

## Bladder Infections In Women: Patient Information

Bladder infections (*cystitis*) are relatively common occurrences among females. *Acute uncomplicated bacterial cystitis* is an infection of the bladder that can cause burning, frequency, urgency, bleeding, urinating small volumes, incontinence, and pain (abdominal, pelvic, or lower back). A patient who I recently saw for cystitis described it as “urinating pine cones,” a very colorful, but appropriate description. Lab studies usually show bacteria, white blood cells and red blood cells in the urine. 80-90% of cystitis is caused by *Escherichia coli*, 5-15% by *Staphylococcus* and the remainder by less common pathogens including *Klebsiella*, *Proteus*, and *Enterococcus*.

Cystitis occurs when bacteria that normally inhabit the colon or vagina gain access to the urinary bladder. While cystitis is common among the female population, it is rare among the male population. Anatomical differences that promote cystitis in women are the short female urethra and the close proximity of the urethra to the vagina and anus, areas that are normally colonized with bacteria. The occasional occurrence of cystitis—while a nuisance and oftentimes uncomfortable—is usually easily treated with a short course of oral antibiotics. When bladder infections recur time and again, it becomes a major source of inconvenience and suffering for the patient, and it becomes important to investigate the source of the recurrence.

A urinary infection is considered *complicated* under the following conditions: if it involves the *kidneys*; if it occurs during *pregnancy*; if the bacteria are *highly resistant* to antibiotics; if there is a *structural abnormality* of the urinary tract; if it occurs in *immune-compromised* patients, including diabetics; in the presence of a “*foreign body*” such as an indwelling urinary catheter, urinary stent or urinary tract stone.

For an infection to develop, there has to be vaginal colonization with pathogenic bacteria (bacteria that can cause an infection and not the normal healthy bacteria that reside in the vagina); movement of these bacteria into the bladder; and finally, attachment of the bacteria to the cells that line the bladder. Whether or not an infection develops is based upon the interaction of female protective mechanisms (“defense”) and bacterial virulence factors (“offense”). “Defense” factors include an acidic vagina, which inhibits the growth of the type of bacteria that cause infections while promoting the growth of “good” bacteria such as *lactobacilli*; the presence of a *mucopolysaccharide* layer that protects the bladder lining; and *immune cells* present in the urine that block the adherence of bacteria to the bladder cells. Additionally, the *dilution* action of urine production and the *flushing effect* of urinating can wash out bacteria before they have a chance to latch on to the lining of the bladder. Bacterial “offense” factors include *fimbriae*, tentacle-like structures that promote attachment to the bladder lining cells and the capability of bacteria to evolve and develop *resistance* to antibiotics.

Women aged 18-24 years old have the greatest prevalence of acute uncomplicated bacterial cystitis and sexual activity often is a factor in bacteria finding their way into the urethra and bladder, hence the term “honeymoon cystitis.” The following are risk factors for cystitis: a new sexual partner; recent sexual intercourse; the use of spermicides, diaphragms or spermicide-coated condoms. Spermicides can change the vaginal “environment” and

promote the presence of different bacteria from the normal flora. Being overweight can play a role in promoting cystitis since it is more difficult to maintain good hygiene under this circumstance.

Cystitis also occurs with increased prevalence in the post-menopausal population, based upon changes that happen because of estrogen deficiency. As a result of low levels of estrogen, there is a change in the normal bacteria (flora) of the vagina in which *E. Coli* replaces *lactobacilli*. Topical estrogen cream has been shown to reverse vaginal colonization with *E. Coli* and helps prevent cystitis. Other factors are an age-related decline in immunity; incomplete bladder emptying; and the not uncommon occurrence of urinary and fecal incontinence often managed with pads, which remain moist and contaminated and can promote movement of bacteria from the anal area towards the urethra. The presence of diabetes (particularly when poorly controlled, with high levels of glucose in the urine that can be thought of as “fertilizer” for bacteria), neurological diseases, pelvic organ prolapse, obesity and poor hygiene further increase the prevalence of cystitis among older women. Irritable bowel syndrome, colitis or any other cause of diarrhea can play a role in the development of cystitis.

It is important to distinguish a symptomatic urinary infection from *asymptomatic bacteriuria*, *urethritis*, *vaginitis*, and *Painful Bladder Syndrome (PBS)/Interstitial Cystitis (IC)*. Asymptomatic bacteriuria is the presence of bacteria within the bladder without causing an infection. Asymptomatic bacteriuria does not require treatment, since treatment is most often futile and achieves nothing but selection of a resistant organism—in other words, by unnecessarily exposing bacteria to an antibiotic environment, bacteria can evolve and adapt to become modified in such a way that the antibiotic is no longer effective. Asymptomatic bacteriuria needs only to be treated in pregnant women and in patients undergoing urological-gynecological surgical procedures. Urethritis is an infection in the urethra; vaginitis is a vaginal infection; and PBS/IC is a chronic inflammatory condition of the bladder that can mimic the symptoms of cystitis.

