoferrin levels.

Lysozyme Stool

Lysozyme is an enzyme that catalyzes the hydrolysis of specific glycosidic bonds in mucopolysaccharides that constitute the cell wall of gram-positive bacteria. Lysozyme is an antibacterial defense present in the G.I. tract and is secreted by granulocytes, macrophages, Paneth cells, and Brunner's Glands as well as normal colonic crypt cells. The main source for fecal lysozyme is the intestinal granulocytes.
Learn more »

Turnaround Time

4 to 6 days

Analytes Tested

Click any analyte name for additional clinical information, including reference ranges, specimen collection, stability and rejection criteria.

Analyte	CPT	ABN Required
Lysozyme; stool	85549	Yes

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Detailed Information

Moderate elevations in fecal lysozyme are commonly associated with significant overgrowth of enteropathogens such as yeast or dysbiotic bacteria. Markedly elevated levels of fecal lysozyme have been identified in colonic inflammatory bowel disease (IBD), such as Crohn's disease and ulcerative colitis as well as other non-IBD G.I. diseases with diarrhea, compared to healthy controls.

In Crohn's disease, excess lysozyme may be a result of active secretions of macrophages in the lamina propria, and monocytic cells in the granulomas (sites of G.I. inflammation). In ulcerative colitis, it has been postulated that elevations in fecal lysozyme may be secondary to intestinal loss of granulocytes and their secretory granules]. Additionally, Paneth cell metaplasia, a phenomenon that occurs with various inflammatory conditions of the large intestine, may be a minor contributor to fecal lysozyme elevations. Paneth cells are part of the intestinal epithelial lining found in the deepest part of intestinal cryptwhich are the crypts of Lieberkohn. Paneth cells contain lysozyme in their secretory granules, and combined with their phagocytic capability, help to regulate intestinal microbial flora.

Lysozyme is helpful in the determination of colonic inflammatory activity rather than small bowel disease. Slightly elevated levels of lysozyme may be treated with anti-inflammatory agents or by removing the antagonist, such as enteroinvasive microorganisms or allergens. Moderate to high levels of lysozyme (>2,000) may indicate an active

inflammatory bowel condition which often requires further testing such as colonoscopy. To rule out IBD, check fecal lactoferrin levels (elevated with IBD).

Microbiology Profile

The Microbiology profile includes comprehensive bacteriology and yeast cultures to identify the presence of beneficial flora, imbalanced flora including Clostridium species, and dysbiotic flora, as well as detection of infectious pathogens. Antimicrobial susceptibility testing to prescriptive and natural agents is also performed for appropriate bacterial and fungal species at no additional charge.
Learn more »

Turnaround Time

6 to 8 days

Analytes Tested

Click any analyte name for additional clinical information, including reference ranges, specimen collection, stability and rejection criteria.

Analyte	CPT	ABN Required
Additional Pathogens culture; stool	87046	No
Bacteriology culture, aerobic; stool	87045	No
Yeast culture; stool	87102	No

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This test is useful for

- Gastrointestinal Symptoms
- Autoimmune Disease
- Joint Pain
- IBD/IBS
- Inflammation
- Food Sensitivities
- Nutritional Deficiencies
- Skin Conditions (Atopic Dermatitis)

Detailed Information

The Microbiology profile includes comprehensive bacteriology and yeast cultures to identify the presence of beneficial flora, imbalanced flora including Clostridium species, and dysbiotic flora, as well as detection of infectious pathogens.

Bacteriology
A good balance of beneficial microflora has been known to be associated with health benefits since the turn of the century. At that time Metchnikoff drew attention to the adverse effects of dysbiotic gut microflora on the host and suggested that ingestion of fermented milks ameliorated what he called "autointoxication." He proposed that the consumption of large quantities of Lactobacillus species would reduce the number of toxin-producing bacteria and result in better health and increased lifespan.

Over the past 90-plus years there has been extensive scientific research demonstrating that a good balance of Lactobacilli, Bifidobacteria and beneficial E. coli bacteria are important to the functional health of the gut, and as a consequence, to the whole organism. The benefits identified include inhibition of microbial pathogens, prevention and treatment of antibiotic-associated diarrhea, prevention of travelers' diarrhea, reduction of lactose intolerance symptoms, reduction in serum cholesterol levels, enhancement of the immune system, and inhibition of the proliferation of Candida albicans. Research has shown that improved biological value of food can be achieved through the activity of Lactobacilli and Bifidobacteria which have been reported to produce folic acid, niacin, thiamin, riboflavin, pyridoxine, biotin and vitamin K.

The mechanisms by which these benefits are derived are not yet fully understood. However, research suggests that some of the beneficial effects may be due to the following activities of beneficial bacteria:

- Release of substances antagonistic to enteropathogenic microorganisms such as:
  - lactocidin
  - lactobicillin and
  - acidolin
- Competition with pathogens for adhesion receptors
- Production of lactase
- Production of short chain fatty acids (SCFAs) such as butyrate, propionate and acetate

In a healthy balanced state of intestinal flora, the beneficial bacteria make up a significant proportion of the total microflora. However, in many individuals we see an imbalance of beneficial bacteria and an overgrowth of non-beneficial or even pathogenic microorganisms—dysbiosis. This can be due to a variety of factors including:

- Daily exposure to chemicals in our drinking water that are toxic to friendly bacteria
- The use of antibiotics
- Chronic consumption of highly processed foods (low in fiber, high in sugar)
- High stress levels

Patients may present with chronic symptoms such as irritable bowel syndrome, autoimmune diseases such as rheumatoid arthritis, fatigue, chronic headaches and allergies to a variety of foods.

Antimicrobial susceptibility testing to prescriptive and natural agents is also performed for appropriate bacterial species at no additional charge. This provides the clinician with important and specific clinical information to help plan an appropriate treatment protocol.

Yeast

Infection with yeast species can cause a variety of symptoms, both intra- and extra-gastrointestinal, and in many cases, may escape suspicion as a pathogenic agent. Controversy remains as to the relationship between Candida infection and episodes of recurrent diarrhea. However, episodes of yeast infection after short-term and long-term antibiotic use have been identified in patients with both gastrointestinal and vaginal symptoms.

There is some evidence linking yeast infections with more chronic extra-gastrointestinal conditions. Studies suggest that the production of antibodies against Candida albicans may contribute to atopic dermatitis in young adults. Other studies have identified the potential role of candidiasis in chronic fatigue syndrome.

Identification of abnormal levels of specific yeast species in the stool is an important diagnostic step in therapeutic planning for the patient with chronic gastrointestinal and extra-gastrointestinal symptoms.

Antimicrobial susceptibility testing to prescriptive and natural agents is also performed for appropriate fungal species at no additional charge. This provides the clinician with useful clinical information to help plan an appropriate treatment protocol.

Parasitology x3

While parasitic infection may be an underlying etiological factor in several chronic disease processes, doctors often do not consider the potential for parasitic involvement because signs and symptoms of parasitic infection often resemble those of other diseases. However, it has been shown that parasite testing is a reasonable approach to the detection of causative agents for chronic gastrointestinal disorders. Parasitology testing can include one-, two- or three-day collection, based on practitioner preference.
Learn more »

Turnaround Time

6 to 8 days

Analytes Tested

Click any analyte name for additional clinical information, including reference ranges, specimen collection, stability and rejection criteria.

Analyte	CPT	ABN Required
Cryptosporidium; stool	87328	No
Day 2 Parasitology, trichrome; stool	87209	No
Day 3 Parasitology, trichrome; stool	87209	No
Giardia lamblia; stool	87329	No
Parasitology, concentrate; stool	87177	No

Parasitology, trichrome; stool	87209	No

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This test is useful for

- Gastrointestinal Symptoms
- Autoimmune Disease
- IBD/IBS
- Inflammation
- Food Sensitivities
- Nutritional Deficiencies

Detailed Information

According to Dr. Hermann R. Bueno of the Royal Society of Tropical Medicine and Hygiene in London, "parasites are the missing diagnosis in the genesis of many chronic health problems, including diseases of the gastrointestinal tract and endocrine system."

While parasitic infection may be an underlying etiological factor in several chronic disease processes, doctors often do not consider the potential for parasitic involvement because signs and symptoms of parasitic infection often resemble those of other diseases. However, it has been shown that parasite testing is a reasonable approach to the detection of causative agents for chronic gastrointestinal disorders.

Most Americans are inclined to believe that parasitic infection is a rare and exotic occurrence, limited to those who have traveled to distant, tropical lands. However, for a number of reasons, there has been an increase in the incidence of parasitic infection in this country. These may include:

- Contamination of the water supply
- Increased use of daycare centers
- Increased travel to, and visits from, countries where parasitic infection is endemic
- Household pets
- Consumption of exotic and uncooked foods
- Antibiotic use
- Changing sexual mores

Signs and symptoms of parasitic infection vary from one individual to another. The more common are constipation, diarrhea, bloating, gas, symptoms of irritable bowel syndrome, arthralgias, myalgias, anemia, increased allergic reactions, skin lesions, agitation and anxiety, difficulty with sleep, decreased energy, malnutrition and decreased immune function.

Infection can occur by four different pathways. These routes include:

- Contaminated food or water
- Insect vectors
- Sexual contact
- Passage through the skin and nose

A thorough patient history will help assess the possibility of parasitic infection and the need for appropriate testing to confirm the suspicion. Parasitology testing can include one-, two- or three-day collection, based on practitioner preference.

Secretory IgA, stool

Secretory IgA (sIgA)is secreted by mucosal tissue and represents the first line of defense of the GI mucosa and is central to the normal function of the GI tract as an immune barrier. Elevated levels of sIgA have been associated with an upregulated immune response.
Learn more »

Turnaround Time

4 to 6 days

Analytes Tested

Click any analyte name for additional clinical information, including reference ranges, specimen collection, stability and rejection criteria.

Analyte	CPT	ABN Required
sIgA; stool	83520	Yes

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Detailed Information

Immunological activity in the gastrointestinal tract can be assessed using secretory immunoglobulin A (sIgA). Secretory IgA is the predominant antibody, or immune protein the body manufactures and releases in external secretions such as saliva, tears, and milk. It is also transported through the epithelial cells that line the intestines out into the lumen. Secretory IgA represents the first line of defense of the GI mucosa and is central to the normal

function of the GI tract as an immune barrier. As the principal immunoglobulin isotype present in mucosal secretions, sIgA plays an important role in controlling intestinal milieu which is constantly presented with potentially harmful antigens such as pathogenic bacteria, parasites, yeast, viruses, abnormal cell antigens, and allergenic proteins. Secretory IgA antibodies exert their function by binding to antigenic epitopes on the invading microorganism, limiting their mobility and adhesion to the epithelium of the mucus membrane. This prevents the antigens from reaching systemic circulation and allowing them to be excreted directly in the feces.

Shiga Toxins, stool

Scientists have identified more than 150 shiga-toxin producing *E. coli*, which are associated with severe abdominal cramping, watery or bloody diarrhea, low-grade fever, vomiting and hemorrhagic colitis, which could progress to hemolytic uremic syndrome (HUS), an important cause of acute renal failure in children and morbidity and mortality in adults. This test detects 100% of the serotypes produced by pathogenic strains of *E. coli*, including *E. coli* O157:H7. Learn more »

Turnaround Time

5 to 7 days

Analytes Tested

Click any analyte name for additional clinical information, including reference ranges, specimen collection, stability and rejection criteria.

Analyte	CPT	ABN Required
Shiga Toxins; stool	87427	No

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This test is useful for

- *E. coli* Symptoms: Cramping, Diarrhea, Fever, Vomiting
- Hemorrhagic Colitis
- Hemolytic Uremic Syndrome

Detailed Information

Shiga toxins are a family of related toxins with two major groups, Stx1 and Stx2 which are produced by *S. dysenteriae* and the Shigatoxigenic group of *Escherichia coli* (STEC). Pathogenic STEC are associated with severe abdominal cramping, watery or bloody diarrhea, low-grade fever, vomiting and more serious outbreaks of life-threatening hemorrhagic colitis and hemolytic uremic syndrome leading to kidney failure. This test detects 100% of the serotypes produced by pathogenic strains of *E. coli*, including *E. coli* O157:H7.

STEC is a major cause of sporadic cases of disease as well as serious outbreaks worldwide. Major transmission modes include contaminated food or water, person-to-person spread in nursing homes, day care centers or other settings, or animal-to-person contact. The most common sources of infection by STEC include undercooked beef and beef products, as cattle are major carriers. Other wild and domestic animals, including birds, can also carry these bacteria. STEC and its Shiga toxins can be destroyed by heat. Food-borne outbreaks have been traced back to undercooked hamburgers, unpasteurized fruit juices, salad bars, salami and unpasteurized milk. STEC strains are usually self-limiting, lasting an average of about eight to ten days

Stool Chemistry

The Stool Chemistry test can provide important information regarding the efficiency of digestion and absorption can be gleaned from the measurement of the fecal levels of elastase (pancreatic exocrine sufficiency), fat, muscle and vegetable fibers, and carbohydrates. Inflammation can significantly increase intestinal permeability and compromise assimilation of nutrients. The extent of inflammation, whether caused by pathogens or inflammatory bowel disease (IBD), can be assessed and monitored by examination of the levels of biomarkers such as lysozyme, lactoferrin, white blood cells and mucus. These markers can be used to differentiate between inflammation associated with potentially life-threatening inflammatory bowel disease (IBD), which requires lifelong treatment, and less severe inflammation that can be associated with irritable bowel syndrome (IBS) which is frequently due to the presence of enteroinvasive pathogens. Lactoferrin is only markedly elevated prior to and during the active phases of IBD, but not with IBS. Monitoring fecal lactoferrin levels in patients with IBD can therefore facilitate timely treatment of IBD, and the test can be ordered separately. Since the vast majority of secretory IgA (sIgA) is normally present in the GI tract, where it prevents binding of pathogens and antigens to the mucosal membrane, it is essential to know the status of sIgA in the gut. sIgA is the only bona fide marker of humoral immune status in the GI tract.
Learn more »

Turnaround Time

6 to 8 days

Analytes Tested

Click any analyte name for additional clinical information, including reference ranges, specimen collection, stability and rejection criteria.

Analyte	CPT	ABN Required
Acetate; stool	82542	Yes
Butyrate; stool	82542	Yes
Calprotectin; stool	83993	Yes
Carbohydrates; stool	*	No
Elastase; stool	82656	No
Fat Stain; stool	89125	No

Lactoferrin; stool	83631	No
Lysozyme; stool	85549	Yes
Mucus; stool	*	No
Muscle Fibers; stool	89160	No
Occult Blood; stool	82272	Yes
Propionate; stool	82542	Yes
Red Blood Cells; stool	*	No
Valerate; stool	82542	Yes
Vegetable Fibers; stool	89160	No
White Blood Cells; stool	*	No
ph; stool	83986	No
sIgA; stool	83520	Yes

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Prompt payment pricing applies when billing to a physician account or prepayment is received with the test.

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Detailed Information

Cornerstones of good health include proper digestion of food, assimilation of nutrients, exclusion of pathogens and timely elimination of waste. To obtain benefits from food that is consumed, nutrients must be appropriately digested

and then efficiently absorbed into portal circulation. Microbes, larger-sized particles of fiber, and undigested foodstuffs should remain within the intestinal lumen. Poor digestion and malabsorption of vital nutrients can contribute to degenerative diseases, compromised immune status and nutritional deficiencies. Impairment of the highly specific nutrient uptake processes, or compromised GI barrier function, as in "leaky gut syndrome," can result from a number of causes including:

Low gastric acid production
Chronic maldigestion
Food allergen impact on bowel absorptive surfaces
Bacterial overgrowth or imbalances (dysbiosis)
Pathogenic bacteria, yeast or parasites and related toxic irritants
The use of NSAIDs and antibiotics

Impairment of intestinal functions can contribute to the development of food allergies, systemic illnesses, autoimmune disease, and toxic overload from substances that are usually kept in the confines of the bowel for elimination. Efficient remediation of GI dysfunctions incorporates a comprehensive guided approach that should include consideration of elimination of pathogens and exposure to irritants, supplementation of hydrochloric acid, pancreatic enzymes and pre- and probiotics, and repair of the mucosal barrier.

Toxigenic C. difficile Culture, stool

This specific anaerobic culture identifies *C. difficile*, which is often present in healthy individuals, but can be associated with antibiotic-associated diarrhea. If *C. difficile* is cultured at any level, the sample is automatically tested for all known toxigenic strains using an FDA-cleared, molecular diagnostic DNA assay at no additional charge. Learn more »

Turnaround Time

5 to 7 days

Analytes Tested

Click any analyte name for additional clinical information, including reference ranges, specimen collection, stability and rejection criteria.

Analyte	CPT	ABN Required
Toxigenic C. Difficile Culture; stool	87075	No

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This test is useful for

- Antibiotic-Associated Diarrhea

- Autism Spectrum Disorders

Detailed Information

Clostridia are anaerobic Gram-positive bacteria that do not grow in the more aerobic environment of the distal colon. However Clostridia produce extremely durable endospores as a means of proliferation—the spores are resistant to air, antibiotics, heat, drying and disinfectants. For this test, Doctor's Data uses growth media optimally suited for growth of Clostridium difficile and anaerobic culture conditions to germinate the spores to metabolically active bacteria that are sub-cultured for positive identification (speciation). If C. difficile is cultured at any level, the sample is automatically tested for all known toxigenic strains using an FDA-cleared, molecular diagnostic DNA assay at no additional charge.

Clostridia generally are resistant to antibiotics and treatment of an overgrowth of *C. difficile*, especially in asymptomatic carriers and infants under age two, is usually not warranted. Additionally, since plasmids have a potential role in transferring various capacities, including antibiotic resistance, from one organism to another, the use of antibiotics in the treatment of clostridia overgrowth should be considered carefully.

Toxigenic C. difficile DNA; stool

A stool specimen or an isolated sample of *C. difficile* is tested for all known toxigenic strains using an FDA-cleared, molecular diagnostic DNA assay. This test is available as a stand-alone test, or included automatically at no additional charge any time *C. difficile* is cultured at any level in our other Clostridium cultures.
Learn more »

Turnaround Time

2 to 4 days

Analytes Tested

Click any analyte name for additional clinical information, including reference ranges, specimen collection, stability and rejection criteria.

Analyte	CPT	ABN Required
Toxigenic C. Difficile DNA; stool	87493	No

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This test is useful for

- Antibiotic-Associated Diarrhea
- Autism Spectrum Disorders

Detailed Information

For this assessment, a stool specimen or an isolated sample of *C. difficile* is tested for all known toxigenic strains using an FDA-cleared, molecular diagnostic DNA assay. This test is available as a stand-alone, or included automatically at no additional charge any time *C. difficile* is cultured at any level in our other *Clostridium* cultures.

Clostridia generally are resistant to antibiotics and treatment of an overgrowth of *C. difficile*, especially in asymptomatic carriers and infants under age two, is usually not warranted. Additionally, since plasmids have a potential role in transferring various capacities, including antibiotic resistance, from one organism to another, the use of antibiotics in the treatment of clostridia overgrowth should be considered carefully.

Yeast Culture

Identification of abnormal levels of specific yeast species in the stool is an important diagnostic step in therapeutic planning for the patient with chronic gastrointestinal and extra-gastrointestinal symptoms. Antimicrobial susceptibility testing to prescriptive and natural agents is also performed for appropriate fungal species at no additional charge. This provides useful clinical information to help plan an appropriate treatment protocol.
Learn more »

Turnaround Time

5 to 7 days

Analytes Tested

Click any analyte name for additional clinical information, including reference ranges, specimen collection, stability and rejection criteria.

