

Herbal Therapy and the Musculo-skeletal System

Herbal medicine has a wide range of application in the treatment and management of musculoskeletal disorders. It may be used in the treatment of acute musculoskeletal injury, bursitis, sciatica, neck and shoulder pain, fibromyalgia, carpal tunnel syndrome, transient joint inflammation, arthritis, gout, rheumatoid arthritis, ankylosing spondylitis, osteoporosis, and systemic lupus erythematosus.

In some cases where the condition is long-standing or severe, these remedies may be chosen for their ability to manage the condition, rather than as a primary treatment. Although the usage of herbal medicine with drug therapies has not been very well studied in the West, it is an increasing trend in countries that maintain a strong history of traditional medicine, such as in China. Despite this trend, herbal medicine offers much in the way of the primary treatment and prevention of musculoskeletal disorders, as it has for millennia.

Orientation

The clinical herbalist recognizes a broad range of therapeutic possibilities in the treatment of musculoskeletal disorders, a few of which have a similar intent to those conventional medical therapies, but most that are unique to the clinical herbalist and traditional healing. The most important concept in traditional medicine is the concept of vitality, what the Chinese call qi, Ayurvedic physicians called prana, and what Hippocrates referred to with the phrase 'vis medicatrix naturae,' or the 'healing power of nature.' The essential tenet of this concept is that disease arises when there is some obstruction to the vital force of the body, resulting in dysregulation of homeostatic feedback mechanisms. Instead of seeking to inhibit the manifestation of homeostatic dysregulation, such as inflammation, the herbalist seeks to resolve this dysregulation by removing that which obstructs vital function. All the different systems of traditional medicine maintain that there are general causative factors when it comes to the manifestation of disease, some of which can really only be understood when one is familiar with the theoretical background of that particular system. In Ayurvedic medicine for example, an important factor in disease is the generation of what is called ama, or 'undigested food.' Ama is the result of sub-optimal digestive dysfunction, not simply related to dietary causes, but in the metabolism of thoughts and emotions, as well as environmental toxins. According to Ayurvedic theory, ama accumulates in the body and initiates a cycle of congestion, inflammation and degeneration through aggravation of the humoral components of the body (kapha, pitta and vata, respectively). Thus in chronic inflammation treatment isn't simply given to reduce inflammation, but to remove ama and thereby the cause of the disease. Ayurveda also maintains several other causes of disease, including artha (improper correlation of sense with sense object), prajnaparadha ('crimes against wisdom'), kala and desha (seasonal, climatic and ecological disturbances), and karma (the fruition of previous actions, i.e. cause and effect).

Nutrition

Every child learns the axiom "you are what you eat," and although this simple concept may be refined to include that although your body is what you assimilate, it is also that which you do not eliminate. Herbal therapies are thus used to enhance the process of assimilation as well as elimination, although many herbs obviously have important nutrient properties, the boundary between what is 'herbal' and 'nutrient' not so clearly defined as the dichotomy between 'drug' and 'food.' Nutrition obviously plays an extremely important role in musculoskeletal health, and basic nutrients such as adequate protein and essential fatty acids are of vital importance. Important as well are a broad

range of phytonutrients contained in vegetables and fruits that have a huge range of biological activities, from antioxidant effects (e.g. anthocyanidins in blueberries) to hormonal regulation (e.g. phytoestrogens in cruciferous vegetables) to simply supplying important nutrients (e.g. vitamin C, vitamin K, fiber, etc.). Among the most prominent changes to our diet in the last 100 years, which echoes a shift to toward an agrarian-based civilization some 9000 years ago, is an increasing reliance upon grains, cereals and legumes. Such foods have been shown to promote mineral deficiencies through the chelating activity of phytic acid, as well as promote gastrointestinal damage through the activity of lectins (Freed 1999). A deficiency of minerals such as calcium and magnesium has obviously important implications in muscle and bone health, interfering with the activities of contraction and mineralization, respectively. One important source of trace minerals in the hunter-gatherer diet were plant foods, especially leafy green such as nettles or sea vegetables such as kelp, which contain markedly high amounts of macro and trace minerals. Another source was from the animals our ancestors consumed, who ate not only the skeletal muscle most people eat today, but also cartilage, ligament and tendon, as well as marrow and organ meats.

