



MMM2018

Molecular Microbiology Meeting

11-12 April



THE UNIVERSITY OF
SYDNEY

Message from the Convener

Welcome to MMM, back on a biennial schedule after the last annual meeting in 2016.

This meeting has been convened by Keith Stanley since its inception about a decade ago as a premier venue for emerging biotechnology, particularly in microbial diagnostics and we owe him a debt of gratitude for its success.

MMM2018 is directly and generously supported by our colleagues in diagnostics and biotechnology and by our supporting partner the Australian Society for Microbiology as well as the Australasian Genomic Technologies Association, and the NSW Government Office of the Chief Scientist and Engineer. We are grateful to all our colleagues who have travelled to support this meeting and come to discuss their work.

We acknowledge and pay our respects to the traditional custodians of the country on which we stand and our responsibility to respect and care for country, people and spirit.

Jon Iredell

Meeting Committee: Jeremy Barr, Mitchell Brown, Andrew Ginn, Ruby Lin, Emily Mascord and Deborah Williamson

Program Day 1: Wednesday 11th April

0900-0945	Registration/Tea & Coffee
0945-0950	Welcome – Jon Iredell
Needles and haystacks; Chairs Ruby Lin/Karen Weynberg	
0950-1010 (20m)	John-Sebastian Eden (WIMR): Exploring the Australian Virome
1010-1020 (10m)	Biotech innovation 1 (Illumina): Gavin Wilkie, NGS Applications in Microbiology
1020-1100 (40m)	Vanessa Hayes (Garvan): Precision medicine and the human microbiome
1100-1130 (30m)	Morning Tea
Pathogen tracking; Chairs Sally Partridge/Elena Martinez	
1130-1140 (10m)	New methods 1: Matthew O’Sullivan (CIDM, NSW Health Pathology) Binary typing for detecting outbreaks of hospital acquired infection
1140-1220 (40m)	Amy Mathers (University of Virginia): Scratching the surface: What WGS reveals about how much more there is to learn about mobile resistance genes
1220-1230 (10m)	Biotech innovation 2 (Cepheid): Jason Nonweiler, Next Generation Xpert MTB/RIF Ultra: Early Experience in a Low Burden Setting
1230-1250 (20m)	Claire Gorrie (Doherty/University of Melbourne): <i>Klebsiella pneumoniae</i> transmission, evolution, and resistance acquisition
1250-1340 (50m)	Lunch

Program Day 1: Wednesday 11th April

Afternoon sessions

Bacteriophages; Chairs Sandra Morales/Erin Price	
1340-1400 (20m)	Karen Weynberg (University of Queensland): Synthetic Biology in the Phage age
1400-1415 (15m)	Jeremy Barr (Monash University): Phage-eukaryote interactions
1415-1425 (10m)	Biotech innovation 3 (Hologic): Deborah Williamson, Using genomics to understand the transmission of STIs
1425-1445 (20m)	Carola Venturini (WIMR): Rational design for bacteriophage therapy
1445-1500 (15m)	Sandra Morales (AmpliPhi): Clinical Bacteriophage Therapy in the 21st Century
1500-1520 (20m)	Afternoon Tea
Clinical microbiology and public health; Chairs Amy Mathers/Claire Gorrie	
1520-1600 (40m)	Susan Ballard (Doherty/MDU): NATA accredited WGS in clinical and public health labs
1600-1610 (10m)	Biotech innovation 4 (AusDiagnostics): Keith Stanley, Unique properties of AusDiagnostics assays allows survey of novel sequences in global pathogens
1610-1620 (10m)	New methods 2: Elena Martinez (CIDM-Public Health): Real time WGS for TB
1620-1630 (10m)	New methods 3: Diana Wong (Prince of Wales): Longitudinal monitoring of ganciclovir levels to optimize cytomegalovirus therapy in renal transplants
1630-1800 (1.5h)	Poster session: drinks and canapes

