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Patient Name	: Mr.AHMED M NAYEM	**Sample UID No.**	: D001B021000105
Age/Gender	: 35Y/Male	**Registered On**	: 06-06-2022 17:33
Patient Id	: 3079	**Sample Collected On**	: 06-06-2022 17:52
Referred By	: -	**Reported On**	: 06-06-2022 23:45
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Department of Biochemistry

Iron

Investigation	Result	Units	Biological Reference Interval
Iron	96	µg/dl	49-181
Method : Pyridyl azo dye			

Comments -
CLINICAL IMPLICATIONS:
1.The combined results of iron,transferrin,and TIBC are helpful in the differential diagnosis of anaemia,in assessment of iron deficiency anaemia and in the evaluation of thalassemia,sideroblastic anaemia asnd haemochromatosis.
2.Transferin saturation is a better index of iron saturation.Percent saturation is a better index of iron stores than serum alone.Saturation <15% percent denotes iron deficiency.
INTERFERING FACTORS:
1.Hemolysis of the blood sample may interfere with testing.Drugs like aspirin,antibiotics,testosterone may cause decreased levels and drugs like ethanol,estrogen may cause an increased iron levels.
2.Diurnal variation in iron.Normal values in the morning,low in midafternoon,very low in the evening.
3.Serum iron and TIBC may be normal in iron deficiency anaemia if Hb is >than 9.0g/dl or >90g/L.
RECOMMENDATION:
In patients receiving folate or Vitamin B12 recommended to repeat iron studies after 1 to 3 months of completion of treatment.

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Department of Immunology

Vitamin B12

Investigation	Result	Units	Biological Reference Interval
Vitamin B12	188	pg/ml	187-883
Method : CMIA			

Comments -
CLINICAL IMPLICATIONS:
1.Levels of Vitamin B12 and folate are usually tested in conjunction with one another for the diagnosis of Macrocytic anaemia and measurement of unsaturated VB12 binding capacity is valuable in distinguishing between untreated polycythemia vera and other conditions in which there is an elevated HCT.
2.Serum levels can be low in the absence of either anaemia or macrocytosis(eg in patients with myeloma,aplastic anaemia) and conversely elevated Transcobalamin II can cause a normal or increase Vitamin B12 levels despite deficient liverstores.

INTERFERING FACTORS:
1.Blood transfusion,pregnancy,elderly patients,high vitamin C and A ,smoking ,drugs like aminoglycosides,metformin may alter the vitamin B 12 levels.
2.Low serum vitamin B 12 levels often occur in folate deficiency,and B12 deficiency can be masked by folate therapy.

REFERENCE:
1) Manual of Laboratory and Diagnostics -Frances Fischbach Marshall B. Dunning III [9th Edition]
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Department of Biochemistry

Liver Function Profile

Investigation	Result	Units	Biological Reference Interval
sGPT (ALT) Method : ALTv	21	U/L	0-50
sGOT (AST) Method : Enzymatic, colorimetric-Vitros	29	U/L	17-59
Alkaline Phosphatase Method : PNPP, AMP Buffer-Vitros	69	U/L	38-126
Gamma GT Method : Vitros microslide	**12**	U/L	15-73
Total Bilirubin Method : Diphyline,Diazonium Salt-Vitros	1.0	mg/dl	0.2-1.3
Direct Bilirubin Method : Spectrophotometric	0.2	mg/dl	0.0-0.4
Indirect Bilirubin Method : Direct measure	0.8	mg/dl	0.0-1.1
Total Protein Method : Biuret	6.8	g/dl	6.3-8.2
Albumin Method : Bromocresol Green	4.3	g/dl	3.5-5.0
Serum Globulin	2.5	g/dl	2.5-3.5
Albumin/Globulin Ratio	1.72	-	1.1-2.5

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Comments -
CLINICAL IMPLICATIONS:

1) Total Bilirubin elevation accompanied by jaundice is due to hepatic, obstructive, hemolytic and blood group compatibility.
2) Increase albumin is associated with dehydration and decrease is due to acute and chronic inflammation, burns and heart failure.
3) Although AST levels always increase in acute MI, ALT level doesn't always increase unless there also liver damage.
4) ALT is usually increased more than AST in acute extra hepatic biliary obstruction.
5) ALT is more specific than AST for liver disease but AST is more sensitive to liver disease.
6) Alkaline phosphatase normal values are higher in pediatric patient and in pregnancy. Values may increase upto 3 times in puberty.
7) GGT is used to confirm biliary abnormality and is elevated in hepatobiliary disease but not in uncomplicated bone disease.
8) GGT values are higher in new born, first 3 to 6 month . Adult male have 25% higher values than female.

