



# **IPNC 2014**

## **Program Book**

**XIXth International Pathogenic Neisseria Conference**

**12-17th October 2014**

**Asheville, North Carolina, USA**



## History of the International Pathogenic Neisseria Conferences

In the 1970s a series of conferences were held dealing with issues of meningococcal epidemiology and vaccination. Some of these conferences were held in Milano, St. Paul de Vence, and Marseille. The first official IPNC was held in San Francisco, California in 1978.

### **1<sup>st</sup> International Pathogenic Neisseria Conference**

1978, San Francisco, California, USA.

Chair: G.F. Brooks

### **2<sup>nd</sup> International Pathogenic Neisseria Conference**

1980, Hemavan, Sweden.

Chairs: S. Normark and D. Danielsson

### **3<sup>rd</sup> International Pathogenic Neisseria Conference**

1982, Montreal, Canada.

Chair: I.W. DeVoe

### **4<sup>th</sup> International Pathogenic Neisseria Conference**

1984, Asilomar, California, USA.

Chair: G.K. Schoolnik

### **5<sup>th</sup> International Pathogenic Neisseria Conference**

1986, Noordwijkerhout, The Netherlands.

Chair: J.T. Poolman

### **6<sup>th</sup> International Pathogenic Neisseria Conference**

1988, Pine Mountain, Georgia, USA.

Chair: S.A. Morse

### **7<sup>th</sup> International Pathogenic Neisseria Conference**

1990, Berlin, Germany.

Chair: M. Achtman

### **8<sup>th</sup> International Pathogenic Neisseria Conference**

1992, Cuernavaca, Mexico.

Chair: C.I. Conde-Glez

### **9<sup>th</sup> International Pathogenic Neisseria Conference**

1994, Winchester, England.

Chair: M.C.J. Maiden and I Feavers

### **10<sup>th</sup> International Pathogenic Neisseria Conference**

1996, Baltimore, Maryland, USA.

Chair: C.E. Frasch

### **11<sup>th</sup> International Pathogenic Neisseria Conference**

1998, Nice, France.

Chair: X. Nassif

### **12<sup>th</sup> International Pathogenic Neisseria Conference**

2000, Galveston, Texas, USA.

Chairs: F. Sparling and P. Rice

### **13<sup>th</sup> International Pathogenic Neisseria Conference**

2002, Oslo, Norway.

Chair: E. Wedege

### **14<sup>th</sup> International Pathogenic Neisseria Conference**

2004, Milwaukee, Wisconsin, USA.

Co-Conveners: M.A. Apicella and H. Seifert

### **15<sup>th</sup> International Pathogenic Neisseria Conference**

2006, Cairns, North Queensland, Australia.

Co-Conveners: J. Davies and M. Jennings

### **16<sup>th</sup> International Pathogenic Neisseria Conference**

2008, Rotterdam, The Netherlands.

Co-Conveners: L. van Alphen, P. van der Lay and G. van den Dobbelen

### **17<sup>th</sup> International Pathogenic Neisseria Conference**

2010, Banff, Canada.

Co-Conveners: Anthony Schryvers and Scott Gray-Owen

### **18<sup>th</sup> International Pathogenic Neisseria Conference**

2012, Würzburg, Germany.

Co-conveners: Matthias Frosch, Ulrich Vogel and Thomas Rudel

We thank Kai Lawson for designing the 2014 IPNC Logo

## Welcome to IPNC 2014 Asheville

Welcome to the XIX<sup>th</sup> International Pathogenic Neisseria Conference and to Asheville, North Carolina and the Blue Ridge Mountains. We hope you find this conference scientifically stimulating and the setting enjoyable. The goal of the 2014 IPNC is to provide a balanced forum of basic and translational research, highlight cutting edge research through plenary oral and poster presentations, and stimulate new areas of investigation through round table discussion groups. It is also our goal to create a dynamic and interactive setting that facilitates interactions between established and junior researchers and among investigators from throughout the world to ensure the future of this important field.



The pathogenic *Neisseria* continue to rank high on the list of medically important bacteria, and research on these organisms is imperative for their eventual control. Study of these pathogens has also led to many fascinating paradigms of pathogenesis and continues to unveil the intricacy of host/bacterial interactions and the evolution and biological processes of bacteria. The major topics of the IPNC 2014 are the *molecular and cellular biology* of host/pathogen interactions, *structure/function relationships of surface molecules and their roles in pathogenesis*, *physiological and metabolic processes* that facilitate pathogen adaptation to different host microenvironments and may be targeted therapeutically, the *role of gene regulation and genetics* in in-host survival and the emergence of new strains, and *host defenses and immunological responses* that can influence susceptibility, carriage, symptomology, and disease pathology. Also highlighted are the *epidemiology of invasive meningococcal disease* and *mechanisms and spread of antibiotic resistance in N. gonorrhoeae*. Both of these latter areas are related to pathogenesis research and benefit from the field of *population genetics*, which can help identify bacterial factors that contribute to virulence or transmission. Finally, the *development of vaccines and novel anti-infectives* is critical for both pathogens, and thus an important focus of the conference.

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We thank the many individuals who have made this year's conference possible, including the Scientific Board who met in Bethesda, Maryland in June, 2014 to review abstracts, select oral presentations and help develop the scientific program. We also thank the numerous individuals within the IPNC community who have agreed to serve as session moderators, round table facilitators, and poster judges. Finally, we thank the many sponsors who provided financial support.

Enjoy the conference!

Ann Jerse  
Cynthia Nau Cornelissen  
Joe Dillard

**Co-Convenors, IPNC 2014 Asheville**

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## 2014 IPNC Convenors

### **Ann E. Jerse, Ph.D.**

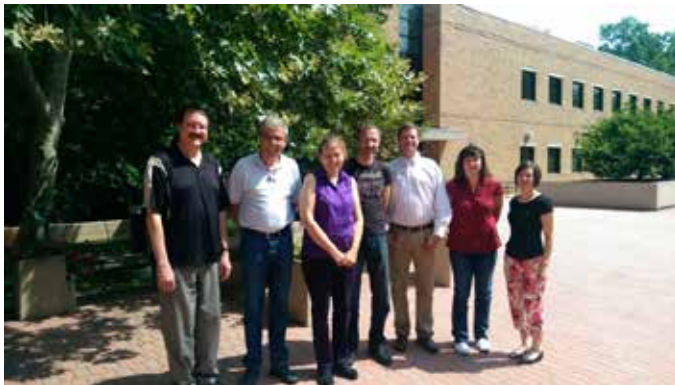
Uniformed Services University  
Bethesda, Maryland, U.S.A.

### **Cynthia N. Cornelissen, Ph.D.**

Virginia Commonwealth University  
Richmond, Virginia, U.S.A.

### **Joe Dillard, Ph.D.**

University of Wisconsin  
Madison, Wisconsin, U.S.A.



## Scientific Board

### **Alison Criss, Ph.D.**

University of Virginia,  
Charlottesville, Virginia, U.S.A.

### **Matthias Frosch, M.D.**

University of Würzburg,  
Würzburg, F.R.G.

### **Gary Jarvis, Ph.D.**

San Francisco Veteran's Affairs Hospital  
San Francisco, California, U.S.A.

### **Vladimir Pelicic, Ph.D.**

Imperial College  
London, U.K.

### **Christoph Tang, M.D.**

University of Oxford  
Oxford, U.K.

## Round Table Facilitators

### Antibiotic Resistance

#### **William M. Shafer, Ph.D.**

Emory University

#### **Magnus Unemo, Ph.D.**

Örebro University Hospital

### New Concepts in Regulatory Control of Neisserial Physiology

#### **Cynthia N. Cornelissen, Ph.D.**

Virginia Commonwealth University

#### **Alastair McEwan, Ph.D.**

Griffith University

### Non-coding RNAs

#### **Joe Dillard, Ph.D.**

University of Wisconsin

#### **Hank Seifert, Ph.D.**

Northwestern University

### Polymicrobial Infections/Colonization

#### **Scott Gray-Owen, Ph.D.**

University of Toronto

#### **Ann Jerse, Ph.D.**

Uniformed Services University

## Gonorrhea Vaccine Workshop

### Organizer: Carolyn Deal, Ph.D.

STD Branch, NIAID, NIH

## **Session Moderators**

Joe Dillard  
Kate Seib  
Ellen Aho  
Charlene Kahler  
Martin Maiden  
Christoph Schoen  
Margaret Bash  
Matthias Frosch  
Sanjay Ram  
Peter Beernink  
Vladimir Pelicic  
Robert Nicholas  
David Trees  
Michael Apicella  
Thomas Hiltke  
Mike Jennings  
Gary Jarvis  
Scott Gray-Owen  
P. Frederick Sparling  
Peter Rice  
Dominique Caugant  
Ray Borrow  
Xavier Nassif  
Alison Criss

## **Poster Judges**

Guillaume Dumenil  
Christopher Davies  
Lisa Lewis  
Yaramah Zalucki  
Sunita Gulati  
Myron Christodoulides  
Joseph Duncan  
Paola Massari  
Marcia Hobbs  
Ellen Aho  
Susu Zughair  
Yih-Ling Tseng  
Ian Feavers  
Aleksandra Sikora  
Jay Lucidarme  
Daniel Golparian

## **Conference Sponsors**

**Bill and Melinda Gates Foundation**  
**Crucell**  
**Cubist Pharmaceuticals**  
**Emory University**  
**Melinta Therapeutics, Inc.**  
**National Institutes of Health/National Institute of Allergy and Infectious Diseases**  
**Pfizer**  
**PTC Therapeutics**  
**TherapyX, Inc.**

## 2014 Igor Stojilkovic Scholarship Recipients

### **Anne-Flore Imhaus, Ph.D.**

PARCC - Paris Centre de Recherche Cardiovasculaire

### **Jessica Poole**

Institute for Glycomics

### **Sozan Qarani**

University of Nottingham/School of Life Science

### **Evgeny Semchenko, Ph.D.**

Griffith University

## Conference Management

### **Gina Carlton**

Henry M. Jackson Foundation

### **Robyn Hulvey**

Henry M. Jackson Foundation

### **Kimberly Boxley**

Henry M. Jackson Foundation and Uniformed Services University

## Finding Your Way

### **Plenary Sessions and Round Table Discussions**

Crowne Ballroom

### **Poster Displays, Meals, Opening Reception, and Poster Receptions**

Expo Center

### **Business Center Location and Hours**

The hotel business center is located behind the front desk, is open 24 hours, and is complimentary to hotel guests.

