

Mark E. Shirliff, Ph.D.

Associate Professor, Department of Microbial Pathogenesis, School of Dentistry,
Univ. of Maryland–Baltimore, Baltimore, Maryland, U.S.A.

Associate Professor, Department of Microbiology and Immunology, School of Medicine,
Univ. of Maryland–Baltimore, Baltimore, Maryland, U.S.A.

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CONTACT INFORMATION

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EDUCATION

January 2001 - Ph.D. in Microbiology and Immunology
Univ. of Texas Medical Branch, Galveston, TX, USA
Dissertation Title, “*Staphylococcus aureus*: Roles in Osteomyelitis”
Advisor: Dr. JT Mader

May 1993 - B.S. (Cum Laude Honors)
Univ. of Houston - Clear Lake, Houston, TX, USA
Junior and Senior Years
Major: Biology; Minor: Geography
&
Univ. of Alberta, Edmonton, AB, Canada
Freshman and Sophomore Years
Major: Biology; Minor: Geography

EMPLOYMENT HISTORY

Academic /Administrative Appointments in Higher Education

<i>Associate Professor with Tenure (Primary Appointment)</i>	Baltimore, MD
Department of Microbial Pathogenesis	<i>July 2009 - present</i>
School of Dentistry, Univ. of Maryland – Baltimore	
<i>Adjunct Associate Professor (Secondary Appointment)</i>	Baltimore, MD
Department of Microbiology and Immunology	<i>Jan 2010 - present</i>
School of Medicine, Univ. of Maryland – Baltimore	
<i>Assistant Professor</i>	Baltimore, MD
Department of Microbial Pathogenesis	<i>Sept 2003 – July 2009</i>
Department of Biomedical Sciences (Div. of Microbial Pathogenesis)	
School of Dentistry, Univ. of Maryland – Baltimore	

EMPLOYMENT HISTORY,

Academic /Administrative Appointments in Higher Education...continued

<i>Adjunct Assistant Professor</i> Department of Microbiology and Immunology School of Medicine, Univ. of Maryland – Baltimore	Baltimore, MD <i>Jan 2004 – Jan 2010</i>
<i>Assistant Research Professor</i> Department of Microbiology & The Center for Biofilm Engineering Montana State Univ. Advisor: Dr. J. W. Costerton	Bozeman, MT <i>Oct 2002 - Aug 2003</i>
<i>Postdoctoral Fellow</i> Center for Biofilm Engineering Montana State Univ. Advisor: Dr. AK Camper	Bozeman, MT <i>Oct 2000 - Oct 2002</i>
<i>Graduate Student and Research Assistant</i> Dept. of Microbiology and Immunology U of Texas Medical Branch Coadvisor: Dr. DW Niesel	Galveston, TX <i>Jan 1997 - Sept 2000</i>
<i>Graduate Student and Laboratory Director</i> Dept. of Marine Biomedical Institute U of Texas Medical Branch Advisor: Dr. JT Mader	Galveston, TX <i>Sept 1995 - Sept 2000</i>
<i>Laboratory Director</i> Dept. of Marine Biomedical Institute U of Texas Medical Branch Advisor: Dr. JT Mader	Galveston, TX <i>April 1995 - Sept 2000</i>
<i>Research Assistant</i> Dept. of Microbiology and Immunology U of Texas Medical Branch Supervisor: Dr. CP Davis	Galveston, TX <i>June 1993 - April 1995</i>

Experience other than Higher Education

Industry Consultant

Goodell, Devries, Leech, & Dan, LLP. 2012 – Present.
Stryker Inc. 2002 – Present.
Sedgewick, LLP. 2012 – 2013.
Twin Star Medical. 2012.
Atrium Medical Corporation. 2012.
Affinergy. 2008.
Shook, Hardy, and Bacon. 2007 – 2009.
Microbiotix. 2006 – 2008.
Targanta. 2006.
Synthes. 2005 – 2007.
Howmedica. 2002 – 2004.
Genome Therapeutics. 2002.

Major Teaching Responsibilities in Higher Education

Undergraduate:

Lecturer, BIO354 – Microbiology and Immunology, Goucher College. *Fall, 2010 – 2014.*

Lecturer, Molecular Techniques - Bioprocesses in Engineering. College of Engineering, Montana State Univ. *Spring, 2002.*

Supervision and mentoring of >40 undergraduate and post-graduate students in laboratory

Graduate:

Director, Oral Examination Committee, Molecular Microbiology and Immunology, Graduate Program in Life Sciences, Univ. of Maryland, Baltimore. 57 Hours/yr. 12 Students. *Spring 2015 – present.*

Course Director and Instructor, MICP 521 – General & Orofacial Infectious Diseases, Univ. of Maryland, Baltimore. 4.5 Hours/yr. 130 Students. *Fall, 2009 – present.*

Course Director and Instructor, MICP 521a – Translational Research Conferences on General & Orofacial Infectious Diseases, Univ. of Maryland, Baltimore. 20 Hours/yr. 260 Students. *Fall, 2009 – present.*

Instructor, GPLS725 – Advanced Microbial Pathogenesis, Graduate Program in Life Sciences, Univ. of Maryland, Baltimore. 3 Hours/yr. *Fall, 2011 – present.*

Course Director and Instructor, GPLS710 – Principles of Microbial Pathogenesis, Graduate Program in Life Sciences, Univ. of Maryland, Baltimore. 4 Hours/yr. *Spring, 2005 – present.*

Instructor, MCO506 – Prokaryotic and Eukaryotic Cell Biology and Genetics, Uniformed Services Univ., Washington D.C. 4 Hours/yr. *Fall, 2014 – present.*

Instructor, MCO503 – Cellular and Molecular Immunology, Uniformed Services Univ., Washington, D.C. 2 Hours/yr. *Fall, 2012 – present.*

Instructor, MSPR 520 – Host Defenses and Infectious Diseases, Univ. of Maryland, Baltimore. 1 Hour/yr. *Fall, 2010 – present.*

Instructor, BSCI 518C – Case Based Conferences, Univ. of Maryland, Baltimore. 3 Hours/yr. *Fall, 2008 – present.*

Instructor, MSPR 520 – Host Defenses and Infectious Diseases, Small Group Study, Univ. of Maryland, Baltimore. 1.5 Hours/yr. *Fall, 2006 – present.*

Instructor, ODSC-511C – (Previously BSCI-511) – Cell and Molecular Biology, Univ. of Maryland, Baltimore. 1 Hour/yr. *Fall 2006 – present.*

Instructor, MICP511 (Previously DBMS 511M) – Microbiology and Immunology, Univ. of Maryland, Baltimore. 2 Hours/yr *Spring 2004 - present.*

Instructor, MCB 602 – Molecular Cell Biology, Univ. of Maryland, Baltimore. *Spring, 2006.*

Instructor, DBMS 619 – Seminars in Biomedical Sciences, Univ. of Maryland, Baltimore. *Fall, 2005 – 2009.*

Instructor, DBMS 635 – Bacterial Genetics, Univ. of Maryland, Baltimore. *Fall 2004 – 2008.*

Instructor, DBMS 604 – Introduction to Biomedical Sciences, Univ. of Maryland, Baltimore. *Fall 2004 –2007.*

Instructor, DPDM 518 – Asepsis Microbiology Assessment, Univ. of Maryland, Baltimore. *Fall, 2004.*

Instructor, Proteomics: Methods and Applications Workshop. La Sapienza Univ., Rome, Italy. *March 27 – April 7, 2004.*

Instructor, Biofilms Techniques Workshop. Univ. of Concepcion, Concepcion, Chile. *January 8 – 20, 2004.*

Major Teaching Responsibilities in Higher Education...*continued.*

Graduate...continued:

Lecturer, Molecular Techniques, Veterinary Molecular Biology, Montana State Univ., *Spring, 2003.*

Lecturer, A Course in Biocompatibility, Aalborg Univ., Denmark, *April 7-9, 2003.*

Laboratory Instructor, Medical Microbiology, Department of Microbiology and Immunology, Univ. of Texas Medical Branch. *1998.*

Laboratory Instructor, Medical Microbiology, Department of Microbiology and Immunology, Univ. of Texas Medical Branch. *1997.*

International Graduate:

Instructor, Bacterial Biofilms and Their Role in Chronic Infections. The Panum Institute, Faculty Of Health Sciences, Univ. of Copenhagen, Copenhagen, Denmark. 20 Hours/yr. *Fall, 2012 – present.*

Instructor, The Host Immune Response to *Candida albicans* Infections. Microbiology and Immunology. The Panum Institute, Faculty Of Health Sciences, Univ. of Copenhagen, Copenhagen, Denmark. 2 Hours/yr. *Fall, 2014 – present.*

HONORS

Teaching Commendation in Host Defenses and Infectious Diseases by the Class of 2016, University of Maryland School of Medicine. 2013.

