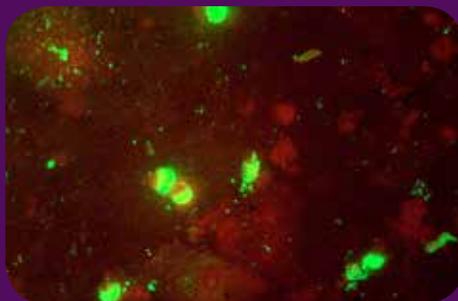




molecular infectious disease testing

PATIENTS. ANSWERS. RESULTS.



ARUP LABORATORIES

As a nonprofit, academic institution of the University of Utah and its Department of Pathology, ARUP believes in collaborating, sharing knowledge, and contributing to laboratory science in ways that benefit our clients and their patients.

Our test menu is one of the broadest in the industry, encompassing more than 3,000 tests, including highly specialized and esoteric assays. We offer comprehensive testing in the areas of genetics, molecular oncology, pediatrics, and pain management, among others.

ARUP's clients include many of the nation's university teaching hospitals and children's hospitals, as well as multihospital groups, major commercial laboratories, and group purchasing organizations. We do not compete with our clients for physician office business, choosing instead to support clients' existing test menus by offering highly complex assays and accompanying consultative support so clients can provide exceptional patient care in their local communities.

Offering analytics, consulting, and decision support services, ARUP provides clients with the utilization management tools necessary to prosper in this time of value-based care. Our UM+ program helps clients control utilization, reduce costs, and improve patient care. 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's reputation for quality is supported by our ability to meet or exceed the requirements of multiple regulatory and accrediting agencies and organizations. ARUP participates in the CAP laboratory accreditation program and has CLIA certification through the Centers of Medicare and Medicaid Services. In December 2016, ARUP earned accreditation to the ISO 15189:2012 standard under CAP.

We believe in collaborating, sharing knowledge, and contributing to laboratory science in ways that provide the best value for the patient. Together, ARUP and its clients will improve patient care today and in the future.

patients. answers. results.®

A laboratory test is more than a number; it is a person, an answer, a diagnosis.®



Molecular Infectious Disease Medical Directors



Adam Barker, PhD
Medical Director, Microbiology; Medical Director, Reagent Laboratory; Medical Director, R&D Special Operations; Director of the ARUP Institute for Clinical and Experimental Pathology® (R&D)

Dr. Barker is an assistant professor at the University of Utah School of Medicine, joining in 2011. He received his PhD in microbiology and immunology at the University of Colorado Health Sciences Center and completed a postdoctoral fellowship in the Department of Microbiology and Molecular Genetics at Harvard Medical School. Dr. Barker is the recipient of the 2009 Outstanding Postdoctoral Award from the Harvard Medical School and 2002 Excellence in Research Award from the University of Colorado Health Sciences Center. He is a member of the American Society of Microbiology, Biophysical Society, and Protein Society.



David R. Hillyard, MD
Medical Director, Molecular Infectious Diseases

Dr. Hillyard is a professor of pathology 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.



Marc Roger Couturier, PhD, D(ABMM)
Medical Director, Microbial Immunology Medical Director, Parasitology and Fecal Testing; Medical Director, Infectious Disease Antigen Testing

Dr. Couturier is an associate professor of pathology at the University of Utah School of Medicine. He received his PhD in medical microbiology and immunology with a specialty in bacteriology from the University of Alberta in Canada. Dr. Couturier served as a research associate/post-doctoral fellow at the Alberta Provincial Laboratory for Public Health and completed a medical microbiology fellowship at the University of Utah. His research interests include *Helicobacter pylori* diagnostics and population prevalence as well as advanced methods of enteric pathogen detection.



Robert Schlberg, MD, Dr Med, MPH
Medical Director, Microbial Amplified Detection, Virology, and Fecal Chemistry; Assistant Medical Director, Molecular Infectious Disease

Dr. Schlberg is an assistant professor of clinical pathology at the University of Utah School of Medicine. He received his MD and doctor medicinae 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. Dr. Schlberg trained in clinical pathology at the Columbia University College of Physicians & Surgeons, where he was the chief clinical pathology resident.



Mark Fisher, PhD, D(ABMM)
Medical Director, Bacteriology and Antimicrobials; Medical Director, Bacteriology and Special Microbiology

Dr. Fisher is an associate professor of pathology at the University of Utah School of Medicine. He obtained a PhD in microbiology and molecular genetics from Emory University and a master of science in microbiology from Idaho State University. Dr. Fisher 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.



