

VACCINES FOR ENTERIC DISEASES

9-11 October 2017, NAU Sao Rafael Atlantico Hotel, Albufeira, Portugal

FINAL ORAL & POSTER PROGRAMME

VED 2017

SCIENTIFIC ADVISORY PANEL

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Timo Vesikari (*University of Tampere, Finland*)

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Mark Riddle (*NMRC, Bethesda, Maryland, USA*)

Armelle Phalipon (*Pasteur Institute, Paris, France*)

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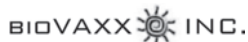
Robert F. Bargatze (*Takeda Vaccines Inc., Bozeman, Montana, USA*)

Hugues Bogaerts (*Consultant, Takeda Vaccines, Belgium*)

Richard Walker (*PATH, Washington DC, USA*)

Fred Cassels (*PATH, Washington DC, USA*)

Shahida Baqar (*NIAID/NIH, Bethesda, Maryland, USA*)



07.15 Onwards

Arrival & Registration & Poster Session A Set-Up

08.45-09.00

Welcome to VED 2017 & Opening Remarks

Richard Walker

(PATH, Washington DC, USA)

SESSION 1: BURDEN OF DISEASE

Moderator: Richard Walker

(PATH, Washington DC, USA)

09.00-09.30

'Changing the diarrheal disease narrative, now'

Eileen Quinn

(PATH, Washington DC, USA)

09.30-10.00

'Vaccine impact on diarrhea in Africa (VIDA) study of the incidence, etiology and adverse clinical consequences of moderate-to-severe diarrhea (MSD) in Sub-Saharan Africa following introduction of rotavirus vaccine'

Karen L. Kotloff

(Center for Vaccine Development, Institute for Global Health, University of Maryland School of Medicine, Baltimore, Maryland, USA)

10.00-10.30

'The global burden of diarrheal diseases: Results from the global burden of disease study 2016'

Christopher Troeger, Ibrahim Khalil, Puja Rao, Manny Garcia, Shijun Cao,

Ali H. Mokdad, Simon Hay and Robert Reiner

(Institute for Health Metrics and Evaluation, University of Washington, Seattle, Washington, USA)

10.30-10.50

'Etiology of diarrhea in hospitalized patients at the International Centre for Diarrhoeal Disease Research, Bangladesh from 2014-2016 using quantitative PCR'

Mami Taniuchi¹, James Platts-Mills¹, Abu Sayeed², Farhana Khanam²,

Ashraful Islam Khan², Jie Liu¹, Eric Houpt¹ and Firdausi Qadri²

(¹ Division of Infectious Diseases and International Health, University of Virginia, Charlottesville, USA; ² Infectious Diseases Division, International Centre for Diarrhoeal Disease Research, Bangladesh, Dhaka, Bangladesh)

10.50-11.20

Coffee Break & Poster Session A Set-Up

SESSION 2: ETEC VACCINES I

Moderators: John Clements¹ and Lou Bourgeois²

(¹ Tulane University, New Orleans, Louisiana, USA; ² PATH, Washington DC, USA)

11.20-11.40

'Development of a recombinant CS6 based ETEC vaccine'

Michael Prouty¹, Steven Poole¹, Milton Maciel¹, Yang Liu¹, Amritha Ramakrishnan², Annette McVeigh¹, April Fordyce¹, Nate Reynolds², Mark Simons², David Poncet³, Premkumar Dinadayala³, Sabrina Joseph¹, Mark Riddle¹, Jon Heinrichs³, Geneviève Renaud-Mongénie³ and Stephen Savarino^{1,3}

(¹ Naval Medical Research Center, Silver Spring, Maryland, US; ² Naval Medical Research Unit Number Six, Lima, Peru; ³ Sanofi-Pasteur, Marcy l'Etoile, France and Swiftwater, Pennsylvania, USA)

11.40-12.00

'Prevalence and molecular conservation of novel candidate antigens in a diverse population of Enterotoxigenic Escherichia coli isolates'

F. Matthew Kuhlmann¹, Jie Ning¹, Madeline Pashos¹, John Martin², Makedonka Mitreva^{1,2}, Tracy H. Hazen³, David A. Rasko³, Felipe Del Canto⁴, Roberto Vidal⁴, Elizabeth Cebelinski⁵, Dave Boxrud⁵, Firdausi Qadri⁶ and James M. Fleckenstein^{1,7}

(¹ Department of Medicine, Division of Infectious Diseases, and the ² McDonnell Genome Institute, Washington University, St. Louis, Missouri, USA; ³ The Department of Microbiology & Immunology, Institute for Genome Sciences, University of Maryland School of Medicine, Baltimore, Maryland, USA;

⁴ Universidad de Chile, Santiago, Chile; ⁵ Minnesota Department of Health, Molecular Epidemiology, Infectious Disease Laboratory, St. Paul, Minnesota, USA;

⁶ International Centre for Diarrhoeal Disease Research, Bangladesh, ICDDR, Dhaka, Bangladesh; ⁷ Medicine Service, Veterans Affairs Medical Center, St. Louis, Missouri, USA)

12.00-12.20

'Heat-stable enterotoxin (ST) cloaks ETEC from the host immune system and binds iron'

Mallory C. Kiefer, Carli C. Thompson, David L. Bauer, Elizabeth B. Norton, John D. Clements and Jacob P. Bitoun

(Department of Microbiology and Immunology, Tulane University School of Medicine, New Orleans, Louisiana, USA)

12.20-12.40

'Passive immunity leads to enhanced priming of the immune system upon oral immunization with F4 fimbriae'

Ut V. Nguyen¹, Bert Devriendt¹, Bruno M. Goddeeris² and Eric Cox¹

(¹ Faculty of Veterinary Medicine, Ghent University, Merelbeke, Belgium;

² Faculty of Bioscience Engineering, KU Leuven, Leuven, Belgium)

12.40-13.00

'Novel structure-based MEFA (multiepitope fusion antigen) vaccinology for a vaccine candidate inducing antibodies against 15 adhesins of enterotoxigenic Escherichia coli (ETEC)'

Qiangde Duan¹, Rahul Nandre¹, Xiaosai Ruan¹, David A. Sack² and Weiping Zhang¹

(¹ Department of Diagnostic Medicine/Pathobiology, Kansas State University College of Veterinary Medicine, Manhattan, Kansas, USA; ² Department of International Health, Johns Hopkins University Bloomberg School of Public Health, Baltimore, Maryland, USA)

13.00-14.00

Lunch Break & Poster Session A

SESSION 3: ETEC VACCINES II

Moderators: Ann-Mari Svennerholm¹ and Richard Walker²

(¹ University of Gothenburg, Gothenburg, Sweden; ² PATH, Washington DC, USA)

14.00-14.10

'ETEC and Shigella vaccine development: A priority for WHO's Initiative for Vaccine Research'

Birgitte K. Giersing and Martin Friede

(Initiative for Vaccine Research, Dept. of Immunization, Vaccines and Biologicals, World Health Organization, Geneva, Switzerland)

14.10-14.30

'Re-establishment and use of the ETEC B7A CHIM to assess the efficacy of orally administered bovine serum antibodies against CS6 or whole cell B7A'

Kawsar Talaat¹, A. Louis Bourgeois¹, Christopher Duplessis², Chad K. Porter², Milton Maciel Jr.², Ramiro Gutierrez², Barbara DeNearing¹, Brittany Adjoodani¹, Rachel Adkinson¹, Kayla Jaep², Brittany Feijoo¹, Jessica Brubaker¹, Aleksandra Beselman³, Subhra Chakraborty¹, David Sack¹, Jane Halpern¹, Stefanie Trop², Mark Riddle², Sabrina Joseph², Steven Poole² and Michael Prouty²

(¹ Department of International Health, Johns Hopkins Bloomberg School of Public Health, Baltimore MD; ² Naval Medical Research Center, Silver Spring, MD; ³ Johns Hopkins Bayview Medical Center, Baltimore, MD)

14.30-14.50

'Optimizing LT antibody analyses to predict protection from oral H10407 ETEC challenge'

Milton Maciel Jr.¹, Robin Baudier², Eduardo Valli², Clarissa D. Mulloy², Chad Porter¹, Ramiro Gutierrez¹, John Clements² and Elizabeth Norton²

(¹ Naval Medical Research Center, Silver Spring, Maryland, USA; ² Tulane University, New Orleans, Louisiana, USA)

14.50-15.10

'Immunological factors contributing to enhanced protective efficacy in volunteers immunized with the dmLT adjuvanted ACE 527 ETEC vaccine'

Subhra Chakraborty¹, Clayton Harro¹, Jessica Brubaker¹, Barbara DeNearing¹, Nicole Bauers², Len Dally³, Alan Fix², Sachin Mani², Louis Bourgeois^{1,2}, Richard Walker² and David Sack¹

(¹ The Johns Hopkins Bloomberg School of Public Health, Baltimore, Maryland, USA; ² PATH, Washington DC, USA; ³ EMMES Corporation, Rockville, Maryland, USA)

15.10-15.30

'A Phase I/II trial of the oral inactivated ETEC Vaccine (ETVAX; OEV 122) in descending age groups in Bangladesh'

Firdausi Qadri, Mohiul Islam Chowdhury¹, Taufiqur Rahman Bhuiyan¹, Farhana Khanam¹, Tasnuva Ahmed¹, Marjahan Akhtar¹, Anna Lundgren², Richard Walker³, Lou Bourgeois³, Alan Fix³, Tom Wierzbza³ and Ann-Mari Svennerholm²

(¹ ICDDR, Dhaka, Bangladesh; ² University of Gothenburg, Gothenburg, Sweden; ³ PATH, Washington DC, USA)

15.30-15.50

'OEV-123 – a clinical trial on ETVAX, an oral vaccine against enterotoxigenic escherichia coli diarrhea'

Anu Kantele

(University of Helsinki and Helsinki University Hospital, Helsinki, Finland)

15.50-16.10

Tea Break & Poster Session A

SESSION 4: NOROVIRUS VACCINES

Moderator: Robert Bargatze

(Takeda Vaccines Inc., Bozeman, Montana, USA)

16.10-16.40

'Progress towards a norovirus vaccine'

