CRITICAL LINK

John M. Colmers
Secretary

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The Laboratories Administration—Maryland's State Public Health Laboratory

Diagnosing Latent TB Infection

Quantiferon-TB Gold In-Tube Provides Valuable Tool

One of the most basic challenges in controlling tuberculosis (TB) is identifying those who are asymptomatic yet are still infected with TB, a condition know as latent TB infection (LTBI). Those with LTBI are at great risk of developing active TB disease and, unless identified and treated, represent a continued threat to public health. For years, the "gold standard" for identifying those with LTBI has been the tuberculin skin test (TST), or Mantoux test. During a TST, various nonspecific antigens obtained from sterilized cultures of *Mycobacterium tuberculosis* are injected between layers of skin. The immune system of a person previously exposed to TB responds to these antigens, causing a raised, hardened area known as an induration or wheal, which then must be read within 48 to 72 hours.

Photo 1: This technician is in the process of correctly placing a Mantoux tuberculin skin test in this recipient's forearm, which will cause a 6mm to10mm wheal, i.e., a raised area of skin surface, to form at the injection site. Photo: CDC Image Library

While this technique is easy to perform and has proven to be fairly accurate as an indicator of LTBI, it is not without weaknesses. Since induration must be checked 48 to 72 hours after applying the TST, there is a need for a return visit by the patient to a healthcare provider. This creates greater logistical concerns for patient management as well as greater healthcare costs. The results of the test are ultimately determined by measuring induration, which is subjective, based upon the interpretation of the reader. Furthermore, exposure to species of mycobacterium not known to cause TB in humans can cross react with the TST, causing false positive results. Most pressingly, Bacillius Calmette-Guérin (BCG), used in many countries routinely as a vaccine against TB, also causes a false positive TST, decreasing the accuracy (specificity) of the test among foreign-born populations.

An exciting new advance in testing for LTBI has been the development of interferon-gamma release assays (IGRAs). The IGRAs gauge

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New Safety and Security Officer Selected

A Welcome to Rachel Vaden

The Laboratories Administration is pleased to announce the selection of Ms. Rachel Vaden as its new Safety and Security Officer.

Rachel has been a Public Health Laboratory Scientist with the Laboratories Administration's Tuberculosis (TB) and Mycology Laboratory for five years. In addition to her laboratory duties, she has been responsible for working with federal, State, and local health authorities to track Maryland's tuberculosis cases through genotypic analysis and testing. She has maintained the Maryland State Laboratories Administration's TB genotyping database in full compliance with the CDC requirements and represented DHMH at the CDC conferences

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New Guide to Public Health Laboratory Services is released p.5

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immune response to TB by measuring blood levels of interferon-gamma, a signaling protein produced by leukocytes during a cell-mediated immune response. Instead of the nonspecific distillate of proteins utilized in the TST, IGRAs use antigens specific for *Mycobacterium tuberculosis* to stimulate white blood cells directly, and then quantify the release of interferon-gamma. This helps eliminate some of the variables which make the TST less reliable. There are two major IGRA technologies that have received FDA approval for commercial use: T-SPOT ®*.TB*, produced by Oxford Immunotec Ltd., and QuantiFERON®-TB Gold In-Tube (QFT-G), produced by Cellestis, Inc.

Photo 2: The three specialized Quantiferon Gold In-Tube blood collection tubes: Nil (grey top), Antigen (red top), and Mitogen (purple top). The tubes are filled with a base of sodium heparin. The grey top tube is the negative control, to determine background interferon-gamma levels in the blood due to any infection. The purple top tube is a immune stimulator, which acts as a positive control to gauge immune response. And the red top tube contains three proteins specific to TB: CPF 10, ESAT 6, and TB 7.7. Photo: Georgia Corso

Overall, IGRAs have excellent specificity that is unaffected by BCG vaccination. The sensitivity of IGRAs and TST varies across tests and populations, but T-SPOT®*.TB* appears to be more sensitive in detecting LTBI with slightly lower specificity than QFT-G.[1,2,3]

The T-SPOT, which received FDA approval July 30, 2008, is an ELISPOT assay, a variation on a standard enzyme linked immunosorbent assay (ELISA) technique that visualizes the activity of individual leukocytes as spots on a plate. These spots are counted, and a difference of six or more spots between the test wells and negative control is considered a positive result.

The test requires a standardized amount of viable white blood cells, 2.5 x 10^5 per well.[4] The test requires carefully centrifuging the blood and pulling of the white blood cells, as well as washing and standardizing the amount of cells, per well. Ultimately, the test requires a greater level of expertise, more specialized equipment, and more labor than other assays, which may prove prohibitive in

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Photo 3: A microplate washer used by the Laboratories Administration in the ELISA procedure. Photo: Georgia Corso

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many laboratory situations. The spots that indicate a positive result are generally counted manually, potentially introducing a level of subjectivity, based upon reader expertise. These aspects of the assay may make it difficult to run effectively in certain laboratory situations.

By comparison, QFT-G is a whole blood assay with no requirements for highly specialized equipment or experience in counting white blood cells. Approved by the FDA on October 10, 2007, QuantiFERON®-TB Gold In-Tube requires only the collection of 1 mL of blood into each of three specialized blood collection tubes manufactured by Cellestis. The Nil tube contains no specific antigens and acts as a negative control, measuring baseline levels of interferon-gamma in the patient's blood.

