Maryland Department of Health & Mental Hygiene

A Publication of Maryland's State Public Health Laboratory

CRITICAL LINK

Building a world class organization
Healthy People Healthy Communities
Maryland Department of Health & Mental Hygiene

July 2008 Volume 12, Number 7

MRSA Revisited

Background

MRSA has emerged as an acronym of Methicillin Resistant *Staphylococcus aureus*, signifying a bad super-bug that is resistant to most available drugs. *Staphylococcus aureus,* from Greek, meaning "golden bunch of grapes" from its colonial and microscopic appearances (Gram-positive cocci in clusters) (Figure 1), is a common bacterial pathogen nicknamed "staph." The number of fatalities in the U.S. caused by the 90,000 staph infections may exceed that of AIDS in the U.S.[1,2]

In the 1950s, when staph became resistant to penicillin by means of a β-lactamase enzyme (penicillinase) that hydrolyzed the β-lactam ring of penicillins, semi-synthetic penicillin derivatives such as methicillin, oxacillin, dicloxacillin and nafcillin became the drugs of choice for treatment. When some began to produce an altered penicillin-binding protein 2a that did not allow these drugs to bind as well to their targets, these staphs became resistant to all penicillin, cephalosporin, and carbapenam derivatives with the β-lactam ring as the central structure of their molecules (Figure 2).

MRSA evolved in the late 1960s. The MRSA infections were additional to the *S. aureus* infections, not replacing them. The U.S. averages 32 invasive MRSA infections per 100,000 population per year. Baltimore averages 117 per 100,000 per year.[3]

(Continued on page 2)

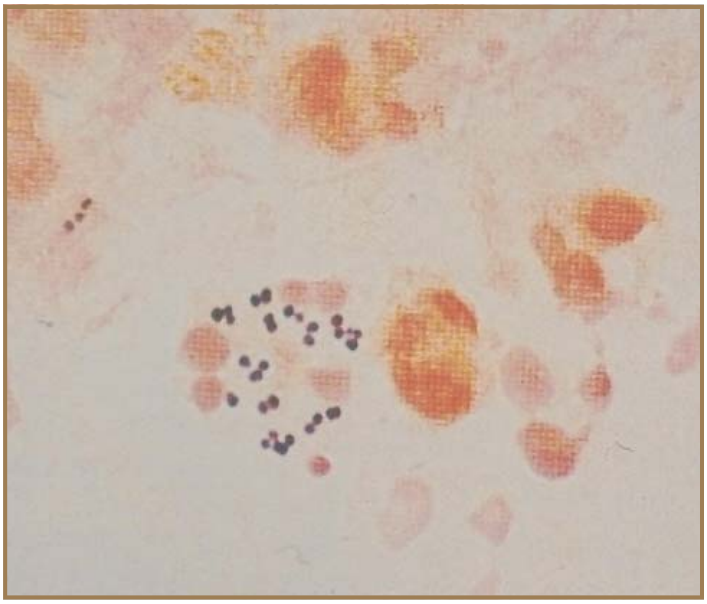

Figure 1: *Staphylococcus aureus* in polymorphonuclear neutrophilic leukocytes (pus). Photo source: Robert Waltersdorff, Ph.D.

Inside this issue:

MRSA Revisited	*Page 1*
Diphtheria and Tetanus Toxoid testing discontinued	*Page 1*
LABORATORY STATISTICS	*Page 6*

Diphtheria and Tetanus Toxoid Testing Discontinued

The Laboratories Administration will no longer offer serology antibody testing for Diphtheria and Tetanus toxoid. This becomes effective immediately. These tests were originally for investigational use only and not to be used for patient management since they were not FDA approved. This decision comes about due to the low request for these tests and the inability to obtain reagents. Should you have any questions contact Gonzalo Crujeiras at 410-767-6167 or e-mail crujeirasg@dhmh.state.md.us.

(Continued from page 1)

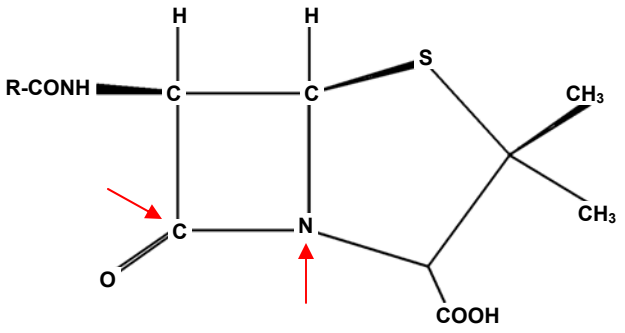

Figure 2: Sites (red arrows) at which staph β-lactamase can attack the β-lactam rings of penicillin and other penicillin derivatives. Source: Georgia Corso, Laboratories Administration

Healthy colonized carriers as well as infected patients can pass these germs to others. Thirty percent of the population carry staph; 1% carry MRSA.[4] These MRSAs were termed nosocomial (from Greek, meaning "disease" and "to take care of," referring to infection that develops during or as a result of being in an acute care hospital).[5] Infections caused by those (then "hospital acquired" or currently "Healthcare Associated,") so called HA-MRSA developed in patients who were either hospitalized or recently discharged from a healthcare facility.

Recently, other strains distinct from those found in healthcare settings have emerged and are termed "Community Associated" MRSAs or CA-MRSAs. These CA-MRSA strains have increasingly become established in both the community and hospital ICUs. Furthermore, these strains can more easily transfer their resistance to other staph because of their more mobile resistance genes. Also, these stains are more virulent because they possess a very toxic factor called Panton-Valentine Leukocidin (PVL) carried by a bacteriophage[6] that causes tissue necrosis and leukocyte destruction.

CA-MRSAs cause not only typical skin and soft tissue infections but also a serious form of pneumonia, as was noted when this topic was first visited.[7] However, because CA-MRSAs are increasingly responsible for Healthcare Associated Infections, the nomenclature may need revision.

Hospital emergency departments, including those of the three lower Eastern Shore facilities, are seeing an increasing number of patients with MRSA.[8] It's also being noticed in many institutions such as police academies,[9] elementary schools and universities on the Eastern Shore,[10] high schools,[11] college athletic teams,[11,12] and prisons.[13] Every year in the U.S., MRSA causes over 94,000 infections and 19,000 deaths, and ranks among the most prevalent of hospital pathogens worldwide.

Disease

Staph infections usually start on the skin appearing as a pimple resembling a spider bite - probably having gained access through a portal of entry such as a cut, abrasion, or razor nick - from where the staph was colonizing the skin. The site progresses into a boil and then a deep painful abscess that has to be surgically incised and drained. If ignored or treated with a drug that is usually effective against ordinary methicillin sensitive *S. aureus* (MSSA), this delay in treatment with an effective antibiotic may allow the infection to penetrate deeper and get into the blood, heart valves, or lungs. A high index of suspicion leading one from routine empiric therapy to optimal therapy can reduce the mortality significantly.[14]

Infection of a surgical wound gives MRSA extra invasive potential.[15] When in association with influenza virus, a severe, necrotizing pneumonia can result with a high fatality rate (during the 1918 influenza pandemic many deaths were attributed to bacterial superinfection by *S. aureus*), particularly when the viral co-infection is with a MRSA-carrying the PVL gene. The PVL is such a powerful exotoxin in its ability to eat holes in membranes, such as those of white cells, that the two protein components are assembled into the active molecule outside the bacterium.[3] Infections appear to be concomitant rather than biphasic as suggested by the short period between symptom onset and recovery of MRSA from the patient.

Laboratory Diagnosis

Tissue or swabs from areas of a suspected purulent wound infection or from screenings are sent to the laboratory in protective transport media. Screening areas where staph are known to colonize are just inside the nose, the throat, and the perineal or groin area. It is considered essential to include all three sites for optimum sensitivity[16] when screening a population for colonization. There are two detection methods with a third on the way: 1. Culture; 2. Two FDA-approved PCR rapid tests; and 3. Coming soon will be one involving analyte-specific reagents that detect protein-A of *S. aureus* and the modified penicillin-binding protein of MRSA.[17]

Conventional culture takes two days to identify *S. aureus* and determine its susceptibility to methicillin and other antimicrobial agents. When screening for MRSA, the submitted specimen is streaked for isolation on sheep blood agar plates or special selective media,[18] incubated at body temperature, and examined the next day for colonial morphology characteristic of staph. Typical colonies may be Gram stained to confirm the microscopic clusters of Gram-positive (dark purple) cocci. At the time of submission, a sample from an infection site may also be Gram stained directly.

