

BIOGRAPHICAL SKETCH

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NAME: Zhao, Yanan

eRA COMMONS USER NAME (credential, e.g., agency login):

POSITION TITLE: Assistant Professor

EDUCATION/TRAINING (*Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.*)

INSTITUTION AND LOCATION	DEGREE (if applicable)	END DATE MM/YYYY	FIELD OF STUDY
Tongji Medical University, Wuhan	MB	07/1999	Preventive Medicine
Tongji Medical College, HUST, Wuhan	MS	07/2002	Epidemiology
Fudan University, Shanghai	PHD	07/2005	Molecular Epidemiology
Public Health Research Institute, UMDNJ, Newark, NJ	Postdoctoral Fellow	2009	Molecular Microbiology

A. Personal Statement

I have the proven leadership and experience necessary to successfully complete the proposed research project. My primary expertise is in rapid molecular diagnosis of drug resistant bacterial and fungal pathogens in high-risk patients. Since 2006, I have worked on rapid diagnostics of Sepsis and related drug resistance. I have worked closely with numerous hospitals and clinical labs as well as commercial partners. I developed the rapid real-time KPC-NASBA assay, which is CE-marked and commercialized by bioMérieux. I also have extensive experience of antifungal drug and novel compound efficacy evaluation using small animal models. I have successfully led the DoD project (PI: Dr. David S. Perlin) evaluating carbohydrate derived fulvic acid as a topical broad-spectrum antimicrobial for drug resistant wound infections. I am the co-PI of research grant for rapid *Candida glabrata* echinocandin resistance diagnostic assay development funded by Merck. Recently, I have developed interest in studying drug distribution and tissue penetration using the cutting edge technologies including MALDI mass spectrometry imaging and laser capture microdissection directed analytical methods.

1. Healey KR, Nagasaki Y, Zimmerman M, Kordalewska M, Park S, **Zhao Y***, Perlin DS. The Gastrointestinal Tract Is a Major Source of Echinocandin Drug Resistance in a Murine Model of *Candida glabrata* Colonization and Systemic Dissemination. *Antimicrob Agents Chemother.* 2017 Dec;61(12)PubMed PMID: [28971865](#); PubMed Central PMCID: [PMC5700336](#). (**corresponding author**)
2. **Zhao Y***, Prideaux B, Nagasaki Y, Lee MH, Chen PY, Blanc L, Ho H, Clancy CJ, Nguyen MH, Dartois V, Perlin DS. Unraveling Drug Penetration of Echinocandin Antifungals at the Site of Infection in an Intra-abdominal Abscess Model. *Antimicrob Agents Chemother.* 2017 Oct;61(10)PubMed PMID: [28739797](#); PubMed Central PMCID: [PMC5610477](#). (**corresponding author**)
3. **Zhao Y***, Paderu P, Railkar R, Douglas C, Iannone R, Shire N, Perlin DS. Blood *Aspergillus* RNA is a promising alternative biomarker for invasive aspergillosis. *Med Mycol.* 2016 Nov 1;54(8):801-7. PubMed PMID: [27335056](#). (**corresponding author**)
4. **Zhao Y***, Nagasaki Y, Kordalewska M, Press EG, Shields RK, Nguyen MH, Clancy CJ, Perlin DS. Rapid Detection of FKS-Associated Echinocandin Resistance in *Candida glabrata*. *Antimicrob Agents Chemother.* 2016 Nov;60(11):6573-6577. PubMed PMID: [27550360](#); PubMed Central PMCID: [PMC5075061](#). (**corresponding author**)

B. Positions and Honors**Positions and Employment**

2005 - 2006 Lecturer of Epidemiology, School of Public Health, Fudan University, Shanghai
2006 - 2009 Postdoctoral Fellow, PHRI, UMDNJ, Newark, NJ

2009 - 2015 Research Associate, PHRI, NJMS, Rutgers University, Newark, NJ
2015 - Assistant Professor, PHRI, NJMS, Rutgers University, Newark, NJ

Other Experience and Professional Memberships

2006 - Contributing Member, American Society of Microbiology

Honors

2005 Outstanding Graduate of Shanghai, Shanghai Municipal Education Commission
2005 The 19th Shanghai Excellent Invention Competition, Municipal Science and Technology Commission
2007 Preventive Medicine Award of China, China Preventive Medicine Association
2007 Science and Technology Progress Award of the Institute of Higher Education of China, Ministry of Education of China