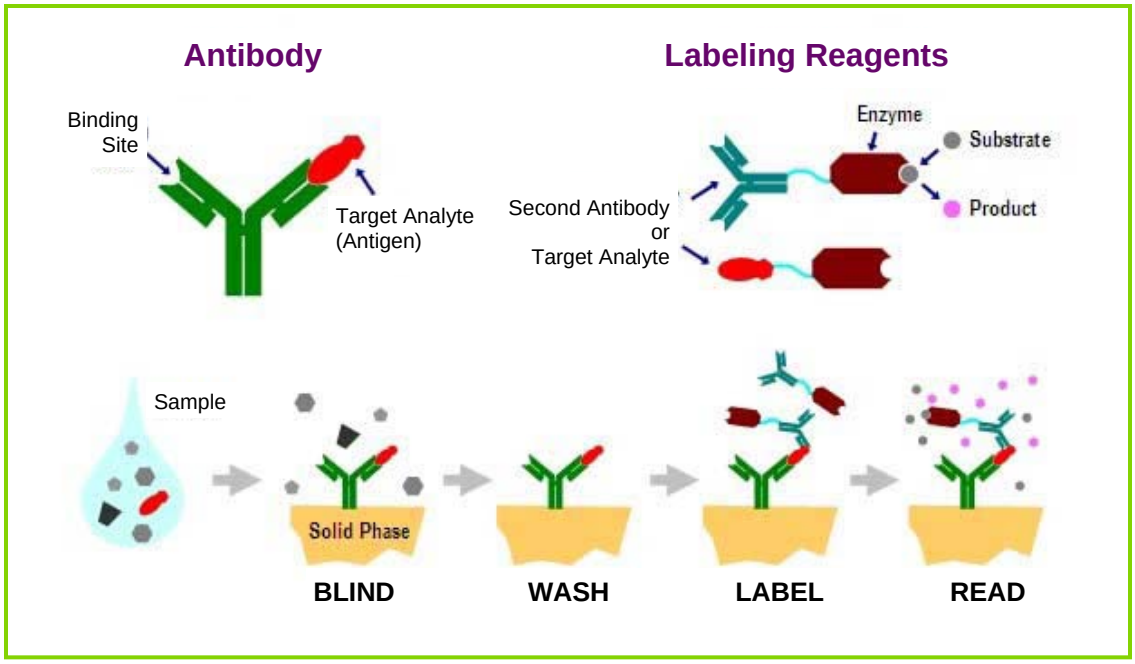

Figure 1: Standard, non-competitive, solid-phase ELISA (enzyme linked immunosorbent assay).

The Antigen tube contains three antigens, ESAT-6, CFP-10, and TB 7.7, specific for the organisms responsible for TB disease in humans. Unlike the TST, which has the potential to yield false positive results when exposed to most species of myco-bacterium, cross-reactivity leading to false positives in QFT-G has only been identified with exposure to *M. kansasii*, *M. marinum*, and *M. szulgai*.[5]

Photo 4: Rich Oatis of the TB Laboratory transfers plasma from a tube to an ELISA plate.
Photo: Georgia Corso

Most importantly, these antigens are not found in BCG, which gives QFT-G a much improved specificity over the TST in populations where BCG vaccinations are routine.

The third tube, the Mitogen tube, contains an immune system stimulator and acts as a positive control. If the Mitogen tube does not yield a strong positive result for a given test, it is suspected that the patient's immune system may not be sufficiently healthy to yield the proper response measured by the test. This could result in false negatives. Such tests must be interpreted as indeterminate. While this does not provide the clinician with a definitive answer regarding LTBI, it does indicate an invalid test, whereas the TST in such an instance may only be interpreted as a false negative.

All three tubes of blood must be drawn in one patient visit and shaken vigorously to ensure the blood coats the walls of the tubes, where the stimulating antigens are present. All blood tubes must be incubated at 37°C within 16 hours, making sure the tubes are freshly shaken before incubation.[6] This is critical, as white blood cells rapidly lose their ability to react to the antigens and produce interferon-gamma.

Once the blood has been incubated at 37°C for 16 to 24 hours, the plasma is harvested, and can be stored for three days prior to testing at room temperature, 28 days if stored at 2-8°C, or for extended periods if frozen at -20°C This allows for a great deal of flexibility in specimen testing. The plasma can then be tested for the presence of interferon-gamma using standard ELISA techniques and practices, allowing for easy integration of the assay into any laboratory with ELISA equipment and experience. The QFT-G test kit includes interferon-gamma standards which are used to generate a standard curve, ultimately allowing the raw absorbance values recorded by an ELISA plate reader to be converted to interferon units per mL of plasma by software provided with the assay. This provides valuable information to the clinician, who must make decisions regarding the possibility of LTBI in a given individual.

QFT-G is a very useful tool for community TB control. Its ease of use allows for integration into a variety of settings. Since

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the test can be performed after blood is drawn in only one patient visit, patient compliance for testing is increased, while the cost of follow-up visits associated with reading TSTs is eliminated. The use of mathematical algorithms by Cellestis' software for interpreting test results helps to eliminate some of the difficult subjective decisions required in measuring induration when interpreting a TST result. Perhaps most importantly, QFT-G's lack of cross-reactivity with most species of mycobacterium, and especially BCG, makes the test particularly useful in detecting LTBI in immigrant and refugee populations.

QFT-G has been performed by the Department of Health and Mental Hygiene's TB Laboratory since the beginning of 2008, as part of the CDC's TB Epidemiologic Studies Consortium's Task Order 18. Task Order 18 is a longitudinal study, to compare the test characteristics, acceptability, and cost effectiveness of QFT-G, T-SPOT, and TST in health care workers, and to determine the repeatability and reproducibility of these tests' results.[7] The study hopes to further understanding of the usefulness of all three methods for diagnosing LTBI, as well as determining which assays may be most practical to perform for the purpose of routine LTBI screening. With the experience gained in performing QFT-G for the past two years as part of this research project, the Laboratories Administration hopes to implement a program of Quantiferon testing for target populations within Maryland in the near future as part of its mission to improve the public health in the State.

