

## Curriculum Vitae

**Jennifer Lynn Edwards**  
**Date of Preparation: December 2007**  
**US Citizen**

**The Research Institute at Nationwide  
Children's Hospital  
Center for Microbial Pathogenesis, W510  
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Columbus, OH 43205  
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### Current Positions:

**Principal Investigator**, Center for Microbial Pathogenesis, The Research Institute at Nationwide Children's Hospital

**Academic Appointment at The Ohio State University**  
**Assistant Professor**, Department of Pediatrics, College of Medicine  
**Member**, The Center for Microbial Interface Biology

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### Education:

- 2004 Post-doctoral Fellowship, The University of Iowa, Iowa City, IA 52242  
Department of Internal Medicine and the Division of Infectious Diseases
- 2002 Ph.D. in Microbiology, The University of Iowa, Iowa City, IA 52242  
Mentor: Michael A. Apicella  
Thesis: "Complement Opsonization and Direct Adherence of *Neisseria gonorrhoeae* to Complement Receptor Type 3 Mediates Cervical Cell Invasion."  
\* Deans' Distinguished Dissertation Award
- 1997 M.A. in Biology, Bemidji State University, Bemidji, MN 56661  
Mentor: Patrick Guilfoile  
Thesis: "The Utility of Thiostrepton for Genetic Analysis of Mycobacteria"
- 1996 B.S. in Biology, Bemidji State University, Bemidji, MN 56661  
Honors: *magna cum laude*

### Research Positions:

- April 2002 to Sept. 2004 **Post Doctoral Fellow**, Department of Microbiology, University of Iowa, Iowa City, IA 52242
- Aug. 1997 to March 2002 **Graduate Research Assistant**, Department of Microbiology, University of Iowa, Iowa City, IA 52242
- Sept. 1996 to May 1997 **Graduate Assistant**, Department of Biology, Bemidji State University, Bemidji, MN 56661

- May 1996 to Aug. 1997      **Research Technician**, Department of Biology, Bemidji State University, Bemidji, MN 56661; Supervisor: Dr. A. Lindgren
- Oct. 1996      **Research Technician**, NASA Biological Research Projects, Brookhaven National Laboratory, New York; Supervisor: Dr. A. Lindgren
- June 1994 to May 1996      Advanced Projects in Molecular and Cellular Biology  
**Undergraduate Independent Research** Projects, Bemidji State University, Bemidji, MN
- Sept. 1994 to May 1996      **Laboratory Technician**, Bemidji State University, Bemidji, MN 56661  
Supervisor: Dr. P. Guilfoile

**Teaching Experience:**

- Autumn, 2007      **Co-instructor** for Microbiology 724, Ohio State University, Columbus OH  
  
**Presenter**, Integrated Biomedical Science Graduate Program (IBGP course 797) Seminar Series, Ohio State University
- Autumn, 2005      **Co-instructor** for Host-Microbial Interactions, Integrated Biomedical Science Graduate Program (IBGP course 851), Ohio State University
- Spring, 2004      **Co-instructor** for Pathogenic Bacteriology, the University of Iowa
- Autumn, 2003      **Co-instructor** for Biotechnology, the University of Iowa
- 1999-2001      **Graduate Assistant**, Department of Microbiology, University of Iowa  
**Classes Taught:** Pathogenic Bacteriology  
Principles of Infectious Disease  
Microbiology for Nursing Students
- 1996-1997      **Graduate Assistant**, Department of Biology, Bemidji State University  
**Classes Taught:** Biology

**Teaching Related Experience:**

- 2007-present      **Initiator and Organizer**, Bench to Outcomes Seminar Series (BOSS), The Research Institute at Nationwide Children's Hospital, Columbus OH  
  
**Discussion Leader/Supervisor**, Center for Microbial Pathogenesis Journal Club, The Research Institute at Nationwide Children's Hospital, Columbus OH
- 2005-present      **Presenter/Participant**, Center for Microbial Pathogenesis Work in Progress Meeting, The Research Institute at Nationwide Children's Hospital, Columbus OH
- 2002-2003      **Discussion Leader**, Topics in Infectious Disease  
University of Iowa, Iowa City, IA

1994-1996            **Biology and Genetics Tutor**  
Bemidji State University, Bemidji, MN

