

What makes up a plant?!

Herbal Glossary of chemical compounds:

ALKALOIDS: This group is comprised of a wide variety of plants that contain nitrogen-bearing molecules that make them very active. Many of these plants have been used to create well-known drugs used for medicinal purposes. One such example, vincristine, which was derived from the Madagascar periwinkle (*Catharanthus roseus*), is used to treat some types of cancer. Another example is atropine, which is found in deadly nightshade.

BITTERS: This group is comprised of a variety of plants that are lumped together because of their very bitter taste. This bitterness causes stimulation of the salivary glands and digestive organs. As such, bitters can be used to improve appetite and strengthen the digestive system. Examples of bitters include wormwood and hops.

CARDIAC GLYCOSIDES: These compounds are found in various medicinal plants (Foxglove, Lily of the Valley) and have strong direct action on the heart. Cardiac glycosides such as digitoxin, digoxin, and convallotoxin support heart strength and rates of contraction when failing. These compounds also have a diuretic effect that stimulates urine production and aids in removal of fluid from tissues and the circulatory system.

CYANOGENIC GLYCOSIDES: These glycosides are based upon cyanide, a very deadly poison, but in small doses, they can serve as a muscle relaxant. The bark of wild cherry and the leaves of elderberry (*Sambucus racemosa*) contain cyanogenic glycosides, which can be used to suppress and soothe dry coughs.

FLAVANOIDS: Flavonoids are found widely throughout the plant world and they have a wide range of medicinal uses and actions. They often act as pigments giving a yellow or white color to flowers and fruits. Some flavonoids have anti-viral and anti-inflammatory properties. Flavonoids found in many plants like lemon and buckwheat are known to strengthen capillaries and prevent leakage into tissues.

MINERALS: Many plants have high levels of minerals because they can draw minerals from the soil and can convert them into a form that is more easily used by the human body. Mineral content is often the key factor in a plant's effectiveness as a medicine. One example of a plant high in minerals is horsetail. The high silica content in horsetail plants is used for arthritis because it supports the repair of connective tissue.

PHENOLS: Phenols are plant compounds that are thought to be produced to protect against infection and herbivory by insects. They are often anti-inflammatory and antiseptic and can have anti-viral properties. Phenols vary in structure and range from salicylic acid (similar to aspirin) to complex sugar-containing phenolic acids. Wintergreen and willow contain salicylates. Members of the mint family often contain phenols.

POLYSACCHARIDES: Polysaccharides are found in all plants and comprised of multiple units of sugar molecules linked together. For medicinal purposes, the “sticky” polysaccharides produce mucilage or gums that are commonly found in bark, roots, leaves, and seeds. These sticky polysaccharides are able to soak up large quantities of water and form jelly like masses that can be used to treat dry or irritated tissues such as skin and mucous membranes.

PROANTHROSYANINS: These compounds are pigments, which give fruits and flowers red, purple, or blue hues and are closely related to tannins and flavonoids. These compounds have been documented to be valuable in protection of circulation specifically in the heart, eyes, and feet. Red grapes, blackberries, and hawthorn berries all have high levels of proanthocyanins.

SAPONINS: This group of active compounds obtains its name from the fact that like soap, they produce lather when placed in water. There are two main forms of saponins: steroidal and triterpenoid. Steroidal saponins are very similar to the chemical structures of many of the human body’s hormones including estrogen and cortisol. Examples plants containing saponins include agave, wild yam, and several members of the lily family. Several native plants are used in a process to produce synthetic hormones for humans.

TANNINS: Most plants produce tannins. Tannins serve as a deterrent to herbivory by insects and grazing animals given that they provide a harsh unpalatable flavor. Tannins are also useful in curing leather because of their tendency to contract and astringe tissues by binding with precipitating proteins. Examples of plants high in tannins include oak bark and black catechu.

VITAMINS: Many plants contain high levels of useful vitamins. Many well-known fruits and vegetables have high levels of vitamin C and beta-carotene. Lesser-known vitamin containing plants like watercress, rose hips, and sea buckthorn have high levels of vitamins B, C, and E.

VOLATILE OILS: Volatile oils are extracted from plants and are used to produce essential oils that play a very important role in medicinal botany. These oils are often very complex and can be comprised of 100 or more compounds. These oils have many uses. For example, tea tree oil is a strong antiseptic. Resins and gums are often linked with essential oils, however these are not volatile.