Timo Vesikari

(University of Tampere, Tampere, Finland)

16.40-17.00

'A phase 1 randomized, placebo controlled trial for the prevention of norovirus illness using an oral recombinant adenoviral based vaccine'

Leesun Kim, Karen Lin, Cassandra Kasperek, Keith Gottlieb, Dave Liebowitz and Sean Tucker

(Vaxart Inc., South San Francisco, California, USA)

17.00-17.20

'Updated estimates of the global burden of norovirus disease'

Aron J. Hall^{1,2}, Sara M. Pires³, Brecht Devleesschauwer⁴, Anita Kambhampati^{1,5}, Kayoko Shioda^{1,5}, Sharia M. Ahmed^{1,5}, Anne Robinson^{1,2}, Linda Verhoef⁶, Umesh Parashar¹, Ben Lopman^{1,2} and Marion Koopmans^{6,7}

(¹ Centers for Disease Control and Prevention, Atlanta, Georgia, USA; ² Emory University, Atlanta, Georgia, USA; ³ Danish Technical University, Lyngby, Denmark; ⁴ University of Ghent, Ghent, Belgium; ⁵ Oak Ridge Institute for Science and Education, Oak Ridge, Tennessee, USA; ⁶ National Institute for Public Health and the Environment, Bilthoven, The Netherlands; ⁷ Viroscience Department, ErasmusMC, Rotterdam, The Netherlands)

17.20-17.40

'Immunotypes: A genomics approach to understand norovirus immunity'

Gabriel I. Parra

(Division of Viral Products, CBER, FDA, Silver Spring, Maryland, USA)

17.40-18.00

'The burden of medically attended acute gastro-enteritis due to norovirus in Japan: Results from a database analysis'

C. Chang¹, M. Sakaguchi¹, T. Verstraeten² and J. Weil³

(¹ Takeda Pharmaceutical Company, Osaka, Japan; ² P95 Pharmacovigilance and Epidemiology Services, Leuven, Belgium; ³ Takeda Vaccines Inc., Bozeman, Illinois, USA)

18.00-18.20

'Replication of human norovirus in human intestinal enteroids'

Jan Vinjé¹, Esther K. Morantz², Hannah Browne³, Khalil Ettayebi⁴, Xi-Lei Zeng⁴, Mary K Estes⁴ and Veronica Costantini¹

(¹ Centers for Disease Control, Atlanta, Georgia, USA; ² Synergy America Inc, Atlanta, Georgia, USA; ³ Oak Ridge Institute for Science and Education, Oak Ridge, Tennessee, USA; ⁴ Baylor College of Medicine, Houston, Texas, USA)

18.20-19.30

VED 2017 Welcome Drinks Reception & VED 2017 Poster Session A

SESSION 5: SHIGELLA VACCINES I

Moderators: Armelle Phalipon¹ and Daniel Cohen²

(¹ Pasteur Institute, Paris, France; ² Tel Aviv University, Tel Aviv, Israel)

08.30-08.50

'Development of a *S. sonnei* controlled human infection model using a lyophilized GMP lot of strain 53G'

Robert W Frenck Jr.¹, Michelle Dickey¹, Akamol E. Suvarnapunya², Lakshmi Chandrasekaran², Robert Kaminski², Monica McNeal¹, Amanda Lynen³, Susan Parker, Amy Hoepfer¹, Sachin Mani⁴, Chad Porter³ and Malabi Venkatesan²
(¹ Cincinnati Children's Hospital Medical Center, Cincinnati Ohio, USA; ² US Army Bacterial Diseases Branch, Walter Reed Army Institute of Research, Silver Spring, Maryland, USA; ³ Infectious Diseases, Naval Medical Research Center, Silver Spring Maryland, USA; ⁴ PATH, Seattle, Washington, USA)

08.50-09.10

'A phase I study of two live oral *Shigella sonnei* vaccine candidates WRSs2 and WRSs3'

Robert W. Frenck¹, Michelle Dickey¹, Robert Kaminski², Akamol E. Suvarnapunya², Shoshana Barnoy², Monica McNeal¹, Jill El-Khorazaty³, Holly Baughman³, Amy Hoepfer¹, Chad Porter⁴ and Malabi Venkatesan²
(¹ Cincinnati Children's Hospital Medical Center, Cincinnati Ohio, USA; ² Bacterial Diseases Branch, Walter Reed Army Institute of Research, Silver Spring Maryland, USA; ³ EMMES Corporation, Rockville, Maryland, USA; ⁴ Infectious Diseases, Naval Medical Research Center, Silver Spring Maryland, USA)

09.10-09.30

'Flexyn2a, a candidate bioconjugate vaccine against *Shigella flexneri* 2a induces protective immune response in a controlled human infection model'

Kawsar R. Talaat¹, Cristina Alaimo², A. Lou Bourgeois¹, Robert W. Kaminski³, Anita Dreyer², Chad K. Porter⁴, Subhra Chakraborty¹, Kristen A. Clarkson³, Jessica Brubaker¹, Daniel Elwood¹, Rahel Frolich², Barbara DeNearing¹, Hailey Weerts³, Brittany Feijoo¹, Jane Halpern¹, David Sack¹, Mark S. Riddle⁴, Patricia Martin² and Veronica Gambillara Fonck²
(¹ Department of International Health, Johns Hopkins Bloomberg School of Public Health, Baltimore, Maryland, USA; ² LimmaTech Biologics AG, Schlieren, Switzerland; ³ Walter Reed Army Institute of Research, Silver Spring, Maryland, USA; ⁴ Naval Medical Research Center, Silver Spring, Maryland, USA)

09.30-09.50

'A phase I dose escalation study to assess the safety and immunogenicity of the SF2a-TT15 conjugate vaccine against *S. flexneri* 2a in healthy adult volunteers (Preliminary Results)'

D. Cohen¹, J. Atsmon^{1,2}, C. Artaud³, S. Meron-Sudai¹, M-L. Gougeon³, A. Bialik¹, S. Goren¹, V. Asato¹, O. Ariel-Cohen¹, A. Reizis¹, A. Dorman¹, I. Volokhov², D. Shaikevich², C.W.G. Hoitink⁴, J. Westdijk⁴, S. Ashkenazi⁵, P. Sansonetti^{3*}, L.A. Mulard^{3**} and A. Phalipon^{3*}
(¹ School of Public Health, Tel Aviv University, Israel; ² Clinical Research Center, Tel Aviv Sourasky Medical Center, Israel; ³ Institut Pasteur, ^{3*} INSERM U1202, ^{3**} UMR3523-CNRS, Paris, France; ⁴ Intravacc, Bilthoven, The Netherlands; ⁵ Schneider Children's Hospital & Tel Aviv University, Israel)

09.50-10.20

Coffee Break & Poster Session A Breakdown

(Poster Session A authors must remove their posters at this coffee break)

SESSION 6: SHIGELLA VACCINES II

Moderators: Armelle Phalipon¹ and Daniel Cohen²

(¹ Pasteur Institute, Paris, France; ² Tel Aviv University, Tel Aviv, Israel)

10.20-10.40

'Progress toward a bivalent *Shigella flexneri* synthetic carbohydrate-based vaccine candidate'

Zhaoyu Hu^{1,2}, Johan Cornil^{1,2}, Catherine Guerreiro^{1,2}, Françoise Thouron^{3,4}, Caroline Ligeour^{1,2}, Sylviane Hoos^{6,7}, Patrick England^{3,4}, Armelle Phalipon^{3,4} and Laurence A. Mulard^{1,2}
(¹ Institut Pasteur, Chemistry of Biomolecules, Paris, France; ² CNRS UMR 3523, Institut Pasteur, Paris, France; ³ Institut Pasteur, Molecular Microbial Pathogenesis, Paris, France; ⁴ INSERM U1202, Institut Pasteur, Paris, France; ⁵ Institut Pasteur, CITECH, Molecular Biophysics, Paris, France; ⁶ CNRS UMR 3528, Institut Pasteur, Paris, France)

10.40-11.00

'Protective vaccine against shigellosis composed of a *Shigella* IpaB-IpaD fusion protein (DBF) in combination with the adjuvant dmlT'

Chad Roy¹, John D. Clements², Wendy Picking³ and Lucy C. Freytag²
(¹ Department of Microbiology and Immunology, Tulane University, New Orleans, Louisiana, USA; ² National Primate Research Center, Tulane University, Covington, Louisiana, USA; ³ Department of Pharmaceutical Chemistry, The University of Kansas, Lawrence, Kansas, USA)

11.00-11.20

'A phase 1 open-label, dose escalating study of *Shigella flexneri* 2a artificial invaplex administered intranasally to healthy, adult volunteers'

K.A. Clarkson¹, C. Duplessis², K.R. Turbyfill¹, C. Porter², R. Gutierrez², M.S. Riddle², T. Lee², H.E. Weerts¹, S.C. Sumlin¹, A. Lynen², E.V. Oaks¹, K. Paolino³, G. Fornillos³ and R.W. Kaminski¹
(¹ Subunit Enteric Vaccines and Immunology, Bacterial Diseases Branch, Walter Reed Army Institute of Research, Silver Spring, Maryland, USA; ² Enteric Disease Department, Infectious Disease Directorate, Naval Medical Research Center, Silver Spring, Maryland, USA; ³ Clinical Trial Center, Regulated Activities Branch, Walter Reed Army Institute of Research, Silver Spring, Maryland, USA)

11.20-11.40

'Generation and development of 4-valent GMMa-based *Shigella* vaccine'

Francesco Citiulo, Anna Maria Colucci, Carlo Giannelli, Luigi Sollai, Ivan Pisoni, Danilo Gomes Moriel, Francesca Mancini, Maria Grazia Aruta, Simona Rondini, Clarissa Pozzi, Allan Saul, Vito Di Cioccio and Laura Bartle Martin
(GSK Vaccines Institute for Global Health (GVGH), Siena, Italy)

11.40-12.00

'Burden, risk factors and patterns of *Shigella sonnei* transmission in hyperendemic communities in a high-income country'

