Effect of Herbal Medicines on Lab Tests

Herbal medicines are classified as dietary supplements and do not have to be proven safe before being released into the marketplace. Many herbs have been associated with one or more abnormal laboratory test results. Abnormal results may occur by any of the following mechanisms:

- Assay interference
- Herb-therapeutic drug interaction
- Organ toxicity

The most common abnormalities are summarized below.

Some herbs have structural similarity with digoxin and interfere with the digoxin immunoassay. Digoxin levels may be falsely elevated or decreased depending on the type of assay used in the laboratory. The herbal products that most often interfere with digoxin measurements are Chan Su, Dan Shen, Uzara root, Asian Ginseng and Siberian Ginseng. Fortunately, the Bayer Centaur assay used in the Saint Luke’s Health System is not adversely affected by these herbs.

Several herbal medicines lower the seizure threshold maintained by several anticonvulsants including phenobarbital and phenytoin. The most common offenders are Evening Primrose, Borage Oil and Shankhapushpi. Therapeutic drug levels may decrease up to 40% after ingestion of these products.

Many herbal medicines interact with warfarin and potentiate its anticoagulant effect, increasing the risk of bleeding. Some herbs can produce as much as a two-fold rise in INR. Examples include angelica root, arnica flower, ansine, bogbean, borage seed oil, Boldo-genugreek, capsicum, Dan Shen, Dong Quai, feverfew, garlic, ginger, Ginkgo biloba, licorice root and willow bark.

Other herbal medicines interfere with warfarin’s anticoagulant properties, leading to subtherapeutic INR values. In some cases, these herbs have been reported to decrease INR as much as 50%. The main culprits are ginseng, Saint John’s Wort and soy milk.

Some herbs can increase the risk of bleeding by inhibiting platelet aggregation. The best known examples are Dan Shen, garlic and Ginkgo biloba.

Besides interfering with warfarin, Saint John’s Wort has been reported to decrease the therapeutic concentration of several other medications including digoxin, cyclosporine, estradiol, Indinavir and theophylline.

Some herbal medicines are hepatotoxic. Kava is the most notorious hepatotoxin and can produce a 70 fold increase in ALT and AST. Mistletoe berries have also been reported to elevate ALT and AST. Chaparral and germander have been associated with cholestatic hepatitis. Comfrey may cause hepatic veno-occlusive disease.

Kelp is promoted as a thyroid tonic and anti-inflammatory medicine. Kelp tablets contain substantial amounts of iodine, which can cause hyperthyroidism. T₄ and T₃ are increased, while TSH is suppressed.

Some herbal medicines affect glucose levels. Chromium is a trace metal that helps to regulate glucose metabolism. Athletes and bodybuilders take chromium supplements to enhance performance. Large doses can induce hyperglycemia. In contrast, ginseng has been associated with hypoglycemic episodes.

Llicorice is used as an anti-inflammatory herb and as a remedy for peptic ulcers. Carbenoxolone, one of the components of licorice, can elevate blood pressure and cause hypokalemia. In extreme cases, licorice ingestion has been associated with hypokalemic myopathy. In these cases the mean plasma potassium level is 1.98 mEq/L and the mean CK level is 5300 IU/L.

Unexpected lead poisoning may occur from the use of herbal medicines contaminated with lead. Some
Chinese herbs have been found to have lead content as high as 20,000 ppm. Ingestion of these products can lead to blood lead levels exceeding 100 ug/dL. Some patients may present with intoxication porphyria secondary to lead poisoning.

Because of these complications, the American Society of Anesthesiologists has suggested that in general patients should discontinue their herbal medicines at least 2 weeks before surgery. Other investigators have recommended that those herbal medicines that interfere with platelet function or coagulation should be discontinued at least 7 days prior to surgery.

In summary, herbal medicines should be considered whenever an otherwise healthy individual has an abnormal laboratory result. They should also be considered whenever a patient has an unexpected response to a prescribed medication or presents with unexplained organ toxicity.

### MRSA – Coming to a Community Near You

Bacteria become antimicrobial resistant by acquiring a gene that permits inactivation of a particular antibiotic or class of antibiotics. It is estimated that more than 70% of bacteria that cause hospital-acquired infections are resistant to at least one commonly used antibiotic.

*Staphylococcus aureus* was the first known bacteria to acquire antibiotic resistance; penicillin was introduced in 1941 and resistance appeared in 1944. Today, methicillin-resistant *Staphylococcus aureus*, commonly known as MRSA, is usually associated with hospital or nursing home acquired infections. Interestingly, genetic studies have revealed that acquisition of the methicillin-resistance gene, called the *mec* gene, by MRSA has occurred only a few times. Therefore, the MRSA common to many hospitals has resulted from dissemination of only a few clones. Transmission of those MRSA clones between cities, countries, and continents has been traced to the transfer of patients infected or colonized with MRSA. Risk factors associated with hospital-acquired MRSA infections include prolonged hospitalization, care in an intensive care unit, prolonged antibiotic therapy, surgical procedures and close proximity to another patient who is infected or colonized with MRSA. In U.S. hospitals, nearly 50% of all *Staphylococcus aureus* isolates are methicillin resistant.

Within the last five years, reports of MRSA infections in people with little or no contact with healthcare facilities and no other risk factors have increased. This type of MRSA is referred to as community-acquired MRSA (CA-MRSA). Thus far, most reported cases have been in children, athletes involved in contact sports, prison inmates, and certain Native American populations in the Midwest and Alaska. CA-MRSA infections have presented in a variety of ways, including severe sepsis with pneumonia and skin infections that closely resemble a spider bite.

The true incidence of CA-MRSA is unknown, but recent studies estimate 0.2% in the general U.S. population. Some CA-MRSA infections are likely caused by strains that have migrated from people who were colonized or infected while hospitalized. Other CA-MRSA strains are believed to have evolved due to a newly acquired resistance gene. The CDC is conducting active surveillance for CA-MRSA in selected regions of the US to help typify the incidence of and risk factors for MRSA in the community. The CDC website ([www.cdc.gov](http://www.cdc.gov)) includes answers to frequently asked questions about MRSA, including practical advice on preventing CA-MRSA.

### CCP Antibodies for Rheumatoid Arthritis

The diagnosis of rheumatoid arthritis (RA) is established primarily based on clinical criteria with serologic support limited to the detection of rheumatoid factor (RF). Approximately 75% of patients with RA are RF positive. The specificity of the RF test is relatively poor, because RF is present in many patients with other autoimmune diseases, infectious diseases, and in some healthy individuals.

Several recent studies have demonstrated that CCP antibodies have much improved specificity for RA compared to RF. A clinical evaluation of this test conducted at Mayo Clinic using specimens previously tested for RF indicated that CCP antibodies were detectable in 93% of RA patients. False positive results occurred in only 3% of patients who did not have RA. The predictive values of positive and negative results were 90% and 98%, respectively. CCP antibodies were detected in approximately 40% of rheumatoid arthritis cases that were seronegative for RF. Like RF, a positive CCP antibody result indicates an increased likelihood of erosive disease in patients with RA.