Outstanding Researcher of the Year, Center Biofilm Engineering 2002.

Christina Fleischmann Award, U of TX Medical Branch. *2000.*

Curtis W. Lambert Academic Scholarship Award, U of TX Medical Branch (2000)

Arthur V. Simmang Academic Scholarship, U of TX Medical Branch (1999)

Elected to Sigma Xi scientific honors society (1998)

Cum Laude Honors, Univ. of Houston (1994)

Information Sciences Academic Scholarship, Univ. of Houston (1993)

PRODUCTIVITY MEASURES

h-index = 36

The h-index is an index that attempts to measure both the productivity and impact of the published work of a scientist or scholar. The index is based on the set of the scientist's most cited papers and the number of citations that they have received in other publications.

I-10 index = 71

The i10-index indicates the number of academic publications an author has written that have at least ten citations.

Citations = 5562

PROFESSIONAL ACTIVITIES AND SERVICE

Local and National Service:

Local:

President, American Society for Microbiology, Maryland Division. *2007–2008.*
Graduate Council, Univ. of Maryland, Baltimore and Univ. of Maryland, Baltimore County. *2007–2008.*
Presenter, Univ. of Maryland School of Dentistry, 20th Annual High School Biomedical Research Program. Univ. of Maryland, Baltimore. *2008.*
Seminar Coordinator, Department of Biomedical Sciences. School of Dentistry. Univ. of Maryland, Baltimore. *2005–2008.*
Center for Biofilm Engineering Seminar Coordinator. *2000–2003.*
President, Forest Bend Fire Department. *1997–1998, 1999–2000.*
President, Theta Chi Fraternity. *1989–1990.*

National:

Meeting Organizing Committee. European Society of Clinical Microbiology and Infectious Diseases. Istanbul, Turkey. April 9-14, 2016.
Meeting Organizing Committee. ASM Animal Workshop, American Society for Microbiology, 7th Conference on Biofilms. Chicago, IL. October 24-29, 2015.
Meeting Organizing Committee. 1st ASM Conference on Polymicrobial Infections. Washington, DC. November 13-16, 2014.

Professional Society Membership:

International Society of Microbial Ecology. *2005–present.*
American Society for Microbiology – Maryland Branch. *2004–present.*
Member, Sigma Xi (elected). *1998–present.*
American Society for Microbiology. *1998–present.*

Editorial Responsibilities:

Editor

Senior Editors, Springer Series on Biofilms. Springer, New York, NY. *2009–present.*
Eurobiofilms. *FEMS Immunol. Med. Micro.* *2010.*
Biofilms and Device-Related Infections. In: Springer Series on Biofilms. Senior Editor, Costerton JW. Springer, New York, NY. *2009.*

Grant Reviewer

NIH, NIAID, Special Emphasis Panel/Scientific Review Group 2014/05 ZAI1 SM-M (M1). *2014.*
NIH, NIAID, Special Emphasis Panel/Scientific Review Group 2013/10 ZRG1 IDM-V (02) M. *2013.*
NIH, NIDCR. Special Emphasis Panel/Scientific Review Group 2010/08 ZDE1 JH (19). *2010.*
NIH, NIAID, BACP – Bacterial Pathogenesis Study Section. *2008.*
NIH, NIAID, 2008/10 ZRG1 BACP-H (02) S - Bacterial Pathogenesis. *2008.*
National Science Foundation. *2003–2006.*
Technology Foundation, Government of the Netherlands. *2002–2003.*
Katholieke Universiteit Leuven, Belgium. *2002–2003.*

PROFESSIONAL ACTIVITIES AND SERVICE..CONTINUED

Editorial Responsibilities...continued:

Journal Reviewer

mBio – 2014 – present.
Journal of Clinical Investigation – 2013 – present.
Pathogens and Disease – 2013 – present.
Journal of Infectious Diseases – 2012 – present.
Journal of Immunology – 2012 – present.
Microbiology – 2012 – present.
PLoS Pathogens. 2012 – present.
PLoS One – 2010 – present.
Journal of Bacteriology. 2007 – present.
Applied and Environmental Microbiology. 2007 – present.
Infection and Immunity. 2006 – present.
Microbes and Infection. 2006 – present.
Antimicrobial Agents and Chemotherapy.
Yonsei Medical Journal. 2006 – present.
FEMS Immunology and Medical Microbiology. 2003 – present.
JAMA. 2005 – present.
Annals of Clinical Microbiology and Antimicrobials. 2003 – present.
Journal of Bacteriology. 2003 – present.
Mayo Clinic Reviews. 2002 – present.
Molecular Microbiology. 2002 – present.

Dental School and Campus Service Activities

APT Committee, Department of Microbial Pathogenesis, School of Dentistry, Univ. of Maryland, Baltimore. 2010 – present.
Chair, Oral Exam Committee, Graduate Program in Life Science, Molecular Microbiology and Immunology, Univ. of Maryland, Baltimore. 2007 – present.
Space Committee. School of Dentistry. Univ. of Maryland, Baltimore. 2010 – present.
Ad hoc Chair, Department of Microbial Pathogenesis. UMB-SOD, 2012-2015.
Chair, Search Committee, Department of Microbial Pathogenesis, School of Dentistry, Univ. of Maryland, Baltimore. 2013-2014.
Admissions Committee, Graduate Program in Life Science, Molecular Microbiology and Immunology, Univ. of Maryland, Baltimore. 2005 – 2013.
Institutional Animal Care and Use Committee, School of Dentistry. Univ. of Maryland, Baltimore. 2010 – 2012.
Curriculum Development Committee. School of Dentistry, Univ. of Maryland, Baltimore. 2008 – 2011.
Search Committee. Chair of Orthodontics, School of Dentistry, Univ. of Maryland, Baltimore, 2011.
Class Advisor, School of Dentistry. Univ. of Maryland, Baltimore. 2006 – 2010.
Chair, Graduate Program in Life Sciences Awards Committee, Graduate School, Univ. of Maryland, Baltimore. 2009.

PROFESSIONAL ACTIVITIES AND SERVICE..CONTINUED

Dental School and Campus Service Activities...continued

Preclinical Progression Committee. Univ. of Maryland, Baltimore and Univ. of Maryland, Baltimore County. 2007 – 2008.

Advanced Dental and Graduate Education Committee. Univ. of Maryland, Baltimore and Univ. of Maryland, Baltimore County. 2007 – 2008.

Faculty Search Committee, Department of Biomedical Sciences. School of Dentistry. Univ. of Maryland, Baltimore. 2006 – 2008.

Graduate Comprehensive Exam Committee, Department of Biomedical Sciences. School of Dentistry. Univ. of Maryland, Baltimore. 2004 – 2008.

Summer Undergraduate Research Program Admissions Committee, Department of Biomedical Sciences, School of Dentistry, Univ. of Maryland, Baltimore. 2007.

Theses and Dissertations Directed (10 Students)

Devon Allison, D.D.S., Ph.D., Microbiology and Immunology, Univ. of Maryland, Baltimore – in progress (Major advisor).

Jeffrey Freiberg, M.D., Ph.D., Microbiology and Immunology, Univ. of Maryland, Baltimore – in progress (Major advisor).

Patrick Kerns, M.D., Ph.D., Microbiology and Immunology, Univ. of Maryland, Baltimore – 2013 (Major advisor). Present position: Returned to Medical School for final two years of M.D. training.

Salar Sanjari, M.S., D.D.S., Department of Microbial Pathogenesis, Univ. of Maryland, Baltimore, – 2014 (Major advisor). Present position: Endodontic Resident – Temple Univ.

Nathan Archer, Ph.D., Microbiology and Immunology, Univ. of Maryland, Baltimore – 2013 (Major advisor). Present position: Postdoctoral fellow, Johns Hopkins.

Anna Muench, Howard Hughes Fellow, Department of Microbial Pathogenesis, Univ. of Maryland, Baltimore – 2012 (Major advisor). Present position: Orthodontist and Partner at Dr. Mairead O'Reilly and Associates.

Brian Peters, Ph.D., Molecular Microbiology and Immunology, Graduate Program in Life Sciences, Univ. of Maryland, Baltimore – 2010 (Major advisor). Elaine Miye Otani Award (Top award given to the outstanding PhD Student across the Univ. of MD—Baltimore campus (2010). Ollie Eylar Award (Outstanding Graduate Student, MMI Dept.) – Univ. of MD—Baltimore (2010). Present position: Assistant Professor, University of Tennessee.

