

Enhanced Identification and Rapid Reporting of Urinary Tract Pathogens for Excellence in Patient Care

Case Study *Texas Health MedSynergies*

Perspectives by Mary Mewhinney Smith, MS, MT (ASCP)
Microbiology Supervisor



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Challenge	Solution	Impact
Need to reduce the complexity and amount of time associated with accurate identification of urinary tract pathogens and antibiotic susceptibility testing to improve patient management	Leveraging bioMérieux's chromID™ CPS agar media advancements	Ready-to-use, chromogenic media allows for the differentiation of many different bacterial isolates, including multiple isolates, based on color directly from plate without having to subculture, decreasing time to result, saving tech labor and eliminating the need for Gram negative ID cards for <i>E. coli</i> , saving money, MacConkey is no longer necessary
Need to streamline workflow to handle high testing volume with a significant workup rate (≥ 40%) to deliver fastest turnaround possible with the highest confidence	Incorporating VITEK® 2 ID/AST system from bioMérieux	Automated solution maximizes operational efficiencies and lab staff allocation, freeing lab staff to focus on workups and other duties while decreasing time to result in many cases by as much as 24 hours

Challenge

- Texas Health MedSynergies (THM) Microbiology Laboratory is based in Dallas, Texas, and provides services for a large group of privately owned physician office labs. THM was formed when the MedicalEdge Healthcare group was acquired by the Texas Health Resources system, in the second largest transaction involving a physician group in the United States.* In 2010, the group made the decision to create a microbiology laboratory to provide "in-house" micro capabilities to better serve physicians and patients. The microbiology lab provides services for more than 650 physicians, averaging more than 2,100 urine cultures a month with a workup rate of ≥ 40 percent.

In creating a microbiology lab from the ground up, THM was challenged to evaluate a range of products and select those that gave the best results for the highest quality patient care in a busy lab environment.

"It's my professional opinion that this protocol for the workup of urine cultures could become the new gold standard for microbiology laboratories."

Solution

- When THM first evaluated the chromID™ CPS media from bioMérieux, the lab instantly realized it allowed the best identification of urinary tract pathogens and greatly aided the technologists in doing a job quickly and accurately. The THM laboratory now plates exclusively on chromID agar and TSAB plates because MacConkey no longer is necessary.

bioMérieux's chromID CPS agar is a ready-to-use, chromogenic media that allows for the differentiation of different bacterial isolates based on color. Urine samples are plated directly onto CPS using a 10 µl loop, a size protocol THM believes greatly enhances the detection of UTIs in patients with low levels of a single bacteria that previously may have been undetected.

Colonies are easily identified, based on the unique color of each isolate. *E. coli* colonies are pink to burgundy, *Proteus spp.* produce light to dark brown colonies and *Enterococci spp.* are turquoise. *Klebsiella*, *Enterobacter*, *Serratia* and *Citrobacter* (KESC group) produce green to brownish-green colonies, *Staphylococcus* species are white to yellow, *Streptococcus agalactiae* colonies are violet, while yeast produce white colonies.

“The use of the 10 µl sample size along with the enhanced ID capabilities of the chromID™ agar allows us to rapidly and accurately report results to our physicians.”

Impact

- THM found many advantages using chromID™ agar. One of the best benefits noted was the ease of identification directly from plates. THM technicians are able to identify *E. coli* strains directly from the plate, decreasing the turnaround time of patient results while also saving tech time and money on Gram negative ID cards. *Proteus mirabilis* and *Enterococcus* species can definitively be identified using chromID agar characteristics, validated with indole testing or Gram staining, respectively.

THM technicians feel very confident releasing preliminary reports from the chromID plates. For pediatric and cancer patients, technicians report preliminary results, based on the unique pigmentation produced by each colony type. The ability to identify organisms directly from the plates allows the lab to get results to physicians more quickly, leading to the best possible quality patient care.

Because of THM's patient population, we see a high number of multiple isolate cultures. When reading the blood plate, it can be hard to determine the predominance and types of organisms present. THM has found chromogenic agar to be extremely useful in cases where multiple isolates are present. The ability to differentiate between different bacterial types by color allows lab staff to accurately distinguish and enumerate each organism type when as many as four bacterial species are present.

“Our goal is to offer excellence in patient testing. The chromID CPS media partnered with the VITEK® 2 system not only decreases turnaround time of results but increases the quality of patient care over traditional methods.”

THM has found the chromID agar to be very clear, versus blood plate, allowing for the detection of Gram positive organisms, such as *Enterococcus*, even when they are hidden under a Gram negative rod. The CPS media also inhibits *Proteus* from swarming, making it easy to select isolated colonies from the CPS media for workup. This allows the lab to select isolated colonies from samples with multiple isolates such as a *Proteus*, *E. coli* and *Enterococcus*, to run sensitivities at 24 hours without having to subculture for isolation, decreasing turnaround time by at least a day.

