

Stephanie Chisolm:

Hello, and welcome to Urinary Tract Infection After Radical Cystectomy. This is a Patient Insight Webinar from the Bladder Cancer Advocacy Network, and is supported by our sponsors. An untreated urinary tract infections can turn into very serious problems and need immediate care, so BCAN is delighted to welcome nurse practitioner, Krisztina Emodi, from the University of California San Francisco, for a discussion of UTIs after bladder removal. Welcome, Krisztina, it's so nice to have you. I know you work with a lot of patients who have UTIs, and this is a really important topic for us, and we're really delighted to have you with us.

Krisztina Emodi:

Thank you so much, Stephanie, and thank you to BCAN for having me. I feel like as a nurse practitioner, I'm really bridging between our fabulous nursing team and our incredible surgeons, and I have a unique role and opportunity to interact, really with our patients and see the full spectrum of recovery, and all the challenges that come up over time. I would like to address in the next 45 minutes to an hour, just some basic anatomy of what a diversion looks like, distinguishing between an infection versus having asymptomatic bacteria in the urine, understanding some of the diagnostics and treatments as it relates to infections found in bladder cancer patients.

I will have some information on patients who have non-muscle invasive bladder cancer undergoing either BCG, but I think, really the bulk of this presentation will focus on people after diversions, and how to work around this. Identifying situations when antibiotics absolutely should be used, have to be used. Identifying clinical situations when suppression is beneficial, and many of you might have heard of antibiotic suppression on shorter or longer term to control urinary tract infections. Then I think,

LEARNING GOALS

- *The anatomy of a urinary diversion
- *Distinguish between UTI vs asymptomatic bacteriuria
- *Understand diagnosis and treatment of UTI found in bladder cancer patients
- *Identify situations when antibiotics SHOULD be used
- *Identify clinical situation when suppression is beneficial
- *Prevention, helpful supplements and some magic in your GUT

ultimately, really the main goal is how to prevent these infections, what are the helpful supplements, and how do we work the magic in your gut, so to speak, because they're all connected to the gut at some point.

When we're looking at definitions of infections in a regular urinary system, they're divided into simple and complex infections, just by the nature of our bladder cancer, whether you have invasion, no invasion, diversion, BCG injection, we are all in the complicated urinary tract infection domain. What this implies, is that generally people have some sign of infection, whether that's a low grade fever, you might have some systemic illness, chills, fatigue, malaise, maybe

some flank pain, nausea, vomiting, but I think the overlying arch after cystectomy, is that people just wake up and the very next day they feel like you have a cold or a train hit you, and the day before there was absolutely nothing went on with you. I oftentimes see that people overlook this symptom, and so you may have had a few infections on board, and then you start to recognize your own symptoms. Oftentimes not a single symptom is really coming by itself, meaning generally people would feel, "There might be some smell and change in my urine. There might be more mucus. I feel more tired. I had some low grade fever a few days ago."

Krisztina Emodi:

When we are looking at recurrent infections, and this talk will focus on that also, sorry, it's really ... the clinical definition, although some people disagree with this, clinically, two episodes of an infection in six months or three episodes of symptomatic infection that needed treatment in 12 months.

