December 7, 2015

NAME: Charles Darkoh, Ph.D.

TITLE: Assistant Professor (Tenure-track)
Center for Infectious Diseases
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UNDERGRADUATE EDUCATION

Bachelor of Science (Hons), (Zoology/Biological Sciences), University of Ghana, Legon, Ghana, 1999.

GRADUATE EDUCATION

Master of Science (Biology), University of Bremen, Bremen, Germany, 2001.

Master of Science (Biotechnology), Stephen F. Austin State University, Nacogdoches, Texas, U.S.A., 2008.

Ph.D. (Molecular Pathology, Microbiology and Molecular Genetics), University of Texas Health Science Center/University of Texas MD Anderson Cancer Center, Graduate School of Biomedical Sciences, Houston, Texas, U.S.A., 2012, Primary advisor/mentor - Herbert L. DuPont, MD; Co-advisor – Heidi B. Kaplan, Ph.D.

POSITIONS AND EMPLOYMENT

Assistant Professor (Tenure-Track) (October, 2012-Present): The University of Texas Health Science Center, School of Public Health, Division of Epidemiology, Human Genetics & Environmental Sciences, Center for Infectious Diseases, Houston, Texas.

Graduate Research Assistant (2008-2012): The University of Texas Health Science Center, Center for Infectious Diseases, Houston, Texas.

Graduate Research Assistant (2006-2008)**:** Stephen F. Austin State University, Nacogdoches, Texas, USA.

Client Services Representative III/Team Lead (2002-2006): First Horizon National Corporation, Irving, Texas, USA.

TEACHING APPOINTMENTS

2012-Present Course Director, Laboratory Methods: Applications and Implications to Public Health (PH-2785), 2012-Present
2012-Present Lecturer, Molecular and Cellular Basis of Human Disease, Graduate School of Biomedical Sciences Molecular Pathology Program Core Course
2013-Present Guest Lecturer, Microbial Pathogenesis, Baylor College of Medicine, Molecular Virology and Microbiology program Course
2015- Guest Lecturer, Topics of Infectious Diseases, University of Texas School of Public Health

STUDENTS MENTORING EXPERIENCE

Primary/Academic Advisor

1. Sharath, Sherene Esther, Ph.D. Epidemiology (Fall, 2013- present)
2. William Charles Shropshire, Ph.D. Epidemiology (Fall, 2015- present)
3. Hassan Oubote Sangban, Ph.D. Epidemiology (Fall, 2015- present)
4. Kimberly Sonia Plants-Paris, MS Epidemiology (Fall, 2015- present)
5. Magdalena R. Deaton, MPH Epidemiology (Fall, 2015- present)
6. Beena Vikas Shirole, MPH Epidemiology (Fall, 2015- present)
7. Feofanova, Elena Valeryevna, MS Epidemiology (Fall 2013-2015, graduated August, 2015)
8. Adegboyega Olaoluwa Oluwatobi, MPH Epidemiology (Fall, 2013- 2015, graduated May 2015)
9. Akpalu, Yao, MPH Epidemiology (Fall, 2013- 2015)
10. Ana Gomez-Rubio, MPH Epidemiology (Fall, 2013- 2015).

Dissertation/Thesis Advisor

1. Akpalu, Yao, MPH Epidemiology, Graduated (Summer 2015).
   Thesis: Buruli Ulcer: Insight Into the Epidemiology, transmission, Prevention, and Control.
2. Ana Gomez-Rubio, MPH Epidemiology, Graduated (Summer 2015).
   Thesis: Incidence of Bacterial Tracheitis in Pediatric Patients with Artificial Airways.

Dissertation/Thesis Committee Membership

1. Rahman Mohammed, Ph.D. Biostatistics, 2015. External reviewer (Graduated May, 2015).
2. Tsai, I-Hsuan, Ph.D. Epidemiology. Fall, 2013- 2014. Dissertation committee member (Graduated December, 2014).