Kimberly E. Hanson, MD, MHS
Medical Director, Mycology Section Chief, Clinical Microbiology

Kimberly Hanson, MD, MHS is a board certified physician in adult infectious diseases and medical microbiology. She has specialized expertise in the diagnosis and management of opportunistic viral, fungal and mycobacterial diseases. Her primary clinical focus is transplant and cancer chemotherapy-related infections.

Molecular Infectious Disease Staff

Diana Mohl, MS, MT(ASCP)MP

Vice President, Division Manager, Infectious Disease

Jennifer Stanchfield, MB(ASCP)

Assistant Vice President, Group Manager, Molecular Infectious Disease

Jeffrey Chumley, MS,MLS(ASCP)^{CM}

Technical Supervisor, Molecular Infectious Disease I

Jeremy Klein, MLS(ASCP)^{CM}

Technical Supervisor, Molecular Infectious Disease Rapid Testing

Jason Metz, MT(ASCP)

Technical Supervisor, Microbial Amplified Detection

Haleina Muir, M(ASCP)MB^{CM}

Technical Supervisor, Special Microbiology

Brandy Serrano, MS, MB(ASCP)

Technical Supervisor, Molecular Hepatitis/Retrovirus, Sequencing Infectious Disease

Molecular Infectious Disease Testing

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.

Viral Infectious Disease Testing

TEST #	TEST NAME
2007192	Adenovirus, Quantitative PCR
2007473	Adenovirus, Qualitative, PCR
0090067	BK Virus, Quantitative PCR
2002304	BK Virus, Quantitative PCR, Blood
2002310	BK Virus, Quantitative PCR, Urine
2013085	Chikungunya by PCR
2004760	Cytomegalovirus Antiviral Drug Resistance by Sequencing
0060040	Cytomegalovirus by Qualitative PCR
2008555	Cytomegalovirus by Qualitative PCR, Saliva
0051813	Cytomegalovirus, Quantitative PCR
2006966	Cytomegalovirus, Quantitative PCR with Reflex to Drug Resistance Testing by Sequencing
2013294	Dengue Virus (1-4) Subtype by PCR
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
2013577	Gastrointestinal Viral Panel by PCR
0060041	Herpes Simplex Virus by PCR
2011148	Herpes Simplex Virus (HSV) by PCR with Reflex to HSV (HSV-1/HSV-2) Subtype by PCR
2010095	Herpes Simplex Virus (HSV-1/HSV-2) Subtype by PCR
0060071	Herpesvirus 6 (HHV6) (A and B), Quantitative PCR
2013089	Human Herpesvirus 8 (HHV-8) by Quantitative PCR
0060784	Human Metapneumovirus by RT-PCR
2011933	Human Papillomavirus (HPV), High Risk with 16 and 18 Genotype by PCR, SurePath
2011940	Human Papillomavirus (HPV), High Risk with 16 and 18 Genotype by PCR, ThinPrep
2011942	Human Papillomavirus (HPV), High Risk by PCR, SurePath
2011947	Human Papillomavirus (HPV), High Risk by PCR, ThinPrep
2007894	Human Papillomavirus (HPV) Genotypes 16 and 18/45 by Transcription-Mediated Amplification (TMA), ThinPrep

TEST #	TEST NAME
3000414	Human Papillomavirus (HPV) Genotype 16 and 18 by PCR, Head and Neck
2007893	Human Papillomavirus (HPV), High Risk by Transcription-Mediated Amplification (TMA), ThinPrep
2007890	Human Papillomavirus (HPV), High Risk by Transcription-Mediated Amplification (TMA) with Reflex to HPV Genotypes 16 and 18/45 by TMA, ThinPrep
2003075	Human T-Lymphotropic Virus Types I/II DNA, Qualitative Real-Time PCR
0060764	Influenza A by PCR (Orderable Test: Respiratory Virus Mini Panel by RT-PCR)
2007469	Influenza A Virus H1/H3 Subtype by Real-Time RT-PCR
2008788	Influenza A Virus H1/H3 Subtype by PCR with Reflex to H1N1 (2009) Oseltamivir Resistance by Sequencing
0060764	Influenza B by PCR (Orderable Test: Respiratory Virus Mini Panel by RT-PCR)
2002643	Influenza Virus A and B DFA with Reflex to Respiratory Virus Mini Panel by RT-PCR
0099169	JC Virus by PCR
3000523	Mumps Virus by PCR
2014546	Norovirus, Groups 1 and 2 by PCR
2006247	Parainfluenza 1-4 by PCR
2005731	Parechovirus by PCR
0060043	Parvovirus B 19 by PCR
2012043	Parvovirus B19 by Quantitative PCR
2007805	Respiratory Virus Panel by PCR
2002565	Respiratory Viruses DFA with Reflex to Respiratory Virus Mini Panel by PCR
0060764	Respiratory Virus Mini Panel by PCR
0060042	Varicella-Zoster Virus by PCR
2007063	Viral Meningitis Panel by PCR, Cerebrospinal Fluid
2007062	Viral Meningoencephalitis Panel by PCR, Cerebrospinal Fluid
0050229	West Nile Virus by PCR
2014065	Zika Virus by PCR, Blood
2014069	Zika Virus by PCR, Urine