Analyte	CPT	ABN Required
Yeast culture; stool	87102	No

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This test is useful for

- Gastrointestinal Symptoms
- Autoimmune Disease
- IBD/IBS
- Inflammation
- Food Sensitivities
- Nutritional Deficiencies
- Skin Conditions (Atopic Dermatitis)

Detailed Information

Infection with yeast species can cause a variety of symptoms, both intra- and extra-gastrointestinal, and in many cases, may escape suspicion as a pathogenic agent. Controversy remains as to the relationship between Candida infection and episodes of recurrent diarrhea. However, episodes of yeast infection after short-term and long-term antibiotic use have been identified in patients with both gastrointestinal and vaginal symptoms.

There is some evidence linking yeast infections with more chronic extra-gastrointestinal conditions. Studies suggest that the production of antibodies against Candida albicans may contribute to atopic dermatitis in young adults. Other studies have identified the potential role of candidiasis in chronic fatigue syndrome.

Identification of abnormal levels of specific yeast species in the stool is an important diagnostic step in therapeutic planning for the patient with chronic gastrointestinal and extra-gastrointestinal symptoms.

Antimicrobial susceptibility testing to prescriptive and natural agents is also performed for appropriate fungal species at no additional charge. This provides the clinician with useful clinical information to help plan an appropriate treatment protocol.

Toxic and Essential Elements

Elements are the basic building blocks of all chemical compounds, and human exposure to them occurs both from natural and anthropogenic sources. Many elements are considered nutrients and are essential for the proper functioning of the body. These are generally divided between macrominerals such as calcium, magnesium, potassium, sodium and zinc, and trace minerals including selenium, iodine, boron and molybdenum.

Conversely, there are a number of elements that are toxic to the human body, interfere with its functioning and undermine health—such as mercury, lead, cadmium, aluminum, and arsenic. These toxic metals have no known physiological functions. They can be toxic to organ systems and may disrupt the balance of essential nutrients. Toxic metals and essential element status can be assessed in urine, blood, feces and hair.

Doctor's Data has always employed the best-available techniques as a specialist and pioneer in essential and toxic elemental testing. In fact, we were one of the first clinical reference laboratories in the world to employ ICP-MS and high-resolution ICP-MS for elemental analysis.

Comprehensive Blood Elements

Whole blood metals are the standard for diagnosis of lead, mercury or other metal toxicity or poisoning, and are also used to assess recent or ongoing exposure to potentially toxic elements. Serum elements are used to assess the status of key elements and electrolytes that have important functions in the extracellular fluid compartment of blood. Whole Blood and Serum Elements tests are available separately or as part of the Comprehensive Blood Elements profile.
Learn more »

Turnaround Time

3 to 5 days

Analytes Tested

Click any analyte name for additional clinical information, including reference ranges, specimen collection, stability and rejection criteria.

Analyte	CPT	ABN Required
Arsenic; whole blood	82175	Yes

Barium; whole blood	83018	Yes
Cadmium; whole blood	82300	Yes
Calcium (total); serum	82310	No
Calcium; whole blood	82310	Yes
Cobalt; whole blood	83018	Yes
Copper; whole blood	82525	Yes
Iron; serum	83540	Yes
Lead; whole blood	83655	Yes
Lithium; whole blood	80178	Yes
Magnesium; serum	83735	No
Magnesium; whole blood	83735	Yes
Manganese; whole blood	83785	Yes
Mercury; whole blood	83825	Yes
Molybdenum; whole blood	83018	Yes
Nickel; whole blood	83885	Yes
Phosphorus (Inorganic); serum	84100	No
Platinum; whole blood	83018	Yes

Potassium; serum	84132	No
Selenium; whole blood	84255	Yes
Sodium; serum	84295	No
Strontium; whole blood	83018	Yes
Thallium; whole blood	83018	Yes
Tungsten; whole blood	83018	Yes
Uranium; whole blood	83018	Yes
Zinc; whole blood	84630	Yes

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This test is useful for

- Alopecia
- Anemia
- Bone Density
- Cardiovascular Disease
- Depression
- Dermatitis or Poor Wound Healing
- Detoxification Therapy
- Fatigue
- Malabsorption
- Hypertension
- Immune Dysfunction
- Impaired Glucose Tolerance
- Inflammation

- Kidney Function
- Nutritional Deficiencies
- Parkinson's-like Symptoms
- Sexual Impotence or Decreased Testosterone Production
- Vision Problems

Detailed Information

Blood elemental analysis should be performed prior to the initiation of, and intermittingly during, metal detoxification. Toxic metals disrupt essential element metabolism and are antagonistic to some elements such as cadmium to zinc and lead to calcium. Further, commonly utilized metal detoxification agents can cause significantly increased urinary wasting of some essential elements. For example, EDTA has a very high affinity for zinc and manganese, and DMPS results in marked increases in copper excretion. Therefore, appropriate evaluation of essential element status is an integral component of safe and effective metal detoxification therapy.

Analysis of toxic elements/metals in whole blood is useful for assessment of recent or ongoing exposure to the toxins, but does not provide accurate information about net retention of toxic metals in the body. For example, blood lead levels peak about five hours after acute exposure and then decrease exponentially with a half-life in blood of about one month. Evaluation and elimination of ongoing exposure to toxic metals is another important component of efficient metal detoxification.

Accurate assessment of essential element status in the most appropriate compartment is highly recommended for determination of appropriate supplementation. The absorption, transport and metabolism of essential elements is highly integrated and regulated. Inappropriate supplementation or dietary imbalance of elements can have significant adverse health effects. For example, excess intake of zinc or molybdenum can result in copper deficiency and excess assimilation of manganese can have serious neurotoxic effects that are expressed as Parkinson's-like disease.

Whole blood analysis is an excellent test for measuring the levels of both intracellular and extracellular circulating elements. Extracellular elements have functions in serum/plasma or are transported to tissues in serum/plasma associated with specific proteins or albumen. Intracellular elements have very specific functions as obligatory constituents of metalloproteins/enzymes in red blood cells and lymphocytes. The red and white blood cells serve as surrogate cells representative of peripheral cells in general. Some essential elements, such as selenium, are portioned in and have important physiological roles in both the intracellular and extracellular compartments. Likewise, the toxic metal lead is transported in both the fluid and cellular (red blood cells) compartments of blood. Therefore measurement of elements in both blood compartments permits a more complete evaluation of total blood element levels.

In contrast, some essential elements/electrolytes such as calcium, sodium, potassium and iron are best assessed in serum because they are transported by serum proteins or have important functions in the extracellular compartment of blood. Also, the differential analysis of some elements, such as magnesium, in both whole blood and serum can provide important clinical information about aberrant metabolism of this extremely important element that is involved in over 300 different intracellular reactions.

Blood elemental analysis is available in whole blood, in serum and as a Comprehensive Blood Elements profile which is comprised of both whole blood and serum elements. It is highly recommended that blood and serum specimens be collected after an overnight fast to avoid the acute influence of a meal.

Creatinine Clearance

The Creatinine Clearance test is the most widely used test for estimating glomerular filtration rate (GFR) and renal function. GFR assessment is highly recommended for weighing the advisability of prescribing a variety of drugs, including chelating agents. The test requires a timed urine collection and a single serum specimen collected during the same time period.
Learn more »

Turnaround Time

2 to 4 days

Analytes Tested

Click any analyte name for additional clinical information, including reference ranges, specimen collection, stability and rejection criteria.

Analyte	CPT	ABN Required
Creatinine Clearance	82575	No
Creatinine, serum	*	No
Creatinine, urine	*	No

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This test is useful for

- Planning Detoxification Therapy
- Kidney Function

Detailed Information

The Creatinine Clearance test is a convenient means of assessing renal function. Toxic metals and xenobiotics—including some pharmaceutical agents—are nephrotoxic and can decrease efficiency of glomerular filtration. Efficient glomerular filtration is critical during chelation therapy in which there is increased mobilization of toxic elements resulting in elevated demands on renal clearance. Assessment is highly recommended for determination of the appropriate dose of a chelating agent for an individual patient and for weighing the advisability of prescribing a variety of drugs.

Creatinine is neither secreted nor reabsorbed by renal tubules, thus urine creatinine can be used to measure renal function through assessment of glomerular filtration. Creatinine excretion is independent of urine flow, and the plasma concentration of creatinine is relatively constant. Therefore, the rate of creatinine clearance can be determined by analyses of creatinine in a timed urine collection and a single serum specimen collected during the same time period.

The quantity of creatinine formed in the body is related to muscle mass and does not change significantly with dietary variability. Heavy metals such as mercury, cadmium and lead are potent nephrotoxins which can markedly decrease renal function and result in increased levels of toxic substances in the body. Safe chelation therapy is highly dependent upon the adequacy of renal function. Excessive mobilization of toxic metals to poorly functioning kidneys can exacerbate kidney damage. Therefore, it is highly recommended that the rate of creatinine clearance be measured in order to determine the appropriate dosage of a chelating agent for each individual patient. Periodic

reassessment of the clearance rate is also recommended and can serve to monitor therapeutic effectiveness.

Pharmaceutical agents such as some antihypertensive agents should be prescribed with caution, especially in patients with marginal kidney function. Determination of creatinine clearance is therefore appropriate before placing patients on certain therapeutic regimens. Assessment of renal function is also warranted for patients with known renal disease or for those at risk for renal dysfunction. For renal patients, the rate of creatinine clearance indicates whether dietary protein restriction is warranted.
Reference ranges are provided for individuals of normal weight for height. The clearance rate corrected for body surface area in square meters can also be calculated.

It is essential that the blood specimen be drawn some time during the timed urine collection period. To facilitate compliance and accuracy of test results, detailed patient instructions are provided with the test kit.

Creatinine Clearance

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Learn more »

Turnaround Time

2 to 4 days

Analytes Tested

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Analyte	CPT	ABN Required
Creatinine Clearance	82575	No
Creatinine, serum	*	No
Creatinine, urine	*	No

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Reference ranges are provided for individuals of normal weight for height. The clearance rate corrected for body surface area in square meters can also be calculated.

It is essential that the blood specimen be drawn some time during the timed urine collection period. To facilitate compliance and accuracy of test results, detailed patient instructions are provided with the test kit.

Fecal Metals

Fecal elemental analysis provides a direct indication of dietary exposure to toxic metals and indirect information about the potential for toxic metal burden. Chronic, low-level assimilation of toxic metals can result in accumulation in the body. For many toxic metals, fecal (biliary) excretion is the primary natural route of elimination from the body. Specimen collection is convenient for the patient and only requires a single-step procedure. Elements are measured by ICP-MS and expressed on a dry weight basis to eliminate variability related to water content of the specimen.
Learn more »

Turnaround Time

3 to 5 days

Analytes Tested

Click any analyte name for additional clinical information, including reference ranges, specimen collection, stability and rejection criteria.

Analyte	CPT	ABN Required
Antimony; feces	83018	Yes
Arsenic; feces	82175	Yes
Beryllium; feces	83018	Yes
Bismuth; feces	83018	Yes
Cadmium; feces	82300	Yes
Copper; feces	82525	Yes
Lead; feces	83655	Yes
Mercury; feces	83825	Yes
Nickel; feces	83885	Yes
Platinum; feces	83018	Yes
Thallium; feces	83018	Yes
Tungsten; feces	83018	Yes
Uranium; feces	83018	Yes

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This test is useful for

- Dietary Exposure to Toxic Elements
- Mercury Exposure from Dental Amalgams

Detailed Information

Analysis of elements in feces provides a comprehensive evaluation of environmental exposure, potential for accumulation in the body (Hg), and possibly endogenous detoxification of potentially toxic metals. For many toxic elements such as mercury, cadmium, lead, antimony and uranium, biliary excretion into the feces is the primary natural route of elimination from the body. The primary process by which the body eliminates the insidious sulfhydryl reactive metals is through the formation of metal-glutathione complexes, of which greater than 90% are excreted into the bile. Evidence for the extent of exposure to mercury from dental amalgams is provided by the fact that fecal mercury levels are highly correlated with the number of amalgams in the mouth. It also clear that fecal mercury levels for people with dental amalgams are remarkably similar from day to day, and approximately ten times higher than in people who do not have mercury amalgams.

Administration of pharmaceutical metal binding agents results in excretion of toxic metals primarily through the kidneys into the urine. In contrast, support of natural detoxification processes enhances the rate of excretion of toxic metals into the feces. Elemental analysis of fecal specimens can provide a valuable tool to monitor the efficacy of natural detoxification of metals in infants or patients who are on very limited and defined diets that do not contain contaminated solid foods. A preliminary study performed at Doctor's Data indicates that biliary/fecal excretion of mercury and lead may be markedly enhanced following high-dose intravenous administration of ascorbic acid. Other orthomolecular or nutraceutical protocols may also enhance the fecal excretion of metals and hence potentially decrease burden on the kidneys. Further research to identify and validate such therapies is warranted.

A primary objective of preventive medicine is avoidance or removal of exposure to toxic substances. The rate of oral absorption of toxic metals varies considerably among elements, and among subspecies of a particular element. Fecal elemental analysis can provide a direct indication of dietary exposure. Orally, the percent absorption of nickel, cadmium and lead is usually quite low, but varies significantly in part due to the relative abundance of antagonistic essential elements in the diet. That is particularly evident for lead and calcium, and cadmium and zinc. Chronic, low-level assimilation of the toxic metals can result in significant accumulation in the body. The results of fecal elemental analysis can help identify and eliminate dietary exposure to toxic metals.

The fecal metals test was not developed to replace the pre- and post-urinary toxic metals provocation test, but rather provides an alternative for infants, children or adults for whom urine collection is problematic, or for individuals who do not tolerate the available pharmaceutical metal detoxification agents. Elements are measured by ICP-MS and expressed on a dry weight basis to eliminate variability related to water content of the specimen.

air Elements

Hair Elements analysis provides information regarding recent and ongoing exposure to potentially toxic metals, especially methylmercury and arsenic, and time-averaged status of specific nutrient elements. This noninvasive screening test requires only .25 grams of hair. Doctor's Data offers a Hair Elements profile containing essential and toxic elements and a Hair Toxic Element Exposure profile containing an expanded lineup of toxic metals.
Learn more »

Turnaround Time

2 to 4 days

Analytes Tested

Click any analyte name for additional clinical information, including reference ranges, specimen collection, stability and rejection criteria.

Analyte	CPT	ABN Required
Aluminum; hair	82108	Yes
Antimony; hair	83018	Yes
Arsenic; hair	82175	Yes
Barium; hair	83018	Yes
Beryllium; hair	83018	Yes
Bismuth; hair	83018	Yes
Boron; hair	83018	Yes
Cadmium; hair	82300	Yes
Calcium; hair	82310	Yes
Chromium; hair	82495	Yes
Cobalt; hair	83018	Yes
Copper; hair	82525	Yes
Germanium; hair	83018	Yes
Iodine; hair	84999	Yes
Iron; hair	83540	Yes
Lead; hair	83655	Yes

Lithium; hair	80178	Yes
Magnesium; hair	83735	Yes
Manganese; hair	83785	Yes
Mercury; hair	83825	Yes
Molybdenum; hair	83018	Yes
Nickel; hair	83885	Yes
Phosphorus; hair	84999	Yes
Platinum; hair	83018	Yes
Potassium; hair	84999	Yes
Rubidium; hair	83018	Yes
Selenium; hair	84255	Yes
Silver; hair	83018	Yes
Sodium; hair	84302	Yes
Strontium; hair	83018	Yes
Sulfur; hair	84999	Yes
Thallium; hair	83018	Yes
Thorium; hair	83018	Yes

Tin; hair	83018	Yes
Titanium; hair	83018	Yes
Uranium; hair	83018	Yes
Vanadium; hair	83018	Yes
Zinc; hair	84630	Yes
Zirconium; hair	83018	Yes

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This test is useful for

- Toxic Element Exposure
- Excessive Fish Consumption
- Alopecia
- Depression
- Fatigue
- Malabsorption
- Hypertension
- Impaired Glucose Tolerance
- Kidney Function
- Parkinson's-like Symptoms
- Sexual Impotence or Decreased Testosterone Production
- Vision Problems

Detailed Information

A specialist and pioneer in essential and toxic elemental testing since 1972, Doctor's Data has been validated as a supplier of trace element results for the certification of a hair reference material to the European Commission Joint Research Centre.

With respect to its contained elements, hair is essentially an excretory tissue rather than a functional tissue. Hair element analysis provides important information which, in conjunction with symptoms and other laboratory values, can assist the physician with an early diagnosis of physiological disorders associated with aberrations in essential and toxic element metabolism.

As protein is synthesized in the hair follicle, elements are incorporated permanently into the hair with no further exchange or equilibration with other tissues. Scalp hair is easy to sample, and because it grows an average of one to two cm per month, it contains a "temporal record" of element metabolism and exposure to toxic elements.

Nutrient elements including magnesium, chromium, zinc, copper and selenium are obligatory co-factors for hundreds of important enzymes and also are essential for the normal functions of vitamins. The levels of these elements in hair are correlated with levels in organs and other tissues.

Toxic elements may be 200 to 300 times more highly concentrated in hair than in blood or urine. Therefore, hair is the tissue of choice for detection of recent exposure to elements such as arsenic, aluminum, cadmium, lead, antimony and mercury. The CDC acknowledges the value of hair mercury levels as a maternal and infant marker for exposure to neurotoxic methylmercury from fish.

Through recent vast improvements in technology, instrumentation and application of scientific protocols, hair element analysis has become a valuable tool for providing dependable and useful data for physicians and their patients. The U.S. Environmental Protection Agency stated in a recent report that "...if hair samples are properly collected and cleaned, and analyzed by the best analytic methods, using standards and blanks as required, in a clean and reliable laboratory by experienced personnel, the data are reliable." (U.S.E.P.A. 600/4-79-049)

Hair, however, is vulnerable to external elemental contamination by means of certain shampoos, bleaches, dyes, and curing or straightening treatments. Therefore, the first step in the interpretation of a hair element report is to rule out sources of external contamination.

Hair element analysis is a valuable and inexpensive screen for physiological excess, deficiency or maldistribution of elements. It should not be considered a stand-alone diagnostic test for essential element function, and should be used in conjunction with patient symptoms and other laboratory tests. Doctor's Data offers a Hair Toxic and Essential Elements profile and a Hair Toxic Element Exposure profile containing an expanded lineup of toxic metals.

Hair Toxic Element Exposure Profile

Hair Elements analysis provides information regarding recent and ongoing exposure to potentially toxic metals, especially methylmercury and arsenic, and time-averaged status of specific nutrient elements. This noninvasive screening test requires only .25 grams of hair. Doctor's Data offers a Hair Elements profile containing essential and toxic elements and a Hair Toxic Element Exposure profile containing an expanded lineup of toxic metals.
Learn more »

Turnaround Time

2 to 4 days

Analytes Tested

Click any analyte name for additional clinical information, including reference ranges, specimen collection, stability and rejection criteria.

