

The Foundations of Herbal Medicine



Bill Chioffi, Director of Education, Gaia Herbs

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PROFESSIONAL RESOURCES

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Introduction

This four part series is intended for healthcare practitioners that are relatively new to the world of botanical medicine, as well as practitioners looking to better understand the optimal way to incorporate herbs into your practice. In this series, you will learn about the history of botanical medicine, the role of botanical medicine in modern society, how to determine the appropriate use of an herb, considerations when choosing herbal products, and how to stock a basic herbal dispensary. This paper covers the most commonly used herbs in clinical practice in various therapeutic categories such as immune support, digestive support, women's and men's health issues, and herbs for pain and stress relief.

Part I: The vital force of nature

Human beings are made up of more than 100 billion cells. These cells communicate with one another on a continuous basis. The cellular, circulatory, digestive and neuromuscular systems in the body are in operation 24 hours a day. When the body is diseased it is capable of self-healing through immune and repair functions; however, this healing process is most effective when the body has adequate rest, nutrition, clean air and water. These healing requirements are common to plants as well; where good soil, clean air and a good source of water are vital to their health.

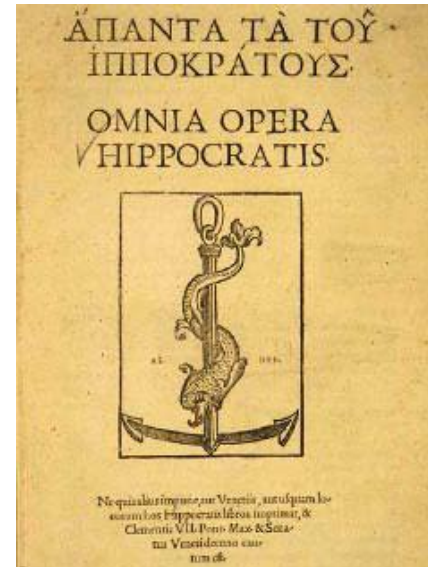
In this section of the report, we will explore the healing power of nature and the basic theories of how plants work in the body as medicines. We'll also examine the historical background of herbalism, focusing specifically on North America.

Vis Medicatrix Naturae

The term *Vis Medicatrix Naturae* translates as “the healing power of nature.” This concept refers to organisms' ability to self-heal. It is one of the defining principles that Hippocrates, the Father of Medicine, developed in his practice. Hippocrates believed that organisms are not passive to injuries or diseases, but rebalance themselves to counteract these issues. He also believed that states of illness were not maladies, but an effort of the body to overcome a disturbed equilibrium in the system. Further, Hippocrates defined this capacity of organisms to correct imbalances as the fundamental difference between living and non-living matter.

Hippocrates considered nature the healer of disease and designed his medical approach to support that fact. He believed a doctor's chief aim should be to facilitate this natural tendency of the body by observing its action, removing obstacles that are keeping the body from healing itself and allowing the organism to recover its own health.

This principle of medicine carried through into the nineteenth century when *Vis Medicatrix Naturae* came to be interpreted as Vitalism, ultimately helping define the philosophical framework of homeopathy, chiropractic medicine, hydrotherapy, osteopathy and naturopathy. The *Vis Medicatrix Naturae* is the first of the six principles of naturopathy, still valued and practiced by ND's to this day.



The chemicals in plants that help to protect them from oxidative forces, like the sun, can also help protect the human body from similar kinds of damage. It is no coincidence that some of the most potent plant medicines are found in the rain forest where plants have adapted to the most powerful oxidizing force on the planet; the sun. Pharmaceutical researchers and herbalists constantly seek out remedies in these locations because of the complexity of the environment and plants' ability to adapt to these locations by creating complexes of antioxidants and other phytochemicals. Plant medicine essentially involves borrowing the intelligence of plant material to inform the human body about how to achieve homeostasis once again. The body recognizes the various constituents in plants the same way it recognizes the vitamins, minerals and antioxidants that come from food.

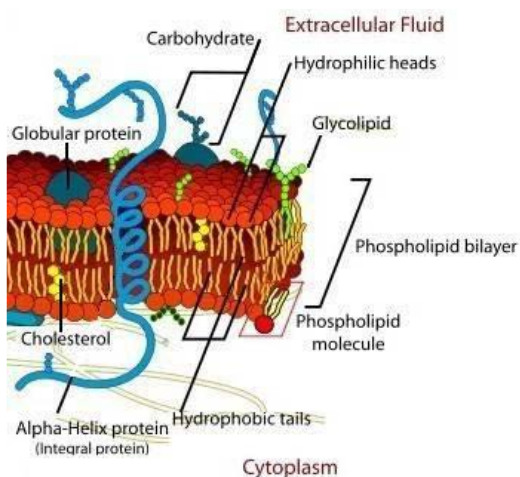
When using botanical remedies, it is important to understand the unique set of circumstances for each individual patient, making adjustments as necessary. This might include evaluating the physical, psychological and emotional parameters of each individual when integrating botanical medicine into a treatment plan. That's because while one herb may be right for a set of symptoms in one patient, it may be completely contraindicated in another with the same set of symptoms. We must always remember that we are treating people not sets of symptoms.

The physiology of herbal medicine

How do herbs work?

Chemicals from plants, foods and nutrients pass through the bloodstream and interact with the body. Responses from cells in the body are programmed and herbs work with these programmed responses to elicit a desired outcome. At the cellular level, this response includes electrochemical reactions with the cell wall and cell and enzymatic reactions with the cell membrane. Electrical pulses found in the charges of plant ions can lead to stimulation of contractile elements in the cell, and can cause the cell to expel material out through the cell membrane.

Enzymatic responses between herbs and cells can alter cell behavior in a number of ways. Herbs can cause muscle contraction or relaxation, the release of neurotransmitters, hormones



or other communications between cells. Because these responses occur in organized patterns, they can be predicted with some degree of certainty. This can help establish the best course of treatment with herbal medicines.

Herbs with what's known as a "healing reflex" trigger a healing response as opposed to controlling any function or process. For example, bitter herbs tend to stimulate upper GI secretions solely through a sensory perception of taste and smell.

Phytochemicals and phytotherapy

The word "phyto" means plant. Phytotherapy is a relatively new paradigm in herbal medicine whereby specific plant compounds are used in an integrative approach either by themselves or in conjunction with whole plant medicine, blending the traditional wisdom of herbal medicine with scientific, evidence-based medicine.

The basic phytochemical constituents in herbal pharmacology are classified into several subgroups of different compounds including:

- Acids
- Carbohydrates (gums and mucilage)

- Phenolic compounds (tannins, coumarins, anthraquinones, flavones)
- Volatile oils (monoterpenes, diterpenes, sesquiterpenes)
- Resins
- Saponins
- Cardioactive glycosides
- Cyanogenic glycosides
- Mustard oil glycosides
- Acrid constituents
- Bitter principles
- Alkaloids

The role of taste

Before science began to investigate the action of herbs, taste was often used to determine how the herb might act on the body. In traditional herbal medicine, herbs are classified into five different tastes: salty, sour, bitter, sweet and pungent.