This article was written by Richard Oatis.

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6. "Quantiferon-TB Gold In-Tube Package Insert". Cellestis. 2007-10-10.
7. Task Order 18: Evaluation of new interferon-gamma release assays in the diagnosis of LTBI in healthcare workers. CDC TBESC http://www.cdc.gov/tb/topic/research/TBESC/task18.htm. Retreived 2010-06-11

New Version of *The Guide to Public Health Laboratory Services*

On June 23, 2010, the Laboratories Administration finished the painstaking task of going over the document that is an instruction manual for customers to use when submitting specimens and/or samples to the state laboratory for testing or interpreting results. There are hundreds of different tests performed in the many laboratories and each test has a different protocol.

This version is 2.0.0. In it are contact information for the laboratories, regulatory compliance information, packaging instructions, interpretation of results, and much more. It will be a living document and there will be more versions as changes are made in the testing procedures done at the Laboratories Administration.

You may access the new Guide at http://dhmh.state.md.us/labs/pdf/guide.pdf

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New Safety Officer is Selected

in Atlanta to help launch the TB Genotyping Information Management System (TBGIMS), a nationwide database for TB genotyping testing.

Prior to joining the Laboratories Administration, Rachel was an Environmental Health and Safety Associate with a multi-disciplined health, safety and environmental consulting firm, providing a wide range of occupational/life safety, industrial hygiene, and environmental services nationally. She researched the health and safety implications and relevant state and federal regulations associated with exposure to various environmental contaminants in the workplace (e.g., asbestos, benzene, vinyl chloride). Rachel also collaborated in the creation of 'Product Evaluation Profiles', an expansive document that provided evaluations of personal exposure potential for a variety of products used by consumers and employees in both industrial and non-industrial environments. In addition, she provided support for various legal proceedings, reviewed depositions and discovery responses, and assisted in preparing expert witnesses for cases involving exposure to hazardous substances.

Rachel graduated from Franklin and Marshall College in Lancaster, PA as a Biology/Government major, and has begun graduate course work in Field Epidemiology at the University of North Carolina at Chapel Hill, Gillings School of Global Public Health.

This article was written by Mark McKinney.

Rachel Vaden, the new Safety and Security Officer for the Laboratories Administration.
Photo: Georgia Corso

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 plies 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.

Laboratory Statistics

Reported from the
Laboratories Administration
during the month of
April 2010

ENTERIC BACTERIOLOGY

GENUS SEROVAR	SEX	AGE	#	JURISDICTION
CAMPYLOBACTER JEJUNI				
	M	39	1	ANNE ARUNDEL
	U	66	1	BALTIMORE
	U	11	1	BALTIMORE
	F	46	1	BALTIMORE
	F	17	1	BALTIMORE
	F	17	1	BALTIMORE
	F	1	1	BALTIMORE
	M	46	1	BALTIMORE
	M	45	1	BALTIMORE
	F	0	1	BALTIMORE CITY
	M	51	1	BALTIMORE CITY
	F	73	1	KENT
	F	44	1	OUT OF STATE
	F	29	1	OUT OF STATE
	F	26	1	OUT OF STATE
	M	37	1	OUT OF STATE
	M	22	1	OUT OF STATE
	M	22	1	WICOMICO
	F	49	1	WICOMICO
CAMPYLOBACTER SPECIES PRESENT. SENT TO CDC FOR SPECIATION.				
	M	70	1	TALBOT
ESCHERICHIA COLI, SEROTYPE 0157:H7				
	F	18	1	BALTIMORE CITY
ESCHERICHIA COLI, SEROTYPE O103:H2				
	M	3	1	OUT OF STATE
SALMONELLA				
	F	0	1	BALTIMORE CITY
	F	87	1	MONTGOMERY
SALMONELLA SER. 4,12:I:-				
	F	65	1	OUT OF STATE
SALMONELLA SER. 4,5,12:I:-				
	F	0	1	BALTIMORE CITY
SALMONELLA SER. BRAENDERUP				
	U	0	1	BALTIMORE
	M	0	1	BALTIMORE CITY
SALMONELLA SER. ENTERITIDIS				
	F	0	1	BALTIMORE
	F	53	1	BALTIMORE
	F	2	1	BALTIMORE
	M	53	1	BALTIMORE
	M	3	2	BALTIMORE
	M	1	2	BALTIMORE
	U	44	1	BALTIMORE CITY
	F	67	1	BALTIMORE CITY
	F	50	1	BALTIMORE CITY
	F	37	1	BALTIMORE CITY
	F	17	1	BALTIMORE CITY
	F	3	1	BALTIMORE CITY
	F	2	2	BALTIMORE CITY
	F	1	1	BALTIMORE CITY
	M	0	1	BALTIMORE CITY
	M	49	1	BALTIMORE CITY
	M	47	1	BALTIMORE CITY
	M	37	1	BALTIMORE CITY
	M	17	1	BALTIMORE CITY
	M	3	1	BALTIMORE CITY
	M	2	1	BALTIMORE CITY
	M	0	1	BALTIMORE CITY
	M	84	1	FREDERICK
	M	5	1	KENT
	F	41	1	OUT OF STATE
	F	17	1	OUT OF STATE
	F	0	1	OUT OF STATE
	M	19	1	OUT OF STATE
	M	2	1	OUT OF STATE
	M	1	1	OUT OF STATE
	F	0	1	PRINCE GEORGE'S
	F	0	1	UNKNOWN
SALMONELLA SER. GIVE				
	U	0	1	MONTGOMERY
SALMONELLA SER. HEIDELBERG				
	F	43	1	CHARLES
SALMONELLA SER. MUENCHEN				
	M	0	1	OUT OF STATE
	U	16	1	OUT OF STATE
SALMONELLA SER. OSLO				
	M	4	1	BALTIMORE CITY
SALMONELLA SER. PARATYPHI B				
	F	40	2	BALTIMORE
	F	71	1	BALTIMORE CITY
SALMONELLA SER. PARATYPHI B VAR L(+) TARTRATE +				
	F	35	1	BALTIMORE
SALMONELLA SER. THOMPSON				
	U	1	1	BALTIMORE CITY
SALMONELLA SER. TYPHI				
	M	65	1	MONTGOMERY
	M	24	8	OUT OF STATE
SALMONELLA SER. TYPHIMURIUM				
	M	78	2	ANNE ARUNDEL
SALMONELLA SER. UNTYPEABLE				
	M	53	1	BALTIMORE CITY
	F	1	1	OUT OF STATE
	U	82	1	WASHINGTON
SHIGELLA FLEXNERI				
	F	2	1	BALTIMORE CITY
	M	31	1	MONTGOMERY
	F	31	1	WASHINGTON
SHIGELLA SONNEI				
	U	38	1	BALTIMORE CITY
	F	0	1	BALTIMORE CITY
	M	49	1	BALTIMORE CITY
	F	23	1	MONTGOMERY
TOTAL			**94**	

