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HERBAL Alternatives to ANTIBIOTICS



An antibiotic might be described as an antibacterial agent that inhibits bacterial growth or kills bacteria. However, colds and many other upper respiratory infections, as well as some ear infections, are caused by viruses, not bacteria. If antibiotics are used too often for things they can't treat—like colds or other viral infections—they can stop working effectively against bacterial infections. This phenomenon is known as *antibiotic resistance*, and is a direct result of antibiotic overuse.¹ As it currently stands, antibiotic overuse represents a significant health risk to modern society. This article will examine antibiotic overuse, as well as the use of herbal medicines that may present a viable alternative to the use of antibiotics or when antibiotics are not indicated.

A Historical Perspective

At the beginning of the 20th century, illnesses caused by infectious diseases ranked as the most common cause of death in North America. By the middle of the century, the diagnosis, prevention, and management of infectious diseases had advanced dramatically, raising false hopes that many infectious diseases would be eliminated by the end of the 20th century. Unfortunately, clinicians, public health officials, and microbiologists have confronted an unprecedented number of resurgent and “new” infectious diseases on a global scale, with antibiotic resistance being among the new diseases represents one of the most serious threats to human health, and a serious threat to the treatment of infectious diseases.²

Ramifications Of Antibiotic Resistance

The overuse of antibiotics contributes to the emergence of antibiotic-resistant infections (ARIs) that are costly and difficult to treat.³⁻⁴ Ongoing and consistent use of antibiotics allows microbes the opportunity to evolve, enabling them to efficiently adapt to new environments. A single dose of antibiotics leads to a greater risk of resistant organisms to that antibiotic in the person for up to a year.⁵ Drug-resistant “superbug” infections, such as Methicillin-resistant *Staphylococcus aureus* (MRSA) and *Clostridium difficile*, are a significant cause of mortality. In 2005, more than 95,000 people in the U.S. developed severe MRSA infections, which led to 9,000 deaths.^{6,7} In the U.S., ARIs are responsible for \$20 billion in excess health care costs, \$35 billion in societal costs and \$8 million in additional hospital days. Reducing ARIs by just 20 percent would save \$3.2 to \$5.2 billion in health care costs each year and eliminate up to \$11.3 million in additional in-hospital days for patients with ARIs.⁸ Even mainstream media has recognized the problem.

According to a report by CBS News:

Antibiotic overuse has led to the growth of drug-resistant strains of bacteria. Each year 90,000 Americans die from health care-associated infections, many of which are drug-resistant. And, the number is growing. From 1993 to 2005 the number of hospital stays involving Methicillin-resistant *Staphylococcus aureus* (MRSA)—bacteria that causes severe infections such as bloodstream infections, surgical site infections, or pneumonia—went up from 1,900 to 368,000 in the U.S. alone. Deaths due to *Clostridium difficile*—bacteria commonly known as C. diff that causes several diarrhea and intestinal problems—went up 35 percent each year from 1999 to 2004.⁹

Reasons For Antibiotic Overuse

So why are antibiotics overused in the first instance? The answer is four-pronged. First, determining if an infection is viral or bacterial is expensive and time-consuming and concerns over malpractice lead many physicians to over-prescribe antibiotics.^{10,11} Second, some patients pressure providers to prescribe antibiotics for conditions for which they are inappropriate, such as the common cold or sore throat, or inappropriately save antibiotics for later use, both of which can lead to increased antibiotic resistance.^{12,13} Third, approximately 70 percent of antibiotics used in the U.S. are used in the non-therapeutic (prophylactic) treatment of livestock cattle, swine, and poultry, and although the FDA issued voluntary guidelines in 2010 urging farmers not to use antibiotics for livestock growth, the guidelines are not yet mandatory.^{14,15} Fourth, evidence-based research on appropriate and inappropriate antibiotic use is often lacking in the medical community.¹⁶ A fifth reason may be public ignorance.

