Biotonic – Scientific Validation of Botanical Ingredients

Radix Astragalus (*Astragalus membranaceus*)

Medicinal Actions:
Adaptogenic, antioxidant, cardiotonic, hypotensive, immune enhancing, immunoregulatory, tonic.[1]

Traditional Use:
The root of astragalus has been used in traditional Chinese medicine for centuries.[1] Astragalus has been used for health promotion[2] and to strengthen and tonify the Qi (energy), as well as tonify the blood and the spleen.[1] In clinical practice, astragalus is used as an adaptogenic agent to restore and balance the body's immune response and to increase vitality.[2]

Scientific Evidence:
The main phytochemical constituents of astragalus include triterpenoid saponins, isoflavonoids and polysaccharides.[1] Astragalus polysaccharides, saponin isolates and flavonoids have been researched in numerous pharmacological studies as water and alcoholic extracts, as well as astragalus injections.[1] The immune modulating activities of astragalus include stimulating macrophage activity, enhancing natural killer (NK) cells and B- and T-cell activity.[1,2] Based on *in vitro* studies, astragalus has been shown to enhance the growth, metabolism, and longevity of cell cultures. Other *in vitro* effects include reduced oxygen consumption of mitochondrial cells and increased tolerance to stress.[1,3]

Indications supported by clinical trials include impaired immunity,[4-10] viral infections,[11-14] allergic rhinitis,[15] fatigue,[16] heart conditions,[17,18] gestational diabetes[19] and as an adjunct in the treatment of cancer.[20,21]

Safety Summary:
Considered safe and well tolerated with no adverse reaction expected at the dose recommended.[1] Based on traditional considerations, astragalus is contraindicated in acute infections.[1] Considered safe during pregnancy.[1] Exercise caution during breastfeeding as safety has not been scientifically established.[1]

Herba Artemesia/Sweet Wormwood (*Artemisia annua*)

Medicinal Actions:
Antiallergic, anticancer, antifungal, antihelmintic, antiinflammatory, antimalarial, antioxidant,[22] antiparasitic, antischistosomal,[23] antiviral.[23,24]

Traditional Use:
In the Traditional Chinese Medicine system, sweet wormwood has been used for centuries for treating "heat" conditions (yang), such as malaria and reliving symptoms of febrile diseases, tidal fever, low grade fever and summer heat stroke due to its cooling nature (yin).[25] The leaves are used for colds, flu, malarial fevers, dysentery and diarrhoea, while the seeds are used for night sweats, indigestion and flatulence.[24]

Scientific Evidence:
The main phytochemical constituents of sweet wormwood include volatile oils, sesquiterpene lactones (artemisinins), phenolic compounds and flavones.[26] Artemisinins, the endoperoxide sesquiterpene

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lactones, have been recognized as the major bioactive ingredients responsible for the medicinal properties of sweet wormwood.[23,27]

There is extensive research *in vitro* and preclinical *in vivo* evidence to support the therapeutic application of artemisinins and sweet wormwood in malarial conditions[23,28,29] in *Schistosoma haematobium* infection[30] and cytomegalovirus infection.[31]

Safety Summary:
Considered safe and well tolerated at the dose recommended.[23,28,32] May cause allergic reactions or dermatitis (direct contact).[24] Avoid during the first trimester of pregnancy due to the artemisinin content which is thought to be teratogenic and may cause foetal resorption.[33]

Siberian Ginseng (*Eleutherococcus senticosus*)

Medicinal Actions:
Adaptogen, anticarcinogenic, antifatigue, antiinflammatory, antimicrobial, antioxidant, antistress, antiviral, hepatoprotective, immune modulating, immunoprotective, mild stimulant, neuroprotective, radioprotective,[34] tonic.[1,35]

Traditional Use:
Siberian ginseng has been used for over 2000 years in tradition Chinese medicine. Based on traditional use, Siberian ginseng helps to expel wind dampness in the body, to strengthen bones, and to enhance the flow of Qi and blood. It also helps invigorate and tonify the spleen and kidneys and has tranquilizing actions.[1] Siberian ginseng has been used clinically to prevent respiratory illnesses (colds and influenza), to increase vitality and energy,[2] to treat oedema, and for joint and back pain. Other indications include insomnia, fatigue, lowered immunity and anorexia.[1]

Scientific Evidence:
The key constituents of Siberian ginseng include lignans, phenylpropanoids (eleutherosides), triterpenoid saponins and glycans.[1] Siberian ginseng is primarily known as an adaptogenic herb.[36] Based on the writings by Brekhman and colleagues, Siberian ginseng is harmless to the host organism, has broad raging therapeutic properties, provides non-specific effects in resistance to a wide variety of harmful factors of a physical, chemical or a biological nature, and acts as a normalizing or stabilizing agent.[36]

Indications supported by clinical trials include improvement of mental[37] and physical performance,[38-40] reduction of stress in individuals affected by chronic illness or environmental and occupational stress.[1,41,42] Siberian ginseng has also been shown to treat fatigue, enhance immune function,[43] and act as an adjuvant therapy in dysentery, cancer and convalescence following antibiotic treatment.[1,44]

Safety Summary:
Considered safe and well tolerated with no adverse reactions expected at the dose recommended.[1] Siberian ginseng is not recommended during the acute phase of infections.[1] In therapeutic doses, it may increase plasma drug levels when used in conjunction with Digoxin.[1] Considered safe with no adverse effects expected during pregnancy and breastfeeding.[1]

Radix Polygoni Multiflora (*Polygonum multiflorum)*

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Medicinal Actions:
Antiaging, antialopecia, antibacterial, antidiabetic, antihyperlipidaemic, antiinflammatory, antioxidant, cognition enhancing,[45] hepatoprotective, immune modulating, neuroprotective.[46]

Traditional Use:
Polygonum has been used in traditional Chinese medicine for centuries as a liver and kidney-tonifying remedy and as an antiaging agent.[45] It is thought to be preventative in neurodegenerative and cardiovascular diseases.[46] In clinical practice, polygonum is generally used in combination with other herbs to enhance the therapeutic effects.[45]

Scientific Evidence:
The major phytochemical constituents of polygonum include flavones, quinones, stilbenes, phospholipids and phenolic compounds.[45]

Despite polygonum being one of the most popular traditional Chinese medicines, there have been very few clinical studies conducted to assess the traditional indications or to study the therapeutic potential of its bioactive constituents.[46]

The immune modulating effects of polygonum are due to the polysaccharide and anthraquinone content of the herb.[45] Based on *in vitro* research, polygonum anthraquinone glycosides are able to enhance T and B lymphocyte proliferation, improve macrophage phagocytosis, increase TNF secretion and enhance the activity of NK cells.[45]

Several *in vivo* and *in vitro* studies have demonstrated the antiinflammatory effects of polygonum and its bioactive constituents. Polygonum works by inhibiting the expression of pro-inflammatory signalling factors such as nuclear factor (NF)-kappa-β, TNF-α, inducible nitric oxide synthase (iNOS), cyclooxygenase-2, chemokines and cytokines.[46-50]

Safety Summary:
No adverse effects expected at the dose recommended. In therapeutic doses, polygonium administration has been linked to cases of liver damage.[46] Exercise caution during pregnancy and breastfeeding as safety has not been scientifically established during these times.[51]

Radix Zingiberis Officianalis (*Zingiber officinale*)

Medicinal Actions:
Antiemetic, antiinflammatory, antiplatelet, carminative, diaphoretic, digestive stimulant, peripheral circulatory stimulant, spasmolytic.[1]

Traditional Use:
Traditionally ginger has been used to enhance digestion, to treat digestive problems including colic, flatulent dyspepsia, cramping, peptic ulcer, loss of appetite and gastrointestinal infections.[1] Due to its pungent, sweet and heating properties, ginger has been used for both digestive and respiratory diseases.[52]

Scientific Evidence:
The key constituents of ginger include monoterpenes (geranial, neral) and sesquiterpenes (zingiberene, beta-bisabolene), essential oils and pungent actives (gingerols, shogaols).[1,53]

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The antiemetic and antinausea activities of ginger have been demonstrated in numerous clinical trials, and assessed in several systematic reviews and meta-analyses.[1,54-59] Ginger has also been shown to enhance gastric emptying in patients with functional dyspepsia.[1]

Animal studies of ginger have also provided supportive evidence for its use in enhancing digestive functions.[1] Ginger was found to stimulate gastric secretion, enhance intestinal lipase activity, increase bile secretion and positively influence gastrointestinal motility.[1]

Ginger extract, its main constituents, and essential oil of ginger have also demonstrated antimicrobial activity in both *in vitro* and *in vivo* trials.[2] Various ginger preparations have documented antibacterial effects against *Staphylococcus aureus, Streptococcus pyogenes, Streptococcus pneumoniae, Haemophilus influenzae*,[60] *Penicillium* spp.*, Escherichia coli, Bacillus subtilis* and *Helicobacter pylori*.[2]

Safety Summary:
Considered safe and well tolerated at the dose recommended.[1] Contraindicated in therapeutic doses in patients with gallstones.[1] No adverse effects expected during pregnancy and breastfeeding at the dose recommended.[61]

Rhizoma Atractylodis Macrocephalae (*Atractylodes lancea*)

Medicinal Actions:
Antiinflammatory, antimicrobial, antioxidant,[62] antipyretic, antitumor, immunoregulatory.[63]

Traditional Use:
The rhizome of atractylodes has been used in traditional Chinese medicine as a tonic herb,[62] for the treatment of rheumatic diseases, digestive disorders, as well as colds and influenza.[63] Due to its medicinal properties, atractylodes was used to invigorate the stomach, strengthen the spleen, eliminate dampness, and expel and clear away wind-cold.[62,63] In Thai traditional medicine, it has been used to treat fever and the common cold. The Thai also utilized atractylodes for the treatment of gastrointestinal disorders including dyspepsia, flatulence, nausea, and non-infectious diarrhoea.[63] In Japan, atractylodes was traditionally used to treat gastrointestinal diseases such as nausea, gastroparesis, and gastric atony.[64]

Scientific Evidence:
The major constituents of atractylodes include essential oils (β-eudesmol, hinesol, L-phenylalanine) and esquiterpenoids (atractylenolides and atractylon, atractylodin).[63,65] Its pharmacological properties have been studied predominantly through *in vitro, ex vivo*, and animal trials.[63]

Atractylodes extract has been shown to delay gastric emptying and stimulate small intestinal motility in mice.[64] It has also demonstrated antiulcer properties in animal models.[66,67] In the study by Seo et al., atractylodes isolate, β-eudesmol, has demonstrated antiinflammatory effects by down-regulation of interleukin-6 (IL-6) production and expression, via the modulation of NF-kappa β.[68] The antimicrobial activity of atractylodes has been demonstrated *in vitro* against *Staphylococcus aureus, Escherichia coli, Saccharomyces cerevisiae, Candida albicans*,[69] *Rhodotorula glutinis* and *Saprolegnia*.[63,70]

Safety Summary:
Considered safe and well tolerated with no adverse reactions expected at the dose recommended.[65] Atractylodes may cause an allergic reaction in individuals with a known sensitivity to plants from the Asteraceae/Compositae family.[65] Exercise caution during pregnancy and breastfeeding as safety has not been scientifically established during these times.[65]

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Wild Yam (*Dioscorea villosa*)

Medicinal Actions:
Antiinflammatory, antioxidant,[2] antirheumatic, cholagogue, mild diaphoretic, oestrogen-modulating,[61] spasmolytic.[71]

Traditional Use:
In traditional Western medicine, wild yam has been used for gastrointestinal disorders including colic, gastrointestinal irritation, spasm, diverticulitis and for neuralgic affection and asthma[61] due to its antispasmodic, antiinflammatory and autonomic nervous system-relaxant properties.[2] It has also been used for rheumatoid arthritis and hormonal imbalance associated with menopause.[61]

Scientific Evidence:
The active constituents of wild yam include phytosterols (β-sitosterol, campesterol, stigmasterol), steroidal saponins (diosgenin, dioscin, dioscornin), alkaloids and flavonoids.[71]

To date, wild yam has not been studied under clinical trial conditions, rather evidence is derived mainly from traditional use and *in vitro* and animal studies.[2] The saponin diosgenin has demonstrated hepatoprotective, antioxidative and hypolipidaemic effects in animal models.[72] *In vitro* trials with diosgenin have reported antiinflammatory activity through the down-regulation of cyclooxygenase expression.[73] Dioscorea saponins have also demonstrated cytotoxic and antifungal activity *in vitro*.[74]

Safety Summary:
Considered safe and well tolerated with no known interactions and contraindications.[61] Due to its saponin content, wild yam may cause irritation of the gastric mucosa and reflux when taken in therapeutic doses.[61] No adverse effects expected during pregnancy and breastfeeding at the dose recommended.[61]

Sclerotium Poria Cocos (*Poria cocos*)

Medicinal Actions:
Anticancer,[75] antifungal, antihyperglycaemic,[76] antiinflammatory, antioxidant, diuretic immune modulating, sedative.[77]

Traditional Use:
Sclerotium Poria Cocos, also known as poria mushroom, is a saprophytic fungus used in traditional Chinese and Japanese medicine due to its diuretic, sedative, and tonic effects.[76] It has been used in traditional medicine to treat chronic gastritis, oedema, nephrosis, gastric atony, acute gastroenteric catarrh, dizziness, nausea and emesis.[75]

Scientific Evidence:
The major constituents of poria mushroom include triterpenoids (Lanostane-, Eburicane-, *seco*-Lanostane and *seco*-Eburcane-tpye triterpenes) and polysaccharides.[76]

In vivo administration of polysaccharides isolated from poria mushroom have demonstrated broad-spectrum antiinflammatory activity.[78] It has been shown to activate macrophages to induce nitric oxide (NO) production and iNOS transcription through the activation of NF-kappaβ/Rel.[78] Treatment of murine

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macrophages has resulted in NF-kappaβ/Rel activation and iNOS expression through the p38 kinase pathway and membrane receptors (CD14, Toll-like receptor 4, and CR3), which are critically involved in the signal transduction leading to NF-κB/Rel activation.[79]

Poria mushroom is known as an immunomodulatory agent that alters the activity of immune function through the dynamic regulation of informational molecules such as cytokines.[76] Ethanol extracts of poria mushroom have demonstrated immunomodulatory activities *in vitro*.[77] In human peripheral blood monocytes poria has enhanced the secretion of immune stimulators interleukin (IL)-1β, IL-6 and TNF-α, and suppressed the secretion of an immune suppressor transforming growth factor-β (TGF-β).[77]

Safety Summary:
Considered safe with no known adverse effects and interactions.[80] Exercise caution during pregnancy and breastfeeding as safety has not been scientifically established during these times.[80]

Radix Codonopsis (*Codonopsis pilosulae*)

Medicinal Actions:
Antifatigue, antimicrobial, antioxidant, antitumor, antiulcer,[81] Immunomodulatory.[82,83]

Traditional Use:
Codonopsis has been used in traditional Chinese medicine to treat digestive dysfunction and associated symptoms such as poor appetite, dyspepsia, indigestion, loose stools and fatigue.[83,84] It was also used for pulmonary insufficiencies such as shortness of breath, coughing and wheezing.[84] Codonopsis exhibits similar therapeutic effects to *Panax ginseng*, and is often used as a substitute for this herb.[82,84] In traditional Chinese medicine, codonopsis is often used in combination with other herbs to improve Qi deficiency, replenish vital energy and nourish the blood.[85,86]

Scientific Evidence:
The main constituents of codonopsis include sterols, triterpenes, glycosides, alkaloids and polysaccharides.[82]

Pharmacological studies on codonopsis have demonstrated its protecting properties against peptic ulceration[87] and beneficial effects on bowel regulation.[84] It has also been shown to enhance learning and memory behaviour,[84,88] increase immunity,[82,83] and improve chronic obstructive pulmonary disease.[85]

Safety Summary:
Codonopsis is considered safe and well tolerated.[85] In therapeutic doses, cconcomitant use may interact with antiplatelet or anticoagulant medications.[89] Exercise caution during pregnancy and breastfeeding as safety has not been scientifically established during these times.[89]

Radix Peony (*Paeonia lactiflora*)

Medicinal Actions:
Anticonvulsant, antiinflammatory, antioxidant, cognition enhancing,[61] muscle relaxant, spasmolytic.[90]

Traditional Use:

Peony has been used in traditional Chinese medicine to invigorate and cool the blood and clear the liver.[61] Clinically, it is utilized for the treatment of wounds, fungal infections, as well as pain and spasmodic conditions.[91] Peony has also been used in combination with other herbs for the treatment of ovulatory disorders and to promote fertility.[92]

Scientific Evidence:
The active constituents of peony include glycosides (paeoniflorin), flavonoids, proanthocyanidins, tannins, terpenoids, triterpenoids, and complex polysaccharides.[91]

Indications supported by clinical trials include cardiovascular disorders[93,94] and women's health.[61] Preclinical research also suggests peony has hepatoprotective[95] and cognition enhancing effects.[96,97]

Safety Summary:
Considered safe with no adverse effects or interactions expected.[61] No adverse effects expected during pregnancy and breastfeeding at the dose recommended.[61]

Tuber Curcumae (*Curcuma longa*)

Medicinal Actions:
Anticarcinogenic, antiinflammatory, antimicrobial, antioxidant, cardioprotective, carminative, cholagogue, choleretic, depurative, hepatoprotective, hypolipidaemic, neuroprotective, radioprotective, vasoprotective.[1]

Traditional Use:
Turmeric has a long history of use in Ayurvedic medicine for the treatment of inflammatory conditions, as a tonic, and blood purifying agent. It has also been used for poor appetite and for liver disorders.[1] In traditional Chinese medicine turmeric has been used to invigorate the blood and as a Qi or vital energy stimulant.[1] Other traditional uses include managing abdominal pain, indigestion, and abdominal bloating.[98]

Scientific Evidence:
The main constituents of turmeric include essential oils (sesquiterpene ketones, zingiberene) and curcuminoids (curcumin).[1] The antiinflammatory properties are thought to be related to turmeric's ability to inhibit pro-inflammatory arachidonic acid and neutrophil function during inflammatory episodes.[99]

Research shows that curcumin, the active constituent of turmeric has gastro-protective effects and is beneficial for inflammatory bowel disease (IBD), irritable bowel syndrome (IBS), as well as dyspeptic and biliary-related symptoms.[1] Curcumin has also demonstrated chemopreventative properties against bowel polyps, which may help reduce the of risk of premalignant conditions.[100]

In clinical trials, curcumin has demonstrated antioxidant activity[101] and gastro protective effects and increased gall bladder contraction in healthy volunteers.[100,102] It has also been used effectively in post-operative care,[103] in patients with Crohn disease,[104] ulcerative colitis,[105] and IBS patients.[1,106]

Safety Summary:
Considered safe and well tolerated with no adverse reaction expected at the recommended dose.[1] Avoid in persons with biliary tract obstruction.[1] Considered safe and well tolerated during pregnancy and breastfeeding.[53]

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Pericarpium Citri Reticulae (*Citrus reticulate*)

Medicinal Actions:
Anticarcinogenic, antiinflammatory, antimicrobial,[107] antioxidant,[108] antiproliferative, antispasmolytic, antiviral,[109] vasoprotective.[108]

Traditional Use:
Pericarpium citri reticulatae is the dried, ripe fruit peel of *Citrus reticulate*. [110] It has been widely used as a herbal medicine in Korea, China, and Japan to treat indigestion and inflammatory disorders of the respiratory tract including bronchitis and asthma.[110] The herb is also used for detoxification.[108] In traditional Chinese medicine, *Pericarpium citri reticulatae* has been utilized to eliminate phlegm and strengthen the spleen.[110]

Scientific Evidence:
The main bioactive constituents of *Pericarpium citri reticulatae* consist of essential oils (D-limonene, α-terpineol, terpinen-4-ol, γ-terpinen, and linalool) and flavonoids (flavone, flavanone and flavonol).[108,111]

Based on *In vitro* research, flavonoids isolated from *Pericarpium citri reticulatae* have demonstrated antimicrobial activity against *Escherichia coli*, *Staphylococcus aureus*, *Enterococcus faecalis*, *Salmonella typhi* and *Enterobacter cloacae*.[108] The polymethoxylated flavones extracted from *Citrus reticulate* have also exhibited antifungal activity by inhibiting the growth of *Aspergillus niger*.[108] The volatile constituents of the fruit peel have demonstrated antibacterial activity against *Escherichia coli, Staphylococcus aureus,* and antifungal activity against *Aspergillus flavus, Aspergillus niger, Aspergillus fumigatus* and *Candida albicans*.[107]

Safety Summary:
Considered safe at the recommended dose with no known adverse effects.[112] In therapeutic doses, *Pericarpium citri reticulatae* may cause hyperkalaemia when used in conjunction with potassium-sparing diuretics.[112] Exercise caution during pregnancy and breastfeeding as safety has not been scientifically established during these times.

Glycyrrhizae Uralensis (*Glycyrrhiza uralensis*)

Medicinal Actions:
Adrenal tonic, antibacterial, anticarcinogenic, antiinflammatory, antiviral, demulcent, hepatoprotective, mild laxative, mucoprotective, spasmolytic,[1] antiulcer.[113]

Traditional Use:
Glycyrrhiza uralensis also known as Chinese or Ural liquorice is one of the most frequently used herbs in traditional Chinese medicine.[113] It has been used for improving overall health, to lengthen life-span, as a cure for injury and swelling, and also for detoxification.[114] In Japan, extract and flavonoid-rich fractions of Chinese liquorice are used for the treatment of gastritis as well as gastric and duodenal ulcers.[114]

Scientific Evidence:
The key constituents of Chinese liquorice include phenolic compounds,[115] pterocarpenes, essential oils, triterpenoids, alkaloids, polyamines and polysaccharides.[113]

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Ethanolic extracts and several compounds (pterocarpenes and isoflavanoids) isolated from Chinese liquorice have exhibited strong antibacterial activity against *Streptococcus mutans* (*in vitro* research).[113]

Other *in vitro* trials have shown that the flavonoids isolated from Chinese liquorice possess antimicrobial activities against methicillin sensitive *Staphylococcus aureus (MSSA),* methicillin resistant *Staphylococcus aureus* (MRSA), *Micrococcus luteus, Bacillus subtilis, Klebsiella pneumoniae* and *Pseudomonas aeruginosa*.[114]

According to Bone and Mills, the British Pharmacopoeia states that *Glycyrrhiza glabra, Glycyrrhiza uralensis* or *Glycyrrhiza inflata* are regarded as being medicinally interchangeable herbs.[1]

Indications supported by clinical trials include dyslipidaemia,[116,117] post-operative recovery,[118] gastric ulcer, duodenal ulcer, functional dyspepsia, viral hepatitis and recurrent mouth ulcers.[1]

Safety Summary:
Considered safe at the recommended dose.[1] In therapeutic doses, *Glycyrrhiza uralensis* may cause hypertension, sodium and water retention and hypokalaemia.[1] Avoid in therapeutic doses with diuretics and laxative medications.[1] Contraindicated in therapeutic doses in cholestatic liver disorders, liver cirrhosis, hypertension, hyperkalaemia, severe kidney insufficiency, oedema, congestive heart failure and pregnancy.[1] Avoid during pregnancy.[1] Considered safe during breastfeeding.[1]

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References

1. Bone K, Mills S. *Principles and Practice of Phytotherapy: Modern Herbal Medicine.* Second ed: Churchill Livingstone, Elsevier; 2013.
2. Braun L, Cohen M. *Herbs and Natural Supplements an Evidenced Based Guide.* Vol 2. 4rt ed. ed. Chatswood, NSW: Elsevier Australia.; 2015.
3. Chang H, But P. *Pharmacology and Applications of Chinese Materia Medica.* Vol 2. Singapore: World Scientific 1987.
4. Weng XS. [Treatment of leucopenia with pure Astragalus preparation--an analysis of 115 leucopenic cases]. *Zhongguo Zhong xi yi jie he za zhi Zhongguo Zhongxiyi jiehe zazhi = Chinese journal of integrated traditional and Western medicine / Zhongguo Zhong xi yi jie he xue hui, Zhongguo Zhong yi yan jiu yuan zhu ban.* 1995;15(8):462-464.
5. Wong EL, Sung RY, Leung TF, et al. Randomized, double-blind, placebo-controlled trial of herbal therapy for children with asthma. *Journal of alternative and complementary medicine (New York, N.Y.* 2009;15(10):1091-1097.
6. Niu GH, Sun X, Zhang CM. [Effect of compound astragalus recipe on lymphocyte subset, immunoglobulin and complements in patients with myasthenia gravia]. *Zhongguo Zhong xi yi jie he za zhi Zhongguo Zhongxiyi jiehe zazhi = Chinese journal of integrated traditional and Western medicine / Zhongguo Zhong xi yi jie he xue hui, Zhongguo Zhong yi yan jiu yuan zhu ban.* 2009;29(4):305-308.
7. Wu J, Wang YX, Su WL, Zhu WX, Lu JW, Li ZK. Effect of astragalus injection on serious abdominal traumatic patients' cellular immunity. *Chin J Integr Med.* 2006;12(1):29-31.
8. Wang MS, Li J, Di HX, et al. Clinical study on effect of Astragalus Injection and its immuno-regulation action in treating chronic aplastic anemia. *Chin J Integr Med.* 2007;13(2):98-102.
9. Liu ZG, Xiong ZM, Yu XY. [Effect of astragalus injection on immune function in patients with congestive heart failure]. *Zhongguo Zhong xi yi jie he za zhi Zhongguo Zhongxiyi jiehe zazhi = Chinese journal of integrated traditional and Western medicine / Zhongguo Zhong xi yi jie he xue hui, Zhongguo Zhong yi yan jiu yuan zhu ban.* 2003;23(5):351-353.
10. Cai XY, Xu YL, Lin XJ. [Effects of radix Astragali injection on apoptosis of lymphocytes and immune function in patients with systemic lupus erythematosus]. *Zhongguo Zhong xi yi jie he za zhi Zhongguo Zhongxiyi jiehe zazhi = Chinese journal of integrated traditional and Western medicine / Zhongguo Zhong xi yi jie he xue hui, Zhongguo Zhong yi yan jiu yuan zhu ban.* 2006;26(5):443-445.
11. Qian ZW, Mao SJ, Cai XC, et al. Viral etiology of chronic cervicitis and its therapeutic response to a recombinant interferon. *Chin Med J (Engl).* 1990;103(8):647-651.
12. Mao SP, Cheng KL, Zhou YF. [Modulatory effect of Astragalus membranaceus on Th1/Th2 cytokine in patients with herpes simplex keratitis]. *Zhongguo Zhong xi yi jie he za zhi Zhongguo Zhongxiyi jiehe zazhi = Chinese journal of integrated traditional and Western medicine / Zhongguo Zhong xi yi jie he xue hui, Zhongguo Zhong yi yan jiu yuan zhu ban.* 2004;24(2):121-123.
13. Tang LL, Sheng JF, Xu CH, Liu KZ. Clinical and experimental effectiveness of Astragali compound in the treatment of chronic viral hepatitis B. *The Journal of international medical research.* 2009;37(3):662-667.
14. Liu ZL, Liu ZJ, Liu JP, Yang M, Kwong J. Herbal medicines for viral myocarditis. *Cochrane database of systematic reviews (Online).* 2010(7):CD003711.
15. Matkovic Z, Zivkovic V, Korica M, Plavec D, Pecanic S, Tudoric N. Efficacy and safety of Astragalus membranaceus in the treatment of patients with seasonal allergic rhinitis. *Phytother Res.* 2010;24(2):175-181.
16. Chen KT, Su CH, Hsin LH, Su YC, Su YP, Lin JG. Reducing fatigue of athletes following oral administration of huangqi jianzhong tang. *Acta pharmacologica Sinica.* 2002;23(8):757-761.
17. Yang QY, Lu S, Sun HR. [Effects of astragalus on cardiac function and serum tumor necrosis factor-alpha level in patients with chronic heart failure]. *Zhongguo Zhong xi yi jie he za zhi Zhongguo Zhongxiyi jiehe zazhi = Chinese journal of integrated traditional and Western medicine / Zhongguo Zhong xi yi jie he xue hui, Zhongguo Zhong yi yan jiu yuan zhu ban.* 2010;30(7):699-701.
18. Li SQ, Yuan RX, Gao H. [Clinical observation on the treatment of ischemic heart disease with Astragalus membranaceus]. *Zhongguo Zhong xi yi jie he za zhi Zhongguo Zhongxiyi jiehe zazhi = Chinese journal of integrated traditional and Western medicine / Zhongguo Zhong xi yi jie he xue hui, Zhongguo Zhong yi yan jiu yuan zhu ban.* 1995;15(2):77-80.
19. Liang HY, Hou F, Ding YL, et al. [Clinical evaluation of the antioxidant activity of astragalus in women with gestational diabetes]. *Nan Fang Yi Ke Da Xue Xue Bao.* 2009;29(7):1402-1404.

AUTHORS: Corene Humphreys, ND, BHSc, Dip Med Herb, Dip Hom, QTA (Microbiology). | Anita Kasa, BNat, Dip Herb Med, Dip Nutr, Dip Yoga.

NUTRITIONALMEDICINENZ.COM / BIOCIDIN.NZ.

PHONE: NZ: 09 425 4250 / 021 941 556. AUST: 001169 425 4250 /00116 21 941 556.

20. Dong J, Gu HL, Ma CT, Zhang F, Chen Z, Zhang Y. [Effects of large dose of Astragalus membranaceus on the dendritic cell induction of peripheral mononuclear cell and antigen presenting ability of dendritic cells in children with acute leukemia]. *Zhongguo Zhong xi yi jie he za zhi Zhongguo Zhongxiyi jiehe zazhi = Chinese journal of integrated traditional and Western medicine / Zhongguo Zhong xi yi jie he xue hui, Zhongguo Zhong yi yan jiu yuan zhu ban.* 2005;25(10):872-875.
21. McCulloch M, See C, Shu XJ, et al. Astragalus-based Chinese herbs and platinum-based chemotherapy for advanced non-small-cell lung cancer: meta-analysis of randomized trials. *J Clin Oncol.* 2006;24(3):419-430.
22. Ferreira JF, Luthria DL, Sasaki T, Heyerick A. Flavonoids from Artemisia annua L. as antioxidants and their potential synergism with artemisinin against malaria and cancer. *Molecules (Basel, Switzerland).* 2010;15(5):3135-3170.
23. Ho WE, Peh HY, Chan TK, Wong WS. Artemisinins: pharmacological actions beyond anti-malarial. *Pharmacology & therapeutics.* 2014;142(1):126-139.
24. Foster S, Duke J. *Medicinal Plants and Herbs of Eastern and Central North America.* 2nd ed. New York, New York: Houghton Mifflin Company; 2000.
25. Brown GD. The biosynthesis of artemisinin (Qinghaosu) and the phytochemistry of Artemisia annua L. (Qinghao). *Molecules (Basel, Switzerland).* 2010;15(11):7603-7698.
26. Bora KS, Sharma A. The genus Artemisia: a comprehensive review. *Pharmaceutical biology.* 2011;49(1):101-109.
27. Carbonara T, Pascale R, Argentieri MP, et al. Phytochemical analysis of a herbal tea from Artemisia annua L. *Journal of pharmaceutical and biomedical analysis.* 2012;62:79-86.
28. Mueller MS, Runyambo N, Wagner I, Borrmann S, Dietz K, Heide L. Randomized controlled trial of a traditional preparation of Artemisia annua L. (Annual Wormwood) in the treatment of malaria. *Trans R Soc Trop Med Hyg.* 2004;98(5):318-321.
29. Blanke CH, Naisabha GB, Balema MB, Mbaruku GM, Heide L, Muller MS. Herba Artemisiae annuae tea preparation compared to sulfadoxine-pyrimethamine in the treatment of uncomplicated falciparum malaria in adults: a randomized double-blind clinical trial. *Tropical doctor.* 2008;38(2):113-116.
30. De Clercq D, Vercruysse J, Kongs A, Verle P, Dompnier JP, Faye PC. Efficacy of artesunate and praziquantel in Schistosoma haematobium infected schoolchildren. *Acta tropica.* 2002;82(1):61-66.
31. Shapira MY, Resnick IB, Chou S, et al. Artesunate as a potent antiviral agent in a patient with late drug-resistant cytomegalovirus infection after hematopoietic stem cell transplantation. *Clin Infect Dis.* 2008;46(9):1455-1457.
32. van der Kooy F, Sullivan SE. The complexity of medicinal plants: the traditional Artemisia annua formulation, current status and future perspectives. *Journal of ethnopharmacology.* 2013;150(1):1-13.
33. Dellicour S, Hall S, Chandramohan D, Greenwood B. The safety of artemisinins during pregnancy: a pressing question. *Malar J.* 2007;6:15.
34. Monograph. Eleutherococcus senticosus. *Altern Med Rev.* 2006;11(2):151-155.
35. Yan-Lin S, Lin-De L, Soon-Kwan H. Eleutherococcus senticosus as a crude medicine: Review of biological and pharmacological effects. *Journal of Medicinal Plants Research.* 2011;5(25):5946-5952.
36. Davydov M, Krikorian AD. Eleutherococcus senticosus (Rupr. & Maxim.) Maxim. (Araliaceae) as an adaptogen: a closer look. *Journal of ethnopharmacology.* 2000;72(3):345-393.
37. Cicero AF, Derosa G, Brillante R, Bernardi R, Nascetti S, Gaddi A. Effects of Siberian ginseng (Eleutherococcus senticosus maxim.) on elderly quality of life: a randomized clinical trial. *Arch Gerontol Geriatr Suppl.* 2004(9):69-73.
38. Asano K, Takahashi T, Miyashita M, et al. Effect of Eleutherococcus senticosus extract on human physical working capacity. *Planta medica.* 1986(3):175-177.
39. Gaffney BT, Hugel HM, Rich PA. The effects of Eleutherococcus senticosus and Panax ginseng on steroidal hormone indices of stress and lymphocyte subset numbers in endurance athletes. *Life sciences.* 2001;70(4):431-442.
40. Kuo J, Chen KW, Cheng IS, Tsai PH, Lu YJ, Lee NY. The effect of eight weeks of supplementation with Eleutherococcus senticosus on endurance capacity and metabolism in human. *Chin J Physiol.* 2010;53(2):105-111.
41. Gaffney BT, Hugel HM, Rich PA. Panax ginseng and Eleutherococcus senticosus may exaggerate an already existing biphasic response to stress via inhibition of enzymes which limit the binding of stress hormones to their receptors. *Medical hypotheses.* 2001;56(5):567-572.
42. Novozhilov GN, Sil'chenko KK. [Mechanism of adaptogenic effect of Eleutherococcus on the human body during thermal stress]. *Fiziol Cheloveka.* 1985;11(2):303-306.

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NUTRITIONALMEDICINENZ.COM / BIOCIDIN.NZ.

PHONE: NZ: 09 425 4250 / 021 941 556. AUST: 001169 425 4250 /00116 21 941 556.

43. Bohn B, Nebe CT, Birr C. Flow-cytometric studies with eleutherococcus senticosus extract as an immunomodulatory agent. *Arzneimittel-Forschung.* 1987;37(10):1193-1196.
44. Hartz AJ, Bentler S, Noyes R, et al. Randomized controlled trial of Siberian ginseng for chronic fatigue. *Psychological medicine.* 2004;34(1):51-61.
45. Lin L, Ni B, Lin H, et al. Traditional usages, botany, phytochemistry, pharmacology and toxicology of Polygonum multiflorum Thunb.: a review. *Journal of ethnopharmacology.* 2015;159:158-183.
46. Bounda G-A, Feng YU. Review of clinical studies of Polygonum multiflorum Thunb. and its isolated bioactive compounds. *Pharmacognosy Research.* 2015;7(3):225-236.
47. Choi RJ, Ngoc TM, Bae K, et al. Anti-inflammatory properties of anthraquinones and their relationship with the regulation of P-glycoprotein function and expression. *Eur J Pharm Sci.* 2013;48(1-2):272-281.
48. Cha DS, Jeon H. Anti-inflammatory effect of MeOH extracts of the stem of Polygonum multiflorum in LPS-stimulated mouse peritoneal macrophages. *Nat Prod Sci.* 2009;15:83-89.
49. Pan MH, Chiou YS, Tsai ML, Ho CT. Anti-inflammatory activity of traditional Chinese medicinal herbs. *J Tradit Complement Med.* 2011;1(1):8-24.
50. Meng G, Liu Y, Lou C, Yang H. Emodin suppresses lipopolysaccharide-induced pro-inflammatory responses and NF-kappaB activation by disrupting lipid rafts in CD14-negative endothelial cells. *British journal of pharmacology.* 2010;161(7):1628-1644.
51. Natural Medicines. Fo-Ti (*Polygonum multiflorum*). Professional Monograph. 2012; https://naturalmedicines.therapeuticresearch.com. Accessed 11/10/2015.
52. Frawley D, Lad V. *The Yoga of Herbs.* WI, USA: Lotus Press; 1986.
53. Mills S, Bone K. *The Essential Guide to Herbal Safety.* Philadelphia, U.S.A.: Churchill Livingstone; 2005.
54. Viljoen E, Visser J, Koen N, Musekiwa A. A systematic review and meta-analysis of the effect and safety of ginger in the treatment of pregnancy-associated nausea and vomiting. *Nutrition journal.* 2014;13:20.
55. Thomson M, Corbin R, Leung L. Effects of ginger for nausea and vomiting in early pregnancy: a meta-analysis. *J Am Board Fam Med.* 2014;27(1):115-122.
56. Dabaghzadeh F, Khalili H, Dashti-Khavidaki S. Ginger for prevention or treatment of drug-induced nausea and vomiting. *Current clinical pharmacology.* 2014;9(4):387-394.
57. Marx WM, Teleni L, McCarthy AL, et al. Ginger (Zingiber officinale) and chemotherapy-induced nausea and vomiting: a systematic literature review. *Nutrition reviews.* 2013;71(4):245-254.
58. Lee J, Oh H. Ginger as an antiemetic modality for chemotherapy-induced nausea and vomiting: a systematic review and meta-analysis. *Oncology nursing forum.* 2013;40(2):163-170.
59. Ding M, Leach M, Bradley H. The effectiveness and safety of ginger for pregnancy-induced nausea and vomiting: a systematic review. *Women Birth.* 2013;26(1):e26-30.
60. Akoachere JF, Ndip RN, Chenwi EB, Ndip LM, Njock TE, Anong DN. Antibacterial effect of Zingiber officinale and Garcinia kola on respiratory tract pathogens. *East Afr Med J.* 2002;79(11):588-592.
61. Bone K. *A Clinical Guide to Blending Liquid Herbs: Herbal Formulations for the Individual Patient.* Edinburgh, Scotland: Churchill Livingstone; 2003.
62. Wang KT, Chen LG, Chou DS, Liang WL, Wang CC. Anti-Oxidative Abilities of Essential Oils from Atractylodes ovata Rhizome. *Evid Based Complement Alternat Med.* 2011;2011:204892.
63. Koonrungsesomboon N, Na-Bangchang K, Karbwang J. Therapeutic potential and pharmacological activities of Atractylodes lancea (Thunb.) DC. *Asian Pacific journal of tropical medicine.* 2014;7(6):421-428.
64. Kimura Y, Sumiyoshi M. Effects of an Atractylodes lancea rhizome extract and a volatile component beta-eudesmol on gastrointestinal motility in mice. *Journal of ethnopharmacology.* 2012;141(1):530-536.
65. Natural Medicines Comprehensive Database. Atractylodes. Professional Monograph. 2013; http://naturaldatabase.therapeuticresearch.com. Accessed 2015/09/20.
66. Plengsuriyakarn T, Viyanant V, Eursitthichai V, et al. Anticancer activities against cholangiocarcinoma, toxicity and pharmacological activities of Thai medicinal plants in animal models. *BMC complementary and alternative medicine.* 2012;12:23.
67. Nogami M, Moriura T, Kubo M, Tani T. Studies on the origin, processing and quality of crude drugs. II. Pharmacological evaluation of the Chinese crude drug "zhu" in experimental stomach ulcer. (2). Inhibitory effect of extract of Atractylodes lancea on gastric secretion. *Chemical & pharmaceutical bulletin.* 1986;34(9):3854-3860.
68. Seo MJ, Kim SJ, Kang TH, et al. The regulatory mechanism of beta-eudesmol is through the suppression of caspase-1 activation in mast cell-mediated inflammatory response. *Immunopharmacology and immunotoxicology.* 2011;33(1):178-185.

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NUTRITIONALMEDICINENZ.COM / BIOCIDIN.NZ.

PHONE: NZ: 09 425 4250 / 021 941 556. AUST: 001169 425 4250 /00116 21 941 556.

69. Chen Y, Wu Y, Wang H, Gao K. A new 9-nor-atractylodin from Atractylodes lancea and the antibacterial activity of the atractylodin derivatives. *Fitoterapia.* 2012;83(1):199-203.
70. Wang Y, Dai CC, Chen Y. [Antimicrobial activity of volatile oil from Atractylodes lancea against three species of endophytic fungi and seven species of exogenous fungi]. *Ying Yong Sheng Tai Xue Bao.* 2009;20(11):2778-2784.
71. Fisher C. *Materia Medica of Western Herbs.* Nelson, New Zealand: Vitex Medica; 2009.
72. Son IS, Kim JH, Sohn HY, Son KH, Kim JS, Kwon CS. Antioxidative and hypolipidemic effects of diosgenin, a steroidal saponin of yam (Dioscorea spp.), on high-cholesterol fed rats. *Bioscience, biotechnology, and biochemistry.* 2007;71(12):3063-3071.
73. Moalic S, Liagre B, Corbiere C, et al. A plant steroid, diosgenin, induces apoptosis, cell cycle arrest and COX activity in osteosarcoma cells. *FEBS letters.* 2001;506(3):225-230.
74. Sautour M, Mitaine-Offer A-C, Lacaille-Dubois M-A. The Dioscorea genus: a review of bioactive steroid saponins. *J Nat Med.* 2007;61(2):91-101.
75. Sun Y. Biological activities and potential health benefits of polysaccharides from Poria cocos and their derivatives. *Int J Biol Macromol.* 2014;68:131-134.
76. Rios JL. Chemical constituents and pharmacological properties of Poria cocos. *Planta medica.* 2011;77(7):681-691.
77. Yu SJ, Tseng J. Fu-Ling, a Chinese herbal drug, modulates cytokine secretion by human peripheral blood monocytes. *Int J Immunopharmacol.* 1996;18(1):37-44.
78. Lee KY, Jeon YJ. Polysaccharide isolated from Poria cocos sclerotium induces NF-kappaB/Rel activation and iNOS expression in murine macrophages. *International immunopharmacology.* 2003;3(10-11):1353-1362.
79. Lee KY, You HJ, Jeong HG, et al. Polysaccharide isolated from Poria cocos sclerotium induces NF-κB/Rel activation and iNOS expression through the activation of p38 kinase in murine macrophages. *International immunopharmacology.* 2004;4(8):1029-1038.
80. Natural Medicines. Poria Mushroom. Professional Monograph. 2013; https://naturalmedicines.therapeuticresearch.com. Accessed 23/09/2015.
81. Ng TB, Liu F, Wang HX. The antioxidant effects of aqueous and organic extracts of Panax quinquefolium, Panax notoginseng, Codonopsis pilosula, Pseudostellaria heterophylla and GIehnia littoralis. *Journal of ethnopharmacology.* 2004;93(2-3):285-288.
82. Yongxu S, Jicheng L. Structural characterization of a water-soluble polysaccharide from the roots of Codonopsis pilosula and its immunity activity. *Int J Biol Macromol.* 2008;43(3):279-282.
83. Wang ZT, Ng TB, Yeung HW, Xu GJ. Immunomodulatory effect of a polysaccharide-enriched preparation of Codonopsis pilosula roots. *General pharmacology.* 1996;27(8):1347-1350.
84. Singh B, Song H, Liu XD, et al. Dangshen (Codonopsis pilosula) and Bai guo (Gingko biloba) enhance learning and memory. *Alternative therapies in health and medicine.* 2004;10(4):52-56.
85. Shergis JL, Liu S, Chen X, et al. Dang Shen [Codonopsis pilosula (Franch.) Nannf] Herbal Formulae for Chronic Obstructive Pulmonary Disease: A Systematic Review and Meta-analysis. *Phytotherapy Research.* 2015;29(2):167-186.
86. Liu M, Tan H, Zhang X, et al. Hematopoietic effects and mechanisms of Fufang ejiao jiang on radiotherapy and chemotherapy-induced myelosuppressed mice. *Journal of ethnopharmacology.* 2014;152(3):575-584.
87. Wang ZT, Du Q, Xu GJ, Wang RJ, Fu DZ, Ng TB. Investigations on the protective action of Condonopsis pilosula (Dangshen) extract on experimentally-induced gastric ulcer in rats. *General pharmacology.* 1997;28(3):469-473.
88. Zhang L, Liu GZ. Nootropic effect of dangshen, radix cadonopsis pilosulae. *European journal of pharmacology.* 1990;183(4):1461.
89. Natural Medicines. Codonopsis. Professional Monograph. 2013; https://naturalmedicines.therapeuticresearch.com. Accessed 2015/09/25.
90. Lee SJ, Lee IS, Mar W. Inhibition of inducible nitric oxide synthase and cyclooxygenase-2 activity by 1,2,3,4,6-penta-O-galloyl-beta-D-glucose in murine macrophage cells. *Archives of pharmacal research.* 2003;26(10):832-839.
91. Thorne R. Peony (Paeonia Spp). Monograph. *Altern Med Rev.* 2001;6(5):495-499.
92. Pizzorno JE, Murray MT. *Textbook of Natural Medicine.* 4th ed. St Louis, Missouri: Churchill Livingstone; 2013.
93. Jia YB, Tang TQ. [Paeonia Lactiflora injection in treating chronic cor pulmonale with pulmonary hypertension]. *Zhong xi yi jie he za zhi = Chinese journal of modern developments in traditional*

medicine / Zhongguo Zhong xi yi jie he yan jiu hui (chou), Zhong yi yan jiu yuan, zhu ban. 1991;11(4):199-202, 195.
94. Ma XF. [Experimental and clinical studies on the treatment of pulmonary heart disease and pulmonary hypertension with Paeonia lactiflora]. *Zhong xi yi jie he za zhi = Chinese journal of modern developments in traditional medicine / Zhongguo Zhong xi yi jie he yan jiu hui (chou), Zhong yi yan jiu yuan, zhu ban.* 1988;8(11):660-662, 645.
95. Qi XG. [Protective mechanism of Salvia miltiorrhiza and Paeonia lactiflora for experimental liver damage]. *Zhong xi yi jie he za zhi = Chinese journal of modern developments in traditional medicine / Zhongguo Zhong xi yi jie he yan jiu hui (chou), Zhong yi yan jiu yuan, zhu ban.* 1991;11(2):102-104, 169.
96. Ohta H, Ni JW, Matsumoto K, Watanabe H, Shimizu M. Peony and its major constituent, paeoniflorin, improve radial maze performance impaired by scopolamine in rats. *Pharmacology, biochemistry, and behavior.* 1993;45(3):719-723.
97. Ohta H, Matsumoto K, Shimizu M, Watanabe H. Paeoniflorin attenuates learning impairment of aged rats in operant brightness discrimination task. *Pharmacology, biochemistry, and behavior.* 1994;49(1):213-217.
98. Yoon SL, Grundmann O, Koepp L, Farrell L. Management of irritable bowel syndrome (IBS) in adults: conventional and complementary/alternative approaches. *Altern Med Rev.* 2011;16(2):134-151.
99. Curcuma longa (Turmeric). Monograph. *Alternative Medicine Review.* 2002;6 Suppl:119-125.
100. Strimpakos AS, Sharma RA. Curcumin: preventive and therapeutic properties in laboratory studies and clinical trials. *Antioxidants & redox signaling.* 2008;10(3):511-545.
101. Durgaprasad S, Pai CG, Vasanthkumar, Alvres JF, Namitha S. A pilot study of the antioxidant effect of curcumin in tropical pancreatitis. *The Indian journal of medical research.* 2005;122(4):315-318.
102. Rasyid A, Lelo A. The effect of curcumin and placebo on human gall-bladder function: an ultrasound study. *Alimentary pharmacology & therapeutics.* 1999;13(2):245-249.
103. Satoskar RR, Shah SJ, Shenoy SG. Evaluation of anti-inflammatory property of curcumin (diferuloyl methane) in patients with postoperative inflammation. *International journal of clinical pharmacology, therapy, and toxicology.* 1986;24(12):651-654.
104. Holt PR, Katz S, Kirshoff R. Curcumin therapy in inflammatory bowel disease: a pilot study. *Digestive diseases and sciences.* 2005;50(11):2191-2193.
105. Hanai H, Iida T, Takeuchi K, et al. Curcumin maintenance therapy for ulcerative colitis: randomized, multicenter, double-blind, placebo-controlled trial. *Clin Gastroenterol Hepatol.* 2006;4(12):1502-1506.
106. Bundy R, Walker AF, Middleton RW, Booth J. Turmeric extract may improve irritable bowel syndrome symptomology in otherwise healthy adults: a pilot study. *Journal of alternative and complementary medicine (New York, N.Y.* 2004;10(6):1015-1018.
107. Sultana HS, Ali M, Panda BP. Influence of volatile constituents of fruit peels of Citrus reticulata Blanco on clinically isolated pathogenic microorganisms under In–vitro. *Asian Pacific journal of tropical biomedicine.* 2012;2(3, Supplement):S1299-S1302.
108. Yi Z, Yu Y, Liang Y, Zeng B. In vitro antioxidant and antimicrobial activities of the extract of Pericarpium Citri Reticulatae of a new Citrus cultivar and its main flavonoids. *LWT - Food Science and Technology.* 2008;41(4):597-603.
109. Wu T, Cheng D, He M, Pan S, Yao X, Xu X. Antifungal action and inhibitory mechanism of polymethoxylated flavones from Citrus reticulata Blanco peel against Aspergillus niger. *Food Control.* 2014;35(1):354-359.
110. Qin K, Zheng L, Cai H, et al. Characterization of Chemical Composition of Pericarpium Citri Reticulatae Volatile Oil by Comprehensive Two-Dimensional Gas Chromatography with High-Resolution Time-of-Flight Mass Spectrometry. *Evidence-Based Complementary and Alternative Medicine.* 2013;2013:11.
111. Wang Y, Yi L, Liang Y, et al. Comparative analysis of essential oil components in Pericarpium Citri Reticulatae Viride and Pericarpium Citri Reticulatae by GC-MS combined with chemometric resolution method. *Journal of pharmaceutical and biomedical analysis.* 2008;46(1):66-74.
112. Jennes F, Flaws B. *Herb Toxicities & Drug Interactions: A Formula Approach.* Blue Poppy Press; 2004.
113. He J, Chen L, Heber D, Shi W, Lu QY. Antibacterial compounds from Glycyrrhiza uralensis. *Journal of natural products.* 2006;69(1):121-124.
114. Fukai T, Marumo A, Kaitou K, Kanda T, Terada S, Nomura T. Antimicrobial activity of licorice flavonoids against methicillin-resistant Staphylococcus aureus. *Fitoterapia.* 2002;73(6):536-539.
115. Nomura T, Fukai T, Akiyama T. Chemistry of phenolic compounds of licorice (Glycyrrhiza species) and their estrogenic and cytotoxic activities. *Pure and Applied Chemistry.* Vol 742002:1199.

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116. Hasani-Ranjbar S, Nayebi N, Moradi L, Mehri A, Larijani B, Abdollahi M. The efficacy and safety of herbal medicines used in the treatment of hyperlipidemia; a systematic review. *Current pharmaceutical design.* 2010;16(26):2935-2947.
117. Fuhrman B, Volkova N, Kaplan M, et al. Antiatherosclerotic effects of licorice extract supplementation on hypercholesterolemic patients: increased resistance of LDL to atherogenic modifications, reduced plasma lipid levels, and decreased systolic blood pressure. *Nutrition (Burbank, Los Angeles County, Calif.* 2002;18(3):268-273.
118. Agarwal A, Gupta D, Yadav G, Goyal P, Singh PK, Singh U. An evaluation of the efficacy of licorice gargle for attenuating postoperative sore throat: a prospective, randomized, single-blind study. *Anesthesia and analgesia.* 2009;109(1):77-81.

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