Analyte	CPT	ABN Required
Aluminum; hair	82108	Yes
Antimony; hair	83018	Yes

Arsenic; hair	82175	Yes
Barium; hair	83018	Yes
Beryllium; hair	83018	Yes
Bismuth; hair	83018	Yes
Cadmium; hair	82300	Yes
Cesium; hair	83018	Yes
Chromium; hair	84295	Yes
Cobalt; hair	83018	Yes
Copper; hair	82525	Yes
Gadolinium; hair	83018	Yes
Germanium; hair	83018	Yes
Gold; hair	80172	Yes
Lead; hair	83655	Yes
Manganese; hair	83785	Yes
Mercury; hair	83825	Yes
Nickel; hair	83885	Yes
Palladium; hair	83018	Yes

Platinum; hair	83018	Yes
Selenium; hair	84255	Yes
Silver; hair	83018	Yes
Tellurium; hair	83018	Yes
Thallium; hair	83018	Yes
Thorium; hair	83018	Yes
Tin; hair	83018	Yes
Titanium; hair	83018	Yes
Tungsten; hair	83018	Yes
Uranium; hair	83018	Yes
Vanadium; hair	83018	Yes
Zinc; hair	84630	Yes

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This test is useful for

- Toxic Element Exposure

- Excessive Fish Consumption
- Alopecia
- Depression
- Fatigue
- Malabsorption
- Hypertension
- Impaired Glucose Tolerance
- Kidney Function
- Parkinson's-like Symptoms
- Sexual Impotence or Decreased Testosterone Production
- Vision Problems

Detailed Information

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With respect to its contained elements, hair is essentially an excretory tissue rather than a functional tissue. Hair element analysis provides important information which, in conjunction with symptoms and other laboratory values, can assist the physician with an early diagnosis of physiological disorders associated with aberrations in essential and toxic element metabolism.

As protein is synthesized in the hair follicle, elements are incorporated permanently into the hair with no further exchange or equilibration with other tissues. Scalp hair is easy to sample, and because it grows an average of one to two cm per month, it contains a "temporal record" of element metabolism and exposure to toxic elements.

Nutrient elements including magnesium, chromium, zinc, copper and selenium are obligatory co-factors for hundreds of important enzymes and also are essential for the normal functions of vitamins. The levels of these elements in hair are correlated with levels in organs and other tissues.

Toxic elements may be 200 to 300 times more highly concentrated in hair than in blood or urine. Therefore, hair is the tissue of choice for detection of recent exposure to elements such as arsenic, aluminum, cadmium, lead, antimony and mercury. The CDC acknowledges the value of hair mercury levels as a maternal and infant marker for exposure to neurotoxic methylmercury from fish.

Through recent vast improvements in technology, instrumentation and application of scientific protocols, hair element analysis has become a valuable tool for providing dependable and useful data for physicians and their patients. The U.S. Environmental Protection Agency stated in a recent report that "...if hair samples are properly collected and cleaned, and analyzed by the best analytic methods, using standards and blanks as required, in a clean and reliable laboratory by experienced personnel, the data are reliable." (U.S.E.P.A. 600/4-79-049)

Hair, however, is vulnerable to external elemental contamination by means of certain shampoos, bleaches, dyes, and curing or straightening treatments. Therefore, the first step in the interpretation of a hair element report is to rule out sources of external contamination.

Hair element analysis is a valuable and inexpensive screen for physiological excess, deficiency or maldistribution of elements. It should not be considered a stand-alone diagnostic test for essential element function, and should be used in conjunction with patient symptoms and other laboratory tests. Doctor's Data offers a Hair Toxic and Essential Elements profile and a Hair Toxic Element Exposure profile containing an expanded lineup of toxic metals.

Red Blood Cell (RBC) Elements

Red blood cell (RBC) elements tests are used to assess the status of essential elements with important intracellular functions, such as magnesium, copper and zinc. Deficiencies or excesses of these essential elements affect numerous metabolic processes. RBC element analysis is also useful for the assessment of ongoing or recent

exposure to specific toxic metals, such as arsenic, cadmium, lead, methylmercury and thallium, that accumulate preferentially in erythrocytes.
Learn more »

Turnaround Time

3 to 5 days

Analytes Tested

Click any analyte name for additional clinical information, including reference ranges, specimen collection, stability and rejection criteria.

Analyte	CPT	ABN Required
Arsenic; RBC	82175	Yes
Boron; RBC	83018	Yes
Cadmium; RBC	82300	Yes
Calcium; RBC	82310	Yes
Chromium; RBC	82495	Yes
Copper; RBC	82525	Yes
Iron; RBC	83540	Yes
Lead; RBC	83655	Yes
Magnesium; RBC	83735	Yes
Manganese; RBC	83785	Yes
Mercury; RBC	83825	Yes
Molybdenum; RBC	83018	Yes
Phosphorus; RBC	83018	Yes

Potassium; RBC	83018	Yes
Selenium; RBC	84255	Yes
Thallium; RBC	83018	Yes
Vanadium; RBC	83018	Yes
Zinc; RBC	84630	Yes

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This test is useful for

- Alopecia
- Anemia
- Bone Density
- Cardiovascular Disease
- Depression
- Dermatitis or Poor Wound Healing
- Detoxification Therapy
- Fatigue
- Gastrointestinal Symptoms
- Hypertension
- Inflammation
- Immune Function
- Impaired Glucose Tolerance
- Kidney Function
- Nutritional Deficiencies
- Parkinson's-like Symptoms
- Sexual Impotence or Decreased Testosterone Production
- Vision Problems

Detailed Information

Red blood cell (RBC) analysis is an invaluable method for assessing insufficiency or excess of elements that have important functions within cells or on blood cell membranes. An important feature of this analysis is that the cells are not washed, because this would result in partial loss of some important elements, such as calcium, that bind to the plasma membrane.

RBC element levels are very useful for:

- Cardiotonic influences (magnesium, potassium)
- Anti-inflammatory processes (selenium, copper, zinc)
- Anemia (copper, iron)
- Immunological function (zinc, copper, magnesium)
- Glucose tolerance (chromium, manganese and possibly vanadium)

Disorders specifically associated with zinc deficiency are also addressed by this analysis. These disorders include loss of visual acuity, dysgeusia, dermatitis and poor wound healing, alopecia, amino acid malabsorption, sexual impotence, decreased production of testosterone, depressed immune function and growth retardation.

Accurate assessment of essential element status is highly recommended for the determination of appropriate supplementation. The absorption, transport and metabolism of essential elements is highly integrated and regulated. Inappropriate supplementation or dietary imbalance of elements can have significant adverse health effects. For example, excess intake of zinc or molybdenum can result in copper deficiency and, although essential, excess retention of manganese can have serious neurotoxic effects.

RBC element analysis is also useful for the assessment of ongoing or very recent exposure to specific toxic elements that accumulate preferentially in erythrocytes. These toxic elements include arsenic, cadmium, lead, methylmercury and thallium. It is important to keep in mind that elevated levels of the toxic elements in these cells reflect only recent or ongoing exposure and do not provide information about the net retention of the metals in the body.

RBC element analysis should be performed prior to and intermittently throughout the course of detoxification or chelation therapy. Monitoring essential element status is necessary to identify needs for and effectiveness of supplementation. Replacement and maintenance of adequate levels of essential nutrients can markedly reduce the apparent adverse "side effects" associated with the use of detoxification agents and the general effects of mobilization of toxic elements. It is important to note that some diseases are associated with abnormal levels of blood cell elements that could be misleading with respect to nutritional status. For example, blood cell copper can be temporarily elevated during inflammatory response while liver levels are not.

Serum Elements

Serum elements are used to assess the status of key elements and electrolytes such as calcium, sodium, potassium and iron that have important functions in the extracellular fluid compartment of blood.

Turnaround Time

2 to 3 days

Analytes Tested

Click any analyte name for additional clinical information, including reference ranges, specimen collection, stability and rejection criteria.

Analyte	CPT	ABN Required
Calcium (total); serum	82310	No
Iron; serum	83540	Yes
Magnesium; serum	83735	No
Phosphorus (Inorganic); serum	84100	No
Potassium; serum	84132	No
Sodium; serum	84295	No

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This test is useful for

- Anemia
- Bone Density
- Cardiovascular Disease
- Dermatitis or Poor Wound Healing
- Fatigue
- Hypertension
- Impaired Glucose Tolerance
- Inflammation
- Kidney Function
- Nutritional Deficiencies
- Sexual Impotence or Decreased Testosterone Production
- Vision Problems

Serum Elements

Serum elements are used to assess the status of key elements and electrolytes such as calcium, sodium, potassium and iron that have important functions in the extracellular fluid compartment of blood.

Turnaround Time

2 to 3 days

Analytes Tested

Click any analyte name for additional clinical information, including reference ranges, specimen collection, stability and rejection criteria.

Analyte	CPT	ABN Required
Calcium (total); serum	82310	No
Iron; serum	83540	Yes
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- Inflammation
- Kidney Function
- Nutritional Deficiencies
- Sexual Impotence or Decreased Testosterone Production
- Vision Problems

Urine Essential Elements

Assessment of essential element status/wasting
Learn more »

Turnaround Time

2 to 4 days

Analytes Tested

Click any analyte name for additional clinical information, including reference ranges, specimen collection, stability and rejection criteria.

Analyte	CPT	ABN Required
Boron; urine	83018	Yes
Calcium; urine	83018	Yes
Chromium; urine	82495	Yes
Cobalt; urine	83018	Yes
Copper; urine	82525	Yes
Iron; urine	83540	Yes
Lithium; urine	83018	Yes
Magnesium; urine	83735	Yes
Manganese; urine	83785	Yes
Molybdenum; urine	83018	Yes

Phosphorus; urine	84105	Yes
Potassium; urine	84133	Yes
Selenium; urine	84255	Yes
Sodium; urine	84300	Yes
Strontium; urine	83018	Yes
Sulfur; urine	83018	Yes
Vanadium; urine	83018	Yes
Zinc; urine	84630	Yes

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Detailed Information

Many clinicians request the analysis of essential elements in urine specimens to evaluate nutritional status and the efficacy of mineral supplementation during metal detoxification therapy. Metal detoxification agents can significantly increase the excretion of specific nutrient elements such as zinc, copper, manganese and molybdenum.

Chromium metabolism authorities suggest that 24-hour chromium excretion likely provides the best assessment of chromium status. Early indication of renal dysfunction can be gleaned from urinary wasting of essential elements such as magnesium, calcium, potassium and sodium in an unprovoked specimen.

Variability in urine volume can drastically affect the concentration of elements. To compensate for urine dilution variation, elements are expressed per unit creatinine for timed collections. For 24-hour collections, elements are reported as both units per 24 hours and units per creatinine.

Urine Mercury

Urine Elements are traditionally used to evaluate exposure to potentially toxic elements and wasting of nutrient elements. Additionally, the comparison of urine element concentrations before and after administration of a chelator can be used to estimate net retention of potentially toxic elements. Subsequent urine element analyses, also following the administration of a chelator, are useful for monitoring the efficacy of metal detoxification therapy. Results are expressed per 24 hours or creatinine corrected to account for urine dilution effects.
Learn more »

Turnaround Time

2 to 4 days

Analytes Tested

Click any analyte name for additional clinical information, including reference ranges, specimen collection, stability and rejection criteria.

Analyte	CPT	ABN Required
Mercury; urine	83825	Yes

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Detailed Information

Early signs of excessive Hg exposure include: decreased senses of touch, hearing, vision and taste, metallic taste in mouth, fatigue or lack of physical endurance, and increased salivation. ymptoms may progress with moderate or chronic exposure to include: anorexia, numbness and paresthesias, headaches, hypertension, irritability and excitability, and immune suppression/dysregulation. Advanced disease processes from excessive Hg assimilation include: tremors and incoordination, anemia, psychoses, manic behaviors, possibly autoimmune disorders and renal dysfunction or failure. Note that in Hg exposure of long duration, renal excretion of Hg (and normal metabolites) may become impaired, and the urine level of Hg might be only mildly elevated or not elevated at all due to renal failure.

Mercury is used in: dental amalgams (50% by weight), explosive detonators; some vaccines, pure liquid form in thermometers, barometers, and laboratory equipment; batteries and electrodes,some medications and Ayurveic herbs, fungicides and pesticides, and in the paper industry. The fungicide/pesticide use of mercury has declined due to environmental concerns, but Hg residues persist in the environment. Emissions from coal-fired power plants and hospital/municipal incinerators are significant sources of mercury pollution.

Methylmercury, the most common, organic form of Hg, occurs by methylation of inorganic Hg in aquatic biota or sediments (both freshwater and ocean sediments). Methylmercury accumulates in aquatic animals and fish and is concentrated up the food chain reaching highest concentrations in large fish and predatory birds. Except for fish, the human intake of dietary mercury is negligible unless the food is contaminated with one of the previously listed

forms/sources. Daily ingestion of fish can result in the assimilation of 1 to 10 micrograms of mercury/day.

Depending upon the extent of cumulative Hg exposure, elevated levels of urine Hg may occur after administration of DMPS, DMSA or D-penicillamine. Blood and especially red blood cellelemental analyses are useful for assessing recent or ongoing exposure to organic (methyl) Hg.

Urine Toxic & Essential Elements

Urine Elements are traditionally used to evaluate exposure to potentially toxic elements and wasting of nutrient elements. Additionally, the comparison of urine element concentrations before and after administration of a chelator can be used to estimate net retention of potentially toxic elements. Subsequent urine element analyses, also following the administration of a chelator, are useful for monitoring the efficacy of metal detoxification therapy. Results are expressed per 24 hours or creatinine corrected to account for urine dilution effects.

Learn more »

Turnaround Time

2 to 4 days

Analytes Tested

Click any analyte name for additional clinical information, including reference ranges, specimen collection, stability and rejection criteria.

Analyte	CPT	ABN Required
Aluminum; urine	82108	Yes
Antimony; urine	83018	Yes
Arsenic; urine	82175	Yes
Barium; urine	83018	Yes
Beryllium; urine	83018	Yes
Bismuth; urine	83018	Yes
Boron; urine	83018	Yes
Cadmium; urine	82300	Yes
Calcium; urine	83018	Yes

Cesium; urine	83018	Yes
Chromium; urine	82495	Yes
Cobalt; urine	83018	Yes
Copper; urine	82525	Yes
Gadolinium; urine	83018	Yes
Iron; urine	83540	Yes
Lead; urine	83655	Yes
Lithium; urine	83018	Yes
Magnesium; urine	83735	Yes
Manganese; urine	83785	Yes
Mercury; urine	83825	Yes
Molybdenum; urine	83018	Yes
Nickel; urine	83885	Yes
Palladium; urine	83018	Yes
Phosphorus; urine	84105	Yes
Platinum; urine	83018	Yes
Potassium; urine	84133	Yes

Selenium; urine	84255	Yes
Sodium; urine	84300	Yes
Strontium; urine	83018	Yes
Sulfur; urine	83018	Yes
Tellurium; urine	83018	Yes
Thallium; urine	83018	Yes
Thorium; urine	83018	Yes
Tin; urine	83018	Yes
Tungsten; urine	83018	Yes
Uranium; urine	83018	Yes
Vanadium; urine	83018	Yes
Zinc; urine	84630	Yes

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This test is useful for

- Toxic Element Exposure

- Alopecia
- Bone Density
- Cardiovascular Disease
- Depression
- Dermatitis or Poor Wound Healing
- Detoxifiction Therapy
- Fatigue
- Gastrointestinal Symptoms
- Hypertension
- Immune Function
- Impaired Glucose Tolerance
- Inflammation
- Kidney Function
- Nutritional Deficiencies
- Parkinson's-like Symptoms

Detailed Information

Analysis of the levels of toxic metals in urine after the administration of a metal detoxification agent is an objective way to evaluate the accumulation of toxic metals. Acute metal poisoning is rare. More common, however, is a chronic, low-level exposure to toxic metals that can result in significant retention in the body that can be associated with a vast array of adverse health effects and chronic disease.

One cannot draw valid conclusions about adverse health effects of metals without assessing net retention. For an individual, toxicity occurs when net retention exceeds physiological tolerance. Net retention is determined by the difference between the rates of assimilation and excretion of metals. To evaluate net retention, one compares the levels of metals in urine before and after the administration of a pharmaceutical metal detoxification agent such as EDTA, DMSA or DMPS. Different compounds have different affinities for specific metals, but all function by sequestering "hidden" metals from deep tissue stores and mobilizing the metals to the kidneys for excretion in the urine.

It is important to perform both pre- and post-provocation urinalysis to permit distinction between ongoing exposures to metals (pre-) and net bodily retention. The pre-provocation urine collection can also be utilized to assess the rate of creatinine clearance if a serum specimen is also submitted.

Many clinicians also request the analysis of essential elements in urine specimens to evaluate nutritional status and the efficacy of mineral supplementation during metal detoxification therapy. Metal detoxification agents can significantly increase the excretion of specific nutrient elements such as zinc, copper, manganese and molybdenum.

Chromium metabolism authorities suggest that 24-hour chromium excretion likely provides the best assessment of chromium status. Early indication of renal dysfunction can be gleaned from urinary wasting of essential elements such as magnesium, calcium, potassium and sodium in an unprovoked specimen.

Variability in urine volume can drastically affect the concentration of elements. To compensate for urine dilution variation, elements are expressed per unit creatinine for timed collections. For 24-hour collections, elements are reported as both units per 24 hours and units per creatinine.

Urine Toxic Metals

Urine Elements are traditionally used to evaluate exposure to potentially toxic elements and wasting of nutrient elements. Additionally, the comparison of urine element concentrations before and after administration of a chelator can be used to estimate net retention of potentially toxic elements. Subsequent urine element analyses, also following the administration of a chelator, are useful for monitoring the efficacy of metal detoxification therapy. Results are expressed per 24 hours or creatinine corrected to account for urine dilution effects.
Learn more »

Turnaround Time

2 to 4 days

Analytes Tested

Click any analyte name for additional clinical information, including reference ranges, specimen collection, stability and rejection criteria.

Analyte	CPT	ABN Required
Aluminum; urine	82108	Yes
Antimony; urine	83018	Yes
Arsenic; urine	82175	Yes
Barium; urine	83018	Yes
Beryllium; urine	83018	Yes
Bismuth; urine	83018	Yes
Cadmium; urine	82300	Yes
Cesium; urine	83018	Yes
Gadolinium; urine	83018	Yes
Lead; urine	83655	Yes
Mercury; urine	83825	Yes
Nickel; urine	83885	Yes

Palladium; urine	83018	Yes
Platinum; urine	83018	Yes
Tellurium; urine	83018	Yes
Thallium; urine	83018	Yes
Thorium; urine	83018	Yes
Tin; urine	83018	Yes
Tungsten; urine	83018	Yes
Uranium; urine	83018	Yes

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This test is useful for

- Toxic Element Exposure
- Alopecia
- Bone Density
- Cardiovascular Disease
- Depression
- Dermatitis or Poor Wound Healing
- Detoxification Therapy
- Fatigue
- Gastrointestinal Symptoms
- Hypertension

- Immune Function
- Impaired Glucose Tolerance
- Inflammation
- Kidney Function
- Nutritional Deficiencies
- Parkinson's-like Symptoms

Detailed Information

Analysis of the levels of toxic metals in urine after the administration of a metal detoxification agent is an objective way to evaluate the accumulation of toxic metals. Acute metal poisoning is rare. More common, however, is a chronic, low-level exposure to toxic metals that can result in significant retention in the body that can be associated with a vast array of adverse health effects and chronic disease.

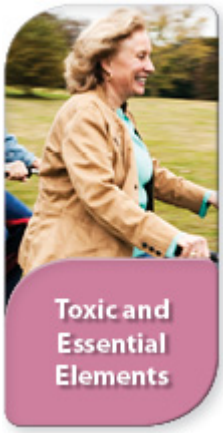
One cannot draw valid conclusions about adverse health effects of metals without assessing net retention. For an individual, toxicity occurs when net retention exceeds physiological tolerance. Net retention is determined by the difference between the rates of assimilation and excretion of metals. To evaluate net retention, one compares the levels of metals in urine before and after the administration of a pharmaceutical metal detoxification agent such as EDTA, DMSA or DMPS. Different compounds have different affinities for specific metals, but all function by sequestering "hidden" metals from deep tissue stores and mobilizing the metals to the kidneys for excretion in the urine.

