Comparison between a Chromogenic MRSA Selective Medium and Mannitol-Salt Medium with Cefoxitin for the detection of Methicillin-Resistant *Staphylococcus aureus*

Thesis

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مقارنة بين المستنبت اللونى المنتقى للمكورات العنقودية المقاومة للمثيسلين و مستنبت المنيتول الملحى المزود بالسفكسيتين للكشف عن المكورات العنقودية الذهبية المقاومة للمثيسلين

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6. SUMMARY

Methicillin-resistant *Staphylococcus aureus* (MRSA) is an increasing problem. Early recognition of patients colonized or infected with MRSA can have a direct impact on the selection of antibiotic therapy and the decision to initiate isolation procedures. Most laboratories struggle to determine the optimal use of resources, considering options to balance cost, speed, and diagnostic accuracy. An ideal method for MRSA detection should have a high sensitivity and a short time to the reporting of the results

This study was conducted during period from February 2010 to November 2011 at the Medical Microbiology and Immunology Department, Faculty of Medicine, Ain Shams University.

The aim of the work was to compare MRSA-Select, a commercially available chromogenic medium, as a rapid method for detection of MRSA in clinical isolates to mannitol salt agar with cefoxiten (MSA-Cefoxitin). The results were evaluated using PCR as a gold standard.

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List of abbreviations

abbreviations	Full name
CA-MRSA	community-associated methicillin resistant staphylococcus aureus
CA-MSSA	community-associated methicillin susceptible staphylococcus aureus
CCs	Clonal complexes
CDC	Centers for Disease Control and Prevention
ClfA and ClfB	clumping factor A and B
Cna	collagen-binding protein
CoNS	Coagulase-negative staphylococci
DHFR	Dihydrofolate reductase
DNase	deoxyribonuclease
ET-A	epidermolytic toxin A
ET-B	epidermolytic toxin B
ETs	Exfoliative toxins
FAME	fatty acid modifying enzyme
FnBpA and FnBpB	fibronectin-binding proteins A and B
GISA	Glycopeptide-intermediate *S. aureus*
HA-MRSA	healthcare-associated infections
J regions	junkyard regions
MLST	multilocus sequence typing
MRSA	Methicillin resistant *Staphylococcus aureus*
MSA	mannitol-salt agar
MSCRAMMs	microbial surface components

	recognizing adhesive matrix molecules
PBP2a	penicillin binding protein 2a
PCR	polymerase chain reaction
PFGE	pulsed-field gel electrophoresis
PL	Plasmin
PLG	plasminogen
PMN	polymorph neuclear cell
PVL	Panton-Valentine leukocidin
S. aureus	*Staphylococcus aureus*
SAK	Staphylokinase
SCC *mec*	Staphylococcal Chromosome Cassette *mec*
SCVs	Small-colony variants
SEA	staphylococcal enterotoxins A
SEls	staphylococcal enterotoxin-like proteins
SEs	staphylococcal enterotoxins
SSSS	staphylococcus scalded skin syndrome
SSTIs	skin and soft-tissue infections
ST	sequence type
TMP	Trimethoprim
TNFR1	tumor necrosis factor receptor 1
TNF-α	tumor-necrosis factor-α
TSS	toxic shock syndrome
TSST-1	Toxic shock syndrome toxin 1
VISA	vancomycin intermediate-resistant *S. aureus*
VRSA	vancomycin resistant *S. aureus*

1. Introduction

Staphylococci are the main causative agents of nosocomial diseases. Over the last few years, the increase in the number of methicillin-resistant *Staphylococcus aureus* (MRSA) has become a major clinical problem. *MRSA* infections are associated with considerable morbidity, mortality, and excess cost ***(Engemann et al., 2003).***

It has been shown that, in most cases, the source of *Staphylococcus aureus* causing bacteremia is the patient's nose, and colonization with MRSA leads to autoinfection at a higher rate than colonization with methicillin-susceptible isolates ***(Stoakes et al., 2006).***

An increase in the number of *MRSA* has become a serious clinical and epidemiological problem, as resistance to this antibiotic implies resistance to all β-lactam antibiotics. ***(Velasco et al., 2005).*** Methicillin-resistance is attributable to the mecA gene, encoding penicillin-binding protein (PBP) 2a, which presents low affinity for β-lactam antimicrobials ***(Fuda et al., 2004).***

The detection of the methicillin resistance represents a real challenge for the routine clinical microbiology laboratories since molecular methods, the gold standard method, are not available for most medical institutions. A wide range of techniques has been used to detect and identify *MRSA* from clinical specimens. Selective and differential culture media, especially mannitol salt agar (MSA), are most widely employed. However, all MSA media are not the same: they differ in their salt, and their performances may not be comparable. In general, MSA media are not sensitive enough to be used for detection of *Staphylococcus aureus* including MRSA in clinical specimens ***(Stoakes et al, 2006).***

Rapid detection of MRSA is essential to optimize therapy, to minimize patients' discomfort and to reduce costs. Chromogenic media were thus developed to detect MRSA strains in one single step. Growth of non-staphylococcal strains is repressed by high salt concentration and enzymic substrate is used to achieve a specific colour reaction to detect *S. aureus*. Growth of methicillin-susceptible *Staphylococcus aureus* (MSSA)