3. Adeboye, Adeniyi Abolaji, Ph.D. Behavioral Sciences. Fall 2013-2015, Dissertation committee member.
4. Feofanova, Elena Valeryevna, MS Epidemiology. Fall, 2013- 2015. Thesis Committee member, (Graduated August, 2015).
5. Heather T. Essigmann, MPH Epidemiology, Thesis Committee member (Graduated December, 2015).

ACADEMIC AND PROFESSIONAL HONOR/AWARDS/SCHOLARSHIPS

1. **The University of Texas Health Center Student Inter-Council Scholarship**. 2011.
2. **Molecular Basis of Infectious Diseases** (MBID) Training Grant award (2009-2011). A competitive National Institutes of Health sponsored predoctoral training fellowship that supports outstanding predoctoral students in bacterial pathogenesis and molecular basis of infectious diseases. 2009-2011. The University of Texas Health Science Center, Houston, Texas.
3. **The Ralph H. and Ruth J. McCullough Foundation Fellowship Award.** Honors an outstanding doctoral graduate student whose novel research possesses a high potential to impact biomedical sciences in the area of infectious diseases (2010-2011). The University of Texas Health Science Center, Houston, Texas.
4. **UNCF/MERCK Graduate Science Research Fellowship Award** (2011). UNCF/MERCK Science Initiative, a nationally competitive award to recognize and support outstanding African Americans pursuing studies in research in the biological, chemical, and engineering sciences.
5. **American Society for Microbiology Travel Award** (2011). Oral presentation at 4th ASM Conference on Cell-Cell Communication in Bacteria, November 6-9, 2011, Miami, Florida.
6. **UTHealth Golf Tournament Scholarship** (2011). The University of Texas of Health Science Center.
7. **S. E. Sulkin Medical Microbiology Award** (2011-2012). First Place in oral presentation and outstanding scientific achievement, The Texas Branch of American Society for Microbiology. University of Texas at Arlington, Arlington, Texas.
8. **Thomas F. Burks Scholarship for Academic Merit** (2011-2012). A competitive university-wide scholarship awarded for excellence and academic achievement. The University of Texas Health Science Center at Houston.
9. **Robert W. and Pearl Wallis Knox Charitable Foundation Scholarship** (2012). Honors a student in good academic standing whose research is in the area of infectious diseases in humans
10. **Dean's Research Scholarship Award** (2012). The University of Texas Medical School at Houston, Texas. Recognizes senior graduate students in good academic standing, who have achieved distinction in biomedical research.

11. **R. Palmer Beasley, M.D. Faculty Award for Innovation** (2015). University of Texas School of Public Health. Recognizes faculty members who exemplify innovative research in the field of public health.

PATENTS

1. DuPont, H. L., Z. D. Jiang, E. Brown, and **Charles Darkoh.** Application No. 11745200.3-2103, PCT/US2011025170. Filed February 17, 2011, entitled **METHODS OF TREATING INFECTION.**
2. **Darkoh, Charles**, L. M. Lichtenberger, E. J. Dial, and H. L. DuPont. U.S. Publication 20120196887 (Application No. 13/364,589 filed February 2, 2011), entitled **METHODS AND COMPOSITIONS FOR IMPROVED RIFAMYCIN THERAPIES.**
3. **Darkoh, Charles**, H. B. Kaplan, and H. L. DuPont. U.S. Application No. 61/491,726 filed May 31, 2011, entitled **METHODS AND COMPOSITIONS FOR THE DETECTION OF FUNCTIONAL *CLOSTRIDIUM DIFFICILE* TOXINS.**
4. **Darkoh, Charles,** H. L. DuPont, and Heidi B. Kaplan. U. S. Application No. 61/673961. Filed July 20, 2012. **METHODS AND COMPOSITIONS TO ENHANCE THE DETECTION OF *CLOSTRIDIUM DIFFICILE* TOXINS.**
5. **Darkoh, Charles**, U.S. Provisional Patent Application No. *62/247,570,* Filed October 28, 2015, entitled **METHODS AND COMPOSITIONS TO INHIBIT CLOSTRIDIUM TOXINS**.