Dani Cohen¹, Adi Behar^{1,2}, Kate S. Baker^{3,4}, Hadar Korin¹, Ravit Bassal⁵, Michal P. Markovich¹, Sophy Goren¹, Nick R. Thompson³ and Khitam Muhsen¹
(¹ School of Public Health, Sackler Faculty of Medicine, Tel Aviv University, Tel Aviv, Israel; ² Kimron Veterinary Institute, Division of Parasitology, Beit-Dagan, Israel; ³ The Wellcome Trust Sanger Institute, Wellcome Trust Genome Campus, Hinxton, Cambridge, UK; ⁴ University of Liverpool, Liverpool, UK; ⁵ Israel Center for Disease Control, Ministry of Health, Israel)

12.00-12.20

'Pre-clinical findings with ShigEtec, a combined *Shigella* and ETEC vaccine that represents paradigm shifts in *Shigella* vaccine approaches'

Petra Girardi, Shushan Harutyunyan, Irene Neuhauser, Valéria Szijsártó, Gábor Nagy, Eszter Nagy and Tamás Henics
(EveliQure Biotechnologies GmbH, Vienna, Austria)

12.20-14.00

Lunch Break & Poster Session B Set-Up

SESSION 7: ROTAVIRUS VACCINES I

Moderator: Timo Vesikari¹ and Fred Cassels²

(¹ University of Tampere, Tampere, Finland; ² PATH, Washington DC, USA)

14.00-14.20

'Post-vaccination oral rotavirus vaccine shedding is not associated with vaccine immunogenicity or efficacy among infants in Bangladesh'

Benjamin Lee¹, Abdul Kader², Sean A. Diehl¹, E. Ross Colgate¹, Marya Carmoli¹, Muhammad Ikhtear Uddin², Salma Sharmin², Shahidul Islam², Taufiqur Rahman Bhuiyan², Dorothy M. Dickson¹, Mami Taniuchi³, William A. Petri³, Firdausi Qadri², Rashidul Haque² and Beth D. Kirkpatrick¹

(¹ University of Vermont, Burlington, Vermont, USA; ² International Center for Diarrhoeal Disease Research, Bangladesh, Dhaka, Bangladesh; ³ University of Virginia, Charlottesville, Virginia, USA)

14.20-14.40

'The global burden of rotavirus in very young children: Opportunity for a neonatal vaccine'

Chandresh Ladva¹, Jacqueline Tate³, Umesh Parashar³, Matt Hasso-Agopsowicz^{2,4}, Andrew Clark⁵, Ben Lopman¹ and the Global Rotavirus Surveillance Network²

(¹ Epidemiology, Rollins School of Public Health, Emory University, Atlanta, Georgia, USA; ² Global Rotavirus Surveillance Network, World Health Organization, Geneva, Switzerland; ³ National Center for Immunization and Respiratory Diseases, Centers for Disease Control and Prevention, Atlanta, Georgia, USA; ⁴ Faculty of Infectious and Tropical Diseases Department, London School of Hygiene and Tropical Medicine, London, UK; ⁵ Health Services Research and Policy, London School of Hygiene and Tropical Medicine, London, UK)

14.40-15.00

'Safety and immunogenicity of a parenteral P2-VP8 subunit rotavirus vaccine'

Michelle J. Groome^{1,2}, Anthonet Koen^{1,2}, Alan Fix³, Lee Fairlie⁴, Julie Morrison⁵, Nicola Page^{6,7}, Lisa Jose^{1,2}, Shabir A. Madhi^{1,2,6}, Monica McNeal⁸, Len Dally⁹, Iksung Cho³, Maureen Power³, Jorge Flores³ and Stanley Cryz³

(¹ Medical Research Council, Respiratory and Meningeal Pathogens Research Unit, University of the Witwatersrand, South Africa; ² Department of Science and Technology/National Research Foundation, Vaccine Preventable Diseases, University of the Witwatersrand, South Africa; ³ PATH, Seattle, Washington, USA; ⁴ Wits Reproductive Health and HIV Institute, University of the Witwatersrand, South Africa; ⁵ Family Clinical Research Unit, Stellenbosch University, South Africa; ⁶ National Institute for Communicable Diseases, National Health Laboratory Service, South Africa; ⁷ Department of Medical Virology, Faculty of Health Sciences, University of Pretoria, Pretoria, South Africa; ⁸ Division of Infectious Diseases, Cincinnati Children's Hospital Medical Center, Cincinnati, USA; ⁹ The Emmes Corporation, Rockville, USA)

15.00-15.20

'A randomized Phase I/II study to evaluate safety and reactogenicity of a single dose of lyophilized live attenuated pentavalent (G1-G4 and P1[8]) heat-stable rotavirus vaccine (HSRV), in healthy adult volunteers; followed by evaluation of the safety, reactogenicity and immunogenicity of a 3-dose series in infants age 6 to 8 weeks'

K. Zaman¹, Ajit pal Singh², W.A. Khan¹, M. Karim¹, Vibhu Kanchan², Asma Aziz¹, Warda Haque¹, Syed Khalid Ali², Michelle Goveia³, Susan Kaplan³, Davinder Gill² and John D. Clemens¹

(¹ icddr, Dhaka, Bangladesh; ² MSD Wellcome Trust Hilleman Laboratories Pvt Ltd., New Delhi, India; ³ Merck & Co. Inc., Kenilworth New Jersey, USA)

15.20-15.50

Tea Break & Poster Session B

SESSION 8: ROTAVIRUS VACCINES II

Moderator: K. Zaman

(icddr, Dhaka, Bangladesh)

15.50-16.10

'Longer-term direct and indirect effects of infant rotavirus vaccination across all ages in the US; 2000 – 2013: Analysis of a large hospital discharge dataset'

Julia M. Baker¹, Jacqueline E. Tate², Claudia A. Steiner³, Umesh D. Parashar² and Benjamin A. Lopman¹

(¹ Department of Epidemiology, Rollins School of Public Health, Emory University, Atlanta, Georgia, USA; ² Division of Viral Diseases, National Center for Immunization and Respiratory Diseases, Centers for Disease Control and Prevention, Atlanta, Georgia, USA; ³ Healthcare Cost and Utilization Project, Agency for Healthcare Research and Quality, Rockville, Maryland, USA)

16.10-16.30

'Quantifying the impact of natural immunity on rotavirus vaccine efficacy estimates: A re-analysis of a clinical trial of monovalent rotavirus vaccine in Dhaka, Bangladesh (PROVIDE) and a simulation study'

Elizabeth T. Rogawski, James A. Platts-Mills, E. Ross Colgate, Rashidul Haque, K. Zaman, William A. Petri Jr. and Beth D. Kirkpatrick (University of Virginia, Charlottesville Virginia, USA)

16.30-16.50

'Association of rotavirus vaccines and intussusception in early introducing African countries using monovalent rotavirus vaccine: Progress of the African Intussusception Surveillance Network'

Jackie Tate and the African Intussusception Surveillance Network (CDC, Atlanta, Georgia, USA)

16.50-17.10

'Strategies to improve rotavirus vaccine impact and effectiveness during the second year of life in Blantyre, Malawi: A mathematical modeling study'

Virginia E. Pitzer¹, Aisleen Bennett^{2,3}, Naor Bar-Zeev^{2,3}, Benjamin A. Lopman⁴, Umesh D. Parashar⁵ and Nigel A. Cunliffe³

(¹ Department of Epidemiology of Microbial Diseases, Yale School of Public Health, Yale University, New Haven, Connecticut, USA; ² Malawi-Liverpool-Wellcome Trust Clinical Research Programme, College of Medicine, University of Malawi, Blantyre, Malawi; ³ Centre for Global Vaccine Research, Institute of Infection and Global Health, University of Liverpool, Liverpool, UK; ⁴ Department of Epidemiology, Rollins School of Public Health, Emory University, Atlanta, Georgia, USA; ⁵ Epidemiology Branch, Division of Viral Diseases, Centers for Disease Control and Prevention, Atlanta, Georgia, USA)

17.10-17.30

'The changing epidemiology of rotavirus diarrhea: Results from the Global Burden of Disease study 2016'

Christopher Troeger, Ibrahim Khalil, Puja Rao, Manny Garcia, Shijun Cao, Simon Hay and Robert Reiner (Institute for Health Metrics and Evaluation, University of Washington, Seattle, Washington, USA)

17.30-17.50

'Skin vaccination using microneedle patches induces mucosal immunity to inactivated rotavirus in mice'

Sung-Sil Moon¹, Theresa K. Resch¹, Yuhuan Wang¹, Jessica Joyce², Song Li², Mark Prausnitz² and Baoming Jiang¹

(¹ Division of Viral Diseases, Centers for Disease Control and Prevention (CDC), Atlanta, Georgia, USA; ² School of Chemical & Biomolecular Engineering, Georgia Institute of Technology, Atlanta, Georgia, USA)

SESSION 9: SALMONELLA VACCINES

Moderator: Myron M. Levine
(University of Maryland, Baltimore, Maryland, USA)

08.30-08.45

'A multivalent vaccine to prevent invasive *salmonella* disease in Sub-Saharan Africa?'