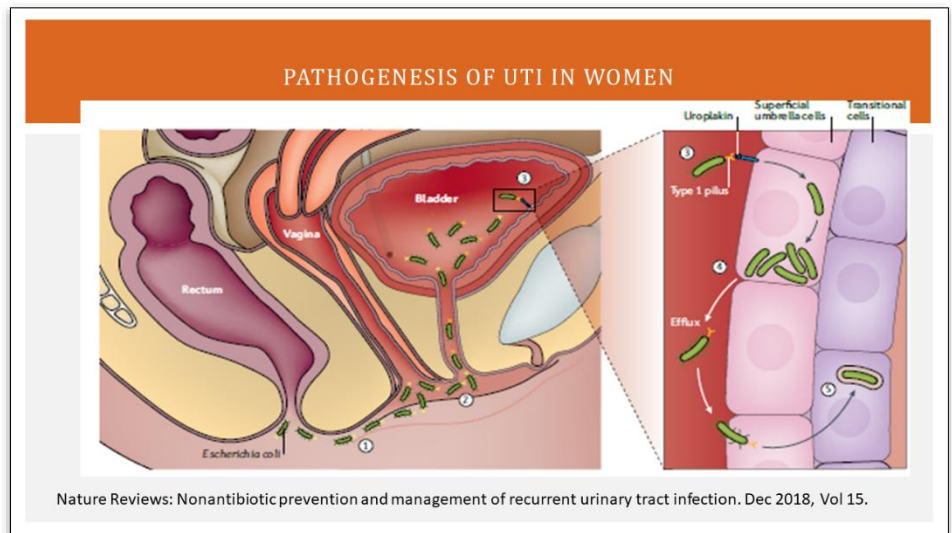
I'm going to just touch base on a very basic idea of pathogenesis of having a UTI in women, and obviously this is prebladder removal, but it still will have applications post-removal. So the colonization of the vaginal wall and the area between the rectum, your vagina and the bladder, is basically full of uropathogens, predominantly E.coli. E.coli is obviously coming through the rectum, most of the time with food, and there has been a lot of

CLINICAL DEFINITIONS

- **Complicated UTI, Traditional Definition:**
 - Structurally or functionally "abnormal" urinary tract: anatomic abnormality, stone, obstruction • Immunosuppression • Catheter/urologic instrumentation
 - Diabetes • Pregnancy • Male gender (IC/PBS)

- **New Definitions to avoid antibiotic resistance: (with diversions)**
 - Signs of infection extending beyond bladder: • Fever • s/sx of systemic illness; e.g. chills, significant fatigue and/or malaise • Flank pain • CVA tenderness • N/V

- **What are recurrent UTIs? –nothing is universally accepted (2 episodes w/ sx in 6 months or 3 in the past 12 months?)**



research linking, predominantly poultry and turkey, how those E.colis, the bacterial colonization is passed from animal product to humans. When you excrete this E. coli there is usually colonization between the vaginal wall and the bladder.

Krisztina Emodi:

There are very particular little arms of pili that this bug gets attached to, and basically gets internalized into these highly specialized cells in the bladder or the bladder wall, creating symptomatic infections. When we are looking at studies, there have been 12 different strains of E.colis that have been found that share common genetics, common microbial resistance, or antibiotics susceptibility between meat, poultry, and human strains of E.coli. I do believe personally that what you eat, either pre cystectomy, post cystectomy is really important, and it should generally help you to decrease some of the colonizations, however that is E.coli specific.

The GAG layer is an important, very cool layer in the bladder, so to speak. Again, this is focusing on people with bladders. The GAG layer is a very specific, very thin, and mucus-like layer that protects the epithelial cells in the bladder. It is having a specific permeability to kind of let good things through, and block out pathogens or block out toxins that are in your urine. Once this GAG layer gets disrupted,

again, people undergoing BCG treatments, intravesical treatments, people having these treatments, and now they're dealing with cystitis or bladder pain syndrome. Generally, we focus on the rebuild of this GAG layer. I think this idea has been around for quite a long time. There have been some intravesical therapies to rebuild the GAG layer, however some of it, I think, is questionable, looking at data and safety. There is one ... basically, this is to protect, a supplement that people are using to help with this rebuilding. In my personal experience, when people actually need to rebuild tissue, hyperbaric oxygen has been the most successful long-term solution, because you can't rebuild these layers very fast. It takes time and patience.

GAG LAYER = GLYCOSAMINOGLYCAN



CystoProtek; This is a natural supplement that can help to replenish the GAG lining of the bladder wall.