### **Registration Location and Hours**

Located in the Laurel Registration Area

Sunday, October 12, 2014	3:00 p.m. – 6:00 p.m.
Monday, October 13, 2014	7:00 a.m. – 5:00 p.m.
Tuesday, October 14, 2014	7:00 a.m. – 5:30 p.m.
Wednesday, October 15, 2014	7:00 a.m. – 12:00 p.m.
Thursday, October 16, 2014	7:30 a.m. – 5:30 p.m.
Friday, October 17, 2014	7:00 a.m. – 12:00 p.m.

### **Tour Desk Location and Hours**

Located in the Laurel Registration Area

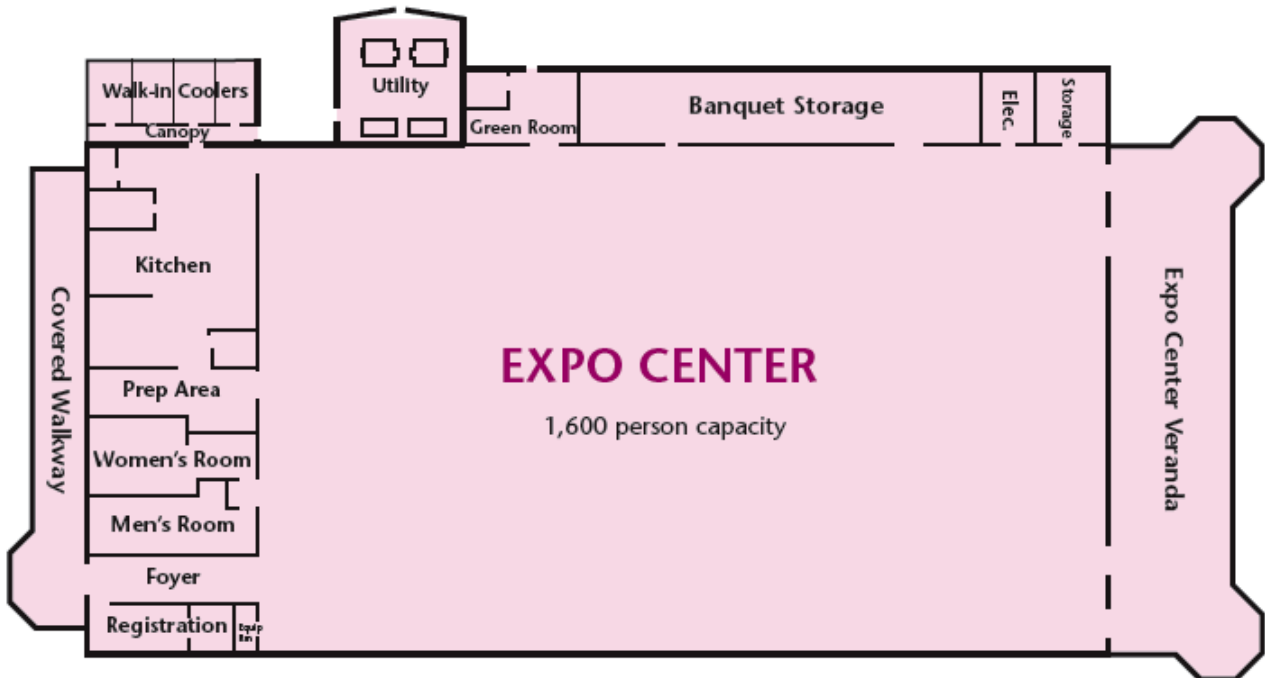
Sunday, October 12, 2014	3:00 p.m. – 6:00 p.m.
Monday, October 13, 2014	8:00 a.m. – 3:30 p.m.
Tuesday, October 14, 2014	8:00 a.m. – 3:45 p.m.
Wednesday, October 15, 2014	8:00 a.m. – 12:00 p.m.



### Speaker Ready Room Location and Hours

Located in the Dogwood Room

Sunday, October 12, 2014	3:00 p.m. – 6:00 p.m.
Monday, October 13, 2014	7:00 a.m. – 5:00 p.m.
Tuesday, October 14, 2014	7:00 a.m. – 5:30 p.m.
Wednesday, October 15, 2014	7:00 a.m. – 12:00 p.m.
Thursday, October 16, 2014	7:30 a.m. – 5:30 p.m.
Friday, October 17, 2014	7:00 a.m. – 10:30 a.m.



### Downtown Shuttle

A shuttle to downtown Asheville is available at \$5.00 per person, round trip. (A taxi will cost approximately \$8.00 each way.) The shuttle has 2–3 drop off and pick up areas in downtown Asheville and operates from 8:00 a.m. – 1:00 a.m.

### On-site Restaurants

**Pro's Table Restaurant** is open from 6:30 a.m. – 2:00 p.m. for breakfast and lunch; and 5:00 – 10:00 p.m. for dinner.

**Mulligan's Bar and Grille** is open for dinner from 4:00 p.m. – 2:00 a.m.

A full food and beverage menu is available through room service from 6:30 a.m. until 10:00 p.m. daily.

### Child Care Information

Please see the hotel front desk for a current list of child care providers.

## Emergency Dialing

Always dial 911 first, then 0 from a house phone to call the front desk.

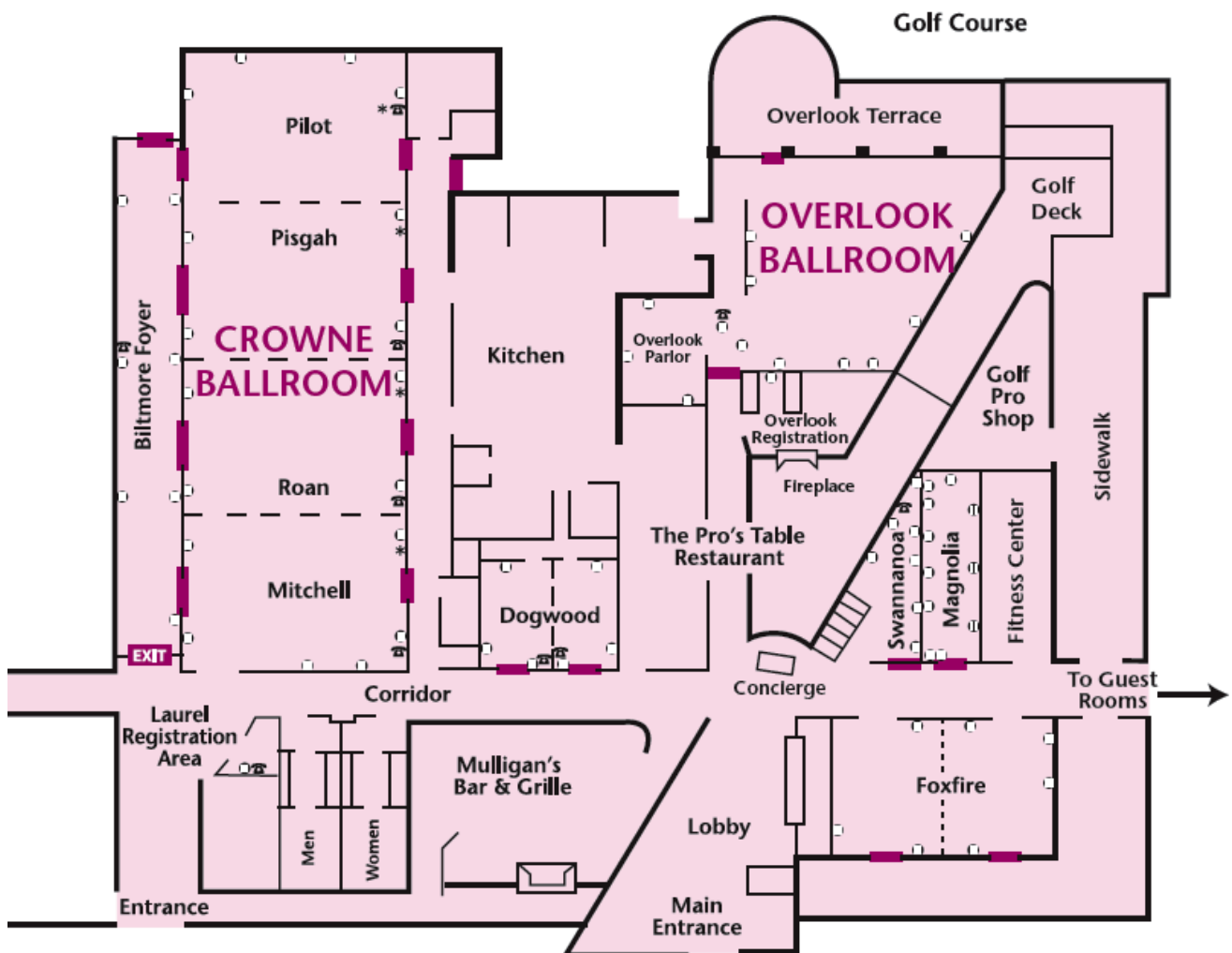
## Emergency Information

### Nearest Hospital

Mission Hospital  
509 Biltmore Ave  
Asheville, NC 28801  
(828) 213-1111

### Nearest Pharmacy

CVS  
24 Westgate Pkwy  
Asheville, NC 28806  
(828) 253-2872



## CONFERENCE AGENDA

### SUNDAY, OCTOBER 12

5:00 WELCOME  
**Cynthia Nau Cornelissen, Ph.D., Virginia Commonwealth University**