Program Day 2: Thursday 12th April

0815-0855	Registration/Tea & Coffee
0855-0900	Welcome – Jon Iredell
New ways of looking at things; Chairs Carola Venturini/Diana Wong	
0900-0920 (20m)	Linda Varadi (CSIRO Melbourne): Renaissance of the Gold-standard
0920-1000 (40m)	Cynthia Whitchurch (UTS): In the groove: <i>Pseudomonas</i> up close
1000-1010 (10m)	Biotech innovation 5 (SpeedX): Litty Tan, Genital lesion producing pathogens diagnosed using PlexPCR
1010-1020 (10m)	New methods 4: Rohan Beresford (Liverpool Hospital): CIM for detecting CPEs
1020-1040 (20m)	Noushin Nasiri (UTS): Just a puff of breath – identifying and preventing disease with breath analysis
1040-1050 (10m)	New methods 5: Matthew Watts (NSW Health Pathology): Loop-mediated Isothermal Amplification (LAMP) in the diagnostic lab
1050-1115 (25m)	Morning tea
Alphabet soup; Chairs Nouri Ben Zakour/Rohan Beresford	
1115-1155 (40m)	Maurizio Labbate (University of Technology Sydney): Antibiotic Resistance Gene Reservoirs in a Sewage-Impacted Coastal Environment
1155-1205 (10m)	Biotech innovation 6 (bioMérieux): James Branley, Clinical and Laboratory Use of BioFire ME in a hospital setting
1205-1245 (40m)	Sally Partridge (WIMR): Mobile AMR plasmids in the Enterobacteriaceae
1245-1300 (15m)	Deborah Williamson (MDU PHL/Doherty): The future of public health and microbiology
1300-1320 (20m)	State-of-the-art 1: Muhammad Kamruzzaman (WIMR): Curing AMR in vivo
1320-1405 (45m)	Lunch

Program Day 2: Thursday 12th April

Afternoon sessions

Back to basics; Chairs Jon Iredell/Noushin Nasiri	
1405-1425 (20m)	Tara Djokic (University of NSW): A first and last outpost for life on mars? Insights from ancient hot springs in the Pilbara
1425-1505 (40m)	Ian Paulsen (Macquarie University): The future of synthetic biology: building a eukaryotic machine
1505-1525 (20m)	State-of-the-art 2: Catriona Halliday (NSW Health Pathology): Mycology diagnostics
1525-1545 (20m)	Erin Price (USC): Integrating genomics and transcriptomics to understand <i>Burkholderia pseudomallei</i> evolution in the cystic fibrosis lung
1545-1605 (20m)	Afternoon tea
Modern plagues; Chairs Maurizio Labbate/Honghua Hu	
1605-1625 (20m)	Sebastian van Hal (RPA Hospital): Diversity and evolution in VRE
1625-1635 (10m)	Biotech innovation 7 (Genetic Signatures): Doug Millar, Irish evaluation of the EasyScreen™ ESBL/CPO Detection Kit Using Primary Patient Swabs.
1635-1655 (20m)	State-of-the-art 3: Christopher McIver (St George Hospital), Direct PCR testing of Blood Cultures to Predict Resistance of Gram-negative Enterobacteria to beta-lactam Antibiotics – a work in progress
1655-1700	Close – Jon Iredell

All presenters are listed on the following pages in alphabetical order (surname)
International guest, Keynotes, Speakers and Chairs.



Associate Professor Amy Mathers

Associate Professor of Medicine and Pathology, School of Medicine, University of Virginia
Director, Adult Antimicrobial Stewardship Program
Associate Director, Clinical Microbiology, University of Virginia Health System



Dr Susan Ballard

Principal Scientist, Microbiological Diagnostic Unit Public Health Laboratory (MDU PHL), The Peter Doherty Institute of Infection and Immunity, The University of Melbourne



Professor Vanessa Hayes

Petre Chair of Prostate Cancer Research, University of Sydney
Head and Professor, Laboratory for Human Comparative and Prostate Cancer Genomics, Garvan Institute of Medical Research.