Myron M. Levine
(University of Maryland, Baltimore, Maryland, USA)

08.45-09.10

'Epidemiology of *Salmonella* Typhi and iNTS disease in sub-Saharan Africa and implications for vaccination programs (TSAP and SETA programs)'

Justin Im¹, Gi Deok Pak¹, Peter Aaby^{2,3}, Yaw Adu-Sarkodie^{4,5}, Muna Ahmed El Tayeb⁶, Mohammad Ali⁷, Abraham Aseffa⁸, Stephen Baker^{9,10}, Holly M. Biggs^{11,12}, Morten Bjerregaard-Andersen^{2,3}, Robert F. Breiman^{13,14}, James I. Campbell⁹, Yun Chon¹, Leonard Cosmas¹³, John A. Crump^{11,12,15,16}, Ligia Maria Cruz Espinoza¹, Denise Myriam Dekker^{17,18}, Barry Fields¹³, Nagla Gasmelseed^{6,19}, Anne-Sophie Heroes²⁰, Julian T. Hertz^{11,12}, Nguyen Van Minh Hoang⁹, Jan Jacobs²⁰, Hyon Jin Jeon¹, Anna Jaeger¹⁷, Leon Parfait Kabore²¹, Vera von Kalckreuth¹, Lisette Kalonji²², Karen H. Keddy^{23,24}, Aderemi Kehinde²⁵, Frank Konings¹, Ralf Krumkamp¹⁷, Benedikt Ley^{1,26}, Sandra Valborg Løfberg^{2,3}, Octavie Lunguya²², Jürgen May^{17,18}, Christian G. Meyer^{27,28}, Eric D. Mintz²⁹, Vittal Mogasale¹, Joel M. Montgomery¹³, Aissatou Niang³⁰, Chelsea Nichols¹, Iruka Okeke²⁵, Beatrice Olack³¹, Ursula Panzner MSc¹, Jin Kyung Park PhD¹, Se Eun Park MIS¹, Marie-France Phoba²², Oluwafemi Popoola²⁵, Henintsoa Rabezahary³², Raphaël Rakotozandrindrainy³², Tiana Mirana Raminosa³², Enusa Ramani¹, Tsriniaina Jean Luco Razafindrabe³², Emmanuel Sampo³³, Heidi Schütt-Gerowitt MD^{1,34}, Amy Gassama Sow^{30,35}, Nimako Sarpong^{5,18}, Hye Jin Seo¹, Arvinda Sooka²³, Abdramane Soura Bassiahi³³, Myron M. Levine³⁶, Adama Tall³⁰, Mekonnen Teferi⁸, Kamala Thriemer^{1,26}, Michelle R. Warren¹, Biruk Yeshitela⁸, Thomas F. Wierzbna^{1,40}, John D. Clemens^{37,38,39} and Florian Marks^{1,10}

(¹ International Vaccine Institute, SNU Research Park, Seoul, Republic of Korea; ² Bandim Health Project, Bissau, Guinea-Bissau; ³ Research Center for Vitamins and Vaccines, Copenhagen, Denmark; ⁴ Kwame Nkrumah University of Science and Technology, Kumasi, Ghana; ⁵ Kumasi Centre for Collaborative Research in Tropical Medicine, Kwame Nkrumah University of Science and Technology (KNUST), Kumasi, Ghana; ⁶ Faculty of Medicine, University of Gezira, Wad Medani, Sudan; ⁷ Johns Hopkins Bloomberg School of Public Health, Baltimore, Maryland, USA; ⁸ Armauer Hansen Research Institute, Jimma Road, ALERT Campus, Addis Ababa, Ethiopia; ⁹ Oxford University Clinical Research Unit, Ho Chi Minh City, Vietnam; ¹⁰ Department of Medicine, University of Cambridge, Cambridge, UK; ¹¹ Kilimanjaro Christian Medical Centre, Moshi, Tanzania; ¹² Division of Infectious Diseases and International Health, Duke University Medical Center, Durham, North Carolina, USA; ¹³ Centers for Disease Control and Prevention, KEMRI Complex, Nairobi, Kenya; ¹⁴ Global Health Institute, Emory University, Atlanta, Georgia, USA; ¹⁵ Duke Global Health Institute, Duke University, Durham, NC, USA; ¹⁶ Centre for International Health, University of Otago, Dunedin, New Zealand; ¹⁷ Bernhard Nocht Institute for Tropical Medicine, Hamburg, Germany; ¹⁸ German Center for Infection Research, and Hamburg-Borstel-Lubeck, Germany; ¹⁹ Faculty of Science, University of Hafr Al Batin, Saudi Arabia; ²⁰ Department of Clinical Sciences, Institute of Tropical Medicine, Antwerp, Belgium; ²¹ Schiphra Hospital, Ouagadougou, Burkina Faso; ²² Institut National de Recherche Biomédicale, Kinshasa, Democratic Republic of the Congo; ²³ National Institute for Communicable Diseases, Johannesburg, South Africa; ²⁴ Faculty of Health Sciences, University of the Witwatersrand, Johannesburg, South Africa; ²⁵ University of Ibadan, Ibadan, Nigeria; ²⁶ Global and Tropical Health Division, Menzies School of Health Research, Charles Darwin University, Australia; ²⁷ Institute of Tropical Medicine, Eberhard-Karls University Tübingen, Tübingen,

Germany; ²⁸ Duy Tan University, Da Nang, Vietnam; ²⁹ National Center for Emerging and Zoonotic Infectious Diseases, Centers for Disease Control and Prevention, Atlanta, Georgia, USA; ³⁰ Institute Pasteur de Dakar, Dakar, Senegal; ³¹ Kenya Medical Research Institute, Nairobi, Kenya; ³² University of Antananarivo, Institute for Microbiology, Antananarivo, Madagascar; ³³ Institut Supérieur des Sciences de la Population, University of Ouagadougou, Ouagadougou, Burkina Faso; ³⁴ Institute of Medical Microbiology, University of Cologne, Cologne, Germany; ³⁵ Université Cheikh Anta Diop de Dakar, Dakar, Senegal; ³⁶ Department of Medicine, University of Maryland School of Medicine, Baltimore, Maryland, USA; ³⁷ International Centre for Diarrheal Disease Research, Bangladesh, Dhaka, Bangladesh; ³⁸ University of California, Fielding School of Public Health, Los Angeles, California, USA; ³⁹ Korea University School of Medicine, Seoul, Korea; ⁴⁰ PATH, Washington DC, USA)

09.10-09.30

'Identification of mutations in *Salmonella* Typhi vaccine strain Ty21a that are responsible for an acid sensitive phenotype'

Madushini Dharmasena, Samantha Johnson and Scott Stibitz
(US FDA-Center for Biologics Evaluation and Research, Silver Spring, Maryland, USA)

09.30-09.50

'Development and characterization of *Salmonella enterica* serovar typhi Ty21a vaccine platform: the promise and insight for vaccines against shigellosis, ETEC diarrhea, typhoid fever, and non-typhoid salmonellosis'

Yun Wu¹, Tint Tint Wai¹, Jonathan M. Jackson¹, Minglin Li¹, Sumana Chakravarty², Eric R. James², Henry Huang², Victoria Laney², Weiping Zhang³, David Sack⁴, Stephen L. Hoffman^{1,2} and B. Kim Lee Sim¹
(¹ Protein Potential, LLC and ² Sanaia, Inc., Rockville, Maryland, USA; ³ Kansas State University, Manhattan, Kansas; ⁴ Johns Hopkins Bloomberg School of Public Health, Baltimore Maryland, USA)

09.50-10.10

'Assessment of the efficacy of a Vi-tetanus toxoid conjugate vaccine using a controlled human infection model of *Salmonella typhi*'

Celina Jin¹, James Meiring¹, Malick M. Gibani¹, Maria Moore¹, Helene B. Juel¹, Elizabeth Jones¹, Anna Nebykova¹, Victoria Harris², Simon Kerridge¹, Ly-Mee Yu², Brian Angus³ and Andrew J. Pollard¹
(¹ Oxford Vaccine Group, Department of Paediatrics, University of Oxford and the NIHR Oxford Biomedical Research Centre, Oxford, UK; ² Nuffield Department of Primary Care Health Sciences, University of Oxford, Oxford, UK; ³ Nuffield Department of Clinical Medicine, University of Oxford, Oxford, UK)

10.10-10.30

'A phase 1, randomized, double-blind, ascending-dose trial to assess the safety and immunogenicity of Typhax, a typhoid fever protein capsular matrix vaccine, in healthy adult subjects'

Kevin P. Killeen, Thomas J. Griffin IV, Ann Thanawastien, Anthony Helstosky and Robert T. Cartee
(Matrivax Research & Development Corporation, Boston, Massachusetts, USA)

10.30-10.45

'Incidence of *salmonella* bacteremia among young children in Sub-Saharan Africa: MAL055 RTS,S/AS01 *Salmonella* ancillary study'

Calman A. MacLennan¹, Ryan Wiegand², Nelli Westercamp², Simon Kariuki³ and the Clinical Trials Partnership Committee Investigators
(¹ Jenner Institute, Nuffield Department of Medicine, University of Oxford, UK; ² Division of Parasitic Diseases and Malaria, Centers for Disease Control and Prevention, Atlanta, Georgia, USA; ³ Kenya Medical Research Institute, Kisumu, Kenya)

10.45-11.00

Coffee Break & Poster Session B

**SESSION 10:
CHOLERA VACCINES**

Moderator: Martin Mengel²

(Agence de Médecine Préventive, Paris, France)

11.00-11.20

'Cholera vaccine use in endemic settings to prevent repeated outbreaks?'

David Sack

(Johns Hopkins Bloomberg School of Public Health, Baltimore, MD USA)

11.20-11.40

'Who is at risk of cholera in Africa? Quantifying potential vaccine demand and impact at policy-relevant spatial levels'

Sean M. Moore^{1,2}, Andrew S. Azman³, Heather S. McKay³ and Justin Lessler³

(¹ Department of Biological Sciences, University of Notre Dame, Notre Dame, Indiana, USA; ² Eck Institute of Global Health, University of Notre Dame, Notre Dame, Indiana, USA; ³ Department of Epidemiology, Johns Hopkins Bloomberg School of Public Health, Baltimore, Maryland, USA)

11.40-12.00

'Cross-sectional serology as an epidemiologic tool for measuring the impact of cholera control programs'

Andrew S. Azman¹, Francisco J. Luquero^{1,2}, Justin Lessler¹, Ashraf Islam Khan³, Taufiqur Rahman Bhuiyan³, Fahima Chowdhury³, Alamgir Kabir³,

Stephen B. Calderwood^{4,5}, Edward T. Ryan^{4,5,6}, Firdausi Qadri³ and Daniel Leung⁷

(¹ Johns Hopkins Bloomberg School of Public Health, Baltimore, Maryland, USA; ² Epicentre, ³ icddr, Dhaka, Bangladesh; ⁴ Massachusetts General Hospital, Boston, Massachusetts, USA; ⁵ Harvard Medical School, ⁶ Harvard School of Public Health, Boston, Massachusetts, USA; ⁷ University of Utah School of Medicine, Utah, USA)

12.00-12.20

'Development of oral cholera & LT-ETEC vaccine tablets containing single strain Hikojima and low cost recombinant cholera toxin B'