It is important to perform both pre- and post-provocation urinalysis to permit distinction between ongoing exposures to metals (pre-) and net bodily retention. The pre-provocation urine collection can also be utilized to assess the rate of creatinine clearance if a serum specimen is also submitted.

Many clinicians also request the analysis of essential elements in urine specimens to evaluate nutritional status and the efficacy of mineral supplementation during metal detoxification therapy. Metal detoxification agents can significantly increase the excretion of specific nutrient elements such as zinc, copper, manganese and molybdenum.

Chromium metabolism authorities suggest that 24-hour chromium excretion likely provides the best assessment of chromium status. Early indication of renal dysfunction can be gleaned from urinary wasting of essential elements such as magnesium, calcium, potassium and sodium in an unprovoked specimen.

Variability in urine volume can drastically affect the concentration of elements. To compensate for urine dilution variation, elements are expressed per unit creatinine for timed collections. For 24-hour collections, elements are reported as both units per 24 hours and units per creatinine.



Find out more

- View Sample Report
- Collection Instructions
- Detailed Information

Whole Blood Chromium & Vanadium

Measurement of Chromium and Vanadium in Whole Blood
Learn more »

Turnaround Time

3 to 5 days

Analytes Tested

Click any analyte name for additional clinical information, including reference ranges, specimen collection, stability and rejection criteria.

Analyte	CPT	ABN Required
Chromium; whole blood	82495	Yes
Vanadium; whole blood	83018	Yes

List price applies when filing with insurance or Medicare, or when billing a patient directly.

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Detailed Information

Accurate assessment of essential element status in the most appropriate compartment is highly recommended for determination of appropriate supplementation. The absorption, transport and metabolism of essential elements is highly integrated and regulated. Inappropriate supplementation or dietary imbalance of elements can have significant adverse health effects. For example, excess intake of zinc or molybdenum can result in copper deficiency and excess assimilation of manganese can have serious neurotoxic effects that are expressed as Parkinson's-like disease.

Whole blood analysis is an excellent test for measuring the levels of both intracellular and extracellular circulating elements. Extracellular elements have functions in serum/plasma or are transported to tissues in serum/plasma associated with specific proteins or albumen. Intracellular elements have very specific functions as obligatory constituents of metalloproteins/enzymes in red blood cells and lymphcytes. The red and white blood cells serve as surrogate cells representative of peripheral cells in general. Some essential elements, such as selenium, are portioned in and have important physiological roles in both the intracellular and extracellular compartments. Likewise,

the toxic metal lead is transported in both the fluid and cellular (red blood cells) compartments of blood. Therefore, measurement of elements in both blood compartments permits a more complete evaluation of total blood element levels.

Whole Blood Elements

Whole blood metals are the standard for diagnosis of lead, mercury or other metal toxicity or poisoning, and are also used to assess recent or ongoing exposure to potentially toxic elements. Whole blood analysis measures total element levels that circulate extracellularly in serum/plasma, as well as intracellularly within blood cells.
Learn more »

Turnaround Time

3 to 5 days

Analytes Tested

Click any analyte name for additional clinical information, including reference ranges, specimen collection, stability and rejection criteria.

Analyte	CPT	ABN Required
Arsenic; whole blood	82175	Yes
Barium; whole blood	83018	Yes
Cadmium; whole blood	82300	Yes
Calcium; whole blood	82310	Yes
Cobalt; whole blood	83018	Yes
Copper; whole blood	82525	Yes
Lead; whole blood	83655	Yes
Lithium; whole blood	80178	Yes
Magnesium; whole blood	83735	Yes
Manganese; whole blood	83785	Yes
Mercury; whole blood	83825	Yes

Molybdenum; whole blood	83018	Yes
Nickel; whole blood	83885	Yes
Platinum; whole blood	83018	Yes
Selenium; whole blood	84255	Yes
Strontium; whole blood	83018	Yes
Thallium; whole blood	83018	Yes
Tungsten; whole blood	83018	Yes
Uranium; whole blood	83018	Yes
Zinc; whole blood	84630	Yes

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This test is useful for

- Alopecia
- Anemia
- Bone Density
- Cardiovascular Disease
- Depression
- Dermatitis or Poor Wound Healing
- Detoxification Therapy
- Fatigue
- Gastrointestinal Symptoms
- Hypertension

- Immune Function
- Impaired Glucose Tolerance
- Inflammation
- Kidney Function
- Nutritional Deficiencies
- Parkinson's-like Symptoms
- Sexual Impotence or Decreased Testosterone Production
- Vision Problems

Detailed Information

Blood elemental analysis should be performed prior to the initiation of, and intermittingly during, metal detoxification. Toxic metals disrupt essential element metabolism and are antagonistic to some elements such as cadmium to zinc and lead to calcium. Further, commonly utilized metal detoxification agents can cause significantly increased urinary wasting of some essential elements. For example, EDTA has a very high affinity for zinc and manganese, and DMPS results in marked increases in copper excretion. Therefore, appropriate evaluation of essential element status is an integral component of safe and effective metal detoxification therapy.

Analysis of toxic elements/metals in whole blood is useful for assessment of recent or ongoing exposure to the toxins, but does not provide accurate information about net retention of toxic metals in the body. For example, blood lead levels peak about five hours after acute exposure and then decrease exponentially with a half-life in blood of about one month. Evaluation and elimination of ongoing exposure to toxic metals is another important component of efficient metal detoxification.

Accurate assessment of essential element status in the most appropriate compartment is highly recommended for determination of appropriate supplementation. The absorption, transport and metabolism of essential elements is highly integrated and regulated. Inappropriate supplementation or dietary imbalance of elements can have significant adverse health effects. For example, excess intake of zinc or molybdenum can result in copper deficiency and excess assimilation of manganese can have serious neurotoxic effects that are expressed as Parkinson's-like disease.

Whole blood analysis is an excellent test for measuring the levels of both intracellular and extracellular circulating elements. Extracellular elements have functions in serum/plasma or are transported to tissues in serum/plasma associated with specific proteins or albumen. Intracellular elements have very specific functions as obligatory constituents of metalloproteins/enzymes in red blood cells and lymphocytes. The red and white blood cells serve as surrogate cells representative of peripheral cells in general. Some essential elements, such as selenium, are portioned in and have important physiological roles in both the intracellular and extracellular compartments. Likewise, the toxic metal lead is transported in both the fluid and cellular (red blood cells) compartments of blood. Therefore, measurement of elements in both blood compartments permits a more complete evaluation of total blood element levels.

Nutritional

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.

The typical Western diet contains too many carbohydrates and saturated fats, and is often low in nutrients such as vitamins and minerals. Poor dietary choices can cause nutritional deficiencies and imbalances which may require dietary changes or nutritional supplementation.

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

Fatty Acids; Erythrocytes

The typical Western diet contains too many carbohydrates and saturated fats, and is often imbalanced with respect to essential and nonessential 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. Learn more »

Turnaround Time

3 to 5 days

Analytes Tested

Click any analyte name for additional clinical information, including reference ranges, specimen collection, stability and rejection criteria.

Analyte	CPT	ABN Required
Arachidonic acid; RBC	82542	Yes
Dihomo-g-linolenic acid; RBC	82542	Yes
Docosahexaenoic acid; RBC	82542	Yes
Eicosapentaenoic acid; RBC	82542	Yes
Elaidic acid; RBC	82542	Yes
Linoleic acid; RBC	82542	Yes
Oleic acid; RBC	82542	Yes
Palmitelaidic acid; RBC	82542	Yes
Palmitic acid; RBC	82542	Yes

Palmitoleic acid; RBC	82542	Yes
Stearic acid; RBC	82542	Yes

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This test is useful for

- ADD/ADHD
- Alzheimer's Disease
- Autism Spectrum Disorders
- Blood Pressure
- Cardiovascular Health
- Coagulation
- Lipid/Lipoprotein Levels
- Immune Response
- Inflammatory Response to Injury and Infection
- Seizure Disorders
- Tumor Growth and Inhibition

Detailed Information

Fatty acids (FAs) are primarily derived from triglycerides in the food and oils that we consume. Non-essential FAs are also biosynthesized in the body, especially during times when carbohydrate intake exceeds the body's needs for glucose and glycogen repletion. Non-essential FAs are most commonly recognized as an important source of energy, and when caloric intake exceeds expenditure, these FAs are stored in adipose tissue as triglycerides. However, FA metabolism is much more complex and it is well established that appropriate balance among essential and non-essential FAs, as well as avoidance of harmful trans-FAs, is required for optimal health and wellness.

FAs are monocarboxylic acids that may be either saturated (no C=C double bonds) or unsaturated (one or more C=C double bonds). Humans make saturated fatty acids and a monounsaturated fatty acid with a double bond at the omega-9 position but do not have the enzymes necessary to introduce a double bond at the omega-3 (ω-3) or omega-6 (ω-6) positions. The essential fatty acids (EFAs) linoleic acid (18:2) and α-linoleic acid (18:3) are polyunsaturated fatty acids (PUFAs) that are precursors of the ω-6 and ω-3 fatty acid series, respectively. The ω-6 and ω-3 FAs compete for desaturase and elongation enzymes that produce longer-chain, more highly unsaturated FAs. The typical Western diet contains an undesirable preponderance of ω-6 fatty acids that impedes elongation and desaturation of ω-3 FAs. FAs derived from EFAs or taken in via diet or supplements are essential components of cell

membrane phospholipids, and appropriate membrane fatty acid content is pivotal for optimal membrane fluidity, receptor activity and cellular metabolism. The same FAs eventually give rise to hormone-like substances (eicosanoids) that are involved in the regulation of blood pressure and coagulation, lipid levels, immune response, tumor growth and inhibition, and the inflammatory response to injury and infection, and may play a role in seizure disorders and dementias such as Alzheimer's disease.

Appropriate balance of membrane phospholipid EFAs is important because the biological effects of the ω-3 and ω-6 FAs metabolites are mediated by their mutual interactions.

This test measures the primary ω-6 and ω-3 PUFAs, and monounsaturated, saturated and trans FAs that are present as constituents of phospholipids in the membranes of erythrocytes. Each FA is reported as a percentage of the total FAs measured and important FA ratios are presented. Commentary is provided for results exceeding reference intervals.

Find out more

- View Sample Report
- Collection Instructions
- Detailed Information

Plasma Amino Acids

Amino acid (AA) analysis aids in the identification of dietary protein adequacy and amino acid 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. 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.
Learn more »

Turnaround Time

3 to 5 days

Analytes Tested

Click any analyte name for additional clinical information, including reference ranges, specimen collection, stability and rejection criteria.

Analyte	CPT	ABN Required
1-Methylhistidine; plasma	82139	No
3-Methylhistidine; plasma	82139	No
A-Amino-n-butyrate; plasma	82139	No
A-Aminoadipate; plasma	82139	No
Alanine; plasma	82139	No
Ammonia; plasma	82139	No
Anserine; plasma	82139	No
Arginine; plasma	82139	No
Asparagine; plasma	82139	No
Aspartic Acid; plasma	82139	No
B-Alanine; plasma	82139	No
B-Aminoisobutyrate; plasma	82139	No
Carnosine; plasma	82139	No
Citrulline; plasma	82139	No
Cystathionine; plasma	82139	No
Cystine; plasma	82139	No

Ethanolamine; plasma	82139	No
G-Aminobutyrate; plasma	82139	No
Glutamic Acid; plasma	82139	No
Glutamine; plasma	82139	No
Glycine; plasma	82139	No
Histidine; plasma	82139	No
Homocystine; plasma	82139	No
Hydroxyproline; plasma	82139	No
Isoleucine; plasma	82139	No
Leucine; plasma	82139	No
Lysine; plasma	82139	No
Met Sulfoxide; plasma	82139	No
Methionine; plasma	82139	No
Ornithine; plasma	82139	No
Phenylalanine; plasma	82139	No
Phosphoethanolamine; plasma	82139	No
Phosphoserine; plasma	82139	No

Proline; plasma	82139	No
Sarcosine; plasma	82139	No
Serine; plasma	82139	No
Taurine; plasma	82139	No
Threonine; plasma	82139	No
Tryptophan; plasma	82139	No
Tyrosine; plasma	82139	No
Urea; plasma	82139	No
Valine; plasma	82139	No

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Detailed Information

Many individuals have "hidden" impairments in amino acid metabolism that are problematic and often go undiagnosed. These impairments may or may not be expressed as specific symptoms. They may silently increase susceptibility to a degenerative disease or they may be associated with, but not causative for, a disease. Because of the wealth of information provided, it is suggested that a complete amino acid analysis be performed whenever a thorough nutritional and metabolic workup is called for.

Amino acid analysis provides fundamental information about nutrient adequacy, including the quality and quantity of dietary protein, digestive disorders, and vitamin and mineral deficiencies—particularly folic acid, B12, B6 metabolism, zinc and magnesium. In addition, amino acid analysis provides important diagnostic information about hepatic and renal function, availability of precursors of neurotransmitters, detoxification capacity, susceptibility to occlusive arterial disease (homocystine), and many inherent disorders in amino acid metabolism.

The patient's results are presented in a functional format that permits ease of interpretation. A comprehensive summary of "presumptive needs" (such as B6, B12/folate, Mg) and "implied conditions" (such as maldigestion/malabsorption, abnormal gastrointestinal flora, impaired detoxification, oxidative stress) are presented based upon each patient's results. Patient-specific amino acid supplement schedules and user-friendly commentary are provided to simplify nutritional intervention.

Plasma vs. Urine Analysis
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.

Plasma amino acid analysis measures what is being transported at the time of sampling. The specimen should be collected after an overnight fast to reduce the influence of dietary protein. Abnormalities are deduced by comparison of measured levels with an established reference range.

The 24-hour urine amino acid analysis has the highest probability of detecting abnormalities if renal function is normal. The 24-hour test indicates what is high and low over the course of a day, reflects blood and tissue amino acid pools, and is not affected by circadian rhythm. Healthy kidneys efficiently conserve essential amino acids. Therefore, urine levels of amino acids decrease first and tend to give an earlier indication of inadequacy than do plasma levels.

A first morning void urine (FMV) amino acid analysis, with results normalized per gram creatinine, provides an alternative when a complete 24-hour collection is not a viable option. The FMV analysis is excellent for identification of marked abnormalities, particularly with respect to gastrointestinal health, inherited disorders in amino acid metabolism and renal function, and can be used for protein challenge testing.

Urine Amino Acids

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Learn more »

Turnaround Time

5 to 7 days

Analytes Tested

Click any analyte name for additional clinical information, including reference ranges, specimen collection, stability and rejection criteria.

Analyte	CPT	ABN Required
1-Methylhistidine; urine	82139	No
3-Methylhistidine; urine	82139	No
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A-Aminoadipate; urine	82139	No

Alanine; urine	82139	No
Ammonia; urine	82139	No
Anserine; urine	82139	No
Arginine; urine	82139	No
Asparagine; urine	82139	No
Aspartic Acid; urine	82139	No
B-Alanine; urine	82139	No
B-Aminoisobutyrate; urine	82139	No
Carnosine; urine	82139	No
Citrulline; urine	82139	No
Creatinine; urine	82570	No
Cystathionine; urine	82139	No
Cysteine; urine	82139	No
Cystine; urine	82139	No
Ethanolamine; urine	82139	No
G-Aminobutyrate; urine	82139	No
Glutamic Acid; urine	82139	No

Glutamine : Glutamate	82139	No
Glutamine; urine	82139	No
Glycine; urine	82139	No
Histidine; urine	82139	No
Homocystine; urine	82139	No
Hydroxyproline; urine	82139	No
Isoleucine; urine	82139	No
Leucine; urine	82139	No
Lysine; urine	82139	No
Met Sulfoxide; urine	82139	No
Methionine; urine	82139	No
Ornithine; urine	82139	No
Phenylalanine; urine	82139	No
Phosphoethanolamine; urine	82139	No
Phosphoserine; urine	82139	No
Proline; urine	82139	No
Sarcosine; urine	82139	No

Serine; urine	82139	No
Taurine; urine	82139	No
Threonine; urine	82139	No
Tryptophan; urine	82139	No
Tyrosine; urine	82139	No
Urea; urine	82139	No
Valine; urine	82139	No

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This test is useful for

- ADD/ADHD
- Autism Spectrum Disorders
- Cardiovascular Disease
- Depression and Anxiety
- Digestive Disorders
- Epilepsy
- Fatigue
- Hypertension
- Infertility
- Insomnia
- Kidney Function
- Nutritional Deficiencies
- Rheumatoid Arthritis

Detailed Information

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Urine Fluoride

Urinary excretion is the main route of elimination for fluoride. Fluoride is found in drinking water, tea and other beverages, toothpaste, refrigerants and non-stick coatings, as well as many prescription drugs including some anesthetics, antibiotics, antidepressants, chemotherapeutics, corticosteroids, asthma and allergy medications, and antifungals.
Learn more »

Turnaround Time

5 to 7 days

Analytes Tested

Click any analyte name for additional clinical information, including reference ranges, specimen collection, stability and rejection criteria.

Analyte	CPT	ABN Required

Fluoride, urine	82735	No

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Detailed Information

Fluoride is potentially toxic at high doses or with prolonged lower-level exposure. It may cause dental fluorosis, osteomalacia, ligament calcification, hypocalcemia, arrhythmias, neurotoxicity, headaches, vertigo, thyroid dysfunction and anemia. Recent studies indicate that fluoride exposure from fluoridated water correlates with increased risk of bone cancer in young boys, and hip fracture in the elderly. Fluoride is measured using an ion specific electrode.

Urine Halides Pre & Post Load

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.
Learn more »

Turnaround Time

5 to 7 days

Analytes Tested

Click any analyte name for additional clinical information, including reference ranges, specimen collection, stability and rejection criteria.

Analyte	CPT	ABN Required
Bromine, urine	84999	Yes
Fluoride,	82735	No

urine		
Iodine, urine	84999	Yes

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This test is useful for

- Fatigue
- Immune Response
- Thyroid Function
- Estrogen Metabolism

Detailed Information

Specific tissues in the body require adequate iodine and the reduced form of the element, iodide, for normal metabolism and optimal health. Adequate iodide uptake and organification of iodine by the thyroid gland is required for the production, storage and release of thyroid hormones. Triiodothyronine (T3) regulates metabolism in several tissues by affecting energy production and neuronal and sexual development. Iodine insufficiency is associated with "sub-clinical" thyroid deficiency, weight gain, loss of energy, goiter and impaired mental function. Iodine is also concentrated in breast tissue where it elicits anti-proliferative effects and protection against fibrocystic breast disease and cancer. Iodine and organic iodine compounds are also concentrated and secreted by the gastric mucosa, salivary glands and the cervix.

Iodine status and metabolism are affected not only by iodine intake, which has decreased significantly, but also by intake and retention of goitrogenic halides bromide and fluoride. Excessive intake of the antagonistic halides can accumulate in tissues, displace iodine and compromise the production of thyroid hormones and the integrity of the thyroid and mammary glands. Antagonistic bromide is abundant in commercially produced baked goods, soft drinks, pesticides, brominated chemicals and some medications. Primary sources of fluoride include fluoridated water, beverages, toothpaste, mouthwashes and some medications.

The Urine Halides test provides comprehensive assessment of iodine sufficiency and retention of antagonistic halides in a single test. The test requires a spot urine specimen, preferably first morning void (FMV), for determination of baseline halide levels. An oral loading dose of iodine/iodide is ingested and all urine is collected for the subsequent 24 hours. Iodine and displaced bromide and fluoride are measured in the urine and the results for each element are reported as μg/gm creatinine and μg/24 hours. Iodine status is assessed by evaluation of the percentage of the ingested dose that is excreted. Low iodine excretion is suggestive of greater bodily retention and need.

