

MRSA:

Methicillin-resistant *Staphylococcus aureus* (MRSA) is recognized as an important pathogen with a world-wide distribution in health care facilities. The MRSA prevalence rates vary widely by locale and type and size of health care facility. In addition, MRSA has been recognized as a cause of community-acquired infection (Peacock et al 1980; Saravolatz et al, 1982; Johnston, B.L. 1994).

MRSA is of significant concern because of its antimicrobial resistance and the ability to disseminate from colonized mucosal or skin sites. As its name implies, MRSA is resistant to methicillin and other members of the penicillinase-resistant penicillins including oxacillin, nafcillin, cloxacillin, flucloxacillin, cephalosporins, imipenem, and other β -lactams. Thus, any *S. aureus* reported as resistant to methicillin should be considered resistant to all classes of β -lactam antibiotics.

Methicillin resistance is mediated by the presence of a chromosomal *mec A* gene. This *mec A* gene produces an abnormal, low-affinity penicillin-binding protein (PBP), referred to as PBP 2a. This PBP 2a is lacking in methicillin-susceptible *S. aureus* isolates. Most strains of MRSA display mixed resistance to methicillin and other β -lactams, this means that only one cell out of every 10^4 to 10^8 cells manifests high-level resistance under standard testing conditions. This explains why the automated systems now used by many laboratories are not consistent in detecting MRSA.

There are three approved in vitro methods for the detection of MRSA: the broth microdilution with 2% NaCl; the oxacillin screen plate containing $6\mu\text{g/mL}$ of oxacillin and 4% NaCl; and the disk diffusion test. Successful detection depends largely on promoting the growth of the resistant subpopulation which is favoured by the cooler temperature ($30\text{-}35^{\circ}\text{C}$), the presence of salt, and prolonged incubation (up to 48hrs).

The oxacillin screen plate is the definitive answer for the detection of MRSA isolates. Therefore, if there is a discrepancy between the automated system and the oxacillin screen plate, the oxacillin screen plate must be taken as correct.

In addition, all MRSA isolates should be submitted to the Provincial Laboratory for confirmation of phenotypic and genotypic analysis of methicillin resistance. This is done in order to rule out the presence of hyper beta-lactamase *S. aureus* isolates which may grow on the oxacillin screen plate, yet are *mec A* gene negative and, hence, not true MRSA's. In addition, genetic analysis is performed to denote the clonality and distribution of the MRSA isolates prevalent within the province of Saskatchewan.

Dr. Peter Pieroni

REFERENCES:

Peacock, J. E. et al. *Ann. Intern. Med.* 93: 526 - 532, 1980.

Saravolatz, L.D., et al. *Ann Intern. Med.* 96: 11-16, 1982.

Johnston, BL. *Seminars in Resp. Infect.* 9 (3): 199 - 206, 1994.

Berger-Bächi, B. *Trends in Microbiology.* 2 (10): 389-392, 1994.

Boyce, J.M. *Infect. Cont. & Hosp. Epi.* 13 (12): 725-737, 1992.