Colonies of interest are spot tested for catalase production by the generation of bubbles (of O_2) when 3% peroxide is added to a smear from the colony on a glass slide. If positive, a coagulase test is set up by inoculating a portion of each suspected colonial morphotype into a small test tube containing 0.5 ml of rabbit plasma and incubating it overnight. If a clot forms (checking it at 4 hours and the next day), it's coagulase-positive and identified as *S. aureus*.

Then, an antibiotic susceptibility test is set up by the standardized Kirby-Bauer (K-B) method on a large Mueller-Hinton agar plate by swabbing the plate from a McFarland standard-density suspension. The suspension is made from organisms taken from the colonies in question and streaked in different directions to achieve a uniform inoculation of the surface. After allowing the inoculum to be absorbed, small paper punch-sized disks, each containing a standard amount of different antibiotic, are dispensed onto the surface, spaced equidistant from each other. The plate is incubated for 24 hours. The next day the zones of inhibition (of the uniform lawn of bacterial growth on the agar surface) around each drug-containing disk is measured

(Continued on page 3)

(Continued from page 2)

in millimeters and interpreted as "susceptible," "intermediate," or "resistant" according to the standards established by the Clinical and Laboratory Standards Institute (CLSI, formerly NCCLS).

The manual method described here is performed at the regional laboratories in Cumberland and Salisbury. An automated instrument called the Vitek® is employed at the Central Laboratory in Baltimore. It has the added advantage of being able to report results quantitatively in terms of minimal inhibitory concentration (MIC) values for each drug, along with the qualitative interpretation. This latter method, being more sensitive, can detect MIC creep over time. For this reason, all MRSAs isolated in the regional laboratories are referred to the Central Laboratory to determine if the staph is a Glycopeptide (the drug class for Vancomycin) intermediate *S. aureus* (GISA). (The credit card company objected to the use of the acronym VISA because of the bad connotation.) Fortunately, to date the number of Vancomycin-resistant *S. aureus* (VRSA) cases that have emerged in the world can be counted on one hand.

Additionally, there is a phenomenon that is called inducible resistance to clindamycin by erythromycin resistance. So when a MRSA is resistant to erythromycin, the staph's ability to induce resistance to clindamycin is detected by placing the clindamycin disk a set distance (15 to 26 mm) from the erythromycin disk on the K-B plate. Induced resistance against clindamycin appears as damping or flattening of the inhibition zone around clindamycin. When observing this phenomenon with the erythromycin disk to the left of the clindamycin disk, the zone around the clindamycin disk appears as a capital letter 'D'. This adjunct procedure is appropriately called the 'D-Test'. See Figure 3.

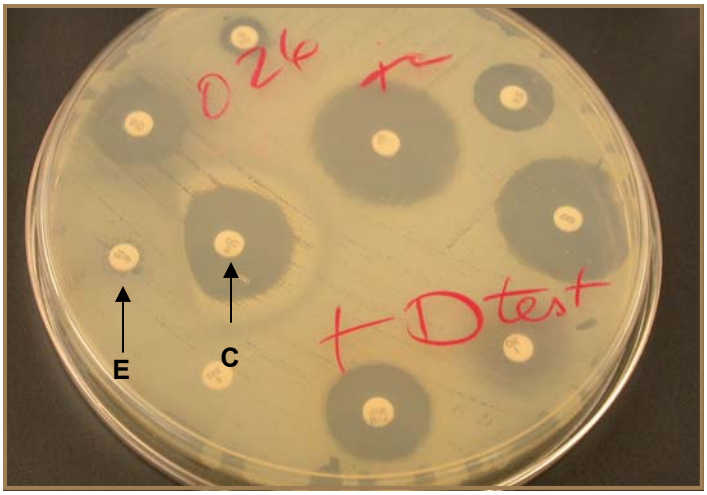

Figure 3: Positive (+) D-Test incorporated into antibiotic susceptibility test on K-B plate. The two disks of interest are the one containing erythromycin on the left (E) and the one containing clindamycin on the right (C). Photo source: Robert Waltersdorff, Ph.D.

There also are automated molecular tests available that can detect identifiable DNA marker sequences located on the portion or element of the chromosome that codes for the methicillin resistance mecA gene. While molecular diagnostic testing using DNA amplification methods is rapid, taking hours instead of days for results, they are currently very expensive, and health-care institutions don't get reimbursed for screen testing.[19]

Figure 4: Lab Scientist Mary Dollinger in Clinical Microbiology section at ESRL validating the D-Test.

However, this cost should be weighed against the cost of a MRSA infection (~$40K)[20,21] that could be prevented by a system that can lead to a prompt clinical response.[22] If the MRSA is further genotyped to differentiate HA-MRSA from CA-MRSA, as mentioned earlier, this information can also be useful for therapy considerations, and will be discussed later.

Treatment

Abscesses may be drained rather than treated with antibiotics. When a MRSA infection becomes life-threatening, the tendency is to turn to vancomycin because of its bactericidal activity. However, there is also a tendency towards a selective environment for vancomycin-resistant enterococcus (VRE), another emerging drug-resistant pathogen. Co-colonization by VRE and MRSA may facilitate transfer of genes conferring Vancomycin resistance to the MRSA. Effective alternatives to vancomycin may include trimethoprim/sulfamethoxazole (SXT), erythromycin, clindamycin, doxycycline, rifampin (if used in combination with another drug), linezolid, daptomycin, quinujpristin-Ddalfopristin, tigecycline, and chloramphenicol.[23,24] Mupirocin has been used topically in the nose to eliminate carriers. In general, HA-MRSAs are more multi-drug resistant than CA-MRSA genotypic strains.

Delay in early treatment usually arises from treating a staph as if it were sensitive to methicillin-type drugs, allowing the infection a chance to become invasive before laboratory results report it to be a MRSA. Emergency departments are now treating skin and soft tissue infections (SSTIs) such as abscesses, impetigo and cellulitis with SXT to halt it early.[25] Some others are using clindamycin or doxycyline followed with linezolid (known for its superior penetration) for failures,[24] with de-facto acceptance even though not yet FDA approved for such indications. Different algorithms are evolving regarding treatment of uncomplicated versus complicated SSTIs. Clinicians consider drug allergies, drug interactions, pharmacokinetics, available oral therapy for outpatient use, pharmacoeconomic data and possible future emergence of resistance.

Treatment of Diabetic Foot Infections is in a more complicated category, as are those for pneumonia and sepsis. In addition to vancomycin, our antibiotic arsenal to be used against MRSA has been augmented to include linezolid, daptomycin, and tigecycline. Also the following drugs are at various stages of FDA trials: telavancin, dalbavancin and ceftobiprole.

(Continued on page 4)

(Continued from page 3)
MRSA Revisited

Risks

A person colonized with MRSA has a greater risk of developing an infection (colonization usually precedes infection) and transmitting MRSA to others. Risk factors for becoming colonized with HA-MRSA include[14] current or recent hospitalization, residence in a long-term care facility where it can spread undetected among the healthy (assisted-living facilities have lower carrier rates than nursing homes), invasive devices such as dialysis ports (the first patient with a VRSA-MRSA was a dialysis patient), catheters and feeding tubes, recent antibiotic use (particularly with fluoroquinolones, which effect their influence by eradicating MSSA,[24] or cephlosporins[26]), and association with healthcare workers.

Risk factors for becoming colonized with CA-MRSA include[14] very young age (because of immature immune system and greater likelihood of developing pneumonia, especially with flu[27]), sports participation (particularly those in which abrasions, cuts, or skin-to-skin contact is involved, or sharing of towels, athletic equipment, razors, uniforms, or whirlpools), having a weakened immune system or underlying condition, living in crowded conditions such as military camps or prisons, possible exposure to antibiotics in food or water contaminated by cattle,[28] pigs,[29] or chickens, tattooing,[30] sexual activity,[31] 65 years of age or older, male, gay male (more so),[32] African ancestry,[33] Pacific islanders (MRSA has even been isolated from seawater there[3]), Alaskan Natives, Native Americans, and methamphetamine users (from skin-picking due to crawling skin sensations[34]), or even regular needle users, whether for illicit drug use or for medicinal purposes.[24] Also, family members and animal companions can serve as reservoirs.[35] MRSA can live for weeks on fomites such as blood pressure cuffs, medical devices, and even doctors' white lab coats and neckties.

