K042812

NOV 2 2 2004

510(k) SUMMARY

SUBMITTED BY: BECTON, DICKINSON AND COMPANY
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CONTACT NAME: Dennis Mertz, Sr. Manager Regulatory Affairs

DATE PREPARED: **October 8, 2004**

DEVICE TRADE NAME: CHROMagar™ MRSA

DEVICE COMMON NAME: Culture Medium

DEVICE CLASSIFICATION: 21 CFR§866.1700, Class II

PREDICATE DEVICES: BBL™ Oxacillin Screen Agar (K863821)

INTENDED USE:

BBL™ CHROMagar™ MRSA is a selective and differential medium for the qualitative direct detection of nasal colonization by methicillin resistant *Staphylococcus aureus* (MRSA) to aid in the prevention and control of MRSA infections in healthcare settings. The test is performed on anterior nares swab specimens from patients and healthcare workers to screen for MRSA colonization. **BBL™ CHROMagar™** MRSA is not intended to diagnose MRSA infection nor to guide or monitor treatment for infections.

DEVICE DESCRIPTION:

The BBL CHROMagar MRSA medium permits the direct detection and identification of MRSA through the incorporation of specific chromogenic substrates and cefoxitin. The cephalosporin (Cefoxitin) is incorporated to select for methicillin resistant strains of *Staphylococcus aureus*. MRSA strains will grow in the presence of cefoxitin and produce mauve-colored colonies resulting from hydrolysis of the chromogenic substrate. Additional selective agents are incorporated for the suppression of gram-negative organisms, yeast and some gram-positive cocci. Bacteria other than MRSA may utilize other chromogenic substrates in the medium resulting in blue to blue/green colored colonies or if none of the chromogenic substrates are utilized, appear as white or colorless.

The incorporation of chromogens and cephalosporin permits the differentiation of MRSA from other organisms.

DEVICE COMPARISON:

The BBL CHROMagar MRSA was compared to BBL Oxacillin Screen Agar (K863821), a legally marketed device to determine resistance of *Staphylococcus aureus* to oxacillin, methicillin and nafcillin. Since BBL CHROMagar MRSA is designed as a primary plating medium, the most notable differences are the added selectivity, use of cefoxitin as an indicator of methicillin resistance and the inclusion of chromogenic substrates.

The BBL CHROMagar MRSA medium differs from the BBL Oxacillin Screen Agar method in that:

- The BBL CHROMagar MRSA medium is an antimicrobial susceptibility test medium that is selective and differential while the BBL Oxacillin Screen Agar is an antimicrobial susceptibility test medium that requires a pure culture prior to inoculation
- The BBL CHROMagar MRSA provides detection and identification of methicillin resistant *Staphylococcus aureus* (MRSA) at 24 hours and up to 48 hours if necessary. The BBL Oxacillin Screen Agar provides identification at 24 hours.
- The BBL CHROMagar MRSA utilizes a specimen swab directly inoculate to the plate for streaking. BBL Oxacillin Screen Agar requires sample preparation of a pure culture to a 0.5 McFarland standard in TSB prior to plating and streaking.
- The BBL CHROMagar MRSA utilizes chromogenic substrates to facilitate the differentation of *Staphylococcus aureus* from other bacteria by producing mauve colored colonies. Bacteria other than MRSA appear as blue to blue/green colored colonies. BBL Oxacillin Screen Agar does not differentiate growth on the plate since only pure cultures are used.
- The BBL CHROMagar MRSA utilizes cefoxitin as its selective agent. The BBL™ Oxacillin Screen Agar utilizes oxacillin as its selective agent.
- The BBL CHROMagar MRSA uses an incubation temperature of 35 – 37ºC. The BBL Oxacillin Screen Agar utilizes an incubation temperature of 30 – 35ºC.

The following is a table showing the comparison of device characteristics of BBL CHROMagar MRSA to BBL Oxacillin Screen Agar:

	BBL CHROMagar MRSA	**BBL Oxacillin Screen Agar**
Intended Use	**BBL™ CHROMagar™** MRSA is a selective and differential medium for the qualitative direct detection of nasal colonization by methicillin resistant *Staphylococcus aureus* (MRSA) to aid in the prevention and control of MRSA infections in healthcare settings. The test is performed on anterior nares swab specimens from patients and healthcare workers to screen for MRSA colonization. **BBL™ CHROMagar™** MRSA is not intended to diagnose MRSA infection nor to guide or monitor treatment for infections.	Oxacillin Screen Agar is a antimicrobial susceptibility test medium to determine resistance of *Staphylococcus aureus* to oxacillin, methicillin and naficillin.
Specimen type	Anterior nares	Pure culture isolate
Inoculation	Direct from specimen collection device.	Dilution of pure culture from TSA.
Incubation Temperature	Incubation at 35 - 37°C.	Incubation at 30 - 35°C.
Incubation Length	24 hours, if negative re-incubate additional 24 hours.	24 hours.
Selective agent	Cefoxitin 6.0 mg	Oxacillin 6.0 mg
Testing Method	Manual	Manual
Growth Detection	Identification at 24 hours or 48 hours.	Identification at 24 hours.
Organism Differentiation	Chromogenic substrates facilitate differentiation of *S. aureus* from other organisms.	None
Shelf Life	10 weeks	12 weeks