5:15 KEYNOTE ADDRESS  
O1. "A mouse model for studying the genetic and immunologic mechanisms of *Neisseria commensalism*"

**Magdalene So, Ph.D.**  
Director, Microbial Pathogenesis Program  
Member, BIO5 Institute  
Professor, Department of Immunobiology  
University of Arizona



6:00 – 8:00 OPENING RECEPTION



### MONDAY, OCTOBER 13

7:00 BREAKFAST (Expo Center)  
8:00 INTRODUCTORY REMARKS  
**Ann Jerse, Ph.D., Uniformed Services University**

#### PLENARY SESSION I: PHYSIOLOGY AND METABOLISM

##### Moderators

**Charlene Kahler, Ph.D., University of Western Australia, Kate Seib, Ph.D., Griffith University**

- 8:20 O2 *The dynamic 'acetylome' of Neisseria gonorrhoeae in biofilm formation*  
**Bradford Gibson, Buck Institute for Research on Aging**
- 8:40 O3 *Localization and substrate specificity of lytic transglycosylases LtgA and LtgD contribute to high levels of peptidoglycan monomer production*  
**Ryan Schaub, University of Wisconsin-Madison**
- 9:00 O4 *The two-component system NtrYX is a key regulator of respiratory gene expression in Neisseria gonorrhoeae*  
**Alastair McEwan, University of Queensland**
- 9:20 O5 *A genetic screen reveals a periplasmic copper chaperone required for nitrite reductase activity in pathogenic Neisseria*  
**Freda Jen, Griffith University**
- 9:40 O6 *Global analysis of HPr role in Neisseria meningitidis physiology and virulence and its implication during experimental infection in mice*  
**Ana Antunes, Institut Pasteur**

10:00 – 10:30 COFFEE BREAK

## PLENARY SESSION II: SURFACE STRUCTURES

### Moderators

**Ellen Aho, Ph.D., Concordia University; Mumtaz Virji, Ph.D., University of Bristol**

- 10:30 O7 *nagZ* triggers gonococcal biofilm disassembly  
**Dan Stein, University of Maryland**
- 10:50 O8 *The neisserial outer membrane protein SLAM is required for translocation of surface lipoproteins across the outer membrane of Neisseria*  
**Trevor Moraes, University of Toronto**
- 11:10 O9 *Concerted spatio-temporal dynamics of imported DNA and ComE DNA uptake protein during gonococcal transformation*  
**Christof Hepp, University of Cologne**
- 11:30 O10 *Mechanobiology of a commensal Neisseria species*  
**Nicholas Biais, CUNY Brooklyn College**
- 11:50 LUNCH (Expo Center)
- 1:45 O11 *Modulation of gonococcal type IV pilus expression and function*  
**Hank Seifert, Northwestern University**
- 2:05 O12 *Structural and functional investigations of the DUS (DNA Uptake Sequence) receptors in the Neisseriaceae family*  
**Jamie Berry, Imperial College London**
- 2:25 O13 *The number of Neisseria meningitidis type IV pili determines host cell interaction*  
**Anne-Flore Imhaus, Paris Centre de Recherche Cardiovasculaire**
- 2:45-3:15 COFFEE BREAK

## PLENARY SESSION III: POPULATION GENETICS

### Moderators

**Martin Maiden, Ph.D., University of Oxford; Christoph Schoen, Ph.D., University of Würzburg**

- 3:15 O14 *Sexual transmission of meningococci may account for an outbreak of meningococcal disease among men who have sex with men*  
**Heike Claus, University of Würzburg**
- 3:35 O15 *Genomic analysis of the evolution and global spread of hyperinvasive meningococcal lineage 5*  
**Odile Harrison, University of Oxford**
- 3:55 O16 *The ST-11 clonal complex: Core genome MLST reveals a complex population structure*  
**Jay Lucidarme, Public Health England**
- 4:15 O17 *Ancestral acquisition of the capsule locus in Neisseria meningitidis occurred multiple times*  
**Charlene Kahler, University of Western Australia**
- 4:35 O18 *Length modulation of horizontal gene transfer in in-silico evolution explains Neisseria meningitidis population structure*  
**Duccio Medini, Novartis Vaccine Research**
- 5:00 – 8:00 DINNER (on your own)

## POSTER SESSION I

- 8:00-10:00 EXPO CENTER  
Physiology and Metabolism, Population Genetics, Surface Structures, Meningococcal Vaccines, Antibiotic Resistance, and Novel Anti-Infectives



TUESDAY, OCTOBER 14

7:00 BREAKFAST (Expo Center)

#### PLENARY SESSION IV: MENINGOCOCCAL VACCINES

##### Moderators

**Margaret Bash, M.D., Center for Biologics and Evaluation, FDA; Matthias Frosch, M.D., University of Würzburg**

- 8:00 O19 *Epidemic meningococcal meningitis in Africa: Success using a Group A conjugate vaccine and a development update on a new pentavalent vaccine (A/C/Y/W/X)*  
**F. Marc LaForce, Serum Institute of India**
- 8:30 O20 *Safety and immunogenicity of a meningococcal serogroup B outer membrane vesicle vaccine with constitutive expression of the iron receptor FetA: a phase I, open-label, dose escalation clinical trial in healthy adult volunteers*  
**Christina Dold, University of Oxford**
- 8:50 O21 *Exploring the capsule biosynthesis machinery of Neisseria meningitidis A with regard to its suitability for in vitro vaccine production*  
**Francesco Berti, Novartis Vaccines**
- 9:10 O22 *Use of a Novel Serogroup B Meningococcal Vaccine in Response to Two University Outbreaks in the US*  
**Manisha Patel, US Centers for Disease Control and Prevention**

9:30 – 10:00 COFFEE BREAK

#### PLENARY SESSION V: FACTOR H/FACTOR H-BINDING PROTEIN

##### Moderators

**Sanjay Ram, M.D., University of Massachusetts; Peter Beernink, Ph.D., Children's Hospital Oakland Research Institute**

- 10:00 O23 *Factor H binding protein as a meningococcal vaccine candidate: Are we there yet?*  
**Sanjay Ram, University of Massachusetts Medical School**
- 10:20 O24 *Identification of several bactericidal epitopes on factor H binding protein, a meningococcal vaccine component using deuterium-hydrogen exchange mass spectroscopy*  
**Gary Zlotnick, Pfizer Vaccines Research**
- 10:35 O25 *Human complement FH impairs protective serum anti-FHbp antibody by skewing antibody repertoire and enhancing FH binding*  
**Isabella Costa, Children's Hospital Oakland Research Institute**
- 10:50 O26 *Impact of reducing complement inhibitor binding on the immunogenicity of an outer membrane vesicle-based vaccine against serogroup B Neisseria meningitidis*  
**Christine Rollier, University of Oxford**
- 11:05 O27 *Resistance of meningococci to anti-FHbp bactericidal activity can be mediated by functional binding of complement FH to PorB3 and overcome by non-bactericidal anti-NspA antibody*  
**Dan Granoff, Children's Hospital Oakland Research Institute**
- 11:20 O28 *Molecular epidemiology and global expression profiling of Neisseria meningitidis factor H binding protein (fHbp) by quantitative mass spectrometry*  
**Vega Massignani, Novartis Vaccines**
- 11:35 O29 *Native outer membrane vesicle vaccine with over-expressed factor H binding protein confers protection against meningococcal colonization in human CEACAM1 transgenic mice*  
**Rolando Pajon, Children's Hospital Oakland Research Institute**

11:50 – 1:45 LUNCH (Expo Center)

## PLENARY SESSION VI: ANTIBIOTIC RESISTANCE

### Moderators

**Robert Nicholas, Ph.D., University of North Carolina; David Trees, Ph.D., US Center for Disease Prevention and Control**

1:45 O30 *Antimicrobial resistance in Neisseria gonorrhoeae – crucial public health actions and research to retain gonorrhea treatable*

**Magnus Unemo, Örebro University Hospital**

2:15 O31 *Whole genome sequencing of Neisseria gonorrhoeae isolates with reduced cephalosporin susceptibility collected in Canada from 1989 to 2012*

Amrita Bharat, Public Health Agency of Canada

2:35 O32 *Structural analysis of penicillin-binding protein 2 from the cephalosporin-resistant N. gonorrhoeae strain H041 – molecular mechanism underlying treatment failures in the clinic*

**Christopher Davies, Medical University of South Carolina**

2:55 O33 *In vivo-selected compensatory mutations increase fitness of ceftriaxone-resistant Neisseria gonorrhoeae*

**Leah Vincent, Uniformed Services University**

3:15-3:45 COFFEE BREAK

## PLENARY SESSION VII: NOVEL ANTI-INFECTIVES

### Moderators

**Michael Apicella, M.D., University of Iowa; Thomas Hiltke, Ph.D., National Institutes of Health**

3:45 O34 *LpxC inhibitors as a novel class of antibiotics against Neisseria gonorrhoeae*

**Pei Zhou, Duke University Medical Center**

4:05 O35 *Utilizing sialic acid analogues to define the molecular basis of complement resistance mediated by sialylation of Neisseria gonorrhoeae lipooligosaccharide and to design novel therapeutics*

**Sanjay Ram, University of Massachusetts Medical School**

4:25 O36 *Characterization of a novel outer membrane protein, NGO1985, as a potential target for the development of pharmacological interventions against gonorrhea*

**Igor Wierzbicki, Oregon State University**

4:45 O37 *Novel factor H-Fc chimeric immunotherapeutic molecules against pathogenic Neisseria*

**Jutamas Shaughnessy, University of Massachusetts Medical School**

5:05 O38 *Development of novel 2-pyridones for the treatment of Neisseria gonorrhoeae infections*

**Melissa Dumble, PTC Therapeutics**

5:30 DINNER (on your own)

## ROUND TABLE DISCUSSIONS

8:00 p.m. – 10:00 p.m.