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 Quantitative, Real-Time PCR
2001567	Hepatitis B Virus Genotype by Sequencing
2013476	Hepatitis B Virus (HBV) Drug Resistance, Genotype and BCP/Precore Mutations by Sequencing
2010784	Hepatitis C Virus Antibody by CIA with Reflex to HCV by Quantitative NAAT
3000577	Hepatitis C Virus (HCV) by Quantitative NAAT with Reflex to HCV High-Resolution Genotype by Sequencing
2009255	Hepatitis C Virus (HCV) Genotype with Reflex to HCV High-Resolution Genotype by Sequencing
0055593	Hepatitis C Virus Genotyping
2014598	Hepatitis C Virus (HCV) Genotype with Reflex to HCV NS5A Drug Resistance by Sequencing
2010647	Hepatitis C Virus (HCV) NS3/4A Protease Inhibitor Resistance, GenoSure
2014139	Hepatitis C Virus NS5A Drug Resistance by Sequencing
2006898	Hepatitis C Virus High-Resolution Genotyping
3000572	Hepatitis C Virus (HCV) by Quantitative NAAT
3000576	Hepatitis C Virus (HCV) by Quantitative NAAT with Reflex to HCV Genotype by Sequencing
2013881	Hepatitis Delta Virus by Quantitative PCR
2011654	Hepatitis E Virus by Quantitative PCR
2011283	HIV-1 Co-Receptor Tropism by Next Generation Sequencing (DEEPGEN)
2009256	HIV1 Genotype and Integrase Inhibitor Resistance by Sequencing
2011279	HIV-1 Genotyping and Tropism by Next Generation Sequencing (DEEPGEN)

TEST #	TEST NAME
0092399	HIV PhenoSense GT
2004331	Human Immunodeficiency Virus GenoSure MG
2012674	Human Immunodeficiency Virus (HIV) Combo Antigen/Antibody (HIV-1/0/2) by ELISA, Reflexive Panel
0092050	Human Immunodeficiency Virus (HIV) Phenotype Comprehensive
2014234	Human Immunodeficiency Virus (HIV-1) by Qualitative Transcription-Mediated Amplification (TMA)
0055670	Human Immunodeficiency Virus 1, Genotyping
0093061	Human Immunodeficiency Virus 1 (HIV-1) by Qualitative PCR
2010797	Human Immunodeficiency Virus 1 (HIV-1) by Quantitative PCR with Reflex to HIV PhenoSense GT
2004457	Human Immunodeficiency Virus 1 (HIV-1) Integrase Inhibitor 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
2008438	Human Immunodeficiency Virus Type 1 (HIV-1) Drug Resistance (GenoSure PRIme)
2010808	Human Immunodeficiency Virus Type 1 (HIV-1) Drug Resistance (PhenoSense GT Plus Integrase)
2012669	Human Immunodeficiency Virus Types 1 and 2 (HIV-1/2) Antibody Differentiation, Supplemental, with Reflex to HIV-1 Quantitative PCR
2004680	Interleukin 28 B (<i>IL28B</i>)-Associated Variants, 2 SNPs
0093370	Trofile Co-Receptor Tropism
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	Acid-Fast Bacillus (AFB) Culture and AFB Stain with Reflex to <i>Mycobacterium Tuberculosis</i> Complex Detection and Rifampin Resistance by PCR
2014284	Antimicrobial Susceptibility - Surveillance Carbapenemase Gene Detection by PCR
2014277	Antimicrobial Susceptibility—Carbapenemase Gene Detection by PCR
0060211	Antimicrobial Susceptibility— <i>mecA/mecC</i> Genes by PCR
0060182	Bacterial Strain Characterization by Pulsed-Field Gel Electrophoresis
0093057	<i>Bartonella</i> Species by PCR
0065078	<i>Bordetella pertussis</i> by PCR
0065080	<i>Bordetella pertussis/parapertussis</i> by PCR
0055570	<i>Borrelia</i> species by PCR (Lyme Disease)
0060715	<i>Chlamydia pneumoniae</i> by PCR
0060241	<i>Chlamydia trachomatis</i> and <i>Neisseria gonorrhoeae</i> by Transcription-Mediated Amplification (TMA)
2011164	<i>Chlamydia trachomatis</i> and <i>Neisseria gonorrhoeae</i> by Transcription-Mediated Amplification (TMA) with Confirmation
0060774	<i>Chlamydia trachomatis</i> and <i>Neisseria gonorrhoeae</i> by Transcription-Mediated Amplification (TMA), M4/UTM
2001551	<i>Chlamydia trachomatis</i> and <i>Neisseria gonorrhoea</i> by Transcription-Mediated Amplification (TMA), SurePath
0060734	<i>Chlamydia trachomatis</i> and <i>Neisseria gonorrhoeae</i> by Transcription-Mediated Amplification (TMA), ThinPrep