The specific halides are analyzed in urine using the most accurate methodology available for each element. Iodine and bromine are measured by ICP-MS as is used by the CDC. Fluoride is measured by ion selective electrode (ISE).

Find out more

- View Sample Report
- Collection Instructions
- Detailed Information

Urine Iodine Pre & Post Load

Iodine is an essential element required for normal function of the thyroid gland and immune system, and the integrity of breast tissue. The test can be performed using conventional random or 24-hour urine collection or after administration of a loading dose of iodide/iodine. Iodine is measured by ICP-MS, as is used by the CDC.
Learn more »

Turnaround Time

5 to 7 days

Analytes Tested

Click any analyte name for additional clinical information, including reference ranges, specimen collection, stability and rejection criteria.

Analyte	CPT	ABN Required
Iodine, urine	84999	Yes

List price applies when filing with insurance or Medicare, or when billing a patient directly.

Prompt payment pricing applies when billing to a physician account or prepayment is received with the test.

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This test is useful for

- Fatigue
- Immune Response
- Thyroid Function
- Estrogen Metabolism

Detailed Information

Specific tissues in the body require adequate iodine and the reduced form of the element, iodide, for normal metabolism and optimal health. Adequate iodide uptake and organification of iodine by the thyroid gland is required for the production, storage and release of thyroid hormones. Triiodothyronine (T3) regulates metabolism in several tissues by affecting energy production and neuronal and sexual development. Iodine insufficiency is associated with "sub-clinical" thyroid deficiency, weight gain, loss of energy, goiter and impaired mental function. Iodine is also concentrated in breast tissue where it elicits anti-proliferative effects and protection against fibrocystic breast disease and cancer. Iodine and organic iodine compounds are also concentrated and secreted by the gastric mucosa, salivary glands and the cervix. The test requires a spot urine specimen, preferably first morning void (FMV), for determination of baseline halide levels. An oral loading dose of iodine/iodide is ingested and all urine is collected for the subsequent 24 hours. Iodine is measured in the urine and the results for each element are reported as μg/gm creatinine and μg/24 hours. Iodine status is assessed by evaluation of the percentage of the ingested dose that is excreted. Low iodine excretion is suggestive of greater bodily retention and need. Iodine is measured by ICP-MS, as is used by the CDC.

Vitamin D Serum

25-Hydroxyvitamin D, known for its role in bone health and calcium absorption, also appears to affect immune function, neurodegenerative and cardiovascular issues, 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 QQQ method to measure Vitamin D2, D3 and total Vitamin D.
Learn more »

Turnaround Time

3 to 5 days

Analytes Tested

Click any analyte name for additional clinical information, including reference ranges, specimen collection, stability and rejection criteria.

Analyte	CPT	ABN Required
25-Hydroxyvitamin D Total, serum	82306	Yes
25-Hydroxyvitamin D2, serum	*	Yes

25-Hydroxyvitamin D3, serum	*	Yes

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This test is useful for

- Alzheimer's Disease
- Bone Health
- Calcium Absorption
- Cardiovascular Disease
- Depression
- Immune Function
- Infections
- Multiple Sclerosis
- Neurocognitive Dysfunction
- Preeclampsia
- Rheumatoid Arthritis
- Type 2 Diabetes

Detailed Information

25-Hydroxyvitamin D is the major circulating form of vitamin D. It occurs in two forms: vitamin D2 (ergocalciferol) and vitamin D3 (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 (D2 plus D3) provides the best assessment of patient vitamin D status and includes vitamin D derived from diet, supplements and exposure to UVB light, such as 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, 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 two forms of vitamin D, and only total concentrations are reported. This LC/MS QQQ method is sensitive and specific for both vitamin D2 and D3, and each form is measured and reported independently.

Environmental Exposure and Detoxification

Environmental chemical exposure has never been more pervasive with thousands of chemicals in use around the world. Many chemicals are integrated into our food supply, the air we breathe and the water we drink. Every day, we ingest small amounts of many chemicals and our bodies cannot metabolize and clear all of them. Chemicals not metabolized are stored in the fat cells throughout our bodies, where they continue to accumulate. As these chemicals build up they alter our metabolism, cause enzyme dysfunction and nutritional deficiencies, create hormonal imbalances, damage brain chemistry and can cause cancer. Because the chemicals accumulate in different parts of the body—at different rates and in different combinations—there are many different chronic illnesses that can result.

Doctor's Data offers a spectrum of tests designed to evaluate the exposure to environmental toxins, and assess the body's capacity for endogenous detoxification. Especially important for the latter category is the Plasma Methylation Profile.

DNA Methylation Whole Blood

Identification of SNPs that influence health and disease risk may improve clinical success and allow patients to optimize health and wellness.

The DNA Methylation Pathway Profile allows clinicians to screen their patients for a variety of genetic changes (single nucleotide polymorphisms, or SNPs) that may impact the function of important biochemical processes such as methionine metabolism, detoxification, hormone balance and Vitamin D function. The presence or absence of SNPs may modify disease risk. The risks may be reduced by lifestyle changes, and inefficient biochemical processes can be supported by diet and nutritional supplements to maximize the functions of metabolic pathways.

Learn more »

Turnaround Time

14 to 21 days

Analytes Tested

Click any analyte name for additional clinical information, including reference ranges, specimen collection, stability and rejection criteria.

Analyte	CPT	ABN Required
ACAT - 1-02; whole blood		Yes
AHCY - 19; whole blood		Yes
AHCY - 1; whole blood		Yes
AHCY - 2; whole blood		Yes
BHMT - 1; whole blood		Yes
BHMT - 2; whole blood		Yes

BHMT - 4; whole blood		Yes
BHMT - 8; whole blood		Yes
CBS - A360A; whole blood		Yes
CBS - C699T; whole blood		Yes
CBS - N212N; whole blood		Yes
COMT - 61; whole blood		Yes
COMT - H62H; whole blood		Yes
COMT - V158M; whole blood		Yes
MAO A - R297R; whole blood		Yes
MTHFR - 3; whole blood		Yes
MTHFR - A1298C; whole blood		Yes
MTHFR - C677T; whole blood		Yes
MTR - A2756G; whole blood		Yes
MTRR - 11; whole blood		Yes
MTRR - A66G; whole blood		Yes
MTRR - H595Y; whole blood		Yes
MTRR - K350A; whole blood		Yes

MTRR - R415T; whole blood		Yes
MTRR - S257T; whole blood		Yes
NOS - D298E; whole blood		Yes
SHMT - C1420T; whole blood		Yes
SUOX - S370S; whole blood		Yes
VDR - Fok1; whole blood		Yes
VDR - Taq1; whole blood		Yes

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Detailed Information

Identifying single nucleotide polymorphisms (SNPs) that may influence health and rise for diseases facilitates clinical support for patients. The Doctor's Data DNA Methylation Pathway Profile includes a variety of SNPs known to influence many aspects of health including:

insulin sensitivity
bone health
cancer risks
cardiovascular health
detoxification processes
fertility
mitochondrial function and metabolism
methylation
neurotransmitter balance

SNPs are DNA sequence variations that occur relatively frequently in the general population. They are different from

disease mutations, which are very rare. Huntington's disease is an example of a disease mutation - if you inherit the altered gene, the disease will develop. Certain SNPs may be associated with particular health conditions, but they are not known to directly ***cause*** disease. The majority of SNPs affect protein, enzyme or cell receptor structure and function.

SNPs may have subtle but true biological effects. Some SNPs have been correlated with health concerns or disease risk. Often several SNPs need to be present to alter metabolic or biochemical functions in the body. SNP activity and gene expression may often be modified by *epigenetic* factors (diet, lifestyle, nutrition, toxicant exposures). The effects of SNPs are often cumulative; the expression of a single SNP often depends on the presence or absence of other SNPS.

The identification of SNPs and their impact on health and physiology is an ongoing area of research – the hope is that finding and studying these small variations in DNA will lead to better and more individualized medical interventions. In many cases the environment – diet, nutrition, toxicant exposures, stress - may further modify the expression of genes and SNPs.

The SNPs affecting detoxification and methylation become even more important if a patient has been exposed to the toxicants such as mercury, lead or bisphenol A (BPA). Lead and BPA inhibit the function of methyltransferases, and mercury inhibits methionine synthase, an important enzyme in the re-methylation of homocysteine. Methylation is an essential step in the detoxification and elimination of arsenic and other xenobiotics. Normal methionine metabolism is a critical component of Phase II detoxification processes; the B-12 and folate-dependent transmethylation and B-6 dependent transsulfuration pathways convert homocysteine to cysteine. Cysteine is an important precursor in glutathione biosynthesis.

The greatest difficulty in interpreting a SNP results is determining the extent to which a DNA genotype is *phenotypically* expressed. Functional tests, combined with evaluation of the patient's symptoms and responses to intervention, are necessary to assess the influence of known SNPs on the phenotype. DDI's Plasma Methylation Profile is one such test; it provides a direct assessment of several major metabolites that indicate genetic and epigenetic affects. The Plasma Methylation Profile is a functional follow-up test when SNPs affecting methionine metabolism are identified.

DDI's DNA Methylation Pathway Profile allows clinicians to screen their patients for a variety of SNPs that may impact the function of important biochemical processes. Identifying SNPs that influence health and disease risk allows clinicians to support their patients with appropriate lifestyle changes and nutrition to maximize health and wellness.

DNA Oxidative Damage Assay

Oxidative stress is adversely involved in many pathophysiological processes, aging and cancer. Oxidation of DNA occurs readily at the guanosine bases, so measurement of 8-hydroxy-2'- Deoxyguanosine (8-OHdG) in urine provides a quantitative assessment of ongoing oxidative damage or stress in the body. When 8-OHdG levels are elevated, it's important to identify the sources of oxidative stress and assess the primary intracellular antioxidant glutathione. Taking steps to reduce oxidative stress is valuable in optimizing health and longevity. This non-invasive test requires a single first morning void (FMV) urine collection.
Learn more »

Turnaround Time

5 to 7 days

Analytes Tested

Click any analyte name for additional clinical information, including reference ranges, specimen collection, stability and rejection criteria.

Analyte	CPT	ABN Required
8-hydroxy-2'-deoxyguanosine; urine	83520	Yes

List price applies when filing with insurance or Medicare, or when billing a patient directly.

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This test is useful for

- Oxidative Stress
- Metabolic Syndrome
- Alzheimer's Disease
- Atopic Dermatitis
- Cancer
- Chronic Hepatitis
- Cystic Fibrosis
- Diabetic Nephropathy
- Diabetic Retinopathy
- Environmental Exposure
- Huntington's Disease
- Inflammatory Bowel Disease
- Pancreatitis
- Parkinson's Disease
- Rheumatoid Arthritis

Detailed Information

Urinary 8-hydroxy-2'-deoxyguanosine (8-OHdG) is an excellent biomarker of oxidative stress and a risk factor for a variety of diseases, including cancer. Reactive oxygen species (ROS) are produced as a result of normal oxygen metabolism or exposure to xenobiotics. Excessive levels are associated with oxidative damage to lipids, proteins and DNA. ROS-induced damage to nuclear and mitochondrial DNA occurs readily at the guanosine bases that are removed by DNA repair mechanisms and excreted in urine. 8-OHdG is the most frequently detected and studied oxidized nucleoside of DNA that is considered to be premutagenic due to its potential for initiation and promotion of carcinogenesis. Bladder and prostate cancers have been associated with elevated levels of 8-OHdG.

Oxidative stress and ROS-induced elevations of 8-OHdG have been associated with numerous pathological processes including cystic fibrosis, atopic dermatitis, rheumatoid arthritis, pancreatitis, chronic hepatitis, inflammatory bowel disease, and neurological diseases such as Parkinson's, Alzheimer's and Huntington's. Elevated levels of 8-OHdG also have been associated with hyperglycemia and have been positively correlated with HbA1c and the severity of nephropathy and retinopathy in diabetics. Environmental factors, lifestyle choices such as smoking and recreational drugs, and some pharmaceuticals have also been associated with elevated urine levels of 8-OHdG. Known environmental factors include exposure to ionizing radiation such as indoor radon, asbestos, toxic metals and metal fumes such as manganese, chromium and vanadium, diesel exhaust, benzene, styrene, toluene and zylenes. In grade school children exposure to toxic or carcinogenic metals released from coal-fired power plants as assessed by measurement of elements in urine was significantly correlated with urine levels of 8-OHdG.

Moderately elevated levels of 8-OHdG have been associated with inadequate intake of carotenoids, antioxidant-rich foods and supplemental antioxidants. A finding of an elevated level of 8-OHdG in a first morning urine void warrants identification of the sources of oxidative stress/inflammation and assessment of the primary intracellular antioxidant glutathione. The efficacy of therapeutic intervention to ameliorate oxidative stress should be monitored by subsequent retesting of urine 8-OHdG and glutathione levels.

Hepatic Detox Profile

The body continually attempts to eliminate chemical toxins through enzymatic processes in the liver. Urinary D-glucaric acid, a byproduct of Phase I detoxification, is an indicator of chemical exposure to over 200 chemicals. Urinary mercapturic acids are excreted end products of Phase II detoxification. Together, assessment of these two analytes provides valuable information about exposure to xenobiotics, liver disease and the ability of the liver to eliminate toxins. This non-invasive test requires a single, first morning void (FMV) urine collection.
Learn more »

Turnaround Time

5 to 7 days

Analytes Tested

Click any analyte name for additional clinical information, including reference ranges, specimen collection, stability and rejection criteria.

Analyte	CPT	ABN Required
D-glucaric acid	84999	Yes
Mercapturic acids	84999	Yes

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This test is useful for

- Chemical Exposure
- Detoxification Therapy
- Liver Detoxification Function

Detailed Information

The production, use and disposal of toxic chemicals and synthetic materials have increased the risk of exposure to health-threatening toxins. Causal relationships between toxic chemicals and diseases have been well established. However many patients endure chronic symptoms that are associated with exposure to toxins before advanced stages of specific diseases are realized. Thus, there is a great demand for noninvasive laboratory tests that can provide timely assessment of chemical exposure and the capability of hepatic detoxification.

One process by which the body eliminates toxins is enzymatic detoxification in the liver. A reliable biomarker for exposure to toxic chemicals is urinary D-glucaric acid. Elevated levels of D-glucaric acid indicate induction of cytochrome P-450 enzymes (phase I) as a result of exposure to many xenobiotics, including pesticides, fungicides, petrochemicals, drugs, toluene, formaldehyde, styrenes and more. Such exposures induce the glucuronic acid enzymatic pathway and production of D-glucaric acid, thus urinary D-glucaric acid is an indirect byproduct of chemical exposure and phase I detoxification reactions.

The urinary level of mercapturic acids indicates quantitatively the degree of activity or capability of phase II detoxification. Mercapturic acids are the final excretory products of detoxification and include a variety of functionalized xenobiotics that have been conjugated with glutathione or L-cysteine prior to excretion. Low levels of mercapturic acids are consistent with insufficient levels of glutathione and/or cysteine. When the rate of formation of functionalized xenobiotics (phase I) exceeds the capacity of phase II detoxification, more potent toxins accumulate.

Especially important for symptomatic patients or those who have a history of chemical sensitivity, this test does not require the use of hepatotoxic compounds. This non-invasive test requires only a single, first morning void (FMV) urine collection. Results are expressed per unit creatinine to normalize for dilution effects, and reference ranges are age and gender specific. The test does not replace comprehensive liver tests for cases of advanced liver disease.

Find out more

- View Sample Report
- Collection Instructions
- Detailed Information

Methylation Profile; plasma

Normal metabolism of methionine is critical for cellular methylation of DNA, proteins and neurotransmitters. Aberrant methionine metabolism can occur in anyone at any age and can be associated with numerous health consequences including cardiovascular disease and cancer. The 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 important "methylation index," a ratio of SAM to SAH. Learn more »

Turnaround Time

5 to 7 days

Analytes Tested

Click any analyte name for additional clinical information, including reference ranges, specimen collection, stability and rejection criteria.

Analyte	CPT	ABN Required
Cystathionine; plasma	82136	No
Cysteine; plasma	82136	No
Homocysteine; plasma	82136	No
Methionine; plasma	82136	No
S-adenosylhomocysteine; plasma	82542	Yes
S-adenosylmethionine; plasma	82542	Yes
SAM, SAH ratio	82542	Yes

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This test is useful for

- Autism
- Birth Defects
- Cancer
- Cardiovascular Disease
- Congenital Heart Disease
- Detoxification Impairment
- Down Syndrome
- General Health and Longevity
- Genetic Disorders
- Immune Dysfunction
- Neurodegenerative Diseases
- Nutritional Deficiencies
- Psychiatric Disorders

Detailed Information

Normal methionine metabolism is absolutely critical for folate-dependent transmethylation and transsulfuration. Abnormal metabolism of methionine can be found in both genders at any age. It is usually associated with genetic or nutritional deficiencies, aging and exposures to environmental toxins. For example, lead can impair methylation via inhibition of the enzyme methylene-tetrahydrofolate reductase (MTHFR).

Conditions associated with untreated, aberrant methionine metabolism include, but are not limited to:

- Abnormal neurotransmitter metabolism and psychiatric disorders such as schizophrenia and bipolar disorder
- Neurodegenerative diseases
- Autism
- Dysregulation of nitric acid homeostasis
- Oxidative stress
- Global under-methylation, synthesis and repair of DNA
- Immune dysregulation/autoimmunity
- Cancer
- Cardiovascular disease
- Congenital heart disease and birth defects
- Impaired endogenous detoxification processes
- Increased risk for Down syndrome.

Methylation

Methionine is first enzymatically converted to S-adenosylmethionine (SAM), the principal methyl donor for methylation of DNA, RNA, protein, phospholipids, creatinine and neurotransmitters. S-adenosylhomocysteine (SAH) is generated as a product of transmethylation and is hydrolyzed to homocysteine (Hcy) and adenosine through a reversible

reaction. SAH is a potent inhibitor of methylation reactions. Efficient removal of adenosine and Hcy is imperative to prevent accumulation of SAH. Hcy is normally removed or recycled by remethylation to methionine through a series of reactions that require 5-methyltetrahydrofolate, B12 and betaine to complete the normal methylation cycle. A low ratio of SAM to SAH is a sensitive indicator of under-methylation. Elevated plasma Hcy is an independent risk factor for cardiovascular disease (CVD). Recent research suggests that elevated SAH may be an even better predictor of risk for CVD.

Transsulfuration: Methionine > Homocysteine > Cysteine

The methionine transsulfuration pathway occurs primarily in the liver and diverts Hcy away from remethylation to methionine toward synthesis of the conditionally essential amino acid cysteine. Homocysteine in the presence of serine and B6 is enzymatically converted to cystathionine and ultimately cysteine. Cysteine is the rate-limiting amino acid in the biosynthesis of quintessential glutathione (GSH). GSH is pivotal in the regulation of intracellular redox homeostasis, oxidative stress, immune function, DNA synthesis and repair, apoptosis and detoxification of metals and chemicals.

The DDI Methylation profile evaluates the plasma levels of methionine, cysteine, SAM, SAH, Hcy and cystathionine, and provides the important "methylation index," a ratio of SAM to SAH. The test results can appropriately guide nutritional support to improve or normalize methionine metabolism and meliorate or prevent the potential adverse consequences associated with inadequate methylation and transsulfuration capacity.

