Mr. SARAVANAN BALAKRISHNAN
CHENNAI Chennai
Tel No : 9940015051
PIN No: 600034
PID NO: P34923517832204
Age: 58 Year(s) Sex: Male

Reference: SELF

Sample Collected At:
AMURA HEALTH PRIVATE LIMITED PLOT NO. 44A, GANDIVAM, VGP SOUTH LAYOUT PART III,SHOLINGANALLUR, CHENNAI, CHENGALPATTU, TAMIL NADU-600119.
Processing Location:- Metropolis Healthcare Ltd, #3, Jagannathan Road, Nungambakkam, Chennai - 600 034

VID: 230121504035169
Registered On: 30/01/2024 01:21 PM
Collected On: 30/01/2024 1:20PM
Reported On: 01/02/2024 08:18 PM

CBC, Complete Blood Count

Investigation	Observed Value	Unit	Biological Reference Interval
Erythrocytes			
Erythrocyte (RBC) Count	4.73	mill/cu.mm	4.7-6.0
Haemoglobin (Hb)	13.7	gm/dL	13.5-18
PCV (Packed Cell Volume)	**38.6**	%	42-52
MCV (Mean Corpuscular Volume)	81.6	fL	78-100
MCH (Mean Corpuscular Hb)	28.9	pg	27-31
MCHC (Mean Corpuscular Hb Concn.)	35.4	g/dL	32-36
RDW (Red Cell Distribution Width)	13.0	%	11.5-14.0
Nucleated RBC	-	per 100 WBCs	
Leucocytes			
Total Leucocytes (WBC) count	6100	cells/cu.mm	4000-10500
Absolute Neutrophils Count	3111	/c.mm	2000-7000
Absolute Lymphocyte Count	2379	/c.mm	1000-3000
Absolute Monocyte Count	427	/c.mm	200-1000
Absolute Eosinophil Count	183	/c.mm	20-500
Absolute Basophil Count	**0**	/c.mm	20-100
Neutrophils	51	%	40-80
Lymphocytes	39	%	20-40
Monocytes	7	%	2.0-10
Eosinophils	3	%	1-6
Basophils	0	%	0-2
Platelets			
Platelet count	235	10^3 / µl	150-450
MPV (Mean Platelet Volume)	8.6	fL	6-9.5
PCT (Platelet Haematocrit)	0.201	%	0.2-0.5
PDW (Platelet Distribution Width)	**17.2**	%	9-17

EDTA Whole Blood - Tests done on Automated Five Part Cell Counter. (WBC,Platelet count by impedance method/DC detection,RBC by pulse height detection method, HB by Automated - Photometric Measurement, WBC differential by VCS technology other parameters calculated) **All Abnormal Haemograms are reviewed confirmed microscopically.** Differential count is based on approximately 10,000 cells.

MC-2518

Tests marked with NABL symbol are accredited by NABL vide Certificate no MC-2518

K. R. Mukilarasi V. Kavita

Dr. Mukilarasi MD Pathology

Dr. Kavita MD, DIP NB

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Investigation	Observed Value	Unit	Biological Reference Interval
Amura Health Package-A+B+C+D+ E (Male)			
Glucose Fasting (Plasma-F,Hexokinase)	91	mg/dL	Normal: 70-100 Impaired Fasting Glucose(IFG): 100-125 Diabetes mellitus: > 126 (on more than one occassion) (American diabetes association guidelines 2022)

Note: An individual may show higher fasting glucose level in comparison to post prandial glucose level due to following reasons : The glycaemic index and response to food consumed, Changes in body composition, Increased insulin response and sensitivity, Alimentary hypoglycemia, Renal glycosuria, Effect of oral hypoglycaemics & Insulin treatment.

Associated Tests: HbA1c (H0018), Diabetes Profile – Maxi (D0021),HOMA Index (H0275), Insulin (I0275).

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Investigation	Observed Value	Unit	Biological Reference Interval
HbA1c- Glycated Haemoglobin, blood by HPLC method			
HbA1C- Glycated Haemoglobin (EDTA Whole Blood,HPLC)	**6.3**	%	Non-diabetic: <= 5.6 Pre-diabetic: 5.7-6.4 Diabetic: >= 6.5
Estimated Average Glucose (eAG) (EDTA Whole Blood)	134.11	mg/dL	

Interpretation & Remark:

1. HbA1c is used for monitoring diabetic control. It reflects the estimated average glucose (eAG).
2. HbA1c has been endorsed by clinical groups & ADA (American Diabetes Association) guidelines 2017, for diagnosis of diabetes using a cut-off point of 6.5%.
3. Trends in HbA1c are a better indicator of diabetic control than a solitary test.
4. Low glycated haemoglobin(below 4%) in a non-diabetic individual are often associated with systemic inflammatory diseases, chronic anaemia(especially severe iron deficiency & haemolytic), chronic renal failure and liver diseases. Clinical correlation suggested.
5. To estimate the eAG from the HbA1C value, the following equation is used: eAG(mg/dl) = 28.7*A1c-46.7
6. Interference of Haemoglobinopathies in HbA1c estimation.
   A. For HbF > 25%, an alternate platform (Fructosamine) is recommended for testing of HbA1c.
   B. Homozygous hemoglobinopathy is detected, fructosamine is recommended for monitoring diabetic status
   C. Heterozygous state detected (D10/ turbo is corrected for HbS and HbC trait).
7. In known diabetic patients, following values can be considered as a tool for monitoring the glycemic control. Excellent Control - 6 to 7 %, Fair to Good Control - 7 to 8 %, Unsatisfactory Control - 8 to 10 % and Poor Control - More than 10 % .

Note : Hemoglobin electrophoresis (HPLC method) is recommended for detecting hemoglobinopathy.

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Investigation	Observed Value	Unit	Biological Reference Interval
Insulin (Fasting) (Serum,ECLIA)	9.61	µIU/mL	Fasting: 2-25

Interpretation:

Increased insulin levels are seen in acromegaly, Cushing syndrome, drugs usage (such as corticosteroids, levodopa, oral contraceptives), fructose or galactose intolerance, insulinomas, obesity, insulin resistance, acanthosis nigricans and metabolic syndrome.
Decreased insulin levels are seen in diabetes, hypopituitarism and pancreatic diseases such as chronic pancreatitis (including cystic fibrosis) and pancreatic cancer.