Normal skin flora coagulase-negative staph can also carry the mecA gene, and may be a potential theoretical source to co-colonizing *S. aureus*. But colonization with MSSA is known to deter colonization with MRSA. Some MRSA strains express heterogeneous resistance with only a small proportion of its population being resistant and, therefore, can be mistaken for MSSA. These strains could represent hidden reservoirs.[36]

Some soil bacteria closely related to human pathogens have been found to subsist on multiple antibiotics at clinically relevant concentrations. Hey, what's up with that? This could also be an unappreciated contributing reservoir of antibiotic-resistance determinants right under our feet.[37]

Prevention

It would be ideal to have a vaccine. We don't. Antibiotic-coated catheters and gloves that release disinfectants might be worth trials. Disinfecting surfaces, wearing a mask, hat, gloves, and gown when working with people with weakened immune systems can be helpful; but most effective is still hand-washing by all with soap and water or using alcohol-based hand sanitizer.

Exercising meticulous aseptic technique by healthcare personnel when working with invasive medical devices is critical. It's important not to share personal items, to be aware of direct contact with others, to keep wounds covered and avoid contact with others until healed, to take care among familial carriers, to wash gym clothes after each wearing, to make universal precautions a habit, and to practice judicious use of antibiotics (so that misuse doesn't promote VRE emergence).

The Veterans Health Administration has focused on eliminating MRSA since 2006 by active surveillance screening for colonization upon patient admission, transfer, and discharge using a rapid molecular assay and by instituting contact isolation or cohorting upon detection. Denmark and the Netherlands, by also screening every patient and preemptively implementing barrier precautions until proven negative by culture, have reduced infection rates. At Loyola University Hospital, when surgical patients were screened and the staff intervened with decolonization and prophylaxis for MRSA, the patients had no infections.[17] A caveat here may be that isolated patients may get less than standard-of-care because of staff reluctance to go through the hassle of donning barrier attire to accommodate patient needs; but there is no evidence of harm by such policies.

Use of patient-dedicated items (blood pressure cuff, stethoscope, etc.) or single-use disposable equipment may be prudent. Environmental culture monitoring proximal to patients may be helpful in guiding cleaning. Some healthcare groups have decolonized carriers using mupirocin in the anterior nares two times a day for five days accompanied by chlorhexidine bathing on days one, three, and five with resulting 80% reduction in sepsis.[21] This procedure has lowered ventilator-associated pneumonia (VAP)[17] and is an effective short-term strategy. Topical vancomycin in the oropharynx has also reduced VAP without increasing incidence of vancomycin resistance. Routine surveillance cultures and subsequent contact isolation have been shown to substantially reduce MRSA bacteremia in both ICU and non-ICU settings.[38] Testing everyone admitted reduced disease in the hospital and after discharge.

In the U.K., a hospital is using copper door handles, push plates, bath taps, toilet handles, and railings, and copper alloy locker handles. The hospital found that MRSA remained active for days on stainless steel but died in a few hours on brass (alloy of copper & zinc), and in 30 minutes on pure copper. This same hospital uses maggots to clear up infected diabetic foot ulcers.[39] Some feel that a strategy of targeting just the high-risk populations, such as nursing home residents, would be more cost-effective. Perhaps there is a compromise that can be made by balancing the extra cost of rapid testing versus the cost of infections not prevented, not to mention legal implications and the impact of publicity. MRSA is technically not reportable in Maryland unless there is an outbreak.

In October, 2008, the Center for Medicare and Medicaid Services (CMS, formerly HCFA) will no longer reimburse hospitals for the costs of catheter-associated infections. No reimbursement for other hospital-associated infections has also been proposed; and where Medicare goes, private insurers are sure to follow. It is felt that this will serve as incentive for hospitals to be extra careful to achieve better prevention; however MRSA is excluded from this new rule.[40] Posted on the Association for Professionals in Infection Control and Epidemiology website is an introduced federal bill, S.2525, that would mandate MRSA surveillance in all U.S. hospitals. Assuming that MRSA exists everywhere, our heightened awareness must influence our diligent practice of constant hand hygiene. Keeping in mind that antibiotics are the kind of drugs that effect more than the target patient, a major key to preventing emergence of resistant microorganisms and outbreaks is the exercise of prudent antibiotic stewardship.

This article was written by Dr. Robert Waltersdorff,
Director of the Eastern Shore Regional Laboratory.

(Continued on page 5)

(Continued from page 4)

MRSA Revisited

References

[1.] Tanner, L. 2007. "Staph Fatalities May Exceed AIDS Deaths", *Balt. Examiner*, Assoc. Press, Oct. 17, 2007

[2.] Lewis,B. 2007. "Kaine Orders MRSA Reports", *Wash. Times*, Oct. 25, 2007

[3.] Daum, R.S. 2008. "Epidemic Community-Acquired MRSA: Lessons from the First Ten Years", Holloway I. D. Symp. Med. Soc. DE, Newark, May.

[4.] CDC - cdc.gov/ncidod/dhqp/ar_mrsa_ca_public.html#1, 2005, CA-MRSA: Public FAQs\CDC Infection Control in Healthcare, pp 1-4.

[5.] Siegel, J.D. et al. 2006. "Management of Multidrug-Resistant Organisms in Healthcare Settings",HICPAC, CDC

[6.] Huijsdens, X.W. et al. 2006. "Multiple Causes of Familial Community-Acquired Methicillin-Resistant *Staph aureus*", *J. Clin. Microbiol.* 44(8):2994-2996.

[7.] Critical Link, 2002. "True Teamwork: Solving a MRSA Pneumonia Outbreak", *Critical Link*, 6(11):1-3.

[8.] Gidjiunis, J. 2007. "Resistant Staph Bacteria Cases on the Rise", *Salisbury Daily Times*, May 15, 2007

[9.] Berger,J. 2007. "Outbreak of Staph Infections Hit Police Academy", *PG Gazette*, Feb. 15, 2007

[10.] Beauchamp, P. 2008. Personal Communication, Somerset County Health Dept., Comm. Disease.

[11.] Davis, R. et al. 2007. "Governments Urged to Make Killer Bug a Priority", *USA Today*, Oct. 19, 2007

[12.] Dziuban, E.J. 2006. "Surveillance for Waterborne Disease and Outbreaks Associated with Recreational Water - United States", CDC, *MMW*R 55(SS-12):29.

[13.] Brown, D. 2008. "State Not Upfront about MRSA Situation", *Hagerstown Herald*, April 29, 2008

[14.] Jones-Nazar, C. et al. 2007. "Severe Methicillin-Resistant *Staph aureus* Community-Acquired Pneumonia associated with Influenza - Louisiana and Georgia, Dec. 2006-Jan. 2007", CDC,*MMWR* 56(14):325-9.

[15.] Mayo Clinic Staff. 2007. "MRSA Infection", *Infectious Disease*, MayoClinic.com, Nov.

[16.] Marshall, C. et al. 2007. "Is Throat Screening Necessary to Detect Methicillin-Resistant *Staph aureus* Colonization in Patients upon Admission to an Intensive Care Unit?", *J. Clin. Microbiol*. 45(11):3855.

[17.] Lusky, K. 2008. "Mitigating MRSA, steps ahead of the law", *CAP Today* 22(5):1, 36-44.

[18.] Lagace'-Wiens, P.R.S. et al. 2008. "Reductions in Workload and Reporting Time by Use of Methicillin-Resistant *Staph aureus* Screening with MRSA Select Medium Compared to Mannitol-Salt Medium Supplemented with Oxacillin", *J. Clin. Microbiol*. 46(4):1174-1177.

[19.] Smith, T.J. 2008. "MRSA: The Threat Continues", *Advance/Laboratory*, Feb., pp.54-60.

[20.] Stone, P.W. et al. 2002. "A Systemic Audit of Economic Evidence Linking Nosocomial Infections and Infection Control Interventions", *Am. J. Infect. Control*, 30:(3) 145-52

[21.] Peterson, L.R. 2007. "Q&A", *CAP Today* 21(11):136.

[22.] Levenson, D. 2007. "The Path to Better MRSA Control", *Clin. Lab. News*, 33 (8):1-4.

[23.] Hindler, J. 2008. "The 2008 CLSI Standard for Antimicrobial Susceptibiltiy Testing", APHL Teleconference, Jan.

[24.] Weigelt, J.A. 2008. MRSA, *Informa Healthcare* USA, New York.