## ANTIBIOTIC RESISTANCE AND SPREAD

### Facilitators

**William Shafer, Ph.D., Emory University; Magnus Unemo Ph.D., Örebro University Hospital**

This roundtable discussion focusses on the current problem of antibiotic resistance expressed by increasing numbers of clinical isolates of *Neisseria gonorrhoeae*. Following introductory remarks by P.F. Sparling M.D. on the evolution and emergence of resistance, the roundtable session will have three sub-sessions with

invited speakers who will discuss current issues regarding the epidemiology and molecular mechanisms of resistance as well as contemporary diagnostic methods to detect resistant strains and resistance-encoding genes and the development of new drugs to combat resistance. Each sub-session will be followed by a group discussion. The roundtable will conclude with a wrap-up discussion period.

*Evolution and emergence of resistance* **P. Frederick Sparling**

*Magnitude of the problem* **Peter Rice, Magnus Unemo**

*Mechanisms, diagnostics and alternative treatments* **Robert Nicholas, David Trees, Daniel Golparian, Kevin Karem**

*Opening the pipeline* **Thomas Hiltke, Erin Duffy, Clive Mason, Chris Murphy**

*Summary and the Future* **William M. Shafer, Magnus Unemo, P. Frederick Sparling**

## **NONCODING RNAs**

### **Facilitators**

**Joe Dillard, Ph.D., University of Wisconsin; Hank Seifert, Ph.D., Northwestern University**

In this roundtable, investigators working in the area of non-coding RNAs in *Neisseria* will discuss the field in general, methods for identifying, validating, and investigating regulatory RNAs; and also provide perspectives on the significance and future possibilities of such research. Discussion with audience members will be highly encouraged.

*Overview of non-coding RNAs in bacteria* **Hank Seifert**

*Methods for the discovery of non-coding RNAs* **Thomas Rudel**

*Validation and investigation of non-coding RNAs* **Yvonne Pannekoek**

*Research perspective on the future of non-coding RNAs in Neisseria* **Caroline Genco**

*Pharmaceutical perspective on the future of non-coding RNAs in Neisseria* **Isabel Delany**



**WEDNESDAY, OCTOBER 15**

7:00

*BREAKFAST (Expo Center)*

## **PLENARY SESSION VIII: GENE REGULATION AND GENETICS**

### **Moderators**

**Mike Jennings, Ph.D., Griffith University; Vladimir Pelicic, Ph.D., Imperial University London**

8:00 O39 *Connection between the twin sRNA regulon and the stringent response in Neisseria meningitidis*

**Yvonne Pannekoek, Academic Medical Center, Amsterdam**

8:20 O40 *Regulation of the gonococcal type IV secretion system involves two transcriptional repressors, two proteases, and an RNA switch*

**Joe Dillard, University of Wisconsin**

8:40 O41 *The ModD1 epigenetic methyltransferase and transcriptional regulator from pathogenic Neisseria meningitidis*

**Aimee Tan, Griffith University**

9:00 O42 *Characterization of the complete gonococcal transcriptome during natural mucosal infection reveals expression of numerous gonococcal regulatory, phage, and hypothetical proteins*

**Caroline Genco, Boston University**

9:20 O43 *Comparative genome sequencing reveals within-host evolution of Neisseria meningitidis during invasive disease* **Christoph Schoen, University of Würzburg**

9:40-10:10 COFFEE BREAK

## PLENARY SESSION IX: HOST DEFENSES AND IMMUNE RESPONSES (1)

### Moderators

**Gary Jarvis, Ph.D., San Francisco Veterans Affairs Medical Center; Scott Gray-Owen, Ph.D., University of Toronto**

- 10:10 O44 *Neisseria gonorrhoeae* infection and female hormonal risk factors: menstruation and ovulation  
**Stephanie McLaughlin, Johns Hopkins University**
- 10:30 O45 *Neisseria gonorrhoeae*-mediated immune suppression: mechanisms and consequences in coincident chlamydia infection  
**Joseph Duncan, University of North Carolina**
- 10:50 O46 *N. gonorrhoeae* induces localization of the inhibitor of apoptosis protein cIAP2 to Exosomes  
**Kathleen Goodman, Boston University**
- 11:10 O47 An LD-Carboxypeptidase (LdcA) controls the release of NOD1 agonist peptidoglycan from *Neisseria gonorrhoeae*  
**Jonathan Lenz, University of Wisconsin**
- 11:30 O48 *Neisseria*-derived heptose is a novel microbial-associated molecular pattern that elicits a TIFA-dependent innate immune response  
**Ryan Gaudet, University of Toronto**

11:50 FREE AFTERNOON

## POSTER SESSION II

7:00 – 9:30 EXPO CENTER  
Host Defenses and Immune Responses, Gene Regulation and Genetics, Epidemiology, Molecular and Cellular Biology, and Gonococcal Vaccines



**THURSDAY, OCTOBER 16**

7:30 BREAKFAST (Expo Center)

## GONORRHEA VACCINE WORKSHOP

8:30-10:00

### Moderator

**Carolyn Deal, Ph.D., Sexually Transmitted Diseases Branch, Division of Microbiology and Infectious Diseases, National Institute of Allergy and Infectious Diseases, National Institute of Health, U.S.A.**

This workshop will focus on gaps, challenges, and potential for development of a vaccine to prevent gonorrhea. Last year the World Health Organization and the National Institute of Allergy and Infectious Diseases convened a technical consultation on development of vaccines for STIs. This meeting focused on five STIs: herpes simplex virus, *Chlamydia trachomatis*, *Neisseria gonorrhoeae*, *Trichomonas vaginalis* and *Treponema pallidum* infections. Gaps in knowledge and challenges to development were outlined in the broad areas of epidemiology, basic and translational research, clinical development, and targeted vaccine indication. Specific details vary for each vaccine, but key themes emerged as a roadmap. Carolyn Deal will



discuss the Roadmap and how STIs may fit into the overall goals of the Decade of Vaccines and the Global Vaccine Action Plan. This will be followed by three talks discussing the practical and regulatory challenges of vaccine development, what industry needs to know to advance a product towards clinical trials, and some of the data that FDA considers in the regulation of bacterial vaccines.

*The way forward: A global roadmap for progress toward STI vaccine development and introduction*

**Carolyn Deal, Ph.D. STD Branch, DMID, NIAID, NIH**

*Vaccine product development - overview of the practical and regulatory challenges*

**Steven L Giarding, Ph.D. Senior Life Scientist, Leidos**

*Factors industry considers in moving a product towards clinical trials*

**Gary Zlotnick, Ph.D., Pfizer, Inc.**

*FDA regulation of bacterial vaccines*

**Scott Stibitz, Ph.D., Center for Biologics Evaluation and Research, US FDA**

10:00-10:30 COFFEE BREAK

## PLENARY SESSION X: GONOCOCCAL VACCINES

### Moderators

**P. Frederick Sparling, M.D., University of North Carolina; Peter Rice, M.D., University of Massachusetts**

10:30 O49 *Modeling the potential impact of gonococcal vaccines*

**Kate Seib, Griffith University**

10:50 O50 *Proteomics-drive reverse vaccinology for gonorrhea*

**Aleksandra Sikora, Oregon State University**

11:10 O51 *Development of MtrE, the outer membrane channel of the MtrCDE and FarAB, MtrE active efflux pump systems as a gonorrhea vaccine*

**Amanda DeRocco, Uniformed Services University**

11:30 O52 *Neisseria gonorrhoeae methionine receptor GNA1946 confers protection from host-mediated killing*

**Evgeny Semchenko, Griffith University**

11:50 – 1:30 LUNCH (Expo Center)

## PLENARY SESSION XI: HOST DEFENSES AND IMMUNE RESPONSES (2)

### Moderators

**Michael Russell, Ph.D., University of Buffalo, Wenxia Song, Ph.D., University of Maryland**

1:30 O53 *Inflammatory microRNAs induced by neisserial OMPs support adjuvant activity*

**Lee Wetzler, Boston University Medical School**

1:50 O54 *Global analysis of neutrophil responses to Neisseria gonorrhoeae reveals a self-propagating inflammatory program*

**Anna Sintsova, University of Toronto**

2:10 O55 *Insights into Neisseria meningitidis infection and immunity from the CEACAM-humanized mouse model*

**Carolyn Buckwalter, University of Toronto**

2:30 O56 *Recruitment of CD46 to the cortical plaque serves to confer resistance to serum killing on Neisseria gonorrhoeae*

**Nathan Weyand, University of Arizona**

2:50 O57 *Resistance to serum and antibody-mediated bacteriolysis dependent on neisserial immunoglobulin-binding protein TspB*

**Gregory Moe, Children's Hospital Oakland Research Institute**

3:10-3:30 COFFEE BREAK

## ROUND TABLE DISCUSSIONS

3:30-5:30

### NEW CONCEPTS IN REGULATORY CONTROL OF NEISSERIAL PHYSIOLOGY

#### Facilitators

**Cynthia N. Cornelissen, Ph.D., Virginia Commonwealth University, Alastair McEwan, Ph.D., Griffith University**

This round table session will focus on new regulators and regulatory pathways that influence physiology and metabolism in the pathogenic *Neisseria* species. Two component regulatory systems, efflux regulators, small RNAs and repeat motifs will be discussed in the context of their influence on piliation, nutrient acquisition, and general metabolism.