Salty

Salty herbs, such as sea vegetables, kelp and bladderwrack, contain multiple minerals and mineral salts that can help resolve congestion in the body and soften tissue masses.

Sour

Sour herbs have astringent effects. These herbs help regulate fluids in the body because sour tastes cause the mouth to automatically salivate. Increasing saliva is just one of the ways that traditional Chinese medicine used sour herbs. Many of these herbs have been found to have an affinity for the kidney system, helping in the regulation of fluids throughout the body.

Bitter

Bitter herbs are generally purgative and therefore help move things through cellular structure. They are energetically cooling and drying, which can be helpful in drying out mucous. These herbs are particularly effective in treating issues for the liver and digestive system.

Sweet

Sweet herbs help replenish and strengthen. Generally considered tonic herbs, they are particularly effective at treating issues in the spleen and stomach. Astragalus is one example of a sweet herb.

Pungent

In traditional Chinese medicine, pungent herbs are used to help eliminate toxins, inflammation and are used to resolve stagnation by assisting in the movement of Chi or vital force or energy. Turmeric and ginger are two pungent herbs that have been researched and have been found to have potent anti-inflammatory properties.

North American herbal history

When it comes to herbal knowledge, traditional uses of herbs across numerous cultures serve as the foundation of knowledge. Science can inform that knowledge, but understanding these historical perspectives is crucial. From a historical context, North American Native Americans provide a rich and well-documented ethnobotany for over 2,500 species of plants.

The history of packaged medicine has its roots in England. But these types of medicines weren't even distributed widely in North America until the first American medical school was established in 1765. In fact, early Colonial settlers in North America relied heavily on traditional Native American medicines. The Native Americans' willingness to impart traditional medicinal knowledge onto the settlers greatly influenced the use of plants as medicine in North America.

When the benefits and medicinal value of these herbs became recognized, the entrepreneurial spirit of America took over. Soon, herbal medicines such as burdock would be branded and patented as Burdock Blood Bitters.





As the development of herbal medicine gained a foothold in the United States, regulations were put in place with things such as the United States Pharmacopeia. Founded in 1820, this system established a set of standards, a system of quality control and a national formulary. The first edition contained more than 425 herbal-based formulas, which comprised close to 67% of all the entries that were in the national

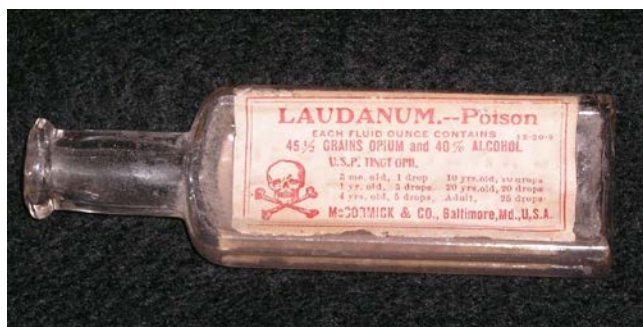
formulary. National formularies still exist today, but the difference between a pharmacopeia and a dispensatory is that the pharmacopeia contains directions on how to prepare medicines, with the object of securing uniformity of nomenclature. A dispensatory, on the other hand, contains the whole pharmacopeia plus the physical and medical history of the various substances, with additions by the author and commentary on the pharmacopeia, therapeutics and modes of administration.

In 1885 the Park Davis Company catalog listed 494 botanical fluid extracts that were concentrated preparations of vegetable drugs in alcohol solution. A monograph for black cohosh first appeared in the USP in 1820. That herb was listed in the U.S. Dispensatory from 1833 until 1955.

By 1870, at what might be considered the peak of herbal medicine, there were about 636 botanical substances in the dispensatory. This was followed by a steady decline until the United States Pharmacopeia Convention 10 was published in 1926. By this time, the number of botanicals dropped to 203.

Increased need for regulation

During this time, though most medicines used were plant based, there were also numerous drugs such as opium, morphine, heroin and cocaine which also found their place in the prescription or patent medicines. The ease with which these drugs could be purchased over the counter lead to a public outcry for increased drug regulation.



From 1888 to 1975, the U.S. Pharmacopeia and the National Formulary were published separately. In 1980, the United States Pharmacopeia purchased the National Formulary and published them together as the USPNF. This would serve as the governing foundation for how drugs and herbal medicines were initially regulated in the United States.

By 1914 there was an act of Congress called the Harrison Act that used the IRS taxes on the sale and purchasing of narcotics as a way to control their use.

In 1919, herbal medicines were put into the hands of physicians by an act of legislature. But the inability to patent plants meant that these forms of medicine were quickly replaced by pharmaceuticals.

Traditional herbalism through the window of science

Jumping ahead to the present, as the biochemical functions of the human body become more defined, plant medicine is being utilized more skillfully than ever before. This includes learning to use herbs in conjunction with drugs, as well as how to use herbs instead of drugs. Things such as the Dietary Supplements Health and Education Act now regulate the way herbs can be marketed. The FDA also has a set of standards for quality control measures for herbal medicines. Groups like the American Herbal Pharmacopeia help to develop standards for botanical medicines to analyze and identify plants.

Adulteration: A not-so-modern problem

Altering herbal medicines with inferior ingredients via adulteration is an issue that has been known and studied since the nineteenth century. Currently, there are three leading non-profit organizations that have taken this problem under consideration: the American Botanical Council, the American Herbal Pharmacopeia and the University of Mississippi's National Center for Natural Products Research. These organizations have initiated large-scale programs to educate members of the herbal and the dietary supplement industry about ingredient and product adulteration. The ABC-AHP-NCNPR Botanical Adulterants Program will focus on both accidental adulteration that occurs as a result of poor manufacturing quality-control procedures, as well as the intentional adulteration of plant-based products for financial gain. This industry-funded program aspires to serve as a self-regulatory mechanism for industry to address adulteration problems through education rather than federal regulation.

Part II: Strategies for herbal use

When considering the best herbal solution for your patient, there's a variety to choose from. Standardized herbs are some of the most common preparations found in the professional marketplace today, but there are a variety of different herbal solutions available to patients. When considering using any herb, however, it is important to choose herbs that are safe for patients. This requires specific knowledge about a variety of herbals, with an understanding of how and when to prescribe them, and specific knowledge about the background of the patient.

In this section of the report, we will examine strategies for herbal use, focusing specifically on standardization, formulas versus single herb usage, customized herbal formulas as well as safety issues and the cautions, contraindications and drug interactions of herbs.

Standardization

Standardization is a chemical analytical process to produce botanicals that possess measurable, quantifiable and replicable content of active ingredient and/or biological activity.