[25.] Pallin, D.J. et al. 2008. "Increased US Emergency Dept Visits for Skin and Soft Tissue Infections, and Changes in Antibiotic Choices, During the Emergence of Community-Associated Methicillin-Resistant *Staphylococcus aureus* ", *Annals of Emergency Med.* March pp.291-298

[26.] LeBlanc, L. et al. 2006. "Fluoroquinolones and Risk for Methicillin-Resistant *Staph aureus* - Canada", *Emerg. Inf. Dis.*12(9):1398-1405.

[27.] Gerbering, J. 2008. "New Strain Emerges as Flu Season Hits Peak", *Wash. Times*, Assoc. Press, Feb. 4, 2008

[28.] Juhasz-Kaszanyitzky, E. et al. 2007. "MRSA Transmission Between Cows and Humans", *Emerg. Inf. Dis.* 13(4):630-2.

[29.] Van Duijkeren, E. et al. 2007. "Methicillin-Resistant *Staph aureus* in Pigs with Exudative Epidermitis", *Emerg. Inf. Dis*. 13(9):1408-1410.

MARYLAND

FOUNDED 1634

CRITICAL LINK

is published monthly by the staff of the

Laboratories Administration

Department of Health & Mental Hygiene

201 W. Preston Street
Baltimore, MD 21201
(Phone 410-767-6909)

Critical Link: Production Manager
Georgia Corso

Editorial Board: Jack DeBoy, Dr. P.H.
Prince Kassim, Ph.D.
Fizza Majid, Ph.D.
Robert Myers, Ph.D.
Jim Svrjcek, B.A.
Michael Wajda, M.S., J.D.
Chengru Zhu, Ph.D.

Laboratories Administration:

Director
Jack DeBoy, Dr.P.H.

Deputy Director for Scientific Programs
Robert Myers, Ph.D.

Deputy Director for
Regulatory & Administrative Programs
Michael Wajda, M.S., J.D.

Questions concerning technical content of this newsletter may be referred to
Dr. Jack DeBoy at 410-767-6100

[30.] MMWR Mass Med Soc. 2006. "Methicillin-Resistant *Staphylococcus aureus* Skin Infections Among Tattoo Recipients --- Ohio, Kentucky, and Vermont, 2004--2005", CDC, *MMWR* 55:677-9.

[31.] Stephenson, M. 2007. "Cases of Heterosexual Transmission of CA-MRSA Recently Reported", *Inf Dis News*, March.

[32.] Altman, L.K. 2008. "New Bacteria Strain is Striking Gay Men", *NY Times*, Jan. 15, 2008

[33.] Stephenson, M. 2007. "Most MRSA Infections in the Untied States are Health Care-Associated", *Inf. Dis. News*, Nov.

[34.] Cohen, A.L. et al. 2007. "Methamphetamine Use & Methicillin-Resistant *Staphylococcus aureus* Skin Infections", *Emerg. Inf. Dis.* 13(11):1707-13.

[35.] Vitale, C.B. et al. 2006. "Methicillin-Resistant *Staphylococcus aureus* in Cat and Owner", *Emerg. Inf. Dis*. 12(12):1998-2000.

[36.] Malhotra-Kumar, S. et al. 2008. "Current Trends in Rapid Diagnostics for Methicillin-Resistant *Staphylococcus aureus* and Glycopeptide-Resistant Staph Aureus", *J Clin Micro* 46(5):1577-87.

[37.] Dantas, G. et al. 2008. "Bacteria Subsisting on Antibiotics", *Science* 320 (5872):100-103.

[38.] Huang, S.S. et al. 2006. "Impact of Routine Intensive Care Unit Surveillance Cultures and Resultant Barrier Precautions on Hospital-Wide Methicillin-Resistant *Staphylococcus aureus* ", *Clin. Inf. Dis.* 43:971-78.

[39.] Borgert, N. 2007. "Staph Uprising - New Tests Combat Scourge of 'Superbug' Infections", *Clin. Lab. Prod*., July.

[40.] Donaghue, E. 2007. "Pressure is on Hospitals to Stamp Out Bacterial Bugs", *USA Today*, Oct. 16, 2007

Laboratory Statistics

NS – Not Speciated
NT – Non-Typeable
VRE – Vancomycin Resistant
SP – Species
NG – No Growth

* This genus has recently been given a new genus name. The genus name in parenthesis is the old name.
** Formerly a part of the *Trichosporon beigelii* complex.
***Alpha streptococci other than *S. pneumoniae* and *Enterococcus*

REPORTED 4/01/08 - 4/30/08

ENTERIC BACTERIOLOGY

GENUS SEROVAR	SEX	AGE	#	JURISDICTION
CAMPYLOBACTER JEJUNI				
	M	33	1	CARROLL
	F	<1	1	HARFORD
	F	55	1	BALTIMORE CITY
	M	23	1	BALTIMORE CITY
ESCHERICHIA COLI				
	F	40	1	BALTIMORE
	F	73	1	BALTIMORE
	F	<1	1	BALTIMORE
	U	<1	1	MONTGOMERY
	U	<1	1	PRINCE GEORGE'S
	M	76	1	BALTIMORE CITY
	M	57	1	BALTIMORE CITY
	U	<1	1	OUT OF STATE
	U	1	1	OUT OF STATE
	U	5	1	OUT OF STATE
	U	57	1	OUT OF STATE
	F	2	1	OUT OF STATE
	F	49	1	OUT OF STATE
	M	3	1	OUT OF STATE
	M	42	1	OUT OF STATE
	U	14	1	OUT OF STATE
SALMONELLA				
	F	37	1	FREDERICK
	M	5	1	FREDERICK
SALMONELLA ANATUM				
	F	<1	1	BALTIMORE CITY
SALMONELLA BERTA				
	M	25	1	BALTIMORE
	M	25	1	OUT OF STATE
SALMONELLA COLINDALE				
	M	<1	1	MONTGOMERY
SALMONELLA DERBY				
	M	16	1	OUT OF STATE
SALMONELLA ENTERITIDIS				
	F	39	1	BALTIMORE
	F	2	1	BALTIMORE
	F	67	1	BALTIMORE
	M	16	1	BALTIMORE
	M	41	1	FREDERICK
	F	<1	1	HARFORD
	F	66	1	HARFORD
	F	74	1	WASHINGTON
	F	61	1	BALTIMORE CITY
	M	45	1	BALTIMORE CITY
	F	36	1	BALTIMORE CITY
	F	51	1	BALTIMORE CITY
	F	<1	1	BALTIMORE CITY
	F	1	1	BALTIMORE CITY
	F	16	1	BALTIMORE CITY
	F	35	1	BALTIMORE CITY
	F	37	1	OUT OF STATE
	U	7	1	OUT OF STATE
	F	15	1	OUT OF STATE
	M	1	1	OUT OF STATE
	M	67	1	OUT OF STATE
	F	74	1	WASHINGTON
SALMONELLA HEIDELBERG				
	M	10	1	BALTIMORE
SALMONELLA INFANTIS				
	M	8	1	MONTGOMERY
SALMONELLA MANHATTAN				
	F	<1	1	ANNE ARUNDEL
	U	15	1	OUT OF STATE
	M	<1	1	OUT OF STATE
	U	1	1	OUT OF STATE
SALMONELLA SAINTPAUL				
	M	<1	1	ANNE ARUNDEL
	F	1	1	BALTIMORE
SALMONELLA SER 4,5,12:I:-				
	F	78	1	PRINCE GEORGES
	F	<1	1	BALTIMORE CITY
SALMONELLA TYPHIMURIUM				
	M	<1	1	WICOMICO
SALMONELLA TYPHIMURIUM VAR COPENHAGEN				
	M	<1	1	TALBOT
	F	<1	1	WICOMICO
	F	<1	1	BALTIMORE CITY
	U	1	1	OUT OF STATE
SALMONELLA UNTYPEABLE				
	M	48	1	BALTIMORE
	M	2	1	OUT OF STATE
	M	39	1	OUT OF STATE
SHIGELLA FLEXNERI II:3,4				
	F	102	1	BALTIMORE
	F	84	1	BALTIMORE CITY
SHIGELLA SONNEI				
	U	60	1	OUT OF STATE
TOTAL			**70**	

ISOLATES – THROAT CULTURES

COUNTY	GROUP A[1]	NON-GROUP A
ALLEGANY	1	19
ANNE ARUNDEL	1	0
BALTIMORE	1	0
CARROLL	1	0
MONTGOMERY	0	2
PRINCE GEORGE'S	0	4
SOMERSET	3	2
WICOMICO	2	14
BALTIMORE CITY	1	4
TOTAL	**10**	**45**