**Student Mentoring:**

**First Year Faculty Advisor:**

2006-2007            Laura Franz, IBGP

**Member, Faculty Advisory Committee for First Year IBGP Students:**

2006-2007            Shirley Luong, Chelsea Bolyard

2005-2006            Susan Richards, Rebecca Allen

**Graduate Rotation Students:**

2006-2007            Amber Nagy, Bryan Anthony

2005-2006            Susie Richards, Amanda Beltramini

**Undergraduate Students:**

2005                    Ryan Hard, Ohio Northern University; Sarita Maturu, University of Cincinnati

**Member Candidate Dissertation Committee:**

2006                    Susie Richards, Integrated Biomedical Science Graduate Program

                          Mentor: Dr. J. Gunn

Corey Clay, Medical Scientist Program/ Integrated Biomedical Science Graduate Program

                          Mentor: Dr. L. Schlesinger, Dr. J. Gunn

Amanda Burnaugh, Integrated Biomedical Science Graduate Program

(transferred to the Department of Pathology, Masters Graduate Program, November 2007)

                          Mentor: Dr. S. King

**Member Dissertation Committee:**

2007                    Amanda Burnaugh, Department of Pathology, Masters Graduate Program

                          Mentor: Dr. S. King

**Professional Affiliations:**

2004 to present        Center for Microbial Interface Biology, The Ohio State University

1995 to present        American Society for Microbiology

1999 to 2005 Iowa Microscopy Society

**Service:**

2007 \***Initiator and Organizer**, Bench to Outcomes Seminar Series (BOSS), The Research Institute at Nationwide Children's Hospital, Columbus OH  
\***Member**, CCRI Retreat Planning Committee  
\***Judge**, Sixth Annual Ohio State University Medical College Graduate and Postgraduate Research Day  
\***Judge**, College of Medicine Future Physician Scientist Award  
\***Judge**, Center for Microbial Interface Biology Retreat  
\***Interviewer**; IBGP student applicants

2006 \***Participant**, Girls are Great! Columbus Children's Hospital  
\***Judge**, Fifth Annual Ohio State University Medical College Graduate and Postgraduate Research Day  
\***Graduate Faculty Representative** – Doctoral Exam Committee Environmental Science Graduate Program  
\***Interviewer**; IBGP student applicants

2005 \***Participant**, Girls are Great! Columbus Children's Hospital  
\***Judge**, Fourth Annual Ohio State University Medical College Graduate and Postgraduate Research Day  
\***Judge**, College of Medicine Future Physician Scientist Award  
\***Interviewer**; IBGP student applicants

***Ad hoc* Reviewer:**

Cellular Microbiology  
Infection and Immunity  
Clinical and Vaccine Immunology

**Honors and Awards:**

2007 \* Young Investigator Award, Columbus Children's Research Institute Intramural Research Support Award  
\* Selected for *Who's Who in America*; Marquis Who's Who Selection Committee

2006 \* International Pathogenic *Neisseria* Conference; Cairns, QLD, Australia. Abstract selected for Plenary Session presentation

2004 \* International Pathogenic *Neisseria* Conference; Milwaukee, Wisconsin Abstract selected for Plenary Session presentation  
\* Igor Stojiljkovic/Raoul Rosenthal Memorial Travel Award, International Pathogenic *Neisseria* Conference Organizing Committee

2003 \* Deans' Distinguished Dissertation Award, University of Iowa, Graduate College,

“...a special, occasional, award presented to scholars who have submitted superior dissertations...” to the Graduate College  
\* 2001-2003 D. C. Spriestersbach Dissertation Prize Department of Microbiology nominee for The University of Iowa, a precursory award to the Council of Graduate Schools/University Microfilms International Distinguished Dissertation Award.

- 2002
  - \* NIH Post-doctoral Fellowship, University of Iowa, Department of Internal Medicine
  - \* International Pathogenic *Neisseria* Conference; Oslo, Norway  
Abstract selected for Plenary Session presentation
  - \* NIH Post-doctoral Fellowship, University of Iowa, Division of Infectious Diseases
  
- 2001
  - \* First place poster competition, University of Iowa, College of Medicine Research Week
  - \* First place poster competition, University of Iowa, Graduate School Student Forum
  - \* Richard and Mary Finkelstein Student Travel Grant, American Society for Microbiology General Meeting, Orlando, FL; one of six awards given annually to students demonstrating excellence in the area of microbial pathogenesis
  