Tarun Sharma¹, Neeraj Joshi¹, Vibhu Kanchan¹, Deepa Sikriwal¹, Ajit Pal Singh¹,

Khalid Ali Syed¹, Stefan Karlsson², Michael Lebens², Manuela Terrinoni²,

Madeleine Löfstrand², Annelie Ekman², Jan Holmgren² and Davinder Gill¹

(¹ MSD Wellcome Trust Hilleman Laboratories Pvt. Ltd., New Delhi, India;

² Gotovax, University of Gothenburg, Gothenburg, Sweden)

12.20-12.40

'Study to evaluate safety, tolerability and immunogenicity of two formulations of novel inactivated (Hikojima serotype) oral cholera vaccine, Hillcho™'

Fahima Chowdhury¹, Syed Khalid Ali³, Ajit Pal Singh³, Afroza Akther¹,

Taufiqur Rahman¹, Vibhu Kanchan³, Tarun Sharm³, UG Michael Lebens²,

Jan Holmgren², Davinder Gill³, John D. Clemens¹ and Firdausi Qadri¹

(¹ icddr, Dhaka, Bangladesh; ² University of Gothenburg, Gothenburg, Sweden;

³ MSD Wellcome Trust Hilleman Laboratories, New Delhi, India)

12.40-13.20

Lunch Break & Poster Session B

**SESSION 10:
CHOLERA VACCINES – CONTINUED**

Moderator: Kevin Killeen

(Matrivax Research & Development Corporation, Boston, Massachusetts, USA)

13.20-13.40

'Long term immune responses to bivalent oral cholera vaccine in Haitian adults'

B. Falkard¹, R.C. Charles^{1,2}, L. Mayo-Smith¹, W.R. Matias^{3,4}, J.E. Teng⁵, Xu Peng⁶,

Pavol Kováč⁶, E.T. Ryan^{1,2}, M.F. Franke³, L.C. Ivers^{3,4,5} and J.B. Harris^{1,7}

(¹ Division of Infectious Diseases, Massachusetts General Hospital, Boston,

Massachusetts, USA; ² Harvard Medical School, Boston, Massachusetts, USA;

³ Department of Global Health & Social Medicine, Harvard Medical School, Boston, Massachusetts, USA; ⁴ Partners in Health, Boston, Massachusetts, USA; ⁵ Division of Global Health Equity, Brigham & Women's Hospital, Boston, Massachusetts, USA; ⁶ NIDDK, LBC, National Institutes of Health, Bethesda, Maryland, USA;

⁷ Department of Pediatrics, Harvard Medical School, Boston, Massachusetts, USA)

13.40-14.00

'Re-engineering the cholera pathogen yields a probiotic-like agent that rapidly protects against cholera'

Matthew Kaden Waldor

(Brigham & Womens Hospital, Boston, Massachusetts, USA)

14.00-14.20

'Update on OCV requests and deployments in 2016/2017'

Lorenzo Pezzoli

(WHO Cholera Team / Focal Point for Vaccination, Geneva, Switzerland)

**SESSION 11:
CLOSTRIDIUM VACCINES**

Moderator: Kevin Killeen

(Matrivax Research & Development Corporation, Boston, Massachusetts, USA)

14.20-14.40

'Clostridium difficile Capsular Polysaccharide Vaccine Candidate'

Mario A. Monteiro¹, Silvia Borrelli¹, Laurent Bouillaut², Thomas J. Griffin IV² and Kevin P. Killeen²

(¹ University of Guelph, Guelph, Ontario, Canada; ² Matrivax Research & Development Corporation, Boston, MA, USA)

14.40-15.00

'Development of a bivalent vaccine against Clostridium perfringens enterotoxin and enterohemorrhagic Escherichia coli Vero toxin 2'

Koji Hosomi¹, Atsushi Hinenoya², Hidehiko Suzuki¹, Takahiro Nagatake¹, Tomomi Nishino¹, Soichiro Hirata^{1,5}, Shinji Yamasaki² and Jun Kunisawa^{1,3,5}

(¹ Laboratory of Vaccine Materials, National Institutes of Biomedical Innovation, Health and Nutrition (NIBIOHN); ² Division of Veterinary Science, Graduate School of Life and Environmental Sciences, Osaka Prefecture University, Osaka, Japan;

³ Division of Mucosal Immunology and International Research and Development Center for Mucosal Vaccine, Institute of Medical Science, The University of Tokyo, Tokyo, Japan; ⁴ Graduate School of Pharmaceutical Sciences, Graduate School of Medicine, and Graduate School of Dentistry, Osaka University, Osaka, Japan; ⁵ Graduate School of Medicine, Kobe, Japan)

15.00-15.20

'Development of a Clostridium difficile PSII-toxoid vaccine candidate'

Kevin P. Killeen, Laurent Bouillaut, Ann Thanawastien and Thomas J. Griffin IV

(Matrivax Research & Development Corporation, Boston, MA, USA)

15.20-15.40

'Clostridium difficile-associated diarrhea and Helicobacter pylori infection: A hospital-based case-control study'

Khitam Muhsen¹, Wasef Na'amnih¹, Amos Adler^{1,2}, Yehuda Carmeli^{1,2} and Dani Cohen¹

(¹ Department of Epidemiology and Preventive Medicine, School of Public Health, Sackler Faculty of Medicine, Tel Aviv University, Tel Aviv, Israel; ² Department of Epidemiology and Preventive Medicine, Clinical Microbiology Laboratory, Tel-Aviv Sourasky Medical Center, Tel Aviv, Israel)

15.40-16.00

Tea Break & Poster Session B Breakdown

**SESSION 12:
FRONTIERS OF VACCINOLOGY**

Moderator: Richard Walker
(PATH, Washington DC, USA)

16.00-16.20

'Activated T follicular helper-like cells in blood after oral ETEC vaccination can be used as correlates for vaccine specific mucosal B cell memory'

Ana Cárdeno, Maria K. Magnusson, Marianne Quiding-Jarbrink and Anna Lundgren
(University of Gothenburg Vaccine Research Institute (GUVAX), Dept. of Microbiology and Immunology, Sahlgrenska Academy, Sweden)

16.20-16.40

'Adjuvant selection regulates gut migration and phenotypic diversity of antigen-specific CD4⁺ T cells following parenteral immunization'

Daniel R. Frederick, Leila M. Sabbagh, Lucy C. Freytag, John D. Clements and James B. McLachlan
(Department of Microbiology and Immunology, Tulane University School of Medicine, New Orleans, Louisiana, USA)

16.40-17.00

'A campylobacter protein of the flagellin protein family as a potential vaccine antigen in broilers'

D. Dory¹, M. Meunier^{1,2}, M. Guyard², E. Vigouroux¹, T. Poezevara², V. Beven¹, S. Quesne², M. Amelot³ and M. Chemaly²
(¹ GVB – Viral Genetics and Biosafety Unit, French Agency for Food, Environmental and Occupational Health & Safety (ANSES), Ploufragan, France; ² HQPAP – Unit of Hygiene and Quality of Poultry and Pork Products, French Agency for Food, Environmental and Occupational Health & Safety (ANSES), Ploufragan, France; ³ SELEAC – Avian Breeding and Experimental Department, French Agency for Food, Environmental and Occupational Health & Safety (ANSES), Ploufragan, France)

17.00-17.20

CLOSING PRESENTATION:

'A comprehensive re-analysis of the etiology of community diarrhea in the MAL-ED study using quantitative PCR'

Eric R. Houpt¹, James A. Platts-Mills¹, Jie Liu¹, Jean Gratz^{1,2}, Darwin Operario¹, Elizabeth T. Rogawski³, Timothy L. McMurry³, Rosemary Nshama², Athanasia Maro², Amidou Samie⁴, Nicola Page⁴, Ira Praharaj⁵, Gagandeep Kang⁵, Carl Mason⁶, Ladaporn Bodhidatta⁶, Paphavee Lertsehtakarn⁶, Sadia Shakoor⁷, Furqan Kabir⁷, Shahida Qureshi⁷, Najeeha Iqbal⁷, Rashidul Haque⁸, Mami Taniuchi^{1,8}, Shaila S. Khan⁸, Margaret Kosek^{9,10}, Mery S. Salas¹⁰, Alexandre Havt¹¹, Irene T. A. Maciel, Jose P. G. Leite¹¹ and Aldo A. Lima¹¹
(¹ Division of Infectious Diseases and International Health, University of Virginia, Charlottesville, Virginia, USA; ² Haydom Lutheran Hospital, Haydom, Tanzania; ³ Department of Public Health Sciences, University of Virginia, Charlottesville, Virginia, USA; ⁴ University of Venda, Thohoyandou, South Africa; ⁵ Christian Medical College, Vellore, India; ⁶ Armed Forces Research Institute of Medical Sciences, Bangkok, Thailand; ⁷ Aga Khan University, Karachi, Pakistan; ⁸ International Centre for Diarrhoeal Disease Research, Dhaka, Bangladesh; ⁹ Bloomberg School of Public Health, Johns Hopkins University, Baltimore, Maryland, USA; ¹⁰ Asociación Benéfica PRISMA, Iquitos, Peru; ¹¹ Clinical Research Unit and Institute of Biomedicine, Federal University of Ceara, Fortaleza, Brazil)

17.15-17.25

VED 2017 Overview & Closing Remarks

Richard Walker
(PATH, Washington DC, USA)

* This final programme is correct at the time of publication. However the organizers reserve the right to make any alterations that may be required in the interests and integrity of the conference programme.

