

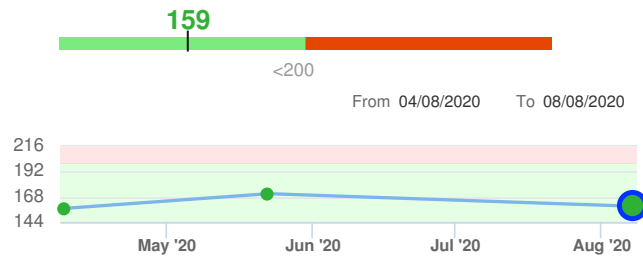
Sex: M Age: 62 Fasting: N Report Status: FINAL / SEE REPORT Collected: 08/07/2020 14:18
Received: 08/07/2020 14:23
Reported: 08/12/2020 13:12

FASTING:NO

▲ LIPID PANEL, STANDARD

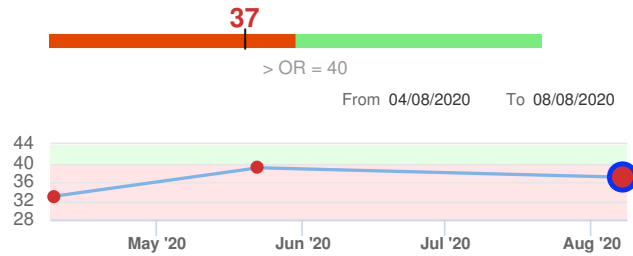
CHOLESTEROL, TOTAL

Desired Result: <200 mg/dL



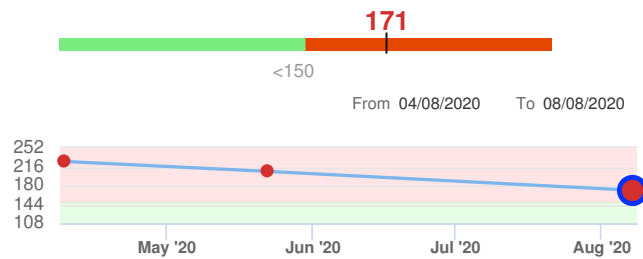
▲ HDL CHOLESTEROL

Desired Result: > OR = 40 mg/dL



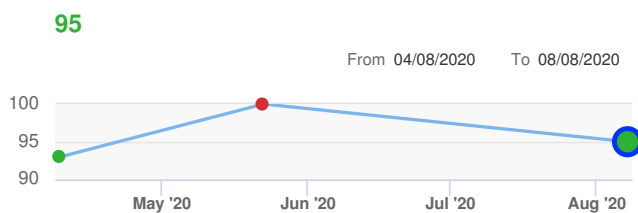
▲ TRIGLYCERIDES

Desired Result: <150 mg/dL



LDL-CHOLESTEROL

mg/dL (calc)



Reference range varies across results

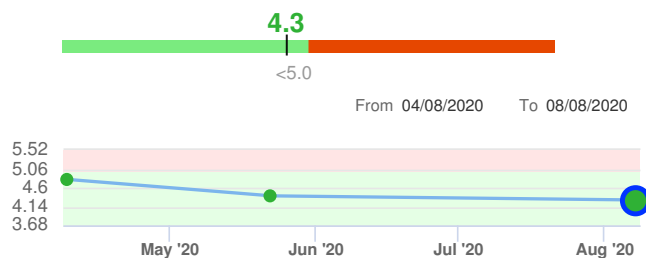
Reference range: <100

Desirable range <100 mg/dL for primary prevention;
<70 mg/dL for patients with CHD or diabetic patients
with > or = 2 CHD risk factors.

LDL-C is now calculated using the Martin-Hopkins calculation, which is a validated novel method providing better accuracy than the Friedewald equation in the estimation of LDL-C.
Martin SS et al. JAMA. 2013;310(19): 2061-2068
(<http://education.QuestDiagnostics.com/faq/FAQ164>)

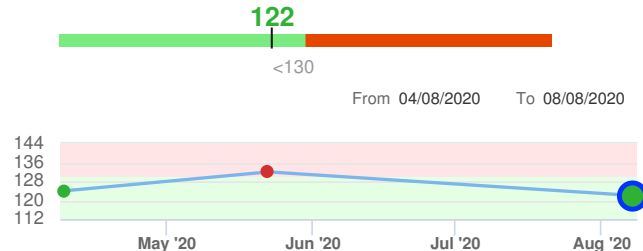
CHOL/HDL-C RATIO

Desired Result: <5.0 (calc)



NON HDL CHOLESTEROL

Desired Result: <130 mg/dL (calc)

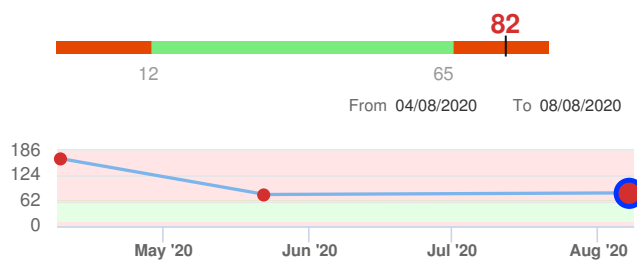


For patients with diabetes plus 1 major ASCVD risk factor, treating to a non-HDL-C goal of <100 mg/dL (LDL-C of <70 mg/dL) is considered a therapeutic option.

▲ DIHYDROTESTOSTERONE

▲ DIHYDROTESTOSTERONE, LC/MS/MS

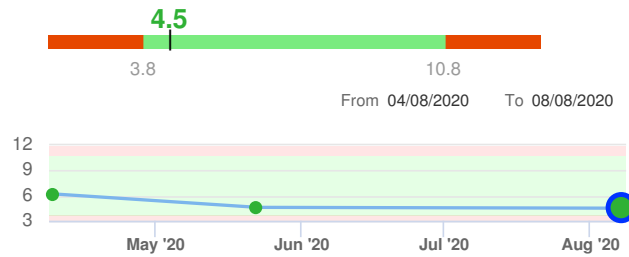
Desired Result: 12-65 ng/dL See Note 1



▲ CBC (INCLUDES DIFF/PLT)

