

This information is for educational purpose only.

Acute Hepatitis Panel	
Hepatitis A Antibody	IgM antibodies detect acute hepatitis A infection within 1 week, persist for 6 Months. IgG develops 4 weeks after IgM and persists for years
Hepatitis B Core Antibody,IgM	IgM antibodies against Hepatitis B virus core usually detected 6-8 wks after acute infection. Persistent IgM antibodies may reflect a chronic infection. IgM antibodies are the only maker of acute infection during the 'serologic window' when HBsAg has become negative, but HBsAb not yet turned positive. Used in combination with other Hepatitis B testing to determine if the infection is acute or chronic.
Hepatitis B Surface Antigen	A peripheral blood antigen found on the surface of the hepatitis B virus. A positive test is diagnostic for infection. Antigen detected 2-4 weeks before symptoms occur in an infected patient. Other Hepatitis B testing is necessary to determine if acute or chronic.
Hepatitis C Antibody	Antibody to the hepatitis C virus. A positive test consistent with acute, chronic and/or past infection. A negative test in acute hepatitis does not rule- out HCV infections as seroconversion may take up to 6 months. HCV RNA (bDNA) is a better indicator of disease
Anti coagulation Panel	
CYP2C9 Gene	Genetic test for mutations on the CYP2C9 gene that encodes for cytochrome P450 2C9, a liver enzyme involved in the metabolism of medications such as Warfrain. A third of the population carries a mutation that results in slower Warfrain metabolism. CYP2C9 mutations, along with VKORC1 mutations, are estimated to account for 40%-63% of the variability in therapeutic warfrain dose. Test for these two mutations can assist in identifying patients at risk for bleeding before starting anticoagulation therapy so they could be started on a lower Warfrain dose. Various formulas exist to calculate warfrain dose based on results.
VKORC1 Gene	Genetic test for mutations on the VKORC1 gene that encodes for Vitamin K Oxide reductase complex subunit-1, an endoplasmic reticulum protein involved in the metabolism of medications such as Warfrain. Mutations can increase sensitivity to Warfrain by reducing the availability of activated Vitamin K required for norm clotting. These VKORC1 mutations along with common CYP2C9 variants are estimated to account for 40%-63% of the variability in therapeutic Warfrain does. Test for these two mutations can assist in identifying patients at risk for bleeding before starting anticoagulation therapy so they could be started on a lower Warfrain does. Various formulas exist to calculate Warfarin dose based on results. Other VKORC genetic Variants have been identified which Warfrain anticoagulation
Anti Phospholipids Antibodies	
Anti-Cardiolipin Antibodies	Antibodies to phospholipids. Used in the evaluation of hypercoagulable states and recurrent fetal loss.

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Lupus Anticoagulant	Antibodies to phospholipids; used in evaluation of hypercoagulable states and recurrent fetal loss. The name is misnomer as associated with many diseases in addition to SLE.
Ashkenazi Jewish Panel	
ASPA	A genetic test to detect mutations of the ASPA gene which codes for the enzymes aspartocyclase, responsible for breaking down Nacetyl-L-aspartic acid (NAA). Mutating causes aspartocyclase deficiency resulting in Canavan disease, a leukodystrophy. Symptoms include developmental delay, decreased muscle tone, macrocephaly, swallowing difficulties, seizures and mental retardation.
BLM1	A genetic test to detect mutations in the gene encoding DNA helicase RecQ protein-like-3 (604610), which causes Bloom syndrome, an autosomal recessive disorder. Characterized by chromosomal instability, resulting in an increased risks of malignancy and type two diabetes. Occurs in any group, but 1% of Ashkenazi Jews are carriers.
FANCC Mutation	A genetic test to detect chromosomal fragility due to mutations on any of 8 different genes associated with fanconi Anemia, an aautosomal recessive disorder causing aplastic anemia in children. Utilized in the workup of aplastic anemia, or for carrier state and prenatal detection of FA.
Gaucher Gene	A genetic test to detect mutations in the GBA gene, that code for the enzyme beta- glucocerebrosidase which breaks down the lipid glucocerebroside. Over 150 different mutations have been identified in Gaucher disease. Type 1 Gaucher disease affects about 1 in 750 Ashkenazi jews.
Hex A Gene	A genetic test to detect mutations causing hexosaminidase deficiency (Tay Sachs Diseases) Hexosaminidase breaks down ganglioside GM2 results in severe neurological damage; death usually before age 5. Autosomal recessive disease. Carrier state 1/30 Ashkenazi Jews, similar rates in French Canadians, Cajuns, and Pennsylvanian Dutch, Due to screening in Jews, most cases occur in non Jewish babies.
IKBKAP Gene	A genetic test to detect mutations of IKBKAP gene which codes for the IKAP protein which is involved in transcription. The mutation primarily affects nerve cells resulting in Familial Dysautonomia. This autosomal recessive syndrome causes hypotonic, vomiting, lack of tears recurrent Pneumonia, blood pressure instability, and decreased sensation of pain or temperature.
Mucopolipidosis Type IV	A genetic test to detect mutations of the MCLON1 gene which is responsible for production of mucolipin 1. Mutation causes accumulation of lipids and mucopolysaccharides I lysosomes resulting in Mucopolipidosis Type IV. Patients present with severe Psychomotor delay in infancy, mental retardation, and visual difficulties. May have normal life span.
Niemann Pick Disease	A genetic test to detect mutations of the NPC1, NPC2, SMPD1 genes which code for the enzyme Sphingomyelinase. Mutation causes an accumulation of sphingomyelin (a lipid) in lysosomes resulting in Niemann-Pick disease. Organs affected include spleen, liver, lungs, bone marrow, and brain. Four main types of NP disease recognized: A, B, C1, C2; all autosomal recessive; 1:40,000 Ashkenazi Jews with type A