Ingredients Approximate formula Per liter

CHROMagar MRSA	G/L	Oxacillin Screen Agar	G/L
Chromopeptone	40.0	Beef Extract	2.0
Agar	14.0	Agar	17.0
Chromogen Mix	0.5	Starch	1.5
Inhibitory agents	0.07	Acid Hydrolysate of Casein	9.0
Sodium Chloride	25.0	Sodium Chloride	40.0
Cefoxitin	0.006	Oxacillin	0.006

SUMMARY OF PERFORMANCE DATA:

ANALYTICAL STUDIES:

Interfering Substances

To determine the effect of potential interfering substances on the recovery and color production of MRSA, a variety of substances expected to be associated with the target specimen were tested with the BBL CHROMagar MRSA (CMRSA). Identification was not adversely affected by commonly used medications, bacterial transport devices, and human blood. A concentration of 10% Phenylephrine Hydrochloride (nasal spray) did show an inhibitory affect on organism growth on both the nonselective blood agar plate (TSA II w/5% sheep blood) and CMRSA.

Reproducibility

Reproducibility testing of the CMRSA was evaluated using 17 test strains. Three different lots of CMRSA were tested to determine that CMRSA reliably detects MRSA within lots, and across lots at different time intervals. Acceptance reproducibility rate of $\geq$95% for both inter-lot and overall testing intervals was achieved.

Expression of Resistance

To assess the ability of CMRSA to detect MRSA strains with varying levels of resistance expression, a total of 17 strains (11 heterogeneous, 5 homogenous and one negative) were tested. CMRSA was compared to nonselective TSA II w/5% sheep blood medium. Testing demonstrated that CMRSA medium can adequately detect both heterogeneous as well as homogeneous MRSA.

Performance

Determine the performance (sensitivity and specificity) of CMRSA medium, BBL Oxacillin Screen Agar oxacillin MIC and oxacillin and cefoxitin disk diffusion and PBP2' for detection of methicillin resistant *S. aureus*. The sensitivity and specificity criteria of $\geq$90% was met for CMRSA as compared to Oxacillin MIC testing and Oxacillin Screen Agar testing however 48 hour incubation is necessary.

CLINICAL STUDIES:

The CMRSA medium was evaluated at four geographically diverse clinical sites, composed of regional hospitals and university-based laboratories.

Reproducibility Testing

The reproducibility of the CMRSA was evaluated at three clinical sites using a total of 10 methcillin-susceptible (MSSA) and methicillin-resistant (MRSA) *S. aureus* strains. Observed results were compared to expected results. Overall reproducibility was 100% across all three sites.

Challenge Strain Testing

The performance of the CMRSA was evaluated at three clinical sites using a panel of twenty (20) challenge strains, composed of methcillin-susceptible (MSSA) and methicillin-resistant (MRSA) *S. aureus* strains. CMRSA was able to reliably detect both at 100%, both at each individual site and across all three sites.

Reference Oxacillin MIC Testing

CMRSA overall recovery of MRSA from 1,974 compliant nares surveillance specimens was at 95% (126/132) when compared to isolation on TSA II of 89% (117/132). As an overall MRSA screening test, % negative agreement was at 99% (1829/1842),when colony color alone was used to report MRSA at 24 hours, and with a confirmatory coagulase test at 48 hours. Specificity was improved by confirming mauve colonies from CMRSA with morphology determination and coagulase testing, particularly at the 48 hour reading, when there was significant breakthrough of mauve-colored coagulase negative staphylococci and gram positive rods. In direct comparison of susceptibility results to Oxacillin MIC, the combined final CMRSA % agreement of MRSA was at 95% (111/117) and % agreement of MSSA was 97% (201/208). Overall category agreement of the CMRSA test with Oxacillin MIC was 96% (312/325).

Reference Oxacillin Screen Agar Testing

CMRSA overall recovery of MRSA from 1,974 nares surveillance specimens was at 95% (125/131) when compared to isolation on TSA of 89% (116/131). As an overall MRSA-screening test, % negative agreement was at 99% (1830/1843), when colony color alone was used to report MRSA at 24 hours, and with a confirmatory coagulase test at 48 hours. Specificity was improved by confirming mauve colonies from CMRSA with morphology determination and coagulase testing, particularly at the 48 hour reading. In direct comparison of susceptibility results to Oxacillin Screen Agar, the combined final CMRSA % agreement of

MRSA was acceptable at 95% (110/116), and % agreement of MSSA was 97% (202/209). Overall category agreement of the CMRSA test with Oxacillin Screen Agar was 96% (312/325).