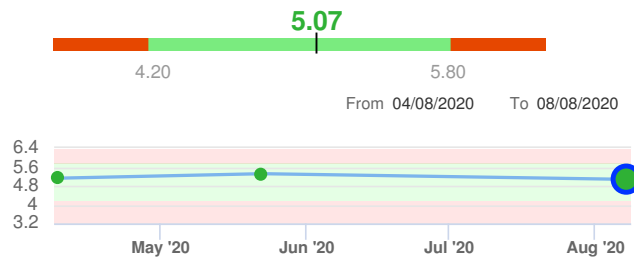
WHITE BLOOD CELL COUNT

Desired Result: 3.8-10.8 Thousand/uL



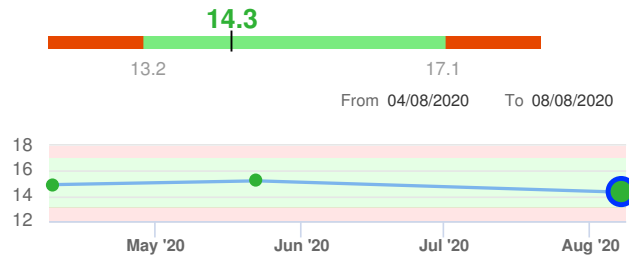
RED BLOOD CELL COUNT

Desired Result: 4.20-5.80 Million/uL



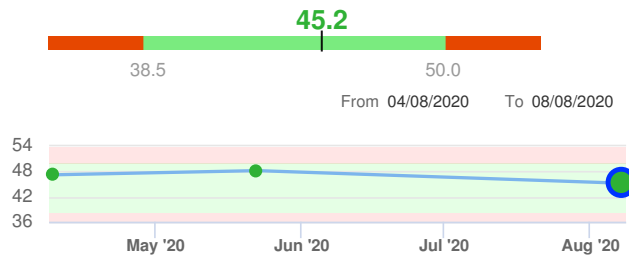
HEMOGLOBIN

Desired Result: 13.2-17.1 g/dL



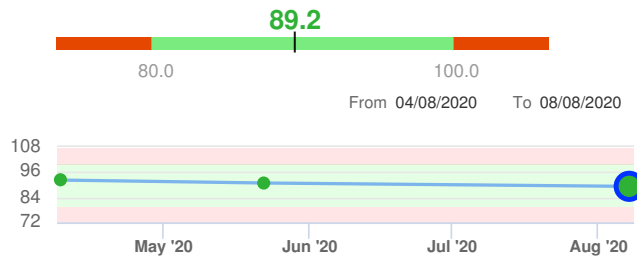
HEMATOCRIT

Desired Result: 38.5-50.0 %



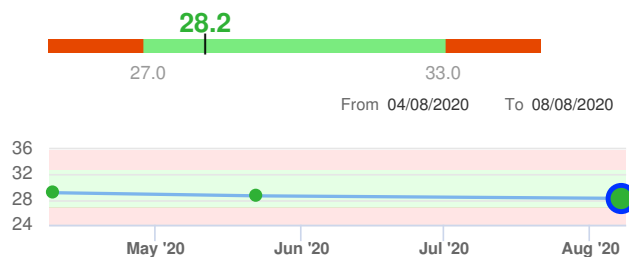
MCV

Desired Result: 80.0-100.0 fL



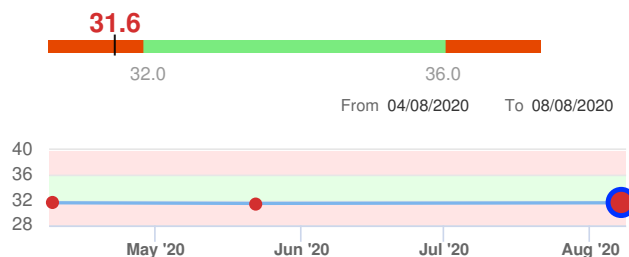
MCH

Desired Result: 27.0-33.0 pg



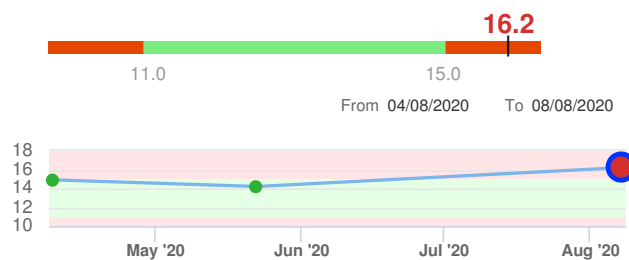
⚠ MCHC

Desired Result: 32.0-36.0 g/dL



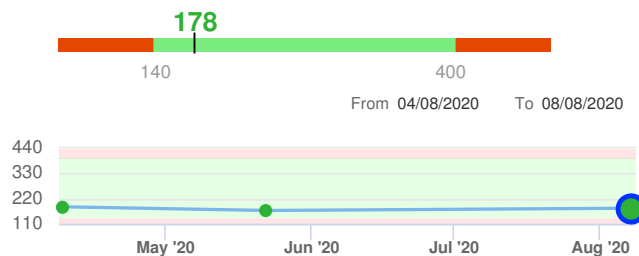
⚠ RDW

Desired Result: 11.0-15.0 %



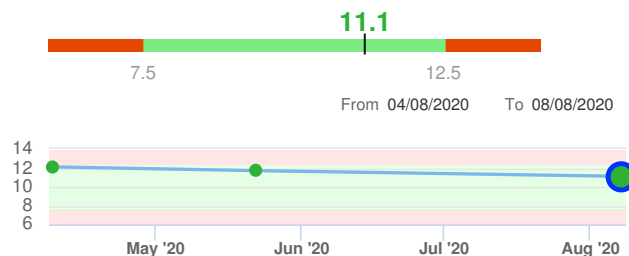
PLATELET COUNT

Desired Result: 140-400 Thousand/uL



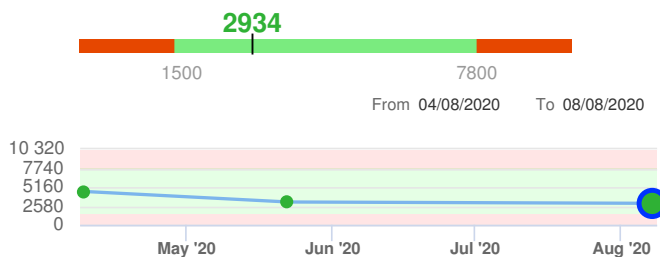
MPV

Desired Result: 7.5-12.5 fL



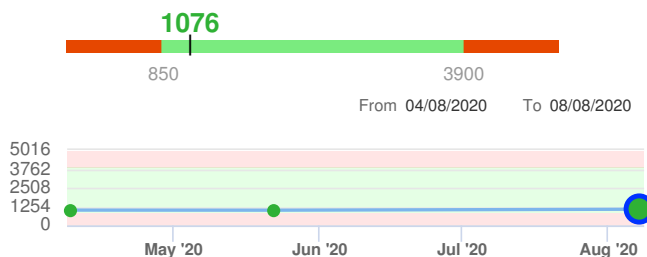
ABSOLUTE NEUTROPHILS

Desired Result: 1500-7800 cells/uL



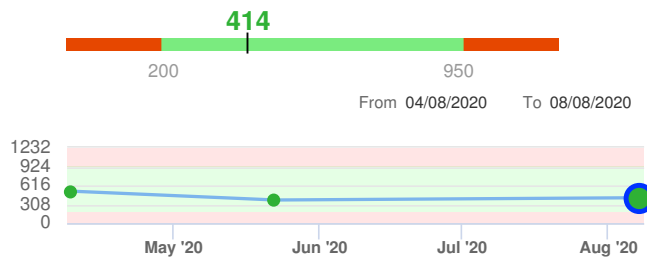
ABSOLUTE LYMPHOCYTES

Desired Result: 850-3900 cells/uL



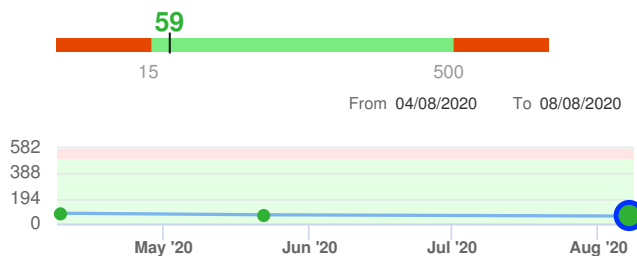
ABSOLUTE MONOCYTES

Desired Result: 200-950 cells/uL



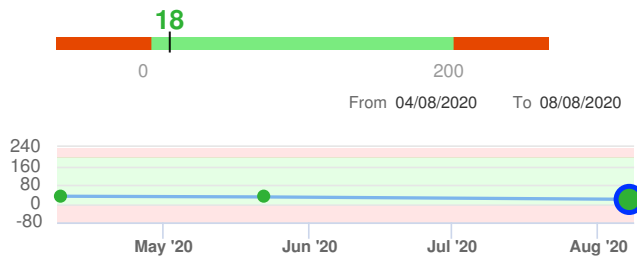
ABSOLUTE EOSINOPHILS

Desired Result: 15-500 cells/uL



ABSOLUTE BASOPHILS

Desired Result: 0-200 cells/uL

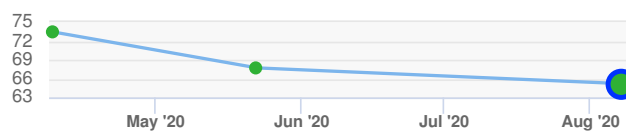


NEUTROPHILS

%

65.2

From 04/08/2020 To 08/08/2020



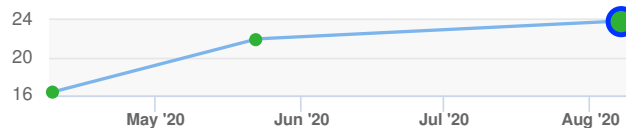
Reference range varies across results

LYMPHOCYTES

%

23.9

From 04/08/2020 To 08/08/2020



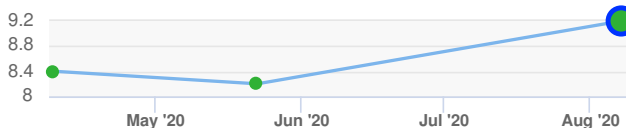
Reference range varies across results

MONOCYTES

%

9.2

From 04/08/2020 To 08/08/2020



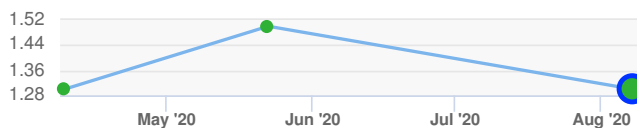
Reference range varies across results

EOSINOPHILS

%

1.3

From 04/08/2020 To 08/08/2020



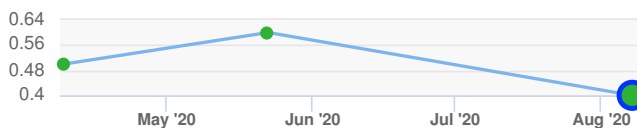
Reference range varies across results

BASOPHILS

%

0.4

From 04/08/2020 To 08/08/2020

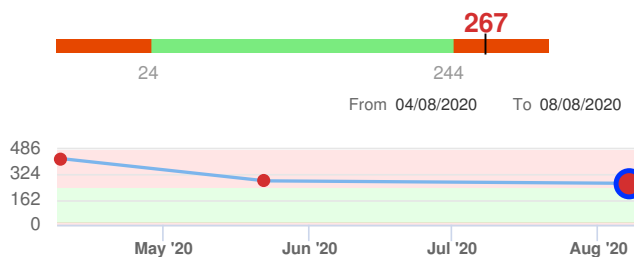


Reference range varies across results

▲ DHEA SULFATE

⚠ DHEA SULFATE

Desired Result: 24-244 mcg/dL



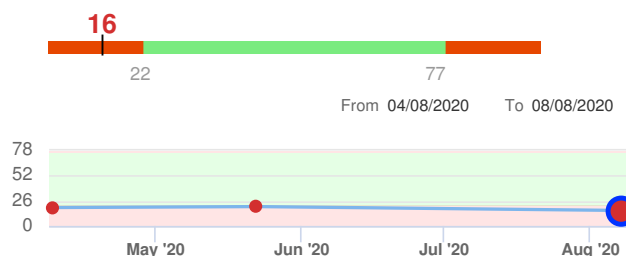
DHEA-S values fall with advancing age.
For reference, the reference intervals for 31-40 year old patients are:

Male: 106-464 mcg/dL
Female: 23-266 mcg/dL

⚠ SEX HORMONE BINDING GLOBULIN

⚠ SEX HORMONE BINDING GLOBULIN

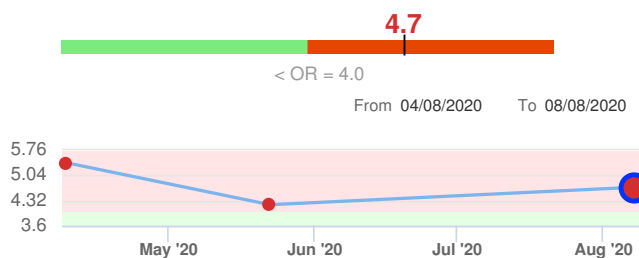
Desired Result: 22-77 nmol/L



⚠ PSA (FREE AND TOTAL)

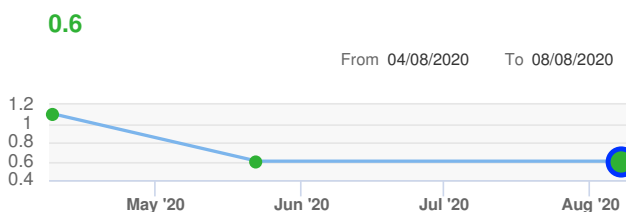
⚠ PSA, TOTAL

Desired Result: < OR = 4.0 ng/mL



PSA, FREE

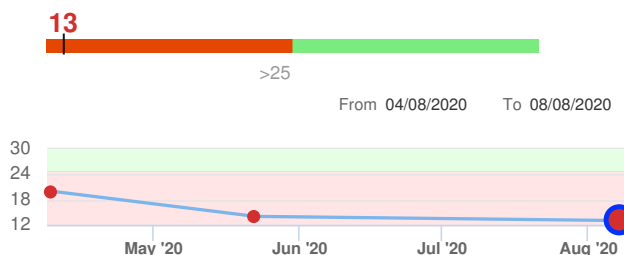
ng/mL



Reference range varies across results

▲ PSA, % FREE

Desired Result: >25 % (calc)



PSA(ng/mL)	Free PSA(%)	Estimated(x) Probability of Cancer(as%)
0-2.5	(*)	Approx. 1
2.6-4.0(1)	0-27(2)	24(3)
4.1-10(4)	0-10	56
	11-15	28
	16-20	20
	21-25	16
	>or =26	8
>10(+)	N/A	>50

References:(1)Catalona et al.:Urology 60: 469-474 (2002)
(2)Catalona et al.:J.Urol 168: 922-925 (2002)
Free PSA(%) Sensitivity(%) Specificity(%)
< or = 25 85 19
< or = 30 93 9
(3)Catalona et al.:JAMA 277: 1452-1455 (1997)
(4)Catalona et al.:JAMA 279: 1542-1547 (1998)

(x)These estimates vary with age, ethnicity, family history and DRE results.

(*)The diagnostic usefulness of % Free PSA has not been established in patients with total PSA below 2.6 ng/mL

(+)In men with PSA above 10 ng/mL, prostate cancer risk is determined by total PSA alone.

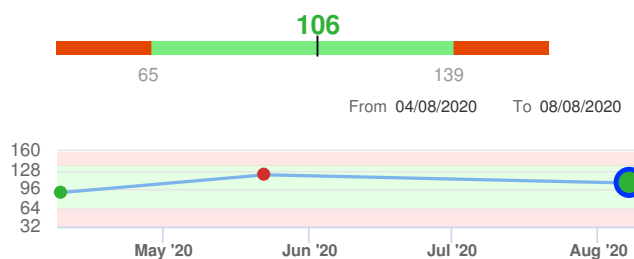
The Total PSA value from this assay system is standardized against the equimolar PSA standard. The test result will be approximately 20% higher when compared to the WHO-standardized Total PSA (Siemens assay). Comparison of serial PSA results should be interpreted with this fact in mind.

PSA was performed using the Beckman Coulter Immunoassay method. Values obtained from different assay methods cannot be used interchangeably. PSA levels, regardless of value, should not be interpreted as absolute evidence of the presence or absence of disease.

COMPREHENSIVE METABOLIC PANEL

GLUCOSE

Desired Result: 65-139 mg/dL

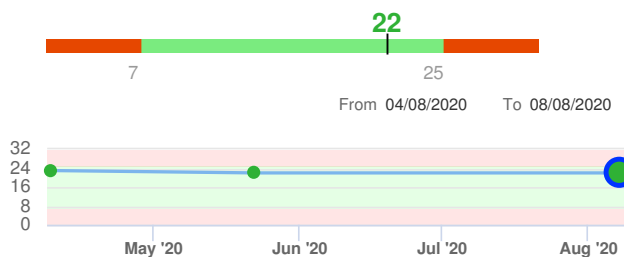


Reference range varies across results

Non-fasting reference interval

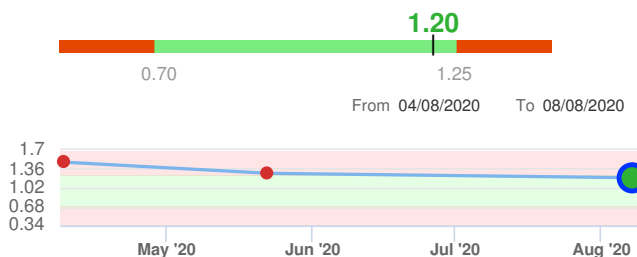
UREA NITROGEN (BUN)

Desired Result: 7-25 mg/dL



CREATININE

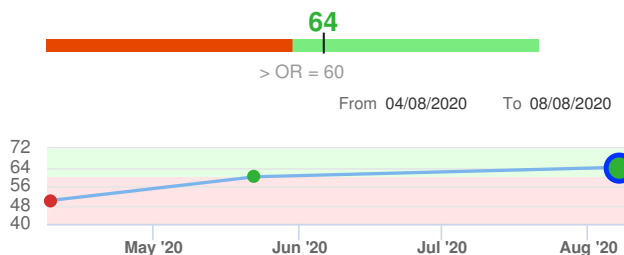
Desired Result: 0.70-1.25 mg/dL



For patients >49 years of age, the reference limit for Creatinine is approximately 13% higher for people identified as African-American.

