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Herbal Strategies in the Treatment of Urinary Tract Infections

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URINARY TRACT INFECTIONS AFFECT APPROXIMATELY 34% OF adults age 20 or older.¹ Although many cases are self-limiting or respond well to conventional approaches, entrenchment and antibiotic-resistant organisms are becoming more common, and a growing number of UTIs are not easily eradicated.² Further complicating matters is the fact that the organisms that cause UTIs don't necessarily confine themselves to the urinary tract, and many can cause or contribute to both local and systemic illnesses such as infertility, heart disease, neurological problems, and cancer. While some cases of resistant UTIs are self-limiting, others can have severe consequences, including nephritis, sepsis, and even death.²

For organisms that do not respond to conventional approaches, it is useful to consider ideas from other medical models that have evidence of efficacy in treating UTIs. One such model is Classical Chinese Medicine (CM). According to CM, UTIs are seen as attempts by the body to excrete pathogenic factors. In some cases it is a local pathogen, in others the infection results from the body attempting to deal with pathology in other areas via urination.³ For example, chronic toxic exposure may increase phase II liver conjugation. The body attempts to eliminate phase II metabolites at least partially through the urinary tract. If they are not completely eliminated, they can become lodged in the urinary tract and weaken the local immune system, making conditions more conducive to infection via routinely encountered pathogens (such as *E. coli*). In such an instance, the elimination of the local pathogen may resolve the acute presentation but the condition is likely to recur until the source of toxicity is eliminated.

Therefore, according to CM, some cases of UTIs originate locally, but others have a distal or systemic origin. In the latter cases,

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treating the UTI locally without treating the distal cause will have unsatisfactory clinical outcomes.

Pathogenesis

Researchers find *E. coli* in 80% of UTIs. Ten to fifteen percent have Staphylococcus (e.g., Saprophyticus and Aureus), and a much smaller percentage have other organisms such as Klebsiella, Chlamydia, Gonococcus, Proteus, Pseudomonas, Herpes Simplex Viruses and Human Papilloma Virus. Complicating matters is the fact that a significant percentage of UTIs are polymicrobial. With current advances in microbiology it is likely that many more culprits will be identified in the near future.⁴

Organisms such as *E. coli* can become entrenched in the umbrella cells in the epithelial layers in the bladder. This makes it very difficult for antibiotics and other therapies to reach them. This process of entrenchment is felt to be one of the factors in recurrence and antibiotic resistance.⁵

Organisms can also hide in biofilms that enable them to evade antimicrobial therapy.⁶ Interstitial cystitis (IC) may also present with similar symptomatology, though specific organisms are generally not identified.

Treatment

As previously mentioned, treating underlying systemic illnesses must be undertaken simultaneously with

treating the actual infection for the successful resolution of resistant UTIs. The following strategy has produced significant clinical efficacy in eradicating many resistant and recurrent UTIs that have failed conventional antibiotic intervention. The strategy has three parts:

- Reduce microorganism adhesion by increasing hydration and diuresis
- Eradicate organisms
- Improve or maintain immune system

Reducing Microorganism Adhesion

As discussed previously, CM theory holds that the body commonly tries to clear pathogens out of the urinary tract through diuresis. The less time the pathogens are able to remain in one area, the more difficult it is for them to get a foothold and to hide deeper in the bladder lining. In its attempt to continually flush pathogens out, the body may create a sense of urgency and feel the need to urinate frequently. If there is insufficient hydration and the pathogen is more aggressive, there may be urinary hesitancy. Clinically, it is generally desirable not to interfere with the body's natural diuretic attempts. Muscarinic receptor antagonists, or various astringent herbal medicines to reduce urinary frequency, should be avoided where possible, as they could potentially increase the likelihood of the UTI spreading or becoming entrenched. Diuretics combined with increased fluid and electrolyte intake should be considered. If the patient is already dehydrated, only mild diuresis should be employed until hydration is restored.

A second aspect to preventing adhesion is the incorporation of anti-adhesion phytochemicals. Researchers at Rutgers University identified compounds in cranberries (proanthocyanidins) that seem to be at least partially responsible for cranberry's purported anti-adhesion effects on uropathogens such as *E. Coli*.⁷ A wide range of doses with both sweetened and unsweetened cranberry have been studied with statistically significant clinical improvements regardless of the form used. However, there is evidence that higher doses (1 L of cranberry juice per day) may increase the risk of kidney stones and should be avoided.⁸ Clinically, we find that a number of patients do not tolerate cranberry well. The reason for this is unclear, though we surmise the sugar, acidity, or both may be responsible. In those instances, blueberries may be a viable alternative, as they are also high in the same type of proanthocyanidins. However, controlled trials on the effects of blueberries on UTIs are lacking.