Ranjani Prabhakara, Ph.D., Molecular Microbiology and Immunology, Graduate Program in Life Sciences, Univ. of Maryland, Baltimore – 2009 (Major advisor). Present position: Staff Fellow, FDA

Rebecca Brady, Ph.D., Molecular Microbiology and Immunology, Graduate Program in Life Sciences, Univ. of Maryland, Baltimore (Major advisor) - 2007. Elaine Miye Otani Award (Top award given to the outstanding PhD Student across the Univ. of MD—Baltimore campus (2007). Ollie Eylar Award (Outstanding Graduate Student, MMI Dept.) – Univ. of MD—Baltimore (2007). Present position: Staff Fellow, FDA.

Sandra Jacobson, Ph.D., Molecular Microbiology and Immunology, Graduate Program in Life Sciences, Univ. of Maryland, Baltimore (Major advisor) – 2007. Present position: Assistant Professor, Univ. of Maryland, College Park.

PROFESSIONAL ACTIVITIES AND SERVICE...CONTINUED

Thesis and PhD Committee Memberships: (25 Committees)

- Lisa Leung, Ph.D., Molecular Microbiology and Immunology, Graduate Program in Life Sciences, Univ. of Maryland, Baltimore – in progress.
- Laura Latéy Bradford, Ph.D., Molecular Microbiology and Immunology, Graduate Program in Life Sciences, Univ. of Maryland, Baltimore – in progress.
- Grace Maldarelli, Ph.D., Molecular Microbiology and Immunology, Graduate Program in Life Sciences, Univ. of Maryland, Baltimore – 2015.
- Alison Scott, Ph.D., Molecular Microbiology and Immunology, Graduate Program in Life Sciences, Univ. of Maryland, Baltimore – 2014.
- Angela Nguyen, Ph.D., Molecular Microbiology and Immunology, Graduate Program in Life Sciences, Univ. of Maryland, Baltimore – 2014.
- Lauren Hittle, Ph.D., Molecular Microbiology and Immunology, Graduate Program in Life Sciences, Univ. of Maryland, Baltimore – 2014.
- Anita Marinelli, Ph.D., Department of Microbiology and Immunology, United States Uniformed Services Univ., – 2014.
- Carolynn Morris, Molecular Microbiology and Immunology, Graduate Program in Life Sciences, Univ. of Maryland, Baltimore – 2014.
- Tim Jacobsen, Ph.D., Department of International Health, Immunology and Microbiology, Faculty of Health Sciences, Univ. of Copenhagen, Denmark – 2014.
- Maria van Gennip, Ph.D., Department of International Health, Immunology and Microbiology, Faculty of Health Sciences, Univ. of Copenhagen, Denmark – 2013.
- Daniel Powell, Ph.D., Molecular Microbiology and Immunology, Graduate Program in Life Sciences, Univ. of Maryland, Baltimore – 2012.
- Leon Demasi, Ph.D., Molecular Microbiology and Immunology, Graduate Program in Life Sciences, Univ. of Maryland, Baltimore – 2012.
- Khandra Sears, Ph.D., Molecular Microbiology and Immunology, Graduate Program in Life Sciences, Univ. of Maryland, Baltimore – 2011.
- Zhenbo Xu, Ph.D., College of Light Industry and Food Sciences, South China Univ. of Technology, Guangzhou, China – 2011.
- Nicole Ammerman, Ph.D., Molecular Microbiology and Immunology, Graduate Program in Life Sciences, Univ. of Maryland, Baltimore – 2009.
- Nick Morin, Ph.D., Molecular Microbiology and Immunology, Graduate Program in Life Sciences, Univ. of Maryland, Baltimore – 2009.
- Stephen M. Techtman, Ph.D., Molecular Medicine, Graduate Program in Life Sciences, Univ. of Maryland, Baltimore – 2009.
- Chun Tan, Ph.D., Department of Biomedical Sciences, School of Dentistry, Univ. of Maryland, Baltimore – 2009.
- Kelsy Smith, Ph.D., Ph.D., Molecular Microbiology and Immunology, Graduate Program in Life Sciences, Univ. of Maryland, Baltimore – 2009.
- Gretchen Dalrymple, D.D.S., M.S., Department of Endodontics, Prosthodontics and Operative Dentistry, Univ. of Maryland, Baltimore – 2008.
- Ajinder Kaur, Ph.D., Molecular Medicine, Graduate Program in Life Sciences, Univ. of Maryland, Baltimore – 2008.
- Jennifer Kofonow, M.S., Biological Sciences, Arizona State Univ., Flagstaff, AZ – 2007.
- M. Chelsea Lane, Ph.D., Microbiology and Immunology, Univ. of Maryland, Baltimore – 2006
- Ashley Crisp, M.S., Microbiology, St. George's Univ. – 2005.
- Alex Bargmeyer, M.S., Civil Engineering, ENVE option, Montana State Univ. - 2003.

PROFESSIONAL ACTIVITIES AND SERVICE..CONTINUED

Postdoctoral Education (6 Postdoctoral Fellows)

Yvonne Achermann, M.D. Department of Microbial Pathogenesis, Univ. of Maryland, Baltimore – 2012 –2014 (Major advisor). Present Position – Assistant Professor, Univ. Hospital of Zurich.

Janette M. Harro, Ph.D., Department of Microbial Pathogenesis, Univ. of Maryland, Baltimore – 2008 –present (Major advisor). Present Position – Research Associate (Faculty), Univ. of Maryland, Baltimore.

Lisa Marie Schlect, D.D.S., Department of Microbial Pathogenesis, Univ. of Maryland, Baltimore – 2011 –2012. Present Position – Asst. Professor, Univ. of Heidelberg.

Graeme O'May, Ph.D., Department of Microbial Pathogenesis, Univ. of Maryland, Baltimore – 2007 – 2011 (Major advisor). Senior Editor, Textcheck, Inc.

Sandra Jacobsen, Ph.D., Biomedical Sciences, Univ. of Maryland, Baltimore – 2007-2008 (Major advisor). Present Position – Senior Instructor, Univ. of Maryland College Park.

Horst Maxeiner, M.D., Biomedical Sciences, Univ. of Maryland, Baltimore – 2003 – 2004 (Major advisor). Present Position – Clinical Microbiology Chief – Univ. of Freiburg.

School of Medicine Faculty Progression Committee

Erik Von Rosenvinge, Sciences, Univ. of Maryland, Baltimore – 2010 - present

Students Performing Independent Study

Dylan Simon (Ph.D.), Lisa Leung (Ph.D.), Erin Harberts (Ph.D.), Joshua Lieberman (M.D./Ph.D.), Rebecca Pelc (Ph.D.), Karsten Sieber (Ph.D.), Laura Leffner (M.S), Erin O'Keefe (Ph.D.), Lindsey Newman (BS), Erin Ladwig (DDS), Khandra Sears (Ph.D.), Weiwei Lu (Ph.D.), Limei Lin (Ph.D.), Christopher Van Deven (DDS), Anna Muench (DDS), Allison Howard (DDS), Adrienne Golly (DDS), Natalia Chalmers (Ph.D.), Robin Maltzberger (BS), Tammy Tu (BS), James Dowling (BS), Michael Cripps (BS), Pooja Paranjpe (BS), Lauren Tunnel (BS), Keira Rycaj (BS), Andy Lucas (BEng), Peter Newell (BS), Kimberly White (BS), Jeremy Mitchell (BEng), Jonathan Hilmer (BS), Miriam Stewart (BS), Megan Falsetta (BS), Krista Cooperstein (BS).