INTERFERING FACTORS:
1) Certain foods like carrots, yam, drugs, anorexia, prolonged fasting may falsely increase bilirubin level.
2) Albumin levels may reduce in pregnancy,over hydration,edema, drugs, obesity.Lipemic samples with a high fat content can interfere with albumin levels.
3) Young children, pregnant women, post-menopausal women have physiological high level of ALT.Many drugs,heparin,hemolyzed blood,obesity causes increase in ALT. Alkaline phosphatase increase after fatty meal.
4) Slight reduce level of AST can be seen during pregnancy and false reduced level in severe liver disease.

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Department of Biochemistry

Blood Sugar Random

Investigation	Result	Units	Biological Reference Interval
Blood Sugar Random	84	mg/dl	70-140
Method : GOD/POD			

Comments -
CLINICAL IMPLICATION:
ADA criteria for definitive test for diabetes:
1) Fasting blood glucose > 126 mg/dl (> 6.99 mmol/l) on at least two occasions.
2) Symptoms of diabetes plus random blood glucose > 200 mg/dl (> 11.1 mmol/l)
3) oGTT with 2 hrs postload (75 gm glucose load) > 200 mg/dl (> 11.1 mmol/l)
4) HbA1c > 6.5%
INTERFERING FACTORS:
1) Steroids, diuretics, pregnancy, surgical procedures, anaesthesia, obesity, smoking may cause elevated glucose levels.
2) Haematocrit > 55%, intense exercise, drug intake may cause lowered glucose level.
3)Dawn phenomenon-Increase in blood glucose typically between 4.00am and 8.00 am due to counter-regulatory harmones.
RECOMMENDATION:
As mild borderline cases may present with normal fasting glucose levels, recommended repeat testing on a different day.
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Department of Immunology

Ferritin

Investigation	Result	Units	Biological Reference Interval
Ferritin	45.48	ng/ml	21.81-274.66
Method : CMIA			

Comments -
CLINICAL IMPLICATIONS:
1. Ferritin is the most reliable indicator of total body iron status and is more specific and sensitive than the iron concentration or TIBC for diagnosing iron deficiency. Feritin decreases before anemia and other changes occurs.
2. Decreased ferritin usually indicates iron deficiency anemia and increased ferritin occurs in iron excess and other causes like hyperthyroid, liverdisease, hemolytic, megaloblastic, sideroblastic and thalassemia.
3. Ferritin levels less than 10ng/ml usually indicate iron deficiency anaemia. In conditions of iron overload and in some chronic diseases ,serum ferritin is an unreliable estimate of storage iron and in such cases serum ferritin is less sensitive than serum iron concentration, TIBC, or percent transferrin saturation.

INTERFERING FACTORS:
1. Recently administered radioactive medication can cause spurious results.
2. Hemolyzed blood, age, diet, antithyroid therapy are the factors that may interfere the ferritin values.
3. Ferritin is not of value to evaluate iron stores in alcoholic person with liver disease

REFERENCES:
1.A Manual of Laboratory and Diagnostic Tests -Frances Fischbach, Marshall B.Dunning III (NINTH EDITION)
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Department of Biochemistry

Transferrin Saturation

Investigation	Result	Units	Biological Reference Interval
Transferrin Saturation	**18.75**	%	20-50

Method : Calculated

Comments -
CLINICAL IMPLICATIONS:
1.Transferrin is the major plasma transport protein for iron. A level of >0.15g/L is associated with nearly normal erythrocyte production in patients with congenital a transferrinemia. The presence of moderate amounts of unsaturated transferrin may be important in control of infections and infestations by iron requiring organisms.
2.Increased levels may be seen with estrogen therapy, pregnancy, iron deficiency anemia. Decreased transferrin is found in microcytic anemia of chronic diseases, protein deficiency or loss from burns or malnutrition, chronic infection,acute liver disease, renal disease, genetic deficiency.
3. Reference range for transferrin saturation for male 20-50%, female 15-50%. Higher transferrin saturation values are found in high iron states such as megaloblastic anemia,sideroblastic anemia and iron overload states. Decreased transferrin saturation is found in chronic iron deficiency, chronic infection, extensive malignancy, tissue inflammation states, uremia ,nephrotic syndrome.
4. Men with anemia should undergo a thorough endoscopic evaluation to assess for gastrointestinal neoplasms when transferrin saturation value is 9% or less. (Ref: Int J hematology2012 jun 28).The earliest markers of iron deficiency include ferritin, marrow iron, and iron binding capacity. These are followed by serum iron, percentage of transferrin saturation and decrease in hemoglobin and hematocrit.