C. Contribution to Science

1. Rapid detection of respiratory and bloodstream infections (BSIs) and associated resistance markers. Early and appropriate antimicrobial therapy is critical to a favorable outcome for patients with respiratory and BSIs. Current diagnostic methods are inadequate and reducing the time period from specimen collection to species identification and antimicrobial susceptibility is essential for improving patient outcome. For the past decade, I have been working on developing next-generation nucleic acid PCR- and RNA-based molecular beacon platforms for rapid identification of bacterial and fungal pathogens, and associated drug resistance in high threat bacterial and fungal pathogens.
 - a. Kordalewska M, **Zhao Y**, Lockhart SR, Chowdhary A, Berrio I, Perlin DS. Rapid and Accurate Molecular Identification of the Emerging Multidrug-Resistant Pathogen *Candida auris*. *J Clin Microbiol*. 2017 Aug;55(8):2445-2452. PubMed PMID: [28539346](#); PubMed Central PMCID: [PMC5527423](#).
 - b. **Zhao Y**, Armeanu E, DiVerniero R, Lewis TA, Dobson RC, Kontoyiannis DP, Roilides E, Walsh TJ, Perlin DS. Fungal DNA detected in blood samples of patients who received contaminated methylprednisolone injections reveals increased complexity of causative agents. *J Clin Microbiol*. 2014 Jun;52(6):2212-5. PubMed PMID: [24719442](#); PubMed Central PMCID: [PMC4042738](#).
 - c. **Zhao Y**, Petraitiene R, Walsh TJ, Perlin DS. A real-time PCR assay for rapid detection and quantification of *Exserohilum rostratum*, a causative pathogen of fungal meningitis associated with injection of contaminated methylprednisolone. *J Clin Microbiol*. 2013 Mar;51(3):1034-6. PubMed PMID: [23303500](#); PubMed Central PMCID: [PMC3592047](#).
 - d. **Zhao Y**, Park S, Warn P, Shrief R, Harrison E, Perlin DS. Detection of *Aspergillus fumigatus* in a rat model of invasive pulmonary aspergillosis by real-time nucleic acid sequence-based amplification. *J Clin Microbiol*. 2010 Apr;48(4):1378-83. PubMed PMID: [20129972](#); PubMed Central PMCID: [PMC2849568](#).
 - e. **Zhao Y**, Park S, Kreiswirth BN, Ginocchio CC, Veyret R, Laayoun A, Troesch A, Perlin DS. Rapid real-time nucleic acid sequence-based amplification-molecular beacon platform to detect fungal and bacterial bloodstream infections. *J Clin Microbiol*. 2009 Jul;47(7):2067-78. PubMed PMID: [19403758](#); PubMed Central PMCID: [PMC2708467](#).
2. Drug discovery against multidrug resistant bacteria and fungi. An epidemic of multidrug-resistant plagues global and U.S. healthcare, and with few new antibiotics making it to market from a diminished pipeline, there is an unmet medical need for new therapeutics to treat drug-resistant infections. I have been involved in developing broad-spectrum topical agents against drug-sensitive and multi-drug resistant bacterial and fungal pathogens commonly associated with wound infections, especially among military combatants in theatre.
 - a. **Zhao Y***, Prideaux B, Nagasaki Y, Lee MH, Chen PY, Blanc L, Ho H, Clancy CJ, Nguyen MH, Dartois V, Perlin DS. Unraveling Drug Penetration of Echinocandin Antifungals at the Site of Infection in an Intra-abdominal Abscess Model. *Antimicrob Agents Chemother*. 2017 Oct;61(10)PubMed PMID: [28739797](#); PubMed Central PMCID: [PMC5610477](#). (**corresponding author**)