There are not currently any standardization methods to test biological activity. This will likely change in the future as the quality and volume of research in botanical medicine grows. The current model involves investigating the activity of certain plants and plant chemicals in vitro or in vivo, or borrowing research that has been done by others in order to formulate phytomedicines. The standardization methods currently in place test for the content of marker molecules or marker compounds.



All too often, standardization becomes over-simplified into the basic normalizing or concentrating of a group of constituents in a plant. When it comes to advancing the development of herbal medicine, it is important to consider the whole manufacturing process, as opposed to just picking apart individual ingredients in a plant and trying to connect their activity with an actual biological activity.

Marketing and the media in particular drive the use of standardized extracts. People begin to look for these herbs in everything once the media reports on their purported use. For example, the “hot” herb of the moment is curcumin. Curcumin has many therapeutic values, but it isn’t the same as turmeric, the plant from which curcumin is derived. There are more than 2,000 years of empirical experience that have shown the benefits of turmeric’s use both as a food and a medicine. The empirical evidence of the benefits of the isolated group of compounds, curcumin, however, has not yet been proven.

Full spectrum processing

Because there are no regulations for standardized marker compounds, what one company deems appropriate to market might differ from the next. Full spectrum processing where agricultural testing is carried out can provide better standardization processes. Standardization of botanical extracts can help deliver consistent, measurable concentrations of recognized phytoconstituents in botanical dietary supplements.

While standardization has many benefits, in some cases it can negatively affect the natural array of phytochemistries that have been co-evolved into original plant material.. This tends to happen when products have been overly refined, purified or spiked with marker compounds. One example is ginkgo. A common standardization found on ginkgo labels is 24/6, but ginkgo leaves don't grow at a 24/6 concentration. This means that certain phytochemicals have to be washed away in the extraction process to maximize the two phytochemicals thought to be most important. This is a classic example of making standardized medicine that is not in line with the whole plant philosophy.

Single herb use

In ayurveda and traditional Chinese medicine, most of the herbs used are in formulas and formulations. Single herb use only really began being utilized in Western herbal traditions. Most medical research is conducted on a single plant or group of chemicals from a plant for a specific condition. Today, single herb use is probably the most commonly used form among consumers. In the 1990s, single herb use gained popularity with the increased media attention given to St John’s wort. With TV personalities like Dr. Oz recommending numerous single use herbs, this facet of the industry continues to grow. This has both positive and negative consequences: on the one hand, it exposes people to natural medicine and allows them to integrate it into their lifestyle choices, but on the other hand people are not always informed about when it is appropriate to use a single herb and when it is not.

Formulas

Time-tested traditions from Traditional Chinese Medicine, ayurveda, European and North American herbalism allow for multi-faceted approaches to diseases or disorders. Avoiding “kitchen sink” herbal formulas and looking to formulas that address the issue from a more comprehensive approach is crucial. Formulas incorporate multiple herbs that are known to be effective when combined in very specific conditions, with each plant contributing to a specific activity that has complimentary and therapeutic results. It takes skilled practitioners years of experience to be able to put together an herbal formula properly. Thus, using well-designed formulas is the best strategy for integrating herbal medicine into a patient’s self-care protocol.

Breaking down a formula

When formulas are created a very specific set of rules and strategies should be utilized. Making these formulas requires a constitutional understanding of each imbalance. A physiomedical approach focusing on rest, tonification and stimulation should be built into each formula. Creating an effective formula also requires an understanding of the etiology of the imbalance, the energetics of the herbs in any given formulation, the influence that the taste properties of each herb brings into the formula and an unwavering commitment and conviction that the formula will work for the patient.

Safety precautions

The most important thing to remember when prescribing an herbal remedy to a patient is “Primum non nocere,” or “first do no harm.” For example, kava can be an effective herb to treat anxiety, but it interacts with alcohol. If you have a patient who you suspect is not disclosing alcohol or drug use to you, it is probably best to avoid prescribing this herb since it might do more harm than good.

Remember, when it comes to prescribing herbal medications communication is essential — be sure to identify a list of medications and supplements with a patient during intake. Keeping the patient’s other health providers aware of the herbal medicines being prescribed is critical since herbs such as ginkgo can cause the blood not to coagulate the way it’s supposed to during surgery.

Even with the large number of people taking herbs for the first time, the amount of problems that occur with herbs are minimal when compared to over-the-counter or prescribed drugs.

However, there are situations where extra caution should be used. Three main areas of concern when it comes to safety include:

1. Multiple medication use by a patient
2. Highly allergic and chemically sensitive individuals
3. Recreational and intentionally adulterated supplements

Cautions, contraindications and drug interactions

It is important to learn how to identify potential problems by picking the right types of herbal supplements for patients. Below are some of the most common categories of constituents found in plants and herbal medicines that warrant caution:

Anthraquinone containing laxative plants

The first group of plants is made up of herbs like buckthorn, cascara sagrada, and turkey rhubarb. All of those herbs can contain anthraquinone laxatives in varying quantities, with buckthorn and cascara sagrada containing the highest amounts. It is important to note that laxative doses should be used for no more than two weeks at a time as long-term use may produce bowel dependence and result in laxative abuse.

Anticoagulant and anti-platelet herbs

Anticoagulant and anti-platelet herbs have mild to moderate thinning effects on the blood, decreasing platelet aggregation or blood clotting effects that can increase the effect of medications such as warafin, Coumadin, or aspirin that also thin the blood. In other words, anticoagulant and anti-platelet herbs can potentiate the effects of these drugs. This can increase the risk of bleeding in some people, from both cuts on the skin and internal bleeding from trauma.

Herbs with anticoagulant properties containing coumarin constituents or that affect platelet aggregation include:

- Angelica, anise, arnica, asafoetida, bogbean, boldo, capsicum, celery, chamomile, ginger, ginkgo, Panax ginseng, horse chestnut, horseradish, licorice, meadowsweet, prickly ash, onion, papain, passionflower, poplar, quassia, red clover, turmeric, wild carrot, wild lettuce and willow.

Thujone containing herbs

Thujone is a toxic oil. It is present in small amounts in herbs but can be as high as 50% in some essential oils such as Thuja oil. It is related to cancer and as the amount of thujone is ingested is increased, the toxic effect becomes more pronounced and leads to increased salivation and redness of the mucous membranes as well as in the pelvic viscera. Thujone heightens and alters the effects of alcohol. Researchers think thujone may have a mind-altering effect similar to THC, the active constituent found in cannabis. Chronic exposure to thujone has been thought to lead to epileptic seizures, delirium and hallucinations.

Plants containing some thujone include:

- Mugwort (*Artemisia vulgaris* and other species), oak moss, Oriental arbor vitae, pennyroyal, sage, tansy, thuja and tree moss.

