

## Guolong "Glenn" Zhang, Ph.D.

Professor  
Boulware Endowed Chair  
Department of Animal and Food Sciences  
Oklahoma State University

### Contact Information:

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### Education:

2001: Howard Hughes Medical Institute (HHMI) Postdoctoral Fellow in Molecular Immunology, Department of Immunobiology, Yale University School of Medicine, CT

1999: Ph.D., in Immunophysiology, Department of Anatomy and Physiology, College of Veterinary Medicine, Kansas State University, KS

1995: M.S., in Nutritional Immunology, Department of Animal Science, China Agricultural University, China

1993 B.S., (with honors) in Animal Genetics, Department of Animal Science, China Agricultural University, China

### Academic Appointments:

2016–present: Ralph F. and Leila W. Boulware Endowed Chair in Animal Science, Oklahoma State University, OK

2002–present Assistant Professor (Jan. 2002-June 2007), Associate Professor (July 2007-June 2014), and Professor (July 2014-present), Department of Animal Science, Oklahoma State University, OK

2009–present Adjunct Associate Professor, Department of Biochemistry and Molecular Biology, Oklahoma State University, OK

2007–present Adjunct Associate Professor, Department of Physiological Sciences, Center for Veterinary Health Sciences, OSU, OK

2010–2011 Visiting Associate Professor, Department of Microbiology, University of Washington School of Medicine, WA (on sabbatical leave)

2000–2001: Postdoctoral Fellow, HHMI and Department of Immunobiology, Yale University School of Medicine, CT

1996–1999: Graduate Research Assistant, Department of Anatomy and Physiology, College of Veterinary Medicine, Kansas State University, KS

1993–1995: Graduate Research Assistant, Department of Animal Science and Ministry of Agriculture Feed Industry Center, China Agricultural University, China

### Awards and Honors:

2018: Regents Distinguished Research Award, Division of Agricultural Sciences and Natural Resources, Oklahoma State University, OK

2016: Ralph F. and Leila W. Boulware Endowed Chair in Animal Science, Oklahoma State University, OK

2015: Sigma Xi Chapter Lecturer Award, Oklahoma State University, OK

2015: Outstanding Overseas Young Investigator Award, Natural Science Foundation of China

2014: James A. Whatley Award for Meritorious Research in Agricultural Sciences, Division of Agricultural Sciences and Natural Resources, Oklahoma State University, OK

2014: Don M. Tyler Award for Outstanding Professional Achievements, Department of Animal Science, Oklahoma State University, OK

2014: Chutian Endowed Visiting Professorship, School of Animal Science and Nutritional Engineering, Wuhan Polytechnic University, China

2012: National Academy of Inventors

2009: Gamma Sigma Delta (Honor Society of Agriculture)

2008: Sigma Xi Young Investigator Award, Oklahoma State University, OK

2007-present: Who's Who in America

2007: Who's Who among American Teachers & Educators

2005: Big XII Faculty Fellowship Award, Oklahoma State University, OK

2004: Junior Faculty Travel Award, American Association of Immunologists

2003: Sigma Xi, a National Research Society

2000-2001: HHMI Postdoctoral Fellowship for two years, Department of Immunobiology, Yale University School of Medicine, CT

1999: Second Place Award in Basic Science, the Sigma Chapter of the Society of Phi Zeta, College of Veterinary Medicine, Kansas State University, KS

1998: Young Investigator Travel Fellowship Award, Society for Experimental Biology and Medicine

1995: Outstanding Graduate Student Award, Department of Animal Science, China Agricultural University, China

1994: Guo Zhaoming Scholarship for Outstanding Graduate Students, Department of Animal Science, China Agricultural University, China

1992: President's Award, China Agricultural University, Beijing, China (The most prestigious award for undergraduate students at CAU)

1991: Outstanding Undergraduate Student Award in Science and Engineering among Universities and Colleges in Beijing, China Glenn Zhang, Ph.D.

1990-1992: Academic Scholarship, First Place Award for three consecutive years, Department of Animal Science, China Agricultural University, China

**Other Professional Experiences and Memberships:**

2001-present: Membership: American Association for the Advancement of Science, American Association of Immunologists, American Association of Veterinary Immunologists, Conference of Research Workers in Animal Diseases

2001-present: Ad hoc reviewer for 25 journals including Journal of Immunology; FASEB Journal; Infection & Immunity; Molecular Immunology; Developmental & Comparative Immunology, Genome Research, and BMC Genomics

2003-present: Ad hoc reviewer or panel member: US Army Medical Research and Materiel Command (USAMRMC),

NIH "Innate Immunity and Inflammation" Study Section, USDA "Food and Agricultural Sciences National Needs Graduate Fellowship Grants Program", NSF "Symbiosis, Defense, and Self-recognition" Program, Canada Foundation for Innovation, and National Science Foundation of China

2009-present: Three editorial Boards: World Journal of Biological Chemistry, Journal of Animal Science and Biotechnology, and International Journal of Antibiotics