ISOLATES - REFERENCE

GENUS SPECIES	SOURCE	#	JURISDICTION
BACILLUS SPHAERICUS			
	STOOL	1	CALVERT
	BLOOD	1	PRINCE GEORGE'S
BREVIBACILLUS BREVIS			
	BLOOD	1	PRINCE GEORGE'S
TOTAL		**3**	

ISOLATES - MISCELLANEOUS

GENUS SPECIES	SOURCE	#	JURISDICTION
ENTEROCOCCUS FAECALIS			
	BLOOD	1	BALTIMORE CITY
ESCHERICHIA COLI			
	WOUND	1	BALTIMORE CITY
GARDNERELLA VAGINALIS			
	VAGINAL	4	PRINCE GEORGE'S
KLEBSIELLA PNEUMONIAE			
	BLOOD	3	BALTIMORE CITY
	CSF	1	BALTIMORE CITY
	LUNG TISSUE	1	BALTIMORE CITY
	OTHER	1	BALTIMORE CITY
	PERITONEAL	1	BALTIMORE CITY
	WOUND	1	BALTIMORE CITY
PROTEUS MIRABILIS			
	WOUND	1	BALTIMORE CITY
SERRATIA MARCESCENS			
	CSF	1	BALTIMORE CITY
STAPHYLOCOCCUS AUREUS			
	WOUND	1	BALTIMORE
	BLOOD	1	BALTIMORE CITY
	WOUND	1	BALTIMORE CITY
	NASAL	2	CARROLL
	VAGINAL	1	PRINCE GEORGE'S
	WOUND	1	PRINCE GEORGE'S
STAPHYLOCOCCUS, COAGULASE NEGATIVE			
	BLOOD	2	BALTIMORE CITY
	WOUND	1	CARROLL
STREPTOCOCCUS, BETA HEMOLYTIC GROUP B			
	VAGINAL	4	ANNE ARUNDEL
	CERVIX	2	PRINCE GEORGE'S
	VAGINAL	7	PRINCE GEORGE'S
	VAGINAL	22	PRINCE GEORGE'S
	VAGINAL	1	SOMERSET
	VAGINAL	1	WICOMICO
STREPTOCOCCUS, BETA HEMOLYTIC NON-GROUP A			
	THROAT	10	ALLEGANY
STREPTOCOCCUS, VIRIDANS GROUP			
	BLOOD	2	BALTIMORE CITY
TOTAL		**65**	

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SEXUALLY TRANSMITTED DISEASES

GENUS SPECIES

SEX	#	JURISDICTION
SYPHILIS SEROLOGY		
F	1	ANNE ARUNDEL
M	1	ANNE ARUNDEL
F	2	BALTIMORE
M	4	BALTIMORE
U	1	BALTIMORE
F	7	BALTIMORE CITY
M	33	BALTIMORE CITY
U	3	BALTIMORE CITY
M	1	CARROLL
F	1	CHARLES
M	1	CHARLES
F	5	MONTGOMERY
M	5	MONTGOMERY
F	13	PRINCE GEORGE'S
M	36	PRINCE GEORGE'S
F	1	SOMERSET
M	1	SOMERSET
M	1	WASHINGTON
F	1	WICOMICO
M	2	WICOMICO
TOTAL	**120**	
CHLAMYDIA TRACHOMATIS		
F	6	ALLEGANY
M	3	ALLEGANY
F	20	ANNE ARUNDEL
M	7	ANNE ARUNDEL
F	22	BALTIMORE
M	17	BALTIMORE
F	4	BALTIMORE CITY
M	14	BALTIMORE CITY
F	9	CALVERT
M	2	CALVERT
F	1	CAROLINE
M	3	CAROLINE
F	1	CARROLL
M	1	CARROLL
F	5	CECIL
M	1	CECIL
U	1	CECIL
F	11	CHARLES
M	10	CHARLES
F	6	DORCHESTER
M	4	DORCHESTER
F	5	FREDERICK
M	3	FREDERICK
U	1	FREDERICK
F	3	GARRETT
F	7	HARFORD
M	2	HARFORD
F	3	HOWARD
M	4	HOWARD
U	1	HOWARD
F	3	KENT
M	1	KENT
F	10	MONTGOMERY
M	6	MONTGOMERY
F	47	PRINCE GEORGE'S
M	65	PRINCE GEORGE'S
U	2	PRINCE GEORGE'S
F	1	QUEEN ANNE'S
M	1	QUEEN ANNE'S
F	1	SAINT MARY'S
F	6	SOMERSET
M	2	SOMERSET
F	2	TALBOT
F	6	WASHINGTON
M	4	WASHINGTON
U	1	WASHINGTON
F	18	WICOMICO
M	4	WICOMICO
F	2	WORCESTER
M	1	WORCESTER
TOTAL	**360**	
NEISSERIA GONORRHOEAE		
M	2	ALLEGANY
F	1	BALTIMORE
M	1	BALTIMORE
F	1	CALVERT
M	1	CECIL
F	1	CHARLES
M	4	CHARLES
M	7	DORCHESTER
F	1	KENT
M	2	MONTGOMERY
F	13	PRINCE GEORGE'S
M	14	PRINCE GEORGE'S
M	1	QUEEN ANNE'S
M	2	SAINT MARY'S
M	1	WASHINGTON
F	11	WICOMICO
M	7	WICOMICO
F	1	WORCESTER
TOTAL	**71**	

