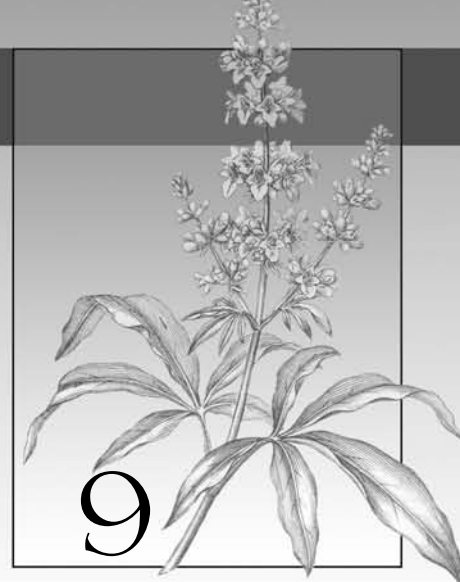


Urinary Complaints

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CHAPTER

URINARY TRACT INFECTION

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Urinary tract infection (UTI) refers to the presence of microbes anywhere in the urinary tract, ranging from the distal urethra to the kidney. UTI in the kidney is called pyelonephritis; in the bladder, cystitis; and in the urethra, urethritis. Infection is usually caused by bacteria, particularly *E. coli*, which accounts for 85% to 90% of all UTIs, but also may be caused by other bacteria, viral, and fungal infection. *Klebsiella*, *Proteus*, and *Pseudomonas* are commonly associated with UTI, particularly in recurrent cases. Urine itself is normally sterile, but the moist environment of the periurethral area, the proximity of the urethral orifice to the rectum, and the short length of the urethra provide a conducive environment for the growth and ascension of potential uropathogenic microorganisms into the urinary system. The presence of bacteria in the urine is called bacteriuria. In nonpregnant women bacteriuria in the absence of symptoms is not considered an indication for treatment; however, during pregnancy, bacteriuria is associated with increased risk of pyelonephritis as well as prematurity and possibly other complications; therefore, UTI in pregnancy requires special consideration.¹⁻³

UTI INCIDENCE AND ETIOLOGY

It is estimated that several hundred million women suffer from UTI annually, with costs to health care providers amounting to over \$6 billion annually worldwide, a figure that may even be an underestimate.⁴ Additional costs to society of UTI are tremendous in terms of the personal suffering of millions of women annually, lost work days, and childcare costs. Over 56% of women will experience a UTI in their lifetimes, and among those experiencing uncomplicated acute UTI, as many as 20% will have a recurrence within 6 months. Overall UTI recurrence rate is between 27% and 48%.⁴ Even with treatment, symptoms typically last for an average of 6 days, with nearly 2.5 days of limited activity.

The rates of UTI are slightly higher in young, sexually active women because of mechanical factors affecting the urethra and the presence of uropathogenic organisms. UTI rates increase during pregnancy and with age, the former because of mechanical pressure of the growing uterus on the ureters and bladder preventing complete voiding, and the latter because of declining estrogen levels, declining mucin (a surface coating of the bladder epithelium that prevents bacterial adhesion), inability to void completely, incontinence, inadequate nutrition, and the occurrence of other disease and excessive catheter use as a result of medical procedures.

RISK FACTORS FOR URINARY TRACT INFECTION

A number of common factors appear to increase the risk of developing a UTI. As mentioned, sexual activity is associated with a higher incidence of symptomatic UTI; however, risk only seems to be increased in the presence of uropathogenic microorganisms, either from a woman's own reservoir of bowel microbes, or passed from a sexual partner. Urinating after sexual activity decreases the rates of infection. Evidence suggests that host genetic factors influence susceptibility to UTI. A maternal history of UTI is more often found among women who have experienced recurrent UTIs than among controls. Susceptible patients may have a genetically increased number of receptors on uroepithelial cells to which bacteria may adhere. Additionally, nonsecretors of specific blood group antigens, which are glycoproteins, are at increased risk of recurrent UTI. Mutations in host genes integral to the immune response (interferon receptors and others) also may affect susceptibility to UTI.³ The use of oral contraceptives doubles the risk of UTI compared with no birth control, and the use of diaphragms and spermicides doubles the rate of UTI compared with OCs. Sexually transmitted infections and vaginitis can cause urethritis. Dehydration can increase bacterial growth leading to UTI. A history of antibiotic use is common in

women with a UTI; a possible mechanism that has been suggested is disruption of the vaginal flora and consequently overgrowth of pathogenic organisms. An interesting correlation exists between recurrent UTI and exposure to cold. A case-controlled study demonstrated a higher rate of UTI in women who reported cold hands, feet, or buttocks in women with UTI than controls. In a nonrandomized crossover study, cooling the feet of 29 healthy women with a history of recurrent UTI led to the development of UTI in five participants, compared with no UTI development in the control group.¹

SYMPTOMS

UTI is commonly divided into lower UTI (urethritis and cystitis) and upper UTI (pyelonephritis), each with differing symptoms and treatments. Urethritis usually presents with a gradual onset, urethral irritation and inflammation, possibly changes in voiding patterns and dysuric symptoms, as well as possible vaginal discharge or bleeding. The most common symptoms of cystitis are frequent, painful urination, the urgent need to urinate, and suprapubic pressure, and malaise, with up to 40% presenting with blood in the urine (hematuria). Some women may exhibit mild to moderate vaginal bleeding associated with UTI.