Krisztina Emodi:

Now, to launch into diversions, and I really want you to have a good understanding what your diversion looks like. I will be focusing on both the ileal conduit and neobladders, along with the Indiana pouch. However, I think ultimately the understanding is about the same, once you have had bladder cancer, leading to removal of your bladder, we are needing to utilize the small bowel to reroute your urinary system.

I really like this picture from

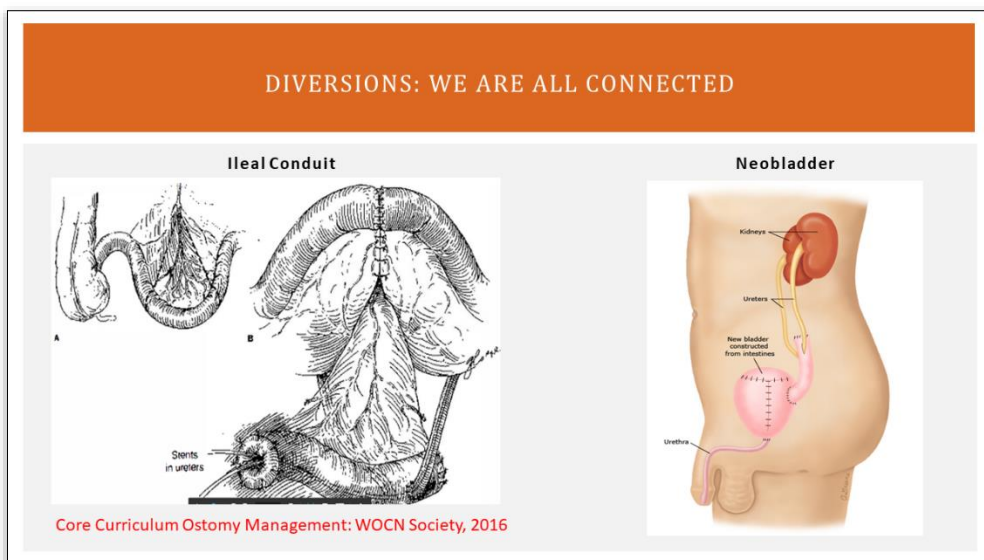
some of the Core Curriculum Ostomy Management trainings that we did, because I feel like a lot of patients don't have a clear understanding what's connected where, and why are we getting infections oftentimes. For us to reroute your urinary system, we need to go upstream from the terminal ileum. This is basically the end of the small bowel, so the end of that curve connecting into the large bowel, and there's a valve that blocks the flow of stool going backwards in the small intestine basically. It is really important because your small intestine's job is to produce mucus, absorb nutrients, and we have trillions of bacteria living in our gut.

Once we make this triangular resection, and we suture the bowel back together, so this is your anastomotic site from surgery, the triangular shape, which kind of looks like a pizza here, is brought to the surface area via your stoma. Your stoma is sitting in the right lower quadrant of your abdomen, the bowel mesentery, lymphatics, vascular structure, blood flow, again, your gut microbiome is a 100% connected to the rest of your small bowel and GI function. This is the first point of needing to understand that without having a healthy gut, it's very difficult to avoid ongoing infections because your urinary system now, as you can see on the bottom portion on the right of the first picture, your ureters are directly sutured into this terminal ileum in a form of your conduit, and now we are all connected.

Krisztina Emodi:

In the neobladder it's very similar. We are removing nearly four to five times more bowel tissue for us to reconstruct a neobladder. Your ileum is approximately an inch. We are needing to reconstruct the sphere from cylinder. There's lots of surgical clips for us to reconstruct. On the right side, you see the chimney of the neobladder, and the ureters are connected to this chimney. Bottom line is, between these two systems, there is no valve to block the reflux of urine into the kidneys, into your ureters, both of these systems produce mucus, and the stagnating mucus is a very high infection risk if people not empty properly.