Associate Professor Maurizio Labbate

Associate Professor of Microbiology, School of Life Sciences, University of Technology Sydney



Associate Professor Sally Partridge

Senior Hospital Scientist, Centre for Infectious Diseases and Microbiology/The Westmead Institute for Medical Research, Westmead Hospital
Honorary Principal Research Fellow (Sydney Medical School), University of Sydney.



Professor Ian Paulsen

Distinguished Professor, Macquarie University
Director, Synthetic Biology Laboratory,
Macquarie University
Deputy Director, Macquarie Biomolecular Discovery and Design Centre



Professor Cynthia Whitchurch

The ithree Institute
Core Member, ithree - Institute of Infection, Immunity and Innovation



Dr Jeremy Barr

Lecturer & Group Leader, School of Biological Sciences
Monash University



Dr Rohan Beresford

Microbiology Registrar, NSW Health Pathology,
Department of Microbiology and Infectious Diseases,
Liverpool Hospital



Associate Professor James Branley

NSW Health Pathology Nepean
Adjunct Associate Professor with the University of
Sydney



Tara Djokic

PhD Candidate, School of Biological, Earth and
Environmental Sciences, Australian Centre for
Astrobiology
PANGAEA Research Centre, University of New South
Wales



Dr John-Sebastian Eden

Research Scientist in Bioinformatics and Genomics
Centre for Virus Research, The Westmead Institute for
Medical Research



Claire Gorrie

Holt Lab, Dept of Biochemistry and Molecular Biology,
Bio21 Molecular Science and Biotechnology Institute,
The University of Melbourne
Microbiological Diagnostic Unit Public Health Lab,
Department of Microbiology and Immunology, The
University of Melbourne, at the Doherty Institute for
Infection and Immunity



Dr Catriona Halliday

Senior Hospital Scientist – Mycology, NSW Health
Pathology Clinical Mycology Reference Laboratory,
Institute for Clinical Pathology and Medical Research,
Westmead Hospital



Dr Muhammad Kamruzzaman

Research Scientist, Centre for Infectious Diseases and
Microbiology, The Westmead Institute for Medical
Research



Dr Elena Martinez

Postdoctoral Research Fellow, Centre for Infectious
Diseases and Microbiology – Public Health



Dr Christopher McIver

Principal Hospital Scientist in the Microbiology
Department, St. George Hospital
Conjoint Associate Professor in the School of Medical
Science, University of New South Wales



Dr Doug Millar

Chief Scientific Officer, Genetic Signatures



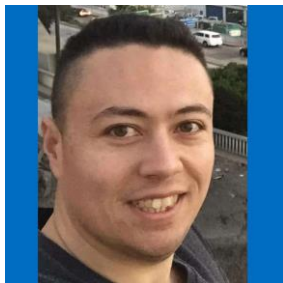
Dr Sandra Morales

Vice President of Research, AmpliPhi Biosciences



Dr Noushin Nasiri

Postdoctoral Research Fellow, Initiative for Biomedical
Materials & Devices (IBMD)
School of Mathematical and Physical Sciences
Faculty of Science, University of Technology Sydney



Jason Nonweiler

Territory Sales Executive, Cepheid ANZ



Dr Matthew O'Sullivan

Senior Staff Specialist, Centre for Infectious Diseases
and Microbiology, NSW Health Pathology,
Westmead Hospital
Clinical Senior Lecturer, Sydney Medical School,
The University of Sydney



Dr Erin Price

USC Senior Research Fellow
Faculty of Science, Health, Education and Engineering
University of the Sunshine Coast