Unsaturated Pyrrolizidine Alkaloids (UPAs):

Unsaturated pyrrolizidine alkaloids (UPAs) are present in butterbur, coltsfoot, comfrey, eupatorium and ragwort. Commonly, the reference to "UPA Free" can be found on some herbal products, especially butterbur which is used in the treatment of migraine headaches and other spasmodic conditions. Special extracts can be used to remove pyrrolizidine alkaloids. These pyrrolizidine alkaloids have a cumulative toxicity and should not be used as single herbs for extended periods of time because of their cumulative toxicity. They can also be alternated with formulas that are UPA free.

There are two fundamental groups of pyrrolizidine alkaloids. The first, saturated pyrrolizidine alkaloids are non-toxic, while the second, unsaturated pyrrolizidine alkaloids are toxic. Some of the outcomes of this toxicity include liver damage, known as veno-occlusive disease, progressing all the way on to cirrhosis of the liver. A number of unsaturated pyrrolizidine alkaloids have been shown to be mutagenic and carcinogenic.

Any internal use of these herbs should be limited to about four to six weeks, with a total of no more than 100mcg per year.

Herbs rich in tannins

Tannins are some of the most common compounds found in plants. These phenolic compounds have astringent properties, bind up and precipitate proteins and affect the absorption of certain pharmaceutical drugs. Unless used in large amounts, tannins are not very

problematic. However, coffee and tea can contain large amounts of tannins which is something to keep in mind when considering using tannin-rich herbs since many patients consume high amounts of these drinks. Adding milk or cream to coffee or tea removes some of these effects. Drinking black coffee or black tea can cause some issues with the absorption of some drugs and nutrients such as iron.

Hormonally active herbs

Hormonally active herbs include plants like soy and saw palmetto which have steroidal components that can mildly affect human hormone activity. They can affect some drugs and hormones and antagonize others. There is significant concern for estrogen-sensitive breast or prostate cancer with hormonally active herbs, but more research is needed to explore the effects of these herbs.

It is important to remember that plant estrogens are metabolized differently by the body than estrogens the body makes itself. Similarly, exogenous sources of estrogen are metabolized differently than the endogenous sources of estrogen that the body produces. Looking at the specific type of cancer, how much soy the patient consumes and in what form they consume it will impact the treatment plan.

Herbs effecting blood sugar

Some herbs have been shown to affect blood sugar levels, some hyperglycemic and others hypoglycemic. For example, cinnamon and bitter melon have been shown to help increase blood sugar metabolism. For this reason it is important to make note of any medications patients are taking if bitter melon is to be used. Further, caution should be used when considering using herbs that affect blood sugar with diabetics and individuals with reactive hypoglycemia.

Part III: Modern herbal manufacturing and quality

Prescribing herbal products can be a complex process for practitioners. From the methods by which manufacturers validate and test plant material, to the standardization of herbs, delivery methods, quality, bioavailability and dosages, there are numerous considerations that need to be taken into account when prescribing herbals.

In this section of the report, we will examine the different stages of the herbal manufacturing process and the various critical elements to consider before selecting one of these herbs.

Quality control of plant material

The quality control measures used to select that right plant material for an herbal remedy are multi-faceted. Not surprisingly, strong, healthy plants produce better medicines. These characteristics all start with the source of the herb. Some questions to begin asking for example, is the plant certified organic? Has the species been scientifically validated? Was it harvested at the correct time of year, and was it processed correctly? Was it dried and washed properly? Was it stored properly after it was harvested, before it was extracted or turned into herbal medicine? Was it validated for activity prior to use?

Certified organic: The optimal choice

Herbs can be grown on farms or harvested in the wild, but herbs harvested in the wild must be procured in a careful and considerate manner. For example, goldenseal and ginseng are wild herbs, but they are also on the endangered species list in much of their natural range. Choosing herbs that are certified organic can help ensure that these types of plants are harvested in a responsible manner.

There are more than 100 agents that are currently authorized to certify farms and businesses to the USDA organic regulations. Most of these certifying agents are accredited to certify farms and business anywhere in the world. Some of certifying agents are also recognized under the international trade agreement, allowing them to obtain organic certification in various different countries. For a product to display the USDA symbol on the front of the package it must be at least 95% organic by volume. Product labels must also state the name of the certifying agent on the information panel.

Many people choose organic herbal supplements because of the absence of pesticides and petrochemicals that are used in the growing process, thus limiting exposure to numerous harmful toxins. But even though organics provide numerous health benefits to our bodies, it is important to remember that the organic agriculture movement was intended to improve the health of soil and the planet, not our bodies. Pesticides and monocropping without practicing the use of cover cropping can de-mineralize the soil and cause damage to the environment, thus increasing our exposure to toxins. Therefore, organic supplements and foods have less negative environmental impact than their traditionally farmed counterparts. When you choose

an organically-produced supplement, you are supporting a business that chooses, often at a greater expense, to exercise environmentally sound business practices.

Ecologically harvested/wildcrafted

Ecologically harvested herbs include herbs that are harvested in their natural habitat according to specific harvesting guidelines. This may mean the herbs are gathered away from roads and industry and are not overharvested.



Ecologically harvested also includes herbs that are grown in managed woodland areas, and herbs that are grown by indigenous growers, such as Kava Kava from the island of Vanuatu pictured. The Ni-Vanuatu, native Vanuatu tribesmen, harvest the kava from the wild. Even though these herbs may not be certified organic, they are grown without the use of pesticides and chemicals.

Standardization

Standardization of plant material is a quality control measure. It is an important step, but no standardization used today indicates the bioavailability of the finished product. In fact, sometimes the opposite is true. Many processes of standardization use methods that extract the minimum amount of a marker substance out of a plant; these methods include the use of solvents like hexane, acetone and toluene. And just because an active ingredient is at a certain level in a standardization doesn't mean that amount can be absorbed by the body, especially if the active ingredient is a purified compound of the herb with other synergistic components removed.

Four components of "full spectrum" standardization

There are four main components to the process of making an extract that is validated full spectrum.

1. Agricultural testing

Agricultural testing is performed when plants are still in their developmental stage growing in the field. Analytical testing is carried out to identify levels of activity using HPLC and other methods. Periodic sampling and testing from field samples can help determine when the plant should be harvested during the peak of its therapeutic activity.

2. Extraction methodology

Extraction methods are set up using only USP grade grain alcohol, certified organic grain alcohol and distilled water as solvents. Non-ingestible solvents are also used in validated full spectrum extraction. Plants are then extracted in their entirety without purification or isolation of inner substances.

3. Concentration technology

Concentration technology looks at a particular process of standardization. Once extracted and filtered, a concentrate is created using low heat and low vacuum to allow for the slow removal of solvents (such as alcohol and water) to preserve the fragile plant constituent. Using this low heat and low vacuum minimizes potential damage to non-heat stable components. As the solvent is distilled, the extract becomes concentrated to the desired level.

4. HPLC analysis

Lastly, high pressure liquid chromatography (HPLC) analysis ensures that the correct activity of a plant is concentrated.