Cystitis often has a sudden onset. Pregnant women may present with contractions and suprapubic pain, with dysuria possibly having been mistaken for normal polyuria of pregnancy. Women with lower UTI often complain of feeling achy, crampy, or “just not feeling well.”

Pyelonephritis commonly has a gradual onset, although it can seem sudden if preceded by lower UTI, and is associated with not only urinary symptoms, but generalized symptoms such as fever, chills, nausea, malaise, and mild to extremely severe lower to middle back discomfort. Patients with pyelonephritis may appear quite ill. It is critical to differentiate between the symptoms of cystitis and pyelonephritis, as the latter requires more aggressive treatment and carries greater risks, particularly during pregnancy (Box 9-1). Cystitis may resolve spontaneously; however, effective treatment lessens the duration of symptoms and reduces the incidence of progression to upper UTI. Pyelonephritis is associated with substantial morbidity. Complications include acute papillary necrosis with possible development of urethral obstruction, septic shock, and perinephric abscess. Chronic pyelonephritis may lead to scarring with diminished renal function.

DIAGNOSIS

Diagnosis is based on a combination of clinical symptoms, physical examination, and laboratory findings. Diagnostic testing methods include urinalysis and culture and sensitivity. A proper urine specimen is obtained via a midstream catch. Vaginal cultures may rule out sexually transmitted disease and vaginal infection.

DIFFERENTIAL DIAGNOSIS

Primary differential diagnoses include urethritis, cystitis, and pyelonephritis.² In women with recurring infection,

BOX 9-1

Differential Diagnosis of Cystitis and Pyelonephritis

Cystitis

- Sudden onset typical
- Dysuria and symptoms associated with urination
- No fever, chills, nausea
- No costovertebral angle (CVAT) tenderness (flank pain)
- WBC count normal

Pyelonephritis

- Gradual onset typical
- Symptoms associated with urination may or may not be present
- Fever, chills, nausea
- + CVAT tenderness (flank pain)
- WBC count elevated

Adapted from Youngkin EQ, Davis MS: Women's Health: A Primary Care Clinical Guide, Stamford, CT, Appleton and Lange, 1994, p. 851.

it is important to differentiate between relapse and reinfection. Additional considerations for acute or chronic UTI include:⁵

- Asymptomatic bacteriuria
- Chancroid
- Constipation
- Diabetes
- Dysfunctional uterine bleeding
- Dysmenorrhea
- Endometriosis
- Gonorrhea
- Interstitial cystitis
- Ovarian cysts
- Pelvic inflammatory disease
- Pregnancy
- Renal calculi
- Sexual assault
- Toxic shock syndrome
- Vaginitis
- Vulvovaginitis

CONVENTIONAL TREATMENT APPROACHES

Oral antibiotics effective against gram-negative aerobic coliform bacteria, particularly *E. coli*, is the principal treatment in patients with UTI. A 3-day course is typical in patients with an uncomplicated lower UTI or simple cystitis with symptoms for less than 48 hours. A bladder analgesic may be given if the patient has intense dysuria. Increased fluid intake is often recommended to promote dilute urine flow. Pregnant, otherwise healthy women with no evidence of an upper UTI may be treated with a 7- to 10-day course of a cephalosporin, such as cephalexin, even in the absence of upper urinary tract signs. Pregnant women are typically treated for all episodes of

bacteriuria, even in the absence of symptoms. Upper UTI requires antibiotic treatment and may require IV therapy and hospitalization. In most cases, pyelonephritis responds to antibiotic treatment in 48 to 72 hours.⁵ Therapeutic approaches to treatment and prevention of urogenital infections have remained essentially unchanged for many years. Antibiotics and antifungals remain the mainstay of therapy. Several antibiotic therapies have become less effective because of antibiotic resistance, and the use of antibiotics in pregnancy often leads to vaginal yeast infection requiring treatment.⁶

Lifestyle changes may be recommended, such as teaching the client to void at the first urge to urinate, void after intercourse, drink adequate fluids, and avoid contraceptives associated with high UTI risk. Estrogen cream may be recommended for older women.^{1,2} Other risk factors may include use of menstrual pads (i.e., rather than tampons), wiping the anogenital region from back to front after a bowel movement (front to back is the proper motion), wearing nonabsorbent underpants or pantyhose, and bubble baths with irritating soaps; however, none of these factors have been found to be significant in clinical trials.¹ Increasingly, conventional practitioners are recommending the use of cranberry juice and vitamin C for UTI treatment. These are discussed under Botanical Protocol.

THE BOTANICAL PRACTITIONER'S PERSPECTIVE

Botanical medicine provides an excellent alternative to antibiotic use for reducing the duration and symptoms of lower UTI, preventing progression to upper UTI, and preventing recurrence. Lower UTI in nonpregnant women is often easily treated with simple protocol. Because of the risks associated with untreated pyelonephritis, it is recommended that patients with upper UTI be referred for medical care, and that botanical interventions be used in the context of complementary care. Care of pregnant women requires specific expertise in midwifery or obstetrics, as well as knowledge of herbs that are contraindicated in pregnancy, and must be done in consultation with an obstetric care provider. This section provides guidelines for the treatment of uncomplicated cystitis (Table 9-1).