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Blood Type	
ABO Blood Type	A test to classify blood by determining the presence or absence of A&B antigens on RBCs along with their associated serum antibodies. Important in avoiding transfusion reactions and useful in the workup of ABO hemolytic disease of the newborn. Usually reported with Rh status.
Rh Type	To detect the presence or absence of Rh antigens on the RBC surface. Important in avoiding transfusion reactions and in determining Rh immune globulin candidacy for prenatal and postpartum patients. Usually reported with ABO type. O negative considered the universal RBC donor.
Basic Metabolic Panel	
Anion Gap	Anion Gap is the difference between the measured anions in the blood. Sodium is the primary measured cation and Cl and HCO ₃ are the primary measured anions, therefore $AG = NA - (Cl + HCO_3)$. Used to classify metabolic acidosis.
BUN	Measurement of urea nitrogen found in the blood. A waste product of protein breakdown. Helpful in assessing kidney function.
Calcium	Element. Sum of ionized calcium plus protein bound calcium. Important in cellular transport mechanisms. The most common reason for low calcium is hypoalbuminemia.
Carbon Dioxide	CO ₂ content is a measurement of bicarb, carbonic acid, and dissolved CO ₂ gas, >90% is bicarb (HCO ₃). The terms "bicarbonate" and total carbon dioxide" are often used interchangeably. Although "bicarbonate" is 1-2 mmol/L lower than total carbon dioxide, this difference is not clinically significant.
Chloride	Extracellular electrolyte. Levels usually increase or decrease in concert with serum sodium.
Creatinine	Muscle breakdown product, proportional to muscle mass. Normal BUN/ Creatine ratio 10:1; dehydration 15-20:1; renal disease 10:1; pre/ post renal > 10:1. Creatinine clearance can be estimated by the following formula: $cc\ males = [(140 - age(yr)) \times (weight(Kg))] / 72 \times \text{serum creatinine}$; for woman multiple above results x 0.85.
Glucose	A sugar. Basic energy source for cells. Fasting 100-125 mg / dL indicates Impaired Fasting Glucose (pre-diabetes). Fasting > 125 mg/dL indicates diabetes mellitus.
Potassium	Intracellular cation, functions as an electrolyte. Important in maintaining acid/base balance. Measurement is of the serum (non-cellular) level.
Sodium	Cation found mainly in the extracellular fluid. Used in the evaluation of hydration states Hyponatremia is due to excess body water. Volume status. Needs to determine first in the workup of hypernatremia.

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Complete Blood Count	
Hematocrit	Percent of blood volume composed of RBCs, calculated by multiplying the RBC x MCV, or by spinning a tube of blood and measuring the portion of blood composed of RBCs. Estimated as Hgb x 3. Used to diagnose anemia
Hemoglobin	Oxygen carrying protein found in RBCs. Utilized in the diagnosis of anemia. Estimated by dividing the hematocrit by 3.
MCH	The amount of Hgb per RBC. Calculated by dividing Hgb by the RBC. Used to guide the workup of anemia. One of the RBC indices.
MCHC	The hemoglobin concentration per red cell. Calculated by the Hct. Used in the workup of anemia. One of the RBC indices.
MCV	A measure of the average volume of RBC. Helpful for characterizing anemia's, but lacks sensitivity and specificity. One of the RBC indices.
MPV	Measurement of the mean platelet volume. Utilized in the work- up of platelet disorders.
Platelet Count	The number of platelets per cubic millimeter of whole blood. Risk of spontaneous bleeding increases below 20,000 platelets.
RBC	Measurement of the number of red blood cells per cubic milliliter of whole blood. Used in the workup of anemia's.
RDW	Measurement of the variation in RBC size and shape. Assists in differentiating iron deficiency from other microcytic anemias. Often increased before MCV becomes abnormal
WBC Count	The number of WBC per ml of whole blood. WBCs primarily consist of neutrophils, lymphocytes, monocytes, eosinophils, and basophils. Leukocytes are mobilized by inflammation as well as infection. WBC levels >30,000 due to temporary conditions are termed leukemoid reactions; they must be distinguished from leukemia.
Celiac Panel	
Anti-Endomysial Antibody (IgA)	Endomysium is the connective tissue stroma covering individual muscle fibers. Antibodies aid in the detection treatment of celiac sprue. Endomysial antibody and tissue transglutaminase (TTG) used to follow-up a positive gliadin IgA; TTG becoming the preferred test as it is less expensive and easier to perform. Gliadin IgA most useful for monitoring response to gluten free diet.
Anti-Gliadin (IgA and IgG)	Antibodies to aid in the detection of celiac spure. Gliadin IgA useful for monitoring response to gluten free diet. Endomysial antibody and tissue transglutaminase (TTG) preferred tests for diagnosis. Gliadin IgG can be positive, with a negative IgA, as IgA deficiency is associated with spure.