SCHOLARLY/RESEARCH ACTIVITIES

Grant and Contract Support

Ongoing Research Support:

Department of Defense Shirtliff (PI) 2015 – 2018
Congressionally Directed Medical Research Programs, Peer Reviewed Orthopaedic Research Program, Idea Development Award, Funding Opportunity Number: W81XWH-14-PRORP-IDA. \$493,421 DC, \$750,000 Total
Novel vaccination for the prevention of prosthetic implant infections
The goal of this study is to develop vaccines to prevent chronic infections in microbes of DOD concern.
Role: PI

UMB/UMCP Seed Grant Shirtliff (PI) 2014 – 2015
Peer Reviewed Grant \$90,000DC, \$90,000 Total
Analysis of the MIT1 Group A *Streptococcus persistence* during innate immune evasion by use an *in vivo* rabbit abscess model combined with Next-Generation Sequencing RNA-seq and Tn-seq methodologies.
This study will utilize novel molecular techniques in order to find those genes necessary for biofilm formation.
Role: PI

R01DE020939 Jabra-Rizk (PI) 2011 – 2016
NIH-NIDCR \$1,250,000 DC, \$1,875,000 Total
Candida albicans and *Staphylococcus aureus* biofilms: *in vitro* and *in vivo* studies National Institutes of Health (Agency NIDCR)
This study endeavors to explore the interactions between a fungal and bacterial pathogen.
Role: Co-PI

MedImmune Shirtliff (PI) 2015 – 2017
Contract \$111,968 DC, \$151,156 Total
Efficacy of anti-Pseudomonal mAbs in a *Pseudomonas aeruginosa* biofilm infection prosthetic implant model.
This grant seeks to utilize monoclonal antibodies against *P. aeruginosa* in order to prevent a prosthetic implant infection in an animal model.
Role: PI

T32 AI007540-14NIH
NIH/NIAID Kaper (PI) 2014 – 2017
Streptococcus biofilms \$138,000 (\$46,000/yr)
This trainee grant is competitively given to an MD/PhD student in the Molecular Microbiology and Immunology program who demonstrates excellent academics and research potential.
Role: PI of Graduate Recipient

SCHOLARLY/RESEARCH ACTIVITIES...CONTINUED

Grant and Contract Support...continued

Pending Research Support

R21 Shirtliff (PI) November 15, 2015
 NIH-NIDCR \$275,000 DC, \$420,750 Total
 Transcriptomic analysis of early childhood caries plaque samples.
 RNA expression profiles determined from in vivo samples from oral plaque samples in children.
 Role: PI

R01DE025679 Shirtliff, Bruno (MPI) November 5, 2015
 NIH-NIDCR \$2,500,000 DC, \$3,750,000 Total
Candida albicans and *Staphylococcus aureus* dual species biofilms
 Transcriptomic and proteomic evaluation of dual species biofilms in the oral cavity.
 Role: PI

CFF – Pilot and Feasibility Award Shirtliff (PI) September 14, 2015
 Cystic Fibrosis Foundation \$90,000 DC, \$97,200 Total
 New targets for therapeutic and protective regimens in CF patients against *Staphylococcus aureus*.
 Identifying and testing novel vaccines in the prevention of *Staphylococcus aureus* respiratory infections using a CF mouse model.
 Role: PI

Pilot Grant Rasko (PI) September 30, 2015
 The Aesthetic Surgery Education & Research Foundation \$27,052 DC, \$27,052 Total
 Comparing Breast Implant Irrigants: Is Triple Antibiotic the Best?
 Role: Co-I

W81XWH-14-PRORP-TRA Shirtliff (PI) October 24, 2014
 Department of Defense Congressionally Directed Medical Research Programs, Peer Reviewed
 Orthopaedic Research Program, \$735,294 DC, \$1,125,000 Total
 Lateral Flow Immunoassay (LFI) for the Rapid Detection and Antibiotic Sensitivity of Prosthetic Implant Infections.
 Role: PI.

U01 DE25513 Manski (PI) December 9, 2014
 NIH-NIDCR \$8,024,178 (+\$4,258,214 Indirects)
 Multidisciplinary and Collaborative Research Consortium to Reduce Oral Health Disparities in Children.
 Role: Co-I

SCHOLARLY/RESEARCH ACTIVITIES...CONTINUEDGrant and Contract Support...continued**Completed Research Support :**

R01 AI069568 Shirtliff (PI) 2007 – 2013
 NIH-NIAID \$1,250,000 DC, \$1,875,000 Total
Staphylococcus aureus biofilms: *in vitro* and *in vivo* studies. National Institutes of Health
 (Agency NIAID)
 This study tests vaccine candidates in two models of biofilm infection.
 Role: PI

R01 – ARRA Supplement Shirtliff (PI) 2010 – 2012
 NIH-NIAID \$214,000 DC, \$321,000 Total
Staphylococcus aureus biofilms: *in vitro* and *in vivo* studies. National Institutes of Health
 (Agency NIAID)
 This study tests vaccine candidates in an expanded selection of animal models
 Role: PI

Maryland Innovative Initiative Shirtliff (PI) 2013 – 2014
 TEDCO \$116,000 DC, \$116,000 Total
 Commercial development of a vaccine against *Staphylococcus aureus*. Maryland Tech.
 Development Corporation.
 This study extends previous vaccine studies to develop improved vectors for antigen production.
 Role: PI

BioMaryland LIFE prize, Shirtliff (PI) 2013 – 2014
 State of MD \$50,000 DC, \$50,000 Total
 Protective vaccine against *Staphylococcus aureus* based on biofilm and other antigens.
 This competitive prize was awarded in order to expand animal models of infection for testing
 vaccine combinations.
 Role: PI

W81XWH-07-1-0210 Shirtliff (PI) 2008 – 2011
 Department of Defense \$280,000 DC, \$350,000 Total
 Vaccine development for recurrent musculoskeletal infections
 This study identified vaccine candidates in from multiple bacterial species using animal models
 of chronic infection.
 Role: PI

N01AI15447-36-0-2 Frasier (PI) 2002 – 2010
 NIH-NIAID under Pathogen Functional Genomics Resource Center \$600,000 in material costs
 Determination of differential gene expression in *Streptococcus mutans*, *Staphylococcus aureus*,
 and *Candida albicans* biofilms through microarray analysis.
 Role: PI

SCHOLARLY/RESEARCH ACTIVITIES...CONTINUED

Grant and Contract Support...continued

Completed Research Support...continued:

5 T32-DE007309 Capra (PI) 2009 – 2011
 NIH-NIDCR \$138,000 (\$46,000/yr)

Candida albicans and *Staphylococcus aureus* dual species biofilms
 This trainee grant is competitively given to a PhD student in the Molecular Microbiology and Immunology program who demonstrates excellent academics and research potential.
 Role: PI of Graduate Recipient

UMB/UMCP Seed Grant Shirtliff (PI) 2014 – 2015
 Peer Reviewed Grant \$90,000DC, \$90,000 Total

Identification of determinants essential for biofilm formation and virulence in methicillin-resistant *Staphylococcus aureus* (MRSA) using a global genetic approach Analysis of the M1T1
 This study will utilize novel molecular techniques in order to find those genes necessary for biofilm formation.
 Role: PI

SBIR Opperman (PI) 2005 – 2006
 NIH-NIAID \$39,000 DC, \$68,000 Total

Detection and evaluation of antimicrobial agent targets and vaccine candidates against *Staphylococcus epidermidis* in models of biofilm infection
 Role: Co-I

Philips Research Costerton (PI) 2005 – 2007
 Philips Oral Healthcare \$99,000 DC, \$147,000 Total

Modern Molecular Methods for the Analysis of Supragingival and Subgingival Biofilm Populations: Location of the Aerobic/Anaerobic Boundary.
 Role: Co-I

U. S. Army Medical Research and Development Command (Nataro (PI) 2007 – 2008
 Department of Defense \$11,345 DC, \$11,345 Total

Host Immune Response to Bacterial Cyclic Diguanylic Acid.
 This study evaluated the host immune response following administration of CdiGMP.
 Role: Co-I

Howard Hughes Fellowship Program Shirtliff (PI) 2006 – 2007
 Howard Hughes Foundation \$35,000 DC, \$35,000 Total

Determination of the phenotypic effect of mutation in genes shown to be up-regulated in *Staphylococcus aureus* biofilms. Fellowship for A. Muench.
 Role: PI

SCHOLARLY/RESEARCH ACTIVITIES...CONTINUEDGrant and Contract Support...continued**Completed Research Support...continued:**

<u>Maryland Industrial Partnerships</u>	Shirtliff (PI)	2005 – 2006
TEDCO		\$65,000 DC, \$97,500 Total

Daily Antimicrobial Tablet for Dental Unit Water.

This project involved testing a novel antimicrobial disinfectant in dental unit waterlines.

Role: PI

<u>TEDCO</u>	Shirtliff (PI)	2005 – 2006
State of MD		\$20,000 DC, \$20,000 Total

Combinatorial Method to Combat Antimicrobial Resistance.

This project involved identifying novel antimicrobial agents for use in dental unit waterlines in collaboration with Sterilex, Inc.

Role: PI

<u>Undergraduate Scholars Program</u>	Shirtliff (PI)	2001 – 2003
Montana State Univ.		\$3,000 DC, \$3,000 Total

Proteomic evaluation of *Staphylococcus aureus* biofilms

This project involved identifying novel antimicrobial agents for use in dental unit waterlines in collaboration with Sterilex, Inc.

