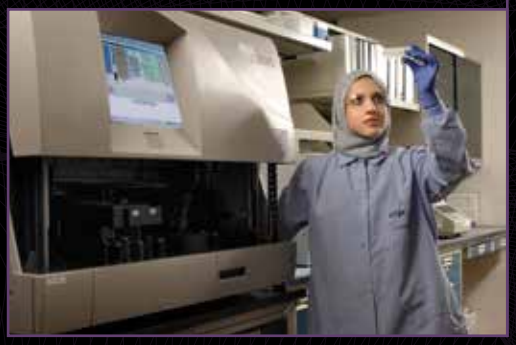
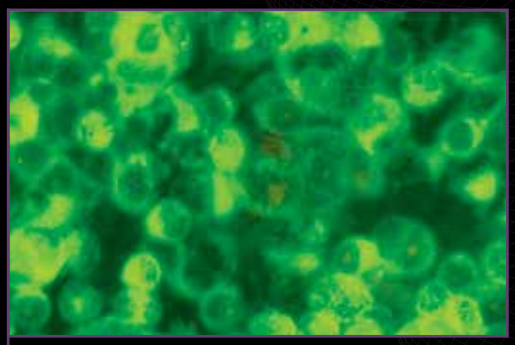
ARUP LABORATORIES

MOLECULAR INFECTIOUS DISEASE TESTING

SERVICES





September 2012

Founded in 1984, ARUP Laboratories is a leading national reference laboratory and an enterprise of the University of Utah and its Department of Pathology. ARUP offers more than 3,000 tests and test combinations, ranging from routine screening tests to esoteric molecular and genetic assays. ARUP serves clients across the United States, including many of the nation's top university teaching hospitals and children's hospitals, as well as multihospital groups, major commercial laboratories, group purchasing organizations, military and other government facilities, and major clinics. In addition, ARUP is a worldwide leader in innovative laboratory research and development, led by the efforts of the ARUP Institute for Clinical and Experimental Pathology®.

ARUP has **one of the broadest test menus** in the industry and performs 99 percent of all testing on-site, **operating 24 hours per day, seven days a week** and processing more than 30,000–35,000 specimens of blood, body fluid, and tissue biopsies per day.

ARUP Client Services **representatives are available 24 hours per day, seven days per week** and provide easy access to technical expertise by facilitating the answering of more than 93 percent of client inquiries without transferring the calls to another person or department.

ARUP Laboratories is a worldwide **leader in innovative laboratory research and development.**

ARUP's comprehensive test menu includes the areas of allergy and immunology, chemistry, cytogenetics, endocrinology, fetal risk assessment, genetics, hematology, hepatitis and HIV, infectious diseases, neurology, oncology, and pathology.

ARUP offers an extensive menu of infectious disease testing that complements the services of hospital laboratories. With full-service analytical capabilities in virology, microbiology, parasitology, bacteriology, mycology, mycobacteriology, epidemiologic typing, and susceptibility testing, ARUP has the capability and expertise to perform an impressive range of testing from the most routine bacterial cultures and serologic antibody assays to the latest in molecular-based techniques, such as PCR, viral-load testing, microorganism identification by 16s rDNA sequencing, and viral genotyping.

ARUP leads the clinical diagnostics field by offering the most up-to-date technologies in infectious disease testing and continually expanding the test menu as new procedures of clinical utility are identified.

Laboratory consultation is available with medical directors and faculty from the University of Utah School of Medicine who have expertise in infectious diseases, parasitology and travel medicine, molecular diagnostic techniques, virology, and mycology.

MOLECULAR INFECTIOUS DISEASE MEDICAL DIRECTORS

DAVID R. HILLYARD, MD
Dr. Hillyard is the medical director of the Molecular Hepatitis and Retrovirus, Molecular Infectious Disease, and Sequencing Infectious Disease laboratories of the Infectious Disease Division at ARUP. He is also a professor of pathology, with an adjunct appointment in biology, at the University of Utah School of Medicine. Dr. Hillyard received his MD from the Columbia University College of Physicians and Surgeons. His training was in anatomic and clinical pathology, with fellowships in medical microbiology and microbial genetics.

