



## Spectra™ UTI

### INTENDED USE

Remel Spectra™ UTI is a solid chromogenic medium recommended for use in qualitative procedures for the primary isolation, differentiation, and presumptive identification of organisms that cause urinary tract infections (UTIs).

### SUMMARY AND EXPLANATION

The diagnosis of urinary tract infections contributes significantly to the daily workload in clinical microbiology laboratories. Increasing resistance to conventional broad-spectrum antimicrobial agents demands rapid identification of pathogens.<sup>1</sup> In recent years, chromogenic media have been developed that allow for presumptive identification of frequently isolated urinary tract pathogens on primary plates.<sup>2,3</sup> Both gram-negative and gram-positive bacteria can be differentiated based on contrasted colony colors produced by reactions of genus- or species-specific enzymes with proprietary chromogenic substrates.<sup>4,5</sup>

Spectra™ UTI is a white opaque medium containing two specific chromogenic substrates, which are cleaved by enzymes produced by *Enterococcus* spp., *Escherichia coli*, and members of the *Klebsiella-Enterobacter-Serratia* (KES) group. In addition, it contains phenylalanine and tryptophan, which provide an indication of tryptophan deaminase activity present among members of the *Proteus-Morganella-Providencia* (PMP) group. *Staphylococcus* spp. produce white colonies and *S. saprophyticus* produces a white colony with a pink halo. *Pseudomonas* spp. produce nonpigmented, translucent colonies. The base used is CLED (cysteine-, lactose-, and electrolyte-deficient) agar, which prevents the swarming of *Proteus* spp.

### PRINCIPLE

One chromogen, X-Gluc, is targeted towards β-glucosidase and allows for the specific detection of enterococci through the formation of teal or blue-green colonies. The other chromogen, Red-Gal, is cleaved by the enzyme β-galactosidase, which is produced by *E. coli*, resulting in pink-red colonies. Cleavage of both chromogens occurs in the presence of coliforms (KES group), resulting in blue colonies. Any uncertainty in identification of *E. coli* may be resolved by performing an indole test using DMACA reagent to test pink-red colonies. Tryptophan, acts as an indicator of tryptophan deaminase activity, resulting in colonies of *Proteus*, *Morganella*, and *Providencia* spp. appearing beige to brown and surrounded by a brownish halo.

### REAGENTS (CLASSICAL FORMULA)\*

Chromogenic Mix.....	26.3 g
Peptone .....	15.0 g
Agar .....	15.0 g
Deminerlized Water .....	1000.0 ml

pH 7.4 ± 0.2 @ 25°C

\*Adjusted as required to meet performance standards.

### PRECAUTIONS

This product is for *In Vitro* diagnostic use and should be used by properly trained individuals. Precautions should be taken against the dangers of microbiological hazards by properly sterilizing specimens, containers, and media after use. Directions should be read and followed carefully.

### STORAGE

This product is ready for use and no further preparation is necessary. Store product in its original container at 2-8°C in the dark until used. Allow product to equilibrate to room temperature before use. Do not incubate prior to use.

### PRODUCT DETERIORATION

This product should not be used if (1) there is evidence of dehydration, (2) the product is contaminated, (3) the color has changed, (4) the expiration date has passed, or (5) there are other signs of deterioration.

### SPECIMEN COLLECTION, STORAGE, AND TRANSPORT

Specimens should be collected and handled following recommended guidelines.<sup>6,7</sup>

### MATERIALS REQUIRED BUT NOT SUPPLIED

(1) Loop sterilization device, (2) Inoculating loop, swabs, collection containers, (3) Incubators, alternative environmental systems, (4) Supplemental media and reagents, (5) Calibrated inoculating loops, 1 or 10 µl, (6) Quality control organisms, (7) Gram stain reagents, (8) Bactidrop™ Spot Indole (p-Dimethylamino-cinnamaldehyde: DMACA) (REF R21550).

### PROCEDURE

- Inoculate and streak the specimen as soon as possible after it is received in the laboratory. **Note:** Inoculate a blood agar plate with each specimen along with the Spectra™ UTI plate to recover organisms that may not grow on Spectra™ UTI.
  - Immerse a calibrated loop (1 or 10 µl) into the urine specimen, holding it vertically.
  - Dispense the contents of the loop onto each plate making a single streak down the center of the plate.
  - Using the same loop, make perpendicular streaks over the entire surface of the plate, obtaining isolated colonies.
- Incubate plates in ambient air, protected from light, for not less than 20-24 hours at 35-37°C.
- Observe colony characteristics, morphology, and color reactions.