Fasting insulin level	Fasting glucose level	Disorder
Normal	Normal	None
High	Normal or slightly high	Insulin Resistance
Low	High	Insufficient insulin production, e.g., diabetes
Normal or high	Low	Hypoglycemia due to over secretion of insulin

Clinical Utility:

- Monitoring insulin levels gives a better prognosis in patients with longstanding diabetes mellitus treated with insulin as antibodies to insulin form in such patients.
- Insulin/ C-peptide ratio is used for differentiating between factitious hypoglycemia and insulinomas where a ratio< 1.0 indicates insulinoma; but results may vary in renal failure.

Disclaimer: Test results may vary depending on your age, gender, health history, the method used for the test . You may have a false-low result if you have a health problem that's damaging red blood cells.

Caution: Patients on Biotin supplement may have interference in some immunoassays. For sample collection, at least 8-hours wait time is recommended for individuals taking high dose of Biotin (more than 5 mg per day) supplements

Associated tests: HbA1c (H0018), Fructosamine (F0056), Diabetes Profile – Maxi (D0021), HOMA Index (H0253).

References:

1. Package Insert
2. Tietz fundamentals of clinical chemistry 6th edition. Burtis CA, Ashwood ER, Bruns DE, 2008.

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Investigation	Observed Value	Unit	Biological Reference Interval
Lipid Profile-Mini			
Cholesterol-Total (Serum,CHOD-POD)	**262**	mg/dL	Desirable: < 200 Borderline High: 200-239 High: >= 240
Triglycerides (Serum,GPO-POD)	**202**	mg/dL	Normal: < 150 Borderline High: 150-199 High: 200-499 Very High: >= 500
Medical Remarks: Suggested Lipoprotein(a)Serum (T. code L0084),Apolipoproteins Profile, Serum (T.code A0470)			
HDL Cholesterol (Serum,Direct Homogenous)	53	mg/dL	Major risk factor for heart disease: < 40 Negative risk factor for heart disease: >= 60
Non HDL Cholesterol (Serum,Calculated)	**209.0**	mg/dL	Optimal: < 130 Desirable: 130-159 Borderline high: 159-189 High: 189-220 Very High: >= 220
LDL Cholesterol (Serum,Calculated)	**168.6**	mg/dL	Optimal: < 100 Near Optimal: 100-129 Borderline high: 130-159 High: 160-189 Very High: >= 190
VLDL Cholesterol (Serum,Calculated)	**40.4**	mg/dL	6-38
LDL/HDL RATIO (Serum,Calculated)	3.18		2.5-3.5
CHOL/HDL RATIO (Serum,Calculated)	4.94		3.5-5

Note: Reference Interval as per National Cholesterol Education Program (NCEP) Adult Treatment Panel III Report.

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Investigation	Observed Value	Unit	Biological Reference Interval
Iron Studies, Serum			
Iron (Serum,Ferrozine-no deproteinization)	102.1	µg/dL	33-193
TIBC (Serum,Calculated)	289		250-450
UIBC (Serum,Ferrozine)	187.1	µg/dL	120-470
Transferin Saturation (Serum,Calculated)	35	%	14-50

Interpretation :

1. Measurements of serum iron, TIBC and the percentage of iron saturation of transferrin are useful screening tests for iron deficiency anaemia.
2. However, serum iron exhibits significant diurnal variation and may transiently rise or reach reference values after dietary or iron supplements & post blood transfusion.
3. The diagnostic specificity of a low serum iron for iron deficiency is lost in the presence of acute & chronic inflammatory processes as the concentrations of iron and transferrin in the serum are significantly affected, and fall rapidly as part of the acute phase response irrespective of the iron stores status in the body.
4. Hence, Concurrent measurement of the markers mentioned in the below interpretative table alongwith serum iron studies improves the diagnostic specificity for iron deficiency anaemia & also provides a reliable work up for microcytic hypochromic anaemia.

Tests	Iron Deficiency anaemia	Anaemia of Chronic disease	Iron overload	Hemoglobinopathy (Especially Trait)
Serum Iron	Decreased	Decreased	Increased	Normal
Serum Total Iron Binding Capacity	Increased	Decreased or Normal	Increased or Normal	Normal
% Transferrin Saturation	Decreased	Decreased or Normal	Increased or Normal	Normal
Serum UIBC	Increased	Decreased or Normal	Decreased	Normal
Serum Ferritin	Decreased	Increased	Increased or Normal	Normal
Serum Soluble Transferrin receptor	Increased	Normal	Decreased	Normal
Serum Hepcidin	Normal	Increased	Normal	Normal

Associated Tests :
1. Serum Soluble Transferrin receptor
2. Serum Hepcidin

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Investigation	Observed Value	Unit	Biological Reference Interval
Calcium (Serum,BAPTA)	9.3	mg/dL	8.6-10.0
Magnesium (Serum,Xylidyl blue)	2.4	mg/dL	1.6-2.6
Testosterone (Total) (Serum,ECLIA)	369	ng/dL	260-1000

Interpretation:

- Testosterone is the principal androgen in men and made by the testicles and adrenal glands.
- In women, it is found in small amounts and made by the ovaries and adrenal glands.
- Testosterone aids in the development of secondary sexual characteristics like enlargement of the genitals, body hair growth, development of muscle and deepening of the voice.

	High Levels seen in	Low Levels seen in
Male	Testicular tumors, Adrenal tumor	Testicular failure (primary hypogonadism) or inadequate stimulation by pituitary gonadotropins (secondary hypogonadism), Infertility, Erectile Dysfunction, Delayed puberty, Early puberty and cancer treatment.
Female	Polycystic ovarian syndrome (PCOS), Adrenal tumor, Congenital Adrenal hyperplasia (CAH) and idiopathic hirsutism.	Primary & secondary hypogonadism, Testicular feminization.

Clinical Utility:

- To evaluate androgen excess or deficiency related to gonadal function, adrenal function, or tumor activity.
- Helpful in children to investigate delayed or precocious puberty and with ambiguous genitalia.
- Helps in monitoring testosterone replacement therapy and antiandrogen therapy.