Identity validation

The next piece of standardization involves identify validation. This process involves looking at plant material at the cellular level with powerful microscopes through macroscopic or microscopic examination.

Chemical profiles can also ensure that the correct genus and species of plant is being identified. Chromatography is used in this way to help determine the chemical fingerprint of the plant material. DNA fingerprint analysis is also more frequently used to properly identify the genus and species of a plant.

Organoleptic inspection, using the powers of sense, like taste, touch, smell and sight, can also be used for identity validation of plant species. This is the method employed by traditional herbalists.

Companies must provide proof of species validation in order to put the botanical name on the label. There are often issues of intentional or unintentional adulteration with certain herbs, particularly skullcap and eleuthero.

Preparation of extracts: The process

Once herb material has been properly identified it can be turned into an extract. The basic extraction production of commercial herbal extracts involves physical and analytical processes that include selection of plant material, comminution, maceration, percolation-battery percolation, kinetic extraction, filtration, thin film evaporation and lab analysis.

As mentioned previously, selection of plant material for extracts is done in a variety of ways to ensure identity validation. Once this has been done, the plant material is ground down into a wet slurry if the plant material is being extracted fresh, and milled into a coarse grind if the plant material is being extracted dry. This process, known as comminution, exposes the surface area of the plant so that the alcohol and water can work to break down the plant material more efficiently.

During the next stage, maceration, ground plant material is saturated in the organic solvent such as grain alcohol and water and is agitated daily for a period of two to four weeks. That saturated plant material is then placed into hydraulic extractors to separate the liquid from the slurry.

The percolation process involves saturating ground herb and plant material for several days and then opening a valve at the bottom of the container letting the menstrum slowly percolate out through the herb material. The battery percolation process uses the same procedure, but utilizes several tanks.

Kinetic extraction is a process where organic solvents are forced under vacuums and temperatures to allow for quick and efficient herb extraction. This is followed by thin film evaporation, where a vacuum is applied to remove the alcohol and most of the water to produce an alcohol-free extract which can be encapsulated after final quality testing.

At the end of this whole process, lab analysis is performed to ensure that everything has been extracted out of the plant material. HPLC, gas chromatography and different pieces of

analytical equipment are then used to ensure that the desired level of marker compounds is present in the finished product and this final analysis is compared to that of the original starting material to be sure that all of the original plant chemistry is represented in the final extract.

Delivery systems

Clearly, herbs aren't only used in these types of concentrated liquid forms. Some of the common delivery systems for herbs include: herbal teas, tablets, capsules, soft gel capsules, tinctures and liquid extracts. Understanding the advantages and disadvantages of each delivery method is crucial when trying to get the best results and thinking.

Teas

Teas are some of the oldest delivery forms of herbs. Teas have multifaceted benefits; the herbs themselves can provide many calming or soothing benefits as can the actual act of drinking tea. Teas can assist with digestion, promote sleep, stimulate or calm the central nervous system and can assist with a wide variety of cold and flu symptoms. But because tea is an infusion, its use in botanical medicine is somewhat limited. The volatile oils are limited when the plant is soaked in hot water for a short period of time. Because of this and other factors of chemical solubility in water, in some cases the concentration of herbal teas often isn't strong enough to produce therapeutic results.

Tablets

Herbal tablets are made with a high pressure tableting machine that compresses powdered plant material into shapes that can be easily swallowed. They can be taken without being tasted, which serves as both an advantage and a disadvantage in some situations. Magnesium stearate often serves as a binding agent to keep the plant material together. Commercial solvents are sometimes used in extraction a powdered standardized extract is to be delivered. It is important to remember that it may take several tablets for a patient to reach therapeutic dose levels. Patient digestion and compliance issues should also be taken into account when recommending herbal tablets since the digestion of the tablets is what makes them effective.

Capsules

Herbal capsules contain the same powdered herb that tablets contain, except the herb is compacted into a two-piece capsule instead of being pressed into a tablet. These capsules can

be taken without being tasted, which is a big advantage for many patients. Unlike tablets, capsules do not require binding agents, but flow agents are often used to ensure that the herbal powder can be smoothly injected into the capsule.

Herbal capsules can also be made using dried extracts and can deliver either a single or a multi-herb formulation. The quantity of the herb is limited by the size of the capsule. That means the larger the capsule, the more herb material it can contain. One must also consider the issues of digestion here, as the ability to full digest the coarse plant material from several capsules can be a limiting factor in the ultimate efficacy for the patient.

Soft gel capsule

Much like tablets and capsules, soft gel capsules can be taken without being tasted. They usually contain some type of liquid comprised of powdered herbs or a plant material mixed with oil. It is important to note that the gelatin and oil base used in these gels often make them difficult for people to digest and absorb.

Tinctures

Tinctures are alcohol/water extracts of plant material. To qualify it as a tincture, the ratio of herb to liquid needs to be as follows: 1:4, 5, 6, 7, 8, 9 or 10. Tinctures contain alcohol that acts as a solvent to extract the active ingredient out of a plant cell. The alcohol in tinctures serves as a preservative for the various alkaloids, resins and other ingredients that comprise the herbs therapeutic value.

Tinctures are considered dilute and require a 5ml minimum dose per serving in most cases. Most tinctures are dosed at milliliter amounts. This means that a 1oz bottle of tincture yields approximately six doses. This is obviously not a very effective for the consumer. Not to mention the various compliance issues that can arise with these delivery methods. For example, will the patient actually take the level of tincture throughout the day that is being prescribed?

Fluid extracts

Fluid extracts are tinctures that have been concentrated to have a 1:1 or 1:2 ratio, instead of 1:4 or higher. The concentration methods for making liquid extracts vary, but they are typically produced using low heat and vacuum to ensure the constituents are unharmed and that a validated full spectrum extract is delivered.

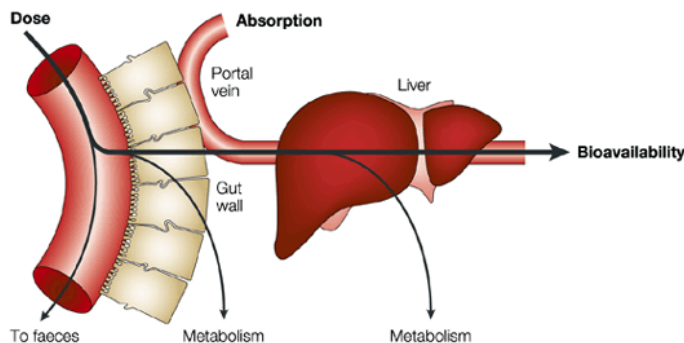
Fluid extracts are a good value for their efficacy. They can be standardized and the taste of these extracts can be particularly useful, particularly with digestive-enhancing herbs.