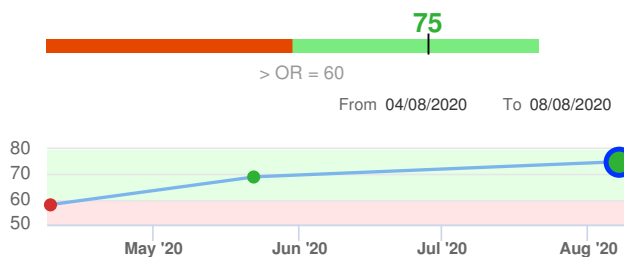
eGFR NON-AFR. AMERICAN

Desired Result: > OR = 60 mL/min/1.73m²



eGFR AFRICAN AMERICAN

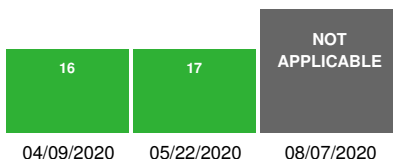
Desired Result: > OR = 60 mL/min/1.73m²



BUN/CREATININE RATIO

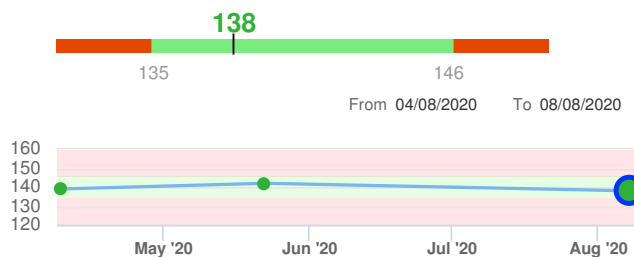
Desired Result: 6-22 (calc)

NOT APPLICABLE



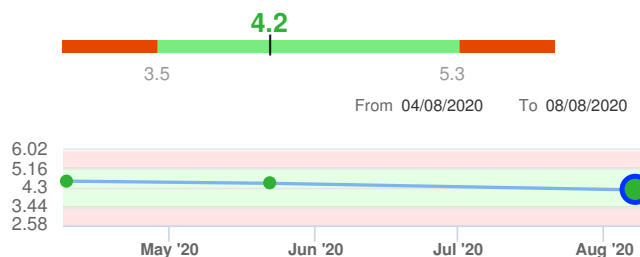
SODIUM

Desired Result: 135-146 mmol/L



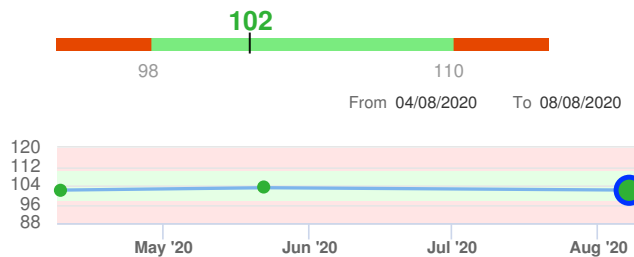
POTASSIUM

Desired Result: 3.5-5.3 mmol/L



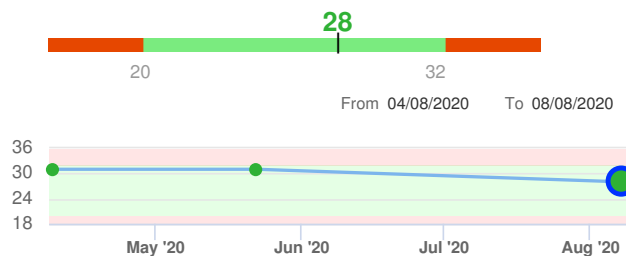
CHLORIDE

Desired Result: 98-110 mmol/L



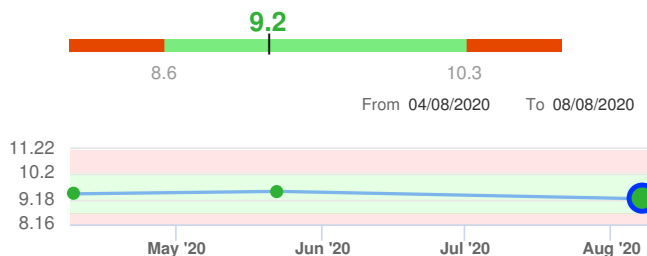
CARBON DIOXIDE

Desired Result: 20-32 mmol/L



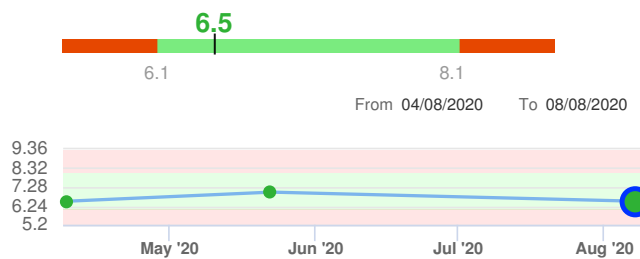
CALCIUM

Desired Result: 8.6-10.3 mg/dL



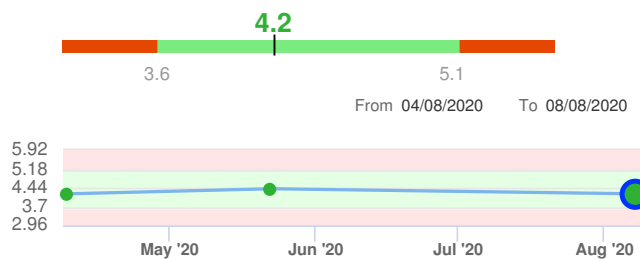
PROTEIN, TOTAL

Desired Result: 6.1-8.1 g/dL



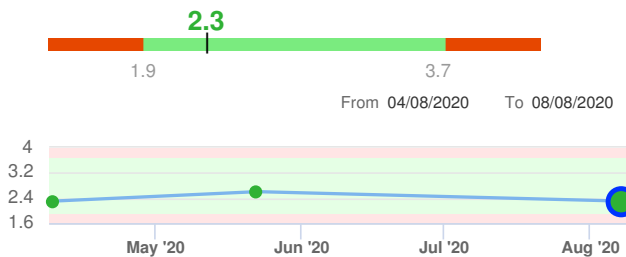
ALBUMIN

Desired Result: 3.6-5.1 g/dL



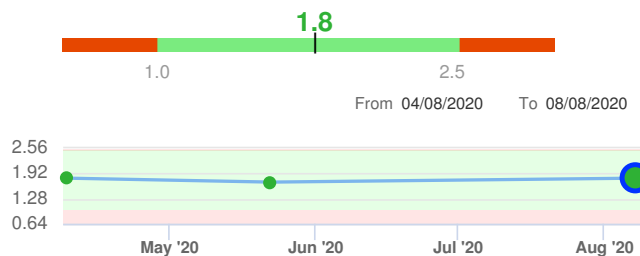
GLOBULIN

Desired Result: 1.9-3.7 g/dL (calc)



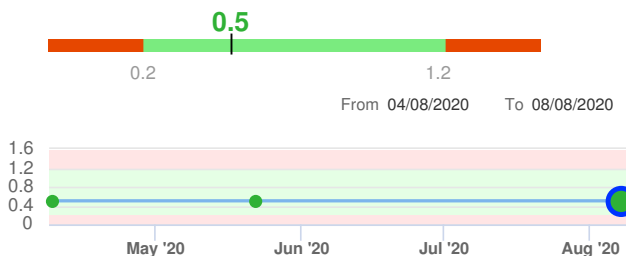
ALBUMIN/GLOBULIN RATIO

Desired Result: 1.0-2.5 (calc)



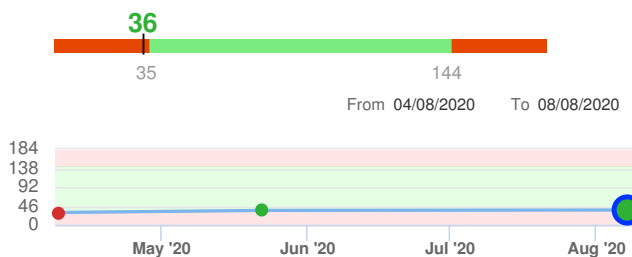
BILIRUBIN, TOTAL

Desired Result: 0.2-1.2 mg/dL



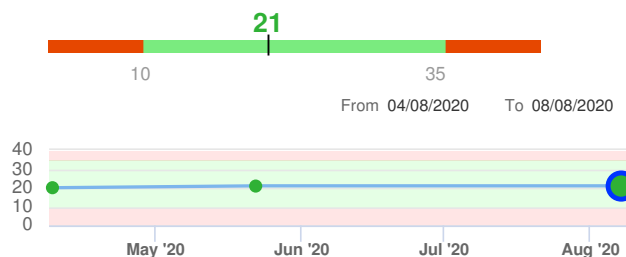
ALKALINE PHOSPHATASE

Desired Result: 35-144 U/L



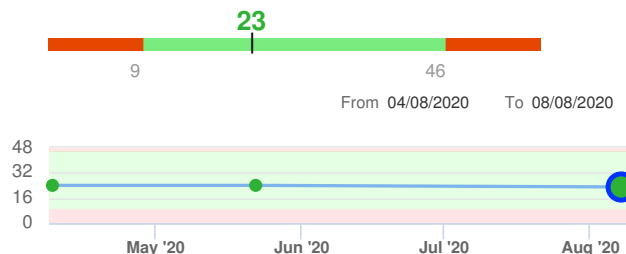
AST

Desired Result: 10-35 U/L



ALT

Desired Result: 9-46 U/L



VITAMIN D,25-OH,TOTAL,IA

VITAMIN D,25-OH,TOTAL,IA

Desired Result: 30-100 ng/mL



No Historical Data

Vitamin D Status 25-OH Vitamin D:

Deficiency: <20 ng/mL
Insufficiency: 20 - 29 ng/mL
Optimal: > or = 30 ng/mL

For 25-OH Vitamin D testing on patients on D2-supplementation and patients for whom quantitation of D2 and D3 fractions is required, the QuestAssured(TM) 25-OH VIT D, (D2,D3), LC/MS/MS is recommended: order code 92888 (patients >2yrs).

