IMPORTANT CLINICAL LABORATORY TESTS TO AID IN THE DIFFERENTIAL DIAGNOSIS OF MUSCULOSKELETAL DISORDERS:

Blood chemistry panels, CBC and UA scan a number of different diseases. Abnormalities do not always necessarily mean the patient has a disease and some patients with diseases may have normal test results. The different panels and tests listed, which can be performed on a patient (if clinically indicated) may give clues to assist in the differential diagnosis of musculoskeletal disorders. In addition, the different panels and tests listed are addressing some of the common findings with these tests and does not represent an all inclusive list of abnormal findings. Keep in mind, there are many variations that can alter the results of these tests and abnormal findings should not be a cause for alarm, but should raise the possibility of a red flag for the chiropractic physician to further evaluate and/or reassess the patient.

Blood Chemistry Panel:
Glucose—blood sugar test to diagnose diabetes or monitor medication.
Uric acid—associated with joints (gout) or kidney pain (stones).
Urea Nitrogen—measures kidney function.
Creatinine—measures kidney function.
Bun—blood urea nitrogen by-product of metabolism removed from blood by the kidneys.
Bun/Creatinine Ratio—the relationship between BUN and creatinine.
Sodium—associated with kidney disease, certain adrenal diseases and dehydration.
Potassium—associated with liver damage.
Chloride—associated with kidney disease, certain adrenal diseases and dehydration.
Carbon Dioxide—gas used to maintain the PH prevent acidic or alkaline state.
Calcium—increased in thyroid problems, decreased in poor diet, kidney disease and/or Vitamin D deficiency.
Phosphorus—related to calcium, usually follows opposite pattern.
Total Protein—measures blood proteins albumin and globulin. Associated with liver disease.
**Albumin**—a blood protein manufactured by the liver. Associated with liver disease, poor nutrition and/or dehydration.

**Globulin**—a blood protein similar to albumin and manufactured by the liver.

**A/G Ratio**—the relationship between albumin and globulin.

**Bilirubin**—aids in digestion. Increased usually associated with liver disease.

**Alkaline Phosphatase**—enzyme in the blood if increased associated with liver or bone disease i.e.: Pagets disease, malignancy (osteoblastic), hyperparathyridism, rickets etc.

**Lactic Dehydrogenase (LDH)**—increase associated with skeletal muscle, liver and myocardial infarction.

**AST (SGOT)**—increase associated with liver, skeletal muscle, kidney or red blood cells.

**ALT (SGPT)**—increase associated with liver disease.

**GGT**—an enzyme used to diagnose liver and gallbladder disease.

**Iron**—decreased values associated with anemia and pregnancy.

**Cholesterol**—high levels are associated with increase incidence of coronary/heart disease.

**HDL-Cholesterol**—blood lipids “Good” fat, high levels associated with decreased risk of heart disease.

**HDL/Cholesterol Ratio**—relationship between HDL and total cholesterol.

**LDL-Cholesterol**—blood lipids “Bad” fat, high levels associated with increase risk of heart disease.

**Triglycerides**—increase associated with diabetes mellitus, acute alcoholism, nephrotic and use of oral contraceptives.

**Specific Blood Chemistry Panels:**

**Bone Panel:**

- **Total protein**—see blood chemistry panel previously discussed.
- **Calcium**—see blood chemistry panel previously discussed.
- **Serum protein electrophoresis**—aids in the work-up of patients with liver disease, multiple myeloma, macroglobulinemia, hypogobulinemia, collagen diseases and nephrotic syndrome.
- **Complete blood count (CBC)**—see section in notes on CBC.
- **Ionized calcium**—see blood chemistry panel previously discussed.
- **Alkaline Phosphatase**—see blood chemistry panel previously discussed.

**Arthritis Panel:**

- **RA Latex**—associated with collagen disease i.e.: RA
- **Uric Acid**—increase associated with gout, leukemia, lymphoma and chronic renal disease.
- **ANA screen**—associated with systemic connective diseases i.e.: SLE, scleroderma, RA etc.
- **C-reactive protein (CRP)**—associated with both inflammation, cellular and tissue damage.
- **HLA-B27**—indicative of ankylosing spondylitis.
- **HLA-B8**—approximately 40% of the time if positive indicative of DISH.