The VED 2017 Scientific Advisory Panel and the organizers would like to acknowledge the support of the following sponsors:



Poster A101

'Toxoid fusion of enterotoxigenic *Escherichia coli* (ETEC) heat-stable toxin (STa) and heat-labile toxin (LT), 3xSTa_{N12S}-dmLT, induces specific and protective anti-STa antibodies'

Qiangde Duan¹, Rahul Nandre¹, Xiaosai Ruan¹, Weiping Zhang¹
and the STa Toxoid Consortium Group

(¹ Department of Diagnostic Medicine/Pathobiology, Kansas State University College of Veterinary Medicine, Manhattan, Kansas, USA)

Poster A102

'Reviewing new evidence on the health economics of rotavirus vaccination'

Frederic Debellut

(PATH, Geneva, Switzerland)

Poster A103

'Rotavirus vaccination may reduce acute gastroenteritis rates across all age groups in the UK'

Margarita Riera-Montes, Tom Cattaert, Germano Ferreira and Thomas Verstraeten
(P95 Epidemiology and Pharmacovigilance, Leuven, Belgium)

Poster A104

'Immunogenicity of Type 2 monovalent oral and inactivated poliovirus vaccines – Bangladesh, 2016'

K. Zaman¹, Concepción F. Estivariz², Michelle Morales², Mohammad Yunus¹, Cynthia Snider², Howard E. Gary Jr.², William C. Weldon², Mark S. Oberste², Steven G. Wassilak², Mark A. Pallansch² and Abhijeet Anand²

(¹ International Centre for Diarrhoeal Disease Research, Bangladesh (icddr), Dhaka, Bangladesh; ² Centers for Disease Control and Prevention, Atlanta, Georgia, USA)

Poster A105

'Bivalent oral cholera vaccine in participants aged 1 year and older in the Dominican Republic: A phase III, single-arm, safety and immunogenicity trial'

Lina Cordero De Los Santos¹, Jesús Feris-Iglesias², Naveena Aloysis³, Venkata Jayanth Midde³, Badri Narayan Patnaik³, Yaël Thollot⁴, Anvar Rasuli⁴ and Eric Dessauzers⁴

(¹ Caimed Dominicana S.A.S., Investigación en Salud, Santo Domingo, Dominican Republic; ² Hospital Infantil Dr. Robert Reid Cabral, Centro de los Héroes, Santo Domingo, Dominican Republic; ³ Shantha Biotechnics Private Limited (A Sanofi Company), Vasantha Chambers, Basheerbagh, Hyderabad, Telangana, India; ⁴ Sanofi Pasteur, Lyon Cedex, France)

Poster A106

'Genomic and phenotypic characterization of typhoid vaccine strain Ty21a reveals insights impacting future vaccine development and optimization'

Yun Wu¹, Tint Tint Wai¹, Jonathan M. Jackson¹, Stephen L. Hoffman^{1,2} and B. Kim Lee Sim¹

(Protein Potential, LLC¹ and Sanaria, Inc.², Rockville, Maryland, USA)

Poster A107

'Fusion protein of C-terminal fragment of *Clostridium perfringens* enterotoxin and cholera toxin B subunit acts as a bivalent food poisoning vaccine'

Hidehiko Suzuki¹, Koji Hosomi¹, Ayaka Nasu¹, Masuo Kondoh² and Jun Kunisawa^{1,3,5}

(¹ Laboratory of Vaccine Materials and Laboratory of Gut Environment System, National Institutes of Biomedical Innovation, Health and Nutrition (NIBIOHN), Japan; ² Laboratory of Bio-Functional Molecular Chemistry, Graduate School of Pharmaceutical Sciences, Osaka University, Osaka, Japan; ³ Division of Mucosal Immunology and International Research and Development Center for Mucosal Vaccine, Institute of Medical Science, The University of Tokyo, Tokyo, Japan; ⁴ Graduate School of Pharmaceutical Sciences, Graduate School of Medicine, and Graduate School of Dentistry, Osaka University, Osaka, Japan; ⁵ Graduate School of Medicine, Kobe University, Kobe, Japan)

Poster A108

'Evaluation of a 4-valent GMMMA-based *Shigella* vaccine for overall coverage and impact based on serologic cross-reactivity among *S. flexneri* serotypes'

Francesco Citiulo, Francesca Necchi, Francesca Mancini, Maria Grazia Aruta, Simona Rondini, Allan Saul and Laura Bartle Martin

(GSK Vaccines Institute for Global Health (GVGH), Siena, Italy)

(POSTER WITHDRAWN)

Poster A109

'Characterization of clinical *Shigella boydii* as multicomponent vaccine candidate'

Paula Taquita Serra, Paloma Inessa de Souza Dantas, Tainá Raiol Alencar, Milton Ozório de Moraes, Sabrina Epiphanyo, Paulo Afonso Nogueira and Patricia Puccinelli Orlandi

(Fundação Oswaldo Cruz – ILM/AM, Adrianópolis, Manaus/AM – Brazil)

Poster A110

'Preformulation studies with the *Escherichia coli* double mutant heat-labile toxin adjuvant for use in an oral vaccine'

Jessica A. White, Candace Haghighi, Johanna Brunner, Marcus Estrada, Manjari Lal and Dexiang Chen (PATH, Seattle, Washington, USA)

Poster A111

'Incidence, transmission and burden of acute viral gastroenteritis: A household study in The Netherlands'

P. Bruijning-Verhagen¹, F.A. Quee¹, R. Schuurman² and M.L.A. de Hoog¹

(¹ Julius Centre for Health Sciences, Infectious Diseases Epidemiology, University Medical Centre Utrecht, The Netherlands; ² Department of Medical Microbiology, University Medical Centre Utrecht, Utrecht, The Netherlands)

Poster A112

'Norovirus-associated hospital discharge rates in Europe, 2004-2015'

T. Verstraeten¹, E. Negro Calduch¹, T. Cattaert¹ and J. Weil²

(¹ P95 Pharmacovigilance and Epidemiology Services, Leuven, Belgium; ² Takeda Vaccines, Bozeman, Illinois, USA)

Poster A113

'Quantifying the double burden of *Cryptosporidium* infection: Morbidity, mortality, and the long-term consequences'

Ibrahim Khalil, Christopher Troeger, Puja Rao, Manny Garcia, Shijun Cao, Alexandria Brown, Mohammad Forouzanfar, Robert Reiner, Simon Hay and Ali H. Mokdad

(Institute for Health Metrics and Evaluation, University of Washington, Seattle, Washington, USA)

Poster A114

'The changing epidemiology of rotavirus diarrhea: Results from the Global Burden of Disease study 2016'

Christopher Troeger, Ibrahim Khalil, Puja Rao, Manny Garcia, Shijun Cao, Simon Hay and Robert Reiner

(Institute for Health Metrics and Evaluation, University of Washington, Seattle, Washington, USA)

Poster A115

'The global burden of *Shigella* and Enterotoxigenic *E. coli*: Results from the Global Burden of Disease study 2016'

Ibrahim Khalil, Christopher Troeger, Puja Rao, Manny Garcia, Shijun Cao, Ali H. Mokdad, Simon Hay and Robert Reiner

(Institute for Health Metrics and Evaluation, University of Washington, Seattle, Washington, USA)

Poster A116

'Development of oral cholera & LT-ETEC vaccine tablets containing single strain Hikojima and low cost recombinant cholera toxin B'

Tarun Sharma¹, Neeraj Joshi¹, Vibhu Kanchan¹, Deepa Sikriwal¹, Ajit Pal Singh¹, Khalid Ali Syed¹, Stefan Karlsson², Michael Lebens², Manuela Terrinoni², Madeleine Löfstrand², Annelie Ekman², Jan Holmgren² and Davinder Gill¹

(¹ MSD Wellcome Trust Hilleman Laboratories Pvt. Ltd. New Delhi, India; ² Gotovax, University of Gothenburg, Gothenburg, Sweden)

(POSTER WITHDRAWN)

Poster A117

'The molecular epidemiology of human astroviruses from selected sites in South Africa from 2009 to 2014'Sandrama Nandan^{1,2} and Nicola A Page^{1,2}*(¹ Center for Enteric Diseases – Virology, National Institute for Communicable Diseases, National Health Laboratory Services, Johannesburg, South Africa; ² Department of Medical Virology, Faculty of Health Sciences, University of Pretoria, Pretoria, South Africa)*

Poster A118

'Inactivated derivatives of the bi-valent *Shigella*-ETEC vaccine candidate CVD 1208S-122'

Tao Wu, Jonathan Moon and Eileen M. Barry

(Center for Vaccine Development, University of Maryland School of Medicine, Baltimore, Maryland, USA)

Poster A119

'Predicting the epidemiological impact of changes to current rotavirus vaccine coverage in the United States'

Molly K. Steele, Andreas Handel, Virginia E. Pitzer, Beryl L. Guterman, Umesh Parashar and Benjamin A. Lopman

(Centers for Disease Control and Prevention, Atlanta, Georgia, USA)

Poster A120

'Key factors to understand and improve live oral rotavirus vaccine performance in high-disease burden settings: a review of the evidence'

Daniel E. Velasquez, Umesh Parashar and Baoming Jiang

(Division of Viral Diseases, Centers for Disease Control and Prevention, Atlanta, Georgia, USA)

Poster A121

'All-cause mortality among hospitalized patients in England attributable to acute gastro-enteritis not caused by *Clostridium difficile*'

Thomas Verstraeten, Maria Alexandridou, Tom Cattaert and Germano Ferreira

(P95 Pharmacovigilance and Epidemiology Services, Leuven, Belgium)

Poster A122

'Stabilization of the recombinant Ty21a-vectored vaccine, TyOraSs, against Shigellosis by foam drying'Victoria Laney¹, Henry Huang¹, Yun Wu², Jonathan Jackson², Minglin Li², Lixin Gao², Rui Xu², Sumana Chakravarty¹, B. Kim Lee Sim² and Eric R. James¹*(¹ Sanaria Inc, Rockville, Maryland, USA; ² Protein Potential LLC, Rockville, Maryland, USA)*

Poster A123

'The impact of universal rotavirus immunization in Israel 2011-2016'

Khitam Muhsen and Dani Cohen

(Department of Epidemiology and Preventive Medicine, School of Public Health, Sackler Faculty of Medicine, Tel Aviv University, Tel Aviv, Israel)

Poster A124

'Inactivated *Shigella* as effective vaccines and vaccine vectors'

K. Navarrete, I. Albino-Flores, E.S. Stibitz and M. Osorio

(Division of Bacterial, Parasitic and Allergenic Products, Center for Biologics Evaluation and Research, US Food and Drug Administration, Silver Spring, Maryland, USA)