Note:

- Testosterone is subject to significant circadian variations and early morning samples are recommended. Testosterone levels are lowest in the evening.
- Levels of testosterone increase with exercise and decrease with age.

Caution:

- Drugs such as androgens and steroids can lead to decrease in testosterone levels.
- Anticonvulsants, barbiturates, clomiphene and estrogen may cause increase in testosterone levels.
- Patients on Biotin supplement may have interference in some immunoassays. For sample collection, at least 8-hours wait time is recommended for individuals taking high dose of Biotin (more than 5 mg per day) supplements.

Associated tests:

- Testosterone Profile (Test code T0043), LH/FSH Ratio Serum (L8015)

References:

- Wallach's Interpretation of Diagnostic Tests, 10th Edition.
- Arch Pathol Lab Med—Vol 141, November 2017.

Cortisol, Morning Sample (Serum 8AM,ECLIA)	12.0	ug/dl	08:00AM: 5-23

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Investigation	Observed Value	Unit	Biological Reference Interval

Interpretation
- Increased levels of cortisol are associated with Cushing syndrome, adrenal and Pituitary adenoma/carcinoma, ectopic pregnancy, ACTH production, glucocorticoid therapy, stress, depression, hypoglycaemia and hyperthyroidism.
- Decreased levels of cortisol are associated with Addison disease -primary adrenal insufficiency, secondary adrenal insufficiency - pituitary insufficiency, hypothalamic insufficiency and congenital adrenal hyperplasia.
- In New-borns, a transient rise in cortisol occurs immediately after delivery and become stable by about 1 week of age.

Clinical Utility:
- Cortisol helps in the diagnosis of Cushing's Syndrome, Addison's disease and to monitor therapy.
- Cortisol also regulates a variety of important cardiovascular, metabolic, immunologic, and maintenance of electrolyte function.

Note:
- Cortisol levels in blood increase during the early morning (highest at about 8 a.m.) and decrease slightly in the evening and during the early phase of sleep
- As more than 90% of circulating cortisol in human serum is protein-bound, changes in the binding proteins can alter the levels of serum total cortisol without influencing the free concentrations of cortisol

Associated test: Cortisol/Creatinine ratio in urine (C0332), Dexamethasone Suppression test for Cortisol-High dose, Serum (D0012), Dexamethasone Suppression test for Cortisol-Low dose, Serum (D0014), Dexamethasone Suppression test Overnight suppression For Cortisol, Serum (D0016)

Reference:

- Tietz Fundamentals of Clinical Chemistry & Molecular Diagnostics; 8th edition; 2019.
- Lee DY, Kim E, Choi MH. Technical and clinical aspects of cortisol as a biochemical marker of chronic stress. BMB Rep. 2015 Apr;48(4):209-16. doi: 10.5483/bmbrep.2015.48.4.275.
- Thau L, Gandhi J, Sharma S. Physiology, Cortisol. [Updated 2022 Aug 29]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2022 Jan.
- Pack Insert

Homocysteine (Serum,Enzymatic)	9.99	µmol/L	0-15

Interpretation :
1. Increased levels of homocysteine are seen in hyperhomocysteinemia or homocystinuria (homocysteine excreted in urine) due to nutritional and genetic deficiencies.
2. Levels are also increased in various diseases like cancers of ovary or breast, Leukaemia, chronic liver or renal failure, post-menopausal state, drug usage, alcohol consumption, and cigarette smoking.
3. High levels of homocysteine can also lead to blood clots or blood vessel blockages
4. Maternal hyperhomocysteinemia is associated with increased risk of pregnancy complications.

Clinical Utility:
1. Homocysteine values can help in the diagnosis and treatment of patients suspected of having hyperhomocystinemia and homocystinuria.
2. Homocysteine is a marker for risk assessment of coronary artery disease (CAD), stroke and deep vein thrombosis.

Caution:
- Drugs like methotrexate, carbamazepine, phenytoin, nitrous oxide, anticonvulsants and 6-azauridine triacetate increase levels of homocysteine.

Reference:

- Kit Insert
- Maron BA, Loscalzo J. The treatment of hyperhomocysteinemia. Annu Rev Med. 2009;60:39-54

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Investigation	Observed Value	Unit	Biological Reference Interval
HsCRP-High Sensitivity CRP (Serum,Immunoturbidimetric)	0.79	mg/L	Low risk: < 1.0 Average risk: 1.0-3.0 High risk: > 3.0

Interpretation:

1. High sensitivity C (Hs-CRP) reactive protein (hs CRP) helps in identification of risk for cardiovascular diseases
2. It also helps in monitoring the prognosis in patients with cardiovascular diseases such as stable coronary disease or acute coronary syndromes.
3. It is also raised in active infection, systemic inflammatory processes or tissue injury, Malignancy, burns and ongoing hormonal therapy like estrogen and progesterone.
4. It also increases after 24-48 hours of acute myocardial infarction, peaks at 72 hours and comes down after several weeks.
5. Decreased levels are seen in Exercise, weight loss, moderate alcohol consumption and drugs (eg. statins, fibrates, niacin).

Caution: Patients with evidence of active infection, systemic inflammatory processes or trauma should not be tested for Hs-CRP for cardiovascular indications, since it may show false high results

Cardiovascular Risk Classification by HsCRP*	
Risk Level	HsCRP (Mg/L)
Low	<1.0
Average	1.0-3.0
High	>3.0
*Cardiovascular disease risk assessment guidelines recommended by the CDC and the American Heart Association (CDC/AHA)	

AssociatedTests: Cardiac Injury Profile-Mini (C0034).

Reference:

- Package insert
- Wallach's interpretation of diagnostic tests, Ed11, 2020
- Sehring SM, Goyal A, Patel BC. C Reactive Protein. [Updated 2021 Dec 28]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2022 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK441843/
- Henry's Clinical Diagnosis and Management by Laboratory Methods. 23rd ed; 2017.
- Tietz fundamentals of clinical chemistry 6th edition. Burtis CA, Ashwood ER, Bruns DE, 2008.