INTERFERING FACTORS:
Hemolysis of blood sample may interfere with results. There is a diurnal variation in iron. Normal values in the morning, lower in the midafternoon, very low in the evening. Serum iron and TIBC may be normal in iron deficiency anemia if the Hb> 9.0g/dl .

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Department of Immunology

25-OH Vitamin D

Investigation	Result	Units	Biological Reference Interval
25-OH Vitamin D	**14.2**	ng/ml	Normal: >= 30 Insufficient: 21 - 29 Deficient: <= 20

Method : CMIA

Comments -
CLINICAL IMPLICATIONS:
1. Increased Vitamin D levels are seen in gastrointestinal symptoms like anorexia, nausea,vomiting, constipation, hypercalcemia, renal colic, supplements, normal growing children ,pregnant and lactating females,tuberculosis,idiopathic hypercalciuria,sarcoidosis. Levels can increase to 200 -300pg/ml during treatment of osteomalacia with physiological doses of vitamin D.
2. Decreased levels are seen in Inadequate diet,Inadequate exposure to sunlight,liver disease,Malabsorption syndrome,osteomalacia, Anticonvulsants, rickets, chronic renal failure, pseudohypoparathyroidism, post-menopausal osteoporosis and adults with insulin requiring diabetes mellitus.
3.25(OH) levels do not indicate clinical vitamin D status in patients with chronic renal failure or type 1 vitamin D dependent rickets or when calcitriol is used as a supplement.

INTERFERING FACTORS:
Age,season of the year,diarrhea or vomiting,certain drugs,diseases,and long term hyperalimentation are the factors that may interfere with the vitamin levels.

RECOMMENDATION:
Recommended to evaluate alternate cause of impaired mineralization ,if the levels are not consistent with the suspected diagnosis.
REFERENCES:
1. A Manual of Laboratory and Diagnostic Tests -Frances Fischbach ,Marshall B.Dunning III(NINTH EDITION)
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Age/Gender	: 35Y/Male	**Registered On**	: 06-06-2022 17:33
Patient Id	: 3079	**Sample Collected On**	: 06-06-2022 17:52
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Department of Hematology

Complete Blood Count

Investigation	Result	Units	Biological Reference Interval
Hemoglobin	15.83	g/dl	13-17
Total Leucocyte Count	9.11	thou/ul	4-11
Red cell counts	5.44	million/ul	4.5-5.5
Hematocrit	47.2	%	42-52
MCV	86.8	fl	78-100
MCH	29.1	pg	27-31
MCHC	33.5	g/dl	31-35
RDW	**14.7**	%	11.6-14.0
RDW-SD	44	fl	38.9-49
MPV	**11.29**	fl	6.8-10.9
Platelet Count	203.9	thou/ul	150-400
Neutrophil	66.74	%	40-80
Lymphocyte	**21.41**	%	30-40
Monocyte	8.55	%	2-10
Eosinophil	3.01	%	1-8

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Basophil	0.3	%	0-2

Comments -
Methodology:

WBC Count, RBC Count, Platelet Count - Electrical Impedance: Hemoglobin - Photometry; Differential Count - Flow cytometry; Hematocrit, RBC & Platelet Indices - Calculated.

Interfering factors:
Factors such as age, gender, pregnancy, drug intake, excessive fluid intake, dehydration, hyperlipidemia, stress, exercise, post-operative state, new born, clotted specimen may interfere with test results. Hence recommended fresh EDTA blood sample for confirmation.

Reference - Manual of Laboratory and Diagnostics -Frances Fischbach Marshall B. Dunning III [9th Edition]

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Department of Biochemistry

Potassium

Investigation	Result	Units	Biological Reference Interval
Potassium	4.7	mmol/L	3.5-5.1
Method : ISE Direct			

Comments -
Clinical Implication:
1. Potassium, electrolytes of intracellular fluid is important to diagnose acid-base and water imbalance and the value varies with circulatory volume.
Interfering factors:
1. Blood drawing procedure affect the values of potassium. Drugs like diuretics and NSAID increase values and excess intake of licorice decrease potassium level.