2012-2015: Nominating Committee, American Association of Veterinary Immunologists  
2014-2016: Treasurer, American Association of Veterinary Immunologists

### Research Support:

Current:

- 01/15/2018-01/14/2021: USDA/NIFA Food Safety Challenge Program, "Novel Non-Antibiotic Approaches for Mitigation of Antimicrobial Resistance in Poultry", Role: Co-PI
  - 03/15/2018-03/14/2020: USDA/NIFA Education and Literacy Initiative Program (Predoctoral Fellowship), "Fecal Microbiota Transplantation to Enhance Production Efficiency", Role: Primary Mentor
  - 09/01/2018-04/30/2019: USDA/NIFA Small Business Innovation Research (SBIR) Program, "Natural Immune Boosting Compounds as Alternatives to Antibiotics", Role: Co-PI (with A. Curtis as PI to commercialize my antibiotic alternative technology)
  - 09/01/2017-12/31/2018: Elanco Animal Health, "Effect of Heat Stress on Broiler Chickens Medicated with Different Concentrations of Nicarbazin", Role: PI
  - 08/01/2018-07/31/2021: OSU Division of Agricultural Sciences and Natural Resources (DASNR) Sitlington Enriched Graduate Scholarship Program, "Sitlington Enriched Graduate Scholarship to Supplement the Stipends of Two Incoming Doctoral Students", Role: PI
- Past:

- 2012-2014: Oklahoma Center for Advancement of Science & Technology (OCAST) Applied Research Support Program, "Development of Immune Boosting Feed Additives", Role: PI, Awarded: \$90,000
- 2012-2015: Oklahoma Center for Advancement of Science & Technology (OCAST) Health Research Program, "Antimicrobial Therapy Using Immunomodulatory Peptides", Role: PI, Awarded: \$135,000
- 2014-2014: Cowboy Technologies, OSU, "Natural Immune Boosting Feed Additives as Alternatives to Antibiotics" (Seed funding for technology commercialization), Role: PI, Awarded: \$50,000
- 2014-2015: Innovad, Inc., Belgium (<http://www.innovad-global.be>), "Impact of Novyrate EB and Novyrate C on Growth Promotion, Antimicrobial Peptide Expression, and Intestinal Microflora Balance in Broiler Chickens", Role: Co-PI, Awarded: \$46,008
- 2013-2018: USDA-NIFA Fellowships Grant Program, "Graduate Training for the Next Generation of Scholars in Application of Genomic and Computational Biology for Animal Production", Role: Co-PI, Awarded: \$238,500
- 2013-2014: OSU Research Facility Renovation and/or Development Program, "Acquisition of a BD FACSAria Cell Sorter to Expand the Capabilities of OSU's Flow Cytometry Core Facility", Role: Co-PI, Awarded: \$316,776
- 2008-2013: USDA/NIFA Foundational Program, "Enhancing Disease Resistance by Boosting Innate Immunity", Role: PI, Awarded: \$365,300
- 2009-2012: NIH-National Institute of Allergy and Infectious Diseases (NIAID), "Antimicrobial Peptide Resistance in *Campylobacter jejuni*", Role: Co-PI, Awarded: \$199,355
- 2007-2010: Oklahoma Center for Advancement of Science & Technology (OCAST) Applied Research Support Program, "Novel Antimicrobial Peptides as Anti-Sepsis Drugs", Role: PI, Awarded: \$90,000
- 2007-2009: Oklahoma Center for Advancement of Science & Technology (OCAST) Health Research Program, "Enteric Defensins and Inflammatory Bowel Disease", Role: PI, Awarded: \$90,000

### Selected Publications:

1. Zhang, G., H. Hiraiwa, H. Yasue, H. Wu, C.R. Ross, D. Troyer, and F. Blecha. 1999. Cloning and characterization of the gene for a new epithelial  $\beta$ -defensin: genomic structure, chromosomal localization, and evidence for its constitutive expression. *Journal of Biological Chemistry* 274: 24031-24037.