*A two-component system regulates pilE transcription in Neisseria elongata* **María A. Rendón**

*Regulation of Neisseria gonorrhoeae misSR two component system* **John Kirby**

*GadhR belongs to the gonococcal MtrR regulon and is a transcriptional activator of the genes*

*encoding GdhA glutamate dehydrogenase and GltT glutamine symporter* **Corinne Rouquette-**

**Loughlin**

*MtrA is a global regulator of genes in N. gonorrhoeae with roles in iron acquisition and glutamate metabolism* **Yaramah Zalucki, Ph.D.**

*Multi-tasking by transcriptional regulators of the Mtr efflux system integrates antimicrobial resistance, pathogenesis and metabolism of Neisseria gonorrhoeae* **William Shafer, Ph.D.**

*Quantitation of proteins regulated by the RNA chaperone protein Hfq of Neisseria meningitidis using LC-MSE* **Robert Huis in't Veld, M.D.**

*Identification and characterization of novel pil RNAs and promoters of Neisseria gonorrhoeae* **Stuart Hill, Ph.D.**

*The Cornea enclosed repeat element: How it is affected by temperature, pH, CO<sub>2</sub>, and non-coding RNAs in the Neisseria spp.* **Sabrina Roberts, Ph.D.**

### POLYMICROBIAL INFECTIONS/COLONIZATION

#### Facilitators

**Scott Gray-Owen, Ph.D., University of Toronto, Ann Jerse, Ph.D., Uniformed Services University**

Polymicrobial research is a rich, but relatively untapped area of *Neisseria* research. However, significant advances in this field are now attainable through microbiome technology, animal and tissue culture co-infection models, and a wealth of detailed information on adaptation mechanisms used by the pathogenic *Neisseria* in the absence of other microbes. This round table will build a case for increased focus on polymicrobial research, discuss current knowledge in this area, and identify areas of research need.

*Overview: Microbiomes of the respiratory and genital tracts* **Anthony Schryvers**

*Overview: Co-infections with N. gonorrhoeae and other sexually transmitted microbes* **Peter Rice**

*Gonorrhea-HIV co-infections* **Scott Gray-Owen**

*Gonorrhea-chlamydial co-infections* **Joseph Duncan**

*Impact of vaginal lactobacilli on Neisseria gonorrhoeae* **Ann Jerse**

*Interactions between Neisseria elongata and Neisseria gonorrhoeae* **Magdalene So**

*Overview: Meningococcal co-infections with respiratory pathogens* **Xavier Nassif**

*Impact of Neisseria lactamica on Neisseria meningitidis* **Andrew Gorrington, Ph.D.**

### CONFERENCE BANQUET - Ticket Required

7:30 p.m. The Venue

21 North Market Street, Asheville

Transportation to the banquet will begin at 6:30 p.m. (specifics to be announced)



FRIDAY, OCTOBER 17

7:00 BREAKFAST (Expo Center)

#### PLENARY SESSION XII: EPIDEMIOLOGY

##### Moderators

**Dominique Caugant, Ph.D. Norwegian Institute of Public Health, Ray Borrow, Ph.D., Public Health England**

8:00 O58 *Molecular epidemiology of serogroup A meningococcus in South Africa, 2003-2012*

**Mignon du Plessis, National Health Laboratory Service, Johannesburg**

8:15 O59 *Capsular switching and global spread of Neisseria meningitidis serogroup W ST-11*

**Mustapha Mustapha, University of Pittsburg**

8:30 O60 *New hypervirulent clones of Neisseria meningitidis evade herd immunity through homologous replacement of loci for cell surface protein antigens and protein glycosylation*

**Araceli Lamelas Cabello, Swiss Tropical and Public Health Institute**

8:45 O61 *Relationship between carriage of Neisseria meningitidis and meningococcal disease in Burkina Faso, 2009-2012*

**Lucy McNamara, US Centers for Disease Control and Prevention**

9:00 O62 *Association of meningococcal type with disease outcome*

**Johannes Elias, University of Würzburg**

#### PLENARY SESSION XIII: MOLECULAR AND CELLULAR BIOLOGY

##### Moderators

**Xavier Nassif, M.D., INSERM, France, Alison Criss, Ph.D., University of Virginia**

9:15 O63 *MDAΦ, the invasive filamentous bacteriophage of Neisseria meningitidis, increases bacterial colonization onto epithelial cells by mediating bacteria-bacteria interaction*

**Emmanuelle Bille, INSERM, France**

9:35 O64 *Neisserial phage protein contributes to neisserial pathogenesis*

**Wenxia Song, University of Maryland**

9:55 O65 *Gonococcal restriction endonucleases cause double-strand breaks and distort mitosis in epithelial cells*

**Helena Aro, Stockholm University**

10:15 – 10:35 COFFEE BREAK

10:35 O66 *Gonococcal association with human CEACAMs during infection of the female genital tract*

**Eshita Islam, University of Toronto**

10:55 O67 *Neisseria meningitidis differentially activates the acid sphingomyelinase-ceramide system to induce its uptake into brain endothelial cells*

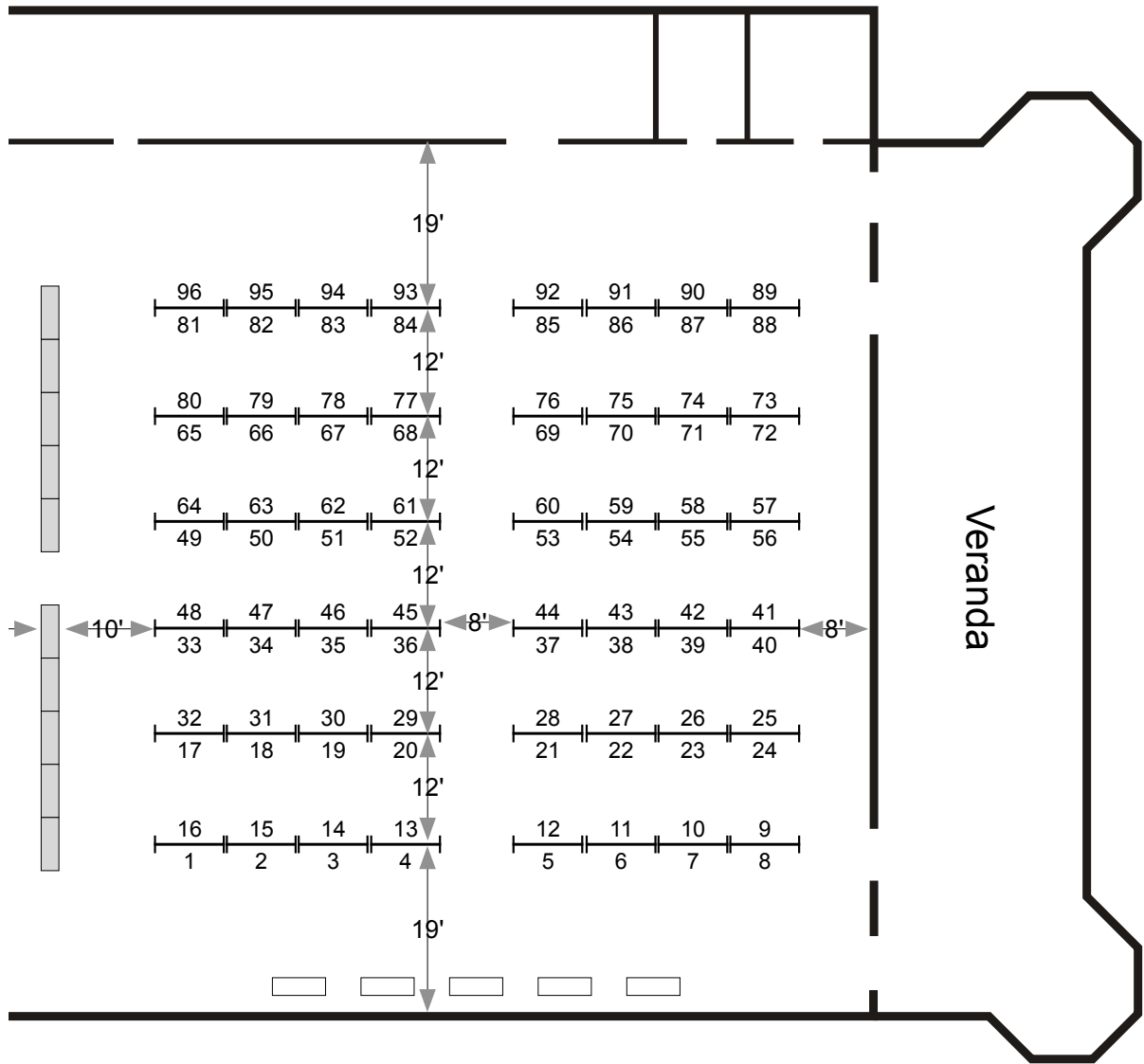
**Alexandra Schubert-Unkmeir, University of Würzburg**

#### MEETING CLOSING

11:15 Roundtable reports

12:00 Conference Farewell

12:05 Announcement of 2016 IPNC



**POSTER SESSION I**

Monday, October 13, 8:00 – 10:00 p.m.

