Yong Cheng

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Research Interests:

I am currently a tenure-track assistant professor in the Department of Biochemistry and Molecular Biology at Oklahoma State University in Stillwater, OK, and highly motivated to pursue an academic and translational-research career. I have worked on multiple projects in the field of mycobacterial pathogen-host interactions, and have interdisciplinary expertise in microbiology and immunology. I feel my qualifications are well-aligned with the studies described in this proposal. In 2007, I received my Ph.D. degree in Microbiology from Huazhong Agricultural University, China, and then I joined the University of Basel, Switzerland, with F. Hoffmann–La Roche Ltd Postdoctoral Fellowship working on the project addressing the function of M.tuberculosis protein kinase G in mycobacterial pathogenesis and the potential application of its inhibitors as new anti-TB drugs. In 2011, I joined the Dr. Jeff Schorey's lab at the University of Notre Dame, Indiana, and focused on the research understanding the roles of exosomes in hostM.tuberculosis interactions, and potential application of these host cell-released vesicles as innovative anti-TB vaccines and biomarkers for TB diagnosis. Additionally, my studies for the first time demonstrated the engagement of the host cytosolic RNA sensing pathway in the host response to mycobacterial infections in host cells. Meanwhile, in collaboration with Hsiri Therapeutics and Dr. Marvin J. Miller from the Department of Chemistry and Biochemistry, University of Notre Dame, we identified a new family of antimycobacterial small molecules. In 2016, I was promoted to a research assistant professor at the University of Notre Dame. As an independent principle investigator, I initiated multiple projects understanding the interactions between non-tuberculous mycobacteria (NTM) and the host in cystic fibrosis (CF) patients using a cystic fibrosis murine model, aiming at development of new treatment for mycobacterial infections in cystic fibrosis patients. In Summer 2020, I was appointed as an assistant professor at Oklahoma State University. My current studies are understanding the host-pathogen interactions during M.tuberculosis and NTM infections using tissue culture and mouse models.

Education:
2016: Postdoc Microbiology and Immunology, University of Notre Dame, Indiana
2010: Postdoc Microbiology and Immunology, University of Basel, Switzerland
2002-2007: Microbiology Ph.D., Huazhong Agricultural University, China
1998-2002: Biotechnology B.Sc., Huazhong Agricultural University, China

Academic Appointments:
2020-Present: Assistant Professor, Department of Biochemistry and Molecular Biology, Oklahoma State University, OK

August 2020: Investigator, Oklahoma Center for Respiratory and Infectious Diseases, Oklahoma State University, OK
July 2020: Director of Microbiology, Hsiri Therapeutics Inc., Pennsylvania
2016-2019: Research Assistant Professor, Department of Biological Sciences, University of Notre Dame, IN
2004: Visiting Scientist, IBSM, CNRS, France

Awards and Honors:
2009: Excellent Doctoral Dissertation Award of Hubei Province, Hubei Association for Science & Technology, China
2008-2009: F. Hoffmann–La Roche Ltd Postdoctoral Fellowship, Switzerland
2007: Excellent Doctoral Dissertation award, Huazhong Agricultural University, China
2007: Excellent Ph.D. student award at Huazhong Agricultural University, China
2002: Excellent undergraduate award, Huazhong Agricultural University, China

Research Support:
1. 1/2018-4/2019: FRSP Initiation Grant, University of Notre Dame, "Identifying mycobacterial genes and cellular pathways involved in Mycobacterium abscessus survival in the lung of cystic fibrosis patients using a CFTRdeficient mouse model.", PI: Yong Cheng
2. 03/1/2019-02/28/2021: Pilot Funding for Research Use of Core Facilities, Indiana Clinical and Translational Sciences Institute, "Characterizing the Host Transcriptional Response to Non-tuberculous Mycobacterial Infection in a Cystic Fibrosis Murine Model.", PI: Yong Cheng
3. 05/2019-5/2020: CRND Catalyst Program, University of Notre Dame, "Understanding the Mechanism of Immune Dysfunction in a Cystic Fibrosis Murine Model during Non-tuberculous Mycobacterial Infection.", PI: Yong Cheng