KIMBERLY E. HANSON, MD, MHS
Dr. Hanson is the medical director of the Mycology, Mycobacteriology, and Virology laboratories at ARUP and an assistant professor of medicine and pathology at the University of Utah School of Medicine. She earned her MD from Northwestern University Medical School and her master of health science at Duke University Medical Center. Dr. Hanson completed her clinical training in medicine at the Dartmouth-Hitchcock Medical Center and her infectious diseases and medical microbiology fellowships at Duke University. Prior to joining ARUP, Dr. Hanson worked as an associate in pathology and medicine at Duke University Medical Center and was an associate director of the Duke Molecular Microbiology Laboratory. Her clinical and research interests focus on the diagnosis and management of infectious complications following transplantation. She is board certified in infectious disease, medical microbiology, and general internal medicine.

MARK A. FISHER, PHD, MS
Medical director of ARUP's Bacteriology and Parasitology laboratories, Dr. Fisher is also an assistant professor of pathology at the University of Utah School of Medicine. Dr. Fisher obtained a PhD in microbiology and molecular genetics from Emory University and a master of science in microbiology from Idaho State University. He subsequently completed fellowships in microbial pathogenesis at the Rocky Mountain Laboratories (NIH) and in medical microbiology at the University of Utah. He is board certified in medical microbiology, and his research interests include microbial pathogenesis and transmission of vector borne pathogens.

ROBERT SCHLABERG, MD, MPH
Dr. Schlaberg is the medical director of the Microbial Amplified Detection Laboratory and an assistant medical director of the Virology and Molecular Infectious Disease laboratories at ARUP, and an instructor of clinical pathology at the University of Utah School of Medicine. He received his MD and doctor medicinæ degrees at the Julius-Maximilians-University in Wuerzburg, Germany and his master of public health at the Mailman School of Public Health at Columbia University in New York City, where he also served as a postdoctoral fellow. Dr. Schlaberg trained in clinical pathology at the Columbia University College of Physicians & Surgeons, where he was the chief clinical pathology resident. He is certified in clinical pathology by the American Board of Pathology. He was awarded the Young Investigator Award by the Academy of Clinical Laboratory Physicians and Scientists.

MOLECULAR INFECTIOUS DISEASE STAFF

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Technical Supervisor, Molecular Infectious Disease II

DEREK WHITING, MT(ASCP)
Technical Supervisor, Molecular Infectious Disease I

VIRAL INFECTIOUS DISEASE TESTING

TEST #	TEST NAME
2007192	Adenovirus, Quantitative PCR
2002088	Adenovirus DNA, Qualitative, RT PCR
0090067	BK Virus, Quantitative PCR
2002304	BK Virus, Quantitative PCR, Blood
2002310	BK Virus, Quantitative PCR, Urine
0060040	Cytomegalovirus by PCR
2004760	Cytomegalovirus Antiviral Drug Resistance by Sequencing
0060031	Cytomegalovirus by PCR, Whole Blood or Bone Marrow
0051813	Cytomegalovirus DNA Quantitative by PCR
2006966	Cytomegalovirus, Quantitative PCR with Reflex to Drug Resistance Testing by Sequencing
2005730	Enterovirus and Parechovirus Detection by RT-PCR
0050249	Enterovirus Detection by RT-PCR
0050246	Epstein-Barr Virus by PCR
0051352	Epstein-Barr Virus, Quantitative PCR
0051353	Epstein-Barr Virus, Quantitative PCR, Whole Blood
0060041	Herpes Simplex Virus by PCR
0060071	Herpesvirus 6 (HHV6) (A and B), Quantitative PCR
2002996	Herpes Virus 8 DNA, Qualitative Real-Time PCR
0060784	Human Metapneumovirus by RT-PCR
0065999	Human Papillomavirus (HPV) DNA Probe, High Risk, Cervical Brush (Digene)
0060744	Human Papillomavirus (HPV) DNA Probe, High Risk, SurePath
0060750	Human Papillomavirus (HPV) DNA Probe, High Risk, ThinPrep
2005277	Human Papillomavirus (HPV), Genotypes 16 and 18

