



June 05, 2023

Re: Introduction of Urinary Tract Infection Panel from Real Time Laboratories

Dear Healthcare Provider:

RealTime Laboratories, Inc (RTL). located in Carrollton, Texas, has introduced and implemented a more specific and sensitive urinary tract infection (UTI) DNA test. This test has a shortened turnaround time for organism identification and genetic resistance to commonly used antibiotics. The lab will accept specimens Monday through Friday from 8 a.m. until 5 p.m. and on Saturday from 8 a.m. until 12:00 noon. Specimens will be reported within 8-24 hours after receipt into the laboratory.

Urinary Tract Infections (UTIs) occur in more than one-half of adult women in the United States¹. Many will develop at least 2 infections in a six-month period or may even have 3 infections within 1 year^{2,3}. Many national and international bodies have published peer-reviewed documents on uncomplicated and complicated UTIs. Types of Urinary Tract Infections are shown in Table 1.⁴

For years, the gold standard for UTI diagnosis is urinalysis and standard urine culture. Urine cultures have shortcomings, such as false negative rates of up to 30% among symptomatic subjects^{5,6} as well as the difficulty the lab may have in reporting final speciation and antibiotic susceptibility testing (AST). Resulting difficulties may take up to 3 to 5 days for a final report. In 2020, Neugent released a document that explains the human urinary microbiome and how it may be related to UTIs⁷. Thus, newer technologies have now been developed to aid in the diagnosis and treatment of UTIs.

Polymerase Chain Reaction (PCR) testing involves the amplification and detection of targeted DNA. Not only are the urine pathogens (disease-causing organisms) detected by PCR, but the test also screens for antibiotic resistance. RealTime Laboratories, Inc. in Carrollton, Texas, has implemented a UTI PCR test for 17 bacteria, 1 yeast, and 7 genes marking resistance to antibiotics. These organisms (Table 2) and genes (Table 3) are shown in this document. A list of which antibiotics have been reported in the peer-reviewed literature for uncomplicated and complicated UTIs is provided (Table 4).

The organism(s) and the genes marking resistance to antibiotics will result between 8-24 hours after receipt of the urine specimen in RTL. All positive cultures will be followed up by the medical department or medical science liaison (MSL) to notify ordering caregivers of the positive results.

For more information, please call RealTime Laboratories Sales Division (972-492-0419 Ext. 209) for clarification or referral to the Medical Department in an expeditious manner. This letter will be followed up by further communications regarding the management of antimicrobial agents and stewardship of such. If you would like to be on a monthly updated newsletter on antibiotics and stewardship of such as well as monthly antibiograms from RTL. Please let the sales department know of your needs.

Regards,

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Table 1.
TYPES OF URINARY TRACT INFECTIONS

Uncomplicated Lower UTIs or Cystitis - Female patients without catheters and without any co-morbid conditions.

Complicated Lower UTIs or Cystitis - Patients in the categories listed below.

- Men
- Pregnant women
- Women with co-morbid conditions, including but not limited to:
 - Kidney stones or surgery
 - Urinary retention
 - Spinal cord injury or hemiplegia
 - Moderate or severe liver disease
 - Diabetes
 - Chronic anticoagulation
 - Sickle cell disease
 - Immunodeficiency or suppressants of the immune system

The reader is referred to the Michigan Hospital Medicine Safety Consortium document on Guidelines for the Treatment of UTIs. For further information (<https://mihms.org/sites/default/files/UTI%20Guideline-6.9.21.pdf>).

Table 2.
Uncomplicated vs Complicated UTIs in humans. *Mandell, Douglas, and Bennett's Principles and Practice of Infectious Diseases: 9th Edition. By John E. Bennet MD, Raphael Dolin MD, Martin J. Blaser MD. (2020)⁸.

Type of UTI	Pathogens Commonly Associated	Comments/Clinical Pearls
Uncomplicated UTI	<i>E. coli</i> <i>Staph. saprophyticus</i> <i>Enterococcus</i> species <i>Klebsiella pneumoniae</i> <i>Proteus mirabilis</i>	> 80% of cases Especially in sexually active females Associated with stones because they produce urease which results in alkalization of the urine thus favoring stone formation
Complicated UTI	<i>E. coli</i> <i>Pseudomonas aeruginosa</i> <i>Acinetobacter baumannii</i> <i>Enterococcus</i> species <i>Staphylococcus</i> species	More common with catheters, nursing home and hospitalized patients If <i>S. aureus</i> present, need to think hematogenous spread from bacteremia

**TABLE 3.
ORGANISMS ON THE RTL UTI PANEL**

Gram Positive Cocci	Gram Negative Bacilli	Yeast
<i>Enterococcus faecalis</i>	<i>Acinetobacter baumannii</i>	<i>Candida albicans</i>
<i>Enterococcus faecium</i>	<i>Citrobacter freundii</i>	
<i>Streptococcus agalactiae</i>	<i>Enterobacter cloacae complex</i>	
<i>Staphylococcus xylosus/saprophyticus</i>	<i>Escherichia coli</i>	
	<i>Klebsiella (Enterobacter) aerogenes</i>	
	<i>Klebsiella oxytoca</i>	
	<i>Klebsiella pneumoniae</i>	
	<i>Morganella morganii</i>	
	<i>Proteus mirabilis</i>	
	<i>Proteus vulgaris</i>	
	<i>Providencia stuartii</i>	
	<i>Pseudomonas aeruginosa</i>	

**TABLE 4.
ANTIBIOTIC RESISTANCE GENES DETECTED ON RTL UTI PANEL**

Gene(s)	Antibiotics and/or Bacteria Involved
mecA	MRSA (Methicillin resistant Staphylococcus aureus (MRSA)/ Beta-lactam resistance
blaSHV	Class A Beta-lactam resistant and MRSA/Beta-Lactamase
vanB	Vancomycin resistance
ermB	Erythromycin resistance
sul1	Trimethoprim/Sulfamethoxazole (Septra/Bactrim) resistance
blaKPC	Carbapenem hydrolyzing class A beta-lactamase KPC
qnrA	Quinolone resistance

DISCLOSURE: RTL does not treat or recommend treatments for uncomplicated or complicated UTIs. The information contained here is taken from noted source documents. For further guidance, the reader may contact the Medical Department at RTL concerning any issues regarding UTIs or treatments.

REFERENCES

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4. Guidelines for Treatment of Urinary Tract Infections. 2022. Michigan hospital medicine safety consortium UTI guidelines.
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7. Neugent, Michael, et al. 2020. Advances in Understanding the Human Urinary Microbiome and Its Potential Role in Urinary Tract Infection. *mBio* 2020 Apr 28;11(2).
8. Mandell, Douglas, and Bennett's Principles and Practice of Infectious Diseases: 9th Edition. By John E. Bennet MD, Raphael Dolin MD, Martin J. Blaser MD. (2020).