Ferritin (Serum,ECLIA)	310	ng/mL	30-400

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Investigation	Observed Value	Unit	Biological Reference Interval

Interpretation :

1. Increased ferritin is seen in iron overload as in multiple blood transfusions, hemochromatosis and anemia of chronic Disorders. It is also seen in liver diseases, alcoholism, inflammatory conditions, leukemia, Hodgkins disease and some malignancies. It is also observed to be increased during COVID 19
2. Decreased ferritin levels are seen in iron deficiency anemia, early stage before iron deficiency manifests as anemia.

Clinical Utility: Levels of ferritin are used for monitoring of iron levels during pregnancy, dialysis and during iron therapy.

Caution: Patients on Biotin supplement may have interference in some immunoassays. With individuals taking high dose Biotin (more than 5 mg per day) supplements, at least 8-hour wait time before blood draw is recommended.

Note :
If the test has been ordered for COVID-19 purpose, you may take one of the following profiles for further investigation under your clinician's advice.

1. Covid Monitor Initial profile (C0374) from Day 1 to Day 5
2. Covid Monitor maintenance profile (C0375) from Day 5 to Day 10
3. Covid Monitor Recovery profile (C0376) after discharge.

Associated Tests: Iron studies (I0286)

Reference:

1. Package insert
2. Arch Pathol Lab Med—Vol 141, November 2017

Vitamin B12 level (Serum,ECLIA)	518	pg/mL	187-883

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Investigation	Observed Value	Unit	Biological Reference Interval

Interpretation :

1. Vit B12 levels are decreased in megaloblastic anemia, partial/total gastrectomy, pernicious anemia, peripheral neuropathies, chronic alcoholism, senile dementia, and treated epilepsy.
2. An associated increase in homocysteine levels is an independent risk marker for cardiovascular disease and deep vein thrombosis.
3. Holo Transcobalamin II levels are a more accurate marker of active VitB12 component.

Caution:

- Patients on Biotin supplement may have interference in some immunoassays. With individuals taking high dose Biotin (more than 5 mg per day) supplements, at least 8-hour wait time before blood draw is recommended.

Disclaimer:

- High levels of Vitamin B12 may be due to exogenous supplementation. Kindly correlate clinically.

Associated Tests

- Active Vitamin B12 (V0012), Homocysteine reflex Vitamin B12-folate serum (H0310), Homocysteine Serum (H0254),RBC Folate R0007.

Reference:

1. Package insert
2. Arch Pathol Lab Med—Vol 141, November 2017

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Investigation	Observed Value	Unit	Biological Reference Interval
25 Hydroxy (OH) Vit D (Serum,ECLIA)	37.8	ng/mL	Deficiency: < 10 Insufficiency: 10-30 Sufficiency: 30-100 Hypervitaminosis: > 100

Interpretation:

- Vitamin D is a fat soluble vitamin and exists in two main forms as D3 & D2. Both are converted to 25(OH) vitamin D in liver.
- For diagnosis of vitamin D deficiency, it is recommended to have clinical correlation with serum 25(OH)vitamin D, serum calcium, serum iPTH & serum alkaline phosphatase
- During monitoring of oral vitamin D therapy- suggested testing of serum 25(OH) vitamin D is after 12 weeks or 3 months of treatment.

Caution:

- Patients on Biotin supplement may have interference in some immunoassays. With individuals taking high dose Biotin (more than 5 mg per day) supplements, at least 8-hour wait time before blood draw is recommended.

Disclaimer:

- The required dosage of vitamin D supplements & time to achieve sufficient vitamin D levels show significant seasonal (especially winter) & individual variability depending on age, body fat, sun exposure, physical activity, genetic factors (especially variable vitamin D receptor responses), associated liver or renal diseases, malabsorption syndromes and calcium or magnesium deficiency.
- Vitamin D toxicity is known but very rare. Kindly correlate clinically, repeat with fresh sample if indicated.

Associated Tests:

- iPTH-Intact Molecule Parathyroid hormone Serum/Plasma (P0114), Calcium(C0017), Vitamin D plus profile(V0016)

Reference:

1. Package insert
2. Arch Pathol Lab Med—Vol 141, November 2017

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Investigation	Observed Value	Unit	Biological Reference Interval
Amylase level (Serum,Enzymatic)	63	U/L	25-125

Interpretation:
- High levels are seen in various pancreatic as well as salivary gland disorders, intestinal blockage, peptic ulcer, appendicitis, viral hepatitis, burns and acute alcohol poisoning.
- Low levels are seen in bone fracture, chronic heart failure, chronic pancreatitis, liver and kidney diseases.

Clinical Utility:
- Helps in diagnosing acute pancreatitis and other pancreatic diseases.
- In acute pancreatitis, high amylase levels are usually associated with high lipase concentrations, although lipase levels may take a while to rise than blood amylase levels and will remain elevated for a longer time period.

Note:
- Pregnancy and recent kidney transplant affects the test results.
- Usage of drugs like aspirin, diuretics, oral contraceptives, corticosteroids, indomethacin, ethyl alcohol and opiates also interfere in test results.
- Amylase levels may be increased in patients with Macroamylase. It can be confirmed by testing serum lipase and urinary amylase levels.

Associated Tests: Lipase Serum (L0068), Urinary amylase (A0433_24/ A0433_24H)

Reference:

- Kit Insert.
- Henry's Clinical Diagnosis and Management by Laboratory Methods. 24th ed. Philadelphia, PA: Elsevier; 2022:chap 23

Lipase (Serum,Enzymatic)	**61.4**	U/L	13-60

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Investigation	Observed Value	Unit	Biological Reference Interval
Thyroid Antibodies-TPO and ATG,Serum (Serum,CMIA)			
Microsomal (TPO) Antibody Titre,Serum	1.37	IU/mL	<= 5.61

Test Interpretation-

- Anti-thyroid peroxidase (anti-TPO) antibodies are specific againstTPO, which catalyses iodine oxidation & iodination reactions in the thyroid gland.
- 10-15% of normal individuals & during pregnancy can have raised anti-TPO antibody titres.
- Anti-TPO antibodies are the most common anti-thyroid autoantibody, present in approximately 90% of Hashimoto's thyroiditis, 75% of Graves' disease and 10-20% of nodular goitre or thyroid carcinoma. Relatives of patients with an autoimmune thyroid disorder (40%-50%) may have elevated serum TPOAb levels. High serum antibodies are found in active phase chronic autoimmune thyroiditis & antibody titer can be used to assess disease activity. Other autoimmune disorders often associated with elevated TPOAb include: Sjogren's syndrome, lupus, rheumatoid arthritis, diabetes mellitus (typeI) and pernicious anemia.