2. Zhang, G., H. Wu, C.R. Ross, J.E. Minton, and F. Blecha. 2000. Cloning of porcine NRAMP1 and its induction by lipopolysaccharide, TNF- $\alpha$ , and IL-1 $\beta$ : role of CD14 and mitogenactivated protein kinases. *Infection and Immunity* 68: 1086-1093.
3. Zhang, G., and S. Ghosh. 2000. Molecular mechanisms of NF- $\kappa$ B activation induced by lipopolysaccharide through Toll-like receptors. *Journal of Endotoxin Research* 6:453-457.
4. Zhang, G., and S. Ghosh. 2001. Toll-like receptor-mediated NF- $\kappa$ B activation: a phylogenetically conserved paradigm in innate immunity. *Journal of Clinical Investigation* 107: 13-19.
5. Zhang, G., and S. Ghosh. 2002. Negative regulation of Toll-like receptor-mediated signaling by Tollip. *Journal of Biological Chemistry* 277: 7059-7065.
6. Zhang, D., G. Zhang, M.S. Hayden, M.S. Greenblatt, C. Bussey, R.A. Flavell, and S. Ghosh. 2004. A Toll-like receptor that prevents infection by uropathogenic bacteria. *Science* 303: 1522-1526.
7. Xiao, Y, A.L. Hughes, J. Ando, Y. Matsuda, J.F. Cheng, D. Skinner-Noble, and G. Zhang. 2004. A genome-wide screen identifies a single  $\beta$ -defensin gene cluster in the chicken: implications for the origin and evolution of mammalian defensins. *BMC Genomics* 5: 56.
8. Patil, A.A., Y. Cai, Y. Sang, F. Blecha, and G. Zhang. 2005. Cross-species analysis of the mammalian  $\beta$ -defensin gene family: presence of syntenic gene clusters and preferential expression in the male reproductive tract. *Physiological Genomics* 23:5-17.
9. Xiao, Y., Y. Cai, Y.R. Bommineni, S.C. Fernando, O. Prakash, S.E. Gilliland, and G. Zhang. 2006. Identification and functional characterization of three chicken cathelicidins with potent antimicrobial activity. *Journal of Biological Chemistry* 281: 2858-2867.
10. Xiao, Y., H. Dai, Y.R. Bommineni, J. Soulages, Y.-X. Gong, O. Prakash, and G. Zhang. 2006. Structure-activity relationships of fowlicidin-1, a chicken antimicrobial peptide. *FEBS Journal* 273: 2581-2593.
11. Bommineni, Y.R., H. Dai, Y.-X. Gong, J.L. Soulages, S.C. Fernando, U. DeSilva, O. Prakash, and G. Zhang. 2007. Fowlicidin-3 is an  $\alpha$ -helical cationic host defense peptide with potent antibacterial and lipopolysaccharide-neutralizing activities. *FEBS Journal* 274: 418-428.
12. Xiao, Y., A. Herrera, Y.R. Bommineni, J.L. Soulages, O. Prakash, and G. Zhang. 2009. The central kink region of  $\alpha$ -helical fowlicidin-2 is critically involved in bacterial killing and endotoxin neutralization. *Journal of Innate Immunity* 1: 268-280.
13. Bommineni, Y.R., M. Achanta, J. Alexander, L.T. Sunkara, J.W. Ritchey, and G. Zhang. 2010. A fowlicidin-1 analog protects mice from lethal infections induced by methicillin-resistant *Staphylococcus aureus*. *Peptides* 31: 1225-1230.
14. Takahashi, D., S.K. Shukla, O. Prakash, and G. Zhang. 2010. Structural determinants of host defense peptides for antimicrobial activity and target cell selectivity. *Biochimie* 92: 1236- 1241.
15. Sunkara, L.T., M. Achanta, N.B. Schreiber, Y.R. Bommineni, D. Gan, W. Jiang, S. Lamont, H. Lillehoj, and G. Zhang. 2011. Butyrate enhances disease resistance of chickens by inducing antimicrobial host defense peptide expression. *PLoS One* 6: e27225.
16. Sunkara, L.T., W. Jiang, and G. Zhang. 2012. Modulation of chicken antimicrobial host defense peptide gene expression by free fatty acids. *PLoS One* 7: e49558.
17. Patil, A., A.J. Ouellette, W. Lu, and G. Zhang. 2013. Rattusin, an intestinal  $\alpha$ -defensin-related peptide in rats with a unique cysteine spacing pattern and salt-insensitive antibacterial activities. *Antimicrobial Agents and Chemotherapy* 57: 1823-1831.
18. Zeng, X., L.T. Sunkara, W. Jiang, M. Bible, S. Carter, X. Ma, S. Qiao, and G. Zhang. 2013. Induction of porcine host defense peptide gene expression by short-chain fatty acids and their analogs. *PLoS One* 8: e72922.
19. Jiang, W., L.T. Sunkara, X. Zeng, D. Zhuo, S.M. Myers, and G. Zhang. 2013. Differential regulation of human cathelicidin LL-37 by free fatty acids and their analogs. *Peptides* 50: 129-138.
20. Sunkara, L.T., X. Zeng, W. Jiang, A.R. Curtis, and G. Zhang. 2014. Cyclic AMP synergizes with butyrate in promoting  $\beta$ -defensin 9 gene expression in chickens. *Molecular Immunology* 57: 171-180.
21. Bommineni, Y.R., G.H. Pham, L.T. Sunkara, M. Achanta, and G. Zhang. 2014. Immune regulatory activities of fowlicidin-1, a cathelicidin host defense peptide. *Molecular Immunology* 59: 55-63.
22. Zhang, G., and L.T. Sunkara. 2014. Avian host defense peptides: from biology to therapeutic potential. *Pharmaceuticals* 7: 220-247.