TEST #	TEST NAME
2005283	Human Papillomavirus (HPV), High Risk with Reflex to Genotypes 16 and 18
2005389	Human Papillomavirus (HPV) DNA, High Risk by Invader Method
0060764	Influenza A by PCR (Orderable Test: Respiratory Virus Mini Panel)
2004217	Influenza A H1N1 (2009) Detection by RT-PCR
2004218	Influenza A H1N1 (2009) Oseltamivir Resistance by Sequencing
0060764	Influenza B by PCR (Orderable Test: Respiratory Virus Mini Panel)
2002643	Influenza Virus A and B DFA with Reflex to Respiratory Virus Mini Panel by RT-PCR
0099169	JC Virus by PCR
0051281	Norovirus Group 1 and 2 Detection by RT-PCR
2006247	Parainfluenza 1–4 by RT-PCR
2005731	Parechovirus Detection by RT-PCR
0060043	Parvovirus B 19 by PCR
0060028	Parvovirus B 19 by PCR, Bone Marrow
0060764	Respiratory Syncytial Virus by PCR (Orderable Test: Respiratory Virus Mini Panel)
2002565	Respiratory Viruses DFA with Reflex to Respiratory Virus Mini Panel by RT-PCR
0060764	Respiratory Virus Mini Panel by RT-PCR
0060042	Varicella-Zoster Virus by PCR
0050229	West Nile Virus RNA by RT-PCR

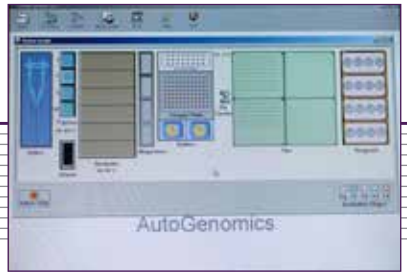
VIRAL INFECTIOUS DISEASE TESTING: HEPATITIS AND HIV

TEST #	TEST NAME
2004722	Hepatitis B Virus DNA Quantitative, Real-Time PCR with Reflex to Genotype
0056025	Hepatitis B Virus DNA Ultrasensitive Quantitative Real-Time PCR
2001567	Hepatitis B Virus Genotype
0055593	Hepatitis C Virus Genotyping
0098264	Hepatitis C Virus RNA Qualitative PCR
0098268	Hepatitis C Virus RNA Quantitative Real-Time PCR
2002685	Hepatitis C Virus RNA Quantitative Real-Time PCR with Reflex to Genotype
0051811	Hepatitis C Virus RNA Quantitative bDNA
2002681	Hepatitis C Virus RNA Quantitative bDNA with Reflex to Genotype
2002682	Hepatitis C Virus RNA Quantitative bDNA with Reflex to Hepatitis C Virus RNA Quantitative, Real-Time PCR
2004331	Human Immunodeficiency Virus GenoSure MG

TEST #	TEST NAME
0092050	Human Immunodeficiency Virus (HIV) Phenotype Comprehensive
0093061	Human Immunodeficiency Virus 1, PCR, Qualitative
2004457	Human Immunodeficiency Virus 1 Integrase Inhibitory Resistance by Sequencing
0055598	Human Immunodeficiency Virus 1 RNA Quantitative Real-Time PCR
2002689	Human Immunodeficiency Virus 1 RNA Quantitative Real-Time PCR with Reflex to Genotype
0020466	Human Immunodeficiency Virus 1 RNA Quantitative bDNA
2002688	Human Immunodeficiency Virus 1 RNA Quantitative bDNA with Reflex to Genotype
0055670	Human Immunodeficiency Virus 1, Genotyping
0051186	Human Immunodeficiency Virus 1, virco TYPE
2004680	Interleukin 28 B (*IL28B*)-Associated Variants, 2 SNPs
2004747	Trofile DNA Co-Receptor Tropism Assay

ARUP OFFERS FULL-SERVICE ANALYTICAL CAPABILITIES

IN VIROLOGY, MICROBIOLOGY, PARASITOLOGY, BACTERIOLOGY, MYCOLOGY, MYCOBACTERIOLOGY, EPIDEMIOLOGIC TYPING, AND SUSCEPTIBILITY TESTING.