Thyroglobulin Antibody (ATG),Serum	1.30	IU/mL	<= 4.11

Test Interpretation-

- Anti-Thyroglobulin (anti-TG) antibodies are specific against thyroglobulin, which is the matrix protein involved in the process of thyroid hormone production.
- 3% of normal individuals& during pregnancy can have raised anti-TG antibody titres.
- Anti-Thyroglobulin antibodies are found in 70% of Hashimoto's thyroiditis, 60% of idiopathic hypothyroidism, 30% of Graves' disease & a small proportion of thyroid carcinoma. Other autoimmune disorders often associated with elevated TGAb include: Sjogren's syndrome, lupus, rheumatoid arthritis, diabetes mellitus (typeI) and pernicious anemia.

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Investigation	Observed Value	Unit	Biological Reference Interval
CCP Antibody Cyclic Citrullinated Peptide (Serum,CMIA)	Negative(< 0.5)	U/mL	Negative: < 5 Positive: >= 5

Interpretation:
- Cyclic Citrullinated Peptide test used for the semi-quantitative determination of the IgG class of auto antibodies specific to CCP in biological specimens.
- High levels seen in Rheumatoid Arthritis, and in other rheumatologic conditions associated with inflammatory arthritis, such as systemic lupus erythematosus
- Low levels may be seen in low disease activity or patients in remission diagnosed with Rheumatoid Arthritis

Note:
- Anti CCP is present in only a quarter to half of patients before or at diagnosis, so a negative result does not rule out Rheumatoid Arthritis
- Patients on Biotin supplement may have interference in some immunoassays. With individuals taking high dose Biotin (more than 5 mg per day) supplements, at least 8-hour wait time before blood draw is recommended.
- The above results obtained cannot be compared to or interchanged with results determined by different assays due to differences in assay methods and reagent specificity

Associated Tests: Rheumatoid Arthritis Panel-1(R0022), Rheumatoid Arthritis Panel-2(R0023), Rheumatoid Arthritis Panel-3 (R0024)

Reference:

- Niewold TB, Harrison MJ, Paget SA. Anti-CCP antibody testing as a diagnostic and prognostic tool in rheumatoid arthritis. QJM. 2007 Apr;100(4):193-201.
- Braschi E, Shojania K, Allan GM. Anti-CCP: a truly helpful rheumatoid arthritis test? Can Fam Physician. 2016 Mar;62 (3):234.
- Abdul Wahab A, Mohammad M, Rahman MM, Mohamed Said MS. Anti-cyclic citrullinated peptide antibody is a good indicator for the diagnosis of rheumatoid arthritis. Pak J Med Sci. 2013 May;29(3):773-7.

DHEAS (Dehydroepiandrostenedione Sulphate) (Serum,ECLIA)	**421**	µg/dL	70-310
Medical Remarks: Please correlate clinically			
E2 Estradiol Serum (Serum,ECLIA)			
E2 - Estradiol level	37.4	pg/mL	11-44
ACTH-Adreno Corticotropic Hormone (Plasma,ECLIA)	**132**	pg/mL	0-46
Progesterone (Serum,CMIA)	0.2	ng/mL	0.0-0.2

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Investigation	Observed Value	Unit	Biological Reference Interval

Interpretation

- High levels are generally seen in some ovarian cysts, molar pregnancies, rare forms of ovarian cancer, adrenal cancer, congenital adrenal hyperplasia, and testicular tumors.
- Low levels may be associated with decreased ovarian function, amenorrhea, ectopic pregnancy, miscarriage & toxemia in late pregnancy.

Clinical utility

- Assessment of infertility
- Evaluation of abnormal uterine bleeding and placental health in high-risk pregnancy.
- Diagnosis and treatment of patients with threatened abortion and ectopic pregnancy.
- Determines the effectiveness of progesterone injections when administered to women to help support early pregnancy.

Note:

- Patients on Biotin supplement may have interference in some immunoassays. With individuals taking high dose Biotin (more than 5 mg per day) supplements, at least 8-hour wait time before blood draw is recommended.

Associated Tests: Estradiol (E0004)

Reference:

- Kit insert
- Arch Pathol Lab Med—Vol 141, November 2017

PSA- Prostate Specific Antigen (Serum,ECLIA)	1.14	ng/mL	Conventional for all ages: 0 - 4 50 - 59 yrs: 0 - 3.5

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Investigation	Observed Value	Unit	Biological Reference Interval

INTERPRETATION :

- Total PSA exists in serum mainly in two forms, complexed (PSA-ACT complex) and unbound (free PSA).
- Increased levels are seen in prostatic and tissue damage caused by benign prostatic hypertrophy, prostatitis, or prostate cancer.
- Transient increase in PSA can also be seen following per rectal digital or sonological examinations.
- PSA measurements are also used in the monitoring of therapy in cancer patients.
- For results between 4-10 ng/ml, free PSA & free/total ratio is recommended.

NOTE:
Patients on Biotin supplement may have interference in some immunoassays. With individuals taking high dose Biotin (more than 5 mg per day) supplements, at least 8-hour wait time before blood draw is recommended.

Disclaimer

- The above results obtained cannot be compared to or interchanged with results determined by different assays due to differences in assay methods and reagent specificity

Reference

- Thompson IM, Pauler DK, Goodman PJ, Tangen CM, Lucia MS, Parnes HL, Minasian LM, Ford LG, Lippman SM, Crawford ED, Crowley JJ, Coltman CA Jr. Prevalence of prostate cancer among men with a prostate-specific antigen level < or =4.0 ng per milliliter. N Engl J Med. 2004 May 27;350(22):2239-46.
- Arch Pathol Lab Med—Vol 141, November 2017
- Pack Insert

IGF-1 (Somatomedin C) (Serum,CLIA)	109.6	ng/mL	63.7-193

Interpretation :

1. Increased levels seen in gigantism,acromegaly and pregnancy.
2. Decreased levels seen with growth hormone deficiencies and hypopituitarism.
3. IGF-1 may be normal in 5-10 % cases of acromegaly and 10-20 % cases of dwarfism.