RBC Glutathione

Glutathione (GSH) is the most abundant and important intracellular antioxidant. GSH in erythrocytes is an indicator of intracellular GSH status, the overall health of cells and of the ability to endure toxic challenges. Low levels of GSH have been reported in cardiovascular disease, cancer, AIDS, autism, alcoholism, and debilitating neurodegenerative diseases such as Alzheimer's and Parkinson's. It has also been associated with chronic retention of many potential toxic elements, chemicals and some drugs. Assessment and support of erythrocyte GSH can contribute to healthy aging and effective detoxification of toxic metals and chemicals.
Learn more »

Turnaround Time

5 to 7 days

Analytes Tested

Click any analyte name for additional clinical information, including reference ranges, specimen collection, stability and rejection criteria.

Analyte	CPT	ABN Required
RBC Glutathione	82978	Yes

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This test is useful for

- Oxidative Stress
- AIDS
- Alzheimer's Disease
- Autism
- Cancer
- Cardiovascular Disease
- General Health and Longevity
- Parkinson's Disease
- Retention of Toxic Elements/Chemicals

Detailed Information

Glutathione (GSH) is a tripeptide (λ-glutamyl-cysteinylglycine) synthesized in most cells. The level of GSH in erythrocytes is a sensitive indicator of intracellular GSH status, the overall health of cells and of the ability to endure toxic challenges. GSH is the most abundant non-protein thiol in mammalian cells. It is involved in many biological processes including detoxification of xenobiotics, removal of oxygen-reactive species, regulation of the redox state of cells and the oxidative state of important protein sulfhydryl groups, and regulation of immune function.

GSH levels are thousands of times higher in cells than in plasma. Plasma GSH represents primarily that synthesized and exported from the liver. Reduced GSH (rGSH) is the active form of the tripeptide and the ratio of rGSH: oxidized GSH (GSSH) is normally about 9:1. Once a blood sample is obtained, erythrocyte rGSH is very susceptible to oxidation and the rGSH:GSSH ratio drops rapidly. Specimen handling to prevent the ex vivo oxidation of rGSH is impractical, and direct measurement of rGSH in vivo is not feasible outside of a research setting. However, research clearly indicates that undesirable ratios of rGSH:GSSH are equally associated with abnormally low levels of total cellular GSH. Therefore, it is clinically meaningful to assess the level of total erythrocyte GSH as an indicator of GSH status and metabolism.

Low levels of GSH have been reported in cardiovascular disease, cancer, AIDS, autism, alcoholism and debilitating neurodegenerative diseases such as Alzhiemer's and Parkinson's. It has also been associated with chronic retention of potential toxic elements such as mercury, lead, arsenic, cadmium, manganese and iron, as well as chemicals and some drugs. Intracellular GSH biosynthesis and intracellular levels can be upregulated as a protective mechanism.

Some factors that result in increased biosynthesis and "high normal" erythrocyte GSH levels include, but are not limited to, moderate alcohol consumption, smoking, regular physical exercise and acute exposure to toxic metals. Under such conditions it is essential to provide the body with the key nutrients involved in GSH synthesis in order to sustain functionally appropriate levels of GSH. Magnesium and potassium are required for both energy-dependent enzymatic steps in GSH synthesis, and cysteine is the rate limiting amino acid. Nutritional products that have been documented to increase erythrocyte GSH/GSH biosynthesis include high-quality whey protein preparations, α-lipoic acid, curcumin, oral liposomal GSH, nebulized GSH, and to a lesser extent, N-acetyl-L-cysteine.

Assessing and supporting appropriately high levels of erythrocyte GSH is important for protecting cells and promoting overall health and longevity, and contributes significantly to safe and effective metal detoxification.

Urine Porphyrins

Abnormal levels of urinary porphyrins, oxidized metabolites of heme biosynthesis, are associated with genetic disorders, metabolic disturbances and diseases, anemias, oxidative stress, and high-level exposure to toxic chemicals or metals. Specific urine porphyrin profiles are associated with high-level exposure to mercury, arsenic, lead and some chemicals and drugs. Precoproporphyrins, associated with mercury, are reported separately and per unit of uroporphyrin to increase detection even when heme biosynthesis is low. This non-invasive test requires a single first morning void (FMV) or 24-hour urine collection.
Learn more »

Turnaround Time

3 to 5 days

Analytes Tested

Click any analyte name for additional clinical information, including reference ranges, specimen collection, stability and rejection criteria.

Analyte	CPT	ABN Required
Copro I-Copro III ratio	84120	No
Coproporphyrin I; urine	84120	No
Coproporphyrin III; urine	84120	No
Heptacarboxyporphyrin; urine	84120	No
Hexacarboxyporphyrin; urine	84120	No
Pentacarboxyporphyrin; urine	84120	No
Precoproporphyrin Peak I; urine	84120	No
Precoproporphyrin Peak II; urine	84120	No
Precoproporphyrin Peak III; urine	84120	No
Precoproporphyrin Uro Ratio	84120	No
Total Porphyrins; urine	84120	No

Total Precoproporphyrin Peak IIII; urine	84120	No
Uroporphyrins; urine	84120	No

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This test is useful for

- Anemia
- Autism
- Genetic Disorders
- Nutritional Deficiencies
- Oxidative Stress
- Toxic Chemical or Metal Exposure

Detailed Information

Urinary porphyrins are oxidized intermediate metabolites of heme biosynthesis and are readily excreted in excess when porphyrinogens accumulate as a result of inhibition of specific enzymes in the heme biosynthetic pathway. Heme is required for oxygen binding, transport and utilization, cytochromes, and electron transport in mitrochondira. The high rate of production of heme facilitates the use of urinary porphyrins as early and sensitive biomarkers of disorders in heme production, which has long been associated with genetic disorders, metabolic disturbances and diseases, nutritional status, oxidative stress and high-level exposure to toxic chemicals or metals.

Specific urinary porphyrin profiles have been associated with very high levels of toxic metals such as mercury (Hg), lead and arsenic. Mercury specifically inhibits two enzymes in porphyrinogen metabolism—uroporphyrinogen decarboxylase and coproporphyrinogen oxidase (CPOX). Inhibition of those two enzymes, particularly in the renal cortex, results in accumulation of pentacarboxyporphyrinogen and coproporphyrinogen III. Oxidation of the abnormally elevated porphyrinogens results in elevated urinary levels of total porphyrins, pentacarboxyporphyrin and coproporphyrin III. Recent research has identified an additional abnormal porphyrin in the urine of Hg-exposed dentists and also in rats fed very high levels of mercury for extended periods of time. A third Hg-associated porphyrin is most commonly referred to as "precoproporphyrin" as it elutes after pentacarboxyporphyrin and before coproporphyrin I. Precoproporphyrin has yet to be characterized with respect to molecular identity and appears to be elevated in Hg-exposed individuals who carry a variant of the CPOX gene (CPOX4 polymorphism).

Research at Doctor's Data, Inc. has identified three separate precoproporphyrin peaks. Since knowledge about the Hg-associated precoproporphyrin entities is limited, we report the levels of all three peaks separately, as well as the total, for research use. Since uroporphyrin levels are not known to be affected by Hg, we also report the total precoproporphyrins-to-uroporphyrin ratio to increase the sensitivity for detecting abnormalities in individuals with low heme biosynthesis, as may occur in children with nutritional deficiencies or autism.

In addition:

- Arsenic exposure has been associated with elevated levels of uroporphyrins and coproporphyrin I, and an elevated ratio of coproporphyrins (I: III).
- Lead exposure has been associated with elevated levels of coproporphyrin III.
- Exposure to hexachlorobenzene and dioxin has been associated with elevated levels of uroporphyrins.
- Exposure to polyvinylchloride (PVC) and polybrominated biphenyl has been associated with elevated levels of coproporphyrins.

Various drugs and other substances can suppress enzymes involved in porphyrin metabolism and affect the levels of urinary porphyrins. Such compounds include alcohol, sedatives, analgesics, antibiotics, estrogens and oral contraceptives. Anemia, pregnancy and liver disease can also affect porphyrin metabolism.

This non-invasive test requires a single first morning void (FMV) or 24-hour urine collection.

Cardiovascular

Doctor's Data measures oxidized LDL cholesterol—found to be higher in CVD patients and correlated with the severity of CVD—as well as up to 16 other primary and secondary risk factors. This adds up to an unparalleled breadth of actionable information at a tremendous value.

Cardiovascular Risk Profile

Cardiovascular disease (CVD) is associated with more deaths than all cancers—and more deaths in women than breast cancer. This Cardiovascular Risk Profile evaluates a thorough battery of traditional and advanced biomarkers to aid in early detection and modification of risk factors. Doctor's Data measures oxidized LDL, small dense LDL and Lp(a), which are higher in CVD patients and correlated with the severity of CVD. A total of 11 primary and secondary risk factors are evaluated to provide actionable information at a tremendous value.
Learn more »

Turnaround Time

5 to 7 days

Analytes Tested

Click any analyte name for additional clinical information, including reference ranges, specimen collection, stability and rejection criteria.

Analyte	CPT	ABN Required
Apolipoprotein, A1, serum	82172	Yes
Apolipoprotein, B, serum	82172	Yes
C-Reactive Protein; serum	86141	No

Cholesterol	80061	Yes
HDL, serum	*	Yes
Homocysteine, serum	83090	No
LDL, serum	83721	Yes
Lipoprotein (a), serum	83695	No
Oxidized LDL, serum	83516	No
Small LDL, serum	84999	Yes
Triglycerides	*	Yes

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This test is useful for

- Cardiovascular Disease
- Lipid/Lipoprotein Profile
- Heart Attack
- Peripheral Arterial Disease
- Stroke
- Cardioprotective Nutrient Status
- Inflammation

Detailed Information

Cardiovascular disease (CVD) is associated with more deaths than all cancers—and more deaths in women than breast cancer. The Cardiovascular Risk Profile from Doctor's Data reviews a thorough battery of biomarkers to aid in early detection and reduction of risk factors before the disease progresses.

Risk Factors and Analysis

Lipoprotein-Related Biomarkers

Total and LDL cholesterol, total triglycerides and HDL cholesterol have traditionally been measured to gauge CVD risk. However, recent research indicates that more focused biomarkers can provide even greater insight.

For example, oxidized LDL is plaque-specific and directly involved in accelerated atherogenesis and late-stage atherosclerotic plaque instability and rupture. Small dense LDL exhibits greater penetration into the arterial wall and has a longer half-life as well as lower resistance to oxidation compared to that of large buoyant LDL. Circulating levels of these two markers are:

1. Strong independent CVD risk factors
2. Higher in CVD patients
3. Correlated with the severity of CVD
4. Not correlated with LDL cholesterol levels

In addition, levels of apolipoproteins A-1 and B, specific protein constituents of HDL and LDL, are also strong indicators of risk.

Doctor's Data profiles evaluate each of these biomarkers as well as ratios of atherogenic to anti-atherogenic lipids, lipoproteins and apolipoproteins for further insight.

Inflammation

Arterial damage is associated with the infiltration of white cells into vessel walls and inflammation, which increases blood levels of two acute phase proteins, C-reactive protein and ferritin. For example, patients with moderately elevated CRP are more likely to develop stroke, myocardial infarction and severe peripheral arterial disease. Although not specific to CVD, analysis of high sensitivity to these two proteins is valuable in a comprehensive assessment of CVD risk.

Comprehensive Cardiovascular Risk Profile

Cardiovascular disease (CVD) is associated with more deaths than all cancers—and more deaths in women than breast cancer. This Comprehensive Cardiovascular Risk Profile evaluates a thorough battery of traditional and advanced biomarkers to aid in early detection and modification of risk factors. Doctor's Data measures oxidized LDL, small dense LDL and Lp(a), which are higher in CVD patients and correlated with the severity of CVD. A total of 17 primary and secondary risk factors are evaluated to provide actionable information at a tremendous value.
Learn more »

Turnaround Time

5 to 7 days

Analytes Tested

Click any analyte name for additional clinical information, including reference ranges, specimen collection, stability and rejection criteria.

Analyte	CPT	ABN Required
Apolipoprotein, A1, serum	82172	Yes
Apolipoprotein, B, serum	82172	Yes
C-Reactive Protein; serum	86141	No
Cholesterol	80061	Yes
CoQ10, plasma	82542	No
Cystatin C, serum	82610	No
Ferritin, serum	82728	Yes
Fibrinogen; antigen, plasma	85385	No
HBA1c Hemoglobin; WB	83036	Yes
HDL	*	Yes
Homocysteine, serum	83090	No
Iron, serum	83540	Yes
LDL, serum	83721	Yes
Lipoprotein (a), serum	83695	No
Magnesium, RBC	83735	Yes
Oxidized LDL, serum	83516	No

Small LDL, serum	84999	Yes
Tocopherol alpha (E), plasma	84446	No
Tocopherol gamma (E), plasma	84591	No
Triglycerides	*	Yes

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This test is useful for

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- Lipid/Lipoprotein Profile
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- Peripheral Arterial Disease
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- Inflammation

Detailed Information

Cardiovascular disease (CVD) is associated with more deaths than all cancers—and more deaths in women than breast cancer. The Comprehensive Cardiovascular Risk Profile from Doctor's Data reviews a thorough battery of biomarkers to aid in early detection and reduction of risk factors before the disease progresses.

Risk Factors and Analysis

Lipoprotein-Related Biomarkers

Total and LDL cholesterol, total triglycerides and HDL cholesterol have traditionally been measured to gauge CVD risk. However, recent research indicates that more focused biomarkers can provide even greater insight.

For example, oxidized LDL is plaque-specific and directly involved in accelerated atherogenesis and late-stage atherosclerotic plaque instability and rupture. Small dense LDL exhibits greater penetration into the arterial wall and has a longer half-life as well as lower resistance to oxidation compared to that of large buoyant LDL. Circulating levels

of these two markers are:

1. Strong independent CVD risk factors
2. Higher in CVD patients
3. Correlated with the severity of CVD
4. Not correlated with LDL cholesterol levels

In addition, levels of apolipoproteins A-1 and B, specific protein constituents of HDL and LDL, are also strong indicators of risk.

Doctor's Data profiles evaluate each of these biomarkers as well as ratios of atherogenic to anti-atherogenic lipids, lipoproteins and apolipoproteins for further insight.

Inflammation
Arterial damage is associated with the infiltration of white cells into vessel walls and inflammation, which increases blood levels of two acute phase proteins, C-reactive protein and ferritin. For example, patients with moderately elevated CRP are more likely to develop stroke, myocardial infarction and severe peripheral arterial disease. Although not specific to CVD, analysis of high sensitivity to these two proteins is valuable in a comprehensive assessment of CVD risk.

Oxidative Stress, Glomerular Filtration and Blood Glucose
Because oxidative stress is a component of CVD, the Comprehensive Cardiovascular Risk Profile measures plasma levels of three primary antioxidants—coenzyme Q10 and α- and γ- tocopherol. The test also looks for elevated serum homocysteine, which has long been established as a risk factor.

Finally, because diabetes and chronic renal disease are also associated with markedly increased risk of CVD, long-term blood glucose homeostasis and glomerular filtration assessments round out the battery of risk factors analyzed.

Oxidized LDL

Plasma levels of Ox-LDL are a sensitive biomarker of atherosclerosis. Elevated Ox-LDL is associated with accelerated atherogenesis, CAD, acute myocardial infarction, and stable and unstable angina. High Ox-LDL has also been associated with metabolic syndrome, impaired glucose tolerance and insulin resistance, and untreated overt hypothyroidism.
Learn more »

Turnaround Time

5 to 7 days

Analytes Tested

Click any analyte name for additional clinical information, including reference ranges, specimen collection, stability and rejection criteria.

Analyte	CPT	ABN Required

Oxidized LDL	83516	No

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This test is useful for

- Coronary Artery Disease
- Heart Attack
- Metabolic Syndrome
- Type 2 Diabetes
- Oxidative Stress

Detailed Information

Oxidized low density lipoproteins are directly involved in the initiation and progression of atherosclerotic lesions in coronary arteries that can result in atherosclerotic coronary artery disease (CAD). This test measures plasma levels of oxidized low density lipoproteins (Ox-LDL) using a highly sensitive and specific immunoassay.

Plasma levels of Ox-LDL are a sensitive biomarker of atherosclerosis. Elevated levels of Ox-LDL are associated with accelerated atherogenesis, CAD, acute myocardial infarction, and stable and unstable angina. It's important to note that total cholesterol levels are not necessarily higher than normal in patients with unstable CAD.

Elevated Ox-LDL has also been associated with metabolic syndrome, impaired glucose tolerance and insulin resistance, and untreated overt hypothyroidism.

Low density lipoproteins (LDL), the major carrier of circulating cholesterol, are very susceptible to oxidation of the constituent apolipoprotein B-100 moiety by prooxidants such as metal ions, reactive oxygen radicals, oxidized macrophages, lipoxygenase and peroxynitrite. When the LDL protein is oxidized it becomes antigenic and the Ox-LDL are taken up excessively by the unregulated "scavenger" or Ox-LDL receptors on monocyte-derived macrophages. Unoxidized native LDL are not involved in the unregulated uptake process and Ox-LDL is present in macrophages in atherosclerotic lesions but not in normal arteries. Once macrophages breach the damaged arterial endothelial barrier, the excessive uptake of lipids form Ox-LDL contributes to their entrapment in the sub-endothelial space. The trapped lipid-laden "foam" cells elicit biosynthesis and release of factors by endothelial cells that are pro-inflammatory and chemotactic for other monocytes, perpetuating the atherosclerotic process with injury to the arteries. Injury to the sub-endothelial vessel walls results in decreased production of nitric oxide and elasticity of the arteries and the damaged lipid-laden arteries eventually narrow, restricting the flow of blood.

Increased antioxidant protection and amelioration of oxidative stress would be expected to decrease levels of atherogenic Ox-LDL. These test results should be interpreted in context with the constellation and severity of symptoms and findings, as well as family history. Direct testing for CAD may be warranted if the level of Ox-LDL is undesirable.

Allergy and Immunology

Celiac disease is caused by an immune reaction to gluten, a protein complex found in wheat, barley and rye. This reaction produces inflammation that damages the small intestine lining and causes increased mucosal permeability. Non-Celiac Gluten Sensitivity can cause symptoms similar to celiac disease, but usually without the same level of intestinal damage. An IgE wheat allergy can trigger a reaction with a range of symptoms from mild to severe and can be potentially fatal. The Celiac and Gluten Sensitivity profile can help identify and differentiate between celiac disease, gluten sensitivity and wheat allergy.

Celiac & Gluten Sensitivity Serum

Celiac disease (CD) is often undiagnosed and is caused in genetically predisposed individuals by abnormal intestinal permeability and abnormal immune response to gluten, a protein complex found in wheat, barley, spelt and rye. The inflammatory autoimmune response damages the lining of the small bowel and is associated with diarrhea, bloating, fatigue, nutritional deficiencies, and systemic autoimmune conditions. Gluten sensitivity can cause similar symptoms but without the same level of tissue damage. The Celiac & Gluten Sensitivity profile from Doctor's Data helps differentiate between CD, gluten sensitivity and wheat allergy by evaluating the serum titers of IgA and IgG for tissue transglutaminase, deamidated gliadin peptide, and gliadin. Wheat allergy is assessed by titers of IgE for wheat.
Learn more »

Turnaround Time

3 to 5 days

Analytes Tested

Click any analyte name for additional clinical information, including reference ranges, specimen collection, stability and rejection criteria.