TEST #	TEST NAME
0060243	<i>Chlamydia trachomatis</i> by Transcription-Mediated Amplification (TMA)
2002838	<i>Clostridium difficile</i> toxin B gene (<i>tcdB</i>) by PCR
2010125	<i>Legionella</i> Species by Qualitative PCR
0060999	<i>Mycobacterium avium intracellulae</i> by DNA Probe (Orderable Test: AFB Identification)
0060999	<i>Mycobacterium chelonae-abscessus</i> Identification by PCR (Orderable Test: AFB Identification)
0060999	Mycobacteria identification by 16S rDNA (orderable Test: AFB Identification <i>Mycobacterium tuberculosis</i> Drug Resistance by Sequencing 2011713)
0060999	<i>Mycobacterium tuberculosis</i> Complex Speciation (Orderable Test: AFB Identification)
0060999	<i>Mycobacterium tuberculosis</i> by DNA Probe (Orderable Test: AFB Identification)
2010775	<i>Mycobacterium tuberculosis</i> Complex Detection and Rifampin Resistance by PCR
2011713	<i>Mycobacterium tuberculosis</i> Drug Resistance by Sequencing
0060256	<i>Mycoplasma pneumoniae</i> by PCR
0060244	<i>Neisseria gonorrhoeae</i> by Transcription-Mediated Amplification (TMA)
0060720	Organism Identification by 16S rDNA Sequencing
3000010	Relapsing Fever <i>Borrelia</i> Species by PCR
0060705	<i>Streptococcus</i> Group B by PCR
2013290	<i>Tropheryma whipplei</i> PCR
0065153	Vaginal Pathogens DNA Direct Probes

Other Infectious Disease Testing

TEST #	TEST NAME
2008665	<i>Babesia</i> Species by PCR
0062224	<i>Blastomyces dermatitidis</i> Identification by DNA Probe
2013798	<i>Candida</i> Species by PCR
2013784	<i>Candida</i> Species by PCR with Reflex to FKS Drug Resistance by Sequencing
2013901	<i>Candida</i> FKS Drug Resistance by Sequencing
0062225	<i>Coccidioides immitis</i> Identification by DNA Probe
2007862	<i>Ehrlichia</i> and <i>Anaplasma</i> Species by Real-Time PCR
2013694	Explyfy Respiratory Pathogens by Next Generation Sequencing
0060756	Fungal Identification by ITS rDNA Sequencing
2012678	Gastrointestinal Bacterial Panel by PCR
2011660	Gastrointestinal Parasite and Microsporidia by PCR
2011150	Gastrointestinal Parasite Panel by PCR
2013577	Gastrointestinal Viral Panel by PCR
0062226	<i>Histoplasma capsulatum</i> Identification by DNA Probe
2004963	Malaria Detection and Speciation, Qualitative by Real-Time PCR

TEST #	TEST NAME
2011626	Microsporidia by PCR
3000352	Mucorales by PCR
2009226	<i>Pneumocystis jirovecii</i> DFA with Reflex to <i>Pneumocystis jirovecii</i> by PCR
2006254	<i>Pneumocystis jirovecii</i> by PCR
2006258	Sexually Transmitted Disease Panel 1
2008670	Tick-Borne Disease Panel by PCR, Blood
0055591	<i>Toxoplasma gondii</i> by PCR
2005506	<i>Trichomonas vaginalis</i> by Transcription-Mediated Amplification (TMA)
0065153	Vaginal Pathogens DNA Direct Probes
2013701	Vulvovaginal <i>Candida</i> Species by PCR
2011172	Urogenital <i>Ureaplasma</i> and <i>Mycoplasma</i> Species by PCR



www.aruplab.com | www.arupconsult.com

ARUP LABORATORIES

500 Chipeta Way
Salt Lake City, UT 84108-1221
Phone: (800) 522-2787
Fax: (801) 583-2712
www.aruplab.com

*ARUP is a nonprofit enterprise of the University of Utah
and its Department of Pathology.*

© 2018 ARUP Laboratories
BD-TS-006, Rev 9, August 2018

