

The Center for Family Medicine - Minot laboratory provides many laboratory tests for our patients. A list of the laboratory tests performed, expected ranges and a brief explanation of the tests are listed below. The expected ranges may vary from other laboratories expected ranges. These ranges are based on the type of instrument and laboratory methods that you use to perform various laboratory tests. Expected ranges may also differ for patient age. The expected ranges listed are for adults. This list is just a guideline, if you have any questions concerning your laboratory results please ask your physician.

Updated Monday June 25, 2007

CHEMISTRY

CHEMISTRY - BASIC PANEL * may be asked to fast for this test			
TEST	Expected Range	Units	Test Guide
Carbon Dioxide (CO2_LC)	M 23-29 F 23-29	mEq/L	CO2 reflects the acid status of your blood. Low CO2 can be due to increased acidity from uncontrolled diabetes, kidney disease, metabolic disorders, or low CO2 can be due to chronic hyperventilation.
Glucose (GLU)	M 70-105 F 70-105	mg/dL	Glucose is a measure of the sugar level in your blood. High levels are associated with eating before the test and diabetes.
Blood Urea Nitrogen (BUN)	M 7-18 F 7-18	mg/dL	BUN is a waste product produced in the liver and excreted by the kidneys. High values may mean that the kidneys are not working as well as they should. Bun is also affected by high protein diets and/or strenuous exercise which raise levels, and by pregnancy which lowers it.
Creatinine (CREAT)	M 0.7-1.3 F 0.6-1.2	mg/dL	Creatine is a waste product largely from muscle breakdown. High values, especially with high BUN levels, may indicate problems with kidneys.
Blood Urea Nitrogen to Creatinine Ratio (BUN/CR)	N/A		BUN/CR ratio is used to help differentiate the cause of acute renal failure.
Sodium (NA)	M 136-145 F 136-145	mmol/L	Sodium is also regulated by the kidneys and adrenal glands. There are numerous causes of high and low sodium levels, but the most common causes are diuretic usages, diabetes drugs and excessive water intake in patients with heart or liver disease.
Potassium (K)	M 3.5-5.1 F 3.5-5.1	mmol/L	Potassium is controlled by the kidneys. It is important for the proper functioning of the nerves and muscles, particularly the heart. If you are taking diuretics or heart pills you should be closely monitored.
Chloride (CL)	M 98-110 F 98-110	mmol/L	Chloride is used to determine if there is a problem with your bodies acid-base balance. Increase CL levels are seen in dehydration, metabolic acidosis. Decreased CL is seen with prolonged vomiting, burns and diuretic use.
Calcium (CA)	M 8.5-10.5 F 8.5-10.5	mg/dL	CA is controlled in the blood by the parathyroid glands and the kidneys. CA is found mostly in the bone and is important for proper clotting, nerve, and cell activity. Elevated CA can be due to medications, inherited disorders of the kidney, excess parathyroid disease or vitamin D. Low calcium can be due to certain metabolic disorders and diuretic use.

Key:

M= male

F = female

mg/dl = milligrams per deciliter

mmol/L = millimoles per liter

mEq/L = milliequivalents per liter

CHEMISTRY - COMPREHENSIVE PANEL * may be asked to fast for this test

TEST	Expected Range	Units	Test Guide
Carbon Dioxide (CO2_LC)	M 23-29 F 23-29	mEq/L	CO2 reflects the acid status of your blood. Low CO2 can be due to increased acidity from uncontrolled diabetes, kidney disease, metabolic disorders, or low CO2 can be due to chronic hyperventilation.
Aspartate Aminotransferase (AST)	M 7-31 F 7-31	U/L	Enzyme that is released into the blood stream if liver or muscle cell injury happens. AST may be elevated in liver problems, hepatitis, excess alcohol ingestion, muscle injury or recent heart attack.
Alanine Aminotransferase (ALT)	M 5-30 F 5-30	U/L	Enzyme that is released into the blood stream if liver cell injury happens. AST may be elevated in liver diseases.
Alkaline Phosphatase (ALK PHOS)	35-123	U/L	Enzyme found primarily in bones and liver. May be elevated in growing children or in bone or liver damage or with gallstones.
Total Bilirubin (TBIL)	M 0-1.0 F 0-1.0	mg/dl	Bilirubin is a breakdown product of red blood cells removed from blood by the liver. It is used to screen and monitor liver disease.
Total Protein (TP)	M 6.0-8.3 F 6.0-8.3	g/dl	TP is influenced by the nutritional status, liver function, renal function, and metabolic errors.
Glucose (GLU)	M 70-105 F 70-105	mg/dL	Glucose is a measure of the sugar level in your blood. High levels are associated with eating before the test and diabetes.
Blood Urea Nitrogen (BUN)	M 7-18 F 7-18	mg/dL	BUN is a waste product produced in the liver and excreted by the kidneys. High values may mean that the kidneys are not working as well as they should. Bun is also affected by high protein diets and/or strenuous exercise which raise levels, and by pregnancy which lowers it.
Creatinine (CREAT)	M 0.7-1.3 F 0.6-1.2	mg/dL	Creatine is a waste product largely from muscle breakdown. High values, especially with high BUN levels, may indicate problems with kidneys.
Blood Urea Nitrogen to Creatinine Ratio (BUN/CR)	M 10-20 F 10-20		BUN/CR ratio is used to help differentiate the cause of acute renal failure.
Calcium (CA)	M 8.5-10.5 F 8.5-10.5	mg/dL	CA is controlled in the blood by the parathyroid glands and the kidneys. CA is found mostly in the bone and is important for proper clotting, nerve, and cell activity. Elevated CA can be due to medications, inherited disorders of the kidney, excess parathyroid disease or vitamin D. Low calcium can be due to certain metabolic disorders and diuretic use.
Sodium (NA)	M 136-145 F 136-145	mmol/L	Sodium is also regulated by the kidneys and adrenal glands. There are numerous causes of high and low sodium levels, but the most common causes are diuretic usages, diabetes drugs and excessive water intake in patients with heart or liver disease.
Potassium (K)	M 3.5-5.1 F 3.5-5.1	mmol/L	Potassium is controlled by the kidneys. It is important for the proper functioning of the nerves and muscles, particularly the heart. If you are taking diuretics or heart pills you should be closely monitored.
Chloride (CL)	M 98-110 F 98-110	mmol/L	Chloride is used to determine if there is a problem with your bodies acid-base balance. Increase CL levels are seen in dehydration, metabolic acidosis. Decreased CL is seen with prolonged vomiting, burns and diuretic use.
Albumin (ALB)	M 3.5-5.0 F 3.5-5.0	g/dl	Albumin makes up one half of the TP and is responsible for osmotic pressure and as a transport molecule. Decrease ALB is seen in liver disease, kidney disease, starvation and burns. ALB is increased in dehydration.

Key:

M= male

F = female

mmol/L = millimoles per liter

U/L= International units per liter

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mEq/L = milliequivalents per liter

CHEMISTRY - ELECTROLYTE PANEL			
TEST	Expected Range	Units	Test Guide
Sodium (NA)	M 136-145 F 136-145	mmol/L	Sodium is also regulated by the kidneys and adrenal glands. There are numerous causes of high and low sodium levels, but the most common causes are diuretic usages, diabetes drugs and excessive water intake in patients with heart or liver disease.
Potassium (K)	M 3.5-5.1 F 3.5-5.1	mmol/L	Potassium is controlled by the kidneys. It is important for the proper functioning of the nerves and muscles, particularly the heart. If you are taking diuretics or heart pills you should be closely monitored.
Chloride (CL)	M 98-110 F 98-110	mmol/L	Chloride is used to determine if there is a problem with your bodies acid-base balance. Increase CL levels are seen in dehydration, metabolic acidosis. Decreased CL is seen with prolonged vomiting, burns and diuretic use.
Carbon Dioxide (CO2_LC)	M 23-29 F 23-29	mmol/L	CO2 reflects the acid status of your blood. Low CO2 can be due to increased acidity from uncontrolled diabetes, kidney disease, metabolic disorders, or low CO2 can be due to chronic hyperventilation.