The nutritional emphasis in the treatment of issues such as osteoporosis and inflammatory joint disease is diet-based, with an emphasis upon nutrient-rich foods. Some may argue that this approach is similarly implemented in modern nutrition, but even after factoring out the current recommendations of a grain-based diet (i.e. the food pyramid), some foods that are highly recommended as a source of nutrients are highly suspect. Milk, for example, is often recommended as an adequate source of calcium, which is an important component of bone. Such a simplistic analysis of the issue of bone loss however does not do justice to the complexity of the process of mineralization, which is not dependent on calcium alone. Magnesium for example, which is quite low in cow's milk, is an important nutrient required for the activation of alkaline phosphatase, an enzyme involved in forming calcium crystals in bone and for the conversion of vitamin D into 1,25-dihydroxyvitamin D₃, its biologically active form (Iseri and French 1984, Rude et al 1985). Researchers evaluated the effect of magnesium supplementation on apparent calcium absorption, bone metabolism and dynamic bone strength in ovariectomized rats as a model of postmenopausal women. The results of this study indicated that magnesium supplementation reduces apparent calcium absorption, but promotes bone formation and prevents bone resorption in ovariectomized rats. Moreover, the results indicated that magnesium supplementation increases the dynamic strength of bone (Toba et al 2000). Further, such recommendations to drink milk on a daily basis to prevent osteoporosis have not withstood the rigors of epidemiology, where it can be shown that populations that do not drink milk have lower rates of osteoporosis (Kaneki et al 2001). The latest research indicates that rather than high doses of calcium, vitamin D is a more important factor to maintain proper bone mass (Feskanich et al 2003). In temperate countries, the population is a greater risk for vitamin D deficiency due to decreased sunlight hours during winter, increased amount of time spent indoors from previous generations, and the decreased consumption of traditional foods naturally rich in vitamin D such as animal liver and eggs. Government agencies have attempted to correct this by adding synthetic vitamin D₂ (ergocalciferol) to the milk supply, but the biological activity of vitamin D₂ is not even one-quarter that of cholecalciferol (vitamin D₃) found in fish and animal liver oils, as well as free-range eggs. Current recommendations are that people that live in temperate climates take 1000 IU of cholecalciferol on a daily basis, all year long (Veith 2001).

Topical treatments

Topical treatments are the application of processed botanical remedies such as liniments, salves, oils, plasters, fomentations, and baths.

Counter-irritants and rubefacients

At the heart of traditional medicine is the belief that joint disease represents a local toxic accumulation, and thus measures are taken to improve local circulation and to enhance the removal of toxins. This belief is still an important aspect of clinical herbal medicine, although drastic measures such as blistering as a technique for elimination are no longer featured in the majority of practices. The use of counter-irritants is indicated in the local treatment of chronic joint disease because joint surfaces are avascular and cannot be effectively treated with internal methods. Counter-irritants enhance local vasodilation, the

proliferation of proinflammatory mediators, the removal of waste products, and stimulate repair and regeneration. All of this is done painlessly, in contrast to what the body might do with much pain and disability. At the heart of this approach is the belief that fever is a natural and important part of the healing process.

There are many different botanicals that have counter-irritant and rubefacient properties: some may even remember the highly effective mustard plaster used by grandmothers to draw blood away from the lungs and thereby relieve bronchial congestion. In Sweden, such external techniques might be used in conjunction with a *sauna*, and in India, affected areas might be rubbed with castor oil and then covered in bags filled with heated brick dust. Thus counter-irritant therapies are known all over the world as an important aspect in the treatment of certain kinds of musculoskeletal disorders, particularly those that are chronic or intractable.

Important counter-irritant and rubefacient botanicals include Ginger root (*Zingiber officinalis*), Kelp (*Fucus vesiculosus*), Juniper berry (*Juniperus communis*), Mustard seed (*Brassica nigra*), Cayenne fruit (*Capsicum minimum*), Bayberry (*Myrica cerifera*), Jimson weed (*Datura stramonium*), and Tobacco leaf (*Nicotiana tabacum*).

Topical analgesics

Topical analgesics are used to relieve pain, with each kind of remedy acting in a unique way. Some analgesics are actually quite toxic when taken internally, and care should be taken not to apply them on broken skin. Among the toxic botanicals are Monkshood root (*Aconitum napellus*), which when applied topically numbs peripheral nerve endings, and Henbane root (*Hyocyamus niger*), which has antispasmodic properties. Arnica flower (*Arnica montana*) is a very popular analgesic, and although its exact mode of action is not known, it is appears to work by removing congestion from injured areas without a counter-irritant activity. Arnica however does not provide immediate relief, but works only over a period of hours after application.

Topical analgesics that are safer include Cayenne fruit (*Capsicum minimum*), St. John's Wort flowering tops (*Hypericum perforatum*), and Cow Parsnip root (*Heracleum lanatum*). Cayenne contains a phenolic compound, the vanillyl amide of isodecenoic acid, called capsaicin that acts by depleting the stores of substance P from sensory neurons, thus inhibiting the pain response. The hypericin-rich bright reddish oil of St. John's Wort blossom is another popular analgesic, particularly useful in neuralgic pain. Similar to the analgesic properties of St. John's Wort is the infused oil of Cow Parsnip root, a medicinal plant common to the Rocky Mountains, indicated in sciatica and trigeminal neuralgia.

Internal treatments

Alkalizing diuretics

The juxtaposition of joint disease and kidney function has long been held by Western herbalists to be an important aspect in the treatment of musculoskeletal disorders. The primary concept in the usage of alkalizing diuretics is the maintenance of the acid/alkali equilibrium of the blood, which is coordinated largely by the kidneys. Alkalizing diuretics counteract the post-digestive acidic nature of dietary articles such as cheese, eggs, meat, milk and refined flour, and assist in the elimination of metabolites such as uric acid that can play a major role in the pathogenesis of musculoskeletal disorders. Alkalizing diuretics also help to restore the acid-base balance of the blood, and prevent the loss of calcium from bone due to the formation of bicarbonate ions.

Important alkalizing diuretics include Celery seed (*Apium graveolens*), Nettle leaf and seed (*Urtica dioica*), Dandelion leaf (*Taraxacum officinale*), Cleaver leaf (*Galium aparine*), Birch leaf (*Betula alba*), and Pipsissewa leaf (*Chimaphila umbellata*).

Alteratives

Alteratives or 'blood cleansers' are an all-important therapeutic modality in herbal medicine. The activity of an alterative is perhaps best characterized by the Eclectic physician Harvey Wicks Felter in his description of Oregon Grape root (*Berberis aquifolium*), a remedy in his opinion that "...stimulates secretion and excretion, improves digestion and elimination; it activates the lymphatic system and ductless glands; and

augments renal secretion. It is a corrector and eliminator of depraved body fluids and assists thereby in good blood-making" (1922, 16). Although there are many different kinds of alteratives with each exerting a specific effect, alteratives generally act upon liver, gall bladder and kidney function, stimulate detoxification pathways and enhance secretion. Alteratives particularly useful in musculoskeletal disorders include Burdock root (*Arctium lappa*), Barberry root (*Berberis vulgaris*), Pokeroot (*Phytolacca decandra*), Myrrh (*Commiphora mukul*), and Lignum vitae (*Guaicum officinale*).

Anodynes and analgesics

The indications for the usage of anodynes and analgesics is no different from that of topical analgesics, except that as many of these botanicals exert their effects by depressing central nervous system function, they should only be administered by competent practitioners. Botanical analgesics have long been recognized as important therapeutic tools, and even now opiates derived from the Opium Poppy (*Papaver somniferum*) are the primary therapeutic tool in pain management. Other plant sources of analgesic compounds include the tropane alkaloids of the nightshade family (e.g. *Atropa belladonna*), the salicylates and phenols of the Salicaceae (e.g. *Salix alba*), and psychoactive plants such as Marijuana (*Cannabis sativa*), Coca leaf (*Erythroxylum coca*), and the various psilocybin mushrooms. Although it might appear that botanical analgesics may have little to offer over the highly concentrated opiates and synthetic analgesics used in modern medicine, there is ample evidence that botanical analgesics have considerable activity at comparatively lower doses, and are very well tolerated. Botanical analgesics are indicated in pain associated with inflammation (e.g. arthritis, myalgia), visceral spasm (e.g. urinary stricture, intestinal colic), vascular spasm (e.g. migraines, dysmenorrhea), and neuralgia.

Although the Opium Poppy has been an important part of the Clinical herbalist's materia medica for thousands of years, its usage is now illegal and whole plant extracts have unfortunately fallen out of favour. Other species of the Papaveraceae however are not restricted, and botanicals such as California Poppy (*Eschscholzia californica*) continue to be used by clinical herbalists as a sedative analgesic, although the sedative activity is nowhere near as strong as that of the Opium Poppy. Similar to California Poppy is the dried latex Wild Lettuce (*Lactuca virosa*), which has traditional application as an analgesic, sedative and antitussive. The herb Yellow Jasmine (*Gelsemium sempervirens*) has both antimuscarinic and antinicotinic activities, making it potent, and potentially dangerous antispasmodic and anodyne. Jamaican Dogwood (*Piscidia erythrina*) is another popular analgesic among clinical herbalists, and is very well tolerated. The Chinese herb Han Fang Ji (*Stephania tetrandia*) is traditionally used as an analgesic specific to active joint inflammation, i.e. red, hot and swollen joints, as is the East Indian herb Bhallataka (*Semecarpus anacardium*). The Chinese also value Yan Hu Suo (*Corydalis yanhusuo*) and use it extensively as an analgesic. In Europe, Arnica (*Arnica montana*) is used internally, topically (on unbroken skin) and in homeopathic doses (e.g. Traumeel) to treat the pain of musculoskeletal injuries.

Other important analgesics are directed more towards neural pain, such as St. John's Wort (*Hypericum perforatum*), Black Cohosh (*Cimicifuga racemosa*) and Nutmeg (*Myristica fragrans*).

Antiinflammatories

Inflammation is a normal response to injury or irritation and is thus seen in traditional medicine to be an agent of healing. When inflammatory processes become excessive or prolonged however tissue degeneration is an inevitable result. Botanicals that have an antiinflammatory activity however are intended not to completely inhibit the inflammatory response but to limit its negative effects and support homeostatic mechanisms.

The mode of action of botanical antiinflammatories is diverse, with four basic groupings based upon the classification of certain chemical constituents, not including the role of essential fatty acids:

1. Salicin-containing botanicals: This group of medicinal plants contains a variety of salicylate compounds that are converted in the body into salicylic acid. Salicylic acid inhibits the enzyme cyclo-oxygenase that converts arachidonic acid into proinflammatory prostaglandins. Unlike acetyl-salicylic acid or aspirin however, the effect of plant salicylates upon cyclo-oxygenase is completely reversible, and thus platelets are not

destroyed and nor is there the same risk of Reye's syndrome if they are taken to relieve the discomfort of influenza or chicken pox. Further, plant salicylates (i.e. salicin) is not toxic the gastric mucosa or liver, such as acetyl-salicylic acid and acetaminophen. Examples of salicin-containing botanicals include Willow bark (*Salix spp.*), Trembling Aspen bark (*Populus tremuloides*), Poplar buds and bark (*Populus canadensis*), and Meadowsweet herb (*Filipendula ulmaria*).

2. Saponin-containing botanicals: Saponins are a kind of glycoside characterized by their frothing property when introduced into an aqueous solution. The toxic property of saponin-containing plants have long been known to aboriginal peoples all over the world, evidenced by their use as fish poisons. The hemolytic property of saponins when ingested by warm-blooded animals however, is non-existent, although in significant doses they can have an irritant effect upon the gastric and respiratory mucosa. This irritant action of such saponin-containing plants is taken advantage of by clinical herbalists in their use as stimulating expectorants in respiratory congestion (e.g. Heartsease blossoms, *Viola tricolor*).

Saponins are structurally similar to the steroid hormones progesterone, estrogen, androgens, and cortisol. They are used by the pharmaceutical industry as the basic template upon which to manufacture steroid hormones. Saponin-containing medicinal plants are broadly divided into two categories: the (pentacyclic) triterpenoid saponins and the steroidal (tetracyclic triterpenoid) saponins.

The steroidal saponins are common to many foods such as carrots, yams, potatoes, asparagus and certain grains. Upon digestion steroidal saponins are modified by commensal bacteria to form sapogenins that then enter the bloodstream. As there are great variance in the types of steroidal saponins, the resulting sapogenin produced can have a variety of activities. Regardless of the effect, steroidal saponins appear to modify hypothalamic function and bind with steroidal receptor sites to elicit their effects. One of the more important steroidal saponin-containing medicinal plants is Wild Yam root (*Dioscorea villosa*), and although it has been traditionally used as an antiinflammatory and antispasmodic in uterine and intestinal smooth muscle, has similar effects in skeletal muscle.

Ashwagandha root (*Withania somnifera*) is an East Indian herb that is highly esteemed in Ayurvedic medicine as a rejuvenative, mild sedative and antiinflammatory botanical. Its high steroid content provides an antiinflammatory activity greater than that of hydrocortisone, and has a comparable activity to phenylbutazone without immunosuppression or gut irritation. It has undergone several clinical trials with markedly efficacious results in the treatment of inflammatory joint disorders.

Other important steroidal saponin-containing medicinal plants include Ginseng (*Panax spp.*) and Siberian Ginseng roots (*Eleutherococcus senticosus*), which although cannot be considered to be potent antiinflammatory agents, are useful adjunct therapies to enhance resistance and restore homeostasis. Such botanicals have an important part to play in modulating the effects of immune function in autoimmune conditions.

Triterpenoid saponin-containing medicinal plants are not much different in terms of their biological effects from their steroidal cousins. Among the most studied of the triterpenoid-containing medicinal plants is Licorice root (*Glycyrrhiza glabra*). In the mid-1950's Licorice was investigated for its usefulness in the treatment of Addison's disease, and was found to potentiate the antiinflammatory activity of cortisone. Apart from having a glucocorticoid-like effect, Licorice also inhibits the enzymatic destruction of the glucocorticoids, allowing these hormones to circulate longer. The distinct advantage of Licorice over corticosteroids like prednisone is that long-term usage will not cause any atrophy of the adrenal gland, although in large doses Licorice may have an aldosterogenic effect and is used with caution in high doses with hypertension and edema.

Other important triterpenoid saponin-containing medicinal plants include *Buplerum* and *Actaea*. Buplerum root (*Buplerum falcatum*, Chai Hu) contains a group of saponins called saikosaponins that have been investigated for their hepatoprotective and antiinflammatory effects, and is indicated used in autoimmune disorders. Black Cohosh root (*Cimicifuga racemosa*) contains the triterpene glycosides actein and cimicifugoside, and has become an increasing popular medicinal plant in the treatment of perimenopausal symptoms. Its primary uses however are as an analgesic, antispasmodic

and anti-inflammatory agent, particularly useful in any kind of rheumatic pain.

3. Volatile oil-containing botanicals: Volatile or essential oils are plant constituents that are volatile in steam, entirely different both chemically and physically from fixed oils. They are secreted by the oils cells of plants, found in secretion ducts or in glandular hairs on the leaves. Volatile oils are generally mixtures of hydrocarbons and oxygenated constituents derived from these hydrocarbons. The taste and odour of volatile oils are determined primarily by the oxygenated constituents, which are readily soluble in alcohol. Purified volatile oils are obtained by steam distillation or enfleurage. Therapeutic grade essential oils are obtained without the use of chemical solvents, and tend to be quite expensive.

Many purified volatile oils exhibit an antiinflammatory activity when applied externally, and as a part of the constituent profile of a whole plant extract, exhibit antiinflammatory activities internally as well. Bisobalal and chamaezulene are volatile constituents found in Chamomile (*Matricaria recutita*) that have well-recognized antiinflammatory activities. Other medicinal plants whose antiinflammatory activity can be largely attributed to its essential oil content include Lavender blossom (*Lavandula angustifolia*), Rosemary herb (*Rosmarinus officinalis*), Eucalyptus leaf (*Eucalyptus globulus*), Sweet Marjoram leaf (*Origanum marjorana*), Ginger root (*Zingiber officinalis*), the various Mints (*Mentha spp.*), and Allspice fruit (*Pimenta dioica*).

4. Other antiinflammatory botanicals: Apart the different classes of antiinflammatory constituents that have already been discussed, there are many other antiinflammatory plants that do not fit into this scheme. One example is the African botanical Devil's Claw (*Harpagophytum procumbens*) that contains the iridoid glycoside harpagoside that has analgesic, antispasmodic and antiphlogistic properties comparable to phenylbutazone, a commonly used NSAID. The specific mechanism of its antiinflammatory activity that is well known among arthritis sufferers however remains elusive. The rather popular Buckbean (*Menyanthes trifolium*) is commonly used in Europe in the treatment of arthritis, and contains several iridoid glycosides that make this plant somewhat similar in activity to Devil's Claw.

Turmeric root (*Curcuma longa*) is another important antiinflammatory medicinal plant that contains a yellow pigment called curcumin. The antiinflammatory activity of this compound has been found to be as or more effective than various steroid drugs in the treatment of inflammation. The advantage of Turmeric over NSAIDs and corticosteroids are its rather broad activities, including leukotriene inhibition, antioxidant activity, fibrinolysis promotion and membrane stabilization. A whole plant ethanol extract of Turmeric is superior to that of the purified constituent, curcumin.

Other important antiinflammatory botanicals to consider are Myrrh resin (*Commiphora mukul*), Baical Skullcap root (*Scutellaria baicalensis*), Sarsaparilla (*Smilax spp.*), Gotu Kola herb (*Centella asiatica*), Fang Feng herb (*Ledebouriella divaricata*), and Yucca root (*Yucca spp.*).

Circulatory stimulants

Circulatory stimulants are used in remissive and poorly healing conditions to enhance blood supply to damaged tissues, and assist in the metabolism of other ingredients in a formula. Circulatory stimulants also aid in the elimination of toxins from damaged tissues. They are, however, contraindicated in active conditions or acute injury, as they tend to enhance immunity and promote inflammation. Many circulatory stimulants are also digestive aids, stimulating gastrointestinal secretion and motility. Among the more useful circulatory stimulants are Prickly Ash berry (*Zanthoxylum americanum*), Ginger root (*Zingiber officinalis*), Cayenne fruit (*Capsicum minimum*), and Cinnamon bark (*Cinnamomum cassia*).

Phytoestrogens

Phytoestrogens are plant-derived compounds that appear to mimic the effect of estrogen *in vivo*. There are many different kinds of phytoestrogens, including some that have a direct estrogenic activity (e.g. the isoflavones) and others that appear to modulate hypothalamic-pituitary function to elicit an estrogenic-like effect (e.g. steroidal saponins).

Phytoestrogens are contained in a large number of foods such as legumes and cruciferous vegetables. The weak estrogenic activity of phytoestrogens in menstruating women protects against excessive stimulation from endogenous and exogenous sources of estrogen by binding with and thereby blocking estrogen receptors. In post-menopausal women phytoestrogens complement the small amounts of estrogen produced by the adrenals to protect against declining estrogen levels and the risk of osteoporosis.

Isoflavone and lignan-containing medicinal plants are known to have a directly estrogenic activity, although many thousands of times weaker than estradiol. Isoflavones are a diverse group, over 700 different substances, and contain an active chemical group called a terminal phenolic group that is similar to an estrogen molecule. The most biologically active are the coumestans and the isoflavones genistein, daidzein, biochanin A and formononetin.

Foods and medicinal plants particularly high in phytoestrogens include Red Clover blossoms (*Trifolium pratense*), Alfalfa leaf and sprouts (*Medicago sativa*), legumes (*Phaseolus spp.*) such as soy and kidney beans, and cruciferous vegetables such as broccoli and broccoli sprouts, and brussel sprouts.

Trophorestoratives

The use of botanicals that have a trophorestorative property is entirely unique to botanical medicine, although newer supplements such as glucosamine, chondroitin and Shark cartilage attempt to replicate this idea by providing the base nutrients to rebuild damaged connective tissues. Traditional methods include broths made from animal carcasses, like chicken, fish heads and fins, or oxtail soup.

Botanical trophorestoratives are thought to strengthen and nourish the tissues of the joints, tendons, ligaments and muscles through the provision of a broad range of phytonutrients. Some of these botanicals, such as Hawthorn berry (*Crataegus oxyacanthoides*) and Bilberry (*Vaccinium myrtillus*) contain high amounts of bioflavonoids that have been shown to enhance the cross-linking of collagen fibers, promoting musculoskeletal strength and flexibility.

Another botanical long thought of as a musculoskeletal trophorestorative is Horsetail herb (*Equisetum arvense*). The innate strengthening power of this plant has other applications beyond that of a trophorestorative, and an aqueous preparation is even used in biodynamic farming to strengthen crops against the wind. The trophorestorative activity of Horsetail has long been thought due to its high silica content, which contributes to the organic matrix and proper mineralization of bone and teeth.

White Bryony root (*Bryonia dioica*) is an extremely important musculoskeletal trophorestorative that also has potent antiinflammatory and analgesic properties. Specifically, Bryony is used as a tonic to any serous membranes, normalizing serous secretion in the peritoneum, pleura and synovium. Unlike most herbs however Bryony has a narrow therapeutic window and must be used with great care.

Other important trophorestoratives for the musculoskeletal system include Solomon's Seal root (*Polygonum multiflorum*), Nettle herb (*Urtica dioica*), Comfrey root (*Symphytum officinale*), Skullcap herb (*Scutellaria lateriflora*), and Kelp (*Fucus vesiculosus*).

Musculoskeletal deficiency

The symptoms of a musculoskeletal deficiency are largely characterized by an atonic state, with poor muscle tone, a slumped posture, lethargy, and weakness, often with cold hands and feet. If joint or muscle pain is present, the pain will be a low-grade ache, and the affected area may appear edematous and congested, but will lack any other indication of inflammation. This can include more pedestrian forms of congestive arthritis to more complex conditions such as multiple sclerosis.

Herbs to stimulate

The primary method to correct this deficiency is to increase the metabolic activity of the muscle, through adequate exercise or in invalids by whatever means possible to

stimulate muscle contraction. Stimulants however can be are very helpful, applied topically as rubefacients and use of sudation therapies, or used internally to stimulate blood flow. Additional measures call for the use of alterative herbs that promote the removal of metabolic wastes from the periphery. Direct stimulants to motor function may also be applicable in same cases, but are symptomatic at best.

- e.g. circulatory stimulants (topically and internally): Ginger (*Zingiber*), Prickly Ash (*Zanthoxylum*), Rosemary (*Rosmarinus*), Cayenne (*Capsicum*)
- e.g. alteratives: Nettle (*Urtica*), Bladderwrack (*Fucus*), Celery seed (*Apium*)
- e.g. motor stimulants: Coffee (*Coffea*), Kola nut (*Cola spp*), Guarana (*Paullinia*)

Musculoskeletal excess

The primary symptoms of musculoskeletal excess is a hypertonic state of the skeletal muscles, characterized by tightness and spasm in those muscles more affected by sympathetic stress, including the neck and shoulder, intercostals, back, and leg muscles. In severe pathologies there are symptoms of acute joint inflammation and muscle pain.

Herbs to relax

In general, botanicals that help to down-regulate the sympathetic activities of the autonomic nervous system or have a direct antispasmodic activity are used to treat musculoskeletal excess. In many cases musculoskeletal excess is concurrent with adrenalin stress and a nervous deficiency, and thus measures are also sometimes taken support the adrenals and nervous system. Additional measures may include stimulating digestive function to promote the flow of blood back to the viscera, as well as down-regulating the inflammatory response.

- e.g. parasympathomimetics: Vervain (*Verbena*), Passionflower (*Passiflora*), Skullcap (*Scutellaria*)
- e.g. antispasmodics: Black Cohosh (*Cimicifuga*), Kava (*Piper methysticum*), Lobelia
- e.g. adrenal trophorestoratives: Licorice (*Glycyrrhiza*), Milky Oats (*Avena*), Ashwagandha (*Withania*, *Convovulus*)
- e.g. bitter stimulants: Gentian (*Gentiana*), Bogbean (*Menyanthes*), Barberry (*Berberis*)
- e.g. anti-inflammatories: Devil's Claw (*Harpagophytum*), Willow (*Salix*), Turmeric (*Curcuma*)

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