

Hao Zhu, Ph.D.

Associate Professor, Department of Clinical Laboratory Sciences
School of Allied Health, University of Kansas Medical Center
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Education:

- 1983-1987 B.S., Department of Biological Engineering, Fudan University, Shanghai, China
Thesis title: *Construction of expression vector for human interleukin II gene in yeast.*
Mentor: Prof. YuYang Li
- 1989-1994 Ph.D., Department of Zoology, The University of Texas at Austin
Thesis title: *Yeast flavohemoglobin - structural and functional studies.*
Mentor: Prof. Austen F. Riggs
- 1995-1999 Post-doc, Hematology Division, Brigham and Women's Hospital, Harvard Medical School
Research project: *Structural and functional analysis of NCB5OR.*
Mentor: Prof. H. Franklin Bunn

Professional Experience:

- 07/2011-present Associate Professor, Department of Clinical Laboratory Sciences,
University of Kansas Medical Center (KUMC), Kansas City
- 10/2006-present Adjunct Assistant Professor, Department of Biochemistry and Molecular Biology, KUMC
- 07/2006-present Adjunct Assistant Professor, Dept. of Physical Therapy and Rehabilitation Science, KUMC
- 12/2005-06/2011 Assistant Professor, Department of Clinical Laboratory Sciences, KUMC
- 12/1999-11/2005 Instructor, Department of Medicine, Harvard Medical School, Boston
- 01/2005-11/2005 Associate Biochemist, Hematology Division, Brigham and Women's Hospital, Boston
- 08/1995-12/2004 Research Fellow, Hematology Division, Brigham and Women's Hospital, Boston
- 09/1994-07/1995 Research Associate, Department of Zoology, The University of Texas at Austin
- 08/1989-08/1994 Graduate Research Assistant, Department of Zoology, The University of Texas at Austin
- 09/1987-07/1989 Research Assistant, Laboratory of Medical Genetics, Shanghai Children's Hospital, China

Professional Membership:

- 2007-present Member, American Diabetes Association
- 2006-present Member, The American Society of Biochemistry and Molecular Biology
- 1996-present Member, The American Association for the Advancement of Science

Honors and Awards:

- 11/2009 Faculty Research Investigator Award, School of Allied Health, KUMC
- 10/2004 Best Poster Award, Redox Signaling in Biology and Disease, a symposium sponsored by
American Society of Biochemistry and Molecular Biology
- 02/2004 Co-inventor, US Patent Application # 10/772,076 (Publication # US 2005/0031605 A1)
"Compositions and Methods of Treating Diabetes"
- 2001-2004 Mentored Research Scientist Development Award, The National Institutes of Health (NIH)
- 1997-2000 Individual National Research Service Award, NIH
- 10/1997 Scholarship for Short Term Visitor and Lecturer, National Science Foundation, China

Research Grants – Active:

- 01/2009-present Principal Investigator, RO1-DK067355 (7R01DK067355-05, 5R01DK067355-06), NIH
Role of Ncb5or in insulin production
- 08/2010-05/2015 Co-Investigator, R01AG031575, NIH
Targeting stress-mediated pathways in the treatment of muscle insulin resistance

Research Grants – Completed:

- 12/2009-3/2010 Principal Investigator, ARRA supplemental grant (3R01DK067355-06S1), NIH
Role of Ncb5or in Insulin Production
- 12/2005-12/2008 Principal Investigator, Sub-contract of RO1 DK067355, Brigham and Women's Hospital
Role of Ncb5or in insulin production
- 10/2007 Principal Investigator, KUMC Research Institute Shared Equipment Award
- 10/2006 Principal Investigator, KUMC Research Institute Shared Equipment Award
- 2001-2004 Principal Investigator, KO1DK59901, NIH
Structural and functional analysis of oxygen sensor
- 1997-2000 Principal Investigator, F32DK09678, NIH
Oxygen sensor: structural and functional studies

Publications – Original Research Articles:

1. S.Z.Huang, X.D.Zhou, **H.Zhu**, Z.R.Ren, and Y.T.Zeng. "Detection of β -Thalassemia Mutations in Chinese Using Amplified DNA from Dried Blood Specimens", *Human Genetics (Berlin)*, 84:129-131, 1990
2. S.Z.Huang, Z.R.Ren, X.D.Zhou, **H.Zhu**, and Y.T.Zeng. "Molecular Characterization of β -Thalassemia Mutations in Chinese", *Ann. NY Acad. Sci. (U.S.A.)*, 612:490-492, 1990
3. Y.T.Zeng, S.Z.Huang, X.D.Zhou, **H.Zhu**, and Z.R.Ren. "DNA Diagnosis of Thalassemias in Chinese by a Non-Radioactive Method". *Ann. NY Acad. Sci. (U.S.A.)*, 612:519-520, 1990
4. **H.Zhu** and A.F.Riggs. "Yeast Flavohemoglobin is an Ancient Protein Related to Globins and a Reductase Family", *Proc. Nat'l. Acad. Sci. (U.S.A.)*, 89:5015-5019, 1992 (PMC49219)
5. D.W.Ownby, **H.Zhu**, K.Schneider, R.C.Beavis, B.T.Chait, and A.F.Riggs. "The Extracellular Hemoglobin of the Earthworm *Lumbricus terrestris*. Determination of subunit stoichiometry", *J. Biol. Chem. (U.S.A.)*, 268:13539-13547, 1993
6. D.J.Smith, **H.Zhu**, P.R.Kolatkar, L.T.Tam, T.O.Baldwin, B.A.Roe, R.H.Broyles, and A.F.Riggs. "The Hemoglobin of the Bullfrog, *Rana catesbeiana*. The cDNA-derived amino acid sequences of the chains of adult hemoglobins B and C: their roles in deoxygenation-induced aggregation", *J. Biol. Chem. (U.S.A.)*, 268:26961-26971, 1993
7. **H.Zhu**, M.Hargrove, Q.Xie, Y.Nozaki, K.Linse, S.S.Smith, J.Olson, and A.F.Riggs. "Stoichiometry of Subunits and Heme Content of Hemoglobin from the Earthworm *Lumbricus terrestris*", *J. Biol. Chem. (U.S.A.)*, 271:29999-30006, 1996
8. **H.Zhu**, D.Ownby, C.K.Riggs, N.J.Nolasco, J.K.Stoops, and A.F.Riggs. "Assembly of the Gigantic Hemoglobin of the Earthworm *Lumbricus terrestris*. Roles of subunit equilibria, non-globin linker chains and valence of the heme iron", *J. Biol. Chem. (U.S.A.)*, 271:30007-30021, 1996
9. **H.Zhu**, H.Qiu, H.P.Yoon, S.Huang, and H.F.Bunn. "Identification of a Cytochrome *b*-type NAD(P)H Oxidoreductase Ubiquitously Expressed in Human Cells", *Proc. Nat'l. Acad. Sci. (U.S.A.)*, 96:14742-14747, 1999 (PMC24718)
10. P.R.Gardner, L.A.Martin, A.M.Gardner, Y.Dou, T.Li, J.S.Olson, **H.Zhu** and A.F.Riggs. "Nitric Oxide Dioxygenase Activity and Function of Flavohemoglobins: Sensitivity to Nitric Oxide and Carbon Monoxide Inhibition", *J. Biol. Chem. (U.S.A.)*, 275:31581-31587, 2000
11. **H.Zhu**, K.Larade, T.A.Jackson, J.Xie, A.Ladoux, H.Acker, U.Berchner-Pfannschmidt, J.Fandrey, A.R.Cross, G.S.Lukat-Rodgers, K.R.Rodgers, and H.F.Bunn. "NCB5OR is a novel soluble NAD(P)H reductase localized in the endoplasmic reticulum", *J. Biol. Chem. (U.S.A.)*, 279:30316-30325, 2004 (PMC3045664)
12. J.Xie, **H.Zhu**, K.Larade, A.Ladoux, A.Seguritan, M.Chu, S.Ito, R.T.Bronson, E.H.Leiter, C.Y.Zhang, E.D.Rosen, and H.F.Bunn. "Absence of a reductase, NCB5OR, causes insulin-deficient diabetes", *Proc. Nat'l. Acad. Sci. (U.S.A.)*, 101: 10750-10755, 2004 (PMC490006)
13. G.Anderson, L.Wegner, C.S.Rose, J.Xie, **H.Zhu**, K.Larade, A.Johansen, J.Ek, J.Lauenborg, T.Drivsholm, K.Borch-Johnsen, P.Damm, T.Hansen, H.F.Bunn, and O.Pedersen. "Variation in Ncb5or: Studies of Relationships to Type 2 Diabetes, MODY, and Gestational Diabetes Mellitus", *Diabetes*, 53:2992-7, 2004 (PMC3044473)
14. K.Larade, Z.G.Jiang, A.Dejam, **H.Zhu**, H.F.Bunn. "The reductase Ncb5or is responsive to the redox