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Department of Biochemistry

Lactate Dehydrogensae

Investigation	Result	Units	Biological Reference Interval
Lactate Dehydrogensae	414	U/L	207-414
Method : Pyruvate			

Comments -
Clinical Implication:
Increased LDH occurs in the following condition:
1. High levels occurs within 36 to 55 hours after MI and continue longer than elevation of sGOT or CPK (3 to 10 days). Differential diagnosis of acute MI be accomplished without LDH isoenzymes.
2. In pulmonary infarction, increased LDH occurs within 24 hours of pain onset. The pattern of normal sGOT and elevated LDH that levels off 1 to 2 days after an episode of chest pain is indicative of pulmonary infraction.

Interfering factors:
1. Strenuous exercise and the muscular exertion involved in childbirth cause increased LDH levels.
2. Skin diseases can cause falsely increased LDH levels.
3. Hemolysis of red blood cells due to freezing, heating, or shaking the blood sample will cause falsely increased LDH levels.
4. Various drugs may cause increased or decreased LDH levels.
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Department of Biochemistry

Chloride

Investigation	Result	Units	Biological Reference Interval
Chloride	101	mmol/L	98-107
Method : ISE Direct			

Comments -
Clinical Implication:
1. Chloride,blood electrolytes is helpful in diagnosing disorders of acid base,water balance and has reciprocal rise (or) fall in response to concentration of other anions.
Interfering factors:
1. Chloride concentration in infants is higher than in children and adults. Drugs may alter chloride levels. Increased values is associated with IV Saline infusion.

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Department of Immunology

Thyroid Profile (Total)

Investigation	Result	Units	Biological Reference Interval
Total T3 Method : CMIA	1.07	ng/ml	0.35-1.93
Total T4 Method : CMIA	8.9	µg/dl	4.87-11.72
Thyroid Stimulating Hormone Method : CMIA	0.970	µIU/ml	0.35-4.94

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Patient Name	: Mr.AHMED M NAYEM	**Sample UID No.**	: D001B021000105
Age/Gender	: 35Y/Male	**Registered On**	: 06-06-2022 17:33
Patient Id	: 3079	**Sample Collected On**	: 06-06-2022 17:52
Referred By	: -	**Reported On**	: 06-06-2022 23:45
Referral Clinic	: Peshawar Medical Center (Irham Arjan)		
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Comments -
-Total T3
Clinical implication:
1.Total T3 level is a quantitative determination of the total T3 concentration in the blood and is the test of choice in the diagnosis of T3 thyrotoxicosis.
2.Starvation and state of nutrition and subacute nonthyroid illness can cause a decreased T3 values.
Interfering factors:
1.Values are increased in pregnancy, usage of drugs such as estrogens and methadone.
2.Values are decreased with use of drugs such as anabolic steroids, salicylates, phenytoin, nicotinic acid and fasting can also cause a decrease in value.
Total T4
Clinical Implications:
1.Total T4 is a good index of thyroid function when TB G (Thyroid Binding Globulin) is normal. The increase in TBG levels normally seen in pregnancy and with estrogen therapy increases total T4 levels.The decrease of TBG levels in person receiving anabolic steroids ,in chronic liver disease and in nephrosis decrease the total T4 value.
2. Total T4 test also can be used as a guide in establishing maintenance dose of thyroid hormone in the treatment of hypothyroidism .It can also be used to follow the results with anti-thyroid drug administration in hyperthyroidism.
3Total T4 values are higher in neonates due to elevated TBG , Value rises abruptly in the first fewhours after birth and decline gradually until the age of 5 years.
Interfering factors:
1.Total T4 level may increase with use of drugs like estrogen,methadone,excess iodine ,second and third month of pregnancy.
2.Values may decrease with salicylates, anticonvulsants, steroids and radiocontrast agents for X-rays.
Thyroid Stimulating Hormone
CLINICAL IMPLICATIONS:
1. TSH has diurnal rhythm, peaks at 2:00-4:00am and has low levels at 5:00-6:00pm with ultradian rhythm (shorter than circadian).
2. Moderately high TSH is often found in euthyroid patients during treatment for hyperthyroidism. In treated hyperthyroid patient, TSH may remain low for 4-6 week after euthyroid state is achieved. TSH surges with birth,peaking at 30min at 25-160mU/L,declining to cord blood levels by 3 days,and reaching adult values in the first week of life.
3.If there is clear evidence of hypothyroidism and TSH is not elevated then an implication of possible hypopituitarism exists.
INTERFERING FACTORS:
1.Values are normally high in neonatal cord blood,and comes to normal by first week.
2.Values are increased in elderly patients,drugs like amphetamine abuse,potassium iodide,lithium,iodine containing drugs.
3.Values may be decreased in first trimester of pregnancy and during treatment with thyroxine and corticosteroids.
4.Heterophilic antibodies may falsely decrease or increase test results.
REFERENCE:
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Patient Name	: Mr.AHMED M NAYEM	**Sample UID No.**	: D001B021000104
Age/Gender	: 35Y/Male	**Registered On**	: 06-06-2022 17:33
Patient Id	: 3079	**Sample Collected On**	: 06-06-2022 17:52
Referred By	: -	**Reported On**	: 06-06-2022 20:07
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Department of Biochemistry