An Unfortunate Case Of Ignorance

Part of the growing problem of antibiotic resistance in the United States may be attributed to the fact that many Americans don't know what the drugs should be used for and what they can actually do. The Pew Charitable Trusts in conjunction with the Centers for Disease Control and Prevention (CDC) surveyed 1,004 adults about their understanding about the use of antibiotics. In addition, they asked focus groups of frequent antibiotic users as well as a cross section of adults about their antibiotic-use beliefs and habits. Only 44 percent of surveyed Americans recognized as *somewhat or a big problem* that some diseases are becoming resistant to antibiotics. While 90 percent of Americans recognize that antibiotics can fight

bacterial infections like strep throat, more than one-third falsely believe that they are also effective at fighting viral infections like the common cold. Furthermore, only 47 percent of Americans realize that their overuse of prescription antibiotics can harm others beside themselves.¹⁷

What Is The Goal?

In considering herbal alternatives to antibiotics, it is important to examine the intended goal in using the specific herbal medicine. Is the purpose of the herb to 1) stimulate and promote your body's own healthy immune response, 2) directly do battle with bacteria, or 3) both? From my perspective as a credentialed herbalist and nutritionist, it is important to do both. First and foremost, you should always strive to make your immune system as healthy and functional as possible. This way, when unwanted bacteria and viruses do invade, your immune system will be in a good position to fit back. Following is a discussion of a few key herbs (and a few other dietary supplements) that can help you achieve these goals. Please keep in mind that given the space limitations of this article, it will not be possible to address all immune/antibacterial herbs. However, for a comprehensive treatise on the topic, I recommend *Herbal Antibiotics: Natural Alternatives for Treating Drug-Resistant Bacteria*, by Stephen Harrod Buhner.

Diet And The Immune System

Before jumping into the herbs, I just want to say a couple of words about your diet. It is important to restrict sugar since sugar interferes with the ability of white blood cells to destroy bacteria. I'm not talking about the type or amount of sugar you get from eating fruit, but rather the amount you get from drinking soda and eating sweets and other junk food. Likewise, alcohol interferes with a wide variety of immune defenses, and excessive dietary fat reduces natural killer cell activity. So just eating a healthy diet can be beneficial for good immune function.¹⁸ Now, onto the herbs.

Echinacea

Arguably, *Echinacea* is the granddaddy of all immune-enhancing herbs. Best known for its use in the treatment of the common cold, there are three species of *Echinacea* commonly used in herbal medicine: *Echinacea purpurea*, *E. angustifolia*, and *E. pallida* (of these, the first two are most popular). The aerial (above ground) parts of the herb and the root contain the medicinal components, including phenolics, caffeic acid esters (e.g., echinacosides), flavonoids, alkylamides, volatile oils, polysaccharides, polyacetylenes.¹⁹

Echinacea is an immune stimulant/supporter. It is excellent in helping to prevent and treat colds and influenza. Research reveals that *Echinacea* supports the immune system by activating white blood cells (lymphocytes and macrophages).²⁰ *Echinacea* also increases the production of interferon, an immune component that is important in responding to viral infections.²¹

Several double-blind, clinical studies have confirmed *Echinacea's* effectiveness in treating colds and flu.^{22,23,24,25} However, some research suggests that *Echinacea* may be more effective if used at the onset of these conditions.^{26,27} One

study involving 238 subjects confirmed that *Echinacea* was safe and effective in producing a rapid improvement of cold symptoms. In the subgroup of patients who started therapy at an early phase of their cold, the effectiveness of *Echinacea* was most prominent.²⁸ In a similar study, 246 subjects with a cold were treated with *Echinacea* preparations or a placebo. Those treated with the *Echinacea* preparations experienced a reduction of symptoms, significantly more effective than the placebo. The researchers concluded that the *Echinacea* preparations “represent a low risk and effective alternative to the standard symptomatic medicines in the acute treatment of common cold.”²⁹

In a meta-analysis of 14 studies³⁰, researchers found that taking *Echinacea* cut the risk of catching the common cold by 58 percent, and if subjects already had a cold it decreased the duration by 1.4 days. In one of the studies, *Echinacea* taken in combination with vitamin C reduced cold incidence by 86 percent, and when the herbal was used alone the incidence of cold was reduced by 65 percent. The bottom line is that when used appropriately, *Echinacea* is effective in preventing and treating the common cold.

NOTE: A much-publicized study from the July 28, 2005 issue of the *New England Journal of Medicine* concluded that *Echinacea* did not have a significant effect on infection with a rhinovirus (one of the 200 viruses that can cause the common cold), but the methodology has been strongly questioned by herbal experts. One such error in methodology is the fact that the study did not use a commercially available product, and dosage was lower than the dose typically used in research and common practice.