MYCOBACTERIOLOGY

ISOLATE

SEX	AGE	#	JURISDICTION
ACID-FAST BACILLUS			
F	80	1	ALLEGANY
MYCOBACTERIUM ABSCESSUS			
F	49	1	BALTIMORE CITY
MYCOBACTERIUM AVIUM COMPLEX			
F	67	1	ANNE ARUNDEL
F	34	1	BALTIMORE
F	71	1	BALTIMORE
F	76	1	BALTIMORE
M	72	1	BALTIMORE
F	23	1	BALTIMORE CITY
F	36	1	BALTIMORE CITY
F	83	1	BALTIMORE CITY
M	35	1	BALTIMORE CITY
M	48	1	BALTIMORE CITY
M	49	1	BALTIMORE CITY
M	53	1	BALTIMORE CITY
M	61	1	BALTIMORE CITY
M	66	1	BALTIMORE CITY
M	51	2	CARROLL
M	86	1	CARROLL
F	33	1	FREDERICK
M	68	1	FREDERICK
F	88	1	MONTGOMERY
M	44	1	PRINCE GEORGE'S
M	68	1	PRINCE GEORGE'S
M	86	1	PRINCE GEORGE'S
F	67	1	WICOMICO
F	83	2	WICOMICO
M	84	1	WICOMICO
MYCOBACTERIUM CHELONAE			
F	58	1	BALTIMORE
MYCOBACTERIUM FORTUITUM			
F	72	1	BALTIMORE
MYCOBACTERIUM FORTUITUM COMPLEX			
F	49	1	BALTIMORE
F	58	1	BALTIMORE
M	65	1	BALTIMORE CITY
M	56	1	FREDERICK
M	31	1	HARFORD
F	43	1	MONTGOMERY
M	40	1	MONTGOMERY
M	52	1	MONTGOMERY
F	72	3	PRINCE GEORGE'S
MYCOBACTERIUM GORDONAE			
F	0	1	BALTIMORE CITY
F	65	1	BALTIMORE CITY
M	70	3	MONTGOMERY
M	27	1	OUT OF STATE
F	66	1	PRINCE GEORGE'S
F	88	1	PRINCE GEORGE'S
M	22	1	PRINCE GEORGE'S
M	29	1	PRINCE GEORGE'S
M	86	1	PRINCE GEORGE'S
M	67	1	WICOMICO
M	90	1	WICOMICO
MYCOBACTERIUM KANSASII			
F	69	1	BALTIMORE
M	51	1	BALTIMORE CITY
M	54	2	BALTIMORE CITY
M	58	1	BALTIMORE CITY
F	26	1	OUT OF STATE
M	48	1	TALBOT
MYCOBACTERIUM SCROFULACEUM			
M	59	1	WICOMICO
MYCOBACTERIUM TUBERCULOSIS			
M	79	1	ANNE ARUNDEL
F	23	1	BALTIMORE
M	24	1	BALTIMORE
M	71	1	BALTIMORE
F	24	1	BALTIMORE CITY
M	15	1	BALTIMORE CITY
F	37	1	MONTGOMERY
F	85	1	MONTGOMERY
M	29	1	MONTGOMERY
M	45	1	MONTGOMERY
F	37	1	OUT OF STATE
F	81	1	OUT OF STATE
M	44	1	OUT OF STATE
F	45	1	TALBOT
M	50	1	WICOMICO
M	80	1	WICOMICO
MYCOBACTERIUM TUBERCULOSIS COMPLEX			
M	79	1	ANNE ARUNDEL
M	24	1	BALTIMORE
M	73	1	BALTIMORE
M	73	2	BALTIMORE CITY
F	63	2	HOWARD
M	33	2	HOWARD
M	41	2	HOWARD
F	37	1	MONTGOMERY
F	38	5	MONTGOMERY
F	85	5	MONTGOMERY
M	15	2	MONTGOMERY

M	32	4	MONTGOMERY
M	45	6	MONTGOMERY
M	68	3	MONTGOMERY
F	81	1	OUT OF STATE
F	83	1	OUT OF STATE
F	47	1	PRINCE GEORGE'S
NON-PHOTOCHROMOGENIC MYCOBACTERIA			
M	37	1	BALTIMORE
M	80	2	BALTIMORE
RAPIDLY GROWING MYCOBACTERIA			
F	59	1	ANNE ARUNDEL
TOTAL		**123**	

MYCOBACTERIUM SUSCEPTIBILITY RESULTS

14 ISOLATES IDENTIFIED
4 DRUG RESISTANT STRAINS FOUND

#	JURISDICTION	DRUG(S)
1	MONTGOMERY	STREPTOMYCIN
1	MONTGOMERY	ISONIAZID, STREPTOMYCIN
1	PRINCE GEORGE'S	ISONIAZID
1	MONTGOMERY	ISONIAZID, STREPTOMYCIN