[1] *Streptococcus pyogenes*

BACTERIOLOGY IDENTIFICATIONS
Referrals

GENUS SPECIES	SOURCE	#	JURISDICTION
ACHROMOBACTER XYLOSOXIDANS			
	SPUTUM	1	ALLEGANY
CORYNEBACTERIUM JEIKEIUM			
	THIGH	1	BALTIMORE CITY
ESCHERICHIA COLI			
	URINE	1	ALLEGANY
HAEMOPHILUS INFLUENZAE NON-TYPABLE			
	BLOOD	2	BALTIMORE CITY
	BLOOD	2	PRINCE GEORGE'S
	BLOOD	1	WASHINGTON DC
HAEMOPHILUS INFLUENZAE SEROTYPE E			
	EYE	1	BALTIMORE CITY
HAEMOPHILUS INFLUENZAE SEROTYPE F			
	BLOOD	1	ALLEGANY
KLEBSIELLA PNEUMONIAE			
	URINE	3	WICOMICO
MYROIDES ODORATUS			
	TOE	1	ALLEGANY
OLIGELLA URETHRALIS			
	BLOOD	1	BALTIMORE CITY
RALSTONIA PICKETTTII			
	BLOOD	1	BALTIMORE CITY
STAPHYLOCOCCUS AUREUS			
	BLOOD	1	BALTIMORE CITY
	CERVIX	1	CARROLL
	BUTTOCK	1	WICOMICO
STAPHYLOCOCCUS SPECIES CONGULASE NEGATIVE			
	BLOOD	2	WICOMICO
TOTAL		**21**	

ISOLATES – MISCELLANEOUS

GENUS SPECIES	SOURCE	#	JURISDICTION
ACINETOBACTER CALCOACETICUS			
	MOUTH	1	MONTGOMERY
BACILLUS SPECIES			
	OTHER	1	BALTIMORE CITY
CLOSTRIDIUM BUTYRICUM			
	BLOOD	1	BALTIMORE CITY
CLOSTRIDIUM SEPTICUM			
	CSF	1	BALTIMORE CITY
CLOSTRIDIUM SORDELLII			
	BLOOD	1	BALTIMORE CITY
CORYNEBACTERIUM SPECIES			
	BLOOD	1	BALTIMORE CITY
ENTEROCOCCUS FAECALIS			
	BLOOD	1	BALTIMORE CITY
	WOUND	1	FREDERICK
ESCHERICHIA COLI			
	BLOOD	2	BALTIMORE CITY
	WOUND	1	FREDERICK
GARDNERELLA VAGINALIS			
	VAGINA	1	BALTIMORE
	VAGINA	5	PRINCE GEORGE'S
	VAGINA	5	SOMERSET
KLEBSIELLA PNEUMONIAE			
	OTHER	1	ALLEGANY
	BLOOD	1	BALTIMORE CITY
	WOUND	1	FREDERICK
PSEUDOMONAS AERUGINOSA			
	OTHER	1	FREDERICK
SERRATIA MARCESCENS			
	OTHER	1	FREDERICK
STAPHYLOCOCCUS AUREUS			
	SPUTUM	1	BALTIMORE
	OTHER	1	BALTIMORE CITY
	SCALP	1	BALTIMORE CITY
	WOUND	2	BALTIMORE CITY
	LABIA	1	CARROLL
	NASAL	1	CARROLL
	WOUND	1	CARROLL
	WOUND	3	FREDERICK
	OTHER	1	MONTGOMERY
	CERVIX	1	PRINCE GEORGE'S
	WOUND	1	PRINCE GEORGE'S
	OTHER	1	UNKNOWN
	SPUTUM	2	WASHINGTON
	LIP	1	WICOMICO
STAPHYLOCOCCUS COAGULASE NEGATIVE			
	WOUND	1	ALLEGANY
	BLOOD	2	BALTIMORE CITY
	CSF	1	BALTIMORE CITY
	WOUND	2	BALTIMORE CITY
	WOUND	1	CARROLL
	FOOT	1	FREDERICK
	ULCER	1	FREDERICK
	WOUND	4	FREDERICK
	OTHER	1	WICOMICO
STAPHYLOCOCCUS EPIDERMIDIS			
	BLOOD	1	BALTIMORE CITY
STAPHYLOCOCCUS SIMULANS			
	WOUND	1	CARROLL
STREPTOCOCCUS ALPHA-HEMOLYTIC			
	ABSCESS	1	ANNE ARUNDEL
STREPTOCOCCUS BETA-HEMOLYTIC GROUP A			
	BLOOD	2	BALTIMORE CITY
STREPTOCOCCUS BETA-HEMOLYTIC GROUP B			
	BLOOD	2	BALTIMORE CITY
	VAGINA	3	HOWARD
	VAGINA	1	MONTGOMERY
	CERVIX	1	PRINCE GEORGE'S
	VAGINA	11	PRINCE GEORGE'S
STREPTOCOCCUS BETA-HEMOLYTIC NOT GROUP A,B,C,D,F,G			
	ULCER	1	BALTIMORE CITY
STREPTOCOCCUS PNEUMONIAE			
	BLOOD	1	BALTIMORE CITY
	CSF	1	BALTIMORE CITY
	LUNG	1	BALTIMORE CITY
	PERICARDIAL	1	BALTIMORE CITY
STREPTOCOCCUS SALIVARIUS			
	BLOOD	1	BALTIMORE CITY
TOTAL		**88**	

SEXUALLY TRANSMITTED DISEASES

GENUS SPECIES	SEX	#	JURISDICTION
SYPHILIS SEROLOGY			
	M	1	ALLEGANY
	F	2	ANNE ARUNDEL
	M	5	ANNE ARUNDEL
	F	5	BALTIMORE
	M	6	BALTIMORE
	F	10	BALTIMORE CITY
	M	33	BALTIMORE CITY
	F	2	CHARLES
	F	1	DORCHESTER
	F	2	FREDERICK

M	1	FREDERICK
F	1	HARFORD
F	3	HOWARD
M	1	HOWARD
F	3	MONTGOMERY
M	6	MONTGOMERY
U	1	MONTGOMERY
F	6	PRINCE GEORGE'S
M	22	PRINCE GEORGE'S
F	1	SOMERSET
F	1	UNKNOWN
M	1	UNKNOWN
M	1	WASHINGTON
F	6	WICOMICO
TOTAL	**121**	

CHLAMYDIA TRACHOMATIS

F	1	ALLEGANY
M	7	ALLEGANY
F	8	ANNE ARUNDEL
M	25	ANNE ARUNDEL
U	2	ANNE ARUNDEL
F	4	BALTIMORE
M	4	BALTIMORE
F	10	BALTIMORE CITY
M	38	BALTIMORE CITY
U	2	BALTIMORE CITY
F	1	CECIL
F	2	HARFORD
M	10	HARFORD
M	2	HOWARD
M	4	KENT
F	20	MONTGOMERY
M	30	MONTGOMERY
F	30	PRINCE GEORGE'S
M	41	PRINCE GEORGE'S
F	11	SOMERSET
M	5	SOMERSET
F	6	WASHINGTON
M	4	WASHINGTON
F	4	WICOMICO
M	4	WICOMICO
TOTAL	**275**	

NEISSERIA GONORRHEAE

F	2	ANNE ARUNDEL
F	1	BALTIMORE
M	2	BALTIMORE
F	1	CARROLL
F	1	DORCHESTER
M	1	DORCHESTER
F	1	FREDERICK
F	1	HARFORD
F	1	HOWARD
M	2	MONTGOMERY
F	8	PRINCE GEORGE'S
M	22	PRINCE GEORGE'S
M	1	ST. MARY'S
M	2	SOMERSET
F	1	WICOMICO
M	2	WICOMICO
M	2	BALTIMORE CITY
F	1	OUT OF STATE
M	2	OUT OF STATE
TOTAL	**54**	