- 2000
  - \* International Pathogenic *Neisseria* Conference; Galveston, TX  
Abstract selected for Plenary Session presentation
  - \* Rachel Mason Travel Grant, University of Iowa, Department of Microbiology
  - \* First place poster competition, Iowa Microscopy Society Annual Meeting
  - \* Abstract selected for American Society for Microbiology General Meeting Press Release
  - \* NIH Pre-doctoral Research Training Grant, University of Iowa, Department of Internal Medicine
  
- 1999
  - \* Iowa Microscopy Society Annual Meeting, Guest Speaker in Recognition of Outstanding Performance as a Student Researcher
  
- 1996 -97
  - \* Teaching Assistantship, Bemidji State University, Department of Biology
  
- 1993-96
  - \* Dean’s List, every quarter of attendance, Bemidji State University, Bemidji, MN
  
- 1995
  - \* Biology Departmental Merit Award
  - \* Fishing for Fun Scholarship
  - \* Alliss Educational Foundation Scholarship, Bemidji State University, Bemidji, MN
  
- 1994
  - \* Biology Departmental Merit Award
  - \* Alliss Educational Foundation Scholarship, Bemidji State University, Bemidji, MN

### **Publications:**

Hamilton, H. L., **J. L. Edwards**, M. A. Apicella, and J. P. Dillard (2007) *Neisseria gonorrhoeae* type

IV secretion system mutants are delayed in adherence and hyper-aggregate on host cells. (*In preparation for submission to Infect. Immun.*)

Potter, A. J., S. P. Kidd, **J. L. Edwards**, M. Falsetta, M. A. Apicella, M. P. Jennings and A. G. McEwan (2007) Thioredoxin reductase is essential for defense of *Neisseria gonorrhoeae* against oxidative stress and for survival of the pathogen during interactions with cervical epithelial cells. (*In preparation for submission to J. Infect. Dis.*)

M. P. Jennings, M. A. Apicella, and **Edwards, J. L.** (2007) Pilin glycosylation modulates CR3-mediated *Neisseria gonorrhoeae* infection of primary, human, cervical epithelial cells. (*In preparation for submission to Cell. Microbiol.*)

**Edwards, J. L.** (2007) Progesterone augments CR3-mediated *Neisseria gonorrhoeae* infection of primary, human, cervical epithelial cells. (*In preparation for submission to Cell. Microbiol.*)

Srikhanta, Y. N., K. L. Seib, H.-J.Wu, **J. L. Edwards**, M. L. Falsetta, T. L. Maguire, S. M. Grimmond, M. A. Apicella, and M. P. Jennings (*Submitted*) Phasevarion mediated differentiation of *Neisseria gonorrhoeae* into cell types with distinct properties in model systems of colonization and infection. *Proc. Natl. Acad. Sci.*

Lim, K. H. L, C. E. Jones, R. N. vanden Hoven, **J. L. Edwards**, M. A. Apicella, M. P. Jennings and A. G. McEwan (*Submitted*) Metal binding specificity of the MntABC permease system of *Neisseria gonorrhoeae* and its role in cell growth and survival. *Infect. Immun.*

**Edwards, J. L.** (2007) Gender Differences in *Neisseria gonorrhoeae* Pathogenesis, p. 149-173, in Virulence Mechanisms of Bacterial Pathogens, 4<sup>th</sup> Ed, American Society for Microbiology Press, Washington D. C., K. Brogden, Editor.

Seib, K. L., H.-J.Wu, Y. Srikhanta, **J. L. Edwards**, T. L. Maguire, S. M. Grimmond, M. A. Apicella, A. G. McEwan, and M. P. Jennings (2007) Characterization of the OxyR regulon of *N. gonorrhoeae*. *Mol. Microbiol.* 63:54-68

**Edwards, J. L.** and M. A. Apicella. (2006) *Neisseria gonorrhoeae* PLD directly interacts with Akt kinase upon infection of primary, human, cervical epithelial cells. *Cell. Microbiol.* 8:1253-1271.

Tseng, H.-J. , Y. Srikhanta, **J. L. Edwards**, M. A. Apicella, and M. P. Jennings (2006) The PerR regulon controls Mn-dependent resistance to oxidative stress in *Neisseria gonorrhoeae*. *Mol. Microbiol.* 60:401-416.

