Continuing Education for Pharmacists

Volume XXIV, No. 1

Natural Products: Coltsfoot to Cranberry

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Goals. The goals of this lesson are to present information on the claims, mechanisms of action, typical dosages used and other items of interest on natural products and nutraceuticals alphabetically from coltsfoot to cranberry, and to provide background information for assisting others on their proper selection and use.

Objectives. At the conclusion of this lesson, successful participants should be able to:

1. identify claims, mechanisms of action, and typical dosages for natural products and nutraceuticals presented;
2. select from a list, the synonyms for these products; and
3. describe popular uses of products discussed.

This lesson is part of a series that presents an overview of the common uses, proposed mechanisms of action, typical dosage regimens and other information of interest on natural products and nutraceuticals. Products reviewed in this article are listed in Table 1.

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The paramount difference between drugs and natural products was explained in the first lesson in this series. However, since natural products are a controversial topic for some people, the authors restate that the information presented is neither a promotion of nor a condemnation against their use. It is merely an overview of what has been reported in both the public and scientific literature, and certainly not an in-depth treatise. Additional sources (websites) of information on natural products are provided in Table 2. Some of these websites require subscription.

COLTSFOOT (*Tussilago farfara*), also known as ass's foot, brandlattich, British tobacco, bullsfoot, butterbur, coughwort, donnhove, fararae folium leaf, fieldhove, filius ante patrem, flower velure, foal's foot, foalswort, guflatich, hallfoot, horsefoot, horsehoof, kuandong hua, pas diane, pferdefut and tussilage, is a low-growing perennial plant that is native to Eastern Europe and Central, Western and Northern Asia. It spread to the mountains of North Africa and was brought to North America by colonists. Coltsfoot grows best in sandy places throughout the Eastern United States and Canada.

In early spring, coltsfoot produces narrow, golden-yellow flowers, which bloom from April to June. When the flowers die, hoof-shaped fleshy, woody leaves appear. The name coltsfoot was derived from the leaves' hoof-shapes.

Coltsfoot has been used for centuries as an antitussive in Western and Chinese folk medicine. This use is reportedly how it was given its Latin name, *Tussilago*. The plant's buds, flowers and leaves are used for dry cough, irritated throat and laryngitis. In Chinese medicine, it is also used to treat asthma and bronchitis.

The usefulness of coltsfoot is reportedly due to the soothing effects of its mucilage content. Other constituents of the plant may have anti-inflammatory activity, but they may also raise blood pressure.

Coltsfoot is approved by the German Commission E (a European agency that oversees the promotion and use of natural products) for use in treating cough, bronchitis and inflammation of the mouth and pharynx. In this country, coltsfoot has been classified by the FDA as an herb with undefined safety because all parts of the plant contain unsaturated pyrrolizidine

Table 1
Natural Products Covered in this Lesson

Coltsfoot
Comfrey
Conjugated Linoleic Acid
Copper
Cordyceps
Cranberry

Table 2
Representative Sources for Information on Natural Products

American Botanical Council	www.herbalgram.org
Facts and Comparisons	www.factsandcomparisons.com
Food and Drug Administration	www.fda.gov (*click on Food*)
National Center for Complementary and Alternative Medicine of the National Institutes of Health	www.nccam.nih.gov
PDR for Herbal Remedies PDR for Nutritional Supplements	www.pdr.net
Pharmacist's Letter	www.naturaldatabase.com

alkaloids (UPA). These substances can cause liver damage and be carcinogenic.

The German Commission E recommends a limit to how high of a content of UPA there can be in commercial products, but dietary supplements sold in the United States are not required to include their UPA content on the product labeling. While there may be little danger of acute poisoning when a product known to contain small amounts of UPA is ingested, the consensus of opinions found when preparing this article is that prolonged use of products with unknown UPA content is not recommended.

Allergic reactions to coltsfoot have been reported and there is believed to be a cross-sensitivity with chamomile, chrysanthemums, daisies, marigolds, ragweed and other herbs. The use of coltsfoot by pregnant women is contraindicated due to its potential abortifacient effects. Since UPA are excreted in breast milk, its use by nursing women is contraindicated also.

The typical dose of coltsfoot is 1.5 to 2.5 grams in 150 mL of boiling water, which is allowed to steep for 15 minutes. The resulting tea is strained and ingested three times a day. The daily dose should not contain more than 1 milligram of UPA. A liquid extract prepared in a 1:1 ratio in either 20 or 25 percent ethanol is given in a dose of 2 mL, three times a day. A tincture prepared in a ratio of 1:5 with 45 percent ethanol is given in a dose of 8 mL, three times a day.

COMFREY (*Symphytum officinale*), also known as ass ear, black root, blackwort, boneset, bruisewort, common comfrey, consound, gum plant, healing herb, knitback, knitbone, salsify, slippery root and wallwort, is a perennial plant that grows about three feet high in moist grasslands. It has bell-shaped purple to yellow-white flowers. Comfrey is indigenous to Europe and temperate areas of Asia. It was naturalized in the United States by early settlers. It is cultivated in Japan as a green vegetable.