PENICILLIN RESISTANT GONORRHEA STATISTICS

REPORTED QUARTERLY
NO REPORT THIS MONTH

MYCOBACTERIOLOGY

GENUS SPECIES	SEX	AGE	#	JURISDICTION
MYCOBACTERIUM AVIUM COMPLEX				
	F	83	1	ANNE ARUNDEL
	F	48	1	ANNE ARUNDEL
	F	75	1	ANNE ARUNDEL
	F	51	1	BALTIMORE
	M	49	1	BALTIMORE
	U	34	1	BALTIMORE
	M	83	1	BALTIMORE
	F	78	1	BALTIMORE
	M	48	1	CARROLL
	F	75	1	FREDERICK
	F	79	1	FREDERICK
	F	69	1	FREDERICK
	M	54	1	FREDERICK
	M	68	1	FREDERICK
	F	72	1	FREDERICK
	M	74	1	FREDERICK
	M	48	1	MONTGOMERY
	F	77	1	MONTGOMERY
	F	82	1	TALBOT
	M	37	1	WICOMICO
	M	75	1	WICOMICO
	F	33	1	BALTIMORE CITY
	F	50	1	BALTIMORE CITY
	F	83	1	BALTIMORE CITY
	M	42	1	BALTIMORE CITY
	F	45	1	BALTIMORE CITY
	M	34	1	BALTIMORE CITY
	F	<1	1	BALTIMORE CITY
	F	39	1	BALTIMORE CITY
	F	70	1	BALTIMORE CITY
MYCOBACTERIUM CHELONAE				
	F	49	1	MONTGOMERY
	M	79	1	PRINCE GEORGE'S
MYCOBACTERIUM FORTUITUM				
	F	70	1	BALTIMORE
	F	70	1	HARFORD
	F	75	1	HARFORD
	M	49	1	PRINCE GEORGE'S
	M	38	1	OUT OF STATE
MYCOBACTERIUM GORDONAE				
	M	69	1	BALTIMORE
	M	29	1	MONTGOMERY
	F	84	1	PRINCE GEORGE'S
	M	57	1	WASHINGTON
	M	48	1	BALTIMORE CITY
	M	43	1	BALTIMORE CITY
	M	45	1	BALTIMORE CITY
	M	38	1	OUT OF STATE
MYCOBACTERIUM KANSASII				
	F	44	1	PRINCE GEORGE'S
	M	31	1	OUT OF STATE
MYCOBACTERIUM MARINUM				
	F	<1	1	ANNE ARUNDEL
	U	<1	1	ANNE ARUNDEL
	M	63	1	TALBOT
	M	63	1	BALTIMORE CITY
MYCOBACTERIUM MUCOGENICUM				
	M	43	1	MONTGOMERY
MYCOBACTERIUM TUBERCULOSIS				
	F	27	1	BALTIMORE
	F	40	1	MONTGOMERY
	M	48	1	PRINCE GEORGE'S
	M	49	1	PRINCE GEORGE'S
	M	57	1	WICOMICO
	M	46	1	BALTIMORE CITY
	M	<1	1	BALTIMORE CITY
	M	43	1	OUT OF STATE

MYCOBACTERIUM TUBERCULOSIS COMPLEX

M	22	1	ANNE ARUNDEL
M	32	1	ANNE ARUNDEL
M	66	1	ANNE ARUNDEL
M	32	1	ANNE ARUNDEL
M	78	1	BALTIMORE
M	78	1	CARROLL
M	47	1	FREDERICK
M	62	1	HARFORD
M	60	1	HOWARD
F	27	1	MONTGOMERY
M	39	1	MONTGOMERY
M	48	1	MONTGOMERY
M	58	1	MONTGOMERY
F	64	1	MONTGOMERY
M	49	1	PRINCE GEORGE'S
M	29	1	PRINCE GEORGE'S
M	47	1	PRINCE GEORGE'S
M	31	1	PRINCE GEORGE'S
M	65	1	SAINT MARYS
M	25	1	SAINT MARYS
M	37	1	WICOMICO
M	52	1	WICOMICO
F	61	1	BALTIMORE CITY
M	56	1	BALTIMORE CITY
M	60	1	BALTIMORE CITY
M	76	1	OUT OF STATE
M	58	1	OUT OF STATE
F	30	1	OUT OF STATE
M	74	1	OUT OF STATE
M	65	1	OUT OF STATE

MYCOBACTERIUM VACCAE

F	40	1	MONTGOMERY
M	53	1	TALBOT

MYCOBACTERIUM XENOPI

F	45	1	BALTIMORE
M	50	1	OUT OF STATE
F	81	1	ALLEGANY
F	81	1	ALLEGANY
F	45	1	WICOMICO

RAPIDLY GROWING MYCOBACTERIA

F	83	1	MONTGOMERY
M	37	1	WICOMICO

SCOTOCHROMOGENIC MYCOBACTERIA

M	42	1	BALTIMORE CITY
F	74	1	ALLEGANY
M	69	1	ALLEGANY
M	76	1	ALLEGANY

TOTAL **103**

MYCOBACTERIUM SUSCEPTIBILITY RESULTS

DURING APRIL, 2008, SUSCEPTIBILITY RESULTS ON 30 ISOLATES OF *M. TUBERCULOSIS* COMPLEX * WERE IDENTIFIED.

TOTAL: 8 DRUG RESISTANT STRAINS FOUND

1	FREDERICK	® to STREPTOMYCIN
2[A]	FREDERICK	® to ISONIAZID
1	HOWARD	® to STREPTOMYCIN
1	MONTGOMERY	® to STREPTOMYCIN
1	PRINCE GEORGE'S	® to STREPTOMYCIN
1	PRINCE GEORGE'S	® to ISONIAZID
1	BALTIMORE CITY	® to ISONIAZID

[A] Two isolates from the same patient
® RESISTANT

**Mycobacterium tuberculosis* complex consists of:
M. tuberculosis
M. bovis
M. bovis, BCG
M. africanum
M. microti
M. canettii

MYCOLOGY

GENUS SPECIES	SEX	AGE	#	JURISDICTION
ABSIDIA SPECIES				
	M	58	1	TALBOT
ALTERNARIA				
	M	<1	1	ANNE ARUNDEL
	U	<1	1	WICOMICO
ALTERNARIA SPECIES				
	F	67	1	PRINCE GEORGE'S
ASPERGILLUS FLAVUS				
	M	28	1	TALBOT
	M	59	1	BALTIMORE CITY
ASPERGILLUS FUMIGATUS				
	M	<1	1	ANNE ARUNDEL
	F	66	1	ANNE ARUNDEL
	M	57	1	MONTGOMERY
	F	74	1	PRINCE GEORGE'S
	F	38	1	TALBOT
	F	79	1	TALBOT
	M	46	1	BALTIMORE CITY
ASPERGILLUS NIGER				
	F	75	1	CECIL
	M	65	1	PRINCE GEORGE'S
	F	61	1	TALBOT
ASPERGILLUS TERREUS				
	F	81	1	CALVERT
	F	79	1	TALBOT
ASPERGILLUS VERSICOLOR				
	U	<1	1	ANNE ARUNDEL
CANDIDA ALBICANS				
	F	25	1	BALTIMORE
	F	73	1	CALVERT
	M	92	1	CALVERT
	F	22	1	CARROLL
	F	24	1	CECIL
	M	69	1	FREDERICK
	F	18	1	MONTGOMERY
	F	35	1	MONTGOMERY
	F	59	1	MONTGOMERY
	F	65	1	MONTGOMERY
	F	72	1	MONTGOMERY
	F	78	1	MONTGOMERY
	M	13	1	MONTGOMERY
	M	31	1	MONTGOMERY
	M	66	1	MONTGOMERY
	M	95	1	MONTGOMERY
	F	35	1	MONTGOMERY
	F	49	1	MONTGOMERY
	F	36	1	PRINCE GEORGE'S
	F	44	1	PRINCE GEORGE'S
	F	52	1	PRINCE GEORGE'S
	F	61	1	PRINCE GEORGE'S
	F	66	1	PRINCE GEORGE'S
	F	67	1	PRINCE GEORGE'S
	M	48	1	PRINCE GEORGE'S
	M	65	1	PRINCE GEORGE'S
	M	82	1	PRINCE GEORGE'S
	F	70	1	PRINCE GEORGES
	M	53	1	PRINCE GEORGE'S
	M	63	1	PRINCE GEORGE'S
	F	47	1	PRINCE GEORGE'S
	F	18	1	PRINCE GEORGE'S
	F	20	1	PRINCE GEORGE'S
	F	22	1	PRINCE GEORGE'S
	F	18	1	PRINCE GEORGE'S
	F	19	1	PRINCE GEORGE'S
	F	20	1	PRINCE GEORGE'S
	F	<1	1	SOMERSET
	F	18	1	SOMERSET
	F	19	1	SOMERSET