Poster A125

'Campylobacteriosis outcomes assessed by baseline immune status in controlled human *Campylobacter jejuni* infection in humans'David Tribble¹, Elizabeth Zell², William Bradley^{1,3}, Ashley Alcalá⁴, Jamie Fraser^{1,3}, Beth Kirkpatrick⁵, Shahida Baqar⁶, Mark Riddle^{1,4}, Renee Laird^{2,4}, Patricia Guerry⁴, Frederic Poly⁴ and Chad Porter⁴*(¹ Infectious Disease Clinical Research Program, Department of Preventive Medicine and Biostatistics, Uniformed Services University of the Health Sciences, Bethesda, Maryland, USA; ² Stat-Epi Associates Inc., Ponte Vedra Beach, Florida, USA; ³ The Henry M. Jackson Foundation for the Advancement of Military Medicine, Inc., Bethesda, Maryland, USA; ⁴ Enteric Diseases Department, Naval Medical Research Center, Silver Spring, Maryland, USA; ⁵ Dept of Medicine, University of Vermont, Burlington, Vermont, USA; ⁶ Division of Microbiology and Infectious Diseases, National Institute of Allergy and Infectious Diseases, Bethesda, Maryland, USA)*

Poster A126

'Hospital-based surveillance for severe rotavirus gastroenteritis among young children in Bangladesh: Defining the potential impact of a rotavirus vaccine program'Syed M. Satter¹, Paul A. Gastanaduy², Khaleda Islam³, Mahmudur Rahman³, Meerjady S. Flora³, Mustafizur Rahman¹, Stephen P. Luby⁴, Umesh D. Parashar², James D. Heffelfinger^{1,2} and Emily S. Gurley¹*(¹ Infectious Diseases Division, International Centre for Diarrhoeal Disease Research, Bangladesh, Dhaka, Bangladesh; ² Centers for Disease Control and Prevention (CDC), Atlanta, Georgia, USA; ³ Institute of Epidemiology, Disease Control and Research (IEDCR), Dhaka, Bangladesh; ⁴ Infectious Diseases and Geographic Medicine, Stanford University, Stanford, California, USA)**(POSTER WITHDRAWN)*

Poster A127

'Epidemiology of childhood intussusception in Bangladesh: A review of an active national hospital based surveillance system, 2012-2016'Syed M. Satter¹, Negar Aliabadi², Catherine Yen², Paul A. Gastañaduy², Makhdom Ahmed³, Abdullah Mamun⁴, Khaleda Islam⁵, Meerjady S. Flora⁵, Mahmudur Rahman⁵, K. Zaman¹, Mustafizur Rahman¹, James D. Heffelfinger², Stephen P. Luby⁶, Emily S. Gurley¹ and Umesh D. Parashar²*(¹ Infectious Diseases Division, International Centre for Diarrhoeal Disease Research, Bangladesh, Dhaka, Bangladesh; ² Centers for Disease Control and Prevention (CDC), Atlanta, Georgia, USA; ³ The University of Texas MD Anderson Cancer Center, Houston, Texas, USA; ⁴ UBC and Vancouver General Hospital, Vancouver, Canada; ⁵ Institute of Epidemiology, Disease Control and Research (IEDCR), Dhaka, Bangladesh; ⁶ Center for Innovation in Global Health, Stanford University, Stanford, California, USA)**(POSTER WITHDRAWN)*

Poster A128

'Adhesion of human enterotoxigenic *Escherichia coli* (ETEC) O169:H41 to porcine intestinal epithelial cells by the novel colonization factor'Yuko Omori¹, Dongming Zheng¹, Erika Ban¹, Eriko Kage-Nakadai¹,Taro Tachibana², Takayuki Wada³, Yukiko Hara-Kudo⁴ and Yoshikazu Nishikawa¹
(¹ Department of Food and Human Health Sciences, Graduate School of Human Life Science; ² Department of Applied Chemistry and Bioengineering, Graduate School of Engineering, Osaka City University, Osaka Japan; ³ Department of International Health, Institute of Tropical Medicine, Nagasaki University, Nagasaki, Japan; ⁴ Division of Microbiology, National Institute of Health Sciences, Tokyo, Japan)

Poster A129

'LT-derived adjuvants (dmLT, LTA1) induce differentiation and altered metabolism in human antigen-presenting cells'

Eduardo Valli, Kevin J. Zwezdaryk, John D. Clements and Elizabeth B. Norton

(Department of Microbiology and Immunology, Tulane University School of Medicine, New Orleans, Louisiana, USA)

Poster A130

'Rough and non-invasive *Shigella* vaccine strains generated by different gene deletions all elicit serotype independent protection in the mouse lung shigellosis model'

Shushan Harutyunyan, Petra Girardi, Irene Neuhauser, Eszter Nagy and Tamás Henics

(EveliQure Biotechnologies GmbH, Vienna, Austria)

Poster A131

'Development, characterization and immunogenicity of CS5 and CS7 subunit vaccine candidates'

Milton Maciel Jr., Steven Poole, Yang Liu, Glomil Corbin, Aaron Kim, Annette McVeigh and Michael G. Prouty

(Naval Medical Research Center, Silver Spring, Maryland, USA)
(POSTER WITHDRAWN)

Poster A132

'Yeast ghosts as oral vaccines against enterotoxigenic *E. coli* in a piglet model'

Bert Devriendt

(Laboratory of Immunology, Faculty of Veterinary Medicine, Ghent University, Ghent, Belgium)

Poster A133

'Antigen specific HLA-DR+ antibody secreting cell (DR+ASC) responses in whole blood in enteric infections using an ELISPOT technique'

Taufiqur Rahman Bhuiyan¹, Mohammad Rubel Hoq¹, Naoshin Sharmin Nishat¹, Deena Al Mahbuba¹, Rasheduzzaman Rashed¹, Kamrul Islam¹, Lazina Hossain¹, Jason B. Harris^{2,4}, Edward T. Ryan², Stephen B. Calderwood², Ann-Mari Svennerholm³ and Firdausi Qadri¹

(¹ Infectious Diseases Division, International Centre for Diarrhoeal Disease Research, Bangladesh, Dhaka, Bangladesh; ² Division of Infectious Diseases, Massachusetts General Hospital, Boston, Massachusetts, USA; ³ Department of Microbiology and Immunology, University of Gothenburg, Sweden; ⁴ Division of Pediatric Infectious Diseases, Massachusetts General Hospital, Boston, Massachusetts, USA)

Poster A134

'High cell density fermentation of *Salmonella* sp to develop an oral enteric fever vaccine'

L.I. Leal, P.B. Sánchez, B. Trujillo, J. Peralta, J.L. Araujo, D.S. Esparza, F.E. Odreman, C. Ortiz, M.L. Muciño, R. Salazar and N.O. Pérez
(Research and Development Unit, Probiomed S.A. de C.V., México)

Poster A135

'Structural basis for the *Acinetobacter baumannii* biofilm formation'

Natalia Pakharukova, Minna Tuittila, Sari Paavilainen, Olena Parilova, Henri Malmi and Anton V. Zavalov
(University of Turku, Turku, Finland; Joint Biotechnology Laboratory, Arcanum, Turku, Finland)

Poster A136

'High throughput sequencing resolved co-infections of rotavirus groups A, C and H in pigs with diarrhea in the United States'

Jennifer J.A. Hull¹, Anna M. Montmayeur¹, Douglas Marthaler², Stephanie Rosow³, Daniel E. Velasquez¹, Sung-Sil Moon¹, Laura Cristal Magaña¹, Naga Betrapally¹, Terry Fei Fan Ng¹ and Baoming Jiang¹

(¹ Division of Viral Diseases, National Center for Immunization and Respiratory Diseases, Centers for Disease Control and Prevention (CDC), Atlanta, Georgia, USA; ² Diagnostic Medicine and Pathobiology, Kansas State University, Manhattan, Kansas, USA; ³ Department of Veterinary Population Medicine, University of Minnesota, St. Paul, Minnesota, USA)

Poster A137

'Secretory IgA: A new vaccine vector for vaccination against enteric diseases'

R. Gayet, G. Bioley, N. Rochereau, S. Paul and B. Corthésy
(GIMAP, Faculte de Medicine, France)

Poster A138

'Detailed characterization of shigellosis in the controlled human infection model'

Chad K. Porter¹, Amanda Lynen¹, Mark S. Riddle¹, Kawsar Talaat², David Sack², Ramiro L. Gutierrez¹, Robin McKenzie², Barbara DeNearing², Brittany Feijoo², Robert Kaminski³, David Taylor⁴, Beth Kirkpatrick⁵ and A. Louis Bourgeois^{2,4}
(¹ Naval Medical Research Center, Silver Spring, Maryland, USA; ² Johns Hopkins University, Baltimore, Maryland, USA; ³ Walter Reed Army Institute of Research, Silver Spring, Maryland, USA; ⁴ PATH, Washington, DC, USA; ⁵ University of Vermont School of Medicine, Burlington, Vermont, USA)

Poster B101

'PIGYVAX: Making a yeast-based candidate vaccine against porcine epidemic diarrhea virus (PEDV)'

Phanramphoei N. Frantz^{1,2}, Claude Ruffie², Anan Jongkaewwattana¹ and Frédéric Tangy²

(¹ National Center for Genetic Engineering and Biotechnology (BIOTEC); ² Thailand and Institut Pasteur, France)

Poster B102

'Developing a controlled human infection model for testing heat-stable toxoid-based vaccine candidates for enterotoxigenic *Escherichia coli* diarrhea'

S. Sakkestad¹, K. Lillebø², H. Steinsland¹, S. Skrede^{1,2}, A.B. Guttormsen^{1,2}, H. Søyland², M. Sævik², A.R. Heien², S. Sørnes¹, M. Tellevik², N. Langeland¹, E. Barry³, H. Sommerfelt^{1,4} and K. Hanevik¹

(¹ University of Bergen, ² Haukeland University Hospital, ³ University of Maryland School of Medicine, ⁴ Norwegian Institute of Public Health)

Poster B103

'Systemic LPS-specific IgG responses to *Shigella* bioconjugate vaccine, correlate with protection against infection with *Shigella flexneri* 2a in a human challenge model'