Botanical treatment of lower UTI incorporates the use of urinary antiseptic and antimicrobial herbs with demulcent herbs (Table 9-2). Additionally, a diuretic may be included to assist the body in its attempt to increase the delivery of fluids through the bladder. Herbs for cramping and aching may be included if needed. Herbs are used in the context of an overall protocol to increase fluids and diuresis, and to relieve offending lifestyle causes (e.g., chronic vulvovaginitis, overgrowth of uropathogenic bowel flora, or use of birth control methods or sexual habits that may contribute to the problem). Rarely UTI can lead to vaginal bleeding, sometimes quite copious. If this occurs seek medical care.

Although not discussed in this chapter, herbal care also incorporates strategies for improving overall immunity in women with chronic recurrent UTI.

Calendula, Thyme, and Lavender

Calendula is typically used as a topical anti-inflammatory rinse with mild antimicrobial activity, either in the form of an infusion or diluted tincture, 1 tbs/125 mL water. Thyme and lavender are used topically for their antimicrobial activity and mild anti-inflammatory activity. In the form of peri-rinses for the treatment of urethritis associated with vulvo-vaginitis, and also for the reduction of rectal to urethral microbial spread. They can be used as infusions or the essential oils can be diluted in tea or warm water. Ingredients for a sample peri-rinse are provided in Table 9-1 (also see Chapter 3). Topical use of these herbs is considered safe during pregnancy.

Cranberry

The use of cranberries (Fig. 9-1) for the treatment of UTI dates back to the mid-nineteenth century when German chemists discovered that consumption of the berries produced a bacteriostatic acid in the urine. By 1900 in the United States, it was postulated that eating cranberries acidified the urine and prevented UTIs.⁷ This mechanism of action has been questioned as studies have failed to consistently show acidification of the urine with consumption of cranberry juice. There are mixed results regarding the effect of cranberry juice, fruit, and extract on urine pH. It appears that cranberry does not consistently lower urine pH and it is uncertain whether any reduction in urine pH that does occur has an antibacterial effect.⁸ However, the use of cranberry products continues to be a popular and empirically efficacious means of preventing and treating uncomplicated lower UTI. It is now accepted that the primary mechanism of action of cranberries is caused by two compounds in cranberries that each prevent fimbriated *E. coli* from adhering to uroepithelial cells in the urinary tract.⁹⁻¹¹ These compounds are also found in blueberries, which may also be used as part of the prevention and treatment of UTI.¹² Although cranberry has primarily been used against uropathogenic *E. coli*, recent evidence from in vitro studies suggests that it may have activity against other uropathogenic organisms, and also against *H. pylori*, responsible for gastric ulcers.¹³ Cranberry also may prevent the formation of biofilms on epithelial mucosa, reservoirs of bacteria that are difficult to effectively treat with antibiotics.⁸

Based on a comprehensive review of the literature by the Cochrane Collaboration, there is some evidence from two good-quality RCTs that cranberry juice may decrease the number of symptomatic UTIs in women over a 12-month period. Based on the literature, there have been problems with noncompliance over long periods of administration, probably because of the taste of some cranberry products or possibly other side effects; and the optimum dosage and administration methods (e.g., juice or tablets) are unclear, necessitating further properly designed trials.¹⁴ However, clinical experience with cranberry juice products in herbal practice suggests that compliance problems can be overcome by using palatable products. In two good-quality RCTs, cranberry products significantly reduced the incidence of UTIs at 12 months compared with placebo/control in women. One trial gave 7.5 g cranberry concentrate daily (in 50 mL); the other

TABLE 9-1

Sample Botanical Protocol for Cystitis

DAYS	HERBS	SUPPLEMENTS	OTHER
1–2	<p>Prepare the following decoction either as a hot or cold water infusion:*</p> <ul style="list-style-type: none"> • 6 g uva ursi leaf[†] • 6 g marshmallow root • 2 g dandelion leaf • 500 mL water <p>Steep and strain. Dose: ½–1 cup every 4 hours depending upon severity of UTI. This preparation will keep refrigerated for 24 hours.</p> <p>3 mL echinacea tincture every 2–4 hours depending upon severity of UTI</p> <ul style="list-style-type: none"> • If there is discomfort and cramping associated with UTI in a nonpregnant patient, 3 mL each of cramp bark and wild yam tinctures may be mixed with the echinacea the dose increased to 5 mL every 2–4 hours. 	500 mg vitamin C every 4 hours [‡]	<ul style="list-style-type: none"> • Every 2 hours drink 6–8 oz of spring water • Every 2 hours drink 6–8 oz of unsweetened cranberry juice. (The juice can be cranberry-apple for palatability, but should contain no added sugars.) Thus, the patient is taking 6–8 oz of fluid to increase urinary volume and flush the urinary tract. • Probiotic supplement • Urinate at first urge • Avoid sexual activity during treatment • Reduce dietary sugar intake other than fresh fruit. • Address/reduce any risk factors that might be present as discussed earlier in the chapter.
3–4	<p>If symptoms have lessened, continue protocol but decrease all doses to ½ of the original volume.</p> <p>If symptoms have not lessened, continue as for Days 1–2, taking 1 “00” capsule of baking soda with each dose of the uva ursi containing infusion.</p>	<p>If symptoms have lessened, continue protocol but decrease all doses to ½ of the original volume.</p> <p>If symptoms have not lessened, continue as above.</p>	<p>If symptoms have lessened, continue protocol but decrease all doses to ½ of the original volume.</p> <p>If symptoms have lessened, continue as above.</p>
5–7	<p>If symptoms have lessened or have disappeared, continue protocol but decrease all doses to ¼ of the original volume.</p> <p>If symptoms have not lessened, seek medical care.</p>	<p>If symptoms have lessened, continue protocol but decrease all doses to ½ of the original volume.</p>	<p>If symptoms have lessened, continue protocol but decrease all doses to ½ of the original volume.</p>
8–14	<p>UTI frequently recurs in the weeks after treatment. This is most commonly a problem with antibiotic treatment, but even with herbs, prophylaxis is preferable to retreatment. On days 8–14 maintain all day 5–7 treatment, but omit the uva ursi blend infusion from the protocol.</p> <p>Repeat days 5–7 for several days if patient notices any inkling of recurrence.</p> <p>Patients with a tendency to UTI can periodically repeat Days 3–7 without the uva ursi blend infusion as prophylaxis on a semi-regular basis, for example, for 1 week per month. In many cases this prevents recurrent episodes entirely.</p>		