The clinical considerations that I always have, and these are just questions in my head when I see my patients, if you have had no cystectomy yet, but again, you're under bladder cancer treatment or intravesical treatment, "Have you had any cystoscopy recently? Instrumentations? Any tumor resection? Have you had any cystitis? What have you worked with? Have you had any pelvic floor evaluations



leading to urinary tract infections? Any urodynamic studies that are very helpful oftentimes when we are not knowing what to do, and we keep having issues?" GI management and constipation. People who are constipated because your bowels are interior very ... much more likely to develop basically urinary issues over time versus people who are not, or who have, again, healthy GI flora.

After diversion, if

somebody keeps having infections, the very first question in my head, "Have you ruled out actually any structural abnormalities? Have you spoke to your clinician if you haven't had a recent renal ultrasound, or you haven't had a recent scan?"

Post-COVID, I feel like a lot of people ... unfortunately, everything has gotten pushed out along the block further. We need to evaluate that you don't have any strictures, so where the ileal conduit and the ureters are reconnected, you want to be sure that nothing is strictured down there, and the actual mechanics of the conduit is intact. Have you formed any stones? Your bladder is impermeable, and basically you're not absorbing or reabsorbing any electrolytes or toxins from the urine. When you had diversion, unfortunately, your bowel is functioning just like a bowel tissue, it would be absorbing things, and potentially forming stones. Sometimes there's potentially a stone sitting in the back of the conduit, or very close to where the ureters are connected into the conduit. This is very easy to see, even in clinic, we don't necessarily need a cystoscope. Sometimes I can just actually use a tube that we use for blood draw, and I can put the curvy end of the tube inside the conduit, shine a light, and I can actually see, mostly all the way to the conduit.

Krisztina Emodi:

Stone stenosis, this can happen both for ileal conduits, or it can happen in Indiana pouch. This is basically the real narrowing of the stomal OSS, to the point where urine is sitting in the back of the conduit, unable to drain properly, leading to urinary reflux through the ureters, potentially causing dilation of your ureters, and the dilation of your renal pelvis, because urine is no longer "sterile," and you are now having mucus mixed with this urine that is refluxing. Think of it like pond with algae, instead of having a beautiful river floating and having trouts jumping at you, really important to know that the actual flow is proper. If we have a basic ultrasound, and we are thinking that there is actually stricture or hydronephrosis, or hydroureter, your clinician needs to rule out that it's actually a real stricture. Your kidneys need to function 50/50, and the next step is renogram, which is a special nuclear scan for us to answer that question.

I think bottom line of this slide, once the mechanics are rolled out, then we can move on and discuss why do we develop these infections, and what needs to be happening with your workup and prevention. In the conduit, your main thing, again, is drainage, so this is your simple stuff, that I still run into patients

CLINICAL CONSIDERATIONS

Before diversion:

- *Any recent cystoscopy or TURBT?
- *Any recent BCG instillation or hx of cystitis?
- *What have you tried?
- *Any UDS evaluation?
- *Any pelvic floor evaluation?
- *GI management? Constipation?

After diversion:

- *Have you been r/o for any structural abnormalities such as anastomotic stricture, stone, stomal stenosis?
- *Renal U/S to r/o hydronephrosis & ureter

This would require a nuclear scan called the Renogram to estimate the differential function of the kidneys & stricture → all normal, we can address UTIs and colonization

occasionally from who had surgery 15 years ago, not connecting religiously to their overnight bag, not emptying your ostomy bag on time below the level of the stomas. Again, once urine goes above it, we are back-flowing into that conduit, refluxing into the ureter. Is your skin intact? How are you doing your ostomy care? For example, if you are having major dermatitis or moisture-related yeast on the skin, that can also affect your urine and potentially people can come down with a massive yeast infection, both on the skin and within their urinary system. Again, are we taking any supplements, diet, probiotics, et cetera?