Dr Keith Stanley

Managing Director, AusDiagnostics



Dr Litty Tan

Director of Research and Development, SpeedX



Associate Professor Sebastian van Hal

Senior Staff Specialist Department Microbiology and Infectious Diseases, Royal Prince Alfred Hospital



Dr Linda Varadi

OCE Postdoctoral Fellow, Manufacturing Nanomaterials and Surface Design Team
CSIRO



Dr Carola Venturini

Postdoctoral Researcher, Center for Infectious Diseases and Microbiology, The Westmead Institute for Medical Research



Dr Matthew Watts

Staff Specialist in Infectious Diseases and Microbiology
Clinical Lecturer, Sydney Medical School Centre for
Infectious Diseases and Microbiology, ICPMR - NSW
Health Pathology
Marie Bashir Institute for Infectious Diseases and
Biosecurity, University of Sydney



Dr Karen Weynberg

CSIRO/UQ Future Science Synthetic Biology Fellow
School of Chemistry & Molecular Biosciences,
University of Queensland



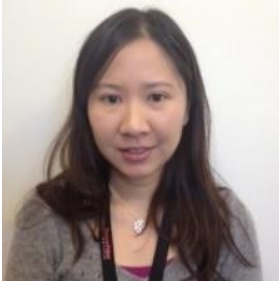
Dr Gavin Wilkie

Application Scientist, Illumina



Dr Deborah Williamson

Deputy Director, Microbiological Diagnostic Unit Public
Health Laboratory (MDU PHL)
The Peter Doherty Institute for Infection and Immunity



Diana Wong

PhD candidate UNSW, Virology Research Laboratory
Prince of Wales Hospital



Dr Nouri Ben Zakour

Senior Bioinformatician, The Westmead Institute for
Medical Research, The University of Sydney



Honghua (Helen) Hu

Research Fellow, Surgical Infection Research Group
Department of Biomedical Sciences, Faculty of Medicine
and Health Sciences, Macquarie University



Professor Jon Iredell

Conjoint Professor of Medicine and Microbiology,
University of Sydney
Senior staff specialist, Infectious Diseases and
Microbiology, Westmead Hospital and NSW Pathology
Immediate Past President, Australian Society of
Microbiology



Associate Professor Ruby Lin

Project Manager, Centre for Infectious Diseases and
Microbiology, The Westmead Institute for Medical
Research

Notes;