The diagnosis of cystitis is on the basis of urinalysis and culture. A urine specimen is obtained after cleansing of the vaginal area with an antibacterial wipe and collection of a mid-stream voided specimen. At times, catheterization is necessary to obtain a specimen. *Dipstick* is the fastest and least expensive means of screening for an infection, but it is not very accurate and fraught with false positives and negatives. *Microscopy* is much more accurate, seeking the presence of bacteria, white blood cells and red blood cells. The definitive test is *urine culture and sensitivity*, which will demonstrate the bacteria responsible for the infection, the quantitative bacterial count, and those antibiotics that are most likely to be effective.

Treatment of cystitis is based upon antibiotics to eradicate the bacteria. In the case of recurrent cystitis, it is important to do an evaluation to rule out a structural cause. This generally involves imaging—often an ultrasound (using sound waves to obtain an image of the urinary tract)—and a cystoscopy (a visual inspection of the urethra and bladder with a flexible scope). This will check the entire urinary tract, including the kidneys and bladder. Findings may be a (*cystocele*) *dropped bladder*, a *stone* within the urinary tract, a *urethral stricture* (a *narrowing in the channel leading out of the bladder that causes an obstruction*), a *urethral diverticulum* (a *pocket connected to the urethra*), or a *fistula* (abnormal connection between the colon and bladder).

After treatment of the acute infection, it is important to make changes in order to help minimize recurrent episodes of cystitis. After urination or a bowel movement, it is important to wipe in a top-to-bottom direction to avoid bringing bacteria from the anus up towards the urethra. It is also important to remain well hydrated to keep the urine from becoming very concentrated: *“The solution to pollution is dilution”* applies well to urinary infections. It is important to urinate on a regular basis over the course of the day, utilizing the natural flushing effect of urination to wash out the bladder and keep it from becoming over-distended. Many workers such as nurses and teachers do not have the time to empty their bladders during the course of their days, and they often end up predisposed to cystitis. It is very important to urinate after sexual activity to help flush out any bacteria that may have been introduced into the urethra and the bladder.

One option for the management of recurrent cystitis is the self-administration of a short course of antibiotics when the cystitis symptoms first occur. It is useful to first test your urine using a dipstick (although not perfect, it is great for home screening) when the symptoms of cystitis arise. This has proven to be safe, economical and effective. Alternatively, a single dose of antibiotic can be administered just before or after sexual activity if the infections are clearly sexually related. Another possibility is a single dose of antibiotic administered on a prophylactic basis every evening or every other evening to prevent recurrent cystitis. *Methenamine* is converted to formaldehyde in the urine and can help prevent recurrent infections. Cranberries, lingonberries, and blueberries contain *proanthocyanidins* that inhibit the adherence of bacteria fimbriae to the bladder cells, acting as anti-adhesives and helping to prevent bacteria from attaching onto bladder cells and causing an infection. There are formulations of *cranberry extract* available to avoid the high carbohydrate load of cranberry juice. *Estrogen cream* applied vaginally can help restore the normal vaginal flora and thus help prevent cystitis. *Probiotics* promote healthy bacteria colonization of the vagina, production of hydrogen peroxide that is toxic to bacteria, maintenance of acidic urine, induction of an anti-inflammatory response in bladder cells, and inhibition of attachment between bacteria and the bladder cells.

In summary, bladder infections in females are common, annoying, but rarely serious. They are very treatable, and those who suffer with recurrent infections can be nicely managed.

### **Pearls To Help Keep Cystitis Away**

- **Wipe in a top-to-bottom motion after using the bathroom**
- **Stay well hydrated to keep the urine dilute**
- **At minimum, urinate every four hours while awake to avoid an over-distended bladder**
- **Maintain a healthy weight**
- **Urinate after sexual activity**
- **If infections are clearly sexual related, an antibiotic taken pre or post-sexually can usually preempt the cystitis**
- **If you are diabetic, maintain the best control possible**
- **Topical estrogen can be helpful for the post-menopausal female**

- **Seek urological consultation for recurrent infections to check for an underlying and correctable structural cause; if none are found, there are a number of means of managing recurrences, including self-diagnosis/self-treatment; daily antibiotic prophylaxis; daily methenamine; cranberry extract; probiotics**