Note: All of the protocol from each of the three columns should be followed concurrently. Symptoms usually begin to significantly resolve within 24–48 hours. If at any time symptoms worsen, or persist past 5 days, seek immediate medical care.

*Steep 1 hour or 4 hours, respectively

[†]See discussion of uva ursi use in pregnancy.

[‡]Pregnant women should not exceed 2000 mg of vitamin C supplementation daily because of risk of rebound scurvy in the infant.

Topical Treatment for Urethritis

Prepare a periurethral rinse:

7 g dried calendula blossoms

4 g dried lavender blossoms

3 g dried thyme leaf

Steep in 1 L of boiling water for 30 minutes. Cover while steeping. Strain and place in a peri-bottle to which has been added 1 tsp sea salt. Instruct patient to rinse the peri-urethral area with the tea after each urination and bowel movement (after wiping) and then pat dry gently.

Alternatively, the mix could be prepared by adding 1 tbs of calendula tincture and 5 drops each of thyme and lavender essential oils to 1 cup of warm water with 1 tsp sea salt, and use as per the instructions of the previous peri-rinse.

TABLE 9-2

Botanical Treatment Strategies for Simple Lower UTI

THERAPEUTIC GOAL	THERAPEUTIC ACTIVITY	BOTANICAL NAME	COMMON NAME		
Reduce infection	Antimicrobial	<i>Achillea millefolium</i>	Yarrow		
		<i>Arctostaphylos uva ursi</i>	Uva ursi		
		<i>Calendula officinalis</i>	Calendula		
		<i>Echinacea</i> spp.	Echinacea		
		<i>Lavandula officinalis</i>	Lavender		
		<i>Thymus vulgaris</i>	Thyme		
		<i>Vaccinium macrocarpon</i>	Cranberry		
Relieve spasm in urinary tract smooth muscle	Antispasmodic	<i>Achillea millefolium</i>	Yarrow		
		<i>Actaea racemosa</i>	Black cohosh		
		<i>Dioscorea villosa</i>	Wild yam		
		<i>Piper methysticum</i>	Kava kava		
		<i>Viburnum opulus</i>	Cramp bark		
		<i>Viburnum prunifolium</i>	Black haw		
		<i>Anemone pulsatilla</i>	Pulsatilla		
Relieve pain	Analgesic	<i>Corydalis ambigua</i>	Corydalis		
		<i>Eschscholzia californica</i>	California poppy		
		<i>Piper methysticum</i>	Kava kava		
		<i>Piscidea piscipula</i>	Jamaican dogwood		
		<i>See Endometriosis, Chronic Pelvic Pain, and specific Plant Profiles for discussions of analgesic herbs</i>			
		Soothe urinary tract irritation and inflammation	Demulcent Anti-inflammatory	<i>Althea officinalis</i>	Marshmallow
				<i>Solidago virga urea</i>	Goldenrod



Figure 9-1 Cranberry (*Vaccinium macrocarpon*). (Photo by Martin Wall.)

gave 1:30 concentrate given either in 250 mL juice or tablet form. There was no significant difference in the incidence of UTIs between cranberry juice vs. cranberry capsules.¹⁴ The safety of cranberries and their general healthful properties, along with combined empiric evidence of numerous practitioners, suggests that it is reasonable for women with no other significant health problems to use cranberry products for the prevention of recurrent UTI.¹⁵ A recent review article on cranberry

summarizes that “recent, randomized controlled trials demonstrate evidence of cranberry’s utility in urinary tract infection prophylaxis. . . . Cranberry is a safe, well-tolerated herbal supplement that does not have significant drug interactions.”¹⁶ Recommended daily doses of cranberry for the prevention of UTI vary. Based on the available literature, the therapeutic dose of cranberry juice is 30 to 300 mL daily or three 8-oz glasses of unsweetened juice daily, or one tablet (300 to 400 mg) of cranberry extract tablets twice daily.^{8,16}

Echinacea

Echinacea is used in protocol for women with an acute UTI and for prevention of chronic UTI. Although Echinacea is not used to directly address the UTI, it is included as an adjunct for overall immune support. Echinacea is discussed extensively in Plant Profiles: Echinacea.