- b. **Zhao Y**, Perez WB, Jiménez-Ortigosa C, Hough G, Locke JB, Ong V, Bartizal K, Perlin DS. CD101: a novel long-acting echinocandin. *Cell Microbiol.* 2016 Sep;18(9):1308-16. PubMed PMID: [27354115](#); PubMed Central PMCID: [PMC5096055](#).
 - c. **Zhao Y**, Paderu P, Delmas G, Dolgov E, Lee MH, Senter M, Park S, Leivers S, Perlin DS. Carbohydrate-derived fulvic acid is a highly promising topical agent to enhance healing of wounds infected with drug-resistant pathogens. *J Trauma Acute Care Surg.* 2015 Oct;79(4 Suppl 2):S121-9. PubMed PMID: [26406424](#).
3. In vitro and in vivo antifungal drug resistance studies. In recent years, my research interest has been focused on antifungal drug resistance, which continues to be an emerging problem in medical mycology. My work has focused on antifungal drug resistance including molecular mechanisms of azole resistance among *Aspergillus fumigatus* and echinocandin resistance in *Candida* species. I have developed comprehensive molecular diagnostic assays to detect specific triazole resistance mutations in Cyp51A. I am the leading role of NIH R21 project (PI: Perlin) about azole resistance in *A. fumigatus*, fully responsible for in vitro/in vivo study design, data analysis and communication with clinical collaborators. I have also actively participated in our preliminary study of host biomarker discovery to monitor therapeutic response in invasive pulmonary aspergillosis. I am now the co-PI of research grant funded by Merck to develop rapid diagnostic assay for echinocandin resistance in *Candida glabrata*. Finally, we are assessing genetic factors that contribute to echinocandin resistance emergence.
- a. Healey KR, Nagasaki Y, Zimmerman M, Kordalewska M, Park S, **Zhao Y***, Perlin DS. The Gastrointestinal Tract Is a Major Source of Echinocandin Drug Resistance in a Murine Model of *Candida glabrata* Colonization and Systemic Dissemination. *Antimicrob Agents Chemother.* 2017 Dec;61(12)PubMed PMID: [28971865](#); PubMed Central PMCID: [PMC5700336](#). (**corresponding author**)
 - b. **Zhao Y***, Nagasaki Y, Kordalewska M, Press EG, Shields RK, Nguyen MH, Clancy CJ, Perlin DS. Rapid Detection of FKS-Associated Echinocandin Resistance in *Candida glabrata*. *Antimicrob Agents Chemother.* 2016 Nov;60(11):6573-6577. PubMed PMID: [27550360](#); PubMed Central PMCID: [PMC5075061](#). (**corresponding author**)
 - c. Healey KR, **Zhao Y**, Perez WB, Lockhart SR, Sobel JD, Farmakiotis D, Kontoyiannis DP, Sanglard D, Taj-Aldeen SJ, Alexander BD, Jimenez-Ortigosa C, Shor E, Perlin DS. Prevalent mutator genotype identified in fungal pathogen *Candida glabrata* promotes multi-drug resistance. *Nat Commun.* 2016 Mar 29;7:11128. PubMed PMID: [27020939](#); PubMed Central PMCID: [PMC5603725](#).
 - d. **Zhao Y**, Stensvold CR, Perlin DS, Arendrup MC. Azole resistance in *Aspergillus fumigatus* from bronchoalveolar lavage fluid samples of patients with chronic diseases. *J Antimicrob Chemother.* 2013 Jul;68(7):1497-504. PubMed PMID: [23463213](#); PubMed Central PMCID: [PMC3935014](#).

Complete List of Published Work in My Bibliography:

<https://www.ncbi.nlm.nih.gov/myncbi/10gldjVPIT35Q/bibliography/42000594/public/>

D. Additional Information: Research Support and/or Scholastic Performance

Completed Research Support

DM110303, DoD

Perlin (PI)

09/30/12-09/29/16

Evaluation of Carbohydrate Derived Fulvic Acid (CHD-FA) as a Topical Broad-Spectrum Antimicrobial for Drug Resistant Wound Infections

Role: Co-Investigator

53563, Merck & Co.

Perlin (PI)

08/01/15-07/01/16

Development and proof-of-concept clinical validation of a novel molecular diagnostic platform for rapid identification of echinocandin resistance in *Candida glabrata*

Role: CPI

1R21AI103636, NIH-NIAID

Perlin (PI)

04/15/13-03/31/15

Linking Triazole Resistance and Fitness in *Aspergillus fumigatus*

Role: Co-Investigator