Glycated Hemoglobin(HbA1c)

Investigation	Result	Units	Biological Reference Interval
Glycated Hemoglobin	4.9	%	<5.7 Non-Diabetic 5.7 - 6.4 Pre-Diabetic >6.4 Diabetic

Comments -
CLINICAL IMPLICATIONS:
1) Glycated hemoglobin reflects average blood sugar level for 2 to 3 month period and useful for evaluating diabetic medications and to track the control of blood glucose in milder cases.
2) Increase in Glycated haemoglobin occurs in non diabetic conditions like Iron deficiency anemia, splenectomy, alcohol toxicity.Decrease in Glycated Haemoglobin in hemolytic anemia, chronic blood loss, pregnancy and chronic renal failure.
3) Improvement in the glucose control occurring in the 4 week before drawing of the sample is not well reflected in the result since the formation of glycated hemoglobin is irreversible.

INTERFERING FACTORS:
1) Presence of HbF and HbH cause falsely elevated values.
2) Presence of Hb S, C, E, D, G and lepore cause falsely decrease results.
3)If test results are not consistent with clinical finding check the patient for HbF which elevates HbA1c results.
4) Hemolytic blood samples may cause falsely low results because of increased erythrocyte turnover.

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Department of Biochemistry

Lipid Profile

Investigation	Result	Units	Biological Reference Interval
Total Cholestrol Method : Enzymatic COD/POD	149	mg/dl	Desirable < 200 Borderline 200 - 239 High > 240
Triglyceride Method : Enzymatic, end point	**235**	mg/dl	Normal Upto 150 Borderline-High 150 - 199 High 200 - 499 Very High > 500
HDL Cholesterol Method : Direct measurement, PTA/MgCl2	**32**	mg/dl	High risk Upto 40 Low risk > 60
LDL Cholestrol Method : Direct Detergent	70.00	mg/dl	Optimal Upto 100 Near optimal 100 - 129 Borderline 130 - 159 High 160 -189 Very High >190
VLDL Cholestrol	**47.00**	mg/dl	10-35
Non HDL Cholestrol	117.00	mg/dl	Desirable < 130 Borderline 130 - 159 High >159
Total Cholestrol HDL ratio	**4.66**	-	Low risk 3.3 - 4.4 Average Risk 4.5 - 7.0 Moderate Risk 7.1 - 11.0 High Risk >11.0
LDL HDL ratio	2.19	-	Low Risk < 3.0 Borderline 3.1 - 6.0 High Risk >6.0

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Comments -

CLINICAL IMPLICATIONS:

1. Cholesterol testing evaluates the risk for atherosclerosis, myocardial occlusion and coronary artery occlusion. Elevated cholesterol levels are a major component in the hereditary hyper lipoproteinemia.It is also used to monitor effectiveness of diet,medications,lifestyle and stress management.
2.The cholesterol to HDL ratio provides more information than does either value alone.When a slightly increased cholesterol is due to high HDL ,therapy is not indicated.
3. LDL cholesterol has a longer shelf life and determine the CHD risk.