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Rubbo Oration

Prof. Paul R. Young - University of Queensland

Plenary Speakers

Prof. Michael P. Jennings - Griffith University

Prof. Karl Kuchler - Medical University Vienna

Dr Susan E. Sharp - Kaiser Permanente

Dr Anja Spang - Royal Netherlands Inst. for Sea Research

A/Prof. Victor J. Torres - New York University

Prof. Fitnat H. Yildiz - University of California

Public Lecture

Prof. Nicholas Graves - AusHSI

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key dates

19 Feb	Registration / Abstracts open
20 April	Earlybird / Oral Abstract deadline
18 May	Poster Abstract deadline

Poster session: Wednesday 11th April 1630-1800

Authors	Affiliations	Poster title
Zainab A. Al-Juifari ¹ , Aviva Levina ¹ , Rachel Mak ¹ , Joonsup Lee ^{1,2} , Julianne J. Djordjevic ³ , Pierre-Georges Juillard ⁴ , Si Chen ⁶ , Stefan Vogt ⁶ , Tania C. Sorrell ³ , Georges E. Grau ^{3,4,5} , Peter A. Lay ^{1,2,3,5}	¹ School of Chemistry; ² Vibrational Spectroscopy Core Facility; ³ Marie Bashir Institute, ⁴ Vascular Immunology, Department of Pathology, Sydney Medical School, and ⁵ AINST, University of Sydney; ⁶ Advanced Photon Source, Argonne National Laboratory, Argonne, Illinois, USA	The role of heavy metals in immune system interaction with pathogen
Nicole Carnt ¹ , Debarun Dutta ¹ , Priyal Mistry ¹ , DaeNia La Rode ¹ , Paul Badenoch ² , Simon Kilvington ³	¹ School of Optometry and Vision Science, University of NSW, ² Flinders Medical Centre, ³ Ophtecs Corporation, Kobi, Japan	A pilot study of the distribution of Acanthamoeba species in Sydney domestic sinks
Theerthankar Das ¹ and Jim Manos ¹	¹ Department of Infectious Diseases and Immunology, Sydney Medical School, University of Sydney, Sydney 2050, Australia	Role of Pseudomonas aeruginosa virulence factor pyocyanin in biofilm formation
Sanjay S. Gautam ¹ , Micheál Mac Aogáin ² , Louise A. Cooley ³ , Greg Haug ⁴ , Janet A. Fyfe ⁵ , Maria Globan ⁵ , Ronan F. O'Toole ^{1,2}	¹ School of Medicine, University of Tasmania, Hobart, Tasmania, Australia, ² Department of Clinical Microbiology, Trinity College Dublin, Dublin, Ireland, ³ Royal Hobart Hospital, Hobart, Tasmania, Australia, ⁴ Launceston General Hospital, Launceston, Tasmania, Australia, ⁵ Mycobacterium Reference Laboratory, Victoria Infectious Diseases Reference Laboratory, Peter Doherty Institute, Melbourne, Victoria, Australia.	Tracking the Origin and Spread of Tuberculosis in Tasmania using Whole Genome Sequencing
Honghua Hu ^{1,2} , Khalid Johani ¹ , Samantha L. Sundercombe ² , Mark Elkins ³ , Peter Bye ^{3,4} , Jim Manos ² , Barbara Rose ² , Colin Harbour ² and Karen Vickery ¹	¹ Faculty of Medicine and Health Sciences, Macquarie University, NSW, 2109, Australia ² Department of Infectious Diseases and Immunology, University of Sydney, NSW, 2006, Australia ³ Department of Medicine, University of Sydney, NSW, 2006, Australia ⁴ Department of Respiratory Medicine, Royal Prince Alfred Hospital, NSW, 2006, Australia	A comparison of the microbiomes of lung of cystic fibrosis and bronchiectasis patients

Poster session: continued

Authors	Affiliations	Poster title
Catherine Janto ¹ , Sandra Jones ¹ , Rifky Balgahom ¹ , Harsha Samarasekara ¹ , James Branley ¹	¹ Department of Microbiology and Infectious Diseases, NSW Health Pathology, Nepean Hospital, Penrith NSW. ² Infectious Diseases and Microbiology, University of Sydney.	One hour detection of organisms from positive blood culture broth using the Biofire Filmarray blood culture identification panel
Catherine Janto ¹ , Rifky Balgahom ¹ , Harsha Samarasekara ¹ , and James Branley ^{1,2}	¹ Department of Microbiology and Infectious Diseases, NSW Health Pathology, Nepean Hospital, Penrith NSW. ² Infectious Diseases and Microbiology, University of Sydney. bioMérieux Australia	One hour detection of clinically significant pathogens from cerebrospinal fluid using the Biofire Filmarray meningitis/encephalitis panel
Sangeeta Khadka ¹ , Silvana Bettiol ² , Lyn Goldberg ³ , Anna King ³ , Leonard Crocombe ¹	¹ Centre for Rural Health, ² School of Medicine, ³ Wicking Dementia Centre, University of Tasmania	Comparison of DNA Extraction and Quantification Methods to Analyse Bacterial Load in Oral Cavity.
Dmitry Kuevda, Keith Stanley, Darren Jarden, Shane Byrne	AusDiagnostics, Microbiology/pathology, St Vincent's Melbourne Hospital, Sullivan Nicolaides Pathology, Brisbane	Molecular diagnostics of bacterial vaginosis and candidiasis. Panel design and validation studies.
Ian Marsh ¹ , Jessica Boyes ² , Karren Plain ² , Martina Jelocnik ³ , Adam Polkinghorne ³ , Leah Stroud ¹ and Narelle Sales ¹	¹ Microbiology and Parasitology, Elizabeth Macarthur Agricultural Institute, NSW Department of Primary Industries ² Faculty of Veterinary Science, University of Sydney ³ Faculty of Science, Health, Education and Engineering, University of the Sunshine Coast	Rapid detection and differentiation of Mycobacterium avium subsp. paratuberculosis strains and Chlamydiae species using qPCR and benchtop pyrosequencing
Elaine McGrath ¹ , Martin Cormican ¹ , Kirsten McGloughlin ² , John Melki ³ , Dilshan Abeysekera ³ , and Douglas Millar ³	National CPE Reference Laboratory, Galway, Ireland and Medical Supply Company, Dublin, Ireland	Evaluation of the EasyScreen™ ESBL/C PO Detection Kit Using Primary Patient Swabs
Balazs, K., Najib E., Groundwater, P. W.	University of Sydney, Australia	Rapid detection of pathogenic bacteria via fluorescent probes