Anita M. Dreyer¹, Kristen A. Clarkson², Hailey Weerts², Cristina Alaimo¹, Kawsar R. Talaat³, A. Lou Bourgeois³, Chad K. Porter⁴, Subhra Chakraborty³, Jessica Brubaker³, Daniel Elwood³, Rahel Frölich¹, Barbara DeNearing³, Brittany Feijoo³, Jane Halpern³, David Sack³, Mark S. Riddle⁴, Veronica Gambillara Fonck¹, Robert W. Kaminski² and Patricia Martin¹

(¹ LimmaTech Biologics, Schlieren, Switzerland; ² Walter Reed Army Institute of Research, Silver Spring, Maryland, USA; ³ Johns Hopkins School of Public Health, Baltimore, Maryland, USA; ⁴ Naval Medical Research Center, Silver Spring, Maryland, USA)

Poster B104

'A phase 2a, randomized, controlled, safety and immunogenicity study to evaluate the 1790GAHB vaccine against *Shigella sonnei* administered by intramuscular route to adults from a shigellosis-endemic country'

Augustin G.W. Ndiaye¹, Christina W. Obiero², Antonella S. Scirè¹, Bonface M. Kaunyangi², Elisa Marchetti¹, Ann M. Gone², Lena D. Schütte³, Daniele Riccucci¹, Joachim Auerbach¹, Allan Saul¹, Laura B. Martin¹, Philip Bejon⁵, Patricia Njuguna^{2,4} and Audino Podda¹

(¹ GSK Vaccines Institute for Global Health, Siena, Italy; ² KEMRI-Wellcome Trust Research Programme, Kilifi, Kenya; ³ GSK Vaccines Clinical Laboratory Sciences, Marburg, Germany; ⁴ Pwani University, Kilifi, Kenya; ⁵ Clinical Tropical Medicine, Nuffield Department of Medicine, University of Oxford, United Kingdom)

Poster B105

'Defining inflammatory and mucosal antibody responses after *Campylobacter jejuni* CG8421 controlled human infection'

Christina L. Garipey¹, Yelizaveta Mochalova¹, Frederic Poly¹, Chad K. Porter¹, Joanna E. Rimmer^{1,3,4}, Clayton Harro², Kawsar R. Talaat², Patricia Guerry¹ and Renee M. Laird¹

(¹ Enteric Diseases Department, Naval Medical Research Center, ² Department of International Health, Johns Hopkins Bloomberg School of Public Health, Baltimore, Maryland, USA; ³ School of Immunity and Infection, University of Birmingham, Birmingham, United Kingdom; ⁴ Academic Department of Military Medicine, Royal Centre for Defence Medicine (Academia and Research), Medical Directorate, Joint Medical Command, ICT Centre, Birmingham Research Park, Birmingham, UK)

Poster B106

'A *Campylobacter jejuni* capsule conjugate vaccine and army liposome formulation adjuvants induce enhanced Th1 immunogenicity and bactericidal antibody responses'

Christina L. Garipey¹, Nina M. Schumack¹, Lisa A. Applebee¹, Zoltan Beck^{2,3}, Gary R. Matyas², Carl R. Alving², Patricia Guerry¹ and Renee M. Laird¹
(¹ Enteric Diseases Department, Naval Medical Research Center, ² U.S. Military HIV Research Program, Walter Reed Army Institute of Research, and ³ Henry M. Jackson Foundation for the Advancement of Military Medicine, Silver Spring, Maryland, USA)

Poster B107

'The PREVAIL Cohort: A US maternal-child longitudinal cohort to evaluate immunologic influences on asymptomatic and symptomatic norovirus infections in early life'

Daniel C. Payne¹, Jan Vinje¹, Umesh D. Parashar¹, Alexi Piasecki¹, Aron Hall¹, Rachel M. Burke¹, Monica McNeal², Jeanne Kleiman², Mary Allen Staat², Elizabeth Schlaudecker², Allison Cline², Emily DeFranco² and Ardythe L. Morrow²
(¹ US Centers for Disease Control and Prevention, Atlanta, Georgia, USA; ² Cincinnati Children's Hospital Medical Center, Cincinnati, Ohio, USA)

Poster B108

'Developing drugs to treat shigellosis as a complementary approach to vaccination'

Elena Fernández-Álvaro and Lluís Ballell-Pages
(GlaxoSmithKline, Diseases of the Developing World-Tres Cantos Medicines Development Campus, Tres Cantos, Madrid, Spain)

Poster B109

'Development of Vi-CRM197 conjugate vaccine EuTCV, the new generation typhoid vaccine, and its improved immunogenicity'

Inhwan Lee, Chankyu Lee, Seukkeun Choi and Yeongok Baik
(R&D Center, Eubiologics, Seoul, Korea)

Poster B110

'Detail virological analysis of Rotateq(RV5) in X-SCID patient with persistent diarrhea after receiving the vaccine'

Ken Sugata¹, Hiroki Miura¹, Fumihiko Hattori¹, Masaru Ihira¹, Satoshi Komoto¹, Koki Taniguchi¹, Masafumi Yamada², Tadashi Ariga², Yuko Naga², Yusuke Tozawa² and Tetsushi Yoshikawa¹
(¹ Fujita Health University School of Medicine and ² Hokkaido University, School of Medicine, Japan)

Poster B111

'Substitutions in the RNA Polymerase are linked to the predominance of GII.2 Norovirus during the 2016/17 season'

Kentaro Tohma, Cara J. Lepore, Lauren A. Ford-Siltz and Gabriel I. Parra
(Division of Viral Products, Center for Biologics Evaluation and Research, Food and Drug Administration, USA)

Poster B112

'Parenteral immunization with the *Shigella flexneri* 2a bioconjugate vaccine induces gut-homing LPS-specific antibody secreting cells'

K.A. Clarkson¹, A.M. Dreyer², K.R. Talaat³, C. Alaimo², A.L. Bourgeois³, C.K. Porter⁴, S. Chakraborty³, J. Brubaker³, D. Elwood³, R. Frölich², B. DeNearing³, H.P. Weerts¹, B. Feijoo³, J. Halpern³, D. Sack³, M.S. Riddle⁴, V. Gambillara Fonck², P. Martin² and R.W. Kaminski¹
(¹ Walter Reed Army Institute of Research, Silver Spring, MD, USA; ² LimmaTech Biologics, Schlieren, Switzerland; ³ Johns Hopkins School of Public Health, Baltimore, Maryland, USA; ⁴ Naval Medical Research Center, Silver Spring, Maryland, USA)

Poster B113

'Increasing anti-adhesin immune responses by modifying fimbrial gene stem-loop structure in live attenuated *Shigella*/ETEC vaccine strains'

Kurt Hanevik^{1,2,3}, Chris Grassel² and Eileen M. Barry²
(¹ Department of Clinical Science, University of Bergen, Norway; ² Center for Vaccine Development, University of Maryland School of Medicine, Baltimore, Maryland, USA; ³ National Centre for Tropical Infectious Diseases, Haukeland University Hospital, Bergen, Norway)

Poster B114

'Estimated incidence of medically attended rotavirus across the age spectrum—Kaiser Permanente Northwest (KPNW), 2014 – 2016'

Rachel M. Burke, Z.M. Marsh, S.B. Salas, J. Donald, M. Schmidt, H. Groom, M.D. Bowen, E.M. Katz, U.D. Parashar and A.J. Hall
(CDC, Atlanta, Georgia, USA)

Poster B115

'Announcing a study to characterize the international epidemiology of ETEC- and *Shigella*-associated moderate-to-severe travelers' diarrhea'

Sophie Druelles¹, Michael Prouty², Nichole Giller², Mark Simons³, Michael Gregory⁴, Elizabeth Odundo⁵, Stacey Bateman⁵, Brett Swierczewski⁶, Zhi-Dong Jiang⁷ and Mark S. Riddle⁸
(¹ Sanofi Pasteur, Health Economics and Outcome Research Department, Lyon, France; ² Naval Medical Research Center, Enteric Diseases Department, Silver Spring, Maryland, USA; ³ Naval Medical Research Unit 6, Lima, Peru; ⁴ Naval Medical Research Unit 3, Cairo, Egypt; ⁵ US Army Medical Research Directorate, Kenya; ⁶ Armed Forces Institute of Medical Sciences, Bangkok, Thailand; ⁷ The University of Texas Health Science Center, Houston, Texas, USA; ⁸ Uniformed Services University of the Health Sciences, Bethesda, Maryland, USA)

Poster B116

'Development and immunological characterization of multivalent adhesin-based fusions to broaden coverage of a subunit enterotoxigenic *Escherichia coli* vaccine'

Steven Poole, Milton Maciel, Jr., Yang Liu and Michael G. Prouty
(U.S. Naval Medical Research Center, Silver Spring, Maryland, USA)
(POSTER WITHDRAWN)

Poster B117

'Both the STh and the STp variant of the heat-stable toxin of enterotoxigenic *Escherichia coli* can elicit antibodies that cross-react with guanylin and/or uroguanylin'

Yuleima Diaz¹, Morten A.G. Larsen¹, Ephrem Debebe Zegeye¹ and Pål Puntervoll^{1,2}
(¹ Centre for Applied Biotechnology, Uni Research Environment, Bergen, Norway; ² Centre for International Health, Department of Global Public Health and Primary Care, University of Bergen, Bergen, Norway)

Poster B118

'Resistance to moderate-to-severe diarrhea following experimental oral challenge with CS6+ Enterotoxigenic *E. coli* strain B7A was accompanied by increased serum and fecal antibody and ALS responses to heat-labile toxin'

Stefanie A. Trop¹, Aaron Kim¹, Glomil M. Corbin¹, Beth Ward¹, Chad K. Porter¹, Michael G. Prouty¹, Ramiro L. Gutierrez¹, Kayla Jaep¹, Chris Duplessis¹, Kawsar Talaat², Barbara DeNearing², Louis Bourgeois², Brittany Adjoonani², Jessica Brubaker² and Milton Maciel, Jr.¹
(¹ Naval Medical Research Center, Silver Spring, Maryland, USA; ² Department of International Health, Johns Hopkins Bloomberg School of Public Health, Baltimore, Maryland, USA)