Role: PI

<u>Montana Network for Biomedical Research Opportunities</u>	Shirtliff (PI)	2002 – 2003
State of MT		\$10,000 DC, \$10,000 Total

Analysis of *Staphylococcus aureus* biofilms through DNA microarrays and 2D gel electrophoresis

Role: PI

<u>Culpepper Research Fund</u>	Shirtliff (PI)	2002 – 2003
Culpepper Foundation		\$25,000 DC, \$25,000 Total

Identification of vaccine candidates and potential antimicrobial targets from *Staphylococcus aureus* biofilms.

Role: PI

<u>Jeane B. Kempner Award</u>	Shirtliff (PI)	2001 – 2003
UTMB		\$28,800 DC, \$28,800 Total

Differential gene expression in bacterial biofilms

Role: PI

<u>SP Research Award</u>	Mader (PI)	1999 – 2000
Schering Plough		\$25,000 DC, \$25,000 Total

Comparative evaluation of oral L-ofloxacin and parenteral nafcillin in the treatment of experimental methicillin sensitive *Staphylococcus aureus* (MSSA) osteomyelitis in rabbits.

Role: Co-I

SCHOLARLY/RESEARCH ACTIVITIES...CONTINUED

Grant and Contract Support...continued

Completed Research Support...continued:

PU Research Award Mader (PI) 1999 – 2000
Pharmacia & Upjohn \$25,000 DC, \$25,000 Total
Comparative evaluation of vancomycin and linezolid in the treatment of methicillin resistant
Staphylococcus aureus osteomyelitis: Studies with a rabbit model
Role: Co-I

T32 AI007526 Barrett (PI) 1998 – 2000
NIH-NIAID \$16,784/yr DC
in vivo gene expression and regulation in methicillin resistant *Staphylococcus aureus*.
Role: Awardee
PI – ME Shirtliff. \$16,784/yr. 1998 - 2000.

Research Support Submitted – Previous 5 years:

“*Staphylococcus aureus* biofilms: *in vitro* and *in vivo* studies” National Institutes of Health – R01. PI – Mark E. Shirtliff. \$1,250,000 (+ \$606,250 Indirects). Competitive Renewal. November 5, 2014.

“Rapid diagnosis of chronic infections through detection of biofilm-specific host antibodies” National Institutes of Health, SBIR. PI – Erik Nilsson. Subcontract to Shirtliff - \$200,000 (+\$100,000 Indirects). November 26, 2014.

“Rapid and Accurate Diagnosis of Tuberculosis” The Gates Foundation. PI – Mark E. Shirtliff. \$1,818,000 (182,000 Indirects). January 14, 2015.

“Molecular mechanisms underlying biofilm development in organohalide respiring bacteria” Directorate of Biology, Division of Integrative Organismal Systems. National Science Foundation. PI – Birthe Kjellerup. (\$250,000 to Shirtliff Lab). January 16, 2015.

“Treatment of *Staphylococcus aureus* through passive immunization” National Institutes of Health - National Institutes of Health – National Institute of Allergy and Infectious Disease. (R21), RFA-AI-12-02. PI – Mark E. Shirtliff. \$275,000 (+ \$137,500 Indirects). February 15, 2015.

“Photoacoustic detection of bio- and emerging threat agents using labeled antibodies” 2016 Basic Research for Combating Weapons of Mass Destruction (C-WMD), Broad Agency Announcement (BAA), Department of Defense HDTRA1-11-16-BRCWMD-BAA. PI – Mark E. Shirtliff. January 30, 2015.

SCHOLARLY/RESEARCH ACTIVITIES...CONTINUED

Grant and Contract Support...continued

Research Support Submitted – Previous 5 years...continued:

- “Engineered PlyCB as a Novel Implant Coating for Osseointegration” Department of Defense Congressionally Directed Medical Research Programs, Peer Reviewed Orthopaedic Research Program, Idea Development Award. Expansion Award. Funding Opportunity Number: W81XWH-14-PRORP-EA. PI – Dan Nelson. \$1,125,000 (Directs + Indirects). Shirtliff Lab subcontract - \$200,000 (Directs + Indirects). October 24, 2014.
- “The Transatlantic Friendship and Mobility Initiative Partnerships for Innovation and Collaboration on Study Abroad.” PI – David Kilgour. \$ 76,987 (+\$35,944 Indirects) – To Shirtliff Lab \$35,944. October 5, 2014.
- “Culture-independent diagnosis of acute and chronic infections” National Institutes of Health - Partnerships for Diagnostics to Address Antimicrobial Resistance of Select Bacterial Pathogens (R01). PI – RK Ernst. \$3,750,000 (+\$1,875,000 Indirects). Co-I – Mark E. Shirtliff. \$750,000 (+ \$375,000 Indirects) to Shirtliff Lab. June 19, 2014.
- “The role of breast implant irrigation and treatment with endolysin on bacterial colonization” UMB-UMCP Seed Grant. PI – Mark E. Shirtliff. \$90,000. Submitted March 17, 2014.
- “Novel multi-component vaccines combat multi-species joint prosthesis infections” Novo Nordisk. PI – Per Nilson. Co-I – Mark E. Shirtliff. \$476,000. Submitted June 6, 2014.
- “*Staphylococcus aureus* Vaccine Development.” Submitted to National Institutes of Health, Partnerships for Development of Vaccine Technologies (R01) RFA-AI-12-01. PI – Mark E. Shirtliff. \$3,486,192 (+ \$1,743,096 Indirects). Submitted July 25, 2012.
- “Lateral Flow Immunoassay (LFI) and Labelled Anti-biofilm Antibodies for the Rapid Detection of *S. aureus* Biofilm Infections” Department of Defense Congressionally Directed Medical Research Programs (CDMRP). Military Infectious Diseases Applied Research Award W81XWH-11-DMRDP-MID-ARA. \$1,992,854.50. Submitted December 11, 2011.
- “Diagnosis and prevention of musculoskeletal biofilm infections” AOTrauma. \$2,996,000. Submitted July 7, 2011.
- “*Staphylococcus aureus*: *in vivo* nasal colonization studies” National Institutes of Health – F31 Kirschstein-NRSA Individual Fellowship. PI – Mark E. Shirtliff. \$92,000 (Indirects not provided). Submitted Jan 15, 2011.

SCHOLARLY/RESEARCH ACTIVITIES...CONTINUED

Grant and Contract Support...continued

Research Support Submitted – Previous 5 years...continued:

- “A vaccine to protect against both biofilm and planktonic *S. aureus* infections.” National Institutes of Health – STTR. PI – Charlie Rodie, Sorrento Pharmaceuticals. Co-I – Mark E. Shirtliff. \$400,000 (+ \$200,000 Indirects). To Shirtliff Lab \$240,000 (+ \$120,000 Indirects). Submitted December 15, 2010.
- “Passive immunization for the prevention of *S. aureus* infections.” National Institutes of Health – STTR. PI – Charlie Rodie, Sorrento Pharmaceuticals. Co-I – Mark E. Shirtliff. \$400,000 (+ \$200,000 Indirects). To Shirtliff Lab \$160,000 (+ \$80,000 Indirects). Submitted December 15, 2010.
- ”Development of alternative, novel therapies to combat Gram-negative bacterial wound infections” USAMRMC. Broad Agency Announcement. PI – Luis Actis. Co-I – Mark E. Shirtliff. \$700,000 (+ \$300,000 Indirects). To Shirtliff Lab \$200,000 (+ \$100,000 Indirects). Submitted Jan 15, 2011.
- “Rapid and Early Detection of *Staphylococcus aureus* Orthopaedic Infection by Lateral Flow Immunoassay” PI – Mark E. Shirtliff. \$720,000 (+ \$180,000 Indirects). Department of Defense, Peer Reviewed Orthopaedic Research Program (PRORP) – CDMRP Submitted August 4, 2010.
- “Human antibodies for prevention of *S. aureus* infections.” National Institutes of Health – STTR. PI – Charlie Rodie, Sorrento Pharmaceuticals. Co-I – Mark E. Shirtliff. \$400,000 (+ \$200,000 Indirects). To Shirtliff Lab \$240,000 (+ \$120,000 Indirects). Submitted December 15, 2010.
- ”Impact of Microbiome on chronic wound healing in diabetics and non-diabetics” National Institutes of Health – R01. PI – Jonathan Zenilman. Co-I – Mark E. Shirtliff. \$213,748 (+ \$106,873 Indirects). Submitted June 6, 2009.
- “Vaccine prevention of post-traumatic chronic orthopaedic war wound infections.” PI – Mark E. Shirtliff. \$400,000. Department of Defense, Peer Reviewed Orthopaedic Research Program (PRORP) – CDMRP Submitted August 4, 2009.
- “Reduction of carriage and prevention of systemic infections due to *Staphylococcus aureus*.” PI – Mark E. Shirtliff. \$700,000. Variations Biotechnologies. Submitted October 4, 2009.