If cranberries are utilized, issues related to the acidity of cranberries should be considered. CM warns against the long-term use of sour substances since it is theorized that too much acidity damages the skeletal system.

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Presumably, the body must neutralize acidity and the skeletal system houses mineral alkaline reserves. Thus, there may be a biochemical basis supporting these observations. Consequently, it may be prudent to exercise caution when prescribing cranberry or other acidic substances on a long-term basis in patients at risk for osteopenia or osteoporosis.

Eradicate microorganisms

The next part of the strategy is to identify the appropriate medications to eradicate the infection. In CM, appropriate herbs are prescribed based on a physical exam involving techniques such as tongue inspection and a specialized palpation of the radial artery. These techniques are extremely useful in differentiating broad categories of infectious organisms and choosing herbs that will eradicate them. However, sending a sample to pathology to identify which strains one is dealing with allows for a higher degree of specificity in the choice of antimicrobial agents.

Irrespective of the specific diagnostic procedure employed, the preponderance of UTIs (> 90%) will involve *E. coli* and/or *Staphylococcus*. Therefore, one can generally begin therapy by upregulating cyclic adenosine monophosphate (cAMP) production to try to expose as many organisms as possible to the antimicrobial therapy. This can be done through the use of an herb called *Coleus forskohlii* (forskolin).⁵ The one study that examined forskolin's ability to eject uropathogenic *E. coli* from entrenchment in the bladder epithelium utilized the herb intravenously. Therefore, higher doses of the herb should be considered if oral therapy is utilized. The maximum dose studied so far is 500 mg/day.⁹ Doses higher than this should involve closer monitoring. The destruction of biofilms has not been extensively studied; however, CM describes analogous processes they refer to as "dampness" or "phlegm" that are felt to encapsulate organisms, making them resistant to treatment. CM differentiates several types of biofilms and over the centuries have developed entire categories of herbs to help eliminate these films and expose the pathogens for destruction.

Prior to or concurrent with administration of forskolin or similar substances, one should administer antimicrobial agents. In choosing antimicrobials, we should be cognizant that most antimicrobials do not differentiate between beneficial and non-beneficial organisms. The destruction of beneficial bacterial colonies can weaken the digestive and immune systems while increasing susceptibility to subsequent overgrowth of undesirable organisms: Particularly fungal forms that are normally inhibited by bacteria. Traditional herbal therapies can have similar effects, though dysbiosis is not commonly

seen clinically with herbal use due to the broad-spectrum "equal opportunity" antimicrobials used. These antimicrobials kill fungal forms as well.

Regardless, where appropriate, concurrent or subsequent administration of probiotics should be considered. The choice of probiotics can be a complicated one. If conventional antibiotics are used, probiotic administration should occur simultaneously with nonpathogenic, nonbacterial forms such as *Saccharomyces boulardii*. Following the discontinuation of antimicrobial therapy, the choice of probiotic strains should be made according to other systemic presentations of the patient. Although an in-depth discussion of probiotic therapy is beyond the scope of this article, it is worth mentioning that one study using lactobacillus strains as a control had slightly higher incidences in UTI recurrence.¹⁰ The significance of this, if any, is uncertain.

Herbal Antimicrobials

The following is a list of some common herbs that effectively eliminate many strains of uropathogens. Some of the herbs are broad-spectrum antimicrobials. In general, one should consider combining at least 3 herbs in a formula. The concurrent use of cranberry and/or blueberry should be considered unless the patient has fructose intolerance. Dosage is very important in the administration of herbal compounds. Too little and you get no effect. Too much and you can cause side effects. Therefore, close monitoring is essential when working with herbs. With long-term administration of herbal medicines it is prudent to monitor, at a minimum, liver enzymes, creatinine and BUN on a quarterly basis. If higher doses are used, more frequent monitoring may be appropriate. In-office urinalyses can also be done more frequently. The monitoring is generally not due to inherent dangers with the herbs themselves; however there have been cases of improper species being used of particular herbs that have ultimately caused hepato and nephrotoxicity. Had these cases been monitored regularly, adverse outcomes would likely have been avoided. Therefore, prudence in monitoring is warranted.