INTERFERING FACTORS:

1.Seasonal and positional variations may alter the cholesterol levels.Estrogens, ascorbic acid,bilirubin decrease the cholesterol levels .Pregnancy,bile salt,high saturated fat,high cholesterol diet may increase the cholesterol values.Prolonged fasting with ketosis may increase the value.
2.Increased levels of HDL may be associated with estrogen therapy,drugs like steroids,alcohol and insulin therapy.Decreased levels are associated with stress,recent illness,starvation,obesity,smoking,hyper triglyceridemia,lack of exercise.
3.Increased LDL may be associated with pregnancy,drugs like steroids.Decreased LDL are found in women under estrogen therapy.No fasting may cause false elevation.
4.A transient increase in triglycerides occurs following heavy meal,alcohol ingestion,pregnancy,acute illness like cold ,flu,obesity,physical inactivity,smoking.Transient decrease occurs after strenuous exercise,weight loss.

RECOMMENDATION

1. Cholestrol levels >200 mg/dl should be retested and the results averaged and if the results differ by >than 10%,,a third test need to be done for confirmation.Perform a comprehensive lipoprotein analysis if cholesterol levels are not lowered within 6 months after start of therapy.If the values are altered in a normal condition,recommended to follow a stable diet for 1 week and overnight fasting (9 to 12 hours)before repeating the test.
2. Cholestrol and HDL should not be measured immediately after MI.A 3 month wait is suggested.
3. If triglyceride levels are more than 400mg/dl or >10.36mmol/L recommended to fast overnight(9 to 12 hours) and retest .Because of biological and analytical variation, atleast 2 serial sample may be necessary for clinical decision making.Vldl cannot be calculated if triglycerides are more than 400mg/dl

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Department of Biochemistry

Total Iron Binding Capacity

Investigation	Result	Units	Biological Reference Interval
Total Iron Binding Capacity	**512**	µg/dl	261-462

Method : Vitros microslide

Comments -
Clinical Implications:
1. Increased TIBC is found in:
a. Iron deficiency
b. Pregnancy (late)
c. Acute and chronic blood loss
d. Acute hepatitis
2. Decreased TIBC is observed in:
a. Hypoproteinemia (malnutrition and burns)
b. Hemochromatosis
c. Non-iron-deficiency anemia (infection and chronic disease)
d. Cirrhosis of liver
e. Nephrosis and other renal diseases
f. Thalassemia
g. Hyperthyroidism
Interfering Factors:
1. Drugs that may cause increased iron include ethanol, estrogens, and oral contraceptives.
2. Drugs that may cause decreased iron include some antibiotics, aspirin, and testosterone.
3. There is a diurnal variation in iron: normal values in the morning, lower in midafternoon, very low in the evening.
4. Serum iron and TIBC may be normal in iron-deficiency anemia if the Hb is >9.0 g/dL (or >90g/L).

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Department of Biochemistry

Sodium

Investigation	Result	Units	Biological Reference Interval
Sodium	142	mmol/L	137-145
Method : ISE Direct			

Comments -
Clinical Implication:
1.Sodium levels detect changes in water balance rather than sodium balance and sodium levels are used to determine electrolytes,acid base balance,water balance,water intoxication,and dehydration.

Interference :
1.Drugs like steroids, calcium, flouride, iron can cause increase in sodium level. Drugs like heparin, laxative, sulphate, diuretics cause decrease in sodium level. High Triglycerides or low protein falsely reduces sodium level.

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Department of Biochemistry

Renal Function Test

Investigation	Result	Units	Biological Reference Interval
Blood Urea Method : Urease (color/UV)	26.4	mg/dl	19-43
Creatinine Method : Enzymatic Vitros	**0.6**	mg/dl	0.66-1.25
Uric Acid Method : Uricase/Peroxidase	6.5	mg/dl	3.5-8.5
BUN Method : Urease (color/UV)	12.34	mg/dl	9-20
BUN Creatinine Ratio	20.57	-	10-30

Comments -
CLINICAL IMPLICATIONS:
1.A markedly increased BUN is conclusive of severe impaired glomerular function and in chronic renal disease BUN level correlates better with the symptoms of uremia than does the serum creatinine.
2.Uric acid levels is used most commonly in the evaluation of renal failure,gout,and leukemia.In gout the amount of increase is not directly related to the severity of the disease.Acute levels may occur following administration of cytotoxic drugs.
3.In chronic renal disease ,BUN/creatinine ratio is a better indicator to evaluate the renal problem than evaluating either alone.For each 50% reduction in GFR serum creatinine doubles.In chronic renal disease the plasma levels of creatinine may be more sensitive to changes in glomerular function than creatinine clearance ,which may be factitiously higher than the true value.