The use of comfrey has been recorded for over 2000 years. It has been used externally as a poultice of leaves and roots to heal burns, sprains, bruises, swelling and hemorrhoids. Comfrey has also been used orally to treat angina, diarrhea, excessive menstrual flow, gastric ulcers and rheumatism, and to suppress bronchial congestion, inflammation and persistent cough.

The parts of comfrey used in folk medicine are the leaf and roots that grow both above and under the ground. The component of comfrey that may have healing activity is allantoin. This substance stimulates tissue repair and wound healing through cell proliferation. It is claimed to significantly affect multiplication in peripheral nerves that are both degenerating and regenerating. Another constituent of comfrey, rosmarinic acid, reportedly has anti-inflammatory activity.

The German Commission E approves the topical use of comfrey for treating blunt injuries including bruises and sprains, and to promote bone healing. In the United States, comfrey has no official status, but allantoin, itself, is an approved ingredient in OTC topical products. There is no scientific proof of effectiveness for the oral ingestion of comfrey for any use.

Topical use of recommended doses of comfrey do not appear to cause toxicity. However, since comfrey contains the UPA mentioned above in the coltsfoot monograph, its oral use is not recommended. The American Herbal Products Association suggests that all comfrey products containing UPA be labeled with the warning: "For external use only. Do not apply to broken or abraded skin. Do not use while nursing." The use of comfrey during pregnancy is contraindicated.

The typical dose of comfrey is a 5 to 20 percent concentration, applied to unbroken skin for no longer than 10 days. An infusion can be prepared by pouring boiling water over 5 to 10 grams of powdered comfrey, steeping for 15 minutes and straining before use.

CONJUGATED LINOLEIC ACID also known as CLA and octadecadienoates, is not a single chemical. Instead, it refers to a group of octadecadienoic acid isomers of linoleic acid. Unlike linoleic acid, all CLA isomers have conjugated bonds. Chemically unsaturated organic compounds that are conjugated, such as CLA, have two double bonds separated by one single bond.

CLA is found in animal tissues used for food, including meat, poultry, eggs and dairy products that have undergone heat processing, such as cheese, milk and yogurt. While vegetable fats are generally poor sources of CLA, it is

chemically produced from linoleic acid obtained from safflower, soybean and sunflower oils.

Claims are made that CLA enhances immunity, protects against cancer, atherosclerosis, heart disease, and food-induced allergic reactions, and helps to build muscle and promote fat loss. It is used to treat diabetes, obesity and wasting, and for body building.

No mechanism of action has been found for CLA to date, but the prominent theory holds that it inhibits lipoprotein lipase, an enzyme that breaks down fat so that it can be absorbed. It also increases the activity of enzymes that break down stored fats. Speculation on the potential anti-cancer activity of CLA is based on its antioxidant properties and the possibility that it regulates the activity of cytokines (hormone-like, low molecular weight proteins that regulate the intensity and duration of immune responses).

Proponents of the use of CLA point out that most of the evidence of its potential benefits are based on animal, not human studies. Also, even though CLA is found in meat and heat processed dairy products, it is virtually impossible to get sufficient therapeutic doses from dietary sources.

Typical doses of CLA range from 1 to 6 grams per day, taken with meals.

COPPER (Cu) is an essential trace mineral in human nutrition. The adult human body is reported to contain between 75 and 100 mg of copper on average. It is involved in the storage and release of iron from its storage sites to form hemoglobin for red blood cells. Most of the body's copper is contained in the substance ceruloplasmin, an alpha-globulin, which is essential for the proper utilization of iron in hemoglobin synthesis. Much of the remaining copper is either protein-bound or contained in amino acids.

Copper is a constituent of many enzymes, including monoamine oxidase, and it is involved in protein metabolism as well as the healing process. It is a cofactor for copper/zinc superoxidase dismutase, which is an important antioxidant enzyme, as is ceruloplasmin. Copper is required for the synthesis of phospholipids and RNA, and plays a role in proper bone formation. Copper is also needed for energy metabolism, the formation of connective tissue and central nervous system activity. During growth, the highest concentrations of copper appear in the rapidly developing structures of the body.

Short of starvation, it is extremely rare for an adult human to have a copper deficiency. It is contained in many foods as well as tap water in most areas of the U.S. Good sources of copper include nuts, grains, shellfish, oysters, organ meats, fruits, and beans. The typical American diet contains 3 to 5 mg of copper daily, while only 2 to 3 mg are considered necessary for replacement.

About one-third of all ingested copper is absorbed. The rest is eliminated in the feces. Instances where deficiencies have been seen include adults undergoing long-term total parenteral nutrition with no copper supplementation, and those with one of the various malabsorption diseases. One area of concern for copper deficiency is in premature infants who are fed low-copper milk formulas.

Copper supplements are used to treat copper deficiency anemia due to inadequate dietary intake, and for wound healing, arthritis, inflammation and osteoporosis. Claims are made that it has anticancer activity and is protective against cardiovascular disease.

The typical dose for copper deficiency in children is 0.1 mg/kg of cupric sulfate, up to 2 mg total, per day. The current ESSADI (Estimated Stated Safe and Adequate Dietary Intake) from the Food and Nutrition Board of the U.S. National Academy of Sciences for adults is 1.5 to 3 mg daily.