COMMENT

No Historical Data

See Note 1

Note 1

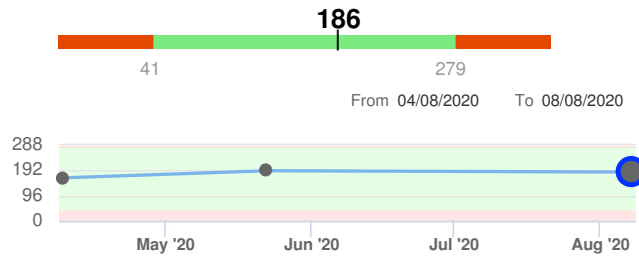
For additional information, please refer to <http://education.QuestDiagnostics.com/faq/FAQ199> (This link is being provided for informational/educational purposes only.)

IGF 1, LC/MS

)

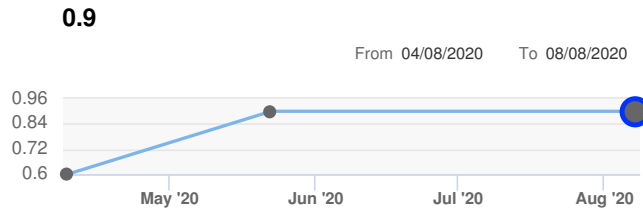
IGF 1, LC/MS

Desired Result: 41-279 ng/mL



Z SCORE (MALE)

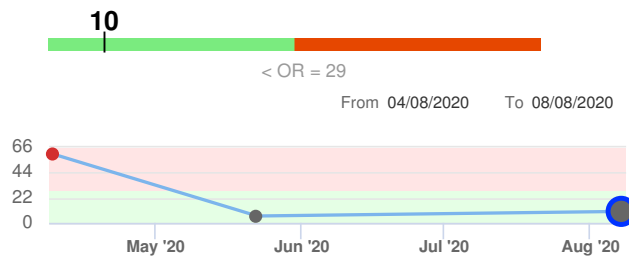
Desired Result: -2.0 - +2.0 SD See Note 1



ESTRADIOL,ULTRASENSITIVE, LC/MS

ESTRADIOL,ULTRASENSITIVE, LC/MS

Desired Result: < OR = 29 pg/mL

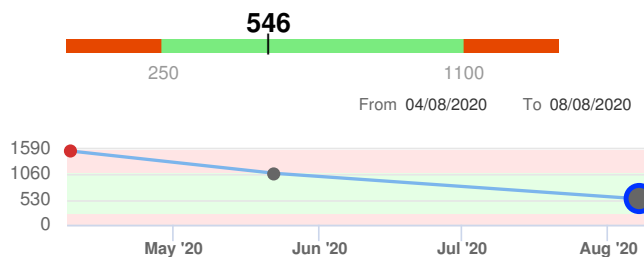


This test was developed and its analytical performance characteristics have been determined by Quest Diagnostics Nichols Institute San Juan Capistrano. It has not been cleared or approved by FDA. This assay has been validated pursuant to the CLIA regulations and is used for clinical purposes.

TESTOSTERONE, FREE (DIALYSIS) AND TOTAL,MS

TESTOSTERONE, TOTAL, MS

Desired Result: 250-1100 ng/dL



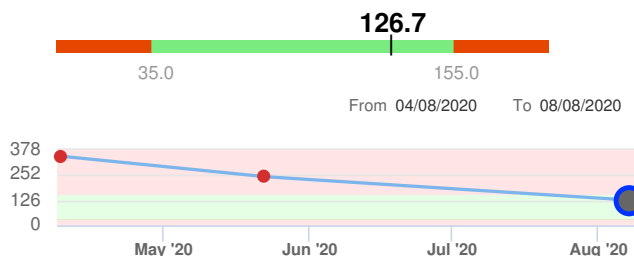
Men with clinically significant hypogonadal symptoms and testosterone values repeatedly in the range of the 200-300 ng/dL or less, may benefit from testosterone treatment after adequate risk and benefits counseling.

For additional information, please refer to <http://education.questdiagnostics.com/faq/TotalTestosteroneLCMSMSFAQ165> (This link is being provided for informational/educational purposes only.)

This test was developed and its analytical performance characteristics have been determined by Quest Diagnostics Nichols Institute Chantilly, VA. It has not been cleared or approved by the U.S. Food and Drug Administration. This assay has been validated pursuant to the CLIA regulations and is used for clinical purposes.

TESTOSTERONE, FREE

Desired Result: 35.0-155.0 pg/mL

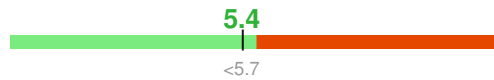


This test was developed and its analytical performance characteristics have been determined by Quest Diagnostics Nichols Institute Chantilly, VA. It has not been cleared or approved by the U.S. Food and Drug Administration. This assay has been validated pursuant to the CLIA regulations and is used for clinical purposes.

HEMOGLOBIN A1c

HEMOGLOBIN A1c

Desired Result: <5.7 % of total Hgb



No Historical Data

For the purpose of screening for the presence of diabetes:

<5.7% Consistent with the absence of diabetes
5.7-6.4% Consistent with increased risk for diabetes (prediabetes)
> or =6.5% Consistent with diabetes

This assay result is consistent with a decreased risk of diabetes.

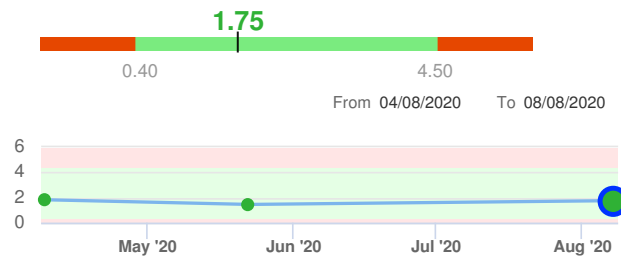
Currently, no consensus exists regarding use of hemoglobin A1c for diagnosis of diabetes in children.

According to American Diabetes Association (ADA) guidelines, hemoglobin A1c <7.0% represents optimal control in non-pregnant diabetic patients. Different metrics may apply to specific patient populations. Standards of Medical Care in Diabetes(ADA).

TSH

TSH

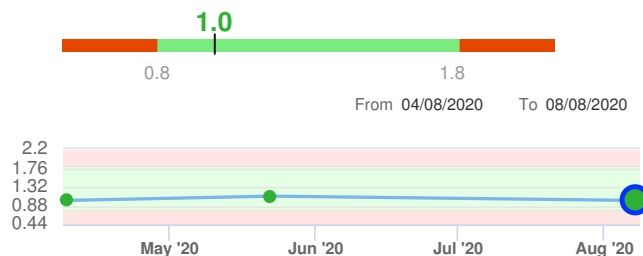
Desired Result: 0.40-4.50 mIU/L



T4, FREE

T4, FREE

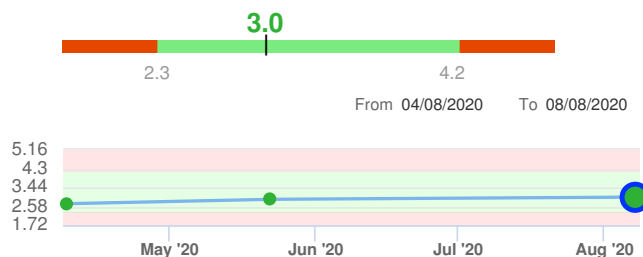
Desired Result: 0.8-1.8 ng/dL



T3, FREE

T3, FREE

Desired Result: 2.3-4.2 pg/mL



FOLATE, SERUM

FOLATE, SERUM

12.0

ng/mL

No Historical Data

Reference Range

Low: <3.4
Borderline: 3.4-5.4
Normal: >5.4

CORTISOL, TOTAL

CORTISOL, TOTAL

7.6

mcg/dL

No Historical Data

Reference Range: For 8 a.m.(7-9 a.m.) Specimen: 4.0-22.0

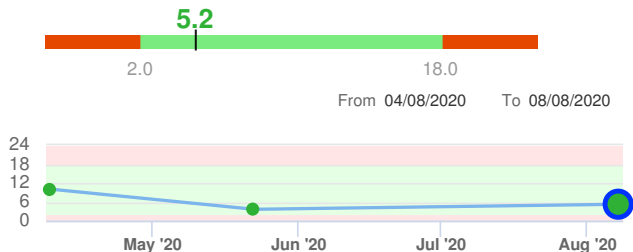
Reference Range: For 4 p.m.(3-5 p.m.) Specimen: 3.0-17.0

* Please interpret above results accordingly *

PROLACTIN

PROLACTIN

Desired Result: 2.0-18.0 ng/mL



Note 1

This test was developed and its analytical performance characteristics have been determined by Quest Diagnostics Nichols Institute San Juan Capistrano. It has not been cleared or approved by FDA. This assay has been validated pursuant to the CLIA regulations and is used for clinical purposes.