[A] TWO ISOLATES FROM THE SAME PATIENT
[B] PROBABLE FOR M. BOVIS
[C] MEETS CASE DEFINITION OF MULTI-DRUG TUBERCULOSIS (MDRTB)

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

PARASITOLOGY

GENUS/SPECIES	#	JURISDICTION
BLASTOCYSTIS HOMINIS		
	3	PRINCE GEORGE'S
	4	MONTGOMERY
	2	BALTIMORE CITY
	1	FREDERICK
	2	MONTGOMERY
	1	FREDERICK
	3	PRINCE GEORGE'S
	2	MONTGOMERY
	2	FREDERICK
	1	HARFORD
	1	HOWARD
	2	MONTGOMERY
CRYPTOSPORIDIUM		
	12	PRINCE GEORGE'S
DIENTAMOEBA FRAGILIS		
	2	FREDERICK
	5	BALTIMORE CITY
	1	PRINCE GEORGE'S
ENDOLIMAX NANA		
	2	FREDERICK
	1	PRINCE GEORGE'S
	1	HOWARD
	3	MONTGOMERY
	3	PRINCE GEORGE'S
	4	MONTGOMERY
	2	BALTIMORE CITY
	1	FREDERICK
	4	PRINCE GEORGE'S
	1	MONTGOMERY
	2	FREDERICK
	1	MONTGOMERY
	1	HOWARD
	7	HARFORD
ENTAMOEBA COLI		
	1	PRINCE GEORGE'S
	4	MONTGOMERY
	1	BALTIMORE CITY
	2	HOWARD
	2	FREDERICK
	3	PRINCE GEORGE'S
	2	HARFORD
	1	PRINCE GEORGE'S
ENTAMOEBA HARTMANNI		
	1	HOWARD
	3	PRINCE GEORGE'S
	1	MONTGOMERY
	1	CARROLL
ENTEROBIUS VERMICULARIS		
	1	WASHINGTON
	1	MONTGOMERY
	1	FREDERICK
	1	UNKNOWN
	1	PRINCE GEORGE'S
GIARDIA LAMBLIA		
	1	MONTGOMERY
	2	HOWARD
	3	FREDERICK
HOOKWORM		
	1	BALTIMORE CITY
IODAMOEBA BÜTSCHLII		
	1	FREDERICK
TRICHURIS TRICHIURA		
	1	HARFORD
	2	HARFORD
TOTAL	**115**	

WATER MICROBIOLOGY

	# TESTED	# NON-COMPLIANT
COMMUNITY	0	0
NON-COMMUNITY	409	72
TOTAL	**409**	**72**

VIRUS ISOLATION

ISOLATE	SEX	AGE	#	JURISDICTION
ADENOVIRUS				
	M	46	1	ANNE ARUNDEL
	M	2	1	ANNE ARUNDEL
HERPES SIMPLEX VIRUS TYPE 1				
	U	18	1	ALLEGANY
	F	19	1	PRINCE GEORGE'S
HUMAN METAPNEUMOVIRUS				
	M	1	1	BALTIMORE
	M	93	1	UNKNOWN
MUMPS VIRUS				
	M	15	1	BALTIMORE
	M	15	1	BALTIMORE
RESPIRATORY SYNCYTIAL VIRUS				
	F	1	1	BALTIMORE
TOTAL			**9**	

FOOD PROTECTION

	TOTALS
FOOD	
NUMBER OF SAMPLES	40
NOTABLE PATHOGENS:	
CAMPYLOBACTER SP.	0
CLOSTRIDIUM DIFFICILE	0
ENTEROCOCCUS	0
E. COLI	25
E. FAECALIS	37
LISTERIA SP.	0
MRSA	18
SALMONELLA SP.	3
VRE	2
CRABMEAT	
NUMBER OF SAMPLES	0
EXCEEDING STANDARDS[1]	0
NOTABLE PATHOGENS:	
LISTERIA INNOCUA	0
SHELLFISH	
NUMBER OF SAMPLES	0
EXCEEDING STANDARDS[2]	0
TOTAL STANDARDS EXCEEDED	0
SHELLFISH GROWING WATERS	
NUMBER OF SAMPLES	314
OTHER	
CLOSTRIDIUM BOTULINUM	0
TOTAL NUMBER OF SAMPLES	**439**

STANDARDS

[1]CRABMEAT FRESH
ESCHERICHIA COLI AT < 36 MPN/100 GRAMS
STANDARD PLATE COUNT AT < 100

[2]SHELLFISH
FECAL COLIFORMS AT < 230 MPN/100 GRAMS
STANDARD PLATE COUNT AT < 500,000 PER GRAM

VIRAL POLYMERASE CHAIN REACTION (PCR)

ISOLATE	SEX	AGE	#	JURISDICTION
HERPES SIMPLEX VIRUS TYPE 1				
	F	22	1	ALLEGANY
	F	17	1	BALTIMORE
	F	20	1	BALTIMORE
	F	26	1	BALTIMORE
	F	30	1	BALTIMORE
	U	19	2	BALTIMORE CITY