POLYPHENOLS: Polyphenols, a type of antioxidant, give plants their bitter taste - part of their defense systems against insect invasion. How smart are plants! They can’t get away from intruders and predators, but they can synthesize chemicals that call in the predators of the predators, have tastes that rebuff, and poisons that kill. Polyphenols give plant cells stability, attract pollinators, and protect against UV light. Polyphenols help to positively influence the health of the gut ecology. The intestinal microflora is a complex ecosystem containing over 400 bacterial species! Bacteria thrive in the gut with the addition of polyphenols, while “bad” bacteria are negatively impacted. What we eat directly influences the health of the structure of our gut and the demographics (the population and particular bacterial groups within it) of the

bacteria in our intestines. Polyphenols are micronutrients that must be hydrolyzed (broken down with water) by intestinal enzymes or microflora. Can you see how polyphenols help to create a healthy environment to be metabolized and utilized for their many benefits??? Polyphenols improve function of the inner lining of blood vessels, and are anti-inflammatory. They add bite to food and give plants colors such as red, blue, orange, yellow, and purple. They may offer protection against the development of cancers, neurodegenerative and cardiovascular diseases, osteoporosis, and diabetes.

The bitterness of polyphenols help to:

1. Curb sugar cravings and maintain healthy blood sugar levels
2. Soothe gas and bloating
3. Relieve heartburn, upset stomach, and nausea
4. Encourage digestive enzymes, bile and HCL production
5. Increase absorption of fat soluble vitamins A D E K

A ~ supports healthy teeth, skin, skeletal, and soft tissue. AKA retinol - produces pigments in retina. Good vision, esp. in low light

D ~ encourages healthy immune system, helps to absorb calcium and promote bone growth and remodeling

E ~ Protects body tissue from damage caused by free radicals, helps to slow down cellular aging

K ~ regulates blood clotting and blood calcium level

*Bitters are best taken in tincture form, 5-15 drops about 15-20 minutes before meals.

Other antioxidants in plants include tannins, glycosides, aglycones, flavanols, flavones, anthocyanins. Just as antioxidants are a critical part of plant defense systems, so they help to defend human cells from intruders as well. Of the many antioxidants in DANDELIONS, here are but a few with information about what they do in the human body:

AESCULITIN, a natural lactone, has analgesic properties as well as having fungicide, anti-mutagenic, antipyretic, and anti asthmatic affects. Aesculetin can help relax muscles. It is weakly basic, nearing neutral in ph, and is soluble in alcohol and acetic acid. Almost insoluble in boiling water.

ALPHA-TOCOPHEROL in the leaf have anti-tumor benefits against bladder, prostate, and stomach cancers. It is cardioprotective.

ASCORBIC ACID in the root is antibacterial, helps to slow down aging, is anti-inflammatory, antiviral, cardioprotective, vasodilator, and immunomodulator and stimulant.

BETA-CAROTENE in leaf and flower is a powerhouse that is anti-cancer to colon, breast, central nervous system, lung, prostate, and stomach cancers. Beta-carotene helps with arthritis symptoms, acne, protects the gastric system, and promotes the formation of mucus. Mucus is that wonderful substance that protects and moves things along the respiratory, digestive, visual, auditory, and renal systems.

CAFFEIC ACID in the entire plant chaperones and protects the DNA in cells from oxidative damage, repairs injured proteins in cells, has inhibitory effects on cancer mutation.

OLEANOLIC ACID in the whole plant shows anti-tumor, anti-malarial, anti-allergic, antibacterial effects.

CHLOROGENIC ACID in the whole plant acts as a diuretic and antiviral. It protects the liver, helps to suppress viral diseases caused by herpes, and aids in blocking histamine reactions. An anti-carcinogenic, chlorogenic acid counteracts the effects of a carcinogen and inhibits the development of cancer.

ISOQUERCITRINE in the flower is an anti-inflammatory antioxidant that is diuretic and aids in capillary angiogenesis. No metabolically active tissue in the body is more than a few hundred micrometers from a blood capillary, which is formed by the process of angiogenesis. Capillaries are needed in all tissues for diffusion exchange of nutrients and metabolites (2).