By being able to select a colony from the CPS agar when multiple isolates are present, the lab also is able to decrease tech time and eliminate cost of additional media required to subculture multiple isolates, many times repeatedly, in order to obtain a pure culture.

THM further increases efficiency by using the chromID media in conjunction with the VITEK® 2 system, allowing the lab to report many complete identification and susceptibility results the same day the plates are read.

In one recent example, the lab received a urine specimen from a patient undergoing chemotherapy. The sample contained four different isolates in the urine culture, all greater than 10⁵ cfu/ml. The lab was able to report the presumptive IDs (*Klebsiella pneumoniae*, *P. mirabilis*, *S. agalactiae* and *Staphylococcus aureus*) on each of the four isolates to the patient's physician within 24 hours of plating. The lab was able to then select all four distinct colonies from the CPS plate, isolate them and complete ID and sensitivity testing the next day.

THM also was excited to discover chromID CPS agar's capability to help technicians distinguish between two different strains of the same bacteria by looking at differences in their pigmentation. In our use of chromID, we found a number of patients that appeared to have two different *E. coli* strains on the chromogenic media – one very light pink and one a darker burgundy. In working up the organisms, in many cases we found a dramatic difference in susceptibility patterns between the two strains. In one example, the first

strain was resistant to ampicillin (MIC ≥ 32 $\mu\text{g/ml}$), ampicillin/sulbactam (MIC ≥ 32 $\mu\text{g/ml}$), cefazolin (MIC ≥ 64 $\mu\text{g/ml}$), ciprofloxacin (MIC ≥ 4 $\mu\text{g/ml}$) and levofloxacin (MIC ≥ 8 $\mu\text{g/ml}$), but sensitive to trimethoprim-sulfamethoxazole (MIC ≤ 20 $\mu\text{g/ml}$). The second strain was sensitive to all of these antibiotics, but was resistant to trimethoprim-sulfamethoxazole (MIC of ≥ 320 $\mu\text{g/ml}$).

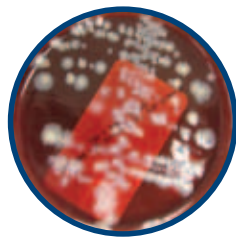
In another example, a patient appeared to have two different *E. coli* strains growing on the CPS media (once again, burgundy and light pink). There was no difference in colony appearance of any of these isolates on the blood plates. The lab was able to isolate the two *E. coli* strains from the same patient sample. Upon testing, both strains were found to be ESBL producers, but isolate 2 was sensitive to nitrofurantoin (MIC ≤ 16) and isolate 1 was resistant (MIC ≥ 128). Recently we isolated two strains of *K. pneumoniae* from a patient sample based on difference in pigmentation and colony type. The identification and susceptibility results from the VITEK[®] 2 confirmed two different isolates. One isolate was resistant to cefazolin (MIC ≥ 32 $\mu\text{g/ml}$) and nitrofurantoin (MIC ≥ 512 $\mu\text{g/ml}$) and intermediate to levofloxacin (MIC ≥ 4 $\mu\text{g/ml}$), while the other organism was sensitive to cefazolin (MIC ≤ 4 $\mu\text{g/ml}$) and levofloxacin (≤ 0.12 $\mu\text{g/ml}$) and intermediate to nitrofurantoin (MIC 64 $\mu\text{g/ml}$).

The CPS media allowed THM to differentiate between these two isolates, complete a full workup for both of them and provide the physician with complete information for the management of the patient. It is important to note that when an ineffective antibiotic is chosen as the initial treatment, this adversely affects patient care and delays the selection of appropriate antibiotic therapy. In the cases listed above, testing only one isolate, or a mixture of the two, could lead to an inaccurate antibiotic sensitivity pattern.

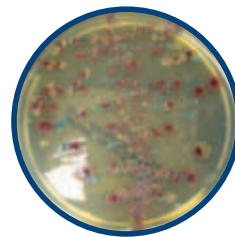
With the chromID[™] CPS media partnered with the automated VITEK 2 system in place, THM is able to meet its goal of offering excellence in patient testing while handling the high volume of samples along with a high percentage of workups, efficiently and accurately.

With our enhanced, new capabilities from bioMérieux, THM decreased turnaround time of results over traditional methods, allowing rapid, accurate reporting to physicians to help improve the quality of patient care.

**The Health Care Acquisition Report, Sixteenth Edition, 2010 by Irving Levin Associates.*



BAP with *E. coli*, *Proteus*, *Enterococcus*



chromID[™] CPS with *E. coli*, *Proteus*, *Enterococcus*



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