Analyte	CPT	ABN Required
Deamidated Gliadin Peptide (DGP) IgA	83516	No
Deamidated Gliadin Peptide (DGP) IgG	83516	No
Gliadin IgA	83516	No
Gliadin IgG	83516	No
Immunoglobulin A (IgA)	82784	No
Tissue Transglutaminase (tTG) IgA	83516	No
Tissue Transglutaminase (tTG) IgG	83516	No

Wheat IgE	86003	Yes

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This test is useful for

- Patients who have persistent skin conditions (rash) or ataxia, idiopathic neurological conditions, autoimmune arthritis/ thyroiditis, unexplained weight loss or persistent gastrointestinal symptoms that are not associated with enteropathogens
- Symptomatic individuals that have tested positive for the HLA DQ2/DQ8 genotypes
- Patients with symptoms or symptom exacerbation with dietary gluten or re-introduction of gluten after a trial elimination of gluten
- Individuals that have a first degree relative with a diagnosis of CD
- Any child with a history of 3 or more antibiotic-treated cases of gastroenteritis while less than 6 months of age
- Patients on a gluten-inclusive diet who have Type I diabetes, Multiple Sclerosis or schizophrenia
- Individuals on a gluten-inclusive diet who have other laboratory evidence that may be associated with CD:
- Elevated liver function tests
- Bone demineralization
- Evidence of impaired absorption of fat-soluble vitamins, iron, B12 or folic acid

Detailed Information

The Celiac & Gluten Sensitivity profile from Doctor's Data helps identify, and differentiate between Celiac disease (CD), non-Celiac gluten sensitivity (NCGS) and wheat allergy by evaluating the serum titers of IgA and IgG for tissue transglutaminase, deamidated gliadin peptide, gliadin, gluten and IgE for wheat.

Celiac disease (CD) is often undiagnosed and is caused in genetically predisposed individuals by abnormal intestinal permeability and abnormal immune response to gluten, a protein complex found in wheat, barley, spelt and rye. The inflammatory autoimmune response is associated with extreme damage to the lining of the small bowel and is associated with diarrhea, bloating, fatigue, nutritional deficiencies, and systemic autoimmune conditions. Although most commonly diagnosed in children, CD is often not expressed until later in life (delayed onset). It has been hypothesized that a gradual or abrupt change in the gastrointestinal microbiome may be responsible for delayed on set. Non-Celiac gluten sensitivity (NCGS) can cause similar symptoms but without the same level of intestinal epithelial tissue damage.

Antibody tests that indicate possible CD and NCGS will only be accurate if the patient is on a gluten-inclusive diet. The test is also useful for monitoring adherence to a gluten-free diet.

Celiac Disease
CD may result in a variety of gastrointestinal (GI) and “extra-intestinal” symptoms. Common symptoms associated with CD include:

- GI – Diarrhea, steatorrhea, weight loss, bloating, flatulence, abdominal pain
- Systemic
    - Fatigue
    - Iron deficiency anemia
    - Rashes and skin problems
    - Peripheral neuropathy or ataxia
    - Autoimmune arthritis or neurological conditions
    - Failure to thrive (infants
    - Bone disease or loss of bone density
    - Malnutrition
    - Hormone and fertility problems
    - Abnormal liver function tests

CD is also associated with other clinical disorders including thyroiditis, type I diabetes mellitus, Down syndrome, and IgA deficiency. Patients diagnosed with CD must remain on a gluten-free diet for life and avoid all gluten containing foods and grains (wheat, rye, spelt, barley). This test is clinically useful for monitoring patient adherence to a gluten-free diet. Gluten is present in almost all processed foods and many beverages. A list of foods that may contain gluten or wheat can be found on our Hidden Sources of Gluten and Wheat page.

Non-Celiac Gluten Sensitivity (NCGS)

Individuals with NCGS are often spared the intestinal damage common in Celiac patients, but suffer from abdominal pain, bloating, diarrhea, constipation, and many "extra-intestinal" symptoms such as "foggy mind", depression, ADHD-like behavior, headaches, bone or joint pain, and chronic fatigue when they have gluten in their diet. There are many antigenic triggers (epitopes) in the gluten protein complex that have cytotoxic, immunomodulatory, and gut permeating properties.

Immune cells activated in the sub-endothelial space in the gut circulate throughout the body. Up to 50% of NCGS patients may only test positive for IgG anti-gliadin antibodies when on a gluten-inclusive diet.

Wheat Allergy

Wheat allergy is caused by an individual's IgE antibody response to many classes of wheat proteins including; serine protease inhibitors, gliadins, glutelins, prolamins and gluten. Symptoms of a wheat allergy reaction can range from mild, such as hives, to severe, such as anaphylaxis. Wheat allergy symptoms are sometimes confused with those of CD/NCGS, but these conditions differ and testing for IgE antibodies to wheat can aid in making the proper diagnosis.

Zonulin; serum

In recent years, scientists have identified zonulin as a key biomarker for intestinal permeability, which has been associated with celiac disease, non-celiac gluten sensitivity (NCGS), and other GI and systemic conditions.

In a healthy GI tract, the tight junctions between cells prevent unregulated influx of luminal contents. However, certain situations, such as the presence of gluten for people with celiac disease or NCGS, can lead to high levels of zonulin in the GI tract. This can induce the breakdown of the tight junctions, leading to intestinal permeability and allowing zonulin to enter the bloodstream.

As a result, circulating zonulin is a clinically useful marker of intestinal permeability. What's more, zonulin is the only regulator of intestinal permeability known to be reversible, which makes it valuable in monitoring therapeutic

interventions as well.

Several autoimmune, inflammatory and neoplastic diseases have been associated with elevated levels of zonulin or evidence of increased intestinal permeability, which can be identified by our Serum Zonulin test.

Learn more »

Turnaround Time

1 to 3 days

Analytes Tested

Click any analyte name for additional clinical information, including reference ranges, specimen collection, stability and rejection criteria.

Analyte	CPT	ABN Required
Zonulin; serum	83520	Yes

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This test is useful for

- Celiac disease
- Non-celiac gluten sensitivity
- Type I diabetes
- Juvenile nonalcoholic fatty liver disease
- Multiple sclerosis
- Rhuematoid arthritis
- Asthma
- Inflammatory bowel disease
- Adult glucose intolerance

Detailed Information

Circulating zonulin is a clinically useful marker of intestinal permeability. Zonulin is a protein, synthesized in intestinal and liver cells, that reversibly regulates intestinal permeability.

High levels of zonulin have been associated with increased intestinal permeability, as zonulin induces the breakdown of the tight junctions between intestinal epithelial cells. Several autoimmune, inflammatory, and neoplastic diseases have been associated with elevated levels of zonulin or evidence of increased intestinal permeability. These include celiac disease, type 1 diabetes, and juvenile nonalcoholic fatty liver disease. In addition, evidence is accumulating to

support an association with multiple sclerosis, rheumatoid arthritis, asthma, and inflammatory bowel disease.

Zonulin levels may be higher in obese adults and in adults with glucose intolerance. Elevated serum levels of zonulin and increased permeability are commonly observed in patients at risk of developing Crohn's disease or type 1 diabetes prior to the onset of symptoms. Zonulin levels may increase with corticosteroid use.

Cellular receptors for zonulin are present in the small and upper large intestines, the heart, and the brain. Zonulin release from the epithelium may be triggered by gliadin fragments or by the adherence of bacteria to the epithelial cell surface. Simple sugars, sodium, emulsifiers, the food additive microbial transglutaminase, and nanoparticles are known to disrupt intestinal barrier function.

Restoration of the gastrointestinal mucosal barrier may include dietary changes, treatment of dysbiosis, digestive supports, and anti-inflammatory therapies. These may include supplements such as quercetin, vitamin C, curcumin, gamma-linoleic acid, omega-3 fatty acids (EPA, DHA), and aloe vera. Other nutrients such as zinc, beta-carotene, pantothenic acid, and L-glutamine may provide some support for rejuvenation of the GI mucosa. Consider a Comprehensive Stool Analysis to further investigate potential causes of increased intestinal permeability.

Zonulin expression in the small intestine occurs when a chemokine receptor is stimulated by gliadin or chemokines and induces proinflammatory signaling pathways in gastrointestinal epithelial cells. The released zonulin activates the cell-signaling pathway via protease-activated receptor 2 and epidermal growth factor, which causes disassembly of the tight junctions between the GI epithelial cells. The loss of the tight junctions increases intestinal permeability and allows polypeptides and other macromolecules to pass between epithelial cells into the lamina propria layer of the gut wall. The macromolecules and polypeptides induce an antigen response and promote proinflammatory cytokine production in the enteric immune system.

Zonulin is a prehaptoglobulin—levels are modulated by the presence or absence of haptoglobin (HP) gene. When zonulin is cleaved by intestinal tryptase IV, it is converted into haptogloblulin, a protein with heme (iron)-binding and antimicrobial properties. HP-1-1 genotypes have zero (null) copies of the HP gene. HP-2-2 genotypes have two copies of the gene, and HP-1-2 genotypes have one copy of the gene. HP 1-1 (null) genotypes may have zonulin levels in the normal range, even if the presence of inflammatory or autoimmune disease is confirmed by other biomarkers. Zonulin levels may increase in nephrotic syndrome (Hp2-1 or 2-2 phenotypes).

Blood Spot

Blood spot testing is very easy to collect, utilizes a simple finger prick collection system that can be conveniently performed at home by the patient, and does not require a venous blood draw or phlebotomist. Blood spot stability and integrity is maintained through desiccation, and samples can be mailed from anywhere in the world in a prepaid return envelope that does not require an express courier. The experienced staff at Doctor's Data has validated many different tests using this collection method, and correlation data between blood spot and serum/blood samples is available for each assay.

Celiac & Gluten Sensitivity Blood Spot

Celiac disease (CD) is often undiagnosed and is caused in genetically predisposed individuals by abnormal intestinal permeability and abnormal immune response to gluten, a protein complex found in wheat, barley, spelt and rye. The inflammatory autoimmune response damages the lining of the small bowel and is associated with diarrhea, bloating, fatigue, nutritional deficiencies, and systemic autoimmune conditions. Gluten sensitivity can cause similar symptoms but without the same level of tissue damage. The Celiac & Gluten Sensitivity profile from Doctor's Data helps differentiate between CD and gluten sensitivity by evaluating the serum titers of IgA and IgG for deamidated gliadin peptide, gliadin, and gluten.

Learn more »

Turnaround Time

3 to 5 days

Analytes Tested

Click any analyte name for additional clinical information, including reference ranges, specimen collection, stability and rejection criteria.

Analyte	CPT	ABN Required
Deamidated Gliadin Peptide (DGP) IgA	83516	No
Deamidated Gliadin Peptide (DGP) IgG	83516	No
Gliadin IgA	83516	No
Gliadin IgG	83516	No
Gluten IgG	86001	Yes

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This test is useful for

- Patients who have persistent skin conditions (rash) or ataxia, idiopathic neurological conditions, autoimmune arthritis/ thyroiditis, unexplained weight loss or persistent gastrointestinal symptoms that are not associated with enteropathogens
- Symptomatic individuals that have tested positive for the HLA DQ2/DQ8 genotypes
- Patients with symptoms or symptom exacerbation with dietary gluten or re-introduction of gluten after a trial elimination of gluten
- Individuals that have a first degree relative with a diagnosis of CD
- Any child with a history of 3 or more antibiotic-treated cases of gastroenteritis while less than 6 months of age
- Patients on a gluten-inclusive diet who have Type I diabetes, Multiple Sclerosis or schizophrenia
- Individuals on a gluten-inclusive diet who have other laboratory evidence that may be associated with CD:
- Elevated liver function tests
- Bone demineralization
- Evidence of impaired absorption of fat-soluble vitamins, iron, B12 or folic acid

Detailed Information

The Celiac & Gluten Sensitivity profile from Doctor's Data helps identify, and differentiate between Celiac disease (CD), non-Celiac gluten sensitivity (NCGS) and wheat allergy by evaluating the serum titers of IgA and IgG for tissue transglutaminase, deamidated gliadin peptide, gliadin, gluten and IgE for wheat.

Celiac disease (CD) is often undiagnosed and is caused in genetically predisposed individuals by abnormal intestinal permeability and abnormal immune response to gluten, a protein complex found in wheat, barley, spelt and rye. The inflammatory autoimmune response is associated with extreme damage to the lining of the small bowel and is associated with diarrhea, bloating, fatigue, nutritional deficiencies, and systemic autoimmune conditions. Although most commonly diagnosed in children, CD is often not expressed until later in life (delayed onset). It has been hypothesized that a gradual or abrupt change in the gastrointestinal microbiome may be responsible for delayed on set. Non-Celiac gluten sensitivity (NCGS) can cause similar symptoms but without the same level of intestinal epithelial tissue damage.

Antibody tests that indicate possible CD and NCGS will only be accurate if the patient is on a gluten-inclusive diet. The test is also useful for monitoring adherence to a gluten-free diet.

Celiac Disease
CD may result in a variety of gastrointestinal (GI) and “extra-intestinal” symptoms. Common symptoms associated with CD include:

- GI – Diarrhea, steatorrhea, weight loss, bloating, flatulence, abdominal pain
- Systemic
    - Fatigue
    - Iron deficiency anemia
    - Rashes and skin problems
    - Peripheral neuropathy or ataxia
    - Autoimmune arthritis or neurological conditions
    - Failure to thrive (infants
    - Bone disease or loss of bone density
    - Malnutrition
    - Hormone and fertility problems
    - Abnormal liver function tests

CD is also associated with other clinical disorders including thyroiditis, type I diabetes mellitus, Down syndrome, and IgA deficiency. Patients diagnosed with CD must remain on a gluten-free diet for life and avoid all gluten containing foods and grains (wheat, rye, spelt, barley). This test is clinically useful for monitoring patient adherence to a gluten-free diet. Gluten is present in almost all processed foods and many beverages. A list of foods that may contain gluten or wheat can be found on our Hidden Sources of Gluten and Wheat page.

Non-Celiac Gluten Sensitivity (NCGS)
Individuals with NCGS are often spared the intestinal damage common in Celiac patients, but suffer from abdominal pain, bloating, diarrhea, constipation, and many “extra-intestinal” symptoms such as “foggy mind”, depression, ADHD-like behavior, headaches, bone or joint pain, and chronic fatigue when they have gluten in their diet. There are many antigenic triggers (epitopes) in the gluten protein complex that have cytotoxic, immunomodulatory, and gut permeating properties.

Immune cells activated in the sub-endothelial space in the gut circulate throughout the body. Up to 50% of NCGS

patients may only test positive for IgG anti-gliadin antibodies when on a gluten-inclusive diet.

Wheat Allergy

Wheat allergy is caused by an individual's IgE antibody response to many classes of wheat proteins including; serine protease inhibitors, gliadins, glutelins, prolamins and gluten. Symptoms of a wheat allergy reaction can range from mild, such as hives, to severe, such as anaphylaxis. Wheat allergy symptoms are sometimes confused with those of CD/NCGS, but these conditions differ and testing for IgE antibodies to wheat can aid in making the proper diagnosis.

DNA Methylation Blood Spot

Identification of SNPs that influence health and disease risk may improve clinical success and allow patients to optimize health and wellness.

The DNA Methylation Pathway Profile allows clinicians to screen their patients for a variety of genetic changes (single nucleotide polymorphisms, or SNPs) that may impact the function of important biochemical processes such as methionine metabolism, detoxification, hormone balance and Vitamin D function. The presence or absence of SNPs may modify disease risk. The risks may be reduced by lifestyle changes, and inefficient biochemical processes can be supported by diet and nutritional supplements to maximize the functions of metabolic pathways.

Learn more »

Turnaround Time

14 to 21 days

Analytes Tested

Click any analyte name for additional clinical information, including reference ranges, specimen collection, stability and rejection criteria.

Analyte	CPT	ABN Required
ACAT - 1-02; blood spot		Yes
AHCY - 19; blood spot		Yes
AHCY - 1; blood spot		Yes
AHCY - 2; blood spot		Yes
BHMT - 1; blood spot		Yes
BHMT - 2; blood spot		Yes
BHMT - 4; blood spot		Yes

BHMT - 8; blood spot		Yes
CBS - A360A; blood spot		Yes
CBS - C699T; blood spot		Yes
CBS - N212N; blood spot		Yes
COMT - 61; blood spot		Yes
COMT - H62H; blood spot		Yes
COMT - V158M; blood spot		Yes
MAO A - R297R; blood spot		Yes
MTHFR - 3; blood spot		Yes
MTHFR - A1298C; blood spot		Yes
MTHFR - C677T; blood spot		Yes
MTR - A2756G; blood spot		Yes
MTRR - 11; blood spot		Yes
MTRR - A66G; blood spot		Yes
MTRR - H595Y; blood spot		Yes
MTRR - K350A; blood spot		Yes
MTRR - R415T; blood spot		Yes

MTRR - S257T; blood spot		Yes
NOS - D298E; blood spot		Yes
SHMT - C1420T; blood spot		Yes
SUOX - S370S; blood spot		Yes
VDR - Fok1; blood spot		Yes
VDR - Taq1; blood spot		Yes

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Detailed Information

Identifying single nucleotide polymorphisms (SNPs) that may influence health and risk for dieases facilitates clinical support for patients. The Doctor's Data DNA Methylation Pathway Profile includes a variety of SNPs known to influence many aspects of health including:

insulin sensitivity
bone health
cancer risks
cardiovascular health
detoxification processes
fertility
mitochondrial function and metabolism
methylation
neurotransmitter balance

SNPs are DNA sequence variations that occur relatively frequently in the general population. They are different from disease mutations, which are very rare. Huntington's disease is an example of a disease mutation - if you inherit the altered gene, the disease will develop. Certain SNPs may be associated with particular health conditions, but they are not known to directly ***cause*** disease. The majority of SNPs affect protein, enzyme or cell receptor structure and

function.

The identification of SNPs and their impact on health and physiology is an ongoing area of research – the hope is that finding and studying these small variations in DNA will lead to better and more individualized medical interventions. In many cases the environment – diet, nutrition, toxicant exposures, stress - may further modify the expression of genes and SNPs.

The SNPs affecting detoxification and methylation become even more important if a patient has been exposed to the toxicants such as mercury, lead or bisphenol A (BPA). Lead and BPA inhibit the function of methyltransferases, and mercury inhibits methionine synthase, an important enzyme in the re-methylation of homocysteine. Methylation is an essential step in the detoxification and elimination of arsenic and other xenobiotics. Normal methionine metabolism is a critical component of Phase II detoxification processes; the B-12 and folate-dependent transmethylation and B-6 dependent transsulfuration pathways convert homocysteine to cysteine. Cysteine is an important precursor in glutathione biosynthesis.

The greatest difficulty in interpreting SNP results is determining the extent to which a DNA genotype is *phenotypically* expressed. Functional tests, combined with evaluation of the patient's symptoms and responses to intervention, are necessary to assess the influence of known SNPs on the phenotype. DDI's Plasma Methylation Profile is one such test; it provides a direct assessment of several major metabolites that indicate genetic and epigenetic affects. The Plasma Methylation Profile is a functional follow-up test when SNPs affecting methionine metabolism are identified.

DDI's DNA Methylation Pathway Profile allows clinicians to screen their patients for a variety of SNPs that may impact the function of important biochemical processes. Identifying SNPs that influence health and disease risk allows clinicians to support their patients with appropriate lifestyle changes and nutrition to maximize health and wellness.