Wu, H.-J. , K. L. Seib, **J. L. Edwards**, M. A. Apicella, A. G. McEwan, and M. P. Jennings (2005) Azurin of pathogenic *Neisseria* is involved in defense against hydrogen peroxide and survival within cervical epithelial cells. *Infect. Immun.* 73:8444-8448.

**Edwards, J. L.** and M. A. Apicella. (2005) I-domain-containing integrins serve as pilus receptors for *Neisseria gonorrhoeae* adherence to human epithelial cells. *Cell. Microbiol.* 7:1197-1211.

L. L. Greiner, **J. L. Edwards**, C. A. Rabinak, J. Q. Shao, and M. A. Apicella. (2005) Biofilm formation by *Neisseria gonorrhoeae*. *Infect. Immun.* 73:1964-1970. (Greiner and Edwards are co-first authors)

**Edwards, J. L.** and M. A. Apicella (2004) *Neisseria gonorrhoeae*: The molecular mechanisms that initiate infection differ between men and women. *Clin. Microbiol. Rev.* 17:965-981.

**Edwards, J. L.**, H. A. Harvey, and M. A. Apicella. (2004) *Neisseria gonorrhoeae*: The varying mechanism of pathogenesis in males and females, p. 203-238, in Bacterial Invasion of Host Cells, Cambridge University Press, Richard Lamont, Editor.

**Edwards, J. L.**, D. D. Entz, and M. A. Apicella (2003) Gonococcal phospholipase D modulates the expression and function of complement receptor 3 in primary cervical epithelial cells. *Infect. Immun.* 71:6381-6391.

**Edwards, J. L.** and M. A. Apicella (2002) The role of lipooligosaccharide in *Neisseria gonorrhoeae* pathogenesis of cervical epithelia: lipid A serves as a C3 acceptor molecule. *Cell. Microbiol.* 4: 584-598.

**Edwards, J. L.**, E. J. Brown, S. Uk-Nham, J. G. Cannon, M. S. Blake, and M. A. Apicella (2002) A co-operative interaction between *Neisseria gonorrhoeae* and complement receptor 3 mediates infection of primary cervical epithelial cells. *Cell. Microbiol.* 4: 571-584.

**Edwards, J. L.**, E. J. Brown, K. A. Ault, and M. A. Apicella (2001) The role of complement receptor 3 (CR3) in *Neisseria gonorrhoeae* infection of human cervical epithelia. *Cell. Microbiol.* 3:611-622.

**Edwards, J. L.**, J. Q. Shao, K. A. Ault, and M. A. Apicella (2000) *Neisseria gonorrhoeae* elicits membrane ruffling and cytoskeletal rearrangements upon infection of primary human endocervical and ectocervical cells. *Infect. Immun.* 68: 5354-5363.

Wen, K.-K., P. C. Giardina, M. S. Blake, **J. L. Edwards**, M. A. Apicella, and P. A. Rubenstein (2000) Interaction of the gonococcal porin P.IB with G- and F-actin. *Biochem.* 39: 8638-8647.

### **Abstracts:**

Edwards, J. L. (2006) Hormonal Modulation of CR3-mediated *Neisseria gonorrhoeae* Infection of Primary, Human, Cervical Epithelial Cells. **Poster Presentation**, 13th Annual Midwest Microbial Pathogenesis Meeting, Cincinnati, OH.

Dominguez, N. M., H. L. Hamilton, **J. L. Edwards**, M. A. Apicella, and J. P. Dillard (2005) Integration and Excision of the Gonococcal Genetic Island of *Neisseria gonorrhoeae*. **Poster Presentation**, 105<sup>th</sup> General Meeting of the American Society for Microbiology, Atlanta, GA.

**Edwards, J. L.** and M. A. Apicella. (2004) I-domain-containing alpha integrins serve as pilin receptors for *Neisseria gonorrhoeae* adherence to human epithelial cells. **Poster Presentation**, Fourteenth International Pathogenic *Neisseria* Conference, Milwaukee, WI.

Dominquez, N. M., H. L. Hamilton, **J. L. Edwards**, M. A. Apicella, and J. P. Dillard (2004) The gonococcal genetic island of *Neisseria gonorrhoeae*: a mobile genetic element. **Poster Presentation**, Fourteenth International Pathogenic *Neisseria* Conference, Milwaukee, WI.