COMMITTEE MEMBERSHIP, PROFESSIONAL ORGANIZATIONS AND SOCIETIES

2006 Member, Biophysical Society
2007 Member, Golden Key International Honor Society
2007 Member, Beta Beta Beta (Tri Beta) National Biological Honor Society
2008 Member, American Association for the Advancement of Science
2008 Member, The American Society for Microbiology
2011 Member, Academic Standards Committee, University of Texas Graduate School of Biomedical Sciences
2012 Member, American Gastroenterological Association
2012 Member, Radiation Safety Committee, University of Texas Health Science Center
2014 Chair, Diversity Committee, University of Texas School of Public Health
2015 Member, Scientific review board of the Rehabilitation Research and Development Service, Spinal Cord Injury and Neuropathic Pain Panel, U.S. Department of Veterans Affairs.

PEER REVIEW

Peer reviewer for the following journals:

Journal of infectious Diseases
Journal of Bacteriology
Clinical Infectious Diseases
Journal of Clinical Microbiology
Infection and immunity
BMC Microbiology
PLoS One

PEER-REVIEWED PUBLICATIONS

1. **Darkoh, C.** and Antwi-Boasiako, Kwame Badu. **2007**. "Benin." In Global Perspectives on the United States: A Nation by Nation Survey: Volume 1, pp. 50-53. Edited by David Levinson and Karen Christensen, Great Barrington, MA: Berkshire Publishing Group.
2. Ajami, Nadim, H. Koo, **C. Darkoh**, R. L. Atmar, P. C. Okhuysen, Z. D. Jiang, J. Flores, H. L. DuPont. **2010**. Characterization of norovirus-associated traveler's diarrhea.Clin Infect Dis. 15; 51(2):123-30. PMID: 20540620.
3. **Darkoh, C.**, M. El-Bouhssini, M. Baum, and B. Clack. **2010**. Characterization of a prolylendoprotease from *Eurygaster integriceps* puton (Sunn pest) infested wheat. Archives Insect Biochem and Physiol; 74 (3):163-178. PMID: 20568295.
4. **Darkoh, C.**, L. M. Lichtenberger, N. Ajami, E. J. Dial, Z. D. Jiang, and H. L. DuPont. **2010**. Bile acids improve the antimicrobial effect of rifaximin. Antimicrobial Agents and Chemotherapy, 54 (9): 3618-3624. PMID: 20547807.
5. **Darkoh, C.**, H. B. Kaplan, and H. L. DuPont. **2011**. Harnessing the glucosyltransferase activities of *Clostridium difficile* for functional studies of toxins A and B. J. Clin Microbiology, 49(8):2933-41.
6. **Darkoh, C., 2011**. Isolation, purification, and characterization of gluten-specific enzyme from Sunn pest, Eurygaster integriceps. MS thesis. ProQuest. 106 pages. (ISBN-10: 1243420138, ISBN-13: 978-1243420138).
7. **Darkoh, C**., and H. L. DuPont. **2011**. Unravelling the role of host endocytic proteins in pedestal formation during enteropathogenic *E. coli* infection. Journal of Infectious Diseases, 667-667. DOI: 10.1093/infdis/jir391.
8. **Darkoh, C.**, H. L. DuPont, H. B. Kaplan. **2011**. A novel approach for the detection of toxigenic *Clostridium difficile* from stool samples. J. Clin Microbiology. 49(12): 4219-4224.
9. **Darkoh, C.**, Eric L. Brown, Heidi B. Kaplan, Herbert L. DuPont. **2013**. Bile Salt Inhibition of Host Cell Damage from *Clostridium difficile* Toxins. PLoS ONE 8(11): e79631. doi:10.1371/journal.pone.0079631.
10. **Darkoh, C**., L. Comer, G. Zewdie, S. Harold, N. Snyder, H. L. DuPont. **2014**. Chemotactic Chemokines are Important in the Pathogenesis of Irritable Bowel Syndrome. PLoSOne. 9(3):e93144. doi: 10.1371/journal.pone.0093144.