SCHOLARLY/RESEARCH ACTIVITIES...CONTINUED

Patents:

1. “*In vivo* biofilm infection diagnosis and treatment” Jeff G. Leid, Timothy L. Vail, Jennifer M. Kofonow, Rebecca A. Brady, **Mark E. Shirtliff** - US Patent Number 8,697,375. April 15, 2014.
2. “Methods and devices for the detection of biofilm.” Jeff G. Leid, Timothy L. Vail, Jennifer M. Kofonow, Rebecca A. Brady, **Mark E. Shirtliff** - US Patent Number 8,541,006. September 24, 2013.
3. “Protective vaccine against *Staphylococcus aureus* biofilms comprising cell wall-associated immunogens” **Mark E. Shirtliff**, Graeme O’May, Jeff G. Leid – US Patent Number 8,318,180. November 27, 2012.
4. “Multivalent vaccine protection from *Staphylococcus aureus* infection”. Jeff G. Leid, Janette Harro, and **Mark E. Shirtliff** – US Patent Publication WO2013134225. March 5, 2013.
5. “Ultraviolet Sterilizing Drainage Catheter”. Cha-min Tang, Paul E. Bigeleisen, Samuel M. Galvagno Jr. and **Mark E. Shirtliff**. US Patent Application Number: 14/535,296. May 7, 2015.
6. “Method for Stimulating Human Leukocytes to Kill Bacteria, Yeast, and Fungi and Biofilms That Have Formed In/On Prosthetic Devices, Catheters, Tissues, and Organs In Vivo” Samuel C. Silverstein, Jeff Leid, Yongmei Li, John D. Loike, J. William Costerton and **Mark E. Shirtliff** – 2005 – US Patent Publication 2005/0214279 A1.
7. “Smart Implant” Debora Armellini, Alexander Pazoki, **Mark E. Shirtliff**, Liene Molly, and Mark A. Reynolds. – September 14, 2006. International Patent Application Number WO 2006/096720 A1; Patent Publication Number US2008/0118893 A1.

SCHOLARLY/RESEARCH ACTIVITIES...CONTINUED

Presentations:

Local Presentations:

1. "Biofilm-Mediated MRSA Infections: Slime by Design" Division of Infectious Diseases, Johns Hopkins Univ. – School of Medicine, Baltimore, Maryland, April 21, 2008.
2. "Biofilms and Polymicrobial Infections" Division of Infectious Diseases, Johns Hopkins Bayview Medical Center, Baltimore, Maryland, January 9, 2008.

National Presentations:

1. "Osteomyelitis, prosthetic implant, and dual infection models" American Society for Microbiology, 7th Conference on Biofilms. Chicago, IL. October 24-29, 2015.
2. "Evaluation of treatment, vaccine, and diagnostic studies using animal models" American Society for Microbiology, 7th Conference on Biofilms. Chicago, IL. October 24-29, 2015.
3. "Medical Device Biofilms Vaccine Research" Food and Drug Administration. Washington, DC. February 25, 2015.
4. "*Staphylococcus aureus* and *Candida albicans*: InterKingdom Partners in Slime". 1st ASM Conference on Polymicrobial Infections. Washington, DC. November 13-16, 2014.
5. "Biofilm: The Science and Disruptive Technologies" AAOS/ORS Musculoskeletal Infection: Where are we in 2014? Research Symposium. Chicago, IL. May 9-10, 2014.
6. "*Staphylococcus aureus* biofilms: A platform for studying pathogenesis" The 23rd Annual Philadelphia Infection & Immunity Forum, American Society for Microbiology, Eastern Pennsylvania Branch. Philadelphia, PA. May 9, 2014.
7. "MRSA: Host immune response and vaccine development" Department of Microbiology and Immunology, Montana State Univ., Bozeman, MT. April 9, 2014.
8. "Immune Control of Biofilms" Uniformed Services Univ. Washington, D.C. February 7, 2014.
9. "Infection Treatment and Prevention: Possible Means of Controlling and Minimizing Biofilm Formation" in Session: Infection in Arthroplasty: The Basic Science of Bacterial Biofilms in Its Pathogenesis, Diagnosis, Treatment, and Prevention. American Academy of Orthopaedic Surgeons Annual Meeting. New Orleans, LA. March 13, 2014.
10. "*Staphylococcus aureus* biofilms as a platform for the vaccine development and novel diagnostics" Regional Biofilm Symposium at Drexel Univ. College of Medicine and Hahnemann Univ. Hospital, Philadelphia, PA. December 17, 2013.
11. "*Staphylococcus aureus*: The Dirty, Slimy Killer" Dean's Lecture Series, Univ. of Southern Florida. Tampa, FL. November 15, 2013.
12. "Considering the biofilm mode of growth in *Staphylococcus aureus* vaccine development" Pfizer Vaccine Research. Pearl River, NJ. August 8, 2013.
13. "*Staphylococcus aureus* biofilm infections: Immune response, diagnostics and vaccine development" Gordon Research Conference on Staphylococcal Diseases. July 28 - August 2, 2013, Waterville Valley Resort, Waterville Valley, NH.

SCHOLARLY/RESEARCH ACTIVITIES...CONTINUED

Presentations:

National Presentations...continued:

14. "Multiple models of infection." Challenges in *S. aureus* vaccine development. NIAID, Rockville, MD, June 7, 2013.
15. "Interaction between the host and *Staphylococcus aureus* biofilms" SPARK Retreat: Strategic Planning for disruptive innovation @ Highmark, WPAHS & CMU on Biofilms, January 9-10, 2013. Nemaacolin Woodlands Resort, Farmington, PA.
16. "Host immune response to *Staphylococcus aureus* biofilm infections" 6th American Society for Microbiology Conference on Biofilms. Miami, FL, USA. October 2, 2012.
17. "Gram positive animal models of infection" 6th American Society for Microbiology Conference on Biofilms. Miami, FL, USA. September 29, 2012.
18. "Biofilms in endodontic infection" The TDO User Meeting and Scientific Session. Kiawah Island, South Carolina. May 17, 2012.
19. "*Staphylococcus aureus* biofilms: Host immune response and vaccine development" Network on the Antimicrobial Resistance of *Staphylococcus aureus*. Bethesda, MD, USA. March 6, 2012.
20. "Vaccine Development in *Staphylococcus aureus* Infections" J. William Costerton Festschrift. Duquesne Club, Pittsburgh, PA, USA. February 24-25, 2012.
21. "Infection treatment and prevention: possible means of controlling and minimizing biofilm formation" in Session: Infection in Arthroplasty: The Basic Science of Bacterial Biofilms in Its Pathogenesis, Diagnosis, Treatment, and Prevention. American Academy of Orthopaedic Surgeons Annual Meeting. San Francisco, CA. February 9, 2012.
22. "Considering the host immune response for vaccine development against *Staphylococcus aureus* biofilms" Montana Biofilm Meeting. Montana State Univ., Bozeman, MT. February 8, 2012.
23. "Improved diagnostics for musculoskeletal infections" Orthopaedic Research Society Annual Meeting. San Francisco, CA. February 5, 2012.
24. "The host immune response to MRSA biofilm infections" Center for Genomic Sciences, Allegheny-Singer Research Institute. Pittsburgh, PA. September 26, 2011.
25. "Biofilms." Philadelphia Academy of Stomatology Quarterly Science Meeting. Philadelphia, PA. September 21, 2011.
26. "Understanding biofilms and host pathogen interactions for MRSA vaccine development" Uniformed Services Univ. of Health Sciences. Bethesda, Maryland. January 24, 2011.
27. "Who's smarter: The bugs or us?" 2010 Orthopaedic Trauma Association. Baltimore, Maryland. October 16, 2010.
28. "Biofilms and Biosafety" American Biological Safety Association 2010 Meeting. Denver, Colorado. October 2, 2010.
29. "Advancements in the fight against biofilms in chronic infections" ATACCC 2010 Conference. St. Petes Beach, Florida. August 17, 2010.
30. "Diagnosis and vaccine prevention of biofilm-mediated chronic orthopaedic infections." AOTrauma CPP Bone Infection workshop. Boston, Massachusetts. July 23, 2010.