Hamilton, H. L., **J. L. Edwards**, M. A. Apicella, and J. P. Dillard (2004) The gonococcal genetic island-encoded type IV secretion system is involved in infection. **Poster Presentation**, Fourteenth International Pathogenic *Neisseria* Conference, Milwaukee, WI.

**Edwards, J. L.** and M. A. Apicella. (2004) Signal Transduction Events Triggered by *Neisseria gonorrhoeae* Engagement of CR3 on Cervical Epithelia are Modulated by Gonococcal PLD. **Poster Presentation**, 104<sup>th</sup> General Meeting of the American Society for Microbiology, New Orleans, LA.

Hamilton, H. L., N. M. Dominquez, **J. L. Edwards**, M. A. Apicella, and J. P. Dillard (2004) Interactions of *Neisseria gonorrhoeae* with the host: a role for the gonococcal genetic island-encoded type IV secretion system in infection. **Poster Presentation**, 104<sup>th</sup> General Meeting of the American Society for Microbiology, New Orleans, LA.

**Edwards, J. L.**, D. Entz, and M. A. Apicella (2003) The modulatory role of *Neisseria gonorrhoeae* PLD in complement receptor 3-mediated pathogenesis of primary, human, cervical epithelia. **Poster Presentation**, Tenth Annual Midwest Microbial Pathogenesis Meeting, Iowa City, IA.

Hamilton, H. L., **J. L. Edwards**, M. A. Apicella, and J. P. Dillard (2003) The type IV secretion system of *Neisseria gonorrhoeae* is involved in DNA secretion and bacteria-host cell interactions. **Poster Presentation**, Tenth Annual Midwest Microbial Pathogenesis Meeting, Iowa City, IA.

Hamilton, H. L., J. M. Skarie, **J. L. Edwards**, M. A. Apicella, and J. P. Dillard (2003) The Type IV secretion system of *Neisseria gonorrhoeae* secretes DNA and is involved in host cell interactions. **Poster Presentation**, 103<sup>rd</sup> General Meeting of the American Society for Microbiology, Washington, DC.

**Edwards, J. L.**, D. Entz, and M. A. Apicella (2002) *Neisseria gonorrhoeae* specifically release a phospholipase D homolog that augments CR3-mediated cervical cell infection. **Poster Presentation**, Ninth Annual Midwest Microbial Pathogenesis Meeting, Indianapolis, IN.

Hamilton, H. L., J. M. Skarie, **J. L. Edwards**, M. A. Apicella, and J. P. Dillard (2002) Type IV secretion system mutants of *Neisseria gonorrhoeae* are deficient in DNA secretion and show altered interactions with host cells. **Poster Presentation**, Thirteenth International Pathogenic *Neisseria* Conference, Oslo, Norway.

**Edwards, J. L.**, E. J. Brown, S. Uk-Nham, J. G. Cannon, M. S. Blake, and M. A. Apicella (2002) Opsonic and non-opsonic interactions occur between *Neisseria gonorrhoeae* and complement receptor 3 on primary cervical epithelial cells. **Poster Presentation**, 102<sup>nd</sup> General Meeting of the American Society for Microbiology, Salt Lake City, UT.

Dillard, J. P., H. L. Hamilton, K. A. Cloud, K. J. Schwartz, **J. L. Edwards**, and M. A. Apicella (2002) Sequence and mutational analysis of the 60 kb gonococcal genetic island. **Poster Presentation**, Molecular Genetics of Bacteria and Phages Annual Meeting, Cold Spring Harbor Laboratory, NY.

**Edwards, J. L.** and M. A. Apicella (2001) The specific interaction of *Neisseria gonorrhoeae* with complement receptor type 3 (CR3) on primary cervical epithelial cells. **Poster Presentation**, Eighth Annual Midwest Microbial Pathogenesis Meeting, Champaign/Urbana, IL.

**Edwards, J. L.**, J. Shao, K. Ault, E. J. Brown, M. A. Apicella (2001) Complement receptor type 3 (CR3) on primary cervical epithelial cells serves as a receptor for *Neisseria gonorrhoeae*. **Poster Presentation**, 101<sup>st</sup> General Meeting of the American Society for Microbiology, Orlando, FL.

**Edwards, J. L.,** J. Shao, K. Ault, and M. A. Apicella (2000) Studies on the invasion of primary human cervical epithelial cells by *Neisseria gonorrhoeae*. **Poster Presentation**, 100<sup>th</sup> General Meeting of the American Society for Microbiology, Los Angeles, CA.