Liquid Phytocaps

Another option when it comes to dosing are the Liquid Phyto-Caps®, patented by Gaia Herbs Professional Solutions. This delivery method yields 60 to 75 drops of concentrated liquid extract per capsule. These alcohol free liquid extracts are free of binders, fillers and excipients. One of the major benefits of this delivery method is that liquid extracts are more stable and do not degrade in potency as crude herbs do and therefore have a longer shelf life.

Bioavailability

The speed and strength at which a substance enters the body depends upon its form. For example, if you go into the emergency room with a compound leg fracture, you will receive an IV with morphine, you won't receive it in capsule form. The same analogy can be applied to herbal solutions. Substances need to be in a solution to pass across cell membranes in the



body and become biologically active. Once a solution enters the body it is metabolized and becomes bioavailable once it has passed through the digestive apparatus and the liver. Some of the solution is also passed through feces and urine.

Tablets, gel caps and soft gels

Tablets, gel caps and soft gels go through a lengthy digestive process to become bioavailable. Herbs are subject to strong acid in the stomach, entering an extreme alkaline environment in the duodenum. The active principles are separated from the fiber and absorbed in the gut. They then travel into the bloodstream to the liver. Active ingredients are sent to the heart and get distributed to the rest of the body in the bloodstream. This means that with tablets and soft gels, bioavailability may take as long as two to four hours once the herb has been digested. In some cases, this isn't an issue but when a patient is dealing with stress, anxiety, or cold and flu symptoms, hours can seem like days. This is something to keep in mind when choosing

the best delivery option. The quantity of the herb is limited by the size of the capsule. Multiple capsules are usually needed to achieve a therapeutic dose. Consider the digestion of the patient and the timing; is an immune challenge the time to take 4-6 capsules of material that needs to be digested for an immediate response?

Tinctures and liquid/fluid extracts

Tinctures and fluid extracts are already in full solution and therefore have increased biological activity due to their efficient absorption and delivery method. This is a major advantage of this delivery method. Tinctures to be effective for most plants need to be dosed at a min of 5mls per serving. This means a one ounce bottle of most tinctures delivers only 6 doses. Liquid extracts offer a competitive advantage in that they offer a more concentrated dose.

Liquid Phyto-Caps®

Similarly, Liquid Phyto-Caps® are already in full solution. They take about 10 to 12 minutes to be into a full dissolution, compared to 45 minutes for tablets, caps and soft gels. They also have the advantage of the option to bite into them and experience the taste of the herbs.

Dosage considerations

Dosage amounts and methods will vary from patient to patient, particularly in children. There are two rules that are generally used with this age group. Clark's rule defines specifications on how liquid extracts should be dosed to children. For this method, the child's weight is divided by 150, producing a fraction of what the dosage would be for an adult. For example, 50/150 given to a child would be a third of the adult dose that's recommended for a liquid extract. On the other hand, Young's rule uses the child's age as a basis for dosing. With this method, you take the child's age, divide it by the child's age and add 12 which also amounts to about one third of the specified adult dose; 150 is used in both calculations as it is the average adult body weight.

Whichever rule is used as a basis for dosing, it is important to consider the constitution and metabolism of the individual. Intake should also always include food sensitivities or allergies. A good rule of thumb is to prescribe half the recommended dosage to patients of any age for the first three or four doses.

Questions to ask manufacturers

When deciding which herbal to prescribe, there are several elements to consider. First, find out if the manufacturer buys its herbal raw materials directly from the grower or from an intermediary supplier. Ask if they grow any of their own botanicals and how they validate herbal raw material genus and species. Determine if the herbs grown are organic and ecologically wild-harvested. Ask about the solvents used in the herb extraction process and if they are Prop 65 compliant. It is not an uncommon request that manufacturers provide test results for the products showing results of heavy metal tests or those testing for pesticides and other contaminants. Finally, ask about how potency is validated and ask for results of potency testing. The manufacturer should be able to show you proof in regard to all of these questions. If they cannot, that could perhaps be a red flag.

Part IV: The basic herbal dispensary

From pain and inflammation, to stress and sleep, digestive health, immune support and overall health for women, men, and children, there are a number of herbs that are considered the first choice for various health conditions and concerns. In this section of the report, we'll discuss how to properly read a supplement label as well as the various herbs that aid in digestion, pain and inflammation, stress and sleep, as well as those that support immune health. We will also look at the various herbal options for women's, men's and children's health.

How to read a supplement label

By law, every supplement sold in the marketplace must carry a label. Daily serving size is the basis for all of the other elements. The image below is a mockup label of the Adrenal Support formula from Gaia Herbs Professional Solutions.

Supplement Facts

Daily Serving Size 2 Capsules
Servings Per Container 30

AMOUNT PER SERVING

Calories 20

Siberian Rhodiola root extract + (Rhodiola rosea) (6 mg† Rosavins) 126 mg†

Holy Basil leaf + Supercritical CO2 extract (Ocimum sanctum) (3.86 mg† total Eugenols) 90 mg †

PROPRIETARY EXTRACT BLEND 520 mg†

Ashwagandha root + (*Withania somnifera*), Wild Oats milky seed fresh ▲ (*Avena sativa*), Holy Basil leaf ▲ (*Ocimum sanctum*), Schisandra berry + (*Schisandra chinensis*)

† Daily Value not established.

Other ingredients: Vegetable glycerin, capsule (vegetable cellulose)
▲ = Certified Organic Ingredient + = Ecologically Harvested

Each 2 capsules contain 5,500 mg dry herb equivalent
Gaia Herbs Liquid Phyto-Caps™ U.S. Patent No. 6,238,696 B1

Number of caps to take per dosage

Required Information

Remember to make sure a botanical name is listed. This indicates the company has done identity testing.

Standardization expressed in mg or as a % of the total extract

Used to indicate a blend, usually in descending order of mg amounts in formula.

Indicates the growing conditions

One thing to note is that underneath "Siberian rhodiola root extract" this label says "rhodiola rosea," indicating the genus and species of the plant. If the botanical name is not listed, it could indicate that the company has not performed identity testing. Testing is required to determine the identity of plant material to ensure that the correct plant genus and species are listed. On these labels, standardization is generally displayed in milligram amounts or as a percentage of the total extract. A common example of this would be the silymarin in milk thistle. It is typically expressed as 80% extract.

The term "proprietary extract blend" is used to indicate a blend of herbs. It is usually listed in descending order of milligram amounts in the formula. In the case of the supplement above, the proprietary extract blend is made up of ashwagandha, wild oats, holy basil and schisandra, totaling 520 milligrams.

It is important to look at the section that lists other ingredients which can often be excipients, fillers, binders, binding agents, maltodextrin and magnesium stearate. It is important to look at these other ingredients since they can make up a significant amount of the formula.

The digestive system

The digestive system is complex. The role of botanical medicine is to normalize that system when it is unbalanced by correcting one part that may affect the rest of the system. What further complicates the treatment of digestive disturbances is that the system is orchestrated

by a complex set of neurochemical and endocrine responses. These react to the material that's placed into the gut. All of this is managed by the enteric nervous system.