CORDYCEPS (*Cordyceps sinensis*), also known as caterpillar fungus, Cs-4, dong chong xia cao, dong chong zia cao, hsia ts'ao tung ch'ung, tochukaso and vegetable caterpillar, is a black mushroom. It extracts nutrients from and grows only on caterpillars found in high altitudes in Tibet and China.

Cordyceps is one of the most valued medicinal agents in Chinese medicine. A laboratory fermentation process has been developed to allow large-scale production and availability. It is used in traditional Chinese medicine as the herb of choice for treating lung and kidney ailments, and as a tonic to promote vitality, endurance and a long life.

In the Western world, cordyceps is used to strengthen the immune system, improve athletic ability and performance, reduce the effects of aging, treat lethargy and improve liver function in patients with hepatitis B infection. It is also used to treat anemia, arrhythmias, chronic bronchitis, cough, dizziness, frequent nocturia (nighttime urination), high cholesterol, kidney and liver disorders, male sexual dysfunction, opium addiction, tinnitus, wasting and weakness. As in Chinese medicine, cordyceps is used as a tonic to increase energy, enhance stamina and reduce fatigue.

Cordyceps is claimed to provide beneficial activity by improving oxygen consumption by the cardiopulmonary system. It increases oxygenation of blood in individuals with decreased lung function such as asthma and bronchitis when they are under stress. It is reported to be an antioxidant that increases serum levels of the enzyme superoxide dismutase.

The use of cordyceps in treating numerous conditions has been studied extensively. There are reports that it has beneficial effects on the cardiovascular, central nervous, endocrine, hepatic, immune, renal, respiratory and reproductive systems. It has been reported to stimulate immune

function by increasing the number of T-helper cells, increase natural killer cell activity, stimulate mononuclear blood cells, increase the levels of interferon-gamma, tumor necrosis factor and interleukin-1, and lengthen the survival time in treated patients.

Other studies suggest that cordyceps might reduce renal toxicity of cyclosporine and aminoglycoside drugs, and be beneficial for patients with chronic renal failure needing therapy with these drugs. It may also inhibit platelet aggregation and clot formation; counteract or prevent arrhythmias while decreasing heart rate and contractility; reduce blood glucose without reducing plasma insulin levels; as well as reduce plasma triglycerides and cholesterol levels.

However, these studies have been done mostly on animals and are not the extensive and rigorous studies in humans that are required for FDA approval of therapeutic claims.

A typical dose of cordyceps is 3 grams per day.

CRANBERRY (*Vaccinium macrocarpon, V. microcarpus, V. oxycoccus, Oxycoccus microcarpus*, and others), also known as American cranberry, European cranberry, highbush cranberry, lowbush cranberry, mooseberry, southern mountain cranberry, and trailing swamp cranberry, refers to a number of related cranberries found in areas ranging from damp bogs to mountain forests throughout the contiguous states and up into Alaska.

Cranberries, along with blueberries and Concord grapes are considered to be the only fruits native to North America. The Pilgrims called them "crane berry" because their stem and flowers resembled the neck, head and beak of the crane. Common usage has shortened the name to cranberry.

Back in the mid-1800s, German physicians observed that the urinary excretion of hippuric acid increased after ingestion of cranberries. From thence, cranberry fruit has been used for the prevention and treatment of urinary tract infections, and as a urinary deodorizer for people with incontinence. This use continues in spite of a lack of scientific proof that cranberries or their juice are effective urinary acidifiers.

Cranberry is also used in folk medicine for treatment of scurvy and cancer, and in Eastern Europe folk medicine, as a diuretic, antiseptic and antipyretic.

Even though cranberry is acidic, it does not significantly acidify the urine, nor has it demonstrated antibiotic or antiseptic activity. Currently, proponents of its use state that cranberry contains anthrocyanin dye and a high-molecular weight compound (as yet unidentified) which inhibits bacterial adherence to infection sites within the urinary tract. This, they claim, limits the ability of bacteria to initiate and spread infection. This activity has been demonstrated in laboratory tests using silicone rubber, but has not been proven in human or animal studies.

Another suggested use of cranberry is as a urinary deodorizer. The pungent odor of fermenting urine from incontinent patients is a persistent, sometimes demoralizing problem. Cranberry is claimed to lower urinary pH enough to retard degradation of urine by *E. coli*, which reduces the production of ammonia-caused odor.

The typical dose for cranberry juice cocktail (products with 33 percent pure cranberry juice content) for preventing urinary tract infection is 3 ounces daily. For treating infections, the recommended dose is 12 to 32 ounces daily. Six capsules of the dried cranberry powder are reportedly equivalent to 3 ounces of the above strength cranberry juice cocktail. Caution should be exercised in dosing since there are liquid cranberry products on the market that contain from 10 to 100 percent cranberry juice. Some sources recommend 300 to 400 mg of concentrated cranberry capsules twice daily. Fresh or frozen cranberries can be used; 1.5 ounces is considered to be equivalent to 3 ounces of 33 percent cranberry juice cocktail.