Selected Publications:

1. Cheng, Y., J. H. Li, L. Shi, L. Wang, A. Latifi, and C. C. Zhang. 2006. A pair of iron responsive genes encoding protein kinases with a Ser/Thr kinase domain and a His kinase domain are regulated by NtcA in the cyanobacterium Anabaena sp. strain PCC 7120. J. Bacteriol. 188: 4822-4829. 3
2. Chen, H., S. Laurent, S. Bedu, F. Ziarelli, H. L. Chen, Y. Cheng, C. C. Zhang, and L. Peng. 2006. Studying the signaling role of 2-oxoglutaric acid: using analogs that mimic the ketone and ketal forms of 2-oxoglutaric acid. Chem. Biol. 13: 849-856.
3. Shi, L., J. H. Li, Y. Cheng, L. Wang, W. L. Chen, and C. C. Zhang. 2007. Two genes encoding protein kinases of the HstK family are involved in the synthesis of the minor heterocyst-specific glycolipid in the cyanobacterium Anabaena sp. strain PCC 7120. J. Bacteriol. 189: 5075-5081
4. Cheng Y. and J. S. Schorey. 2013. Exosomes carrying mycobacterial antigens can protect mice against Mycobacterium tuberculosis infection. Eur. J. Immunol. 43(12): 3279-90.
5. Cheng Y. and J. S. Schorey. 2016. Targeting soluble proteins to exosomes using a ubiquitin tag. Biotechnology and Bioengineering. DOI 10.1002/bit.25884.

6. Smith V.L., Y. Cheng, B. Bryant and J. S. Schorey. 2017. Exosomes function in antigen presentation during an in vivo Mycobacterium tuberculosis infection. Nat. Sci. Rep. 6;7:43578. doi:10.1038/srep43578.
7. Li L., Y. Cheng, S. Emrich and J. S. Schorey. 2018. Activation of endothelial cells by extracellular vesicles derived from Mycobacterium tuberculosis infected macrophages or mice. PloS one 13 (5): e0198337.
8. Cheng, Y., G. C. Moraski, J.W. Cramer, M. J. Miller, and J. S. Schorey. 2014. Bactericidal activity of an Imidazo[1, 2-a]pyridine using a mouse M. tuberculosis infection model. PLOS One. 9: e87483.
9. Moraski G. C.*, Y. Cheng*, S. Cho, J.W. Cramer, A. Godfrey, T. Masquelin, S.G. Franzblau, M.J. Miller, J.S. Schorey. 2016. Imidazo[1,2-a]pyridine-3- carboxyamides are Active Antimicrobial Agents of M. avium Infection In Vivo. Antimicrob. Agents Chemother. 60(8):5018-22. doi: 10.1128/AAC.00618-16. (* Co-first authors)
10. Cheng Y.*, J. S. Schorey, C.C. Zhang and X.J. Tan. 2017. Protein Kinase Inhibitors as Potential Antimicrobial Drugs against Tuberculosis, Malaria and HIV. Review. Curr Pharm Des. doi: 10.2174/1381612823666170612122429. (*Corresponding author)
11. Cheng Y. and J. S. Schorey. 2018. Mycobacterium tuberculosis–induced IFN- β production requires cytosolic DNA and RNA sensing pathways. Journal of Experimental Medicine. 215 (11), 2919-2935.
12. Cheng Y. and J. S. Schorey. 2019. Extracellular vesicles deliver Mycobacterium RNA to promote host immunity and bacterial killing. EMBO Rep. 20(3): e46613. doi: 10.15252/embr.201846613.
13. Cheng, Y., Kiene, N.J., Tatarian, A., Eix, E.F., Schorey, J.S. 2020. Host cytosolic RNA sensing pathway promotes T Lymphocyte-mediated mycobacterial killing in macrophages. PLoS Pathogens 16 (5), e1008569.