Case study

A 34-year-old female presented with chronic, recurrent UTI, duration of 5 years, resistant to a broad range of antibiotic therapies. Patient had been able to reduce the frequency of UTIs with cranberry juice, but complains of an acute presentation that began following intercourse and progressed to extreme burning and pain upon urination, low back pain, and fever of 102°. Urinalysis revealed presence of glucose. Serum albumin and urine specific gravity were elevated and the patient's

Table 1

Herbal Antimicrobials

Herb	Dosage	Pathogenic Organisms	Notes	Caution
<i>Scutellaria baicalensis</i>	3-30 g (9 g generally sufficient) (aqueous extraction)	Broad spectrum antimicrobial, including uropathogens <i>Klebsiella</i> , <i>Proteus</i> , <i>Mycobacterium smegmatis</i> , <i>Candida albicans</i> , <i>E. coli</i> , and <i>S. aureus</i> . ^{1,2}	Traditionally considered safe during pregnancy unless there is thyroid insufficiency. Should be considered where there are signs of inflammation.	If GI upset, reduce dosage or discontinue. Closer monitoring is required if there are no signs of inflammation or if there are signs of thyroid insufficiency.
<i>Poria cocos</i>	9-12 g	<i>E. coli</i> , proteus, chlamydia, and <i>S. aureus</i> (including MRSA). ²	Mild diuretic action. Generally does not cause GI disturbances.	
<i>Forsythia</i>	6-15 g	Broad spectrum antimicrobial, including uropathogens <i>E. coli</i> and proteus. ²	Particularly indicated where significant inflammation is present (eg, fever, swelling, burning). May also help prevent or treat nephritis.	If GI upset, reduce dosage or discontinue. Use with caution if patient presents with diarrhea or there are no signs of inflammation.
<i>Polyporus</i>	5-10 g (aqueous extraction)	<i>E. coli</i> , <i>S. aureus</i> , chlamydia ^{2,3}	Stronger diuretic action than <i>Poria cocos</i>	Important to ensure proper hydration when using this herb.
<i>Dianthus (superbus, sinensis, caryophyllus)</i>	5-10 g (aqueous)	Chlamydia (sup.), ³ <i>E. coli</i> (sin.), ⁴ <i>Klebsiella</i> and broad spectrum gram (-) and (+) bacteria (cor.) ⁵	Not enough pharmacologic research on this herb, but very effective clinically in combination with other herbs.	Contraindicated during pregnancy (unless inducing labor) as it stimulates uterine contractions.
<i>Forskolin</i>	100-500 mg/day in divided doses.		This herb is used to help eject organisms from the bladder epithelium and make them more susceptible to other therapies. ⁶ Should be combined with other antimicrobials.	Do not use concurrently with calcium channel blockers or nitrates. IV forskolin was used to eject <i>E. coli</i> from bladder epithelium. If administering orally, higher doses may be necessary.

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lips and eyes were dry. HbA1c was normal with a fasting blood sugar of 105. Patient was prescribed the following regimen:

- Discontinue cranberry juice
- Low glycemic diet (avoid all fruit and grains for 2 months)

- Increase fluid intake
- No intercourse for 1 month. Partner should see urologist for complete examination.
- Preliminary herbal formula consisting of the following:
 - Scutellaria Baicalensis: 9g/day aqueous extract (AE)
 - Polyporus: 9g/day AE
 - Forsythia: 15g/day AE

Within 24 hours temperature reduced to 98 and dysuria improved by 50%. Within three days patient was asymptomatic and the formula was changed as follows:

- Forskolin: 250mg bid for 3 weeks
- Scutellaria B: 9g/day AE 3 weeks
- Poria Cocos: 9g/day AE 3 weeks
- Forsythia: 6g/day AE 3 weeks

Patient improvement continued and, despite no evidence of infection in partner, partner was administered a similar formula (scutellaria was reduced to 6g). Follow-up at 2 years revealed no recurrence.

Discussion

Patient had mixed acute and chronic presentation. Acute presentation was dealt with first. A stronger diuretic (polyporus) was used despite dehydration because of the risk of nephritis, as well as a high dose of forsythia. Following resolution of the acute phase, polyporus was switched with poria cocos so as not to further dehydrate the patient. Forsythia was reduced so as not to injure the digestive system and forskolin was added to help push out any remaining entrenched organisms. The simple dietary modifications normalized blood sugar levels to a fasting level of 87 mg/dL which also likely contributed to the favorable long term outcome. Despite a normal urological examination, organisms can be hard to detect when they are inactive. Given the proximity of the patient's recurrence to intercourse, the Partner was prophylactically treated.

Build Immunity

The last phase involves optimizing the immune system. As discussed previously, a short course of probiotic therapy is prudent immediately following therapy. Dietary and lifestyle factors such as smoking, alcohol consumption, lack of sleep, and a diet high in refined carbohydrates should be addressed. A comprehensive

physical exam should be conducted. A diet high in organic, locally grown fruits and vegetables is generally very helpful to maximize immunity as is moderate exercise. Please note that heavy exercise is not recommended, as it causes oxidative damage and may weaken the immune system. Acupuncture can also be extremely effective at improving immune function,¹⁶ as can various herbal medicines, the discussion of which is beyond the scope of this article.

In conclusion, herbal strategies together with nutrition and lifestyle changes can be extremely effective in alleviating both acute and chronic UTIs that are resistant to conventional therapy. ♦

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