Performing Sites

AMD Quest Diagnostics/Nichols Chantilly-Chantilly VA, 14225 Newbrook Dr, Chantilly, VA 20151-2228 Laboratory Director: Patrick W Mason M.D.,PhD

EZ Quest Diagnostics/Nichols SJC-San Juan Capistrano,, 33608 Ortega Hwy, San Juan Capistrano, CA 92675-2042 Laboratory Director: Irina Maramba MD,PhD,MBA

NL1 Quest Diagnostics LLC-Quest Diagnostics LLC, 200 Forest St, 3Rd Fl, Marlborough, MA 01752-3023 Laboratory Director: Salim E Kabawat MD

Key

Priority Out of Range Out of Range

Report Insights

HDL CHOLESTEROL

HDL Cholesterol < 40 mg/dL

The level of HDL cholesterol circulating in the blood can help determine your risk for heart disease. The National Heart, Lung, and Blood Institute (NHLBI) considers an HDL cholesterol level of less than 40 mg/dL in men 20 years of age and older to be a risk factor for heart disease. HDL cholesterol is considered the "good" cholesterol and a level equal to or above 60 mg/dL may reduce the risk of heart disease. Other cholesterol measurements, alongside patient characteristics, should be taken into consideration when determining a person's risk level for heart disease and monitoring for therapy (lifestyle modifications or medication) responses. Click here: https://www.nhlbi.nih.gov/files/docs/public/heart/cholesterol_tlc.pdf to learn more from this guide about cholesterol levels and how they matter to a person's health from the NHLBI.

TRIGLYCERIDES

Triglycerides > or = 150 mg/dL

The level of triglycerides circulating in the blood can help determine your risk for heart disease. According to the National Heart, Lung, and Blood Institute (NHLBI) says there is research to show that a triglyceride level > or = 150 mg/dL may increase risk for heart disease. Other cholesterol measurements, alongside patient characteristics, should be taken into consideration when determining a person's risk level for heart disease.

Click here : https://www.nhlbi.nih.gov/files/docs/public/heart/cho_ltc.pdf to learn more from this NHLBI guide about triglycerides and cholesterol levels and how they matter to a person's health.

LIPID PANEL, STANDARD

Know the Facts about High Cholesterol

Nearly 1 in 3 American adults has high cholesterol. Too much cholesterol puts you at risk for heart disease and stroke, two leading causes of death in the United States. High cholesterol has no signs or symptoms, so the only way to know if you have it is to get your cholesterol checked. Talk to your health care team about how you can manage your cholesterol levels and lower your risk.

Read more in this handout from the American Heart website :

https://www.heart.org/-/media/files/health-topics/cholesterol/ccccc_my-cholesterol-guide.pdf

Or view the CDC website for more information about Cholesterol : <https://www.cdc.gov/cholesterol/index.htm>

Heart Medication Awareness

This publication discuss heart medication, and the importance of finding the right dose.

View More :

<https://iiccontent.care360.com/iic-content-service/media/image?path=/insights/c1560f33-b352-4cd4-8205-a85431bb4e3c/images/11Febheartmedication.pdf>

DIHYDROTESTOSTERONE

What is testosterone?

Testosterone is a male hormone that comes mostly from the testes in men. The adrenal gland also makes a little bit. In women, both the ovaries and the adrenal gland make small amounts. Testosterone levels increase in boys as they start to reach puberty. It's the reason men have:

- A deep voice
- More facial and body hair
- Increased height
- Increased muscle mass
- Less body fat

In men, testosterone is needed to:

- Keep muscles and bones strong
- Maintain normal mood and energy level
- Maintain interest in sex
- Produce sperm cells
- Have an erection

What is a normal testosterone level?

Blood levels start out low in young boys. They increase during puberty to adult levels. Normal adult levels are about 250 to 1100 ng/dL.

What causes low testosterone?

Typically starting at age 40 or younger, testosterone levels slowly decrease. But older age doesn't cause low testosterone. Although it's more common in older men, not all of them develop it. These things do cause low testosterone:

- Injury to the testes, hypothalamus, or pituitary glands
 - Accident
 - Autoimmune disease
 - Cancer
 - Inflammation

- Certain drugs
 - Anabolic steroids
 - Glucocorticoids
 - Hormone therapy used to treat prostate cancer
 - Opioid pain killers
- Radiation and chemotherapy
- Genetic disorders such as Klinefelter syndrome

Can low testosterone be treated?

Yes. Doctors treat it by giving the patient testosterone. The goal is to increase blood levels to the middle of the normal range. That's about 400 ng/dL. Testosterone comes in creams, gels, patches, and injections. Your doctor will help you decide which is best for you.

What are the risks of testosterone treatment?

Some types of testosterone therapy cause a rash or itching (just where it's applied). Other possible side effects include:

- Acne and oily skin
- Breast tenderness
- An increase in red blood cells, which might cause blood clots in the arteries or veins
- A decrease in sperm production and ability to father a child
- Prostate cancer

What are the benefits of testosterone treatment?

It might take several months for the medicine to take effect.

When it does, these are some possible benefits:

- More interest in sex
- Less depression
- More energy and muscular strength
- Less risk of bone fracture

How is low testosterone diagnosed?

Doctors use a blood test to diagnose low testosterone. Blood levels are higher in the morning than they are at night, so, you should have your blood drawn in the morning. If your level is low, your doctor might try to find out why. To do this, he/she will use a medical history, physical exam, and other laboratory tests.

What are the symptoms of low testosterone in men?

Low testosterone can cause many symptoms.

Decreased energy and sex drive are common.

Here are some other symptoms:

- Depression
- Decreased muscle strength
- Low bone density

Your doctor can treat this condition. But first, you have to be diagnosed with it. This starts with a simple blood test that finds out how much testosterone is in your blood.

I am being treated for low T. What testing do I need?

Men being treated might need the following tests¹

:

- Total testosterone 3 to 6 months after starting therapy
- Hematocrit 3 to 6 months after starting therapy and annually thereafter (to detect possible increases in the number of red blood cells)
- Bone density after 1 to 2 years of therapy; this test is just for men with osteoporosis or

low-trauma fracture

- Prostate cancer screening tests (DRE and PSA) 3 to 6 months after starting therapy and then per screening guidelines; doctors should do these tests before starting treatment too

References

1. Bhasin S, Cunningham GR, Hayes FJ, et al. Testosterone therapy in adult men with androgen deficiency syndromes: an Endocrine Society Clinical Practice Guideline. J Clin Endocrinol Metab. 2010;95:2536-2559.
2. Rosner W, Auchus RJ, Azziz, R. Position statement: Utility, limitations, and pitfalls in measuring testosterone: an Endocrine Society Position Statement. J Clin Endocrinol Metab. 2007;92:405-413.

Low Testosterone in Men

Read this publication to find out more about the symptoms, diagnosis, and treatment options for low testosterone in men.

View More :

<https://iiccontent.care360.com/iic-content-service/media/image?path=/insights/4dbbeff3-5ac8-4c2a-a084-284128846ec7/images/12Junelowtestosteroneinmen.pdf>

CBC (INCLUDES DIFF/PLT)

Blood Test Results: CBC Explained

A complete blood count (CBC) with differential measures the essential components of the blood including white blood cells, red blood cells, and platelets. Learn more about the various components of a CBC from this table provided by the International Waldenström's Macroglobulinemia Foundation (IWMF).

Download the table from the IWMF website : [http://www.iwmf.com/sites/default/files/docs/bloodcharts_cbc\(1\).pdf](http://www.iwmf.com/sites/default/files/docs/bloodcharts_cbc(1).pdf)

Complete Blood Count (CBC)

A CBC is a commonly ordered blood test that may be helpful to diagnose a variety of health conditions, such as an infection, anemia, or bleeding disorder. It is also a general indicator of overall health. A CBC test screens for many blood components, including red and white blood cells, platelets, and hemoglobin. Learn more about the various components of a CBC from this table provided by the International Waldenström's Macroglobulinemia Foundation (IWMF). Download the table from the IWMF website by clicking here. :

[http://www.iwmf.com/sites/default/files/docs/bloodcharts_cbc\(1\).pdf](http://www.iwmf.com/sites/default/files/docs/bloodcharts_cbc(1).pdf)

DHEA SULFATE

Dehydroepiandrosterone (DHEA)

DHEA is an important precursor hormone, and is the most abundant circulating steroid present in the human body. Learn more about DHEA at You & Your Hormones, the public information website of the Society for Endocrinology.