F	18	1	BALTIMORE CITY
F	20	1	BALTIMORE CITY
F	21	1	BALTIMORE CITY
F	22	1	BALTIMORE CITY
M	20	1	BALTIMORE CITY
M	23	1	BALTIMORE CITY
M	24	1	BALTIMORE CITY
M	30	1	BALTIMORE CITY
F	29	1	MONTGOMERY
M	25	1	MONTGOMERY
F	20	2	PRINCE GEORGE'S
F	21	1	PRINCE GEORGE'S
F	19	1	SAINT MARY'S
F	20	1	SOMERSET
F	22	1	SOMERSET
F	20	1	TALBOT
F	20	1	WASHINGTON
F	18	1	WICOMICO
HERPES SIMPLEX VIRUS TYPE 2			
F	18	1	ALLEGANY
M	23	1	ALLEGANY
F	23	1	BALTIMORE
F	44	1	BALTIMORE
F	48	1	BALTIMORE
U	18	1	BALTIMORE CITY
U	19	1	BALTIMORE CITY
U	25	2	BALTIMORE CITY
U	37	1	BALTIMORE CITY
U	42	1	BALTIMORE CITY
F	21	1	BALTIMORE CITY
F	22	1	BALTIMORE CITY
F	29	1	BALTIMORE CITY
F	33	1	BALTIMORE CITY
F	56	1	BALTIMORE CITY
M	14	1	BALTIMORE CITY
M	18	1	BALTIMORE CITY
M	22	1	BALTIMORE CITY
M	23	2	BALTIMORE CITY
M	24	2	BALTIMORE CITY
M	25	1	BALTIMORE CITY
M	26	2	BALTIMORE CITY
M	30	1	BALTIMORE CITY
M	35	2	BALTIMORE CITY
F	22	1	CALVERT
M	23	1	CARROLL
F	22	1	CHARLES
M	27	1	DORCHESTER
F	29	1	FREDERICK
F	20	1	HARFORD
M	23	1	HARFORD
F	27	1	MONTGOMERY
M	25	1	MONTGOMERY
F	22	3	PRINCE GEORGE'S
F	23	1	PRINCE GEORGE'S
F	26	1	PRINCE GEORGE'S
F	30	1	PRINCE GEORGE'S
F	31	1	PRINCE GEORGE'S
F	42	1	PRINCE GEORGE'S
M	17	1	PRINCE GEORGE'S
M	23	1	PRINCE GEORGE'S
M	29	1	PRINCE GEORGE'S
F	19	1	WICOMICO
F	26	1	WICOMICO
M	26	1	WICOMICO
INFLUENZA A(H1/N1) NOVEL A			
M	66	1	CECIL
M	33	1	WASHINGTON
TOTAL		**81**	

VIRAL HEPATITIS

ORGANISM	# SPECIMENS	# POSITIVES	JURISDICTION
HEPATITIS A			
	1	0	WASHINGTON
SUBTOTAL	**1**	**0**	
HEPATITIS B			
	57	0	ALLEGANY
	170	1	ANNE ARUNDEL
	49	2	BALTIMORE
	421	5	BALTIMORE CITY
	8	0	CALVERT
	12	0	CARROLL
	136	0	CECIL
	4	0	CHARLES
	1	0	DORCHESTER
	47	2	FREDERICK
	16	0	GARRETT
	41	0	HARFORD
	28	0	HOWARD
	1	0	KENT
	296	4	MONTGOMERY
	336	5	PRINCE GEORGE'S
	1	0	QUEEN ANNE'S
	1	0	SAINT MARY'S
	1	0	SOMERSET
	14	0	TALBOT
	40	0	WASHINGTON
	67	0	WICOMICO
	1	0	WORCESTER
SUBTOTAL	**1,748**	**19**	
HEPATITIS C			
	48	4	ALLEGANY
	184	31	ANNE ARUNDEL
	57	3	BALTIMORE
	243	47	BALTIMORE CITY
	8	0	CALVERT
	14	1	CARROLL
	80	9	CECIL
	12	0	CHARLES
	1	0	DORCHESTER
	50	3	FREDERICK
	16	0	GARRETT
	47	1	HARFORD
	13	0	HOWARD
	1	0	KENT
	49	1	MONTGOMERY
	216	8	PRINCE GEORGE'S
	1	0	SAINT MARY'S
	2	0	SOMERSET
	14	1	TALBOT
	1	0	UNKNOWN
	18	0	WASHINGTON
	9	0	WICOMICO
	1	1	WORCESTER
SUBTOTAL	**1,085**	**110**	
TOTALS	**2,834**	**129**	

RABIES

SOURCE	#	JURISDICTION
CAT	1	CECIL
FOX	1	ALLEGANY
	1	CARROLL
	1	CECIL
	1	HOWARD
	1	WORCESTER
RACCOON	1	ALLEGANY
	1	ANNE ARUNDEL
	1	BALTIMORE
	5	BALTIMORE CITY
	3	CARROLL
	1	CHARLES
	6	FREDERICK
	1	HARFORD
	1	HOWARD
	3	MONTGOMERY
	1	PRINCE GEORGE'S
	1	QUEEN ANNE'S
	1	SOMERSET
	1	WASHINGTON
	1	WORCESTER
TOTAL POSITIVES	**34**	
TOTAL SPECIMENS	**325**	

CHLAMYDIOPHILIA PSITTACI
(CHLAMYDIA)

REPORTED QUARTERLY
NO REPORT THIS MONTH

CD4 FLOW CYTOMETRY WORKLOAD

REPORTED QUARTERLY
NO REPORT THIS MONTH

BLOOD LEAD

MARYLAND			
	I	<10	125
	IIA	10-14	4
	IIB	15-19	3
	III	20-44	11
	IV	45-69	1
	V	>69	0
TOTAL			**144**
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**