F	20	1	SOMERSET
F	21	1	SOMERSET
F	22	1	SOMERSET
F	23	1	SOMERSET
F	20	1	WICOMICO
U	48	1	BALTIMORE CITY
U	50	1	BALTIMORE CITY
F	84	1	BALTIMORE CITY
M	45	1	BALTIMORE CITY
M	64	1	BALTIMORE CITY
M	55	1	BALTIMORE CITY
M	59	1	BALTIMORE CITY
M	64	1	BALTIMORE CITY
M	75	1	BALTIMORE CITY
M	78	1	BALTIMORE CITY
M	84	1	BALTIMORE CITY
F	17	1	BALTIMORE CITY
CANDIDA GLABRATA			
F	32	1	MONTGOMERY
F	78	1	MONTGOMERY
M	86	1	MONTGOMERY
F	45	1	MONTGOMERY
F	61	1	PRINCE GEORGE'S
F	71	1	PRINCE GEORGE'S
M	64	1	BALTIMORE CITY
CANDIDA KRUSEI			
F	79	1	ANNE ARUNDEL
M	31	1	MONTGOMERY
M	61	1	PRINCE GEORGE'S
F	60	1	PRINCE GEORGE'S
CANDIDA LUSITANIAE			
F	30	1	ANNE ARUNDEL
F	38	1	MONTGOMERY
M	<1	1	BALTIMORE CITY
CANDIDA PARAPSILOSIS			
F	98	1	MONTGOMERY
M	43	1	PRINCE GEORGE'S
M	<1	1	OUT OF STATE
CANDIDA SPECIES			
M	78	1	BALTIMORE CITY
CANDIDA TROPICALIS			
F	32	1	MONTGOMERY
M	<1	1	PRINCE GEORGE'S
CRYPTOCOCCUS NEOFORMANS			
U	60	1	BALTIMORE
F	49	1	PRINCE GEORGE'S
FUSARIUM SPECIES			
M	52	1	FREDERICK
F	75	1	PRINCE GEORGE'S
M	37	1	TALBOT
HISTOPLASMA CAPSULATUM			
M	43	1	BALTIMORE CITY
MOULD			
M	60	1	BALTIMORE
F	61	1	PRINCE GEORGE'S
M	64	1	BALTIMORE CITY
PAECILOMYCES SPECIES			
F	48	1	CARROLL
M	59	1	BALTIMORE CITY
PENICILLIUM SPECIES			
F	59	1	ALLEGANY
F	38	1	MONTGOMERY
F	36	1	PRINCE GEORGE'S
RHIZOPUS ORYZAE			
M	8	1	BALTIMORE
RHIZOPUS STOLONIFER			
F	51	1	MONTGOMERY
F	72	1	PRINCE GEORGE'S
RHODOTORULA SPECIES			
F	68	1	MONTGOMERY
F	76	1	MONTGOMERY
SCOPULARIOPSIS BREVICAULIS			
F	93	1	PRINCE GEORGE'S
TRICHODERMA			
F	<1	1	OUT OF STATE
TRICHOPHYTON MENTAGROPHYTES			
F	92	1	BALTIMORE CITY
TRICHOPHYTON RUBRUM			
M	73	1	PRINCE GEORGE'S
F	34	1	TALBOT
F	63	1	TALBOT
F	54	1	BALTIMORE CITY
TRICHOPHYTON TONSURANS			
U	4	1	TALBOT
M	4	1	TALBOT
TOTAL		**124**	

PARASITOLOGY

GENUS SPECIES	#	JURISDICTION
PROTOZOA		
CHILOMASTIX MESNILI	1	PRINCE GEORGE'S
ENDOLIMAX NANA	9	MONTGOMERY
	4	PRINCE GEORGE'S
	2	FREDERICK
ENTAMOEBA COLI	2	MONTGOMERY
	4	PRINCE GEORGE'S
IODAMOEBA BUTSCHLII	1	PRINCE GEORGE'S
	4	FREDERICK
TOTAL	**27**	
NEMATODES		
ENTEROBIUS VERMICULARIS	2	CARROLL
	1	KENT
BLASTOCYSTIS HOMINIS	5	PRINCE GEORGE'S
	3	FREDERICK
	5	MONTGOMERY
	3	BALTIMORE CITY
TOTAL	**19**	
HELMINTHS		
HOOKWORM	6	HOWARD
CYSTODES	2	FREDERICK
HYMENOLEPIS NANA	1	MONTGOMERY
TOTAL	**9**	

ARTHROPOD IDENTIFICATION

NONE

TICK IDENTIFICATION

NONE

WATER MICROBIOLOGY

	# TESTED	**# NON-COMPLIANT**
COMMUNITY	10	0
NON-COMMUNITY	491	61
TOTAL	**501**	**61**

FOOD SAFETY

FOOD AND SHELLFISH MICROBIOLOGY

	# OF SAMPLES	NOTABLE PATHOGENS
FOOD	46	0
		# STANDARDS EXCEEDED *
CRABMEAT	0	0
		# STANDARDS EXCEEDED **
SHELLFISH	0	0
SHELLFISH GROWING WATERS	219	
OTHER†	1	
TOTAL	**266**	**0**

†**CLOSTRIDIUM** BOTULINUM TOXIN ASSAY

STANDARDS

* CRABMEAT-FRESH

ESCHERICHIA COLI = LESS THAN 36 MPN/100 GRAM
STANDARD PLATE COUNT = LESS THAN 100,000 PER GRAM

** SHELLFISH

FECAL COLIFORMS = LESS THAN 230 MPN/100 GRAM
STANDARD PLATE COUNT = LESS THAN 500,000 PER GRAM

VIRUS ISOLATION

ISOLATE	SEX	AGE	#	JURISDICTION
ADENOVIRUS				
	M	21	1	PRINCE GEORGE'S
	F	19	1	PRINCE GEORGE'S
	M	22	1	PRINCE GEORGE'S
SUBTOTAL			**3**	
HERPES SIMPLEX VIRUS TYPE 1				
	M	44	1	BALTIMORE CITY
	M	22	1	BALTIMORE CITY
	M	31	1	BALTIMORE CITY
SUBTOTAL			**3**	
INFLUENZA A VIRUS				
	F	19	1	PRINCE GEORGE'S
	F	28	1	TALBOT
SUBTOTAL			**2**	
INFLUENZA B VIRUS				
	F	90	1	CALVERT
	M	88	1	FREDERICK
	M	42	1	TALBOT
	M	20	1	BALTIMORE CITY
SUBTOTAL			**4**	
TOTAL			**12**	

NOTE: PCR (POLYMERASE CHAIN REACTION) TESTING RESULTS CANNOT BE REPORTED THIS MONTH BECAUSE WE ARE TRANSITIONING TO A NEW COMPUTER SYSTEM. WE HOPE TO HAVE PCR STATISTICS BY NEXT MONTH.

The services and facilities of the Maryland Department of Health and Mental Hygiene (DHMH) are operated on a non-discriminatory basis. This policy prohibits discrimination on the basis of age; ancestry; color; creed; marital status; mental or physical disability; national origin; race; religious affiliation, belief, or opinion; sex; or sexual orientation and applies to the provisions of employment and granting of advantages, privileges and accommodations. The Department, in compliance with the Americans with Disabilities Act, ensures that qualified individuals with disabilities are given an opportunity to participate in and benefit from DHMH services, programs, benefits, and employment opportunities.

VIRAL HEPATITIS

ORGANISM	# OF SPECIMENS	POSITIVES	JURISDICTION
HEPATITIS A			
	8	0	BALTIMORE
	3	0	BALTIMORE CITY
	3	0	CARROLL
	1	0	HOWARD
	3	0	PRINCE GEORGE'S
	1	0	WICOMICO
SUBTOTAL	**19**	**0**	
HEPATITIS B			
	59	0	ALLEGANY
	118	3	ANNE ARUNDEL
	89	1	BALTIMORE
	717	8	BALTIMORE CITY
	10	0	CALVERT
	47	1	CARROLL
	130	3	CECIL
	3	0	CHARLES
	113	1	FREDERICK
	9	0	GARRETT
	62	0	HARFORD
	36	2	HOWARD
	1	0	KENT
	257	2	MONTGOMERY
	412	11	PRINCE GEORGE'S
	1	0	QUEEN ANNE'S
	1	0	SAINT MARY'S
	5	0	SOMERSET
	17	0	TALBOT
	5	0	UNKNOWN
	30	0	WASHINGTON
	122	1	WICOMICO
	2	0	WORCESTER
SUBTOTAL	**2,246**	**33**	