11. **Darkoh, C.,** Bradley Turnwald, Zhi-Dong Jiang, Hoonmo L. Koo, Kevin Garey, and Herbert DuPont. **2014**. Colonic Immunopathogenesis of *Clostridium difficile* Infections. Clin Vaccine Immunol. 21(4):509-17. doi: 10.1128/CVI.00770-13.
12. Yandamuri, R.C., Gautam, R., **Darkoh C**., Vanitha Dareddy, V., El-Bouhssini, M., and Clack, B.A. **2014**. Cloning, Expression, Sequence Analysis and Homology Modeling of the Prolyl Endoprotease from *Eurygaster integriceps Puton.* Insects. *5*, 762-782; doi:10.3390/insects5040762.
13. **Darkoh, C**., and Asiedu, G.A. **2015**. Quorum Sensing Systems in Clostridia, p. 133-154. *In* V. C. Kalia (ed.), Quorum Sensing vs Quorum Quenching: A Battle with No End in Sight. Springer India. ISBN 978-81-322-1982-8.
14. **Darkoh, C**., H. L. DuPont, S. J. Norris, and H. B. Kaplan. **2015**. Toxin Synthesis by *Clostridium difficile* is Regulated through Quorum Signaling. mBio 6:e02569-02514. doi: 10.1128/mBio.02569-14. PMID: 25714717.
15. **Darkoh**, **C.**, C. Chappell, C. Gonzales, and P. Okhuysen. **2015**. A Rapid and Specific Method for the Detection of Indole in Complex Biological Samples. Appl Environ Microbiol. 81(23):8093-7. doi: 10.1128/AEM.02787-15. Epub 2015 Sep 18. PMID: 26386049.
16. **Darkoh, C.** and Odo, Chioma. **2015**. The *Clostridium difficile* Toxins: Mechanism of Action and Immunopathogenesis: In Proteins-Recent Trends and Emerging Topics. IConcept Press Ltd. (In press).
17. Martinez, P., **C. Darkoh**, E. Garrido, S. Fisher-Hoch, D. Briles, A. Kantarci, and S. Mirza. **2015**. PspA Facilitates Evasion of Pneumococci from Bactericidal Activity of Neutrophil Extracellular Traps (NETs). (Reviewed)

INVITATIONS AND ABSTRACT PRESENTATIONS

- Poster presentation and Graduate Student Volunteer (February, 2008): Joint 52nd Annual Meeting of the Biophysical Society and 16th IUPAB International Biophysics Congress, Long Beach, California. Characterization and purification of prolylendopeptidase from *Eurygaster integriceps*.
- Poster presentation (April 25, 2008): Bright Ideas Conference, Stephen F. Austin State University, Nacogdoches, Texas. Characterization and purification of prolylendopeptidase from *Eurygaster integriceps*.
- Oral presentation (June 30, 2010). Quorum sensing-mediated regulation of toxin production in *C. difficile*. Molecular Basis of Infectious Diseases (MBID) Summer Undergraduate program, Houston, Texas.
- Poster presentation (March 26, 2010): Molecular Basis of Infectious Diseases (MBID) Retreat, Houston, Texas. Bile acids improve the Bioavailability and Bacteriostatic Effect of Rifaximin.
- Oral presentation (May 1-5, 2010). Bile acids improve the antimicrobial effect of rifaximin. American Gastroenterological Association, Digestive Diseases Week, New Orleans. Bile acids improve the bioavailability and bacteriostatic effect of rifaximin. Gastroenterology, Volume 138, Issue 5, Pages S-5.
- Oral presentation (March 24th, 2011). Detection of Toxigenic *Clostridium difficile* by Harnessing the Glucosyltransferase Activities of its Toxins. Molecular Basis of

Infectious Diseases Training Grant Retreat. The University of Texas Health Science Center, Houston, Texas.