Total Proteins

Total Protein (Serum,Biuret)	7.11	g/dL	6.4-8.3
Albumin,Serum (Serum,Bromocresol green)	4.57	g/dL	3.5-5.2
Globulin (Serum,Calculated)	2.54	g/dL	1.8-3.6
A/G Ratio (Serum,Calculated)	1.8		1.1-2.2

BilirubinTotal, Direct, IndirectSerum

Bilirubin-Total (Serum,Diazo)	0.43	mg/dL	0.2-1.2

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Investigation	Observed Value	Unit	Biological Reference Interval
Bilirubin-Direct (Serum,Diazo)	0.16	mg/dL	<= 0.30
Bilirubin- Indirect (Serum,Calculated)	0.27	mg/dL	0.1-1.0
SGPT (ALT) (Serum,Enzymatic)	14	U/L	0-45
SGOT (AST) (Serum,Enzymatic)	15	U/L	0-35
Alkaline Phosphatase (Serum,pNPP)	45	U/L	40-130
Gamma GT (GGTP) (Serum,Enzymatic)	18	U/L	8-61
BUN-Blood Urea Nitrogen (Serum,Urease, UV)	8.9	mg/dL	6-20

Remark: In blood, Urea is usually reported as BUN and expressed in mg/dl. BUN mass units can be converted to urea mass units by multiplying by 2.14.

Electrolytes

Sodium (Serum,ISE) — **135** mmol/L — 136-145

Medical Remarks: Please correlate clinically.

Interpretation:

- Low levels are noted in prolonged vomiting or diarrhea, diminished reabsorption in the kidney and excessive fluid retention. High levels are seen in case of excessive fluid loss, high salt intake and increased kidney reabsorption

Potassium (Serum,ISE) — 4.43 mmol/L — 3.5-5.1

Interpretation:

- Low levels are noted in reduced intake of dietary potassium or excessive loss of potassium from the body due to diarrhea, prolonged vomiting or increased renal excretion. High levels may be caused by dehydration or shock, severe burns, hemolysis, diabetic ketoacidosis, and retention of potassium by the kidney

Chlorides (Serum,ISE) — **97** mmol/L — 98-107

Interpretation:

- **Low levels** are noted in reduced dietary intake, prolonged vomiting and reduced renal reabsorption as well as some forms of acidosis and alkalosis. High levels are found in dehydration, kidney failure, some forms of acidosis, high dietary or parenteral chloride intake, and salicylate poisoning.

Bicarbonate (Serum,Enzymatic) — **31.3** mmol/L — 22-29

Medical Remarks: Please correlate clinically.

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Investigation	Observed Value	Unit	Biological Reference Interval
Uric Acid (Serum,Uricase)	**7.1**	mg/dL	3.4-7.0

Interpretation:

- Increased in Gout, asymptomatic hyperuricemia, leukemia, polycythemia, hemolytic anemia, sickle cell anemia, resolving pneumonia, toxemia of pregnancy, psoriasis, lymphoma, metabolic acidosis, chronic lead poisoning.
- Decreased in disorders of copper accumulation , kidney tubule disorder, Acromegaly, Celiac disease, Xanthine oxidase deficiency.
- Its used to monitor gout and also chemotherapeutic treatment of neoplasm to avoid renal urate deposition with possible renal failure (tumor lysis syndrome).

Note:

- A purine rich diet as well as sever exercise increases uric acid values.
- High protein-weight reduction diet and alcohol consumption can cause raised uric acid levels.

Reeference:

- Package insert
- Wallach’s interpretation of diagnostic tests, Ed11, 2020.
- Henry's Clinical Diagnosis and Management by Laboratory Methods. 23rd ed; 2017.
- Tietz fundamentals of clinical chemistry 6th edition. Burtis CA, Ashwood ER, Bruns DE, 2008.

GFR With Creatinine

Creatinine (Serum,Jaffe)	0.96	mg/dL	0.70-1.20
Age (Serum)	58.00	Years	
eGFR (CKD-EPI) (Serum,Jaffe)	Above 90	ml/min/1.73 sq m	Normal OR high: >= 90 Mild decrease : 60-89 Mild moderate decrease: 45-59 Moderate to severe decrease: 30-44 Severe decrese: 15-29 Kidney failure: < 15

Note: Equation is not valid for patients below 18 years of age.Calculated by IDMS-Traceable CKD-EPI creatinine equation.

FSH - Follicle Stimulating Hormone (Serum,ECLIA)	4.10	mIU/mL	1.4-15.4

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Investigation	Observed Value	Unit	Biological Reference Interval

Interpretation:
FSH is a glycoprotein hormone secreted by Anterior pituitary gland and regulates the development, growth, pubertal maturation, and reproductive processes of the body. In women, FSH helps control the menstrual cycle and stimulates the growth of eggs in the ovaries. FSH levels in women change throughout the menstrual cycle, with the highest levels happening just before an egg is released by the ovary. In men, FSH helps control the production of sperm. Normally, FSH levels in men do not change very much.

In men, FSH helps control the production of sperm. Normally, FSH levels in men do not change very much.

- FSH is increased in Luteal Phase of Menstrual cycle, Ovarian hyper stimulation syndrome, Complete testicular feminization syndrome, Primary hypogonadism (anorchia, testicular failure, menopause), Precocious puberty (either idiopathic or secondary to a central nervous system lesion), perimenopausal, post menopause, hormonal therapy, heavy smokers or drinkers or people with a vitamin D deficiency
- Normal to decreased FSH in: Polycystic ovary disease in females, Pituitary gland tumor or adenoma, Secondary hypogonadism, Hyperprolactinemia, very underweight

Clinical Utility:

- An adjunct in the evaluation of menstrual irregularities
- To monitor ovulation in IVF treatment
- Diagnosing pituitary disorders
- Evaluating patients with suspected hypogonadism

Note:

- Patients on Biotin supplement may have interference in some immunoassays. With individuals taking high dose Biotin (more than 5 mg per day) supplements, at least 8-hour wait time before blood draw is recommended.
- Because of episodic, circadian and cyclic nature of FSH secretion, clinical evaluations may require determinations in pooled multiple serial samples.