**ANTIBIOTIC RESISTANCE**

Board #	Abstract Number and Title	Presenter
1	P1. A preliminary molecular assay for detection of antimicrobial resistant <i>Neisseria gonorrhoeae</i>	Amrita Bharat
2	P2. Distribution of antibiotic resistance genes in a global <i>Neisseria</i> genome collection	Carina Brehony
3	P3. Fluoroquinolone resistance-conferring <i>gyrA</i> 91/95 mutations provide enhanced in vivo fitness to <i>Neisseria gonorrhoeae</i> strain MS11 by increasing resistance to cationic antimicrobial peptides	Jonathan D'Ambrozio
4	P4. Structural effect of the Asp345a insertion in penicillin-binding protein 2 from penicillin-resistant strains of <i>N. gonorrhoeae</i>	Christopher Davies
5	P5. Genomics of antibiotic resistance emergence within <i>Nesseria gonorrhoeae</i>	Matthew Ezewudo
6	P6. Establishment of a <i>Neisseria gonorrhoeae</i> reference lab & repository for understanding the spread of antimicrobial resistant gonorrhoea in the U.S. military	Michelle Pilligua-Lucas
7	P7. Antimicrobial susceptibilities of <i>Neisseria gonorrhoeae</i> in Nanjing, China, 2013	Xiaohong Su
8	P8. In vitro activity of the novel DNA gyrase inhibitor AZD0914 against 187 clinical <i>Neisseria gonorrhoeae</i> isolates with multi-resistance to other antimicrobials	Xiaohong Su
9	P9. Population genomic analysis identifies a strong association of the gonococcal genetic island with third generation cephalosporin resistance in gonococci	Odile Harrison
10	P10. Recent increase in reduced susceptibility to ceftriaxone in <i>Neisseria gonorrhoeae</i> after a decrease of the frequency of the presence of the mosaic <i>penA</i> gene	Alje Van Dam

**MENINGOCOCCAL VACCINES**

Board #	Abstract Number and Title	Presenter
11	P11. Meningococcal serogroup A, C, Y and W serum bactericidal antibody profiles in Hajj pilgrims	Xilian Bai
12	P12. Effect of the Eculizumab (Soliris (R) ), on the meningococcal serogroup B (MenB) serum bactericidal antibody (SBA) assay	Xilian Bai
13	P13. Comparison of different serogroup A immunoassays following a single dose of either MenAfriVac or quadrivalent polysaccharide vaccine in healthy Africans 2- to 29- years of age	Margaret Bash
14	P14. Simultaneous quantitation of PorA and PorB in outer membrane vesicles of Bexsero vaccine using isotope dilution mass spectrometry	Nicola Beresford
15	P15. The Global Meningococcal Initiative, report from the second summit meeting, Cape Town, South Africa	Ray Borrow
16	P16. Structural insights reveal a novel trimeric autotransporter adhesin fold in the meningococcal vaccine antigen NadA and the mechanism of its ligand-dependent transcriptional regulation by NadR	Matthew Bottomley

17	P17. Sequence, structural and functional differences between different isotypes of transferrin binding proteins A and B from <i>Neisseria meningitidis</i>	Somshukla Chaudhuri
18	P18. Development and characterization of a low cost synthetic oligomer based meningococcal serogroup C conjugate vaccine	Manoj Kumar Chhikara
19	P19. Variation in factor H-binding protein distribution among culture and non-culture meningococcal disease cases in England and Wales in 2011	Stephen Clark
20	P20. Structural characterization of endotoxin from <i>Neisseria meningitidis</i> B and subsequent evaluation of its pro-inflammatory activity	Marilza Correa
21	P21. A recombinant protein truncation strategy induces bactericidal antibodies to the Macrophage Infectivity Potentiator protein of <i>Neisseria meningitidis</i> and circumvents potential cross-reactivity with human FKBP proteins.	Myron Christodoulides
22	P22. The <i>Neisseria meningitidis</i> amino acid ABC transporter substrate-binding protein, NMB1612, induces functional cross-protective bactericidal antibodies	Myron Christodoulides
23	P23. The biology and function of Adhesin Complex Proteins of pathogenic <i>Neisseria</i>	Myron Christodoulides
24	P24. Pre-clinical evaluation of the vaccine potential of the highly conserved, expressed and surface-exposed Cell Binding Factor (CBF, NMB0345) protein of <i>Neisseria meningitidis</i>	Myron Christodoulides
25	P25. Potential public health impact of having included <i>N. meningitidis</i> serogroup B in the 2005 recommendation for adolescent meningococcal serogroup A, C, Y, and W-135 vaccination	Raymond Farkouh
26	P26. Potential impact of vaccination of college-age adolescents against <i>N. meningitidis</i> serogroup B: Results of a transmission dynamic model	Raymond Farkouh
27	P27. Are transferrin receptor-mediated iron acquisition systems primarily limited to pathogenic bacteria that inhabit the upper respiratory tract?	Vahid Farshchi Andisi
28	P28. Antigen engineering of transferrin binding protein B as a vaccine antigen against infection by <i>Neisseria meningitidis</i>	Jamie Fegan
29	P29. Interchangeability of meningococcal group C conjugate vaccines with different carrier proteins in the United Kingdom infant immunisation schedule	Helen Findlow
30	P30. Potential coverage of the BEXSERO® MenB vaccine on non-B meningococci	Brunella Brunelli
31	P31. Expression of <i>Neisseria meningitidis</i> antigens of the 4CMenB vaccine; comparison between MATS and FACS for prediction of hSBA	Johan Holst
32	P32. Immunogenicity and safety of a single dose of CRM-conjugated (Novartis) or TT-conjugated (GSK) meningococcal quadrivalent vaccine in adolescents who were primed with Meningitec™, Menjugate™ or NeisVac-C™ at preschool age	David Ishola
33	P33. Bivalent rLP2086 elicits antibodies in individuals that provide broad coverage against MnB strains expressing prevalent and outbreak-associated fHBP variants	Thomas Jones
34	P34. A prototype GMMA based vaccine against meningococcal meningitis caused by multiple serogroups in sub-Saharan Africa	Oliver Koeberling

35	P35. Characterization of the human antibody repertoire to type B meningococcus vaccine	Vega Massignani
36	P36. Using monoclonal antibodies to understand the molecular basis for the cross bactericidal activity of NHBA antigen	Marzia Giuliani
37	P37. Expediting development of and access to new vaccines	Lucia Lee
38	P38. Variation in PorB sequence promotes generation of non-PorB-specific bactericidal antibody	Kathryn Matthias
39	P39. Examination of the role of dendritic cells, macrophages and B cells in the function of vaccine adjuvants, including meningococcal PorB	Lee Wetzler
40	P40. Examination of the role of meningococcal PorB adjuvant in the induction of vaccine induced immune responses using a system biology approach.	Lee Wetzler
41	P41. Pooled hSBA titers predict seroresponse rates of infants vaccinated with 4CMenB	Duccio Medini
42	P42. Antibody responses in humans after vaccination with a novel serogroup A and W outer membrane vesicle (OMV) vaccine targeted for the African meningitis belt – Results from a phase I study in Cuba	Lisbeth Naess
43	P43. An OMV vaccine derived from a capsular group B meningococcus with constitutive FetA expression: preclinical evaluation of immunogenicity and toxicity	Gunnstein Norheim
44	P44. Elimination of meningococcal A epidemics in Africa is within reach.	Abraham Hodgson
45	P45. Vaccine development using genetic fusions of surface-exposed loops from <i>Neisseria meningitidis</i> PorB and TbpA conjugated to the cholera toxin B subunit	Gregory Price
46	P46. Safety and immunogenicity of a serogroup A and W meningococcal outer membrane vesicle vaccine: Results from a Phase I clinical study in Cuban volunteers	Luis Garcia
47	P47. Epidemic meningococcal meningitis in Africa: Success using a Group A conjugate vaccine and a development update on a new pentavalent vaccine (A/C/Y/W/X)	Marc LaForce
48	P48. Immune response against proteoliposomes incorporating the recombinant meningococcal macrophage infectivity potentiator protein (rMIP)	Sandra Sanchez
49	P49. Meningococcal antigen typing system (MATS) based coverage for Bexsero on invasive MenB strains isolated from infants aged less than one year in Germany 2007-2013	Heike Claus
50	P50. Engineering antigens derived from transferrin receptors – importance of surrogate host-pathogen systems and an integrated vaccine design and evaluation pipeline	Anthony Schryvers
51	P51. Duration of immunity and immunological memory induced by a Brazilian meningococcal C conjugate vaccine	Reinaldo Martins
52	P52. Decline of protective antibodies after serogroup C meningococcal conjugate vaccine in patients with sickle cell disease	Alessandra Souza
53	P53. Timing of adolescent booster after single primary MenCC immunization at young age and the role of saliva in evaluating the effect of vaccination.	Susanne Stoof