Poster session: Wednesday 11th April 1630-1800

Authors	Affiliations	Poster title
Paola Quinones, Huyet Luu, Amber Hillius, Manisha C. Yadav, Anne-Laure Shapiro, Marcela A. Carvallo Pinto, Ankur H. Shah, and Daniel P. Kolk	Hologic Inc., 10210 Genetic Center Drive, San Diego, CA 92121 USA	Detection of EBV from plasma and serum specimens using a fully automated laboratory developed test
Leah W. Roberts^{1,2}, Patrick Harris^{3,4}, Brian M. Forde^{1,2}, Graeme Nimmo⁴, Narelle George⁴, Krispin Hajkowicz⁵, Jeff Lipman⁶, Mark A. Schembri^{1,2}, David Paterson^{3,5}, Scott A. Beatson^{1,2}	¹ School of Chemistry and Molecular Biosciences, ² Australian Infectious Disease Research Centre, University of Queensland, Brisbane QLD, ³ UQ Centre for Clinical Research, Brisbane QLD, ⁴ Pathology Queensland, Central Laboratory, Brisbane, QLD, ⁵ Unit of Infectious Diseases, Royal Brisbane and Women's Hospital, Herston, Queensland, Australia and ⁶ Burns Trauma and Critical Care Research Centre, The University of Queensland Australia.	Integration of Whole Genome Sequencing to investigate an outbreak of carbapenem-resistant <i>Acinetobacter baumannii</i> (CRAB) in a Brisbane Intensive Care Unit
Dinesh Subedi¹, Ajay Kumar Vijay¹, Scott A. Rice^{2,3,4}, and Mark Willcox¹	¹ School of Optometry and Vision Science, University of New South Wales, Kensington, NSW, Australia ² Centre for Marine Bio-Innovation, University of New South Wales, Sydney, Australia ³ The School of Biological Sciences, Nanyang Technological University, Singapore ⁴ Singapore Centre for Environmental Life Sciences Engineering, Nanyang Technological University, Singapore	Phenotypic and genotypic characterisation of a multi-drug resistant ocular isolate of <i>Pseudomonas aeruginosa</i>
Jinlong Tan, Linda Váradi, David E Hibbs, Paul W Groundwater	University of Sydney, Australia	Enhancing Gram-negative uptake of potential antibacterials
Litty Tan, Director R&D SpeedX	SpeedX	Updated Australian STI Management Guidelines for NGU: Implementation of <i>Mycoplasma genitalium</i> resistance testing