Key:

M= male

F = female

mmol/L - millimoles per liter

CHEMISTRY - LIPID PANEL * should be fasting for this test			
TEST	Expected Range	Units	Test Guide
Cholesterol (CHOL)	M 0-200 F 0-200	mg/dl	Cholesterol is one of the major lipids or fats in the body. High levels indicate an increased risk of heart disease. Levels can be controlled with diet, exercise, and/or medications.
Triglyceride (TRIG)	M 0-190 F 0-190	mg/dl	Triglycerides are fats (lipids) that provide a reserve of energy. Increases in triglycerides may indicate heart disease risk. TRIGs can rise with obesity, diabetes, and alcohol consumption.
Low Density Lipids (LDL-C)	M 0-130 F 0-130	mg/dl	Elevations of LDL are associated with an increased risk of heart disease.
High Density Lipids (HDL-CL)	M 35-65 F 35-65	mg/dl	Elevations of HDL are associated with a decreased risk of heart disease. HDL can be increased with exercise. This is the "good cholesterol".
Very Low Density Lipids (VLDL)	M 8-39 F 8-39	IU/L	VLDL is another lipid found in the blood.
Cholesterol to High density lipids (HDL/CL)	3.5-5.0		The ratio of cholesterol to HDL is another indicator of heart disease risk. A ratio of 4.5 or less is associated with a lower risk of heart disease.

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IU/L = International Units per liter

CHEMISTRY - HEPATIC PANEL			
TEST	Expected Range	Units	Test Guide
Aspartate Aminotransferase (AST)	M 7-31 F 7-31	U/L	Enzyme that is released into the blood stream if liver or muscle cell injury happens. AST may be elevated in liver problems, hepatitis, excess alcohol ingestion, muscle injury or recent heart attack.
Alanine Aminotransferase (ALT)	M 5-30 F 5-30	U/L	Enzyme that is released into the blood stream if liver cell injury happens. AST may be elevated in liver diseases.
Alkaline Phosphatase (ALK PHOS)	M 53-128 F 42-98	U/L	Enzyme found primarily in bones and liver. May be elevated in growing children or in bone or liver damage or with gallstones.
Total Bilirubin (TBIL)	M 0-1.0 F 0-1.0	mg/dl	Bilirubin is a breakdown product of red blood cells removed from blood by the liver. It is used to screen and monitor liver disease.
Direct Bilirubin (DBIL)	M 0-0.2 F 0-0.2	mg/dl	DBIL is Bilirubin that has been conjugated by the liver and becomes water soluble. This is used to differentiate liver diseases.
Albumin (ALB)	M 3.5-5.0 F 3.5-5.0	g/dl	Albumin makes up one half of the TP and is responsible for osmotic pressure and as a transport molecule. Decrease ALB is seen in liver disease, kidney disease, starvation and burns. ALB is increased in dehydration.
Total Protein (TP)	M 6.0-8.3 F 6.0-8.3	g/dl	TP is influenced by the nutritional status, liver function, renal function, and metabolic errors.

Key:

M= male

F = female

U/L= International units per liter

mg/dl = milligrams per deciliter

g/dl= grams per deciliter

CHEMISTRY - RENAL PANEL			
TEST	Expected Range	Units	Test Guide
Albumin (ALB)	M 3.5-5.0 F 3.5-5.0	g/dl	Albumin makes up one half of the TP and is responsible for osmotic pressure and as a transport molecule. Decrease ALB is seen in liver disease, kidney disease, starvation and burns. ALB is increased in dehydration.
Calcium (CA)	M 8.5-10.5 F 8.5-10.5	mg/dL	CA is controlled in the blood by the parathyroid glands and the kidneys. CA is found mostly in the bone and is important for proper clotting, nerve, and cell activity. Elevated CA can be due to medications, inherited disorders of the kidney, excess parathyroid disease or vitamin D. Low calcium can be due to certain metabolic disorders and diuretic use.
Creatinine (CREAT)	M 0.7-1.3 F 0.6-1.2	mg/dL	Creatine is a waste product largely from muscle breakdown. High values, especially with high BUN levels, may indicate problems with kidneys.
Blood Urea Nitrogen (BUN)	M 7-18 F 7-18	mg/dL	BUN is a waste product produced in the liver and excreted by the kidneys. High values may mean that the kidneys are not working as well as they should. BUN is also affected by high protein diets and/or strenuous exercise which raise levels, and by pregnancy which lowers it.
Blood Urea Nitrogen to Creatinine Ratio (BUN/CR)	M 10-20 F 10-20		BUN/CR ratio is used to help differentiate the cause of acute renal failure.
Glucose (GLU)	M 70-105 F 70-105	mg/dL	Glucose is a measure of the sugar level in your blood. High levels are associated with eating before the test and diabetes.
Phosphorus (PHOS)	M 2.7-4.5 F 2.7-4.5	mg/dl	Phos is stored in the bones and regulated by the kidneys. Elevated levels are seen in kidney disease.
Sodium (NA)	M 136-145 F 136-145	mmol/L	Sodium is also regulated by the kidneys and adrenal glands. There are numerous causes of high and low sodium levels, but the most common causes are diuretic usages, diabetes drugs and excessive water intake in patients with heart or liver disease.
Chloride (CL)	M 98-110 F 98-110	mmol/L	Chloride is used to determine if there is a problem with your bodies acid-base balance. Increase CL levels are seen in dehydration, metabolic acidosis. Decreased CL is seen with prolonged vomiting, burns and diuretic use.
Carbon Dioxide (CO2_LC)	M 23-29 F 23-29	mmol/L	CO2 reflects the acid status of your blood. Low CO2 can be due to increased acidity from uncontrolled diabetes, kidney disease, metabolic disorders, or low CO2 can be due to chronic hyperventilation.
Potassium (K)	M 3.5-5.1 F 3.5-5.1	mmol/L	Potassium is controlled by the kidneys. It is important for the proper functioning of the nerves and muscles, particularly the heart. If you are taking diuretics or heart pills you should be closely monitored.

Key:

M= male

F = female

g/dl= grams per deciliter

mg/dl = milligrams per deciliter

mmol/L = millimoles per liter

CHEMISTRY - MISCELLANEOUS

TEST	Expected Range	Units	Test Guide
Free Triiodothyronine FT3	2.50-3.90	pg/dl	Hormone release by thyroid gland. It is used to determine various thyroid disease.
Free Thyroxin (FT4)	0.58-1.64	ng/dl	Hormone released from the thyroid gland. Used with Thyroid Stimulating Hormone to determine thyroid disease.
Thyroid Stimulating Hormone (TSH)	0.34-5.60	µIU/ml	Hormone released by the pituitary gland that regulates thyroid function. It is used to determine various thyroid disease.
Glucose Tolerance Test (GTT)	Various	mg/dl	Used to determine how your body handles a measured amount of glucose over a period of time. Sometimes used to confirm diabetes.
Glycosylated Hemoglobin, Glycohemoglobin, Hemoglobin A _{1c} , (HbA _{1c})	4.4-6.4	%	Measures the amount of glucose chemically attached to the red blood cells. Since blood cells live about 3 months, it tells your average glucose for the last 2-3 months. High levels suggest poor diabetic control
Prostatic Specific Antigen (PSA)	0-4.0	ng/dl	Test used to screen for prostate cancer.
Gamma Glutamyltransferase (GGT)	M 0-57 F 0-38	U/L	Enzyme found in pancreas, liver, and kidney. GGT is used to detect liver disease and is an early sign of alcoholic cirrhosis.
Troponin	>.50	ng/ml	Enzyme used to screen for heart attacks.
Lactate Dehydrogenase (LDH or LD))	M 63-155 F 62-131	U/L	Enzyme used to screen for liver diseases and heart attacks.
Creatine Kinase (CK, CPK)	M 38-174 F 26-140	U/L	Enzyme used to screen for heart attacks.
Cratine Kinase - muscle brain (CK-MB)	0.6-6.3	pg/dl	Isoenzyme used to screen for heart attacks.
Amylase (Amy)	M 25-125 F 25-125	U/L	Enzyme found in the pancreas. You see elevated levels in pancreatitis, appendicitis and other diseases.