### INTERPRETATION

After incubation, use the following table to interpret the results of the color reactions and as a guideline for additional confirmatory tests. A Gram stain may be performed to confirm results.<sup>8</sup>

Organism	Colony color	Confirmatory Test(s)
Enterococci	Teal or blue-green	
<i>Escherichia coli</i>	Pink	Spot Indole
KES <sup>a</sup> group	Medium- to dark-blue	Spot Indole, Motility, ODC, DNase
PMP <sup>b</sup> group	Tan-brown w/brownish halo	Spot Indole, H <sub>2</sub> S, ODC, Urea Hydrolysis
<i>Pseudomonas</i>	Nonpigmented, translucent	Oxidase, Fluorescence
Staphylococci	Opaque, white to cream	Catalase, Coagulase
<i>Staphylococcus saprophyticus</i>	White w/ pink halo	Catalase, Coagulase, Novobiocin Disk = 5µg
<i>Streptococcus agalactiae</i> <sup>*</sup>	Nonpigmented, white	Catalase, Hippurate Hydrolysis, CAMP Test

a = *Klebsiella*, *Enterobacter*, *Serratia* spp., b = *Proteus*, *Morganella*, *Providencia* spp.

**KEY:** ODC = ornithine decarboxylase, DNase = doxynucleonuclease produced by *Serratia* spp.,<sup>9</sup> H<sub>2</sub>S = hydrogen sulfide, CAMP = test for detection of synergistic protein produced by *S. agalactiae*<sup>7</sup>

<sup>\*</sup> *S. agalactiae* has been infrequently associated with urinary tract infections. It produces a small, white colony on Spectra™ UTI, similar in appearance to *S. aureus*. A Gram stain and catalase test may be used to differentiate *S. agalactiae* and *Staphylococcus* spp. Consult appropriate references for additional differential tests.<sup>6,7,9</sup>

### QUALITY CONTROL

All lot numbers of Spectra™ UTI have been tested using the following quality control organisms and found to be acceptable. Testing of control organisms should be performed in accordance with established laboratory quality control procedures. If aberrant quality control results are noted, patient results should not be reported.

CONTROL	INCUBATION	RESULTS
<i>Enterobacter aerogenes</i> ATCC® 13048	Ambient, 18-24 h @ 33-37°C	Blue colonies
<i>Enterococcus faecalis</i> ATCC® 29212	Ambient, 18-24 h @ 33-37°C	Teal or Blue-Green colonies
<i>Escherichia coli</i> ATCC® 25922	Ambient, 18-24 h @ 33-37°C	Pink colonies
<i>Proteus mirabilis</i> ATCC® 12453	Ambient, 18-24 h @ 33-37°C	Brown colonies w/ brownish halo
<i>Staphylococcus aureus</i> ATCC® 25923	Ambient, 18-24 h @ 33-37°C	White, nonpigmented colonies

**LIMITATIONS**

- Organisms with atypical enzyme patterns may give anomalous reactions.
- An indole test can be performed using DMACA to distinguish between *E. coli* and *Citrobacter freundii* or *Enterobacter cloacae*, and also between *Proteus mirabilis* and other species. Do not use Kovac's indole reagent, as the color of the *E. coli* colonies may interfere with the red color of a positive Kovac's reaction. Do not apply indole reagent directly to the plate; perform test on suitable filter paper. Further biochemical tests should be performed when necessary.<sup>8</sup>
- Members of the KES group, which produce colonies that are blue in color, require additional tests for identification. Consult appropriate references for additional differential tests.<sup>6,7,9</sup>
- Listeria monocytogenes* is a gram-positive bacillus rarely associated with urinary tract infections (e.g., following spontaneous abortion, stillbirth, premature delivery). *L. monocytogenes* produces teal or blue-green colonies on Spectra™ UTI similar to enterococci; however, unlike enterococci, it is PYR negative. Other tests may be necessary to differentiate *Listeria* from enterococci including, a Gram stain and catalase test. Consult appropriate references for additional differential tests.<sup>6,7,9</sup>