- Oral presentation (June 28th, 2011). Mechanism of Toxin Production in *Clostridium difficile*. Molecular Basis of Infectious Diseases Training Grant Summer Undergraduates research program. The University of Texas Health Science Center, Houston, Texas.
- Oral presentation (November 10-12, 2011). Regulation of Toxin Production in *Clostridium difficile*. American Society for Microbiology-Texas Branch, University of Texas at Arlington, Arlington, Texas.
- Oral presentation (November 6-9, 2011). Regulation of Toxin Production in *Clostridium difficile*. American Society for Microbiology 4th ASM Conference on Cell-Cell Communication in Bacteria, Miami, Florida.
- Oral presentation (March 19, 2012). Harnessing the Power of the Community to Wreak Havoc: The Case of *Clostridium difficile*. Texas A&M Institute of Biosciences, Houston, Texas.
- Texas Medical Center Digestive Diseases Center GI Forum (March 14, 2013). Harnessing the Power of the Community to Wreak Havoc: A New Paradigm of *C. difficile* Toxin Regulation. Baylor College of Medicine, Houston, Texas.
- American Society for Microbiology, Texas Branch-Spring Meeting, New Braunsfel (April 6, 2013). A New Paradigm of *C. difficile* Toxin Regulation.
- Molecular Virology and Microbiology Seminar Series, Baylor College of Medicine, (November 21, 2013), A New Paradigm of *Clostridium difficile* Virulence and Pathogenesis.
- Abstract presentation (October 18 - 21, 2014) American Society for Microbiology 5th ASM Conference on Cell-Cell Communication in Bacteria, San Antonio, Texas, Toxin Synthesis by *Clostridium difficile* is Stringently Regulated Through Quorum Signaling.
- American Society for Microbiology, Texas Branch-Spring Meeting, Houston (November 6-8, 2014). Uncovering the Role of Quorum Signaling in *Clostridium difficile* Pathogenesis.
- 115th General Meeting of the American Society for Microbiology, New Orleans (May 29-June 3, 2015). Agr Quorum Signaling-Dependent Regulation of *Clostridium difficile* Toxin Production and Pathogenesis.
- Microbiology and Molecular Genetics Department Seminar Series, University of Texas medical School (December 3, 2015). Regulating to Wreak Mayhem: The Case of *Clostridium difficile* Toxins.

RESEARCH SUPPORT

Current Research Support

1. **Title**: Targeting the Toxins: A Novel Non-Antimicrobial Approach to Combat *Clostridium difficile* infections
   Funding agency: NIH-NIAID R01 Grant # R01AI116914
   Goal: Develop a novel non-antibiotic treatment for *C. difficile* infections by targeting both toxin production and toxin activity.
   Project period: June 15, 2015 - May 31, 2020
   Role: Principal Investigator

2. **Title**: The Role of Acyloxyacyl Hydrolase in the Pathogenesis of Irritable Bowel Syndrome
   Funding agency: Gillson-Longenbaugh Foundation
   Goal: Investigate the role of acyloxyacyl hydrolase and genetic alterations in the pathogenesis of irritable bowel syndrome.
   Project period: January 1, 2013- January 1, 2018
   Role: Principal Investigator

3. **Title:** Development of a Novel One-Step Method for Detection and Isolation of Active Toxin-Producing *Clostridium difficile* Strains Directly from Stool Samples.
   Goal: Develop a diagnostic test for *Clostridium difficile* infections.
   Funding agency: University of Texas Pioneer Award
   Project period: November, 2012- September, 2016
   Role: Principal Investigator

Completed Research Support

1. **Title:** Mechanism of *Clostridium difficile* Pathogenesis
   Goal: Investigate the mechanism of toxin synthesis regulation in *Clostridium difficile.*
   Funding agency: University of Texas School of Public Health Prime Award
   Project period: April, 2013 - April, 2014
   Role: Principal Investigator

2. **Title:** Quorum Signaling-Mediated Regulation of *Clostridium difficile* Toxin Production
   Goal: Elucidate the quorum signaling compound responsible for toxin synthesis regulation in *Clostridium difficile.*
   Funding agency: Texas Medical Center Digestive Diseases Center Pilot/Feasibility Grant
   Project period: February, 2013 - January, 2014
   Role: Principal Investigator