Poster session: continued

Authors	Affiliations	Poster title
Zheng Xu¹, Sophie Octavia¹, Laurence Don Wai Luu¹, Michael Payne¹, Verlaine Timms^{2,3}, Chin Yen Tay⁴, Anthony D Keil⁵, Vitali Sintchenko^{2,3}, Nicole Guiso⁶, Ruiting Lan^{1,*}	¹ School of Biotechnology and Biomolecular Sciences, University of New South Wales, Sydney, New South Wales, Australia ² Centre for Infectious Diseases and Microbiology–Public Health, Institute of Clinical Pathology and Medical Research, Westmead Hospital, New South Wales, Australia ³ Marie Bashir Institute for Infectious Diseases and Biosecurity, The University of Sydney, New South Wales, Australia ⁴ Pathology and Laboratory Medicine, University of Western Australia, Perth, Western Australia, Australia ⁵ Department of Microbiology, PathWest Laboratory Medicine WA, Princess Margaret Hospital for Children, Perth, Australia ⁶ Molecular Prevention and Therapy of Human Diseases, Institut Pasteur, Paris, France	Molecular epidemiology of the 2013-2017 pertussis epidemic in Australia
Grace J. Yan¹, Jennifer H. Lun¹, Daniel Enosi Tuipulotu¹, Leigh Morrell¹ and Peter A. White¹	¹ School of Biotechnology and Biomolecular Sciences, Faculty of Science, University of New South Wales, Sydney, NSW, Australia	Emergence of norovirus recombinant strain GII.P16/GII.4 Sydney 2012 in New South Wales, 2017
Yasir M1, Dutta D1, Willcox MD1	School of Optometry and Vision Science, The University of New South Wales, Australia	The role of antimicrobial peptides in reducing bacterial biofilms
Xiaomei Zhang¹, Michael Payne¹, Qinning Wang², Vitali Sintchenko^{2,3}, Ruiting Lan¹	¹ School of Biotechnology and Biomolecular Sciences, University of New South Wales, Sydney, New South Wales, Australia ² Centre for Infectious Diseases and Microbiology–Public Health, Institute of Clinical Pathology and Medical Research, Westmead Hospital, New South Wales, Australia ³ Marie Bashir Institute for Infectious Diseases and Biosecurity, The University of Sydney, New South Wales, Australia	Identification of serovars' specific genes for typing the five most prevalent Salmonella serovars in Australia

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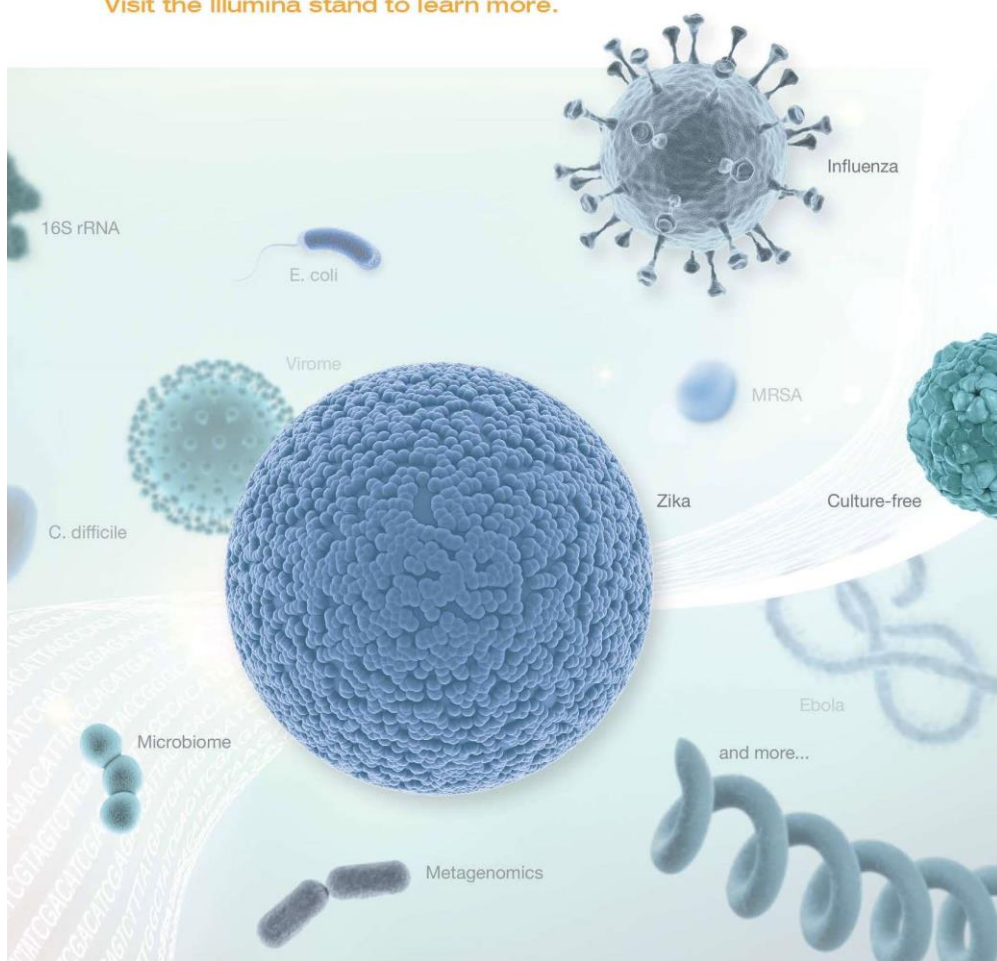
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* Not for sale in USA.