Besides colds and flu, Germany's *Commission E Monographs* (an internationally authoritative source of credible information on the use of herbs for various disorders) indicates that among *Echinacea's* uses, this herb can be used to treat chronic infections of the respiratory tract.³¹ Other current and evidence based uses of *Echinacea* include, but are not limited to: Vaginal candidiasis, ear, urinary and sinus infections, allergies, herpes, cystitis, bronchitis, prostatitis, tonsillitis, and laryngitis.³²

A good dosage range for *Echinacea* extract is 200–300 mg, jumping up to 900–1200 mg daily (in 3–5 divided doses) for acute infection (e.g. cold or flu).³³ While some sources have suggested that *Echinacea* should not be used with drugs intended to suppress the immune system, such suggestions are speculative and lack clinical documentation.³⁴

At this point it should also be noted there is a popular misconception that *Echinacea* should only be used for a limited period of time, since it will cease its effectiveness otherwise. This misconception was based upon misinterpretations of a specific study on *Echinacea*, which demonstrated decreased immune activity after about 10 days.³⁵ However, if the study is carefully read, it is clear that the *Echinacea* was only administered for five days; after which point it was discontinued. Only when it was discontinued did immune activity begin to decline; and even then it still remained elevated above normal for a few days.³⁶ Furthermore, other research (as well as a history of traditional use) support the effectiveness of *Echinacea* when used for extended periods of time.¹¹

Andrographis and Eleutherococcus senticosus

Andrographis paniculata has a history of use in both Ayurvedic and traditional Chinese medicine.³⁷ It contains a number of bitter constituents, which appear to have both immune-stimulating and anti-inflammatory activity.³⁸ Double-blind studies have found that *Andrographis* may help reduce the severity of symptoms in individuals suffering from the common cold.^{39, 40, 41, 42}

In the very recent past, *Eleutherococcus senticosus*, or Eleuthero for short, was commonly called “Siberian Ginseng.” This name was botanically incorrect since Eleuthero is not even in the same genus (plant family) as *Panax ginseng*. Nevertheless, like *Panax* species, Eleuthero shows excellent adaptogenic activity (an adaptogen is an agent that helps the body adapt to stress). Russian explorers, divers, sailors, and miners also used Eleuthero to prevent stress-related illness.⁴³ In addition, evidence also suggests that Eleuthero may prove valuable in the long-term management of various diseases of the immune system, including HIV infection and chronic fatigue syndrome.⁴⁴ In Chinese medicine, it was used to prevent respiratory tract infections, colds and flu.

Of particular interest is using a combination of *Andrographis* and Eleuthero to treat upper respiratory infections. In two randomized, parallel-group clinical studies⁴⁵, patients diagnosed with influenza (540 patients and 66 patients, respectively) were treated with a combination of *Andrographis* and Eleuthero, or nothing at all (in the control group). In both studies, the differences in the duration of sick leave (7.2 days versus 9.8 days in the control group) and frequency of post-influenza complications indicated that the *Andrographis*/Eleuthero combination contributed to quicker recovery and reduced the risk of post-influenza complications. The results showed that in *Andrographis*/Eleuthero-treated patients the symptoms had become less pronounced and the temperature had returned more rapidly to normal values, and symptoms such as headache, muscle pain, and conjunctivitis disappeared sooner than in patients of the control group.

In addition, two randomized double-blind, placebo-controlled parallel group clinical trials⁴⁶ were performed to investigate the effect of an *Andrographis*/Eleuthero combination in the treatment of uncomplicated upper-respiratory tract infections. This includes common cold, rhinitis, nasopharyngitis (Inflammation of the nasal passages and of upper sore throat) and pharyngitis (sore throat). There were 46 patients in one study, and 179 patients in another. In both studies, the total symptom score and total diagnosis score showed highly significant improvement in the *Andrographis*/Eleuthero group as compared with the placebo. Throat symptoms/signs, were found to show the most significant improvement. There was a 55 percent better improvement in the symptom score for the treatment group as compared with the placebo group.

Also, a double-blind, placebo-controlled, parallel-group clinical study⁴⁷ was carried out to evaluate the effect of an *Andrographis*/Eleuthero combination in the treatment of acute upper respiratory tract infections, including sinusitis. Ninety-five individuals in the treatment group and 90 individuals in the placebo group completed the study according to the protocol.

Temperature, headache, muscle aches, throat symptoms, cough, nasal symptoms, general malaise and eye symptoms were taken as outcome measures with given scores. The total score analysis showed a highly significant improvement in the *Andrographis*/Eleuthero combination group versus the placebo. The individual symptoms of headache and nasal and throat symptoms together with general malaise showed the most significant improvement while cough and eye symptoms did not differ significantly between the groups. Temperature was moderately reduced in the *Andrographis*/Eleuthero combination group. The authors of the study concluded that the *Andrographis*/Eleuthero combination had a positive effect in the treatment of acute upper respiratory tract infections and also relieved the inflammatory symptoms of sinusitis.

Doses of *Andrographis*/Eleuthero should be in the range of in the range of 340 mg *Andrographis paniculata* extract (providing 21 mg andrographolide and deoxyandrographolide), 39 mg Eleuthero extract (providing 2 percent total Eleutheroside B and Eleutheroside E).

Berberine

Berberine is a bitter-tasting, yellow, plant alkaloid found in the roots of various herbs, including goldenseal (*Hydrastis canadensis*), barberry (*Berberis vulgaris*), Oregon grape (*Berberis aquifolium*), goldthread (*Coptis chinensis*) and tree turmeric (*Berberis aristata*). This compound has a long history of medicinal use in Chinese and Ayurvedic medicine. Berberine containing plants may help promote immune response by increasing the production of antigen specific immunoglobulins,⁴⁸ and may also have a direct effect against bacteria.^{49, 50} For example, berberine may help fight urinary tract infections since it inhibits bacteria from adhering to the wall of the urinary bladder.⁵¹ One possible mechanism by which this takes place is that berberine might inhibit bacterial sortase, a protein responsible for anchoring bacteria to cell membranes.⁵² Berberine was also shown to be effective in an integrative treatment against patients with chloroquine-resistant malaria⁵³ and bacterial-induced diarrhea.⁵⁴

In addition, berberine has activity against *Candida* yeast.⁵⁵ In fact, berberine was demonstrated to be effective in reducing the growth of the invasive mycelial form of *Candida albicans*.⁵⁶ In addition, extracellular enzymes secreted by *Candida albicans* are considered to be responsible for penetration of the yeast into host cells, and general overgrowth. Berberine has been shown to reduce these enzymes and the consequent adherence of *Candida* to epithelial cells. Furthermore, berberine was able to suppress symptoms of *Candida* overgrowth and accelerated elimination of the yeast.⁵⁷

Regardless of the herbal source, try to get 400 mg berberine daily.

Shiitake and AHCC

For thousands of years, mushrooms have been used as both food and medicine in various cultures. One of those mushrooms, Shiitake (*Lentinula edodes*)⁵⁸, is currently used for promoting healthy immune function⁵⁹, healthy liver function⁶⁰ and modulating the unwanted growth of mutated stomach⁶¹ and pancreas cells⁶², and has been validated in scientific literature for these purposes.

Active Hexose Correlated Compound (AHCC) is an extract derived from Shiitake, as well as other species of Basidiomycete family of mushrooms. AHCC is a mixture of polysaccharides, amino acids, lipids, and minerals. Oligosaccharides make up about 74 percent of AHCC.⁶³ Like its predecessor, AHCC has antioxidant effects, and is thought to act as a biological response modifier. It seems to promote the activity of natural killer (NK) cells in patients with unwanted growth of mutated cells. In animal models, it also seems to protect against carbon tetrachloride-induced liver damage, promote healthy blood glucose levels within a normal range, and decrease apoptosis (i.e., programmed cell death) of the thymus.⁶⁴

AHCC demonstrated early clinical promise in promoting healthy immune response. This was shown in animal research where AHCC helped restore immune response that had been negatively affected by trauma, infection, and food deprivation.⁶⁶ In humans, the effect of AHCC on immune response was investigated by measuring the number and function of circulating dendritic cells (DCs), a type of immune cell, in healthy volunteers. Twenty-one healthy volunteers were randomized to receive placebo or AHCC for four weeks. The results were that the AHCC group had a significantly higher number of total DCs compared to when they first started the study, and compared to the control subjects. Other types of immune cells were also significantly increased in the AHCC group compared to controls.⁶⁷

The effects of AHCC in a clinical setting were examined in patients who had surgery for the undesirable growth of mutated liver cells. A total of 269 patients participated in the study, with 113 receiving AHCC. The results were that the AHCC group had a significantly longer period of no recurrence of mutated liver cells, and an increased overall survival rate when compared to the control group.⁶⁸

A prospective cohort study was performed with 44 patients with undesirable growth of mutated liver cells. All of the patients underwent supportive care. Survival time, quality of life, clinical and immunological parameters related to liver function, cellular immunity, and patient status were determined. Of the 44 patients, 34 and 10 received AHCC and placebo (control) orally, respectively. Patients in the AHCC treated-group had a significantly prolonged survival when compared to the control group, and quality of life in terms of mental stability, general physical health status, and ability to have normal activities were significantly improved after three months of AHCC treatment.

An effective daily dose is 3–6 grams AHCC daily.

Pomegranates

Pomegranates are high in polyphenolic compounds, making its juice higher in antioxidant activity than red wine and green tea.⁷⁰ The most abundant of these compounds is ellagic acid, which has been shown in research to be the antioxidant responsible for the free-radical scavenging ability of pomegranate juice.⁷¹ According to some researchers⁷², the actions of pomegranate's components suggest a wide range of clinical applications for the treatment and prevention of cancer, as well as other diseases where chronic inflammation is believed to play an essential developmental role, suggesting immune modulatory activity. Of

particular interest where ARIs are concerned, one study⁷³ found that pomegranate had specific antibacterial activity against MRSA. The authors of that study suggest a beneficial effect from the daily intake of pomegranate “as dietary supplements to augment the human immune system’s antioxidant, antimalarial and antimicrobial capacities.”

The consumption of 2–8 ounces of pomegranate juice is a good daily dose.

Other Dietary Supplements For General Immune Response

In terms of dietary supplements, there are some general immune-promoting nutrients, which may have benefit promoting immune response:

- Vitamin A—Plays an important role in immune system function and helps mucous membranes, including those in the lungs, resist invasion by microorganisms.⁷⁴ Daily dose: 5,000-10,000 IU.
- Vitamin C—Stimulates the immune system by both elevating interferon levels and enhancing the activity of certain immune cells.⁷⁵ Daily dose: 500-1000 mg. Increase to 1000 mg every other waking hour during acute infection.
- Zinc—Marginal deficiencies result in impairments of immune function.⁷⁶ Supplementation with zinc has been shown to increase immune function in healthy people.⁷⁷ Daily dose: 15 mg. Increase to 15 mg, three times daily in lozenge form during acute infection.
- Probiotics—Probiotics are well established for their role in immune health, and have been shown to have efficacy in the treatment of bacterial vaginosis^{78, 79} and irritable bowel syndrome.⁸⁰ Daily dose: 5–10 billion CFU of *Lactobacillus* and/or *Bifidobacteria* species.

Conclusion

In addition to those listed, there are many other herbs with value to the immune system and/or with antibacterial properties. These include *Astragalus membranaceus*, *Picrorrhiza kurroa*, *Thuja occidentalis* and Green tea, just to name a few. If it wasn't included in this article, don't assume it doesn't have value. The fact is, it most likely does but I could only choose a few to discuss here. In any case, use of the herbs and other supplements discussed in this article may help you support and maintain a healthy immune system, which is your best defense against any bacteria and viruses. Likewise, some of these herbs may also have direct effects against specific microorganisms. Nevertheless, if you are sick you should see your doctor to have your individual situation assessed. ■

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Gene Bruno is the Dean of Academics for Huntington College of Health Sciences. With graduate degrees in both nutrition and herbal medicine, Gene is a 32 year veteran of the Dietary Supplement industry. He has educated and trained natural product retailers and health care professionals, has researched and formulated natural products for dozens of dietary supplement companies, and has written articles on nutrition, herbal medicine, nutraceuticals and integrative health issues for trade, consumer magazines, and peer-reviewed publications.