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IgA	Immunoglobulin A is a component of serum gamma globulins. The primary antibody in saliva, tears mucous secretions and colostrums; with an important role in mucosal immune- protection. Used in the evaluation of immune deficiency states, monitoring IGA myeloma therapy and in the work-up of celiac disease.
TTG	Antibodies to transglutaminase. Aids in the diagnosis of celiac spure. Replacing endomysial and antigliadin test; less expensive and easier to perform with sensitivity and specificity > 95%. Consider obtaining IgA levels, as IgA deficiency is associated with celiac disease and may cause false negative.
Complete Metabolic Pannel	
Albumin	Plasma binding protrin synthesized by the liver. Helps to maintaine osmotic pressure in the vascular space. Reflect overall nutritional status. Generally decreased levels after age 40; edema seen with levels < 2.5; 21 day ½ life-slow to respond to nutritional intervention.
Alk Phos	Alkilane Phosphatase enzyme. Found in liver, biliary trac, bone, intestine, and placenta. Primarily used in the assestment of hepatobiliary and bone disease. Gamma-glutamyl tranfarase (GGT) and 5 ‘Nucleotidase’ increased hepatobiliary, not bone disease; Alk Phos isoenzymes less reliable to differentiate source.
ALT	Alanine transaminase enzymes. High levels in hepatocytes, but also in muscle and kidney. Involved in amino acid metabolism. Release with tissue damage, primarily use to assess liver damage.
Bilirubin, Total	A break down product of hemoglobin. Used to assess hepatobiliary disease and hemolysis.
BUN	Measurement of urea nitrogen found in the blood. A waste product of protein brackdown. Helpful in assessing in kidney function.
Calcium	Element. Some of ionized calcium plus protein bound calcium. Important in cellular transport mechanism. The most common reason for low calcium is hypoalbuminemia .
Carbon Dioxide	CO2 content is a measurement of bicarb, carbonic acid, and dissolved CO2 gas, >90% is bicarb (HCO3). The terms “bicarbonate” and “total carbon dioxide” are often used interchangeably. Although “bicarbonate: is 1-2mmol/L lower then total carbon dioxide, this difference is not clinically significant.
Chloride	Extracellular electrolyte. Levels usually increase or decreased in concert with serum sodium.
Creatinine	Muscle breakdown product, proportional to muscle mass. Normal BUN/Creatinine ration 10:1; dehydration 15-20:1; renal disease 10:1; pre / post renal >10:1. Creatinine clearance can be estimated by the following formula: CC males=[(140-age(yr) x *(weight(Kg))]/72 x serum creatinine; For woman multiple above result x 0.85.
Phosphorus	An inorganic anion, important calcium homeostasis. Assess along with calcium levels.