Performance Compared to PBP2′ Latex Agglutination, Cefoxitin Disk Diffusion and PCR detection of the *mecA* gene

CMRSA was also compared to other test methods for identifying MRSA: the PBP2′, a Cefoxitin (30μg) disk diffusion test, and PCR detection of the *mecA* gene. Sensitivity and specificity compared to these additional method is shown in the following table:

CMRSA vs. Cefoxitin Disk Diffusion		CMRSA vs. PBP2' Latex Agglutination		CMRSA vs. PCR (mecA)	
% Agreement of MRSA (95% CI)	**% Agreement of MSSA (95% CI)**	**% Agreement of MRSA (95% CI)**	**% Agreement of MSSA (95% CI)**	**% Agreement of MRSA (95% CI)**	**% Agreement of MSSA (95% CI)**
94.9% (112/118) (89.3%,98.1%)	98% (200/204) (95.1%,99.5%)	93.5% (115/123) (87.6%,97.2%)	98.5% (198/201) (95.7%,99.7%)	95.7% (111/116) (90.2%,98.6%)	97% (196/202) (93.6%,98.9%)

DEPARTMENT OF HEALTH & HUMAN SERVICES

Food and Drug Administration
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Rockville MD 20850

NOV 2 2 2004

Mr. Dennis Mertz
Sr. Manager Regulatory Affairs
BD Diagnostic Systems
Becton, Dickinson and Company
7 Loveton Circle
Sparks, MD 21152

Re: k042812
Trade/Device Name: BBL™ CHROMagar™ MRSA
Regulation Number: 21 CFR 866.1700
Regulation Name: Culture Medium for Antimicrobial Susceptibility Tests
Regulatory Class: Class II
Product Code: JSO
Dated: October 8, 2004
Received: October 12, 2004

Dear Mr. Mertz:

We have reviewed your Section 510(k) premarket notification of intent to market the device referenced above and have determined the device is substantially equivalent (for the indications for use stated in the enclosure) to legally marketed predicate devices marketed in interstate commerce prior to May 28, 1976, the enactment date of the Medical Device Amendments, or to devices that have been reclassified in accordance with the provisions of the Federal Food, Drug, and Cosmetic Act (Act) that do not require approval of a premarket approval application (PMA). You may, therefore, market the device, subject to the general controls provisions of the Act. The general controls provisions of the Act include requirements for annual registration, listing of devices, good manufacturing practice, labeling, and prohibitions against misbranding and adulteration.

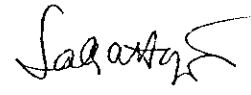
If your device is classified (see above) into either class II (Special Controls) or class III (PMA), it may be subject to such additional controls. Existing major regulations affecting your device can be found in Title 21, Code of Federal Regulations (CFR), Parts 800 to 895. In addition, FDA may publish further announcements concerning your device in the Federal Register.

Please be advised that FDA's issuance of a substantial equivalence determination does not mean that FDA has made a determination that your device complies with other requirements of the Act or any Federal statutes and regulations administered by other Federal agencies. You must comply with all the Act's requirements, including, but not limited to: registration and listing (21 CFR Part 807); labeling (21 CFR Parts 801 and 809); and good manufacturing practice requirements as set forth in the quality systems (QS) regulation (21 CFR Part 820).

This letter will allow you to begin marketing your device as described in your Section 510(k) premarket notification. The FDA finding of substantial equivalence of your device to a legally marketed predicate device results in a classification for your device and thus, permits your device to proceed to the market.

If you desire specific information about the application of labeling requirements to your device, or questions on the promotion and advertising of your device, please contact the Office of *In Vitro* Diagnostic Device Evaluation and Safety at (301) 594-3084. Also, please note the regulation entitled, "Misbranding by reference to premarket notification" (21CFR Part 807.97). You may obtain other general information on your responsibilities under the Act from the Division of Small Manufacturers, International and Consumer Assistance at its toll-free number (800) 638-2041 or (301) 443-6597 or at its Internet address http://www.fda.gov/cdrh/dsma/dsmamain.html.

Sincerely yours,



Sally A. Hojvat, M.Sc., Ph.D.
Director
Division of Microbiology Devices
Office of In Vitro Diagnostic Device
Evaluation and Safety
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Enclosure

510(k) Number: K042812

Device Name: BBL™ CHROMagar™ MRSA

Indications for Use:

BBL™ CHROMagar™ MRSA is a selective and differential medium for the qualitative direct detection of nasal colonization by methicillin resistant *Staphylococcus aureus* (MRSA) to aid in the prevention and control of MRSA infections in healthcare settings. The test is performed on anterior nares swab specimens from patients and healthcare workers to screen for MRSA colonization. BBL™ CHROMagar™ MRSA is not intended to diagnose MRSA infection nor to guide or monitor treatment for infections.

Prescription Use √ AND/OR Over-the-Counter Use _____
(Part 21 CFR 801 Subpart D) (21 CFR 807 Subpart C)

(PLEASE DO NOT WRITE BELOW THIS LINE-CONTINUE ON ANOTHER PAGE IF NEEDED)

Concurrence of CDRH, Office of In Vitro Diagnostic Devices (OIVD)

Division Sign-Off

Office of In Vitro Diagnostic Device Evaluation and Safety

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