54	P54. Predicting serum bactericidal activity with a high-throughput flow-cytometric complement deposition assay using an expanded serum panel	Stephen Taylor
55	P55. Randomized controlled trial comparing the immunogenicity of 3- and 4-dose schedules of a meningococcal MenACWY conjugate vaccine in healthy infants	Igor Smolenov
56	P56. Identification of an optimal formulation of MenABCWY vaccine in adolescents using desirability analysis	Igor Smolenov
57	P57. Evaluation of meningococcal C conjugate vaccine programs in Canadian children	Julie Bettinger

## NOVEL ANTI-INFECTIVES

Board #	Abstract Number and Title	Presenter
58	P58. Fibroblast Growth Factor1 is required for optimal meningococcal invasion into Human Brain Microvascular Endothelial cells	Karl Wooldridge
59	P59. Establishment of the gonorrhea mouse model for pre-clinical testing of antimicrobial agents against gonorrhea	Kristie Connolly
60	P60. Development of a broth microdilution assay for determination of in vitro susceptibility of <i>Neisseria gonorrhoeae</i>	Nicole Cotroneo
61	P61. In vitro activities of the novel bicyclics modithromycin (EDP-420, EP-013420, S-013420) and EDP-322 against multidrug resistant clinical <i>Neisseria gonorrhoeae</i> isolates and international reference strains	Daniel Golparian
62	P62. High in vitro activity of the novel spiropyrimidinetrione AZD0914, a DNA gyrase inhibitor, against multidrug resistant <i>Neisseria gonorrhoeae</i> isolates suggests a new effective option for oral treatment of gonorrhea	Susanne Jacobsson
63	P63. The neisserial LOS phosphoethanolamine transferase: crystal structure, catalytic function and progress on drug design	Charlene Kahler
64	P64. Identification of putative drug targets and functional annotation of hypothetical proteins of <i>Neisseria gonorrhoeae</i> using bioinformatics tools	Ravi Kant
65	P65. Novel antimicrobial agents against <i>Neisseria gonorrhoeae</i> from extracts of natural products.	Lori Snyder

## PHYSIOLOGY AND METABOLISM

Board #	Abstract Number and Title	Presenter
66	P66. Carbohydrate transport and metabolism in <i>Neisseria meningitidis</i>	Ana Antunes
67	P67. Pyrophosphate-mediated iron acquisition from transferrin in <i>Neisseria meningitidis</i> does not require TonB activity	Francis Biville
68	P68. Differences in AmpG sequence increase pro-inflammatory peptidoglycan fragment release in <i>Neisseria gonorrhoeae</i> compared to <i>Neisseria meningitidis</i>	Jia Mun Chan
69	P69. Common cell shape evolution of nasopharyngeal pathogens	Frédéric Veyrier



## POPULATION GENETICS

Board #	Abstract Number and Title	Presenter
70	P70. Generation of a finished Swedish serogroup Y genome belonging to the ST-23 clonal complex	Odile Harrison
71	P71. Persistent meningococcal carriage is associated with low levels of genetic variation	Christopher Bayliss
72	P72. comparative analysis of canadian <i>Neisseria meningitidis</i> serogroup B isolates	Julie Bettinger
73	P73. Whole genome comparison of <i>Neisseria meningitidis</i> isolates from patients and their close family contacts using gene-by-gene analysis	Holly Bratcher
74	P74. From genes to genomes: current status of the <i>Neisseria</i> reference libraries hosted on PubMLST.org	Keith Jolley
75	P75. A new <i>Neisseria</i> species?	Paul Kristiansen
76	P76. A genetic characterization of the 4CMenB vaccine antigen genes in serogroup B isolates from invasive meningococcal disease (IMD) cases in the four Western Canadian Provinces of British Columbia, Alberta, Saskatchewan and Manitoba from 2009 to 2013	Dennis K.S. Law
77	P77. Genetic analysis and quantitation of factor H binding protein expression in US invasive meningococcal serogroup B isolates from population-based active bacterial core surveillance (2010-2012)	Paul Liberator
78	P78. Exploring the evolution of three pandemic waves of serogroup A meningococci using whole-genome analysis and mathematical modelling: how important is immune escape?	Eleanor Watkins

## SURFACE STRUCTURES

Board #	Abstract Number and Title	Presenter
79	P79. Structural insight into the translocation mechanism of the zinc-uptake receptor ZnuD, a vaccine candidate against <i>Neisseria meningitidis</i>	Charles Calmettes
80	P80. Temperature reduction stimulates proteomic changes enhancing meningococcal biofilm formation	Heike Claus
81	P81. Contribution of the TbpA loop 3 helix to transferrin-iron acquisition by <i>Neisseria gonorrhoeae</i>	Devin Cash
82	P82. Binding of the RmpM to porin complexes depends on a six amino acid peptide of its N-terminal domain	Paula Freixeiro
83	P83. Structural characterisation of HpuA	Stephen Hare
84	P84. SLAM2: an outer membrane transporter required for the display of surface lipoprotein HpuA	Yogesh Hooda
85	P85. The role of gonococcal TonB-dependent Transporters, TdfH and TdfJ in heme and zinc acquisition	Sophonie Jean
86	P86. Applications of high-resolution MALDI-TOF mass spectrometry to analysis of intact lipooligosaccharides (LOS) from <i>Neisseria meningitidis</i>	Constance John
87	P87. Biochemical and biophysical analysis of the interactions between lactoferrin-binding protein B and lactoferrin	Sarathy Karunan Partha

88	P88. Neisserial Opa protein interactions with human receptors in vitro and in vivo	Jennifer Martin
89	P89. Analysis of <i>Neisseria meningitidis</i> PorB extracellular loops potentially implicated in TLR2 recognition.	Paola Massari
90	P90. Glycan binding by <i>Neisseria meningitidis</i> and the meningococcal serogroup B vaccine antigen NHBA	Tsitsi Mubaiwa
91	P91. Compensatory mutations in <i>Neisseria meningitidis</i> Factor H binding protein: Implications for immune escape and evolution	Rolando Pajon
92	92. Investigating host specificity in the bacterial transferrin receptors	Anastassia Pogoutse
93	P93. <i>Neisseria gonorrhoeae</i> and complement receptor 3: Probing the lectin functions of the I-domain of CD11b	Jessica Poole

## POSTER SESSION II

Wednesday, October 15, 7:00 – 9:30 p.m.

### EPIDEMIOLOGY

Board #	Abstract Number and Title	Presenter
1	P94. Meningococcal disease among men who have sex with men –United States, 2012-2013	Amy Blain
2	P95. Understanding factors affecting University of California Santa Barbara students' decision to get vaccinated with Bexsero™, an unlicensed meningitis B vaccine: A survey on students' knowledge, attitudes and practices	Lucy Breakwell
3	P96. Whole genome sequence analysis of a representative collection of disease-associated isolates from the Republic of Ireland, epidemiological years 2010-11 to 2012-13.	Carina Brehony
4	P97. Invasive bacterial disease in Croatia and the role of <i>Neisseria meningitidis</i>	Suzana Bukovski
5	P98. National surveillance of serogroups and antimicrobial resistance of <i>Neisseria meningitidis</i> (Nm) isolates causing invasive disease in Argentina: Period 2006-2013	Adriana Efron
6	P99. Asymptomatic carriage of <i>Neisseria meningitidis</i> (Nm) among 18-21 year old students attending the "Universidad Nacional de la Plata" (UNLP)-Buenos Aires- Argentina between September 2012 and March 2013	Adriana Efron
7	P100. Epidemiology and surveillance of meningococcal disease in England and Wales.	Steve Gray
8	P101. Re-emergence of a <i>Neisseria meningitidis</i> serogroup A ST2859 clone in Northern Ghana after transient replacement by serogroup W ST2881 meningococci	Julia Hauser
9	P102. Retrospective characterization of meningococcal serogroup B and C outbreak strains in	Melissa Whaley
10	P103. Factors affecting vaccine uptake during mass-vaccination with the serogroup A meningococcal conjugate vaccine, MenAfriVac in Burkina Faso	Paul Kristiansen
11	P104. Transmissibility of recent isolates of <i>Neisseria gonorrhoeae</i> from Nanjing, PRC	Lisa Lewis

12	P105. Epidemiology of Serogroup B Meningococcal Disease—United States, 2005-2012	Jessica MacNeil
13	P106. Epidemiology of serogroup B meningococcal outbreaks and interim guidelines for the use of an unlicensed serogroup B vaccine under a CDC-sponsored IND for the control of outbreaks in organizational settings	Sarah Meyer
14	P107. Meningococcal disease in Ethiopia 2012-13, prior to MenAfriVac vaccination	Gunnstein Norheim
15	P108. <i>Neisseria meningitidis</i> serogroup B (NmB) clones circulating in Argentina: impact on vaccination strategies.	Cecilia Sorhouet
16	P109. Clinical course and mortality of meningococcal infections in the Netherlands between June 1999 and June 2011: results of a national representative surveillance study.	Susanne Stoof
17	P110. Comparison of two trans-isolate media for transport of CSF and growth of bacterial meningitis pathogens to improve culture confirmation	Ashley Tate