- status in β -cells and is not involved in the ER stress response” *Biochem. J.*, 404:467-476, 2007 (PMC1896276)
15. K.Larade, Z.G.Jiang, Y.Z.Zhang, W.F.Wang, S.Bonner-Weir, **H.Zhu**,* and H. F.Bunn*. “Loss of Ncb5or results in impaired fatty acid desaturation, lipotrophy and diabetes”, *J. Biol. Chem. (U.S.A.)*, 283:29285-29291, 2008 (PMC2570878) * Co-senior author
 16. Y.Z.Zhang, K.Larade, Z.G.Jiang, S.Ito, W.F.Wang, **H.Zhu**,* and H.F.Bunn*. “The flavoheme reductase Ncb5or protects cells against endoplasmic reticulum stress-induced lipotoxicity” *J. Lipid Research.* 51:53-62, 2010 (PMC2789786) * Co-senior author
 17. B.Deng, S.Parthasarathy, W.F.Wang, B.R.Gibney, K.P.Battaile, S.W.Lovell, D.R.Benson, and **H.Zhu**. “Study of the individual cytochrome b5 and cytochrome b5 reductase domains of Ncb5or reveals a unique heme pocket and a possible role of the CS domain”, *J. Biol. Chem. (U.S.A.)*, 285:30181-30191, 2010 (PMC2943328)
 18. J.Lu, L.E, W.F.Wang, J.R.Frontera, **H.Zhu**, W.T.Wang, P.Lee, I.Y.Choi, W.Brooks, J.Burns, D.Aires, R.H. Swerdlow. “Alternate Day Fasting Impacts the Brain Insulin Signaling Pathway of Young Adult Male C57BL/6 Mice”, *J. Neurochemistry*, 117:154-163, 2011 (PMC3055925)
 19. M.Xu, W.F.Wang, J.R.Frontera, M.C.Neely, J.Lu, D. Aires, F.Hsu, J.Turk, R.H.Swerdlow, S.E.Carlson, and **H.Zhu**. “Ncb5or deficiency increases fatty acid catabolism and oxidative stress”, *J. Biol. Chem. (U.S.A.)* 286:11141-11154, 2011 (PMC3064168)
 20. W.F.Wang, Y.Guo, M.Xu, H.Huang, L.Novikova, K.Larade, Z.G.Jiang, T.C.Thayer, J.R.Frontera, D.Aires, H.Ding, J.Turk, C.E.Mathews, H.F.Bunn, L.Stehno-Bittel, and **H.Zhu**. “Development of diabetes in lean Ncb5or-null mice is associated with manifestations of endoplasmic reticulum and oxidative stress in beta cells”, *Biochim Biophys Acta- Molecular Basis of Diseases*, 1812:1532-41, 2011 (PMC3185181)
 21. Y.Guo, M.Xu, B.Deng, J.R.Frontera, K.L.Kover, H.L.Ding, D.Aires, S.E.Carlson, J. Turk, W.F.Wang, and **H.Zhu**. “Beta-cell injury in Ncb5or-null mice is exacerbated by consumption of a high-fat diet”, *European Journal of Lipid Science and Technology*, accepted

Publications – Reviews and Book Chapters:

1. H.F.Bunn, J.Gu, L.E.Huang, J.W.Park, and **H.Zhu**. "Erythropoietin: A Model System for Studying Oxygen-dependent Gene Regulation", *J. Exp. Biol.*, 201:1197-1201, 1998
2. **H.Zhu** and H.F.Bunn. “Oxygen Sensing and Signaling: Impact on the Regulation of Physiologically Important Genes”, *Respiration Physiology*, 115:239-247, 1999
3. **H.Zhu** and H.F.Bunn. "How Do Cells Sense Oxygen?", *Science*, 292:449-451, 2001
4. **H.Zhu**, T.A.Jackson, and H.F.Bunn. “Detecting and Responding to Hypoxia”, *Nephrol. Dial. Transplant*, 1:3-7, 2002
5. H.F.Bunn and **H.Zhu**. "Structure and Function of Hemoglobins”, *Human Hemoglobin* (edit. YT Zeng), *Science Publisher (Peking, China)*, 2002
6. T.A.Jackson, G.S.Lukat-Rodgers, A.R.Cross, H.F.Bunn, K.Rodgers, and **H.Zhu**. "Characterization of human NAD(P)H oxidase, flavohemoprotein b5/b5R", *Proceedings of the 1st International Conference on NAD(P)H oxidases 2002* (edit. K.K.Griendling, K.H.Krause, H.W.Schmidt), *Book on Demand GmbH (Norderstedt, Germany)*, 2004
7. W.E.Royer, **H.Zhu**, T.A.Gorr, J.F.Flores, and J.E.Knapp. "Allosteric Hemoglobin Assembly: Diversity and Similarity", *J. Biol. Chem. (U.S.A.)*, 280: 27477-27480, 2005

Oral Presentation at Professional Meetings:

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| May 2011 | The 4 th Meeting of International BioIron Society, Vancouver, British Columbia, Canada |
| June 2005 | