Seven herbs every pediatrician should know

By Kathi J. Kemper, MD, MPH

Do some parents of your patients know more about medicinal herbs than you do? This review of the seven you're most likely to encounter—their uses, main effects, and side effects—will help you catch up.

If these questions were a pop quiz, how would you do?

■ "I know that aloe vera is good for burns, but recently I read that drinking it helped cure ulcers and AIDS. Is there any evidence for this?"

■ "One of my Hispanic patients is giving her baby manzanilla tea for colic. Is that safe?"

■ "I'm tired of giving my child antibiotics for recurrent ear infections; do you think that echinacea will boost his immune system and prevent the need for ear tubes?"

■ "I read in *Newsweek* about those deaths from Herbal Ecstasy. What is that?"

■ "Someone in my migraine discussion group on the Net said she'd been taking feverfew to prevent headaches. Is there any science behind that?"

■ "Is goldenseal any better than placebo in treating childhood diarrhea?"

■ "My cousin recommended that I

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use this tea tree oil instead of the Lotrimin you prescribed for my son's ringworm. I'd like to avoid medication. Is it worth a try?"

I've heard all these questions in recent weeks, from patients and colleagues both, as more and more patients turn to herbal remedies for common ailments. Herbs have been written up in natural health and parenting magazines and occasionally get glaring headlines in *Consumer Reports* (November 1995), *Newsweek* (May 6, 1996) and the *New York Times* (April 21, 1996).

Yet despite the ready availability of herbs everywhere from grocery stores to gardens, these plants remain a mystery to most physicians. Colleagues who are well trained in pharmacology are often ignorant about medicinal herbs, while increasingly well-informed patients expect physicians to have answers about the safety and effectiveness of herbal remedies and advice about the herbs' more refined pharmaceutical cousins.

At one time, physicians would have been able to answer questions about herbs. Indeed, the history of medicine is largely the history of using herbs to help and heal. The fourth edition of Henry Morris's *Essentials of Materia Medica, Therapeutics, and Prescription Writing* (WB Saunders, 1896) dispenses detailed advice about the use of herbs such as colchicum for gout, salicin for fever, opium as a hypnotic, and belladonna as a mydriatic and asthma remedy. Many modern medications were originally derived from herbs, but nowadays few pharmacology courses cover widely used herbal remedies.

The information I've gathered on seven of the herbal remedies most commonly used for children will help fill in some of those gaps. Substantial research supports the use of several of these remedies in common childhood illnesses, such as chamomile for colic, feverfew to prevent migraines in adolescents, goldenseal for diarrhea, and tea tree oil for skin infections. Others require caution, because of risks for serious toxicity with overdoses (of ephedra, for example) or misuse (the oral ingestion of tea tree oil). Table 1 provides an overview of all seven, with information on the parts of the plant they are made from, the form in which they are used (teas, poultices, tinctures), the conditions they are used to treat, and the side effects they produce.

Aloe vera

The gel extracted from the leaves of the *Aloe vera* or true aloe plant is an active ingredient in hundreds of skin lotions, sun blocks, and cosmetics. In addition, many people—more than half of the members in a survey of one prepaid health organization, for example—use aloe gel as a home remedy. Aloe first gained popularity in the United States in the 1930s with reports of its success in treating X-ray and radium burns. Recently, aloe extracts have been used to treat canker sores, gastric and duodenal ulcers, and AIDS.

The most extensive studies of the use of aloe have focused on burns and skin irritations. Aloe vera gel contains glucomannan (an emollient polysaccharide), bradykininase (a protease inhibitor), magnesium lactate, and an antiprostaglandin, anti-inflammatory compound. In experimentally induced full-thickness burns in guinea pigs, aloe vera had similar antimicrobial effect and resulted in more rapid healing than silver sulfadiazine ointment.[1] In another animal study, aloe was superior to a topical antibiotic in expediting wound healing and improving scar strength.[2] Aloe has well-documented antibacterial effects against a variety of pathogens including *Staphylococcus aureus, Streptococcus pyogenes, Serratia marcescens, Klebsiella pneumoniae, Pseudomonas aeruginosa,* and *Mycobacterium tuberculosis*. In humans, it has been proven to accelerate healing from dermabrasion, frostbite, and aphthous stomatitis.

Aloe has potent anti-inflammatory properties that may work synergistically with its antibacterial effects to enhance wound healing. However, no randomized controlled trials indicating that aloe gel is effective alone or in combination with standard therapies for gastric or peptic ulcers have been conducted.

An aloe extract, acemannan hydrogel (Carrisyn), was approved by the Food and Drug Administration in 1994 to treat aphthous stomatitis. It is currently under investigation as an antiviral and immunomodulator for treating persons infected with human immunodeficiency virus (HIV). In vitro studies

TABLE 1

Seven herbal remedies: An overview

Herb/part used	Common uses	Method of application	Side effects
Aloe vera/pure gel from leaves	Burns Constipation Ulcers Canker sores Immune stimulant HIV infections	Gel applied topically or taken internally several × d Doses not standardized	Diarrhea, gastric cramping when taken internally Contact dermatitis from related species, *Aloe arborescens*
Chamomile/flowers	Calming, sedating Aromatherapy Antispasmodic Colic Anti-inflammatory Soothe diaper rash, chicken pox, poison ivy	Tea (in infants) or tinctures, $^1/_2$–4 oz, 3–4 ×d Essential oil used in aromatherapy or added to bath	Allergic reactions One case of botulism in infant given tea from homegrown plant
Echinacea/leaves, stalks, and roots	Immune stimulant Colds, ear and sinus infections HIV infection	Tinctures, capsules, or tablets taken internally as immune stimulant; doses not standardized. Generally, $^1/_4$–1 dropperful of tincture 3–4 × d. May be diluted with water or fruit juice	None reported
Ephedra (Ma huang)/ leaves and stalks	Decongestant Asthma and allergy Weight loss "Natural high"	Generally taken internally	Hypertension, tachycardia Toxic psychosis Death NOT RECOMMENDED
Feverfew/fresh or dried leaves	Migraine prophylaxis Rheumatoid arthritis Insect repellent Menstrual pain	1–3 fresh leaves or 25–50 mg capsules of crushed, dried leaves bid to prevent migraine	Allergic reactions Mouth ulcers Rebound headache if discontinued abruptly
Goldenseal/roots	Diarrhea Antiseptic, antimicrobial for acne, conjunctivitis, eczema, ear infections Possible immune stimulator Anti-arrhythmic	$^1/_4$–$^1/_2$ tsp of tincture or $^1/_8$ tsp of fluid extract 3 or 4 × d for diarrhea. Can be mixed with 4 oz water or juice	Hypotension, hypertension Local irritation Nausea, vomiting, diarrhea Displaces bilirubin from albumin NOT RECOMMENDED FOR INFANTS LESS THAN 1 MONTH OF AGE
Tea tree oil/essential oil from leaves	Minor skin infections Fungicide Acne Vaginitis	Applied topically 2–4 × d	Contact dermatitis if applied to broken or irritated skin As little as 10 mL po can affect CNS function and cause muscle weakness NOT FOR INTERNAL USE

suggest that acemannan is an immunoenhancer that increases monocyte responses to alloantigens, stimulates cytotoxic T lymphocytes (killer T cells), and acts synergistically with antiviral therapies such as zidovudine (Retrovir) and acyclovir to inhibit viral replication.[3] In vivo studies of acemannan have shown anti-tumor effects against neoplasms and feline leukemia virus in animals.[4,5] Although these results are encouraging, they are a long way from proving that aloe cures AIDS or herpes infections.

Another aloe extract called aloin or aloe latex, the yellow exudate of the inner sheath cells of the leaves, is an anthraquinone. Aloin is a powerful purgative; remedies for skin and mucous membranes that contain aloin can cause cramping and diarrhea, and should be avoided. Aside from this caution, aloe vera is extremely safe and nontoxic when used topically or taken internally.

Chamomile

The Egyptians dedicated chamomile to the sun god and worshiped its healing properties. Chamomile tea was well known to Peter Rabbit's mother. Known in Spanish as manzanilla, the tea is used all over the world to calm colicky babies. Chamomile washes and compresses are used to soothe diaper rashes, chickenpox, and poison ivy. European oncologists and oral surgeons use a chamomile extract called kamillosan to treat chemotherapy-induced mucositis. Salons and spas use the essential oil of chamomile as a calming aromatherapy agent. Both varieties of chamomile, *Matricaria chamomilla* or *recutita* (German chamomile) and *Anthemis nobilis* (English, Roman, or common chamomile) are members of the *Compositae* family. German chamomile is the one most often cultivated and has been subjected to most scientific evaluation.

The essential oil of chamomile is light blue and makes up about 0.5% of the flower head. The oil's active compounds include chamazulene, α-bisabolol, apigenin, and others. Chamazulene has anti-inflammatory properties related to its inhibition of leukotriene synthesis. Bisapolol reduces inflammation, fever, and arthritis and has been shown in animal studies to inhibit the development of experimentally induced ulcers. The essential oil of German chamomile and bisapolol also have potent antispasmodic effects. Apigenin, the flavonoid, has significant affinity for central benzodiazepine receptors, which may account for its anxiolytic and sedative effects.[6] It also has potent anti-inflammatory and possibly antitumor effects.[7]

Infants with colic who were enrolled in a double-blind, randomized, controlled clinical trial were significantly better when treated with an herbal tea whose main ingredient was chamomile than when they were given a placebo.[8] Chamomile aromatherapy demonstrated significant sedative and mood-elevating effects in another randomized, comparison cross-over trial.[9]

I regularly recommend chamomile tea for children who are anxious or irritable from any mild illness or upset, including colic, upset stomachs, chickenpox,

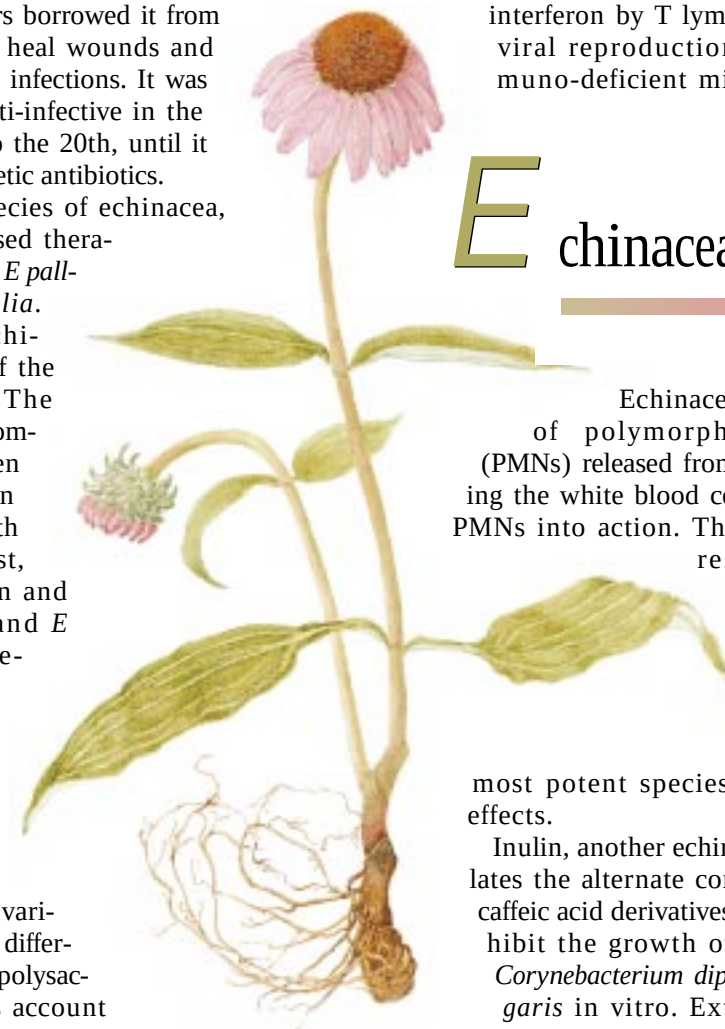
and fevers requiring "plenty of fluids." Aside from rare allergic reactions, chamomile tea has an impressive safety record over thousands of years. The herbal tea is widely available in grocery stores and is already used by many families as part of cultural or folk medicine.

Echinacea

This herb, perhaps better known as the purple coneflower, enjoys a widespread reputation as an immune booster and has been used to treat conditions ranging from the common cold to HIV infection.

Echinacea is native to the American midwest. European settlers borrowed it from Native Americans to heal wounds and promote healing from infections. It was widely used as an anti-infective in the 19th century and into the 20th, until it was replaced by synthetic antibiotics.

There are nine species of echinacea, three of which are used therapeutically: *E purpurea, E pallida*, and *E angustifolia*. Like chamomile, echinacea is a member of the *Compositae* family. The proportion of active compounds varies between species, by the portion of the plant used, with the timing of harvest, and with preparation and storage. *E pallida* and *E angustifolia* are frequently mistaken for one another, and products sold as one species may well contain substantial amounts of another. Echinacea species contain a variety of chemicals with different effects. The active polysaccharides in the roots account for much of echinacea's anti-inflammatory and immune stimulating properties.



Feeding rats the polysaccharide portion of *Echinacea angustifolia* root, or applying it topically, significantly decreases experimentally induced inflammation.[10] The polysaccharides also stimulate fibroblasts to make and repair damaged connective tissue and block tissue breakdown mediated by hyaluronidase. These effects may account for echinacea's historic use in treating snake bites.

The most notable benefit of the polysaccharide portion of echinacea is the stimulation of the immune system. Echinacea enhances the production of interferon by T lymphocytes, thus blocking viral reproduction and attack.[11] In immuno-deficient mice, echinacea activates macrophages and monocytes to engulf and destroy bacteria and fungi and to produce tumor necrosis factor, interferon, interleukin-l, and interleukin-6.

Echinacea increases the number of polymorphonuclear leukocytes (PMNs) released from the bone marrow, raising the white blood cell count and mobilizing PMNs into action. These effects increase the resistance of mice to lethal infections with *Candida albicans*, *Listeria monocytogenes* and staphylococci.[12] *Echinacea purpurea* is the most potent species for stimulating these effects.

Inulin, another echinacea root extract, stimulates the alternate complement pathway. The caffeic acid derivatives in echinacea directly inhibit the growth of *Staphlococcus aureus*, *Corynebacterium diphtheria*, and *Proteus vulgaris* in vitro. Extracts from echinacea's

stems and leaves have antiviral effects in vitro against influenza and herpes virus.

In women suffering from recurrent yeast infections, echinacea extracts plus econazole were significantly more effective than econazole alone in preventing recurrence.[13] In German adults, high doses of *E purpurea* extracts reduced cold symptoms significantly more than did placebo.[14] In a randomized, controlled study in adults, fresh echinacea extracts taken twice daily significantly reduced the number of colds—particularly in those whose immune systems were already weakened.[15]

Preliminary studies are underway to assess echinacea's immune-stimulating effects in treating cancer and HIV infection. *E angustifolia* and *E pallida* root extracts stimulate macrophages to kill tumor cells under experimental conditions. Unfortunately, these studies have not included comparison groups, but randomized, controlled trials are being planned.

So far, no well-controlled studies of echinacea in the treatment of children's colds, ear infections, sinus infections, or any other common condition for which it is widely used have been conducted, and so the efficacy of this herb in children's complaints remains unproven. As for safety, aside from rare allergic reactions, no serious toxicity with oral or topical use has been reported in the more than 100 years in which echinacea has been used in American folk medicine. In my practice I use echinacea as a potentially active, safe, and inexpensive placebo that is widely available in health food stores and pharmacies.

Ephedra (Ma huang)

Ephedra has been known and used as Ma huang in China for over 5,000 years. Its most active ingredient, ephedrine, was first chemically isolated in 1887. Other alkaloids present in ephedra include compounds well known to modern physicians: pseudoephedrine, norepinephrine, and norpseudoephedrine. Historically, Chinese and Indians healers relied on ephedra as an asthma remedy. More recently, it has been used as a nasal decongestant, central nervous system stimulant, and appetite suppressant. In the last few years, it has been sold as the "natural high" Herbal Ecstasy, or used illicitly in combination with methamphetamine and other stimulants.

There are over 40 species of ephedra. The varieties indigenous to North and Central America lack the active alkaloids found in Asian species. The North American species used to make "Mormon tea," a folk tea used in arid parts of the Western states, may be refreshing, but lacks ephedra's active alkaloids. Although there is great variation in their chemical and biologic activity, many members of the ephedra family are difficult to distinguish and products labeled as ephedra may be contaminated with related species with different activities. Depending on growing conditions, the amount of alkaloid even in Asian ephedra varies from less than 0.5% to over 2.5%; the ephedrine content of the alkaloid varies from 30% to 90%.

Ephedrine is a potent bronchodilator that also constricts peripheral blood vessels, which accounts for its effectiveness as a decongestant and asthma remedy. Ephedra also has diuretic properties and can stimulate uterine contractions. In combination with caffeine, it appears to induce sufficient thermogenesis to aid in weight loss programs in adults. The aerial parts of the plant have been shown to have anti-inflammatory effects in animal studies.

The side effects of ephedra are similar to those of its pharmacologic derivatives: hypertension, tachycardia, palpitations, anxiety, restlessness, headache, insomnia, and dizziness. Toxic psychoses have also been reported. Tragically, a number of teenagers and young adults have died from ephedra overdoses in the search for a safe high. More than half of the 665 complaints about dietary supplements the FDA has received since 1993 concern supplements that contain ephedrine alkaloids. Because of the risk of side effects, the variability in potency, the possibility of contamination, and the availability of safer, more effective medicinal alternatives, I do not recommend ephedra or Ma huang to treat children.

Feverfew

Tanacetum parthenium (feverfew) is yet another member of the *Compositae* family of healing herbs. The small, tough, daisy-like flowers commonly grow along roadsides and in abandoned fields. Feverfew

Feverfew

was used by the ancient Greeks and early Europeans to treat fevers, repel insects (the pyrethrin in feverfew may account for its effectiveness as a repellent), and treat insect bites and stings. Despite its name and historical use, feverfew is not currently used as a febrifuge but to prevent migraine headaches, relieve menstrual pain, and treat arthritis.

Biochemical analysis has shown great variability in the strength, potency, and purity of commercially available feverfew preparations. The plants are rich in sesquiterpene lactones, particularly parthenolide, and flavonoid glycosides such as tanetin and apigenin (see chamomile section). These compounds are anti-inflammatory and spasmolytic. Feverfew extracts inhibit prostaglandin synthesis up to 88% in vitro. Aqueous extracts also prevent release of arachidonic acid and inhibit platelet aggregation stimulated by ADP or thrombin. Feverfew inhibits mast cell release of histamine and serotonin release from both platelets and polymorphonuclear leukocytes, which may be how it prevents migraine headaches.

Migraine sufferers who consume as little as two to three feverfew leaves a day report a dramatic decrease in the frequency and severity of their headaches. In two double-blind studies, 25 milligrams twice daily of freeze-dried feverfew leaves effectively prevented migraines in adults.[16,17] Feverfew must be taken daily for weeks or months before the benefits are noticeable; it is not effective in relieving acute pain. Stopping the daily dose suddenly may result in rebound headaches. Though some patients report that feverfew dramatically relieves their joint pain, it did not prove effective in treating arthritis in the only randomized, controlled trial evaluating it to date.[18]

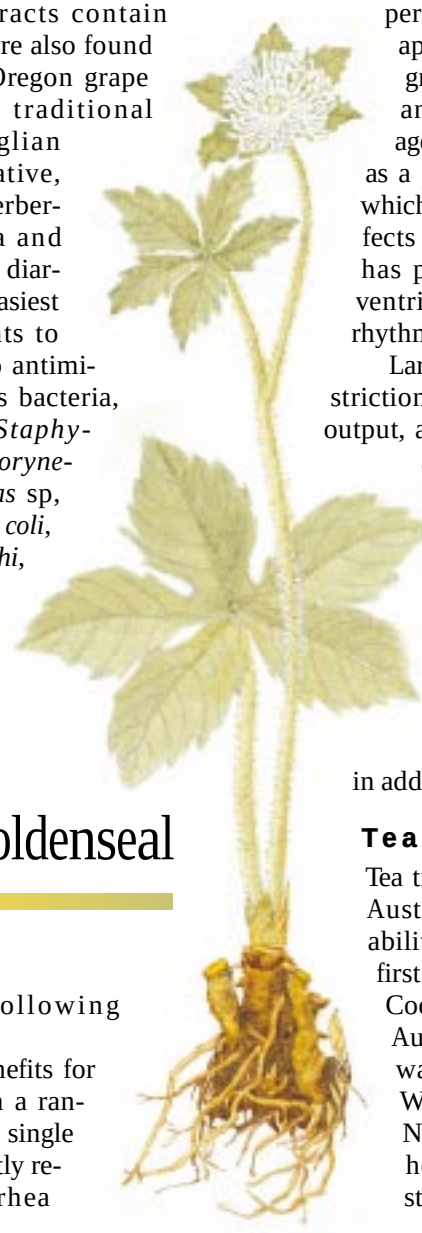
Side effects of feverfew include rare allergic reactions, tachycardia, mouth ulcers, dermatitis, and rebound headaches upon discontinuing use. Although the effects of prolonged use starting in childhood are unknown, no genotoxic or mutagenic effects have been reported. Canada's Health Protection Branch has granted a drug identification number for a British feverfew product, making it available as a nonprescription medication in Canada. Randomized, controlled, double-blind clinical trials of feverfew for the prevention of migraine headaches in children, treatment of menstrual cramps, and treatment of juvenile rheumatoid arthritis have not been done. Until such trials are undertaken, feverfew appears to be a relatively safe and inexpensive herbal alternative to β-blocker medications for the prevention of migraine headaches.

Goldenseal

Goldenseal remedies are derived from the root of the perennial *Hydrastis canadensis*. They are Native American remedies introduced to European settlers by the Cherokees, who used goldenseal as an eye wash, a skin soother, and a treatment for diar-

rhea. Modern herbalists call on goldenseal's antiseptic properties to treat acne (washing the face with a goldenseal infusion), conjunctivitis (as an eye wash), cradle cap (as a scalp rinse), ear infections (as ear drops), and itchy rashes such as eczema (in poultices). Goldenseal is also taken internally for treatment of colds, diarrhea, fever, and sore throat.

The yellow-red alkaloid extracts contain berberine and hydrastine, which are also found in barberry (*Berberis vulgaris*), Oregon grape (*Mahonia aquifolium*) and the traditional Chinese herbal remedy, huanglian (*Coptis chinensis*). Another relative, *Berberis aristata,* also contains berberine and has been used in India and China for many centuries to treat diarrhea. Goldenseal is generally the easiest of the berberine-containing plants to obtain. It has in vitro and in vivo antimicrobial activity against numerous bacteria, fungi, and protozoa such as *Staphylococcus* sp., *Streptococcus* sp, *Corynebacterium diphtheria*, *Pseudomonas* sp, *Trichomonas vaginalis*, *Escherichia coli*, *Shigella dysenteriae*, *Salmonella typhi*, *Vibrio cholera*, *Entamoeba histolytica*, *Giardia lamblia*, *Candida albicans*, and others.[19] Berberine blocks adherence of *Streptococcus pyogenes* and *E coli* to epithelial cells in vitro. It also inhibits the intestinal secretory response to cholera and *E coli* Toxins and normalizes mucosal histology following cholera toxin damage.[20]



Goldenseal

Berberine has demonstrated benefits for treating patients with diarrhea. In a randomized, controlled clinical trial, a single dose of berberine sulfate significantly reduced stool volumes and diarrhea compared with placebo among patients with enterotoxigenic *E coli* and *V cholera*.[21] Its effectiveness (at doses of 10 mg/kg/day) in treating children with Giardia is comparable to furazolidone and metronidazole.[22]

Currently, berberine is under investigation as a possible immune stimulator (for cancer and HIV treatment) and for its cardiac effects. It stimulates peritoneal macrophages in vitro, induces apoptosis in leukemic cell lines, inhibits growth of human hepatoma cells in vitro, and may be useful as a photosensitive agent for treating gliomas.[23–25] It behaves as a partial agonist of α-2 adrenoreceptors, which may account for its clonidine-like effects such as hypotension and sedation. It has positive inotropic effects during left ventricular failure and has class III anti-arrhythmic effects in rabbit and canine studies.

Large doses can cause peripheral vasoconstriction, hypertension, and increased cardiac output, as well as irritate the mouth and throat and cause nausea, vomiting, and diarrhea. Berberine displaces bilirubin from albumin and should *not* be given to infants less than one month old. Hydrastine and berberine do not have any known genotoxic or mutagenic effects. In my practice, I recommend goldenseal tinctures to parents of toddlers and older children interested in natural remedies for diarrhea, in addition to oral rehydration therapy.

Tea tree oil

Tea tree oil is derived from the leaves of the Australian tree, *Melaleuca alternifolia.* Its ability to treat minor skin infections was first described by the crew of Captain James Cook, although it had long been used by Australian aborigines as an antiseptic. It was used by Australian medics during World War II to treat wound infections. Nowadays, tea tree oil can be found in health food stores and natural grocery stores as a pure oil and as an ingredient

in toothpaste, deodorant, and even toothpicks.

The leaves contain approximately 2% of a volatile oil which consists of approximately 50% to 60% terpenes (pinene, terpinene and cymene) and 6% to 8% cineol and several sesquiterpenes. Oil levels change throughout the year, and the amount of various constituents extracted varies with the length of distillation. Its potent antibacterial properties against *Staphylococcus aureus, Staphylococcus epidermidis,* and *Propionibacterium acnes* are primarily due to terpinen-4-ol, α-terpineol, and α-pinene.

In an Australian study of 124 teenagers, 5% tea tree oil gel was as effective as 5% benzoyl peroxide in treating mild to moderate acne.[26] In comparison to standard fungal medications (tolnaftate, for example), tea tree oil is as effective in treating symptoms, but less effective in eradicating fungi.[27] It is also effective in treating some cases of trichomonal, nonspecific, and Candidal vaginitis.[28]

Tea tree oil taken internally can have systemic side effects; topical application may cause local irritation or contact dermatitis. A 23-month-old boy became confused and unable to walk 30 minutes after ingesting less than 10 cc of tea tree oil. The veterinary literature describes a similar syndrome (depression, weakness, incoordination, and muscle tremors) in animals who licked off tea tree oil that had been topically applied to treat skin conditions. The d-Limonene constituents can cause contact dermatitis if applied to broken skin (eczema or burns, for example).

Aside from oral ingestion or applying it to broken skin, tea tree oil appears to be a safe and effective herbal alternative remedy to treat mild acne and mild bacterial and fungal infections of the skin.

The information given here will help you respond to your patients' need for guidance in using tea tree oil and other herbal remedies safely. Additional research is necessary to explore further benefits of these herbs (echinacea and aloe as immune boosters, for instance) and of other plant derivatives. Table 2 lists additional sources of information, and an extensive reference list is available on request. □

TABLE 2

For more information

Books and periodicals

HerbalGram, published by the American Botanical Association in Austin, TX

Kathi J. Kemper: *The Holistic Pediatrician: Parents' Comprehensive Guide to Safe and Effective Therapies for the 25 Most Common Childhood Ailments.* New York, Harper Perennial, 1996

The Lawrence Review of Natural Products, published by Facts and Comparisons, 111 West Port Plaza, Suite 400, St. Louis, MO 63146-3098. 314-878-2515

Michael T. Murray: *The Healing Power of Herbs,* ed 2. Rocklin, CA, Prima Publishing, 1995

Varro E. Tyler: *The Honest Herbal.* New York, Pharmaceutical Products Press, 1993

World Wide Web sites

American Botanical Council: *http://www.herbalgram.org/abcmission.html*

Herbal Hall, a discussion list for professional herbalists: *http://www.crl.com/~robbee/herbal.html*

HerbaNet Information Center: *http://www.io.org/~herbs/InfoCenter/Overview.html*

Medicinal Herbs: *http://frank.mtsu.edu/~sward/herb/medicinal.html* or *http://www/yahoo.com/Health/Alternative_Medicine/Herbs/*

Michael Moore, Director, Southwest School of Botanical Medicine: *http://www.rt66.com/hrbmoore/HOMEPAGE/HomePage.html*

The Herb Research Foundation: *http://sunsite.unc.edu/herbs/*

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