Herbs for digestion

There are two basic categories of herbs for digestion: carminative and bitters.

Carminative

Carminatives help dispel and relieve the pressure and discomfort caused by gas. Because the combat gas before it begins, they are best taken before meals. The action of carminatives is often increased when taken as a tea, or as an herb that can be tasted. Common carminative herbs include fennel, cardamom, ginger, caraway, anise, cinnamon, dill and nutmeg. These herbs are most effective in treating colic and flatulence, IBS, congestive dyspepsia, excess mucous and bronchial congestion as well as sluggish digestion. Contraindications are in cases of gastroesophageal reflux.

Bitters

In this second category are the bitters. Some of the most common bitter herbs include dandelion, gentian, wormwood, goldenseal, milk thistle and yellow dock. Bitters can also be consumed as a food in the form of dandelion greens, arugula or kale. They are indicated for a lack of appetite and digestion, liver and bile disorders, blood sugar disorders, gastritis, gastric ulceration and food intolerances.

Contraindications for bitters are primarily for duodenal ulcers and cold conditions since bitters are cooling to the system. Since bitter receptors in the mouth initiate different processes with digestion, it is best to consume bitters in a form that can be tasted. They can be taken in liquid form as tinctures or extracts or they can be eaten with a meal or consumed as a tea.

Bitters utilize the reflex response, stimulating the production and flow of digestive juices. Bitter principles found in plants, such as the iridoids in gentian and sesquiterpenes, are a class of essential oils that are in wormwoods or sweet Annie. The alkaloids found in berberine-containing plants, such as goldenseal and Oregon grape, stimulate bitter receptors in the mouth, causing an immediate signal to the gustatory nerve and the release of the gastrointestinal hormone gastrin.

Gastrin is known to increase gastric acid, pepsin and pancreatic digestive secretions, intestinal juice production, hepatic bile flow and bicarbonate production. It also increases the production of insulin, glucagon and calcitonin secretions as well as the muscle tone of the lower esophageal sphincter, the stomach and the small intestine.

Herbs for pain

There are numerous categories of pain-relieving herbs that can be used to fit treatment plans for pain relief. Once you have identified what type of pain it is you're treating, you can make the proper choices for the botanical that will suit that situation.

General anodynes (pain relievers)

For the acute treatment of general pain, the goal is to deliver an immediate or fast-acting therapy. While an herb like turmeric can be a great anti-inflammatory, it doesn't always immediately relieve pain. General anodynes are effective, fast-acting pain relievers. They include California poppy, kava, valerian, skullcap, St. John's wort, and passionflower.

Some traditional uses for California poppy include headache, toothache and general nerve-related pain. There are many uses for kava as a general anodyne or a pain reliever. In fact, a study on PMS cramps used kava, in conjunction with calcium, and found it to be as effective as Motrin for subjective pain relief.

Valerian is one of the most well-known relaxant herbs. It provides a relaxing effect on muscle tissues and can be used for nervous headaches. Skullcap can be effective at treating pain related to nervous exhaustion or over-agitated nervous systems. St. John's wort can be applied topically in oil form for general sciatic nerve pain and trauma injury. Passionflower is generally used for pain associated with nervous tension.

Anesthetics

Some common anesthetic herbs include kava, cayenne and the camphor and methyl salicylate herbs. Kava is effective at relieving toothaches. Cayenne or capsaicin—the active ingredient in cayenne pepper—is a pain reliever. Capsaicin deadens pain nerve endings. Common examples of this are hot balms and heating rubs. Camphor/methyl salicylates have cooling properties, making them effective for short-term treatment.

Antispasmodics

Cramp bark and black haw are effective antispasmodics that work well for muscle and PMS cramps. As mentioned earlier, skullcap and valerian are general anodynes, but they also work well for spasm-type pain.

Sedatives

Some common herbal sedatives include kava, California poppy, valerian, skullcap, passionflower and hops.

Muscle relaxants

Black cohosh is an herb that has been used traditionally as an anti-inflammatory for years by eclectic physicians, specifically for the treatment of rheumatic pain. Other muscle relaxants include kava and skullcap.

Herbs for inflammation

The right choice for an herbal remedy depends on the type of inflammation a patient is experiencing.

Chronic and acute inflammation in the tissues and joints

The herbs best used to treat this type of inflammation include turmeric, ginger, feverfew, willow, meadowsweet, boswellia and arnica. Turmeric and ginger are cyclooxygenases 1 and 2 modulators which halt the overexpression of inflammation before it starts to trigger pain sensation in the body. Feverfew has the same type of activity and is most commonly used for migraine headaches. Willow bark works well as a general acute inflammation herb. Meadowsweet is a bitter-tasting that contains salicylates. Boswellia serrata can be found in many inflammation formulas. Arnica is used primarily in homeopathic preparations.

Skin inflammation and bruising

Herbs best suited for skin inflammation and bruising include arnica, calendula, aloe and chamomile. Calendula and aloe bring tonification back to the gums, and bring some tone back to loose gum tissue that could be causing excess inflammation. Aloe is particularly effective at treating pain and inflammation from things like sunburns. Adding chamomile to a bath can be a great reap the benefits of this herb on the skin's surface.

Stress reduction reduces inflammation

Adaptogens can be used for tonification and support of the entire endocrine system. Some common adaptogens include: holy basil, ashwagandha, rhodiola, schisandra berry and wild oat milky seed.

Adaptogens

It's a well-known fact that increased physical, chemical and emotional stress triggers higher the inflammatory markers in the body. Adaptogens serve to tonify and support the endocrine system. Adaptogens allow the body to counter adverse physical, chemical or biological stressors, by raising nonspecific resistance towards stress, thus allowing the organism to adapt to stressful circumstances. They are resilient plants, often thriving in harsh environments. Rhodiola rosea, for example, grows in the Siberian Mountains, so it clearly must make adaptations for itself in order to survive.

There are three basic requirements for plants to be considered adaptogens. First, they must be nontoxic to the recipient. Second, they produce a nonspecific response in the body. Third, they must have a normalizing influence on the physiology—irrespective of the direction of change from the physiological norms caused by the stressor.

Some common adaptogens include rhodiola rosea, schisandra chinensis, withania somnifera and holy basil.

Nervines

Adaptogens and nervines work well together. Nervines provide specific support of the nervous system and are generally very well-tolerated. Common nervines include lemon balm, chamomile flower, passionflower and American skullcap.

Combining these herbs with adaptogens like ashwagandha and holy basil can promote balance by normalizing physiological functions, revitalizing the endocrine, immune and nervous systems.

Sedatives and sleep aids

Kava kava

Many plants have multiple uses and functions. For example, kava can be effective in addressing issues related to both sleep and anxiety. It is a soporific, meaning it produces a deep sleep. It is also an anesthetic and therefore relieves pain topically.