INTERFERING FACTORS:
1.A combination of low protein high carbohydrate diet ,late pregnancy (PHYSIOLOGIC HYDREMIA),IV feedings may cause a lowlevels of BUN.BUN is normally lower in children and women than adult.Elderly person can have an increased BUN levels.Many drugs like steroids,tetracyclines,thyroxine,Stress,strenuous exercise may alter the values of BUN levels.
2.Stress,strenuous exercise,purine rich diet(liver,kidney,sweet breads)increases uric acid levels.High levels of aspirin,low purine intake,coffee,tea intake may cause a decreased levels of uric acid.Drugs like steroids,diuretics,acetaminophen may alter the uric acid levels.
3.High levels of ascorbic acid,cephalosporin,diet high in meat,ketoacidosis may increase serum creatinine substantially.Creatinine is falsely decreased by bilirubin,glucose,histidine,quinidine compounds.Drugs like cephalosporins may alter the values.Lipemic and hemolysed samples may cause a false elevations.

REFERENCE:
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Department of Biochemistry

Calcium

Investigation	Result	Units	Biological Reference Interval
Calcium	9.36	mg/dl	8.4-10.2

Method : Arsenaezo III

Comments -
CLINICAL IMPLICATIONS:
The lowest values are observed at 2.00-4.00AM and the highest values at 8.00PM.
INTERFERING FACTORS
Concentration of calcium varies with age and are highest in the neonatal period. A change of 1g/dl of protein corresponds to a parallel change in total Ca concentration of <0.8mg/dl.Repeated determinations of serum calcium should be made for diagnosis of hyperparathyroidism.False elevations of serum calcium are caused by venous stasis during collection and by prolonged storage of blood.

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Patient Id	: 3079	**Sample Collected On**	: 06-06-2022 17:52
Referred By	: -	**Reported On**	: 07-06-2022 14:50
Referral Clinic	: Peshawar Medical Center (Irham Arjan)		
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Department of Immunology

Folate

Investigation	Result	Units	Biological Reference Interval
Folate	11.8	ng/ml	4.4-31

Method : CMIA

Comments -
Clinical Implications:
1. Decreased folic acid levels are associated with:
a. Malabsorption of colic acid (e.g., small bowel disease)
b. Excessive use of folic acid by the body (e.g., pregnancy, hypothyroidism)
c. Megaloblastic (macrocytic) anemia caused by VB12 deficiency.
d. Hemolytic anemia (sickle cell, phrnocytosis, PNH).
e. Adult celiac disease, sprue
f. Vitamin B6 deficiency.
2. Increased folic acid levels are associated with:
a. Vegetable diet
b. Pernicious anemia, VB12 deficiency
3. Decreased RBC folate occurs with:
a. Untreated folate deficiency
b. VB12 deficiency (60% of uncomplicated cases)
Interfering Factors:
1. Drugs that are folic acid antagonists, among others.
2. Hemolyzed specimens (false elevation)
3. Iron-deficiency anemia (false increased)

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Department of Biochemistry

eGFR

Investigation	Result	Units	Biological Reference Interval
eGFR	163	ml/mins/1.73m2	Normal >90 Mildly decrease 60 - 89 Mildly to Moderate decrease 45 - 59 Moderately to Severely decreased 30 to 44 Severely decrease 15 - 29 Kidney Failure <15

Method : Calculated

Comments -
CLINICAL IMPLICATIONS
1. eGFR is more specific and sensitive indicator of kidney disease than BUN although in chronic renal disease, BUN to creatinine ratio provides more information.
2. Increased ratio with a normal creatinine occurs in heart failure, salt depletion, dehydration, catabolic states, increased BUN, GI hemorrhage, impaired renal function plus excess protein intake, production or tissue breakdown. Increased ratio with elevated creatinine occurs in obstruction of urinary tract, pre-renal azotemia with renal disease.
3. Decreased ratio with decreased BUN occurs in acute tubular necrosis, severe liver disease, starvation, decreased urea synthesis, pregnancy and other conditions. Decreased ratio with increased creatinine occurs in phenacemide therapy, rhabdomyolysis, muscular patients with develop renal failure.

INTERFERING FACTORS
1. High levels of ascorbic acid, cephalosporins cause falsely increased creatinine levels. A diet high in meat, ketoacidosis increases creatinine levels.
2. Creatinine levels are falsely decreased by bilirubin, glucose, histidine and quinidine compounds.
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