Key:

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ng/dl = nanograms per deciliter

U/L= International units per liter

µIU/ml = micro International Units per milliliter

mg/dl = milligrams per deciliter

% = percent

U/L = International Units per liter

ng/ml = nanograms per milliliter

pg/dl = picograms/deciliter

HEMATOLOGY

HEMATOLOGY			
TEST	Expected Range	Units	Test Guide
White Blood Cells (WBC)	M 4-11 F 3.5-11	$10^3/\mu\text{L}$	The WBCs are used to fight infection. They may decrease in some viral infections but usually increase in bacterial infections.
Red Blood Cells (RBC)	M 4.5-6.5 F 3.8-5.8	$10^6/\mu\text{L}$	The RBCs carry oxygen throughout your body. Decreased RBCs are seen in anemia.
Hemoglobin (HGB)	M 13-18 F 11.5-16.5	g/dL	HGB is the amount of oxygen carrying protein in the RBCs. Low HGB suggest anemia.
Hematocrit (HCT)	M 40-54 F 35-47	%	HCT is the percentage of the blood volume occupied by RBCs. Low HCT suggests anemia.
Mean Corpuscular Volume (MCV)	M 76-98 F 76-96	fL	MCV indicates the size of the red blood cells and helps diagnose the cause of anemia.
Mean Corpuscular Hemoglobin (MCH)	M 27-34 F 27-34	pg	MCH is a measurement of the average weight of hemoglobin in individual red cells. MCH helps diagnose cause of anemias.
Mean Corpuscular Hemoglobin Concentration (MCHC)	M 31-36 F 31-36	g/dL	MCHC is the average concentration of hemoglobin in RBCs. MCHC helps diagnoses cause of anemia.
Red Cell Distribution Width (RDW)	M 11-16 F 11-16	%	RDW is a measure of variation in RBC size. RDW is used to detect RBC size changes and help in diagnosing various disorders.
Platelet (PLT)	M 150-400 F 150-500	$10^3/\mu\text{L}$	PLTs are involved in making your blood clot.
Mean Platelet Volume (MPV)	M 6-10 F 6-10	fL	MPV is a measurement of the average size of the platelets.
Differential			
Neutrophils (NE)	M 45-75 F 45-70	%	NE are WBCs that are used to fight infection. They are increased in bacterial infections, inflammation, hemorrhage, exercise, and other disease states.
Lymphocytes (LY)	M 20-40 F 20-40	%	Lymphocytes are WBCs that control the immune system. They can be increased in viral infections and other disease states.
Monocytes	M 3-10 F 3-10	%	Monocytes are large WBCs that eat foreign cells, bacteria, and parasites. They are increased in the above conditions and other disease states.
Eosinophils	M 1-5 F 1-5	%	Eosinophils are WBCs that are increased in allergies and parasitic infections.
Baosphils	M 0-1 F 0-1	%	Basophils are WBCs that are increased in various infections.

Key:

M= male

F = female

$10^3/\mu\text{L}$ = 10^3 cells per microliter

$10^6/\mu\text{L}$ = 10^6 cells per microliter

g/dl = grams per deciliter

mg/dl = milligrams per deciliter

% = percent

fL = femtoliter

pg = picogram

HEMATOLOGY AND COAGULATION MISCELLANEOUS

TEST	Expected Range	Units	Test Guide
Erythrocyte Sedimentation Rate (ESR or Sed Rate)	M 0-11 F 0-22	mm/hr	Measure of the rate that red blood cells settle out of plasma. You see elevations in inflammation, infections, anemia, and other diseases.
Bleeding time (BT)	M 2.3-9.5 F 2.3-9.5	Minute	Helps determine platelet function. Increased BT is seen with low platelets, ingestion of drugs that effect platelet function or platelet disorders
Prothrombin Time (PT)	11.4-14.4	Second	Measures how fast your blood clots and used to monitor coumadin therapy.
International normalized ratio (INR)	Therapeutic 2-4		This is a calculation to enable different laboratories to compare PT results. It corrects for different reagent sensitivity.
Partial Thromboplastin time (PTT)	26.3-32.9	Second	Measures how fast your blood clots and used to monitor heparin therapy.

Key:

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f= female

mm/hr = millimeters per hour

SEROLOGY

SEROLOGY & MISCELLANEOUS			
TEST	Expected Range	Units	Test Guide
Pregnancy Test, Human Chorionic Gonadotropin (Beta Sub, hCG)	negative	mIU/ml	hCG is produced by the placenta and is released into the mother blood stream, this test is used to confirm pregnancy.
Antibody Screen (Ab screen)	negative	dilution number	This test is to identify antibodies that may be found in a patient. If antibodies are found, patients may require more monitoring during pregnancy or may be harder to crossmatch for blood products.
Blood Type	A, B, O , AB		Your blood type is determined by the antigens on your red blood cells. This information is used to help decide compatibility of blood products.
Rh	D+ or D-		Your Rh status is dependent on having or lacking the Rh antigen on your red blood cells. This information is used to help decide compatibility of blood products.
Rubella	Immune		This test measures the rubella titer found in your blood. You should be immune if you had the disease or were vaccinated. Pregnant patients that are susceptible should avoid people with rubella.
Mononucleosis (Mono) Test	Negative		Heterophile antibodies may be formed when a patient has infectious mononucleosis. This test measures heterophile antibodies to aid in the diagnosis of infectious mononucleosis.
Rheumatoid Factor (RA or RF)	Negative		Rheumatoid factors are various antibodies that may be formed when a patient has rheumatoid arthritis. This test detects these antibodies.
Cold Agglutinins	Negative		Cold Agglutinins are antibodies that may be formed when a patient has Mycobacteria pneumonia. This test detects these antibodies.
Neisseria Gonorrhoea (GC Culture)	Negative		GC is a sexually transmitted disease. This test will pick up GC if it is present.
Wet Mount (Vaginal)	Negative for Clue Cells, Yeast and Trichomonas		Microscopic examination of vaginal fluid to detect a variety of diseases and problems of the vaginal area.
Wet Mount (Skin)	Negative for yeast or fungal elements		Microscopic examination of skin scrapings for yeast and fungal elements.
Chlamydia	Negative		Chlamydia is a sexually transmitted disease. This test will pick up chlamydia is present.
Pinworm Preparation	Negative		Microscopic examination of slide collected to look for pinworm eggs.
Nasal Smears	Negative		Microscopic Examination of a smear collect from the nasal passages to look for eosinophils. Eosinophils are elevated in allergic reactions.
Rapid Streptococcus (Rapid Strep)	Negative		This test picks up Group A streptococcus that can cause sore throats and other problems if not treated.
Semen Analysis	Negative		This test is performed post vasectomy to detect if there is still sperm in the patients semen sample.
Occult Blood	Negative		This test is used to detect blood in stool specimens. It is used a screen for colon cancer.

Key:

mIU/ml = milli International Units/ milliliter

URINALYSIS

URINALYSIS			
TEST	Expected Range	Units	Test Guide
Specific Gravity (Sp.Gr.)	1.005-1.025		Used to measure urine concentration. It's higher when individuals are dehydrated (low on fluid).
pH	5.0-8.0		The measure of urine acidity. pH can change in various disease, with some medications, and for various other reasons.
Leukocytes	negative (neg)		An enzyme in white blood cells. May indicate an infection of the kidney or urinary tract, including the bladder.
Nitrites	negative (neg)		May indicate a urinary tract infection.
Protein	negative to trace	mg/dl	Normally, there is no protein in the urine. Protein can indicate kidney damage, blood in the urine, or a kidney infection.
Glucose	negative (neg)	mg/dl	Glucose is not normally found in the urine, but may occur in diabetes and other illnesses.
Ketone	negative (neg)		May be found in starvation, high protein diets, and uncontrolled diabetics.
Urobilinogen	0-1	mg/dl	Elevated urobilinogen may be due to the overburdening of liver functions.
Bilirubin	negative (neg)		May appear in the urine in liver and gallbladder disease.
Blood	0-trace (tr)		May indicate an infection, kidney stones, trauma, or bleeding from the bladder or kidneys, or bleeding from the vagina in women. May also indicate muscle strain.
Microscopic			
White Blood Cells WBC	0-5/HPF		May indicate a urinary tract infection or inflammation or contamination from the vagina or foreskin..
Red Blood Cells RBC	0-3/HPF		May indicate kidney disease.
Bacteria	negative (neg)		May indicate a urinary tract or kidney infection, or maybe normal.
Epithelial	negative (neg)		May indicate improper specimen collection.
Mucous	negative (neg)		May indicate vaginal contamination or improper specimen collection.
Cast	negative (neg)		May indicate dehydration or kidney disease.
Other			Other structures may be found in the urine. They are used to help diagnose various kidney or urinary tract disorders.
Microalbumin	≤20	mg/dl	Microalbumin is used to in screening for early kidney damage in diabetic patients.

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g/dl = grams per deciliter

HPF = High Power Field