Valerian

Valerian is an extremely useful sleep aid, particularly for those with sleep maintenance problems. A nervine, valerian is soporific, inducing deep sleep. It is a sedative that help address nervous exhaustion.

Hops

Hops is a sedative and a bitter digestive. The digestive benefits of this herb can be great for those with combination sleep disturbances and digestive issues.

California poppy

This herb is particularly effective at treating anger issues or over-excitability. This nervine is a sedative and soporific. As noted previously, it can also be used for pain relief.

Herbs for immune health

There are two basic categories of herbs that support immune health: tonic herbs and herbs for acute use.

Tonic herbs

This group of herbs can be used for long-term immune strengthening and acute use. They are generally administered in smaller amounts for extended periods of time to produce immune-stimulating effects.

Common tonic herbs include: astragalus, Maitake mushroom, Reishi, larch, echinacea purpurea flowering tops, ashwagandha, olive leaf and elderberry.

Herbs for acute use

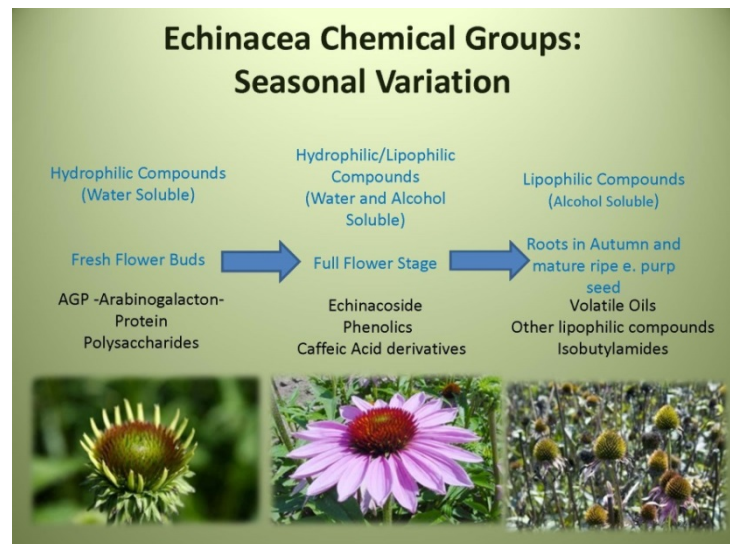
Herbs for acute use in immune health treat inflammation and infection simultaneously and are generally used in relatively higher amounts for shorter periods of time.

Common herbs for acute use include: echinacea angustifolia and purpurea root, andrographis, olive leaf, oil of oregano, propolis, elderberry and berberine containing plants such as goldenseal, Oregon grape and barberry.

Echinacea chemical groups

One of the most well-known herbs in this group is echinacea, but there is some confusion about the uses of this plant. There are a number of different compounds found in echinacea. Some are immune-stimulating, and some are anti-inflammatory.

Echinacea has different chemical groups that vary based on season. The early flowering stage of echinacea puerperae and the full-flowering stage of echinacea puerperae contain arabinogalactan proteins, polysaccharides, phenolic compounds and caproic acid derivatives. They are water-soluble and therefore need to be harvested in their fresh and freshly-dried states and made into a low-alcohol extract. The mature seeds of echinacea puerperae and the roots of echinacea angustifolia have alcohol-soluble or lipocytic compounds called isobutylamides. These are anti-inflammatory, so they are best used in the early onset of head colds and the rhinovirus to help control inflammation.



Polysaccharides are large, long-chain sugar molecules that are found in echinacea puerperae flowers and medicinal mushrooms. Typically the body sees one of these molecules at a time. But the body's attempts at absorption may cause the immunomodulation, as in the case of food allergies. In oral consumption, action is largely confined to the gut. The body perceives these sugar molecules as a threat and sends immune complexes to combat the threat. But by

the time the immune complexes get to the gut and intestines, they have been digested. Once these immune complexes are produced they free to act on other invaders in the system.

Herbs for women's health

There are numerous herbs used for women's health. For hormonal balance, some effective herbs include chaste tree, black cohosh and maca. Chaste tree berry normalizes and stimulates pituitary gland function, dysmenorrhea and is used for PMS and perimenopause, working through the pituitary gland function to help modulate hormonal balance. Black cohosh acts as a relaxant and can be used for normalizing menstruation, or helping with PMS symptoms.

Other women's health issues can be treated with a variety of herbs. For example, women with nausea, vomiting and dysmenorrhea can be treated with ginger. Lactation support can be addressed using fenugreek. Urinary tract infections can be treated with cranberry and uva ursi. One of the best herbs for treating breast cancer and weight loss is green tea.

Herbs for men's health

Adaptogens are extremely effective in men's health. Some of these include ginseng, American ginseng, holy basil, ashwagandha, schisandra, rhodiola and maca.

Prostate tonics include horse chestnut, saw palmetto, nettle root, white sage, pomegranate seed and green tea.

Erectile dysfunction can be addressed with yohimbe, epimedium, maca and saw palmetto.

Natural health solutions for kids

Respiratory conditions

Some of the most effective herbs to treat respiratory conditions can involve topical applications or steam. These include essential oils from plants such as lavender, pine, peppermint or yarrow. Herbs that break up mucus secretions include plantain, anise, grindelia, ginger, licorice, mullein and various demulcent herbs. Children with dry coughs can be treated with marshmallow, slippery elm, Irish moss, and plantain. Ear infections and pain relief associated with these infections can be addressed with ear drops that contain mullein flour, lobelia, St. John's wort, garlic or goldenseal.

ADD and ADHD

Herbs can be a viable alternative to prescription drugs in addressing ADD and ADHD in children. Some common herbs include passionflower, skullcap, California poppy, chamomile, lavender, blue vervain, lemon balm and gotu kola.

Conclusion

The world of herbal medicine is fascinating and inspiring. The plants represented in this paper are medicines that carry the healing power of nature. The sooner we as practitioners of herbal medicine can realize that we are acting as agents of the plants, the better. The plants themselves can teach us much about their use and function as it relates to improving health. The information shared here barely scratches the surface of the detail that is available in the study of plant medicine, but hopefully it served to inform and inspire for further study and to enhance your relationship with plants.

Contributor

Bill Chioffi is the director of education for Gaia Herbs, Inc. He has worked extensively in the Natural Products Industry for 19 years. Bill has been a manager and staff herbalist for Natural Foods retail stores, production manager for Gaia Herbs, the Eastern regional sales manager and currently creates and delivers educational programs for the Gaia retail sales force, retail and professional division partners and consumers. Bill has studied therapeutic botanical protocols for many common health disorders over the last 15 years at the Medicines from the Earth Symposium for Botanical Medicine and independently with naturopathic physicians and herbalists. He received his Bachelor's degree from the University of Vermont in 1991 then studied herbalism and taught English in Eastern Europe. Bill lives outside of Boston, Massachusetts with his wife Elizabeth, son Cameron and lots of plants.