Krisztina Emodi:

The neobladder is slightly different, because once the bladder is resected we are removing all nerves connected to the bladder. The formation of this information from your bladder to communicate to your brain, when you have a bladder, when to pee, is actually very complex. Once it's resected, your neobladder is basically a pouch inside, if you're not emptying that pouch properly, again, with stagnating urine and mucus, you are at a very high infection risk. Do you self-catheterize? What is your catheterization routine? How often do you catheterize? Do you know how much residual urine do you have? At night, do you get up at night? A lot of times people get very tired from getting up, I think more so within the first six months of surgery. I've had patients using condom catheters because they were so exhausted, and over time, this again, led to having not only a urinary tract infection, but massive pyelonephritis. I think the equation that I sort of came up here with combination of mucus, and stagnating urine, leading to bacterial overgrowth, leading to an infections.

Probiotics have been shown effective in multiple clinical trials. Again, I think a lot of it has been targeting E.coli specimens that are particularly colonizing rectal and vaginal areas. However, I think the bottom line is that having a healthy microbiome in your gut will be affecting the rest of the health of your conduit, and the neobladder, how everything is connected.

Some of the foods that can affect your conduit or your neobladder. I've had a few questions regarding smell. Smell is not necessarily an indication in itself whether or not you have an infection. I think, when I

said at the beginning, usually symptoms don't come by themselves, so if you just have really, really bad smell, but no other symptoms, you might have some over colonization, but also there are very specific odor-producing foods that are affecting your urine smell 100%.

FOODS THAT CAN CAUSE URINE TO SMELL

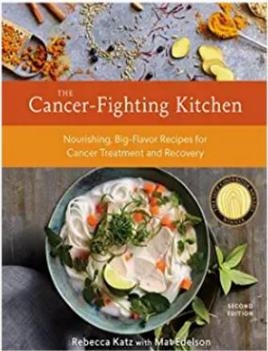
[HTTPS://WWW.OSTOMY.ORG/WP-CONTENT/UPLOADS/2022/02/FOOD_REFERENCE_CHART_2022-02.PDF](https://www.ostomy.org/wp-content/uploads/2022/02/food_reference_chart_2022-02.pdf)

United Ostomy Association: Food Chart

***ODOR PRODUCING:**

- ASPARAGUS
- BROCCOLI
- BRUSSELS SPROUT
- CABBAGE
- CAULIFLOWER
- EGGS
- FATTY FOODS
- GARLIC
- LEGUMES (e.g., BAKED BEANS, LENTILS, PEAS)
- ONION
- SMOKED FOODS
- STRONG CHEESE

SOME MEDICATIONS
SOME VITAMINS



***ODOR CONTROL:**

- CONSUME PROBIOTICS (e.g., YOGURT, AIDS IN DIGESTION)
- EAT SMALLER/ MORE FREQUENT MEALS, AIDS IN DIGESTION
- FRUITS AND VEGETABLES; HELPS KEEP THE COLON CLEAN
- STAY WELL HYDRATED AND AVOID CONSTIPATION
- ODOR ELIMINATORS (DROPS, GELS, SPRAYS, TABLETS, SACHETS THAT CAN BE PLACED INTO AN OSTOMY POUCH)

Krisztina Emodi:

These are from the United Ostomy Association site for food chart, and you can download it. They have their PDF reference for all kinds of additional information, and I find it very helpful, and then just some simple ideas of how to control odor if it's truly regarding odor.

As far as diet goes, I usually get a lot of questions how to prevent things. The book that we use at the UCSF Cancer Center is called The Cancer Fighting Kitchen from one of our local authors, Rebecca Katz, from the North Bay here. Although this is not specifically plant-based, it does have some meat that she incorporates. It is very heavily focused on cancer prevention, and just really getting mostly plant-based diet, along with different methods of controlling chemotherapy or immunotherapy related side effects that patients potentially experience. I think this is a fabulous gem that I found over the years, and I use it pretty much every day in my clinical practice.