LUTEOLIN in the flower - oh man - does so many things to promote health, stop the inflammatory process, stop the cancer process in early stages, tells cancer cells to self destruct (apoptosis), dilates the blood vessels to aid in bringing down blood pressure, destroy bacteria.

QUERCITIN in the flowers are analgesic, anti arthritic, antidepressant, anti-flu, anti-plaque, anti-tumor, diaphoretic, vasodilator, all the things!!!!

TANNINS are antibacterial and aid the expulsion of parasites from the intestines. Tannins have limited systemic absorption, which means its medicine is mostly limited to mucous membranes and skin. As tannins are taken in, they can bond with mucosal proteins to quell diarrhea and with blood proteins to decrease minor bleeding.

INULIN, which is a fructan made up of chains of fructose molecules that is not digested in the small intestine. Also known as fiber, inulin travels to the lower gut, where it functions as a prebiotic - food source for beneficial gut bacteria, making for a more healthy functioning digestive system. Inulin aids in the removal of waste and allows for more complete elimination. Yay team inulin! There's nothing like a good poop to make a person feel good about themselves.

TARAXASTEROL, a phytosterol that has been shown to have cholesterol lowering and antimicrobial effects. Phytosterols inhibit metastasis and are chemoprotective - protecting healthy tissue from the toxic effects of anticancer drugs.

Taraxasterol interferes with cancer process- inhibit, delay, reverse carcinogenesis which is the initiation of cancer formation.

TARAXEROL is an anti-inflammatory triterpenoid. Triterpenes have strong antioxidant properties, prevent insulin resistance and normalize glucose and insulin levels. Taraxerol helps with wound healing. Anticancer activity.

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Nutrients and their Superpowers

CALCIUM is responsible for muscle contraction and relaxation and anxiety relief, nerve impulse transmission, and proper functioning of the heart and kidneys. Calcium plays a part in a chain of events that coagulate blood after and injury. Incidentally, Vitamin D is required for optimal calcium absorption and the sun is the best source.

MAGNESIUM strengthens cell membranes, aids in the relaxation of cramping muscles, supports a healthy immune system. It helps to lift the spirits, calm down stress.

POTASSIUM regulates fluid balance, nerve signals, and stops muscle spasms. Potassium protects the heart.

I call calcium, magnesium, and potassium the trifecta to keep us calm and aid in recovery from muscle cramping.

CHROMIUM slows the aging process, and stimulates insulin production.

COPPER eases arthritis, fatigue, and inhibits inflammatory markers.

IRON in the root is the mineral that attaches itself to a blood cell and attracts an oxygen molecule from the lungs. The blood cell then travels to the capillary beds where the oxygen molecule jumps off, enters a mitochondria in the nucleus of a cell and causes a reaction that violently breaks apart molecular chains to create energy. That's called the Krebs Cycle, my friends. Mind blown!!!!

MANNITOL is a sugar alcohol that is a diuretic and helps to speed up the elimination of toxic substances. It's important to note that drinking plenty of water when using any diuretic is critical to the health and function of the renal system. Mannitol is also a laxative, so that's cool.

NIACIN helps relieve vertigo, hangovers, protects the cardiac system, and helps to prevent cancer. It seems to help to prevent dementia.

PHOSPHORUS stimulates the immune system, plays an important role in the formation and strength of bones and teeth. The body needs phosphorus to make proteins for growth, maintenance, and cellular and tissue repair. It is an essential component of cell membranes and is required by every cell in the body for normal function.

SELENIUM helps to slow aging, make healthy hair, nails and teeth, less cardiovascular disease. Selenium gives our cell structure, prevent cellular damage, increases antioxidant capabilities, helps the body to resist disease, boosts immunity, regulates thyroid function, defends against heart disease.

A trace mineral, we need only small amounts, however, it can be destroyed in food processing and high heat.

THIAMIN aids in the reduction of heartburn, protects the nerves, helps to prevent canker sores, relieve migraines and fatigue, and plays a role in treating lyme disease.

ZINC stimulates the production of insulin, helps relieve dandruff, plays a role in healthy gums. Zinc is required for the ability to smell and taste. It aids in wound healing, cell division and growth, and the breakdown of carbohydrates.