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Potassium	Intracellular cation, functions as an electrolyte. Important in maintaining acid/ base balance. Measurement is of the serum (non-cellular) level.
Protein, Total	A measurement of the plasma protein concentration primarily composed of albumin and globulins
Sodium	Cation found mainly in the extra cellular fluid. Used in the evaluation of hydration states. Hiponatremia is due to excess body water. Volume status needs to be determined first in the workup of hipernathremia.
Electrolytes	
Anion Gap	Is the difference between the measured cations and measured anions in the blood Sodium is the primarily measured cation and Cl and HCO ₃ are the primary measured anions, their fore $AG=Na-(Cl+HCO_3)$. Used to classify metabolic acidosis.
Carbon Dioxide	CO ₂ content is the measurement of bicarb, carbonic acid, common and dissolved CO ₂ gas >90% is bicarb (CHO ₃). The terms “bicarbonate” and “total carbon dioxide” are often used interchangeably. Although “bicarbonate” is 1-2 mmol/L lower than total carbon dioxide, this difference is not clinically significant.
Chloride	Extracellular electrolyte. Levels usually increase or decrease in concert with serum sodium.
Potassium	Intracellular cation, functions as an electrolyte. Important in maintaining acid/ base balance. Measurement is of the serum (non-cellular) level.
Sodium	Cation found mainly in the extra cellular fluid. Used in the evaluation of hydration states. Hiponatremia is due to excess body water. Volume status needs to be determined first in the workup of hipernathremia.
Factor Assays	
Factor IX	A vitamin-K dependent coagulation protein, synthesized in the liver. Factor IX dysfunction results an x-linked bleeding disorder, hemophilia B. Hemophilia A and B are clinically identical; specific assays distinguishes between the two.
Factor V	A protein synthesized in the liver. Functions both in the intrinsic and extrinsic pathways of coagulation, catalyzing the cleavage of prothrombin to thrombin. Point mutation of factor V (Leiden) increases the risk of deep vein thrombosis (DVT) and pulmonary embolism (PE).
Factor VIII	A glycoprotein coagulation cofactor synthesized by the liver. FVIII dysfunction results in an x-linked bleeding disorder, hemophilia A. Circulates with von Willebrand’s Factor , which regulates the plasma concentration of FVIII.
Factor X Assay	A vitamin- K dependent coagulation protein, synthesized in the liver. Activated factor X (factor Xa) converts prothrombin to thrombin; thus deficiency results in prolongation of both PT and PTT. Deficiency is associated with moderate to severe bleeding and can be acquired or inherited. Congenital factor X deficiency is rare and is inherited as one of several

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	autosomal recessive mutations. The assay is occasionally used in the work-up of a bleeding disorders.
Hepatic Function Panel	
Alkaline Phospholipids	Alkaline phosphates enzyme. Found in liver, biliary tract, bone, intestine and placenta. Primarily used in the assessment of hepatobiliary, and bone disease. Gamma-glutamyl transfrase (GGT) and 5' nucleotidase increase in hepatobiliary disease, not bone disease; alk phos is enzymes less reliable to differentiate source.
ALT	Alanine transaminase enzymes. High levels in hepatocytes, but also in muscle and kidney. Involved in amino acid metabolism. Release with tissue damage, primarily use to assess liver damage.
AST	Aspartate aminotransferase enzyme. High levels in hepatocytes, but also in muscle and kidney. Involved in amino acid metabolism. Release with tissue damage, primarily used to assess liver damage.
Bilirubin, Total	Breakdown product of hemoglobin. Used to access hepatobiliary disease and hemolysis .
Protein, Total	A measurement of the plasma protein concentration primarily composed of albumin and globulins.
Hypercoagulability Panel	
Anti-Thrombin III	A non- vitamin K dependent protease, which inhibits thrombin and other coagulation factors. Useful in the work-up of coagulopathies.
Factor V	A protein synthesized in the liver. Functions both in the intrinsic and extrinsic pathways of coagulation, catalyzing the cleavage of mutation of factor V (Leiden) increase the risk of a deep vein thrombosis (DVT) and pulmonary embolism (PE).
Fibrinogen	The protein precursor of fibrin. Fibrin and platelets are the main constituent blood clots. Measured in the workup of coagulopathies.
Lupis Anticoagulant	Antibodies to phospholipids; used in evaluation of hypercoaguable states and recurrent fetal loss. The name is misnomer as associated with many diseases in addition to SLE.
MTHFR Gene	PCR analysis for the C677T and the A1298C mutations in the MTHFR gene, which codes for the methylenetetrahydrofolate reductase enzyme. This converts 5,10-methylenetetrahydrofolate to 5 methylenetetrahydrofolate, the main circulating form of folate, required for the conversion of homocysteine to methionine. Utilized in the workup of hypercoaguable states and recurrent miscarriages. Only the homozygous mutation has been associated with elevated homocysteine levels.
Protein C	A vitamin K dependent plasma protein made by the liver. Inactive factors 5 and 7. Deficiency results in an increase. Utilized in the evaluation of recurrent disease or family history.