Uva Ursi

Uva ursi (Fig. 9-2) is one of the most commonly used urinary tract disinfectants in modern herbal medicine.¹⁷ The leaves, taken as a cold or hot infusion, decoction, or tincture, are primarily used as an antiseptic in urinary tract infections.⁷ Uva ursi is commonly combined with urinary demulcents, such as marshmallow root or corn silk, and also may be taken with an herbal diuretic, most commonly dandelion leaf, but goldenrod or birch

Antimicrobial Herbs

Two primary herbs used as antimicrobials in the treatment of lower UTI are cranberry fruit and uva ursi leaf. Some controversy exists in using these two herbs together based on the disputed belief that uva ursi must be used in an alkaline urinary environment for efficacy, and that cranberry products acidify the urine. Modern herbal practice and emerging evidence suggest that, in fact, there may be no reason to avoid combining these herbs. It appears that although an alkaline environment may enhance the efficacy of uva ursi, effectiveness as a antimicrobial is not depending on the urinary pH, and in fact, cranberry may not significantly reduce urinary pH. Herbalists have long combined these herbs in UTI treatment protocol with excellent outcomes.



Figure 9-2 Uva ursi (*Arctostaphylos uva ursi*). (Photo by Martin Wall.)

leaf may be used as well. Diuretics are contraindicated in pregnancy. Cold infusion reduces the tannin content of the product, making it easier for the digestive system to handle and reducing the nausea sometimes associated with its use; however, cold preparations might be inadvisable for immunocompromised patients because of the potential for microbial contamination from the herbs. Uva ursi is approved by the German Commission E for the treatment of inflammatory conditions of the urinary tract.¹⁸ It is widely used in the treatment of uncomplicated acute and recurrent UTI, based on its astringent and antibacterial actions, and when antibiotics are not deemed essential.¹⁹ Midwives include the herb as an astringent anti-inflammatory in sitz baths and perineal rinses for postnatal perineal healing and as part of treatment of vaginitis and urethritis. Unfortunately, there are few clinical trials and pharmacodynamic studies of uva ursi. In vitro studies using crude leaf preparations and extracts of uva ursi leaf have demonstrated mild antimicrobial activity against known UTI-causing organisms including *C. albicans*, *E. coli*, *S. aureus*, and *Proteus vulgaris*, and others.²⁰ Several studies have also demonstrated

anti-inflammatory activity of the herb, particularly enhanced when extracts are used in combination with anti-inflammatory pharmaceutical drugs, such as prednisolone, indomethacin, or dexamethazone.^{21,22} One double-blind, placebo-controlled, randomized study of 57 women utilized a combination extract of hydroalcoholic extract of uva ursi leaves, standardized to an unknown amount of arbutin and methylarbutin uva ursi with dandelion leaf (*Taraxacum officinalis*) to evaluate the efficacy of this combination for the prevention of recurrent urinary tract infection. Inclusion in the study required that otherwise healthy individuals had suffered at least three episodes of cystitis in the past year and at least one episode in the last 6 months prior to this study. Patients received either the extract ($n = 30$) or placebo ($n = 27$) three tablets three times daily for 1 month and were then followed for 12 months. At the end of the 12-month monitoring period, significantly more women in the placebo group experienced recurrent cystitis compared with the treatment group ($p < 0.05$). No adverse effects were reported.^{17,23}

Some amount of disagreement can be found in the literature regarding the requirement of an alkaline pH environment for the efficacy of this herb. Some authors postulate that a reduced urinary pH inhibits the efficacy of the herb; others argue that increasing the alkalinity of the urinary environment enhances the efficacy of the herb, while still others state that activity is not dependent on urinary pH. Given the reliability of this herb generally, it is prudent to conclude that if uva ursi does not seem to be working, the addition of four “00” capsules of the equivalent of 1 tablespoon sodium or potassium bicarbonate may be taken once or twice daily, divided between uva ursi doses, to alkalinize the urine in such situations before making a final determination about efficacy.^{15,19,24,25}

The question of whether this herb is safe for use in pregnancy is difficult to definitely answer based on the available evidence. The Botanical Safety Handbook gives this herb a Class 2b and 2d rating: Not to be used in pregnancy, a caution that is reiterated by many authorities.^{17,18,26,27} However, the reasons for contraindication are variable and not well supported, ranging from alleged uterotonic and oxytocic activity to “theoretical fetotoxicity.”^{17,27} The original source of the concern of oxytocic activity appears to stem from Brinker, who reported that there is “empirical” evidence of oxytocic action with no further explanation.²⁸ Low Dog states that the herb has potential fetotoxicity because of its hydroquinone content. Studies using pure hydroquinone (i.e., not the whole herb or whole herb products) have produced microtubulin dysfunction in bone marrow, and exposure of human lymphocytes and cell lines to hydroquinone has been shown to cause genetic damage.¹⁵ However, giving pure constituent is not the same as giving a whole herb, a perennial problem in assessing the safety of herbs with conventional pharmaceutical testing models. Although Tyler et al. state that mutagenicity may be associated with this herb, other researchers report on low potential for mutagenicity and negative Ames’ test.¹⁷ In animals administered 100 and 400 mg/