SCHOLARLY/RESEARCH ACTIVITIES...CONTINUEDPresentations:**National Presentations...continued:**

31. "MRSA biofilm vaccine." NIAID Staphylococcal Vaccine Workshop. Bethesda, Maryland. May 10, 2010.
32. "SYMPOSIUM 5: Infection." Session Chair. OTA Annual Meeting - 25th Anniversary Meeting. San Diego, CA. October 8-10, 2009.
33. "Chronic orthopaedic infections: Are vaccines the answer?" OTA Annual Meeting - 25th Anniversary Meeting. San Diego, CA. October 8-10, 2009.
34. "The host immune response: How important is it?" OTA Annual Meeting - 25th Anniversary Meeting. San Diego, CA. October 8-10, 2009.
35. "Views from the host and the pathogen in *Staphylococcus aureus* anti-biofilm vaccine development." National Institute of Standards and Technology, Bethesda, Maryland. September 28, 2009.
36. "Vaccines against *Staphylococcus aureus* biofilms." Gordon Conference of *Staphylococcus aureus*. New Hampshire. September 1, 2009.
37. "Biofilms and chronic wound infections." Symposium on Advanced Wound Care/Wound Healing Society. Dallas, TX. April 29, 2009.
38. "Role of the host and the pathogen in musculoskeletal infections." Musculoskeletal Infection Society Annual Meeting. August 7-8, 2009.
39. "*Staphylococcus aureus* biofilms" Food and Drug Administration. Bethesda, Maryland. April 14, 2009.
40. "Controversies in Infection: Diagnosing and Treating." 22nd Annual Symposium on Advanced Wound Care and Wound Healing Society (SAWC/WHS) Meeting. Dallas, Texas. April 26-29, 2009.
41. "Sensing and biofilms – biofilm effect on antimicrobial agents and effect of antibacterial agents on biofilm formation." 48th Interscience Conference on Antimicrobial Agents and Chemotherapy/46th Infectious Disease Society of America Joint Annual Meeting, Washington, D.C. October 25-28, 2008.
42. "Host-Pathogen Interactions in Biofilm Infections" Session Convener. 108th General Meeting of the American Society for Microbiology, Boston, Massachusetts, June 1-5, 2008.
43. "Host Immune Response in Chronic *Staphylococcus aureus* Biofilm Infections" 108th General Meeting of the American Society for Microbiology, Boston, Massachusetts, June 1-5, 2008.
44. "Persistent Biofilm Infections" Department of Ophthalmology, Harvard Medical School, and The Schepens Eye Research Institute, Boston, Massachusetts, November 1, 2007.
45. "The Role of Biofilms on Chronic Infectious Diseases, with Special Focus on Bone and Joint Infections" Mayo Clinic, Rochester, MN, September 4, 2007.
46. "The Role of Biofilms in Chronic Infection" Department of Molecular Microbiology and Immunology, Univ. of Missouri Medical School, Columbia, Missouri, August 20, 2007.
47. "Biofilms in Orthopaedic Infections" Department of Orthopaedics, Univ. of Missouri Medical School, Columbia, Missouri, May 23, 2007.

SCHOLARLY/RESEARCH ACTIVITIES...CONTINUEDPresentations:**National Presentations...continued:**

48. "The Role of Biofilms in Chronic Infections" Center for Genomic Sciences, Allegheny General Hospital, Allegheny-Singer Research Institute, Pittsburgh, Pennsylvania, December 11, 2006.
49. "The Use of a Denaturing HPLC Modification of the DGGE Technique for the In Situ Analysis of Complex Bacterial Populations in Health and Disease" ASM General Meeting, Orlando, Florida, May 21-25, 2006.
50. "*Staphylococcus aureus* biofilms: *in vitro* and *in vivo* studies" Annual Research Symposium. Joan C. Edwards School of Medicine Marshall Univ., Huntington, West Virginia. March 20, 2006.
51. "*Staphylococcus aureus* Infections" Northern Arizona Univ., Flagstaff, Arizona. March 13, 2006.
52. "Role of Biofilms in Osteomyelitis" Philips Oral Healthcare Biofilm Symposium. Univ. of Southern California, Los Angeles, California, Oct. 24-25, 2005.
53. "The HPLC Modification of the DGGE Method for Population Analysis" Philips Oral Healthcare Biofilm Symposium. Univ. of Southern California, Los Angeles, California, Oct. 24-25, 2005.
54. "Molecular methods for the analysis of biofilm communities" Philips Oral Healthcare Biofilm Symposium. Univ. of Southern California, Los Angeles, California, Oct. 24-25, 2005.
55. "Studies on *Staphylococcus aureus* Biofilms." 2005 Summer Symposium: Bugs and Biomaterials: Bacteria and the Biointerface. Univ. of Washington · Seattle, WA August 24 - 26, 2005.
56. "Detachment and Host Antibody Response to *Staphylococcus aureus* Biofilm Infections" Center for Biofilm Engineering, Montana State Univ., Bozeman, MT, March 3, 2005.
57. "The Clinical Impact of Biofilm Infections" Winthrop Univ. Hospital, Mineola, NY, February 3, 2005.
58. "Biofilms and Device Related Infections", Southwestern Association of Clinical Microbiology, Yearly Scientific Meeting. San Antonio, TX, September 16, 2004.
59. "Staphylococcal biofilms" Northern Arizona Univ., Flagstaff, AZ, April 26, 2004.
60. "Antimicrobial Resistance and Implications for Antibiotic-Impregnated Bone Cement" Stryker Howmedica Osteonics, Mahwah, NJ, April 21, 2004.
61. "*Staphylococcus aureus* and biofilms" National Institutes of Health, Washington DC, December 15, 2003.
62. "Biofilms and their role in chronic infections" Columbia Univ., New York, NY, December 1, 2003.
63. "Proteomic and genomic evaluation of *Staphylococcus aureus* biofilms" Society of Industrial Microbiology, 2003 Annual Meeting, Minneapolis, Minnesota, August 12, 2003.
64. "Evaluation of *Staphylococcus aureus* biofilms" Department of Microbiology, Univ. of New Hampshire, May 6, 2003.
65. "Proteomic, microarray, and host-pathogen interaction studies of *Staphylococcus aureus* biofilms" Univ. of Maryland, Departments of Oral and Craniofacial Biological Sciences, February 26, 2003.

SCHOLARLY/RESEARCH ACTIVITIES...CONTINUED

Presentations:

National Presentations...continued:

66. “*Staphylococcus aureus* biofilms” Genome Therapeutics, Waltham, Massachusetts, February 20, 2003.
67. “Biofilms of staphylococci” New York Medical College. Department of Microbiology and Immunology, December 9, 2002.
68. “Biofilms: Properties, significance, and current research” Department of Environmental Engineering, Washington State Univ., December 2, 2002.
69. “Proteomics, genomics, and host-pathogen interactions in *Staphylococcus aureus* biofilms” Department of Microbiology, Montana State Univ., October 11, 2002.
70. “*Staphylococcus aureus* biofilms” Veterinary Molecular Biology, Montana State Univ., September 10, 2002.

International Presentations:

1. “Using biofilm research to guide vaccine and diagnostic technology development” Kolloquium Infektiologie und Mikrobiologie. Klinik für Infektionskrankheiten und Spitalhygiene, Abteilung für Infektiologie, Universitäts-Kinderklinik, and Institut für Medizinische Mikrobiologie, UniversitätsSpital, Zürich, Switzerland. July 30, 2015.
2. “Anti-biofilm vaccine studies in animals” Eurobiofilms 2015. IV European Congress on Microbial Biofilms. Brno, Czech Republic. June 23-26, 2015.
3. “Osteomyelitis and Dual infection models” Eurobiofilms 2015. IV European Congress on Microbial Biofilms. Brno, Czech Republic. June 23-26, 2015.
4. “Prevention of biofilm infection through active and passive immunization” Eurobiofilms 2015. IV European Congress on Microbial Biofilms. Brno, Czech Republic. June 23-26, 2015.
5. “MRSA in Orthopaedic Infections: Prevention and Diagnosis” XXVI SICOT Triennial World Congress combined with 46th SBOT Annual Meeting. Rio de Janeiro, Brazil. November 19-22, 2014.
6. “The immune system and *Candida albicans* infections” Annual Meeting for the Graduate Program of Immunology and Infectious Diseases. Sandbjerg Estate, Denmark. September 3-5, 2014.
7. “Animal models of biofilm infection” Eurobiofilms. September 9-12, 2013. Ghent, Belgium.
8. “Biofilms: MRSA as a model” May 30, 2013. College of Light Industry and Food Technology, South China Univ. of Technology, Guangzhou, P.R. China.
9. “Suggestions from the West” May 31, 2013. College of Light Industry and Food Technology, South China Univ. of Technology, Guangzhou, P.R. China.
10. “Diagnosis and treatment of biofilm infections” Meet-the-Expert Session. 23rd Meeting of the European Society of Clinical Microbiology and Infectious Diseases (ESCMID), April 27 – 30, 2013, Berlin, Germany.
11. “Prophylaxis and therapeutic aspects of biofilm infections” 23rd Meeting of the European Society of Clinical Microbiology and Infectious Diseases (ESCMID), April 27 – 30, 2013, Berlin, Germany.