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Protein S	A vitamin K dependent glycoprotein cofactor which increases the anticoagulant effect of protein C. Synthesized by hepatocytes and megakaryocytes. Reduces thrombin generation and increases fibrinolysis. Confirm an abnormal functional result with an immunoassay for free protein S. Useful to evaluate recurrent thrombotic disease or family history.
Prothrombin 20210 Mutation	A PCR analysis of DNA to detect the presence of the prothrombin 20210 G>A mutation, which codes for a variant form of prothrombin (Factor II). PT 20210 is associated with an increased risk for venous thrombosis, but not arterial.
PT	The test measures vitamin K dependent clotting ability. Used to screen for bleeding disorders and to monitor patients on warfarin. The International Normalized Ratio (INR) has been introduced to reduce inter laboratory variability in reporting PT. INR 2-3 target range for prevention and treatment of non-valvular thromboembolic disease; 2.5-3.5 for mechanical valves and anti-phospholipid antibody syndrome.
PTT	A measure of the time taken for a clot to form in citrated blood following the addition of calcium and a phospholipid platelet substitute. Used in the workup of bleeding disorders to monitor heparin therapy and to screen for lupus anticoagulant.
Liver Function Test	
Alkaline Phosphatase	Alkaline Phosphatase enzyme. Found in liver, biliary tract, bone, intestine, and placenta. Primarily used in the assessment of hepatobiliary and bone disease. Gamma-glutamyl transferase (GGT) and 5 'Nucleotidase' increased hepatobiliary, not bone disease; Alk Phos isoenzymes less reliable to differentiate source.
ALT- Alanine Transaminase	Alanine transaminase enzymes. High levels in hepatocytes, but also in muscle and kidney. Involved in amino acid metabolism. Released with tissue damage, primarily used to assess liver damage.
AST- Aspartate Aminotransferase	Aspartate aminotransferase enzyme. High levels in hepatocytes, but also in muscle and kidney. Involved in amino acid metabolism. Released with tissue damage, primarily used to assess liver damage.
Bilirubin, Total	A breakdown product of hemoglobin. Used to assess hepatobiliary disease and hemolysis.
Protein, Total	A measurement of the plasma protein concentration primarily composed of albumin and globulins
Peripheral Smear	
Anisocytosis	Abnormal variation in the size of RBC's with increase RDW. Seen in anemias. The peripheral smear is a microscopic slide examination of the blood cells to detect structural abnormalities for anemias. A proper slide preparation/reading can result in artifactual abnormalities.

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Bands	The immature form of the neutrophil, having a “band” like appearance with Wright’s stain. An increased number of bands is called a left shift. Often seen as the first sign of infection.
Basophilic Stippling	Abnormal blue granules seen in RBC’s. The peripheral smear is a microscopic slide examination of the blood cells to detect structural abnormalities for evaluating anemias. Improper slide preparation/reading can result in artifactual abnormalities.
Basophils	Basophils are granulocytes which appear blue with Wright’s stain. Tissue basophils are called mast cells. Elevated basophil count is rare, most often associated with leukemia and myeloproliferative disorders.
Bite Cell	Abnormal RBC’s with appearance of having had a piece bitten out. The peripheral smear is a microscopic slide examination of the blood cell to detect structural abnormalities for evaluating anemias. Improper slide preparation/reading can result in artifactual abnormalities.
Burr Cells	Abnormal shaped RBC’s with spaced projections on the surface. The peripheral smear is a microscopic slide examination of the blood cell to detect structural abnormalities for evaluating anemias. Improper slide preparation/reading can result in artifactual abnormalities.
Heinz Bodies	Small round deposits of hemoglobin seen on special staining. The peripheral smear is a microscopic slide examination of the blood cell to detect structural abnormalities for evaluating anemias. Improper slide preparation/reading can result in artifactual abnormalities.
Howell-Jolly Bodies	Round, purple inclusions seen in RBC’s. The peripheral smear is a microscopic slide examination of the blood cell to detect structural abnormalities for evaluating anemias. Improper slide preparation/reading can result in artifactual abnormalities.
Nucleated RBCs	Red blood cells that still contain a nucleus. The peripheral smear is a microscopic slide examination of the blood cell to detect structural abnormalities for evaluating anemias. Improper slide preparation/reading can result in artifactual abnormalities.
Ovalocytes	RBC’s with an elliptical shape. The peripheral smear is a microscopic slide examination of the blood cell to detect structural abnormalities for evaluating anemias. Improper slide preparation/reading can result in artifactual abnormalities.
Pappenheimer Bodies	RBC’s with round purple granules. The peripheral smear is a microscopic slide examination of the blood cell to detect structural abnormalities for evaluating anemias. Improper slide preparation/reading can result in artifactual abnormalities.
Poikilocytosis	A term that indicates abnormal variation in the shape of RBC’s. Seen in a variety of anemias. The peripheral smear is a microscopic slide examination of the blood cell to detect structural abnormalities for evaluating anemias. Improper slide preparation/reading can result in artifactual abnormalities.
Rouleaux	Abnormally formed “stacks” of RBC’s due to abnormal plasma protein. The peripheral smear is a microscopic slide