**Joint Pain or Swelling Tests:**

- **CBC**—see section in notes on CBC.
- **Erythrocyte sedimentation rate (ESR)**—associated with inflammation.
Synovial fluid analysis, including culture-assists in the detection and differential diagnosis of osteoarthritis, traumatic arthritis, pseudogout, gout, rheumatic fever, bacterial arthritis, tuberculous arthritis and lupus erythematosus. RA latex-associated with collagen disease i.e.: RA. ANA screen-associated with systemic connective tissue diseases i.e.: SLE, scleroderma, RA etc. Uric acid-see arthritis panel.

**Prostate Profile:**
Prostatic acid phosphatase-increase associated with carcinoma of the prostate. Prostate specific antigen-increase associated with carcinoma of the prostate.

**Thyroid Profile:**
Triiodothyronine (T3)-increase associated with hyperthyroidism, severe liver disease, nephrosis, etc. Decrease associated with hypothyroidism and normal pregnancy. Thyroxine (T4)-increase associated with hyperthyroidism, acute thyroiditis, early hepatitis and pregnancy. Decrease associated with hypothyroidism, chronic thyroiditis, nephrosis, etc. Free thyroxine index (FTI)-increase associated with hyperthyroidism. Decrease associated with hypothyroidism. Thyroid stimulating hormone (TSH)-markedly elevated in primary hypothyroidism.

**Parathyroid Function and Calcium Metabolism:**
Serum calcium-see blood chemistry panel previously discussed. Alkaline phosphatase-see blood chemistry panel previously discussed. Urine calcium-increase associated with primary hyperparathyroidism, vitamin D toxicity, osteolytic conditions, Pagets and renal tubular acidosis, etc. Serum phosphorus-increase associated with hypoparathyroidism, vitamin D toxicity, kidney disease, acromegaly, cushings disease, etc. Total protein-see blood chemistry panel previously discussed.

**Hypertension (Coronary Risk Profile):**
Note: See blood chemistry panel previously discussed. Cholesterol High-density lipoprotein (HDL) cholesterol Coronary risk indicator Triglycerides Low-density lipoprotein (LDL) cholesterol

**Pancreas Function Tests:**
CBC-see section in notes on CBC. Glucose tolerance test (GTT)-increase associated with diabetes mellitus and decrease associated with hypoglycemia. Lipase-increase associated with acute pancreatitis. Amylase-increase associated with acute pancreatitis
Liver Function Tests:
Note: See blood chemistry panel previously discussed.
Total protein-albumin and globulin
Bilirubin-total and direct
Cholesterol
Serum Glutamic Oxalacetic transaminase (SGOT) aka (AST)
Gamma-glutamyltranspeptidase (GGT) or peptidase
Alkaline phosphatase
Serum glutamate pyruvate transaminase (SGPT)
Lactic Dehydrogenase (LDH)

Miscellaneous Tests:
Urine (Bence-Jones Protein)-increase associated with malignant conditions i.e.: Multiple myeloma.
Antistreptolysin-O titer (ASO)-increase associated with acute rheumatic fever and acute glomerulonephritis.
Anti-Nuclear Antibody (ANA)-associated with SLE and other various connective tissue diseases.

CBC and UA:

CBC (Complete Blood Count) with Differential:
WBC-high count associated with infection or disease.
RBC-decreases associated with anemia.
HGB-low levels associated with anemia.
HCT-low levels associated with anemia.
MCV, MCH, MCHC-used to aid in the diagnosis of anemia.
Neutrophils, Lymphocytes, Eosinophils, Basophils, Monocytes-associated with fighting infection to producing antibodies.
Platelet-associated with clotting mechanism.

UA (Urinalysis):
Color-varies from pale yellow to dark amber usually proportional to concentration.
Appearance-normally clear if freshly voided.
Specific Gravity-measures kidney’s ability to concentrate urine.
PH-normally more acidic.
Protein-associated with renal disease.
Glucose-associated with diabetes.
Ketones-found in fever, anorexia, GI disturbances, starvation.
Blood-detects both intact RBC’s and lysed RBC’s. Associated with disease or trauma anywhere in the kidneys or urinary tract. Also, associated with prostatitis, renal carcinoma, renal calculi and excessive exercise like marathon runners.
Bilirubin-associated with liver disease.
Leukocytes-associated with pyelonephritis or inflammation involving other structures in the urinary tract.
Casts-associated with renal failure.
Bacteria-associated with contamination.