SCHOLARLY/RESEARCH ACTIVITIES...CONTINUEDPresentations:**International Presentations...continued:**

12. "Candida albicans and Staphylococcus aureus: Partners in slime." Society for General Microbiology (SGM) Spring Conference 2013. Manchester, England, UK. March 25-28, 2013.
13. "Immune response and vaccine development in Staphylococcus aureus biofilm infections" The Panum Institute, Faculty Of Health Sciences, Univ. of Copenhagen, Copenhagen, Denmark. June 19, 2012.
14. "The problematic diagnosis of chronic infections" BioConference Live - Clinical Diagnostics Conference 2012. May 23, 2012.
15. "MRSA chronic infections" Kitakyushu International Symposium on Infectious Diseases and Chemotherapy. Secretariat of the 81st Annual Meeting of Western Branch of Japanese Association for Infectious Disease. ISC-WG: Device-related infection and Biofilm. Fukuoku, Japan. October 7, 2011.
16. "Taking the biofilm phenotype into consideration in the diagnosis and prevention of orthopaedic infections." Kitakyushu International Symposium on Infectious Diseases and Chemotherapy. Secretariat of the 81st Annual Meeting of Western Branch of Japanese Association for Infectious Disease. ISC-WG: Device-related infection and Biofilm. Fukuoku, Japan. October 6, 2011.
17. "Considering Staphylococcus aureus biofilms in vaccine development and diagnostics." Novartis. Sienna, Italy. September 9, 2011.
18. "Staphylococcus aureus biofilm infections: Immune response, diagnostics and vaccine development" Gordon Research Conference on Staphylococcal Diseases. Barga, Italy. July 24-29, 2011.
19. "Staphylococcus aureus biofilm infection models" Eurobiofilms 2011. Copenhagen, Denmark. July 5, 2011.
20. "Novel vaccine strategies and improved diagnostics for musculoskeletal infections" AO Trauma eCM XII: Implant Infection. Davos, Switzerland. June 22-24, 2011.
21. "Novel approaches for an antibiofilm S. aureus vaccine.", 8th World Congress on Trauma, Shock, Inflammation, and Sepsis (TSIS), Munich, Germany. March 9th – 13th, 2010.
22. "Biofilms in medical and dental infectious II." Session Chair. 5th ASM Conference on Biofilms. Cancun, Mexico. November 15 - 19, 2009.
23. "Candida albicans-Staphylococcus aureus dual-species biofilms mediate invasive staphylococcal infection." 5th ASM Conference on Biofilms. Cancun, Mexico. November 15 - 19, 2009.
24. "Host immune response to biofilm infections." Co-Organizer and Session Chair. Eurobiofilms, Rome, Italy. September 4, 2009.
25. "Vaccine development and the host immune response to Staphylococcus aureus biofilms. Eurobiofilms, Rome, Italy. September 4, 2009.
26. "Biofilm Infections: A case study of Staphylococcus aureus pathogenesis." Univ. of Ottawa, Ottawa, Canada. March 3, 2009.
27. "Staphylococcus aureus Biofilm Infections: Host immune response and vaccine development." National Research Council of Canada. Ottawa, Canada. March 2, 2009.

SCHOLARLY/RESEARCH ACTIVITIES...CONTINUED

Presentations:

International Presentations...continued:

28. "Animal models of *Staphylococcus aureus* chronic biofilm infections" 5th ASM Conference on Biofilms. Cancun, Mexico. November 15 - 19, 2009.
29. "The Role of Biofilms in Chronic Orthopaedic Infections" Annual Meeting of the Japanese Orthopaedic Society, Nagasaki, Japan, October 18-19, 2006.
30. "The Importance of Biofilms in Battlefield Injuries", Management of Battlefield Tissue Injury, Toronto, Canada, June 28, 2004.
31. "Workshop on Proteomics and Applications in Biofilm Research" La Sapienza Univ., Rome, Italy, March 29 – April 5, 2004.
32. "Microbial proteomics: Workshop on sample preparation, two-dimensional gel electrophoresis, and mass spectrometric analysis" Concepcion, Chile, January 12-16, 2004.
33. "Proteomic evaluation of *Staphylococcus aureus* biofilms" American Society for Microbiology Biofilms 2003, Victoria, Canada, November 3, 2003.
34. "*Staphylococcus aureus* biofilms" Departments of Environmental Engineering and Biotechnology, Aalborg Univ., Denmark, April 7, 2003.
35. "A search for vaccines against staphylococcal biofilm-mediated infections" Department of Microbiology, Danish Technological Univ., Copenhagen, Denmark, April 1, 2003.
36. "Using microarrays to determine the gene expression profiles in biofilms" Danish Technological Institute, Denmark, April 3, 2003.
37. "Treatment of osteomyelitis and septic arthritis: Evidences from animal models" Treatment of Bone and Joint Infections, 1st Annual Meeting of the Italian Society for Anti-infective Therapy, Vicenza, Italy, March 28, 2003.
38. "Hyperbaric oxygen therapy and the treatment of musculoskeletal infections" Treatment of Bone and Joint Infections, 1st Annual Meeting of the Italian Society for Anti-infective Therapy, Vicenza, Italy, March 28, 2003.

SCHOLARLY/RESEARCH ACTIVITIES...CONTINUED

Active Collaborations:

Local collaborations

1. U of Maryland School of Dentistry:
 - a. Department of Microbial Pathogenesis (Dr. RK Ernst) – 2013 – *present*.
 - b. Department of Oncology and Diagnostic Sciences and Clinical Faculty (Mary Ann Rizk) – 2005 – *present*.
 - c. Division of Pediatric Dentistry (Keui-ling Hsu) – 2013 – *present*.
2. U of Maryland School of Medicine
 - a. Eric Sundberg – 2014 – *present*.
 - b. David Rasko – 2010 – *present*.
 - c. Vincent Bruno – 2011 – *present*.
 - d. Emmanuel Mongodin – 2013 – *present*.
 - e. Chah-Min Tang – 2012 – *present*.
 - f. Erik Von Rosenvinge – 2010 – *present*.
3. U of Maryland Center for Vaccine Development
 - a. SM Tennant and G. Ramachandran – 2013 – *present*.
4. U of Maryland School of Pharmacy
 - a. David Goodlett – 2013 – *present*.
5. Johns Hopkins
 - a. Nuernberger E – 2012 – *present*.

National collaborations

1. University of Maryland, College Park (Kevin McIver) – 2009 – *present*.
2. Northern Arizona University (Jeff Leid) – 2002 – *present*.
3. Drexel University (Garth Ehrlich) – 2001 – *present*.
4. Jefferson University (Jay Parvizi and WC Arnold) – 2012 – *present*.
5. University of Memphis (Warren Haggard) – 2013 – *present*.
6. University of Tennessee (Brian Peters) – 2015 – *present*.
7. University of South Florida (Nick Cogan) – 2012 – *present*.
8. Food and Drug Administration, CBER (Drusilla Burns, Rebecca Brady, Scott Stibens) – 2011 – *present*.
9. University of Arkansas Medical School (Mark Smeltzer) – 2010 – *present*.

International collaborations

1. University of Copenhagen (Thomas Bjarnsholt, Clause Moser) – 2005 – *present*.
2. Zurich Hospital (Yvonne Achermann and Annelies Zinkernagel) – 2015 – *present*.
3. ACTA (Academisch Centrum Tandheelkinde Amsterdam) (Bastiaan Krom) – 2011 – *present*.
4. College of Light Industry and Food Technology, South China Univ. of Technology, Guangzhou, P.R. China (Zhenbo Xu) – 2010 – *present*.

SCHOLARLY/RESEARCH ACTIVITIES...CONTINUED**Complete List of Published Work in MyBibliography:**

<http://www.ncbi.nlm.nih.gov/sites/myncbi/mark.shirtliff.1/bibliography/41124435/public/?sort=date&direction=ascending>

Publications:**Peer Reviewed Journal Articles**

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STATEMENT: TO WHOM IT MAY CONCERN:

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Employment History from Social Security You can receive a statement of your employment history from Social Security by completing a Request for Social Security Earnings Information form. Youâ€™ll receive detailed information about your work history including employment dates, employer names and addresses, and earnings. The Social Security Administration charges a fee for detailed information based on the length of time for which you would like to receive records. Employment history. The reason a hiring manager looks at your resume is to determine whether your skills and experience are a match for his open position. Where does he look on your resume? He looks at your Employment History to see if the skills and accomplishments you list show that you will be an ideal worker. In this lesson, you will learn which format is best for listing your employment history.