Go to the You & Your Hormones website : <http://www.yourhormones.info/hormones/dehydroepiandrosterone.aspx>

PSA (FREE AND TOTAL)

PSA Test

The PSA test measures the level of prostate-specific antigen in a man's blood. Learn more about the PSA test from this fact sheet provided by the NIH's National Cancer Institute (NCI).

Go to the NCI website : <http://www.cancer.gov/types/prostate/psa-fact-sheet>

Understanding Prostate Changes

The prostate is a small gland in men. It is part of the male reproductive system. Learn more about the prostate from this publication provided by the National Cancer Institute (NCI).

Click here to download NCI's publication on the prostate. :

<http://www.cancer.gov/types/prostate/understanding-prostate-changes/prostate-booklet.pdf>

ALKALINE PHOSPHATASE

Alkaline Phosphatase (ALP) < 40 U/L

For men 20 years of age and older, the reference range for ALP in serum specimens is between 40 U/L and 115 U/L. A lower level of ALP may occur after blood transfusions or heart bypass surgery, and also with malnutrition, including protein and zinc deficiencies, and some bone diseases (eg, Paget's disease). Tests for ALP are typically done in combination with other laboratory tests, such as for aspartate aminotransferase (AST) and alanine aminotransferase (ALT), to assess liver function. You can learn more about ALP test results from the American Association for Clinical Chemistry by clicking here : <https://labtestsonline.org/tests/alkaline-phosphatase-alkp> to visit Lab Tests Online.

COMPREHENSIVE METABOLIC PANEL

Comprehensive Metabolic Panel Result: What does it mean?

A CMP refers to a broad screening tool that includes 14 tests that evaluate the functioning of a person's liver and kidneys, as well as the body's fluid balance and general metabolism. The results additionally provide a general indicator of your overall health; a CMP is often ordered in your yearly physical exam.

In a CMP, levels of liver enzymes, waste products of the kidneys (BUN and creatinine), electrolytes (calcium, sodium, potassium), and glucose, among other indicators of general body function are detected. The test results of a CMP are useful to examine for conditions, such as diabetes, liver disease, and kidney disease and also to monitor present conditions, such as hypertension.

See More : <http://labtestsonline.org/understanding/analytes/cmp/tab/test#what>

Source: <http://labtestsonline.org> : <http://labtestsonline.org/understanding/analytes/cmp/tab/test#what>

VITAMIN D,25-OH,TOTAL,IA

What is vitamin D?

Vitamin D is a fat-soluble vitamin that occurs in 2 forms: vitamin D₃ and vitamin D₂. Vitamin D₃, the more common form, is made in the skin after exposure to sunlight. Vitamin D₂, on the other hand, comes mostly from food and over-the-counter supplements. It may also be used in the pharmacological treatment of vitamin D deficiency.

Vitamin D is rapidly metabolized in the liver to 25-hydroxyvitamin D (25[OH]D). This inactive form is then converted in the kidneys to the active 1,25-dihydroxyvitamin D form.

What does vitamin D do in the body?

Vitamin D helps maintain healthy levels of calcium and phosphorus by aiding in their absorption from the gut. This helps the body form and maintain strong bones. Vitamin D also modulates neuromuscular, immune, and other cellular functions. Vitamin D deficiency has been associated with a wide range of medical conditions including heart disease, hypertension, diabetes, and cancer.

Who should have 25-hydroxyvitamin D testing?

The Endocrine Society recommends screening individuals at risk for deficiency. These include those with ¹:

- Rickets
- Osteomalacia
- Osteoporosis
- Chronic kidney disease
- Hepatic failure
- Malabsorption syndromes
- Hyperparathyroidism
- Medications (anti-seizure medications, glucocorticoids, AIDS medications, antifungals, cholestyramine)

The Society also recommends screening ¹:

- African-American and Hispanic children and adults
- Pregnant and lactating women
- Older adults with history of falls
- Older adults with history of nontraumatic fractures
- Obese children and adults

The Endocrine Society also recommends monitoring patients with granuloma-forming disorders and some lymphomas by testing 25(OH)D and serum calcium.¹ Some physicians may wish to monitor people receiving vitamin D therapy to evaluate for compliance and expected change in concentration.

How much vitamin D do people need?

To maximize bone health, the Endocrine Society suggests a dietary intake of at least 400 IU/day for **infants <1 year** and at least 600 IU/day for **children 1 year and older**.¹ Whether these levels are enough to provide all the nonskeletal benefits of vitamin D is not known. At least 1000 IU/day may be needed to raise the blood level consistently above 30 ng/mL (cut point for vitamin D sufficiency).¹

To maximize bone health and muscle function in **adults 19 to 70 years of age**, the Endocrine Society suggests a dietary intake of at least 600

)

IU/day.¹ Whether these levels are enough to provide all the nonskeletal benefits of vitamin D is not known. At least 1500–2000 IU/day may be needed to achieve a blood level of 30 ng/mL.¹

To maximize bone health and muscle function in **adults over 70 years**, the Endocrine Society suggests a dietary intake of at least 800 IU/day.¹ Whether these levels are enough to provide all the nonskeletal benefits of vitamin D is not known. At least 1500–2000 IU/day may be needed to achieve a blood level of 30 ng/mL.¹

Obese children and adults and those on certain medications may need at least 2 to 3 times the suggested dietary intake for their age group.¹ Relevant medications include anticonvulsants, glucocorticoids, AIDS medications, and antifungals such as ketoconazole.

For people who are vitamin D insufficient or deficient, supplementation or a therapeutic prescription may be needed to correct the deficiency. Refer to the Endocrine Society guidelines¹ for treatment recommendations.

What are the sources of vitamin D?

Vitamin D can be obtained from exposure to sunlight. However, sun exposure can be affected by season of the year, latitude, time of day, skin pigmentation, use of sunscreens, and age. These variables may necessitate alternative sources for some people.

One alternative source is the diet. Some foods are naturally high in vitamin D; these include oil-rich fish such as salmon, mackerel, and herring. For example, fresh farmed salmon may have approximately 100-250 IU in 3.5 ounces, whereas fresh, wild caught salmon may have approximately 600-1000 IU in a 3.5 ounce serving. Shiitake mushrooms, especially sun-dried, are also high in vitamin D. Other foods are fortified with vitamin D; these include milk and other dairy products, orange juice, and some grain products.

Multivitamin and other supplements are another alternative source.

None of these sources may be adequate for people with liver or kidney disease as they may be unable to produce sufficient amounts of the active form of vitamin D. This is because vitamin D metabolism to the active form requires the liver and kidney. These people may need supplementation with the active form (1,25-dihydroxyvitamin D).

What is the impact of seasons on vitamin D?

25(OH)D concentrations are typically at their lowest at the end of February and at their highest at the end of August. This seasonal effect is more notable in northern latitudes than in southern latitudes where the sun is out for more of the year. Thus, there may be more of a need to supplement, or to supplement with higher doses of vitamin D, in the winter months than in the summer months.

Quest Diagnostics data show that the percentage of patients who are deficient in vitamin D vary seasonally from 21% at the end of summer and 48% at the end of winter.

How common is vitamin D deficiency?

Based on a sample of patients throughout the United States, Quest Diagnostics observed that 33% of patients were deficient in vitamin D, and 60% were either deficient or suboptimal.

What does vitamin D testing measure?

Vitamin D tests generally measure the total concentration of 25(OH)D, which is the main form of vitamin D circulating in blood and the best indicator of vitamin D deficiency or excess. Vitamin D tests using liquid chromatography, tandem mass spectrometry (LC/MS/MS) may also provide the concentration of vitamin D2 and D3 which, when added together, equal the total vitamin D concentration. For detection of vitamin D deficiency, measurement of 1,25-dihydroxyvitamin D is not recommended, as levels may be misleadingly normal in patients with significant vitamin D deficiency.

Why do physicians test for vitamin D?

A physician generally will order a test to determine the level of vitamin D in a patient's body. A physician would typically evaluate the test result in connection with several other factors affecting a patient's health such as medical history, gender, and age.

What are vitamin D2 and vitamin D3?