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	examination of the blood cell to detect structural abnormalities for evaluating anemias. Improper slide preparation/reading can result in artifactual abnormalities.
Schistocytes	Fragmented RBC's. The par peripheral smear is a microscopic slid examination of the blood cell to detect structural abnormalities for evaluating anemias. Improper slide preparation/reading can result in artifactual abnormalities.
Sickle Cells	Creacent shaped RBC's seen in hemoglobinopathies. The par peripheral smear is a microscopic slid examination of the blood cell to detect structural abnormalities for evaluating anemias. Improper slide preparation/reading can result in artifactual abnormalities.
Spherocytes	Spherically sshaped RBC's (rather than concave). Associated with low MCV and high MCHC. The par peripheral smear is a microscopic slid examination of the blood cell to detect structural abnormalities for evaluating anemias. Improper slide preparation/reading can result in artifactual abnormalities.
Stomatocytes	RBC's with a mouth shaped appearance. The par peripheral smear is a microscopic slid examination of the blood cell to detect structural abnormalities for evaluating anemias. Improper slide preparation/reading can result in artifactual abnormalities.
Target Cell	Abnormal RBC's with a darker center. The par peripheral smear is a microscopic slid examination of the blood cell to detect structural abnormalities for evaluating anemias. Improper slide preparation/reading can result in artifactual abnormalities.
Teardrop Cells	Abnormally teardrop shaped RBC. The par peripheral smear is a microscopic slid examination of the blood cell to detect structural abnormalities for evaluating anemias. Improper slide preparation/reading can result in artifactual abnormalities.
Renal Function Panel	
Albumin	Plasma binding protein synthesized by the liver. Helps to maintained osmotic pressure in the vascular space. Reflect overall nutritional status. Generally decreased levels after age 40; edema seen with levels < 2.5; 21 day ½ life-slow to respond to nutritional intervention.
Anion Gap	Is the difference between the measured cations and measured anions in the blood Sodium is the primarily measured cation and Cl and HCO ₃ are the primary measured anions, their fore $AG = Na - (Cl + HCO_3)$. Used to classify metabolic acidosis.
BUN	Measurement of urea nitrogen found in the blood. A waste product of protein breakdown. Helpful in assessing in kidney function.
Calcium	Element. Some of ionized calcium plus protein bound calcium. Important in cellular transport mechanism. The most common reason for low calcium is hypoalbuminemia .
Chloride	Extracellular electrolyte. Levels usually increase or decrease in concert with serum sodium.

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Creatinine	Muscle breakdown product, proportional to muscle mass. Normal BUN/Creatinine ration 10:1; dehydration 15-20:1; renal disease 10:1; pre / post renal >10:1. Creatinine clearance can be estimated by the following formula: CC males= $[(140 - \text{age}(\text{yr}) \times (\text{weight}(\text{Kg}))/72 \times \text{serum creatinine})]$; For woman multiple above result x 0.85
Glucose	A sugar. Basic energy source for cells. Fasting 100-125 mg / dL indicates Impaired Fasting Glucose (pre-diabetes). Fasting > 125 mg/dL indicates diabetes mellitus.
Phosphorus	An inorganic anion, important calcium homeostasis. Assess along with calcium levels.
Potassium	Intracellular cation, functions as an electrolyte. Important in maintaining acid/ base balance. Measurement is of the serum (non-cellular) level.
Sodium	Cation found mainly in the extra cellular fluid. Used in the evaluation of hydration states. Hiponatremia is due to excess body water. Volume status needs to be determined first in the workup of hipernathremia.
Sexually Transmitted Diseases Tests	
Chlamydia DNA	
CMV (Cytomegalovirus) IgG	Positive IgG results, in the absence of IgM antibodies, most often are indicative of past Cytomegalovirus (CMV) infection and do not necessarily assure protection from future infection with CMV. Patients with systemic lupus erythematosus may give false positive results. Positive CMV titers from maternal antibody can persist in neonates for up to 6 months. Negative results indicate no significant level of detectable antibodies to CMV. In neonates, a negative result may help to exclude congenital infection. Since a single specimen cannot determine a recent infection, paired specimens, acute and convalescent, should be tested concurrently to demonstrate sero-conversion. Patients with negative or equivocal results, if clinically indicated, should be retested in 2 to 4 weeks.
CMV (Cytomegalovirus) IgM	Positive IgM results to Cytomegalovirus (CMV) are indicative of a primary or recurrent infection. IgM antibodies to CMV can persist for 2 to 9 months after the initial infection. Not all patients with reactivated CMV infection will have detectable levels of IgM antibodies. Positive IgM results in neonate have a high probability of being an indication of congenital or neonatal infection. Patients infected with Epstein-Barr virus may give false positive results. A negative result indicates no significant level of detectable antibodies to CMV but does not exclude a primary or a recurrent infection. Immunocompromised patients may give a false negative result during an active infection. Patients with negative and equivocal results, if clinically indicated, should be retested in 2 to 4 weeks.
Gonorrhea DNA	Gonorrhea is a sexually transmitted disease (STD) caused by a bacterium that can cause numerous reproductive and health issues if left untreated. It's a serious disease that often has minimal or no symptoms. If you do have symptoms, some include a discharge and painful urination. These symptoms are very similar to Chlamydia, so you might want to consider the Comprehensive STD Panel - it tests for Gonorrhea and Chlamydia, as well as several others.