Zenni, M. K., **J. L. Edwards**, J. Q. Shao, M. R. Ketterer, R. D. Williams, and M. A. Apicella (1999) CD66 carcinoembryonic antigens as receptors for *Neisseria gonorrhoeae* in human urethral epithelial cell systems. **Poster Presentation**, 94<sup>th</sup> Annual Meeting of the American Urological Association, Dallas, TX, 1999.

Invited Press Release:

**Edwards, J. L.** and M. A. Apicella (2000) Ruffles and ribbons: studies of gonococcal infection in a model of the lower female genital tract. **Press Release**, 100<sup>th</sup> General Meeting of the American Society for Microbiology, Los Angeles, CA.

**Other Creative Works Pertinent to Professional Focus:**

US Patent # 7250172 Vaccine and Compositions for the Prevention and Treatment of Neisserial Infections. Approval date: July 31, 2007; Apicella, M.A., **J. L. Edwards**, B. W. Gibson, and K. Scheffler.

US Patent # 7261901 Vaccine and Compositions for the Prevention and Treatment of Neisserial Infections. Approval date: August 28, 2007; Apicella, M.A. and **J. L. Edwards**

**Invited and Oral Presentations:**

The role of *Neisseria gonorrhoeae* PLD in cervical cell infection. FASEB Summer Research Conference: Phospholipid metabolism: disease, signal transduction, and membrane dynamics. New Haven, CT. To be presented July 2008.

Gonococcal nitric oxide respiratory and detoxification mechanisms contribute to infection of primary cervical epithelial cells. The Department of Microbiology and Molecular Genetics, Michigan State University, East Lansing, MI. October 2007.

Progesterone and nitric oxide augment gonococcal cervical infection. Children's Health Research Center Seminar Series. Columbus, OH. October 2007.

Nitric oxide promotes *Neisseria gonorrhoeae* infection of primary cervical epithelial cells. 14th Annual Midwest Microbial Pathogenesis Meeting, Chicago, IL. September 2007.

Hormonal Modulation of CR3-mediated *Neisseria gonorrhoeae* Infection of Primary, Human, Cervical Epithelial Cells. Fifteenth International Pathogenic *Neisseria* Conference, Cairns, QLD, Australia. September 2006.

Gonococcal PLD and signaling events triggered by *Neisseria gonorrhoeae* infection of primary cervical epithelial cells. Fourteenth International Pathogenic *Neisseria* Conference, Milwaukee, WI. September 2004.

The Modulatory Role of *Neisseria gonorrhoeae* PLD in Complement Receptor 3-mediated Pathogenesis of Primary, Human, Cervical Epithelia. Children's Research Institute. Columbus, OH. November 2003.

Complement opsonization and direct adherence of *Neisseria gonorrhoeae* to complement receptor 3 mediate cervical cell invasion. Wyeth Vaccines Research. Pearl River, NY. August 2003.

Gonococcal PLD modulates CR3-dependent infection of cervical epithelia. Wyeth Vaccines Research. Rochester, NY. July 2003

Neisserial phospholipase D: a novel, secreted, virulence factor in gonococcal cervicitis. The Department of Internal Medicine, Division of Infectious Disease Seminar Series, Iowa City, IA. February, 2003.

*Neisseria gonorrhoeae* directly binds to the I-domain of complement receptor 3 on primary cervical epithelial cells. Thirteenth International Pathogenic *Neisseria* Conference, Oslo, Norway. September 2002.

The specific interaction of the gonococcus with complement receptor type 3 (CR3) on primary cervical epithelial cells. Mechanisms of Parasitism and Infectious Diseases Research Retreat, Iowa City, IA. August 2002.

The role of the alternative complement pathway in the interaction of the gonococcus with CR3 on primary cervical epithelial cells. The Department of Internal Medicine Inflammation Group Seminar Series, Iowa City, IA. May, 2001.

Cellular studies on the invasion of primary cervical epithelial cells by *Neisseria gonorrhoeae*. Twelfth International Pathogenic *Neisseria* Conference, Galveston, TX. November 2000.

Studies of the interaction of *Neisseria gonorrhoeae* with primary human cervical epithelial cells. Iowa Microscopy Society Annual Meeting, Iowa City, IA. September 1999.