BACTERIAL INFECTIOUS DISEASE TESTING

TEST #	TEST NAME
0060738	AFB Culture (Includes AFB Stain 0060151) with Reflex to *Mycobacterium tuberculosis* Amplified Direct Detection (0060095)
0060211	Antimicrobial Susceptibility—*mecA* Gene by PCR
0060182	Bacterial Strain Characterization by Pulsed-Field Gel Electrophoresis
0093057	*Bartonella* DNA Detection by PCR
0060762	*Bartonella* DNA Detection by PCR, Whole Blood
0065080	*Bordetella pertussis/parapertussis* by PCR
0055570	*Borrelia* species DNA Detection by PCR (Lyme Disease)
0060715	*Chlamydia pneumoniae* by PCR
2001551	*Chlamydia trachomatis and Neisseria gonorrhea* by Amplified Detection (APTIMA), SurePath
0060241	*Chlamydia trachomatis and Neisseria gonorrhoeae* by Amplified Detection (APTIMA)
0060774	*Chlamydia trachomatis and Neisseria gonorrhoeae* by Amplified Detection (APTIMA), M4/UTM specimens
0060734	*Chlamydia trachomatis and Neisseria gonorrhoeae* by Amplified Detection (APTIMA), ThinPrep

TEST #	TEST NAME
0060243	*Chlamydia trachomatis* by Amplified Detection (APTIMA)
2002838	*Clostridium difficile* toxin B gene (tcdB) by PCR
0065153	*Garnerella vaginalis* by DNA Probe (Orderable Test: Vaginal Pathogens DNA Direct Probes)
0056105	*Legionella* Species by PCR
0060999	*Mycobacterium avium intracellularae* by DNA Probe (Orderable Test: AFB Identification)
0060999	*Mycobacterium chelonae-abscessus* Identification by PCR (Orderable Test: AFB Identification)
0060063	*Mycobacterium tuberculosis* Amplified Detection, CSF
0060095	*Mycobacterium tuberculosis* Amplified Direct Detection
0060771	*Mycobacterium tuberculosis* Complex Speciation
0060999	*Mycobacterium tuberculosis* by DNA Probe (Orderable Test: AFB Identification)
0060256	*Mycoplasma pneumoniae* by PCR
0060244	*Neisseria gonorrhoeae* by Amplified Detection (APTIMA)
0060720	Organism Identification by 16S rDNA Sequencing
0060705	*Streptococcus* Group B by PCR
0065153	Vaginal Pathogens DNA Direct Probes

OTHER INFECTIOUS DISEASE TESTING

TEST #	TEST NAME
0062224	*Blastomyces dermatitidis* Identification by DNA Probe
0065153	Candida species DNA Probe (Orderable Test: Vaginal Pathogens DNA Direct Probes)
0062225	*Coccidioides immitis* Identification by DNA Probe
2002994	*Ehrlichia chaffeensis* DNA, Real-Time PCR
2003078	*Ehrlichia* and *Anaplasma* Species by Real-Time PCR
0060756	Fungal Identification by ITS rDNA Sequencing
0062226	*Histoplasma capsulatum* Identification by DNA Probe
2004963	Malaria Detection and Speciation, Qualitative by Real-Time PCR

TEST #	TEST NAME
0060720	Organism Identification by 16S rDNA Sequencing
2006258	Sexually Transmitted Disease Panel 1
2006254	*Pneumocystis jirovecii* by PCR
0055591	*Toxoplasma gondii* by PCR
2005506	*Trichomonas vaginalis* by Amplified Detection
0065153	*Trichomonas vaginalis* DNA Probe (Orderable Test: Vaginal Pathogens DNA Direct Probes)
2004769	Yeast Differentiation by PNA FISH

Dr. Hillyard is the medical director of the Molecular Infectious Disease laboratories at ARUP.

CLIENT COMMITMENT STATEMENT

ARUP supports our clients' success by providing excellence and consistency in our delivery of services, by sharing knowledge, and by developing progressive laboratory technology.

DEFINING THE FUTURE

TOGETHER®

A nonprofit enterprise of the University of Utah and its Department of Pathology

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