Vitamin D2 is derived from fungal and plant sources and is commonly found in supplements, such as multivitamins, in the United States. Vitamin D2 may also be used in the pharmacological treatment of vitamin D deficiency. Vitamin D3 is derived from animal sources and is made in the skin following exposure to sunlight. The LC/MS/MS technique is able to directly quantify vitamin D2 and vitamin D3. By comparison, immunoassay-based vitamin D tests can only indirectly measure vitamin D2 and vitamin D3; therefore, only the total vitamin D is reported.

Reference

1. Holick MF, Binkley NC, Bischoff-Ferrari HA, et al. Evaluation, treatment, and prevention of vitamin D deficiency: an Endocrine Society clinical

practice guideline. *J Clin Endocrin Metab.* 2011;96:1911-1930.<https://www.endocrine.org/~media/endosociety/Files/Publications/Clinical%20Practice%20Guidelines/FINAL-Standalone-Vitamin-D-Guideline.pdf>:
<https://www.endocrine.org/~media/endosociety/Files/Publications/Clinical%20Practice%20Guidelines/FINAL-Standalone-Vitamin-D-Guideline.pdf>

âThis FAQ is provided for informational purposes only and is not intended as medical advice. A physician's test selection and interpretation, diagnosis, and patient management decisions should be based on his/her education, clinical expertise, and assessment of the patient.

Document FAQS.163 Version: 1

Version 1 effective 05/04/2015 to present

Version 0 effective 04/10/2015 to 05/03/2015: <http://education.questdiagnostics.com/faq/FAQ163-retired0>

Vitamin D

Vitamin D is a nutrient that is needed for health and to maintain strong bones by helping the body absorb calcium from food and supplements. Learn more about vitamin D from this fact sheet provided by the NIH's Office of Dietary Supplements.

Download the fact sheet from the NIH website : <https://ods.od.nih.gov/pdf/factsheets/VitaminD-Consumer.pdf>

Vitamin D, 25-Hydroxy

Vitamin D is a nutrient and it acts as a hormone in the body. It can come from some foods, such as salmon and fortified milk, and also supplements, but it is primarily made in the skin after sun exposure. Vitamin D regulates calcium and phosphate levels and is an important regulator of bone mass. It is also involved in actions of the immune system, muscles, and nerves. Vitamin D deficiency can cause osteoporosis (bone thinning and weakness in adults) or rickets, a childhood bone disease.

The liver is the first processor of vitamin D in the body and it metabolizes the fat-soluble vitamin to 25-hydroxyvitamin D, also known as calcifediol. 25-hydroxyvitamin D is used to assess vitamin D levels. More information on vitamin D and vitamin D deficiency can be found at Medline Plus by clicking here: <https://medlineplus.gov/ency/article/003569.htm>.

ESTRADIOL,ULTRASENSITIVE, LC/MS

Estrogen Blood Tests

Estrogen tests are used to detect a deficiency or excess in women and a hormone excess in men to help diagnose a variety of conditions associated with this imbalance. Learn more about estrogen testing from the American Association for Clinical Chemistry's (AACC) Lab Tests Online website.

Go to the Lab Tests Online website : <https://labtestsonline.org/understanding/analytes/estrogen/tab/test/>

TESTOSTERONE, FREE (DIALYSIS) AND TOTAL,MS

What Does Testosterone Do?

Learn more about testosterone, the main sex hormone in men, from this fact sheet provided by the Endocrine Society at their Hormone Health Network (HHN) website.

Read or download the fact sheet from the HHN website :

<http://www.hormone.org/hormones-and-health/what-do-hormones-do/what-does-testosterone-do>

HEMOGLOBIN A1C

HbA1c and eAG

The A1c is a blood test that tells you what your average blood glucose levels have been for the past 2 to 3 months. It may also be reported as estimated average blood glucose (eAG).

To interpret your result, first find your A1C number on the left. Then read across to learn your average blood glucose for the past 2 to 3 months.

6%	126 mg/dl	8.5%	197 mg/dl
6.5%	140 mg/dl	9%	212 mg/dl
7%	154 mg/dl	9.5%	226 mg/dl
7.5%	169 mg/dl	10%	240 mg/dl
8%	183 mg/dl	10,5%	255 mg/dl

Hemoglobin A1c (HbA1c)

HbA1c is formed by glucose molecules attaching to the protein, hemoglobin (a process called glycation), in red blood cells. The blood test for HbA1c measures the percentage of hemoglobin that is glycated in the blood. Circulating HbA1c levels are an indicator of how much glucose the body has been exposed to over a 2-to-3-month time period. Measurement of HbA1c is useful for diagnosis as well as assessing the risk for developing diabetes. The American Diabetes Association (ADA) states that type 2 diabetes may be diagnosed if HbA1c is at 6.5% or higher with repeat testing. Learn more about HbA1c by clicking here : <http://www.diabetes.org/diabetes-basics/diagnosis/> to visit an informational page from the ADA website.

TSH

Question 1. What is TSH and how is it measured?

Thyroid stimulating hormone (TSH) is one of the most important hormones currently used to diagnose thyroid abnormalities. This glycoprotein is secreted by the pituitary and stimulates release of thyroxine (T4) and triiodothyronine (T3) from the thyroid gland. TSH release from the pituitary is controlled by thyrotropin releasing hormone (TRH) stimulation and negative feedback from free T3 and free T4.

Question 2. Does the time of day matter when sampling for TSH testing?

Yes. TSH concentration follows a diurnal rhythm. Typically, the peak occurs around midnight and the nadir (~50% of the peak value) around mid-day. Population-based reference intervals are generally obtained from subjects tested in the daytime, closer to the trough than to the peak. So, when evaluating a patient's serial TSH concentrations, differences in sample collection time should be considered.

Question 3. How variable is TSH?

TSH has moderate intraindividual variability and even more marked interindividual variability. The interindividual coefficient of variation is about 32%; consequently there is a wide population-based reference interval for TSH. Since the intraindividual variation is considerably less, comparing a specific patient's current TSH level with any past level may be more illuminating than comparing the patient's current TSH level to the reference interval. A difference of 0.7 mIU/L or greater is considered significant when evaluating a patient's serial TSH values.

Thyroid Screen - TSH

TSH refers to thyroid stimulating hormone. This hormone is produced in the pituitary gland and it acts on the thyroid gland in the front of your neck. Here it stimulates the production of thyroid hormones and their release into the blood. While high or low levels of TSH in the blood may indicate a thyroid disorder, additional tests may be ordered to better understand the specific medical condition. More information on TSH and screening for thyroid disorders may be found on WebMD by clicking here : <https://www.webmd.com/women/what-is-tsh-test#1>.

Thyroid Function Tests

The blood tests that are most widely used to evaluate thyroid function include those that measure TSH, T4, T3, free T4, and thyroid antibody levels. Read more about these tests in the brochure provided by the American Thyroid Association (ATA).

Download the brochure from the ATA website : http://www.thyroid.org/wp-content/uploads/patients/brochures/FunctionTests_brochure.pdf

T4, FREE

Thyroid Function Tests

The blood tests that are most widely used to evaluate thyroid function include those that measure TSH, T4, T3, free T4, and thyroid antibody levels. Read more about these tests in the brochure provided by the American Thyroid Association (ATA).

Download the brochure from the ATA website : http://www.thyroid.org/wp-content/uploads/patients/brochures/FunctionTests_brochure.pdf

T3, FREE

Thyroid Function Tests

The blood tests that are most widely used to evaluate thyroid function include those that measure TSH, T4, T3, free T4, and thyroid antibody levels. Read more about these tests in the brochure provided by the American Thyroid Association (ATA).

Download the brochure from the ATA website : http://www.thyroid.org/wp-content/uploads/patients/brochures/FunctionTests_brochure.pdf

FOLATE, SERUM

Folate Fact Sheet

Folate is a B-vitamin used by our bodies to make DNA and other genetic material and is needed for the body's cells to divide. Learn more about folate from this fact sheet provided by the NIH's Office of Dietary Supplements (ODS).

Download the fact sheet from the ODS website : <https://ods.od.nih.gov/factsheets/Folate-Consumer/>

Quest Diagnostics Patient Service Centers

Use our online scheduling service to make an appointment at a Quest Diagnostics Patient Service Center.

Schedule an Appointment : <https://secure.questdiagnostics.com/hcp/psc/jsp/SearchLocation.do>

Note: Data displayed only for results that meet strict identification matching. Historical result view may vary based on corrected or updated patient demographics. The reference range displayed may vary due to potential changes in laboratory testing methods. Please refer to the published reference range on each lab report.

These results have been sent to the person who ordered the tests. Your receipt of these results should not be viewed as medical advice and is not meant to replace discussion with your doctor or other healthcare professional.

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