kg per day of arbutin, no signs of fetal toxicity were observed.¹⁷ Uva ursi has been used by midwives as a mainstay treatment of acute symptomatic cystitis in pregnancy for over two decades in the United States with no adverse reports associated with its use.²⁹ Empiric observation demonstrates less recurrence of UTI with uva ursi versus treatment with antibiotics. The transference to infants of arbutin/hydroquinone from uva ursi use during lactation has not been researched and therefore is not recommended by German authorities; however, the risk remains speculative.¹⁸ McKenna et al. recommend using only the lowest doses during lactation, observing the infant for side effects, and using under the guidance of a knowledgeable lactation expert.⁷ It is always prudent to avoid the medical use of herbs during the first trimester unless absolutely necessary. In the case of uva ursi, it is advisable to avoid it entirely during the first trimester, and to use it only if it is the best option for treatment of UTI later in pregnancy, using only at a minimal effective dose and for minimal duration. Further research in this area is clearly needed, particularly given the volume and frequency of UTIs among pregnant women.

Yarrow

In vitro studies of the essential oil and methanol extracts of several species of yarrow found *Achillea millefolium* to be active against a number of pathogenic organisms including *Staphylococcus aureus*, *Klebsiella pneumoniae*, *Pseudomonas aeruginosa*, *Salmonella enteritidis*, *Aspergillus*, and *Candida albicans*, and also to possess antioxidant activity.^{30,31} Water extracts have also demonstrated antimicrobial activity.³² Two studies, however, while identifying antimicrobial activity in a number of herbs, did not demonstrate antimicrobial activity of yarrow.^{33,34} The German Commission E lists among its actions antibacterial, astringent, and spasmolytic. No other literature was identified evaluating use of yarrow for UTI. Herbalists typically recommend the tea, 1 cup two to four times daily, for its antimicrobial and mild diuretic effects. Mills and Bone assert that limited use in pregnancy has not been associated with adverse fetal outcomes. Evidence of increased fetal damage in animal studies exists, with unknown relevance to human consumption. Yarrow is generally contraindicated during pregnancy because of its potentially high thujone content and emmenagogic activity.^{27,35}

Demulcent and Anti-inflammatory Herbs

Goldenrod

Goldenrod is an anti-inflammatory, diuretic herb and spasmolytic favored for its beneficial effects in the treatment of UTI, which have been successfully demonstrated in both animal and uncontrolled human trials.^{19,36} It is described by the German Commission E monographs and ESCOP as used for irrigation therapy for diseases of the lower urinary tract, especially for inflammation, as well as for prevention and treatment of urinary calculi and renal gravel. The flavonoid (including quercetin), saponin, caffeic acid derivatives, and glycosides have been described as the active components.³² Goldenrod is taken as an infusion, 3 to 4 g of dried herb/150 mL

water, steeped 10 minutes, taken two to three times daily.^{19,32} It is suggested to take in conjunction with copious fluids.^{18,19,32} ESCOP contraindicates the use of European goldenrod in patients with edema because of impaired cardiac or renal function.¹⁹ Patients with allergies to plants in the Compositae family should avoid use of this herb. No data are available on use during pregnancy and lactation.

Marshmallow Root

Marshmallow root is soothing and anti-inflammatory to the throat and GI system.¹⁹ It is an excellent addition to water extracted uva ursi infusions and decoctions for its demulcent, soothing effects in the treatment of UTI.³⁵ The roots are rich in mucilage, which is composed largely of polysaccharides. Lack of studies on the pharmacodynamics of this herb in the urinary system make it impossible to conclude whether there are direct or indirect effects on the urinary epithelium of the urinary tract, but combination with uva ursi certainly reduces the possible irritation to the GI of the high-tannin content of that herb. Alcohol is not an effective menstruum for extraction of polysaccharides; therefore, only water-based extraction methods are used for this herb.

Antispasmodic Herbs

Discussions of specific antispasmodic herbs are found elsewhere in this book. All of the herbs listed in Table 9-2 as antispasmodics are used specifically for their unique ability to relieve spasms in the pelvic organs, mostly through their action on smooth muscle. Yarrow has mild antimicrobial activity. Kava kava has a reputation for marked action specifically on the bladder, and is especially valued for treatment of neurogenic bladder pain. Yarrow and kava kava are contraindicated in pregnancy and should be used with caution in lactation. See Plant Profiles: Kava kava for specific precautions with its use. Wild yam has been used historically for its ability to ease spasms in the hollow organs, and is considered a valuable herb for the treatment of cramping associated with lower UTI, as are cramp bark and black haw. Black cohosh is specifically indicated for pelvic discomfort and cramping that are also associated with drawing pains in the lower back and legs. See plant profiles: Black Cohosh, for safety consideration. Yarrow may be taken as a tea or infusion, alone or added to other UTI specific herbs, but otherwise these herbs, including yarrow, generally are included in tincture form with other herbs for UTI, typically as 10% to 50% of the formula.