## GENE REGULATION AND GENETICS

Board #	Abstract Number and Title	Presenter
18	P111. Regulation of the <i>Neisseria gonorrhoeae</i> misSR two component system	John Kirby
19	P112. DprA is required for natural transformation, limits phase and pilin antigenic variation, and is dispensable for DNA repair in <i>Neisseria gonorrhoeae</i>	Paul Duffin
20	P113. Quantitation of proteins regulated by the RNA chaperone protein Hfq of <i>Neisseria meningitidis</i> using LC-MSE	Robert Huis in 't Veld
21	P114. Identification and characterization of novel pil RNAs and promoters of <i>Neisseria gonorrhoeae</i>	Stuart Hill
22	P115. Characterization of <i>pilE</i> gene regulation in <i>Neisseria gonorrhoeae</i>	Stuart Hill
23	P116. Translational regulation of the respiratory electron transport chain of <i>Neisseria meningitidis</i> by the Fur controlled small non-coding RNA NrrF.	Yvonne Pannekoek
24	P117. A two-component system regulates <i>pilE</i> transcription in <i>Neisseria elongata</i>	Maria Rendón
25	P118. GdhR belongs to the gonococcal MtrR regulon and is a transcriptional activator of the genes encoding GdhA glutamate dehydrogenase and GltT glutamate symporter.	Corinne Rouquette-Loughlin
26	P119. The Correia Enclosed Repeat Element: How it is affected by temperature, pH, CO <sub>2</sub> , and non-coding RNAs in the <i>Neisseria spp.</i>	Sabrina Roberts
27	P120. DNA uptake sequences in <i>Neisseria gonorrhoeae</i> as intrinsic transcriptional terminators and markers of horizontal gene transfer	Lori Snyder
28	P121. Genome sequence assembly, annotation, and comparative analysis of a potential novel serogroup of <i>Neisseria meningitidis</i>	Lori Snyder
29	P122. Epigenetic gene regulation of DNA methyltransferase in <i>Neisseria meningitidis</i>	Adeana Scott
30	P123. MtrA is a global regulator of genes in <i>N. gonorrhoeae</i> with roles in iron acquisition and glutamine metabolism	Yaramah Zalucki

## GONOCOCCAL VACCINES

Board #	Abstract Number and Title	Presenter
31	P124. Lipooligosaccharide (LOS) heptose I glycan extensions modulate the bactericidal efficacy of a monoclonal Ab directed against a gonococcal LOS vaccine epitope	Srinjoy Chakraborti
32	P125. A new approach to gonococcal vaccine development based on local induction of Th1-driven immune responses	Michael Russell
33	P126. Refinement of immunising antigens to produce antibodies capable of blocking function of the AniA nitrite reductase of <i>Neisseria gonorrhoeae</i>	Lucy Shewell
34	P127. Antibody to reduction modifiable protein (Rmp) increases the bacterial burden and the duration of gonococcal infection in a mouse model.	Sunita Gulati

## HOST DEFENSES AND IMMUNE RESPONSES

Board #	Abstract Number and Title	Presenter
35	P128. Pre-existing <i>Chlamydia</i> infection is associated with an increased risk of gonococcal infection	Sunita Gulati
36	P129. Functional analysis of the anti-factor H binding protein antibody repertoire of adults immunized with 4CMenB vaccine	Peter Beernink
37	P130. <i>N. gonorrhoeae</i> activates caspase 1 in epithelial cells	Senthil Velan Bhoopalan
38	P131. Development of an asymptomatic gonorrhea/chlamydia coinfection model	Allison Costenoble-Caherty
39	P132. <i>Neisseria gonorrhoeae</i> induces a M2 polarization of human macrophages.	Alejandro Escobar
40	P133. Immunity elicited by <i>Neisseria meningitidis</i> carriage confers broader protection than anticipated by serum antibody cross-reactivity in CEACAM1-humanized mice	Scott Gray-Owen
41	P134. The role of lipooligosaccharide phosphoethanolamine transferase A, a lipooligosaccharide-modification enzyme, in gonococcal defense against human neutrophils	Jonathan Handing
42	P135. <i>Neisseria meningitidis</i> activates NLRP3 inflammasome in human neutrophils	Berhane Idosa
43	P136. Distinct outcomes upon transcervical <i>Neisseria gonorrhoeae</i> infection of the female mouse upper genital tract during different phases of the reproductive cycle	Ephita Islam
44	P137. Use of GMMA for the generation and characterisation of monoclonal antibodies specific for the Neisserial Adhesin A (NadA)	Emma Ispasanie
45	P138. Structural analysis of lipooligosaccharides (LOS) of <i>Neisseria meningitidis</i> from patient and carrier strains reveals multiple facets of correlation of structure with pathobiology	Gary Jarvis
46	P139. Secretion of a nuclease by <i>Neisseria gonorrhoeae</i> enhances bacterial escape from killing by neutrophil extracellular traps	Richard Juneau
47	P140. Phase variable expression of <i>lptA</i> modulates resistance of <i>Neisseria gonorrhoeae</i> to cationic antimicrobial peptides	Justin Kandler

48	P141. Molecular basis of the human antibody repertoire to meningococcal factor H binding protein	Alexander Lucas
49	P142. Human transferrin increases gonococcal colonization in the lower genital tract of female mice and the neutrophil response to infection	Michelle Pilligua-Lucas
50	P143. Two lytic transglycosylases are important for <i>Neisseria gonorrhoeae</i> survival from human neutrophils	Stephanie Ragland
51	P144. <i>Neisseria gonorrhoeae</i> modulates immune cell survival through pyroptosis	Jessica Ritter
52	P145. <i>Neisseria gonorrhoeae</i> induces changes in MMP-2 and MMP-9 levels upon infection of human Fallopian tube epithelial cells	Paula Rodas
53	P146. NADPH oxidase assembly in primary human neutrophils infected with <i>Neisseria gonorrhoeae</i>	Asya Smirnov
54	P147. Seroprevalence of antibody-mediated, complement-dependent opsonophagocytic activity to <i>Neisseria meningitidis</i> serogroup B in England	Stephen Taylor
55	P148. Lipopolysaccharide engineering in <i>Neisseria meningitidis</i> : structural and functional analysis of novel lipid A variants obtained by expression of heterologous modifying enzymes	Peter van der Ley
56	P149. Host cytokine responses to <i>Neisseria gonorrhoeae</i> infection within the female genital tract of humanized mice	Lee Wetzler
57	P150. Phosphoethanolamine (PEA) modification on the lipid A moiety of <i>Neisseria gonorrhoeae</i> lipooligosaccharide reduces autophagy formation in macrophages	Susu Zughair

## MOLECULAR AND CELLULAR BIOLOGY

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58	P151. Extended glycan diversity in the O-linked protein glycosylation system linked to allelic polymorphisms and minimal genetic alterations in a glycosyltransferase gene	Bente Børud
59	P152. Spatial organization of the endothelial receptors for meningococcal type IV pili governs bacterial adhesion and signaling events	Sandrine Bourdoulous
60	P153. Exhaustive identification by high throughput screening of new meningococcal and host factors required for meningococcal pathogenesis	Elena Capel Malo
61	P154. Characterization of Neisserial autotransporter lipoprotein (NalP)	Osman Adamu Dufailu
62	P155. Molecular characterization of two capsule null locus meningococci causing invasive disease in South Africa	Karistha Ganesh
63	P156. Molecular analysis of the Type IV pilus motor proteins in commensal and pathogenic <i>Neisseria</i>	Alyson Hockenberry
64	P157. Pilus mediated bacterial aggregation is critical for optimal meningococcal endovascular colonization <i>in vivo</i> .	Olivier Join-Lambert
65	P158. Adhesion of <i>Neisseria meningitidis</i> to endothelial cells impairs the generation of the potent anticoagulant Activated Protein C through the cleavage of the Endothelial Protein C Receptor	Hervé Lécuyer
66	P159. TLR2-dependent epithelial cell activation increases cellular up-take of <i>Neisseriae</i>	Deana Toussi

67	P160. Typing and loop charges of <i>porB</i> VR of <i>Neisseria meningitidis</i> carriage and invasive isolates	Paola Massari
68	P161. Investigating the role of type IV pili retraction forces of pathogenic <i>Neisseria gonorrhoeae</i> and commensal <i>Neisseria elongata</i> during their interaction with human host cells.	Emilia Laura Munteanu
69	P162. <i>Neisseria meningitidis</i> infection causes cell cycle arrest at S phase in continuous and primary human brain endothelial cells.	Alexandra Schubert-Unkmeir
70	P163. Investigating the role of the non-integrin laminin receptor in the pathogenesis of meningococcal meningitis	Sozan Qarani
71	P164. <i>Neisseria meningitidis</i> sensing of host cells induces microcolony dispersal	Sara Sigurlasdóttir
72	P165. <i>Neisseria gonorrhoeae</i> breaches the epithelial barrier by inducing calcium flux and calcium-dependent activation of non-muscle myosin II for tissue invasion	Wenxia Song
73	P166. Quick molecular techniques to generate mutants in the <i>Neisseria</i> genus.	Ingrid Spielman
74	P167. The moonlighting functions of meningococcal fructose 1,6-bisphosphate aldolase: adhesion and plasminogen binding	David Turner
75	P168. Molecular characterization of <i>Neisseria meningitidis</i> isolates collected through Active Bacterial Core surveillance and an enhanced surveillance in the United States, 2010-11	Jeni Vuong
76	P169. Restriction endonucleases from invasive <i>N. gonorrhoeae</i> cause DNA double-strand breaks and distort mitosis in epithelial cells during infection	Linda Weyler
77	P170. Fibroblast Growth Factor1 is essential for meningococcal invasion into Human Brain Microvascular Endothelial cells	Karl Wooldridge



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