Associated Tests: FSH-LH Testosterone (F0062), AMH- Mullerian inhibiting substance (A0417), Inhibin B (I0274)

Reference:

1. Package insert
2. Wallach’s interpretation of diagnostic tests, Ed11, 2020
3. Arch Pathol Lab Med—Vol 141, November 2017
4. Tietz fundamentals of clinical chemistry 6th edition. Burtis CA, Ashwood ER, Bruns DE, 2008.

LH-Leutinising Hormone (Serum,ECLIA)	3.11	mIU/mL	1.2-7.8

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Investigation	Observed Value	Unit	Biological Reference Interval

Interpretation :

LH is a glycoprotein hormone co-secreted with FSH by Anterior pituitary gland which together control growth and reproductive activities of the gonadal tissues.

1. LH is increased in Luteal Phase of Menstrual cycle, Complete testicular feminization syndrome, Primary hypogonadism (anorchia, testicular failure, menopause), Precocious puberty (either idiopathic or secondary to a central nervous system lesion)
2. LH is decreased in: Primary ovarian hyperfunction in females, Primary hypergonadism in male, In failure of the pituitary or hypothalamus, Hyperprolactinemia , Polycystic Ovary disease (PCOS).

Clinical Utility:

- An adjunct in the evaluation of menstrual irregularities
- Evaluating infertility
- Predicting ovulation in IVF Treatment
- Diagnosing pituitary disorders

Caution:

- Patients on Biotin supplement may have interference in some immunoassays. With individuals taking high dose Biotin (more than 5 mg per day) supplements, at least 8-hour wait time before blood draw is recommended.

Disclaimer:

- Because of episodic, circadian and cyclic nature of LH secretion, clinical evaluations may require determinations in pooled multiple serial samples.

Associated Tests: FSH-LH Testosterone (F0062), AMH- Mullerian inhibiting substance (A0417), Inhibin B (I0274), PCOS Profile (P1003).

Reference:

1. Package insert
2. Wallach’s interpretation of diagnostic tests, Ed10, 2015
3. Arch Pathol Lab Med—Vol 141, November 2017
4. Tietz Textbook of Clinical Chemistry and Molecular Diagnostics. Burtis CA, Ashwood ER, Bruns DE, eds. 5th edition, St. Louis: Elsevier Saunders; 2014.

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Investigation	Observed Value	Unit	Biological Reference Interval
Prolactin (Serum,ECLIA)	12.2	ng/mL	4.04-15.2

Interpretation :

MALE :
Hyperprolactinaemia in males may be associated with decreased libido, impotence, infertility, gynaecomastia.

FEMALE :
Prolactin secretion from pituitary shows significant diurnal, episodic and cyclical variations.
Following is a suggested approach to hyperprolactinaemia in females -

Serum Prolactin levels	Interpretation	Remark
4.79 - 23.3 ng/ml	**Normal**	**Biological Reference Interval**
23.3 to 50.0 ng/ml	Mild prolactin excess	Often seen with physiological conditions like physical/emotional stress, exercise, pregnancy, lactation, etc. This may not be associated with clinical hyperprolactinaemia & needs review after a month
51 to 75 ng/ml	Moderate prolactin excess	Often associated with clinical hyperprolactinaemia(short luteal phase,oligomennorrhea), hypothyroidism (often subclinical), macroprolactinaemia.
Above 100 ng/ml	Marked prolactin excess	Often associated with clinical hyperprolactinaemia- hypogonadism, amenorrhea, galactorrhea, hypothyroidism (often subclinical), macroprolactinaemia.
Above 200 ng/ml	Marked prolactin excess	Often associated with pituitary adenoma requiring further workup. High levels may be repeated with tripooled sample.

References :

1. Diagnosis & Treatment of hyperprolactinaemia. The endocrine society clinical practice guideline, 2011
2. Diagnosis & Management of hyperprolactinemia. Canadian Medical Association CMAJ .Sept.16, 2003;169(6)

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Investigation	Observed Value	Unit	Biological Reference Interval
Amura Health Package-A+B+C+D+ E (Male)			
Thyroid panel-1 (T3/T4/TSH) (Serum,ECLIA)			
T3 (Total)	86.3	ng/dL	84.6-201.8
T4 (Total)	6.15	µg/dL	5.1-14.1
TSH(Ultrasensitive)	2.22	µIU/mL	0.54-5.3

INTERPRETATION

TSH	T3 / FT3	T4 / FT4	Suggested Interpretation for the Thyroid Function Tests Pattern
Within Range	Decreased	Within Range	• Isolated Low T3-often seen in elderly & associated Non-Thyroidal illness. In elderly the drop in T3 level can be upto 25%.
Raised	Within Range	Within Range	•Isolated High TSHespecially in the range of 4.7 to 15 mIU/ml is commonly associated with Physiological & Biological TSH Variability. •Subclinical Autoimmune Hypothyroidism •Intermittent T4 therapy for hypothyroidism •Recovery phase after Non-Thyroidal illness"
Raised	Decreased	Decreased	•Chronic Autoimmune Thyroiditis •Post thyroidectomy,Post radioiodine •Hypothyroid phase of transient thyroiditis"
Raised or within Range	Raised	Raised or within Range	•Interfering antibodies to thyroid hormones (anti-TPO antibodies) •Intermittent T4 therapy or T4 overdose •Drug interference- Amiodarone, Heparin,Beta blockers,steroids, anti-epileptics"
Decreased	Raised or within Range	Raised or within Range	•Isolated Low TSH -especially in the range of 0.1 to 0.4 often seen in elderly & associated with Non-Thyroidal illness •Subclinical Hyperthyroidism •Thyroxine ingestion"
Decreased	Decreased	Decreased	•Central Hypothyroidism •Non-Thyroidal illness •Recent treatment for Hyperthyroidism (TSH remains suppressed)"
Decreased	Raised	Raised	•Primary Hyperthyroidism (Graves' disease),Multinodular goitre, Toxic nodule •Transient thyroiditis:Postpartum, Silent (lymphocytic), Postviral (granulomatous,subacute, DeQuervain's),Gestational thyrotoxicosis with hyperemesis gravidarum"
Decreased or within Range	Raised	Within Range	•T3 toxicosis •Non-Thyroidal illness