Metabolomic Profile; Blood Spot

The Metabolomic Profile provides assessment of the likelihood of Metabolic syndrome in at-risk patients. The Metabolomic Profile evaluates five biomarkers that may reflect a patient's risk of developing Metabolic syndrome, which is identified by a cluster of cardiometabolic risk factors, with insulin resistance and adiposity as its central features. Identification of individuals with metabolic syndrome is important due to its association with an increased risk of and type 2 diabetes mellitus and coronary heart disease.
Learn more »

Turnaround Time

3 to 5 days

Analytes Tested

Click any analyte name for additional clinical information, including reference ranges, specimen collection, stability and rejection criteria.

Analyte	CPT	ABN Required
Body Mass Index (BMI)		No

C-Reactive Protein	86141	No
Hemoglobin A1c	83036	Yes
Insulin	83525	No
Leptin	83520	Yes

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Detailed Information

Doctor's Data offers the Metabolomic Profile due to increasing awareness of the need to detect Metabolic syndrome before it progresses to adult-onset diabetes and related health consequences. The profile is designed to assess the likelihood of Metabolic syndrome in at-risk patients. Metabolic syndrome may occur at all stages in life. The number of people with Metabolic syndrome has increased over the last two decades. In 2006 it was estimated that 13% of US adolescents, 24% of young – midlife adults, and 40% of senior adults (> 70 y.o.) have Metabolic syndrome.

Although the number of people with Metabolic syndrome is increasing, human genetics have not. Epigenetic, controllable factors clearly play a role in the development of Metabolic syndrome. Contributing factors may include obesity, insulin resistance, polycystic ovary disease, hormone imbalance or a sedentary, unhealthy (smoking, etc.) lifestyle. "Over nutrition" and poor dietary choices (highly processed, high fat, high salt, high sugar "empty-calorie" foods), combined with sedentary habits interact with our genetic programming: we store extra calories as fat. Fat cells (adipocytes) produce hormones (adipokines) that interact with the hypothalamus and or immune system and may have pro-inflammatory or anti-inflammatory effects. Altered adipokine levels have been observed in Metabolic syndrome. The biomarkers that constitute the Metabolomic Profile include:

Hemoglobin A1c (HbA1c) – estimates the average blood glucose concentration for the life of the red blood cell (120 days)
Insulin – levels of insulin elevate early in type II diabetes, and then decrease as pancreatic beta cells lose function
High sensitivity C-reactive protein (hs-CRP) – estimates the risk of cardiovascular disease
Leptin – leptin is a hormone produced by adipocytes to provide a satiety signal to the hypothalamus. Elevated circulating levels of leptin are associated with adipose tissue abundance, and a leptin resistance may ensue. High levels of this adipokine may have pro-inflammatory effects, and leptin accelerates arterial foam cell formation.

Patients that may especially benefit from the Metabolomic Profile include those with:

- Increased waist size or body mass index (BMI) >30
- High triglycerides or need for cholesterol medication
- Low HDL cholesterol or need for cholesterol medication
- Hypertension or need for hypertension medication
- Fasting Glucose > 100 mg/dL
- Family or personal history of cardiovascular disease, high cholesterol or type II diabetes
- Personal history of chronic inflammatory disease

Except for obesity, the risk factors for Metabolic syndrome, and the chronic diseases that may develop from it, may present no symptoms until well advanced. The greatest window of opportunity to prevent the development of atherosclerosis, type II diabetes or heart failure may occur during the early, symptom-free stages of Metabolic syndrome. Early detection and intervention through diet and lifestyle changes may prevent the development of symptoms or disease complications. The Metabolic Profile facilitates clinicians in the early detection of Metabolic syndrome.

Vitamin D Blood Spot

25-Hydroxyvitamin D, known for its role in bone health and calcium absorption, also appears to affect immune function, neurodegenerative and cardiovascular issues, 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 QQQ method to measure Vitamin D2, D3 and total Vitamin D.
Learn more »

Turnaround Time

3 to 5 days

Analytes Tested

Click any analyte name for additional clinical information, including reference ranges, specimen collection, stability and rejection criteria.

Analyte	CPT	ABN Required
25-Hydroxyvitamin D Total, blood spot	82306	Yes
25-Hydroxyvitamin D2, blood spot	*	Yes
25-Hydroxyvitamin D3, blood spot	*	Yes

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This test is useful for

- Alzheimer's Disease
- Bone Health
- Calcium Absorption
- Cardiovascular Disease
- Depression
- Immune Function
- Infections
- Multiple Sclerosis
- Neurocognitive Dysfunction
- Preeclampsia
- Rheumatoid Arthritis
- Type 2 Diabetes

Detailed Information

25-Hydroxyvitamin D is the major circulating form of vitamin D. It occurs in two forms: vitamin D2 (ergocalciferol) and vitamin D3 (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 (D2 plus D3) provides the best assessment of patient vitamin D status and includes vitamin D derived from diet, supplements and exposure to UVB light, such as 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, 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 two forms of vitamin D, and only total concentrations are reported. This LC/MS QQQ method is sensitive and specific for both vitamin D2 and D3, and each form is measured and reported independently.

Find out more

- View Sample Report
- Collection Instructions
- Detailed Information

Endocrinology

Analysis of blood or urine hormones, neuro-biogenic amines and peptides that may affect health, metabolism, mood or behavior.

Metabolomic Profile

The Metabolomic Profile provides assessment of the likelihood of Metabolic syndrome in at-risk patients. The Metabolomic Profile evaluates five biomarkers that may reflect a patient's risk of developing Metabolic syndrome, which is identified by a cluster of cardiometabolic risk factors, with insulin resistance and adiposity as its central features. Identification of individuals with metabolic syndrome is important due to its association with an increased risk of and type 2 diabetes mellitus and coronary heart disease.
Learn more »

Turnaround Time

5 to 7 days

Analytes Tested

Click any analyte name for additional clinical information, including reference ranges, specimen collection, stability and rejection criteria.

Analyte	CPT	ABN Required
Adiponectin; serum	83520	Yes
Body Mass Index (BMI)		No
C-Reactive Protein; serum	86141	No

HBA1c Hemoglobin; whole blood	83036	Yes
Insulin; serum	83525	No
Leptin : Adiponectin ratio		No
Leptin; serum	83520	Yes

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Detailed Information

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Although the number of people with Metabolic syndrome is increasing, human genetics have not. Epigenetic, controllable factors clearly play a role in the development of Metabolic syndrome. Contributing factors may include obesity, insulin resistance, polycystic ovary disease, hormone imbalance or a sedentary, unhealthy (smoking, etc.) lifestyle. "Over nutrition" and poor dietary choices (highly processed, high fat, high salt, high sugar "empty-calorie" foods), combined with sedentary habits interact with our genetic programming: we store extra calories as fat. Fat cells (adipocytes) produce hormones (adipokines) that interact with the hypothalamus and or immune system and may have pro-inflammatory or anti-inflammatory effects. Altered adipokine levels have been observed in Metabolic syndrome. The biomarkers that constitute the Metabolomic Profile include:

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Insulin – levels of insulin elevate early in type II diabetes, and then decrease as pancreatic beta cells lose function
High sensitivity C-reactive protein (hs-CRP) – estimates the risk of cardiovascular disease
Leptin – leptin is a hormone produced by adipocytes to provide a satiety signal to the hypothalamus. Elevated circulating levels of leptin are associated with adipose tissue abundance, and a leptin resistance may ensue. High levels of this adipokine may have pro-inflammatory effects, and leptin accelerates arterial foam cell formation.
Adiponectin – improves insulin sensitivity and stimulates glucose uptake in adipocytes, and adiponectin has been shown to reduce lipid accumulation in foam cells in vitro. Very low levels of this anti-inflammatory adipokine may increase the risk for certain cancers
Leptin to Adiponectin ratio- the ratio of leptin to adiponectin appears to be a sensitive indicator for a variety of health conditions.

Patients that may especially benefit from the Metabolomic Profile include those with:

- Increased waist size or body mass index (BMI) >30
- High triglycerides or need for cholesterol medication
- Low HDL cholesterol or need for cholesterol medication
- Hypertension or need for hypertension medication
- Fasting Glucose > 100 mg/dL
- Family or personal history of cardiovascular disease, high cholesterol or type II diabetes
- Personal history of chronic inflammatory disease

Except for obesity, the risk factors for Metabolic syndrome, and the chronic diseases that may develop from it, may present no symptoms until well advanced. The greatest window of opportunity to prevent the development of atherosclerosis, type II diabetes or heart failure may occur during the early, symptom-free stages of Metabolic syndrome. Early detection and intervention through diet and lifestyle changes may prevent the development of symptoms or disease complications. The Metabolic Profile facilitates clinicians in the early detection of Metabolic syndrome.

Neuro-Biogenic Amines, Comprehensive; Urine

Urinary neuro-biogenic amines provide an overall assessment of a patient's ability to synthesize and metabolize neurotransmitters, both in the periphery and, for some enzymes, behind the blood brain barrier as well. Alterations in urinary neurotransmitter status may be associated with a variety of conditions including metabolic disorders, mood/behavioral disorders, and in rare occasions the presence of certain tumors. Associations between urinary neurotransmitter levels and health conditions have been documented in scientific literature and may provide valuable insights as part of a comprehensive health assessment.

Learn more »

Turnaround Time

5 to 7 days

Analytes Tested

Click any analyte name for additional clinical information, including reference ranges, specimen collection, stability and rejection criteria.

Analyte	CPT	ABN Required
3,4-Dihydroxyphenylacetic acid (DOPAC); urine	82542	No
3-Methoxytyramine (3-MT); urine	82542	No
5-Hydroxyindolacetic acid (5-HIAA); urine	83497	No

Catecholamine Fractionation, free:	82384	No
Creatinine; urine	82570	No
Dopamine, free; urine	82384	No
Epinephrine, free; urine	82384	No
Gamma-aminobutyrate; urine	82139	No
Glutamate; urine	82139	No
Glycine; urine	82139	No
Histamine; urine	83088	No
Metanephrine Fractionation:	83835	No
Metanephrine; urine	83835	No
Norepinephrine, free; urine	82384	No
Normetanephrine; urine	82385	No
Phenethylamine (PEA); urine	82139	No
Serotonin; urine	84260	No
Taurine; urine	82139	No
Tryptamine; urine	82139	No
Tyramine; urine	82139	No

Tyrosine; urine	82139	No

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This test is useful for

- Functional testing for COMT and MAOA
- Identifying neurological imbalances
- Measuring response to therapy
- Risk assessment

Detailed Information

Analysis of urinary neuro-biogenic amines (neurotransmitters),and their metabolites, provides a non-invasive assessment of neurotransmitter metabolism. Neurotransmitter testing may provide therapeutic opportunities that improve clinical success and patient health outcomes.

A review of the current scientific literature demonstrates how urinary neuro-biogenic amine testing may be used in clinical practice:

• Functional testing - Neuro-biogenic amine metabolism may be mediated by a variety of enzymes, including catechol-*O*-methyltransferase (COMT) and monoamine oxidase (MAO). Patterns of neurotransmitters and their metabolites may provide functional information about these two important enzymes.

• Identify imbalances - research indicates that urinary neuro-biogenic amine measurements may correlate with neurological conditions such as depression and PTSD.

• Response to therapy - certain neuro-biogenic amines, such as serotonin, may be altered by the addition of neurotransmitter precursors such as 5-hydroxytryptophan (5-HTP). These changes may be apparent in the urine.

- Risk assessment - Changes in urinary serotonin, dopamine, and glutamate levels have been suggested as biomarkers for neurobehavioral toxicology (symptoms from chemical or toxicant element environmental exposures)

Neurotransmitters, or "biogenic amines" are secreted from pre-synaptic neurons into the synapse between nerve cells to stimulate receptors on post-synaptic neurons. The neurotransmitters are all produced from essential aromatic amino acids. Neurotransmitter metabolism may be mediated by a variety of enzymes expressed differently throughout the body. Circulating levels of neurotransmitters and metabolites may have distinctive sources. Urinary levels of neuro-biogenic amines primarily reflect the activity of the peripheral and GIT enteric nervous systems. Up to 20% of urinary neurotransmitters are estimated to originate in the CNS.

A lack of nutritional cofactors (vitamins, minerals) required for normal enzyme function may decrease enzyme function and neurotransmitter levels. Neurotransmitter receptors and metabolic enzymes may be subject to mutations and single nucleotide polymorphisms (SNPs) that may affect receptor or enzyme function. Normal neurotransmitter receptor function is also necessary for normal neurotransmitter activity. Neurotransmitter levels may be influenced by diet, lifestyle and other health conditions such as: high sodium intake, age, gender, body mass index, kidney function, environmental exposures, infection and tobacco use.

Urinary neuro-biogenic amines provide an overall assessment of a patient's ability to synthesize and metabolize neurotransmitters, which must occur in both the peripheral nervous system and behind the blood brain barrier (BBB). Alterations in urinary neurotransmitter status may result from a variety of conditions including metabolic disorders, mood/behavioral disorders, environmental exposures or (rarely) the presence of certain tumors. Evaluation of neurotransmitters may provide increased clarity about a patient's health and functional status.

Urinary neuro-biogenic amines are a non-invasive way to assess the synthesis and metabolism of neurotransmitter molecules essential for normal function. Information gained through neurotransmitter testing may provide therapeutic opportunities that improve clinical success and patient health outcomes. Associations between urinary neurotransmitter levels and health conditions have been documented in scientific literature and may provide valuable insight as part of a comprehensive health assessment.

Neuro-Biogenic Amines; Urine

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Learn more »

Turnaround Time

5 to 7 days

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Catecholamine Fractionation, free:	82384	No
Creatinine; urine	82570	No
Dopamine, free; urine	82384	No
Epinephrine, free; urine	82384	No
Gamma-aminobutyrate; urine	82136	No
Glutamate; urine	82136	No
Glycine; urine	82136	No
Histamine; urine	83088	No
Norepinephrine, free; urine	82384	No
Phenethylamine (PEA); urine	82136	No
Serotonin; urine	84260	No

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Detailed Information

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A lack of nutritional cofactors (vitamins, minerals) required for normal enzyme function may decrease enzyme

function and neurotransmitter levels. Neurotransmitter receptors and metabolic enzymes may be subject to mutations and single nucleotide polymorphisms (SNPs) that may affect receptor or enzyme function. Normal neurotransmitter receptor function is also necessary for normal neurotransmitter activity. Neurotransmitter levels may be influenced by diet, lifestyle and other health conditions such as: high sodium intake, age, gender, body mass index, kidney function, environmental exposures, infection and tobacco use.

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Urinary neuro-biogenic amines are a non-invasive way to assess the synthesis and metabolism of neurotransmitter molecules essential for normal function. Information gained through neurotransmitter testing may provide therapeutic opportunities that improve clinical success and patient health outcomes. Associations between urinary neurotransmitter levels and health conditions have been documented in scientific literature and may provide valuable insight as part of a comprehensive health assessment.

Thyroid Profile; serum

The analysis of thyroid hormones and antibodies together may improve the accuracy diagnosis and clinical success. The American Thyroid Association estimates that approximately 20 million Americans have thyroid disease, and approximately 60% of those with thyroid disease are unaware of their condition. Many patients with thyroid disorders may remain undiagnosed in many patients with asymptomatic or non-specific clinical presentations. The recognition of auto-immunity as a leading cause of thyroid dysfunction has led to the evaluation of auto-antibodies in thyroid testing.

Measuring only thyroid stimulating hormone (TSH) may be misleading in a variety of circumstances, including the recent treatment of thyrotoxicosis, pituitary disease, non-thyroid illness, thyroid hormone resistance or rare, TSH-secreting tumors. Under these circumstances, and in many other cases, the evaluation of thyroid hormones and thyroid antibodies may clarify the diagnosis of thyroid conditions and improve clinical success.
Learn more »

Turnaround Time

2 to 3 days

Analytes Tested

Click any analyte name for additional clinical information, including reference ranges, specimen collection, stability and rejection criteria.

Analyte	CPT	ABN Required
Free T3; serum	84481	Yes
Free T4; serum	84439	Yes

Thyroglobulin Antibody (Anti-TG)	86800	No
Thyroid Peroxidase Antibodies (Anti-TPO)	86376	No
Thyroid Stimulating Hormone (TSH)	84443	Yes

List price applies when filing with insurance or Medicare, or when billing a patient directly.

Prompt payment pricing applies when billing to a physician account or prepayment is received with the test.

Doctor's Data offers profiles containing multiple analytes. *Multiple analytes may be billed under a single CPT code. Many analytes can be ordered individually. Pricing may vary. Click on a specific analyte for more information or read our detailed billing and payment policies.

The CPT codes listed on our website are for informational purposes only. This information is our interpretation of CPT coding requirements and may not necessarily be correct. You are advised to consult the CPT Coding Manual published by the American Medical Association. Doctor's Data, Inc. takes no responsibility for billing errors due to your use of any CPT information from our website.

Sign in at the top of any page to view pricing and order tests. Or click here to create an account. You may also contact us for assistance placing an order.

This test is useful for

- Hypothyroid conditions
- Hyperthyroid conditions
- Autoimmune conditions
- Arrhythmia
- Infertility
- Cholesterol disorders
- Fatigue
- Pituitary disorders

Detailed Information

The analysis of thyroid hormones and antibodies together may improve the accuracy of diagnosis and clinical success. The American Thyroid Association estimates that approximately 20 million Americans have thyroid disease, and approximately 60% of those with thyroid disease areunaware of their condition. Many patients with thyroid disorders may remain undiagnosed in many patients with asymptomatic or non-specific clinical presentations.

Patients with conditions such as osteoporosis, dyslipidemia, atrial fibrillation, or infertility may be evaluated for thyroid disorders. Current recommendations for diabetic women planning pregnancies include a full thyroid panel with antibodies preconception, with monitoring during pregnancy and three months post-partum.

Measuring only thyroid stimulating hormone (TSH) may be misleading in a variety of circumstances, including the recent treatment of thyrotoxicosis, pituitary disease, non-thyroid illness, thyroid hormone resistance and rare TSH-secreting tumors. Joshi (2011) recommends monitoring free T3 and T4 in patients with low serum TSH levels, to establish patterns of increasing or decreasing values over time. The main purpose of free-T4 and free-T3 assays is to discern thyrotoxicosis from hypothyroidism and the euthyroid state. Less than one percent of thyroid hormone is free unbound hormone; this one percent is the biologically active fraction. Total T4 and T3 values cannot reliably distinguish between these conditions due to hereditary and acquired variations in the concentrations of thyroid hormone binding proteins. Measuring T3 levels during treatment with antithyroid medication may have predictive value in the management of autoimmune thyroiditis, such as Grave's disease.

The recognition of auto-immunity as a leading cause of thyroid dysfunction has led to the evaluation of auto-antibodies in thyroid testing. Thyroid antibody tests are used to distinguish autoimmune thyroid disorders from other thyroid dysfunction. Thyroid antibody tests, such as thyroid peroxidise antibodies (TPOAb) and thyroglobulin antibodies (TgAb), are most important in patients with other, pre-existing autoimmune conditions, for example, systemic lupus erythematosus, rheumatoid arthritis, and Celiac disease.

Elevations of thyroid antibodies or low levels of thyroid hormones may prompt the evaluation of iodine and selenium status, as iodine deficiency may be exacerbated by deficiencies of selenium, iron or Vitamin A. Iodine is an essential component of thyroid hormones, and iodine deficiency is a world-wide health problem. Declining levels of urinary iodine in the US population has been documented by Centers for Disease Control and Prevention (CDC, 2002). The enzymes that convert T3 to T4 are selenium dependent. Low selenium levels have been associated with goiter and thyroid nodules in European women.

The evaluation of thyroid hormones and thyroid antibodies is an opportunity to discover and treat the functional cause of vague symptoms and chronic complaints. The analysis of thyroid hormones and antibodies together may improve the accuracy of diagnosis and clinical success.