NEWBORN & CHILDHOOD SCREENING

PRESUMPTIVE POSITIVES

DISORDERS	#
PHENYLKETONURIA (PKU)	4
MAPLE SYRUP URINE DISEASE (MSUD)	1
HOMOCYSTINURIA	13
TYROSINEMIA	11
ARGININEMIA	0
CITRULLINEMIA	0
GALACTOSEMIA	2
BIOTINIDASE DEFICIENCY	3
HYPOTHYROIDISM	82
HEMOGLOBIN -DISEASE	24
HEMOGLOBIN -BENIGN	528
CONGENITAL ADRENAL HYPERPLASIA (CAH)	38
CYSTIC FIBROSIS	0
FATTY ACID OXIDATIONS	6
ORGANIC ACIDEMIAS	18
ACYLCARNITINE - BORDERLINE	29
ACYLCARNITINE - OTHERS	0

MONTHLY TOTALS

# OF SPECIMENS SCREENED	12,987
NUMBER OF TESTS	827,596
% UNSATISFACTORY SPECIMENS	1.9

2010 YEAR-TO-DATE CONFIRMED CASES

CONDITIONS CONFIRMED	#
MEDIUM CHAIN ACYL-CoA DEHYDROGENASE DEFICIENCY (MCAD)	1
SHORT CHAIN ACYL-CoA DEHYDROGENASE DEFICIENCY (SCAD)	3
ELEVATED FORMIMINOGLUTAMIC ACID (FIGLU)	1
3-METHYLCROTONYL-COA CARBOXYLASE DEFICIENCY (3-MCC)	3
GALACTOSE EPIMERASE DEFICIENCY	1
GALACTOSEMIA - VARIANT -DG	2
GALACTOSEMIA - UNKNOWN VARIANT	1
CONGENITAL ADRENAL HYPERPLASIA-UNCLASSIFIED	1
HYPOTHYROIDISM - PRIMARY	9
OTHER HYPOTHYROIDISM	3
TBG DEFICIENCY	3
SICKLE CELL DISEASE -SS	21
SICKLE CELL DISEASE -SC	11
SICKLE CELL DISEASE -S BETA THALASSEMIA	1
SICKLE CELL DISEASE-SV	1
CYSTIC FIBROSIS	2
CFTR-RELATED METABOLIC SYNDROME (CRMS)	1
TRANSIENT TYRODINEMIA	5

ENVIRONMENTAL CHEMISTRY

SAMPLE TYPES	# NON-COMPLIANT	# TESTED
ASBESTOS		
AIR	1	3
BULK	0	0
AIR QUALITY		
$PM_{2.5}$	0	348
RADIATION		
AIR/CHARCOAL FILTERS	0	120
MILK	0	1
WIPES	0	117
RAW WATER	0	6
VEGETATION	0	0
OTHER	0	0
DRINKING WATER		
METALS		
COMMUNITY	5	12
NON-COMMUNITY	5	7
PRIVATE WELLS	33	163
PESTICIDES & PCBs		
COMMUNITY	0	73
NON-COMMUNITY	0	4
PRIVATE WELLS	0	7
VOLATILE ORGANIC COMPOUNDS		
COMMUNITY	3	256
NON-COMMUNITY	0	136
PRIVATE WELLS	0	88
RADIATION		
COMMUNITY	2	37
NON-COMMUNITY	0	0
PRIVATE WELLS	0	7
INORGANICS		
COMMUNITY	0	50
NON-COMMUNITY	3	118
PRIVATE WELLS	5	157
FOOD CHEMISTRY		
SUSPECTED TAMPERING	0	3
MICROSCOPIC FILTH	0	0
LABELING	0	0
SURVEILLANCE	0	0
CHEMICAL CONTAMINATION	0	0
TOTAL	**57**	**1,713**

VIRAL LOAD SPECIMENS

HIV-1 RNA COPIES/ML	$<10^3$	10^3—10^4	10^4—10^5	$>10^5$	**TOTALS**
ALLEGANY	8	4	2	1	15
FREDERICK	3	0	1	0	4
MONTGOMERY	102	14	11	3	130
PRINCE GEORGE'S	139	26	17	12	194
SOMERSET	0	0	1	0	1
WASHINGTON	4	1	0	0	5
WICOMICO	4	0	1	1	6
SUBTOTALS	260	45	33	17	355
DEPT. OF CORRECTIONS	36	3	4	1	44
TOTALS	296	48	37	18	399

HIV ANTIBODY SCREENING

SUBMITTER	TOTAL SPECIMENS	# EIA POSITIVE	% EIA POSITIVE	# WB POSITIVE	% WB POSITIVE
CORRECTIONAL INSTITUTIONS	258	2	0.78%	2	100.00%
FAMILY PLANNING (NON-GOVERNMENT)	138	0	0.00%	0	0.00%
HEALTH CENTERS (NON-GOVERNMENT)	458	30	6.55%	28	93.33%
HLTH DEPT, NON-STD, FAMILY PLAN	468	1	0.21%	0	0.00%
HLTH DEPT, NON-STD, OB/GYN	105	1	0.95%	1	100.00%
HLTH DEPT, NON-STD, OTHER	642	52	8.10%	50	96.15%
HLTH DEPT, STD CLINICS	993	13	1.31%	12	92.31%
HOSPITAL, OTHER	118	11	9.32%	9	81.82%
HOSPITAL, PUBLIC	34	1	2.94%	1	100.00%
JUVENILE SERVICES	77	0	0.00%	0	0.00%
LABORATORIES (NON-HOSPITAL)	372	12	3.23%	7	58.33%
PEDIATRIC - CHILD HEALTH	3	0	0.00%	0	0.00%
PRIVATE PHYSICIANS	15	0	0.00%	0	0.00%
PRIVATE STUDENT HEALTH CNTRS	45	0	0.00%	0	0.00%
PUBLIC STUDENT HEALTH CENTERS	287	1	0.35%	1	100.00%
TOTALS	**4,013**	**124**	**3.09%**	**111**	**89.52%**

MAILING LABEL

Critical Link
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