References: 1. Interpretation of thyroid function tests. Dayan et al. THE LANCET • Vol 357 • February 24, 2001
2. Laboratory Evaluation of Thyroid Function, Indian Thyroid Guidelines, JAPI, January 2011,vol. 59

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Routine Examination Urine

Investigation	Observed Value	Unit	Biological Reference Interval
Amura Health Package-A+B+C+D+ E (Male)			
General Examination			
Colour (Automated LED Light Sensor)	**Yellow**		Pale Yellow
Appearance (Automated LED Light Sensor)	Clear		Clear
Reaction (pH) (Automated Dipstick Method)	5.5		4.5-8
Specific gravity (Automated Dipstick Method)	**1.005**		1.010-1.030
Chemical Examination (Automated Urine Chemistry)			
Urine Protein (Albumin) (Automated Photoelectric colorimetry /Protein Error Principle)	Absent		Absent
Urine Glucose (sugar) (Automated Photoelectric Colorimetry/GOD POD)	Absent		Absent
Urine Ketones (Acetone)	Absent		Absent
Bile Salt and pigment	Absent		Absent
Bile salts (Hay's Sulphur method)	Absent		Absent
Bile pigments (Automated Photoelectric colorimetry/Fouchet's method)	Absent		Absent
Urobilinogen (Automated Photoelectric colorimetry/ Diazo Reaction)	Normal		Normal
Nitrite (Automated Photoelectric colorimetry/Modified Greiss Reaction)	Negative		Negative
Microscopic Examination(Automated cell analyzer by Digital Imaging Technology)			
Red blood cells	Absent	/hpf	0-2
Dysmorphic Red Blood Cells	Absent		Absent
Pus cells (WBCs)	**4-6**	/hpf	0-5
Epithelial cells	**3 - 5**	/hpf	0-4
Crystals	Absent	/hpf	Absent
Cast	Absent	/hpf	Absent
Amorphous deposits	Absent		Absent

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Investigation	Observed Value	Unit	Biological Reference Interval
Bacteria	Absent	/hpf	Absent
Trichomonas Vaginalis	Absent		Absent
Yeast cells	Absent		Absent

All urine samples are checked for adequacy and suitability before examination

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Investigation	Observed Value	Unit	Biological Reference Interval
tTG (Tissue Transglutaminase) IgG (Serum,EIA)	Negative,1.5	U/mL	Negative: < 10 Positive: >= 10
DHT (5-alpha Dihydrotestosterone) (Serum,ELISA)	409	pg/mL	143-842

Interpretation note:

- Low levels are observed In Klinefelter syndrome also known as 47, XXY
- Increased levels are observed In idiopathic hirsutism or hirsutism without a known cause in about 40 % of the patients
- In polycystic ovaries (PCO) about 35 % of the patients have an increased DHT level.
- A decrease in the levels of DHT is seen in patients with azoospermia.
- There is a very low level of DHT in patients with anorchia a rare condition in which both testes are absent.

Clinical Utility:

- Measurement of 5-alpha Dihydrotestosterone (DHT) is useful in investigations of delayed puberty in men and evaluation of the presence of active testicular tissue.
- It has been reported that in some prostate cancer (especially in stage D) the determination of DHT could be useful in predicting the response to anti-androgen therapy.

Associated Tests:

- Testosterone Total (T0042), Testosterone Free (T0041)

Reference:

- Kit Insert

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Investigation	Observed Value	Unit	Biological Reference Interval
RBC Folate			
Folic Acid (Serum,ECLIA)	6.07	ng/mL	3.1-17.5

Interpretation :

- Decreased levels of folic acid are seen in megaloblastic anemia, malnutrition, liver disease, chronic haemodialysis, alcoholism, and inadequate dietary intake. Low levels are associated with a higher risk of fetal malformations during pregnancy.

Clinical Utility:

- To assess Folic acid vitamin deficiency

Caution:

- In patients taking methotrexate therapy, antibodies formed may interfere with the assay.
- Drugs which decrease serum folic acid levels are phenytoin, phenobarbital, erythromycin, Chloramphenicol, tetracycline, oestrogens.

Associated Tests: Homocysteine reflex B12-folate Serum (H0310), Homocysteine Serum (H0254), Vitamin B12 Cyanocobalamin Serum (V0010)

Folic acid, RBC (Whole Blood,Calculated)	**1443.04**	ng/mL	523-1257

Interpretation :

- Decreased levels of folic acid are seen in megaloblastic anaemia, malnutrition, liver disease, chronic haemodialysis, alcoholism, and inadequate dietary intake.
- Low levels are associated with a higher risk of foetal malformations during pregnancy.

Clinical Utility:

- To assess Folic acid vitamin deficiency

Caution:

- In patients taking methotrexate therapy, antibodies formed may interfere with the assay.
- Drugs that decrease serum folic acid levels are phenytoin, phenobarbital, erythromycin, Chloramphenicol, tetracycline, oestrogens.

Associated Tests: Homocysteine reflex B12-folate Serum (H0310), Homocysteine Serum (H0254), Vitamin B12 Cyanocobalamin Serum (V0010)

Reference:

- Kit Insert

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Investigation	Observed Value	Unit	Biological Reference Interval
SHBG (Sex Hormone Binding Globulin) (Serum,CLIA)	37.00	nmol/L	13-71

Interpretation :-

1. SHBG is important transport protein for estrogens and androgens in peripheral blood. SHBG concentration is a major factor regulating their distribution between the protein-bound and free states.
2. SHBG concentration in plasma is regulated by androgen/estrogen balance, thyroid hormones, insulin and dietary factors.
3. Plasma SHBG concentrations are affected by many different medical conditions.
   - High values being found in hyperthyroidism, hypogonadism, androgen insensitivity and hepatic cirrhosis in men.
   - Low concentrations are found in myxoedema, hyperprolactinaemia and syndromes of excessive androgen activity.
4. Measurement of SHBG along with Free Androgen index (FAI), which is ratio of testosterone to SHBG helps in identifying excessive androgen activity & useful in the evaluation of mild disorders of androgen metabolism.

IGF BP3 (Serum,CLIA)	3.40	ug/ml	3.4-6.9

Note : IGFBP-3 forms the major bound form of IGF-1 hence IGF-1 levels should be interpreted in conjunction with IGFBP-3 levels and GH levels.

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