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HIV - ELISA	Enzyme Immune Assay (EIA) test measures the presence of IgG antibody to HIV, 99.7% specificity. Antibody usually appears 4-12 weeks after infection and by 6 months in 95% of infected patients.
HIV – Western Blot	An indeterminate result (positive EIA with only one band positive Western Blot) can come from partial seroconversion, advanced HIV infection, or cross-reacting antibodies in pregnancy.
HIV – RNA (Viral Load)	Viral load tests are reported as the number of HIV copies in a milliliter of blood. If the viral load measurement is high, it indicates that HIV is reproducing and that the disease will likely progress faster than if the viral load is low. A high viral load can be anywhere from 5,000 to 10,000 copies and can range as high as one million or more. A low viral load is usually between 200 to 500 copies, depending on the type of test used. This result indicates that HIV is not actively reproducing and that the risk of disease progression is low. A viral load result that reads “undetectable” does not mean that you are cured. It may mean that the level of HIV virus in your blood is below the threshold needed for detection by this test. Other tests that are ultra-sensitive and that can measure as few as 20 to 40 copies in a milliliter of blood can be performed to make sure.
HIV- CD4 Count	Helper T cells derived from the thymus. A receptor of HIV. Adult T cells express either CD4 or CD8 antigens. 36-64% of all lymphocytes. Levels decrease abruptly with acute HIV infection; may rebound then decline over several years. Counts < 100 are associated with increase risk of opportunistic infections.
HPV (Human Papillomavirus)	Double stranded DNA virus. More than 100 serotypes, high risk types (16, 18, 31, 33, 35) associated with cervical cancer. HPV can not be grown in vitro. Disease is usually self limited; 90% resolving without complications.
HSV – Type 1 and HSV-Type 2 (Herpes Simplex)	Herpes Simplex Virus (HSV) is responsible for several clinically significant human viral diseases, with severity ranging from inapparent to fatal. Clinical manifestations include genital tract infections, neonatal herpes, meningoencephalitis, keratoconjunctivitis, and gingivostomatitis. There are two HSV serotypes that are closely related antigenically. HSV type 2 is more commonly associated with genital tract and neonatal infections, while HSV type 1 is more commonly associated with infections of non genital sites. IgM HSV antibodies in infants may be helpful in the diagnosis of neonatal infection. IgM antibody usually appears within the first 4 weeks of life in infected infants and persist for many months. IgM suggest a recent HSV exposure but does not differentiate between primary infections and reactivation.
RPR (Syphilis)	Screening test for syphilis bacteria (Treponema Pallidum). Measure of reaginic antibodies to cardiolipin antigen. Low titers (<1:8) suggests non-syphilitic cause; confirm with the more specific FTA-ABS test to diagnose syphilis. False positive seen in autoimmune diseases.
FTA-ABS	Fluorescent antibodies are mixed with patient serum to identify Treponema Pallidum antigens for the diagnosis of syphilis. Remains positive for life, even if adequate treatment has been received; not useful to monitor response to therapy. Up to 2% of the general population will test falsely positive, confirm with second test (VDRL, PCR, etc.)
VDRL	Screening test for syphilis bacteria (Treponema Pallidum). Measure of reaginic antibodies to cardiolipin antigen. Low

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	titers (<1:8) suggests non-syphilitic cause; confirm with the more specific FTA-ABS test to diagnose syphilis. False positive seen in autoimmune diseases.
Toxoplasma Antibodies IgG and Toxoplasma Antibodies IgM	Positive IgG results, in the absence of IgM antibodies, most often are indicative of past Toxoplasma gondii infection. Positive Toxoplasma titers from maternal antibody can persist in neonates for up to 6 months. Negative results indicate no significant level of detectable antibodies to Toxoplasma. In neonates, negative results may help to exclude a congenital infection. Since a single specimen cannot establish a recent infection, paired specimens, acute and convalescent, should be tested concurrently to demonstrate seroconversion. Patients with negative and equivocal results, if clinically indicated, should be retested in 2 to 4 weeks.
Thyroid Function Test	
FTI	Mathematical calculation used to correct total T4 in the ace of abnormal TBG. Ultra sensitive TSH and free T4 more direct measurements of thyroid status. $FTI = \frac{\text{total T4} \times T3 \text{ uptake}}{100}$
T3, Total	Thyroid hormone secreted by thyroid gland, more active metabolically than T4. Useful in the diagnosis of hyperthyroidism when the FT4 is normal or borderline. Excellent indicator of severity of disease. Not useful in diagnosis hypothyroid states; any condition that elevates TGB will elevate total of T3, if in doubt check T3.
T3, Uptake	Measurement of the unoccupied binding sites of TBG, inversely proportional to TBG. Used to in the calculation of FTI (T7), to exclude the possibility that an elevated T4 is due to an increase in TGB .
T4, Free	Unbound Thyroxin hormone, available for uptake by cells. Used in the assessment of thyroid dysfunction; typically when the TSH is equivocal.
T4, Total	Hormone secreted by the thyroid gland. Total measures T4 free and bound thyroxin binding globulin.
TBG	Protein witch binds T3 and T4. Useful to follow metastatic thyroid carcinoma. Used to evaluate an elevated total T4, however ultra sensitive TSH and free T4 are more direct measures of thyroid status.
TSH	Hormone excreted by the piturary. Stimulates the thyroid gland to produce T3 and T4. Used to screen for thyroid deseas monitor therapy. Not recommended to screen for thyroid disease and hospitalized patients.
Urinalysis	
Albumin	Urine protein is mostly albumin. Urinary protein is an important indicator of renal disease. Routine detection by dipstick is specific for albumin. Adding sulfosalicylic acid (SSA) detects all proteins. A discrepancy in protein detected by SSA compare to the amount detected by the dipstick may indicate multiple myeloma.