NUTRITIONAL CONSIDERATIONS/ ADDITIONAL THERAPIES

Probiotics

There is limited research on the influence of diet on UTI. Midwives and herbalists commonly suggest a reduction in dietary sugar consumption and an increase in fluid intake, with the addition of cranberry juice, as discussed. Because urinary tract infections are often caused by bowel flora, which are pathogenic in the urinary tract, one train of thought is that modification

of bowel flora may lead to a reduction in recurrent UTI.^{37–40} The use of probiotics to restore normal vaginal flora, and thus provide a competitive bacterial barrier to uropathogens is emerging as an area of research in the prevention of recurrent UTI.^{1,13} Proponents of this approach use specific microorganism strains to restore the vaginal lactobacilli microflora such that the indigenous lactobacilli recover, or the patient retains some degree of acidic pH and protection against infection. The basis for use of probiotics emerged from clinical observations in 1973, when a study of healthy women showed an association between lactobacilli presence in the vagina and absence of UTI history. Results from a limited number of studies have demonstrated a significant reduction in recurrence rate of UTI using one or two capsules vaginally per week for 1 year, with no side effects or yeast infections. A two-strain combination is recommended for vaginal use: *L. rhamnosus* GR-1 is used for its anti-Gram negative activities and resistance to spermicide, and *L. fermentum* RC-14 is included for anti-Gram positive cocci activities and hydrogen peroxide production. Various protocols have been explored, such as administration postmenses, one or two capsules per week, or one capsule daily for 3 days.³⁷ Studies are needed to determine whether healthy people and those prone to recurrent urogenital infections benefit from daily ingestion of probiotics, such as *L. rhamnosus* GG, the most clinically documented probiotic strain for gut health. A study using this strain in fermented milk has suggested some reduction in UTI recurrences. The potential for intestinal probiotics to influence bladder and vaginal health through immune modulation has not been fully explored.⁶ Researchers in one study concluded that dietary habits may be an important risk factor in UTI recurrence. One-hundred thirty-nine women from a health center for university students or from the staff of a university hospital (mean age: 30.5 years) with a diagnosis of an acute UTI were compared with 185 age-matched women with no episodes of UTIs during the past 5 years. Data on the women's dietary and other lifestyle habits were collected by questionnaire. A risk profile for UTI expressed in the form of adjusted odds ratios (ORs) with 95% CIs was modeled in logistic regression analysis for 107 case control pairs with all relevant information. Frequent consumption of fresh juices, especially berry juices, and fermented milk products containing probiotic bacteria (e.g., yogurt, cultured milk, cheese) was associated with a decreased risk of recurrence of UTI. A preference for berry juice over other juices, and consumption of fermented milk products three times weekly were both associated with a reduction in recurrent UTI.¹² The efficacy of probiotics depends on having the proper strains, prepared and stored to maintain their activity. According to Low Dog, a recent analysis of 20 probiotic products claiming to contain specific *Lactobacillus* species found 30% of products to be contaminated with other organisms, and 20% of products contained no viable species whatsoever.¹⁵

Vitamin C

Vitamin C has is used as a bacteriostatic and acidifying agent in the treatment of urinary tract infections.

Studies have shown, however, that it actually does not significantly acidify the urine. It is likely, therefore, that it is having a bacteriostatic action through other mechanisms not yet fully elucidated. It was demonstrated by Carlsson et al. that large amounts of a bacteriostatic gas (NO) are formed in mildly acidified nitrite containing human urine and that NO formation is greatly enhanced by the addition of vitamin C. Moreover, mildly acidified nitrite-containing human urine showed antimicrobial activity against three of the most common urinary pathogens and this inhibitory effect was further increased after addition of ascorbic acid.⁴¹

TREATMENT OF AN CASE HISTORY 1: UNCOMPLICATED LOWER UTI IN A NONPREGNANT WOMAN

Lisa, a 32-year-old married mother of four young children, has a history of UTI since her teenage years. Throughout her adult years, infections have recurred regularly, and with more frequency during times of stress. She has always received antibiotic treatment in the past. She is overweight (5'2" and 220 pounds), with no reported health problems and an unremarkable gynecologic history and no history of pyelonephritis or other renal problems. She has been a regular patient in a midwifery practice through the pregnancy and birth of her fourth child, now 3 months old and breastfeeding. Her pregnancies were uneventful, though likely with undiagnosed gestational diabetes. She had mild transient glucosuria, and large babies (on average, 9 lbs), the most recent birth resulting in a shoulder dystocia that was resolved with no consequences to mother or newborn. She has not been diagnosed with gestational diabetes, but was told that she could be at risk for the later development of adult onset diabetes. She has a family history of marked obesity (maternal, sister).

Lisa presents with an acute, severe UTI, which by 10 PM when she phoned the office on an emergency basis, had led to a complete inability to void accompanied by pain (8 on a scale of 1 to 10), nausea, and malaise. She is afebrile on self-reporting, and has no other symptoms, but is extremely anxious and does not want to go on another round of antibiotics, particularly while breastfeeding. Her husband had picked up an over-the-counter medication for her to take to help her void. She does not know the name of it but described it as a "little blue pill" that she has used several times before. It did not help and now she is concerned. She was reassured that her UTI was a solvable problem, but that given the hour we needed a strategy. Her husband agreed to make the 45-minute drive to the office to fill a prescription from the apothecary, and she began an herbal protocol immediately, with a 24-hour observation period: If symptoms improved she would continue with the botanical protocol; if they did not, or at any point worsened, she would obtain medical treatment.