**EXPECTED VALUES**

Organism	Expected Result
<i>Escherichia coli</i>	Medium to large pink colony
<i>Citrobacter</i> , <i>Enterobacter</i> , <i>Klebsiella</i> , <i>Serratia</i>	Medium- to dark-blue or colony
<i>Enterococcus</i> spp.	Small teal or blue-green colony
<i>Proteus mirabilis</i> , <i>Proteus vulgaris</i> , <i>Morganella morganii</i>	Small, non-spreading, tan-brown colony w/ brownish halo
<i>Pseudomonas</i> spp.	Medium nonpigmented, translucent, colony w/ an irregular edge
<i>Staphylococcus aureus</i>	Nonpigmented, white colony
<i>Staphylococcus saprophyticus</i>	White colony w/ pink halo
<i>Streptococcus agalactiae</i>	Small, nonpigmented to white colony

**PERFORMANCE CHARACTERISTICS**

In a clinical study which included testing of 392 bacterial isolates from urinary tract infections, Spectra™ UTI performed as indicated in the following table.<sup>10</sup>

Organism	Total Isol.	UTI @ 24h	UTI @ 48h	UTI % @ 24 h	UTI % @ 48 h
<i>C. freundii</i>	4	4	4	100	100
<i>E. aerogenes</i>	2	2	2	100	100
<i>E. cloacae</i>	4	4	4	100	100
<i>E. coli</i>	192	186	189	96.9	98.4
<i>K. oxytoca</i>	13	13	13	100	100
<i>K. pneumoniae</i>	30	30	30	100	100
<i>M. morganii</i>	2	2	2	100	100
<i>P. mirabilis</i>	14	13	13	92.9	92.9
<i>P. vulgaris</i>	1	1	1	100	100
<i>S. marcescens</i>	1	1	1	100	100
<i>P. aeruginosa</i>	15	14	15	93.3	100
Enterococci	81	77	78	95.1	96.3
Staphylococci, coagulase-neg.	14	14	14	100	100
<i>S. aureus</i>	2	2	2	100	100
<i>S. saprophyticus</i>	1	1	1	100	100
Group B <i>Streptococcus</i>	16	8	8	50	50
<b>Overall Total</b>	<b>392</b>	<b>372</b>	<b>377</b>	<b>94.9</b>	<b>96.2</b>




**BIBLIOGRAPHY**

- Pezzlo, M. 1998. Clin. Microbiol. Rev. 1:268-280.
- Rambach, A. 1990. Appl. Microbiol. 56:301-303.
- Kodaka, H., M. Ishikawa, M. Iwata, F. Kashitani, S. Mizuochi, and K. Yamaguchi. 1995. J. Clin. Microbiol. 33:199-201.
- Merlino, J., S. Siarakas, G.J. Robertson, G.R. Funnell, T. Gottlieb, and R. Bradbury. 1996. J. Clin. Microbiol. 34:1788-1793.
- Samra, Z., M. Heifetz, J. Talmor, E. Bain, and J. Bahar. 1998. J. Clin. Microbiol. 36:990-994.
- Murray, P.R., E.J. Baron, J.H. Jorgensen, M.L. Landry, and M.A. Pfaller. 2007. Manual of Clinical Microbiology. 9<sup>th</sup> ed. ASM Press, Washington, D.C.
- Forbes, B.A., D.F. Sahm, and A.S. Weissfeld. 2007. Bailey and Scott's Diagnostic Microbiology. 12<sup>th</sup> ed. Mosby Elsevier, St. Louis, MO.
- Clinical and Laboratory Standards Institute (CLSI). 2002. Abbreviated Identification of Bacteria and Yeast. Approved Guideline, M35-A. CLSI, Wayne, PA.
- Garcia, L.S. 2010. Clinical Microbiology Procedures Handbook. 3<sup>rd</sup> ed. ASM Press, Washington D.C.
- Aspevall, O., B. Osterman, R. Dittmer, L. Sten, E. Lindback, and U. Forsum. J. Clin. Microbiol. 2002. 40:1500-1503.

**PACKAGING**

REF R01818, Spectra™ UTI monoplate ..... 10/Pk  
 REF R01819, Spectra™ UTI monoplate ..... 100/Pk  
 REF R02192, Spectra™ UTI // Blood Agar biplate ..... 10/Pk

**Symbol Legend**

<b>REF</b>	Catalog Number
<b>IVD</b>	In Vitro Diagnostic Medical Device
<b>LAB</b>	For Laboratory Use
	Consult Instructions for Use (IFU)
	Temperature Limitation (Storage Temp.)
<b>LOT</b>	Batch Code (Lot Number)
	Use By (Expiration Date)

Spectra™ is a trademark of Thermo Fisher Scientific and its subsidiaries.