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Appearance	A description about the clarity of the specimen. Disease state may alter appearance. Concentrated urine is darker than dilute.
Glucose	Glucose is present in the glomerular filtrate and is reabsorbed in the proximal tubule by active transport. Glucosuria seen with serum glucose <180mg/dl.
Ketones	A waste product of fat metabolism. Three main ketone bodies: beta-hydroxy butyric acid, acetoacetate, and acetone. First two are readily converted to acetone making acetone the main substance being tested. The urine dip stick reacts with acetoacetate, weakly with acetone, but not with beta-hydroxybutyrate; a weak positive does not rule out DKA.
Leukocyte	Detects esterase released by the leukocytes in the urine and indicates the presence of WBCs. A positive result indicates pyuria and warrants subsequent microscopy; the test is designed to test the presence of leukocytes not their amount.
Specific Gravity	A measure of urine concentration. SG depends on the number and size of particles in solution whereas urine osmolality depends only on the number of particles. Used to determine hydration status and renal function. uOSM is a better indicator of renal concentrating ability SG is increased by presence of large solutes (protein, glucose).
Blood	A measure of free hemoglobin in urine, due to hemoglobin filtered through the glomerulus or by lysis of RBC's in the urinary tract. When dipstick is positive but no RBC's seen on micro, extra/renal hemolysis should be considered. A negative test reliably excludes hemoglobinuria.
Color	The yellow color of urine is due to the presence of the pigment urochrome. Straw/colored urine indicates low specific gravity (dilute urine) and amber colored urine indicates high specific gravity (concentrated urine). Many OTC products contain dyes and other substances that can color the urine.
Nitrate	A urine dipstick test used for evaluation of UTI. Enterobacteriaceae convert nitrate to nitrite which gives a positive test. The test may be negative as not all bacteria are capable of converting nitrate or if there has been insufficient time for bacterial conversion. Any shade of pink on the test strip is considered positive.
Urobilinogen	A colorless degradation product of bilirubin found in the urine and feces, the majority excreted in feces. A sensitive indicator of impaired liver function. The absence of urobilinogen in urine in a jaundiced patient indicates complete biliary obstruction.
Urinary Catecholamines	
HVA	The major metabolite of the catecholamine dopamine. Excreted in the urine primarily used for the diagnosis and monitoring of neuroblastomas.
Urinary Catecholamines	Neurotransmitters derived from the amino acid tyrosine in the adrenal medulla; excreted in the urine. Includes epinephrine, norepinephrine and dopamine. The majority of the substances are metabolized to vanillylmandelic acid

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	(VMA) and homovanillic acid (HVA). Utilized in the diagnosis of pheochromocytoma.
VMA	The majority metabolite of the catecholamines epinephrine and norepinephrine. Excreted in the urine. Utilized in the diagnosis of pheochromocytoma. And in monitoring neuroblastomas.
Warfarin Panel	
CYP2C9 Gene	Genetic test for mutations on the CYP2C9 gene that encodes for cytochrome P450 2C9, a liver enzyme involved in the metabolism of medications such as Warfarin. A third of the population carries a mutation that results in slower Warfarin metabolism. CYP2C9 mutations, along with VKORC1 mutations, are estimated to account for 40%-63% of the variability in therapeutic warfarin dose. Test for these two mutations can assist in identifying patients at risk for bleeding before starting anticoagulation therapy so they could be started on a lower Warfarin dose. Various formulas exist to calculate warfarin dose based on results.
VKORC1 Gene	Genetic test for mutations on the VKORC1 gene that encodes for Vitamin K Oxide reductase complex subunit-1, an endoplasmic reticulum protein involved in the metabolism of medications such as Warfarin. Mutations can increase sensitivity to Warfarin by reducing the availability of activated Vitamin K required for norm clotting. These VKORC1 mutations along with common CYP2C9 variants are estimated to account for 40%-63% of the variability in therapeutic Warfarin doses. Test for these two mutations can assist in identifying patients at risk for bleeding before starting anticoagulation therapy so they could be started on a lower Warfarin dose. Various formulas exist to calculate Warfarin dose based on results. Other VKORC genetic Variants have been identified which Warfarin anticoagulation