Her protocol is a standard botanical UTI intervention as follows:

Days 1–2

Drink:

- One 6- to 8-oz glass of water or diluted, unsweetened cranberry juice alternating every hour throughout the day.
- ½ cup of uva ursi and marshmallow infusion four times daily (see the preceding for preparation)
- 500 mg vitamin C and 4 mL of echinacea tincture every 4 hours
- If necessary for spasmodic bladder, take 3-mL antispasmodic tincture, including equal parts of wild yam, cramp bark, and yarrow.

Avoid:

All sugar, including honey, maple syrup, and other natural sugars, in food products.

Days 3–5

Repeat above protocol but reduce all doses by 50% frequency.

Days 6–7

Repeat days 3–5, but take only ¼ cup of the decoction.

Lisa began the protocol immediately that night, and given the acute situation, woke repeatedly throughout the night to continue. By 4 AM she voided copiously, and by morning her symptoms had improved mildly but not significantly. She continued the protocol throughout the day with no further improvement. By 4 PM, suggested she take two “OO” capsules of baking soda with her next two doses of the uva ursi decoction, after which marked improvement ensued. By the next morning, she was voiding normally and beginning to feel symptom free. By day, 3 she was completely symptom free and continued the protocol until completed. She phoned 3 weeks later saying she was thrilled that she had not had her typical relapse and was able to avoid antibiotics. We discussed her tendency to UTI, as well as the possible association with diabetes, and she was encouraged to reduce the sugar consumption that was a regular part of her heavily carbohydrate-based vegetarian diet. She was also reminded of the importance of voiding soon after she felt the urge, rather than waiting until a convenient time when she was not busy with her small children, and to urinate before she sat down to nurse the baby, rather than holding it until the baby was finished.

CASE HISTORY 2:

TREATMENT OF AN UNCOMPLICATED LOWER UTI IN A PREGNANT WOMAN AT 8 WEEKS' GESTATION

Note: The following case is from the late 1980s, prior to the publication of contraindications to the use of uva ursi during pregnancy and prior to ACDG recommendation for antibiotic treatment of all UTI in pregnancy. Should a pregnant woman experience recurrent infection, cranberry juice, increased fluids, and vitamin C, along with lifestyle changes, should be considered, or appropriate antibiotic therapy employed.

Michelle, age 24, phoned early in the morning with presenting symptoms of frequent urination, light, irregular uterine cramping, and blood-tinged vaginal mucus. She was 8 weeks pregnant with her first child, and

planning a home birth with a midwife. She had no other medical problems. Vaginal examination revealed a closed cervix and speculum inspection revealed no evidence of blood in the vaginal canal or around the cervix. Her past history of frequent UTIs and current symptoms suggested that UTI might be the problem, and a urine dipstick provided preliminary confirmation. She suspected that she might be slightly dehydrated from the intense heat of summer, and she and her partner had also had sex the previous morning. Michelle wanted to avoid antibiotics if at all possible because of a history of vaginal candidal infections following past treatment for UTI, but understood that if symptoms persisted, antibiotics would be necessary. A 24-hour trial was agreed upon with support of her family doctor, with medical intervention to be sought should symptoms worsen or persist, and a prescription for an antibiotic made available.

Michelle immediately began an intensive regimen of cranberry juice concentrate diluted in water every 2 hours, alternated with an 8-oz glass of water every 2 hours, 500 mg vitamin C 4 times daily, and ¼ cup of uva ursi and marshmallow root infusion every 2 hours, prepared with 7 g each of the herbs steeped in 1 liter of boiling water. The herbs were left to sit in the infusion, the liquid being strained off for each dose.

Within 8 hours, symptoms began to improve, and all cramping and spotting had completely ceased by 24 hours. She decreased the dose and frequency of the uva ursi and marshmallow infusion to ½ the original recommendation for the next 24 hours, and after this remained on the cranberry juice preparation for 5 days, drinking three glasses per day, and maintaining a high water intake. She has no further episodes of recurrence and gave birth to a healthy child after a full-term pregnancy, with no complications, at home.

INTERSTITIAL CYSTITIS

Eric L. Yarnell

The syndrome of chronic urinary bladder inflammation, pelvic pain, and frequent urination was dubbed interstitial cystitis (IC) in the 19th century. There is no uniform or pathognomonic histopathologic lesion; rather, IC represents part of a spectrum of irritative pelvic syndromes not clearly resulting from infection.⁴² Although some patients have ulcerations of the bladder epithelium, these occur in less than 10% of cases. Interstitial cystitis generally affects women beginning around 40 years of age, and also affects men.⁴³ Generally speaking, IC waxes and wanes but does not tend to spontaneously remit except in a minority of patients. Although anxiety, depression, and psychosocial distress (including inability to work owing to pain and frequency of urination) are common accompanying complications, the condition itself does not progress and has no known life-threatening complications.

PATHOPHYSIOLOGY

Interstitial cystitis is a multifactorial disorder with no definitively established etiology.⁴² Connections to allergy