ELITe InGenius®

EVER-GROWING MENU

Fully Automated Sample-to-Result System

Transplant
Pathogen
Monitoring

Healthcare
Associated
Infections

Respiratory
Infections

Meningitis &
Encephalitis

Sexually
Transmitted
Infections

Gastro-Intestinal
Infections

- CMV
- EBV
- BKV
- VZV
- HSV1
- HSV2
- Parvo B19
- Adenovirus
- Enterovirus
- JCV
- HHV6
- HHV8
- HHV7
- Hepatitis E
- *T. gondii**
- VNV*

- MRSA/SA
 - *S. aureus*
 - *mecA / mecC*

- *C. difficile*
 - Toxin A
 - Toxin B

- Carbapenem Resistance
 - KPC
 - IMP-VIM-NDM
 - OXA

- ESBL
 - CTX-M-1,15
 - CTX-M-9,14

- Colistin Resistance*
 - *mcr1*
 - *mcr2*

- Viral Panel
 - Flu A
 - Flu B
 - RSV

- Bacterial Panel
 - *M. pneumoniae*
 - *C. pneumoniae*
 - *Legionella spp.*

- MTB + Resistance*
 - MTB complex
 - Rifampicin resistance
 - Isoniazid resistance

- Viral Panel 1
 - HSV1
 - HSV2
 - VZV

- Viral Panel 2
 - Enterovirus
 - Parechovirus
 - Adenovirus

- Bacterial Panel*
 - *N. meningitidis*
 - *S. pneumoniae*
 - *H. influenzae*

- STI Panel
 - *C. trachomatis*
 - *N. gonorrhoeae*
 - *M. genitalium*

- MG + Resistance*
 - *M. genitalium*
 - Macrolide resistance

- Norovirus*
 - Genotypes I & II

- Viral Panel*
 - Rotavirus
 - Adenovirus
 - Astrovirus

- Bacterial Panel*
 - *Salmonella*
 - *Campylobacter*
 - *Y. enterocolitica*

- Parasitic Panel*
 - *G. lamblia*
 - *C. parvum*
 - *E. histolytica*

Coagulation
Factors

- Coagulation Panel
 - Factor II
 - Factor V
 - MTMFR

*Tests under validation or in development, available in 2018

 **ELITechGroup**
MOLECULAR DIAGNOSTICS

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Notes;

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For more information

MMM2018

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