HEPATITIS C

	57	6	ALLEGANY
	130	26	ANNE ARUNDEL
	84	2	BALTIMORE
	202	45	BALTIMORE CITY
	11	1	CALVERT
	53	10	CARROLL
	75	13	CECIL
	3	0	CHARLES
	109	1	FREDERICK
	12	0	GARRETT
	24	0	HARFORD
	6	0	HOWARD
	1	0	KENT
	25	0	MONTGOMERY
	237	3	PRINCE GEORGE'S
	5	0	QUEEN ANNE'S
	4	0	SAINT MARY'S
	1	0	SOMERSET
	17	0	TALBOT
	12	2	WASHINGTON
	25	2	WICOMICO
	2	1	WORCESTER
SUBTOTAL	**1,095**	**112**	
TOTALS	**3,360**	**145**	

RABIES

FOX	1	BALTIMORE
	3	MONTGOMERY
	1	ST. MARY'S
RACCOON	1	ALLEGANY
	1	ANNE ARUNDEL
	4	BALTIMORE
	1	CAROLINE
	3	CARROLL
	1	CECIL
	1	DORCHESTER
	1	FREDERICK
	3	HARFORD
	1	HOWARD
	7	MONTGOMERY
	1	PRINCE GEORGE'S
	2	QUEEN ANNE'S
	2	TALBOT
	1	WICOMICO
SKUNK	1	GARRETT
	1	QUEEN ANNE'S
	1	ST. MARY'S
	1	TALBOT
	1	WASHINGTON
TOTAL POSITIVES	40	
TOTAL SPECIMENS	348	

CHLAMYDOPHILIA (CHLAMYDIA) PSITTACI

REPORTED QUARTERLY
NO REPORT THIS MONTH

CD4 FLOW CYTOMETRY WORKLOAD

REPORTED QUARTERLY
NO REPORT THIS MONTH

NEWBORN & CHILDHOOD SCREENING

STATISTICS FOR APRIL 2008

PRESUMPTIVE POSITIVES	
DISORDERS	**#**
PHENYLKETONURIA	6
MAPLE SYRUP URINE DISEASE	4
HOMOCYSTINURIA	14
TYROSINEMIA	2
ARGININEMIA	1
CITRULLINEMIA	0
GALACTOSEMIA	4
BIOTINIDASE DEFICIENCY	0
HYPOTHYROIDISM	53
HEMOGLOBIN -DISEASE	26
HEMOGLOBIN -BENIGN	349
CONGENITAL ADRENAL HYPERPLASIA (CAH)	31
CYSTIC FIBROSIS	3
FATTY ACID OXIDATIONS	12
ORGANIC ACIDEMIAS	30
ACYLCARNITINE - BORDERLINE	8
ACYLCARNITINE - OTHERS	14

MONTHLY TOTALS	
# OF SPECIMENS SCREENED	10,242
NUMBER OF TESTS	769,978
% OF UNSATISFACTORY SPECIMENS	2.5

YEAR-TO-DATE CONFIRMED CASES	
CONDITIONS	**# CONFIRMED**
MCAD	2
3MCC	1
SCAD	1
VLCAD	0
GA-I	1
MAPLE SYRUP URINE DISEASE	0
PKU- CLINICALLY SIGNIFICANT VARIANT	1
PKU- NOT CLINICALLY SIGNIFICANT VARIANT	1
GALACTOSEMIA- CLASSICAL GALT DEFICIENCY	1
GALACTOSEMIA - VARIANT	1
BIOTINIDASE DEFICIENCY	0
GALACTOSE EPIMERASE DEFICIENCY	0
PARTIAL BIOTINIDASE DEFICIENCY	0
CAH- CLASSICAL SALT WASTING	0
CAH-NON-CLASSICAL	0
HYPOTHYROIDISM - PRIMARY	7
OTHER HYPOTHYROIDISM	3
SICKLE CELL DISEASE -SS	5
SICKLE CELL DISEASE -SE	1
SICKLE CELL DISEASE -SC	2
SICKLE CELL DISEASE -S BETA THALASSEMIA	3
CYSTIC FIBROSIS	2

ENVIRONMENTAL CHEMISTRY

SAMPLES	# NON-COMPLIANT	# TESTED
ASBESTOS		
AIR	6	12
BULK	0	0
AIR QUALITY		
$PM_{2.5}$	0	501
PM_{10}	0	0
RADIATION		
AIR/CHARCOAL FILTERS	0	72
MILK	0	4
WIPES	0	55
RAW WATER	0	14
VEGETATION	0	0
OTHER	0	1
DRINKING WATER		
METALS		
COMMUNITY	10	21
NON-COMMUNITY	2	8
PRIVATE WELLS	89	258
PESTICIDES & PCBs		
COMMUNITY	0	81
NON-COMMUNITY	0	48
PRIVATE WELLS	0	0
VOLATILE ORGANIC COMPOUNDS		
COMMUNITY	2	363
NON-COMMUNITY	0	65
PRIVATE WELLS	0	126
RADIATION		
COMMUNITY	17	92
NON-COMMUNITY	0	0
PRIVATE WELLS	4	26
INORGANICS		
COMMUNITY	0	19
NON-COMMUNITY	7	79
PRIVATE WELLS	7	246
FOOD CHEMISTRY		
SUSPECTED TAMPERING	0	0
MICROSCOPIC FILTH	0	2
LABELING	0	0
SURVEILLANCE	0	3
CHEMICAL CONTAMINATION	0	0
TOTAL	**144**	**2,096**

LEAD ENVIRONMENTAL

TEST	#	ELEV	BRL	UNSAT
TOTAL PAINT	**6**	**4**	**1**	**0**
TOTAL SOIL	**8**	**2**	**2**	**0**
DUST				
FLOOR	297	20	250	2
SILL	426	18	298	2
WELL	145	14	70	1
OTHER	8	1	6	0
TOTAL DUST	**876**	**53**	**624**	**5**
GRAND TOTAL	**890**	**59**	**627**	**5**

INTERPRETATION OF RESULTS:
# = Number of Samples Received
ELEV= Elevated
BRL= Below Reporting Limit
UNSAT = Unsatisfactory
PAINT Positive in excess of 0.5%
SOIL Action level 400 - 5,000 ppm
DUST Clearance limits: Floor/Other 40 ug/sq ft
Window Sill 250 ug/sq ft
Window Well 400 ug/sq ft

LEAD SCREENING - BLOOD LEAD

CLASS	RANGE ug/dl	# TESTED
MARYLAND		
I	<10	160
IIA	10-14	4
IIB	15-19	6
III	20-44	7
IV	45-69	0
V	>69	0
TOTAL		**177**
WASHINGTON DC		
I	<10	0
IIA	10-14	0
IIB	15-19	0
III	20-44	0
IV	45-69	0
V	>69	0
TOTAL		**0**

HIV ANTIBODY SCREENING – BLOOD (APRIL 2008)

SPECIMEN SOURCES	TOTAL	POSITIVE EIA	%	POSITIVE WB	%
HEALTH DEPARTMENTS AND CLINICS	2,273	111	4.88%	108	97.30%
HOSPITALS	142	4	2.82%	4	100.00%
DETENTION CENTERS	502	13	2.59%	11	84.62%
PRIVATE PHYSICIANS	12	0	0.00%	0	0.00%
STUDENT HEALTH CLINICS	349	5	1.43%	4	80.00%
EMPLOYEE HEALTH CLINICS	16	0	0.00%	0	0.00%
AUTOPSIES	305	12	3.93%	7	58.33%
ORGAN/TISSUE DONORS	85	1	1.18%	1	100.00%
TOTAL	**3,684**	**146**	**3.96%**	**135**	**92.47%**

VIRAL LOAD SPECIMENS (APRIL 2008)

HIV–1 RNA Copies/ml	$<10^3$	$10^3 – 10^4$	$10^4 – 10^5$	$>10^5$	Totals
ALLEGANY	17	0	3	1	21
CARROLL	1	0	0	0	1
MONTGOMERY	80	18	19	6	123
PRINCE GEORGES	84	7	14	9	114
SOMERSET	1	0	0	0	1
WASHINGTON	3	0	2	0	5
WICOMICO	1	0	1	0	2
SUBTOTALS	**187**	**25**	**39**	**16**	**267**
DEPT. OF CORRECTIONS	59	16	32	20	127
TOTALS	**246**	**41**	**71**	**36**	**394**

If you prefer to receive your issues of *Critical Link* electronically, send your address to:

criticallink@dhmh.state.md.us

It is also available on line at

http://www.dhmh.state.md.us/labs/html/critical-link.html

MAILING LABEL

Maryland Department of Health & Mental Hygiene
J. Mehsen Joseph Public Health Laboratory
Critical Link c/o Georgia Corso L-15
201 West Preston Street
Baltimore Maryland 21201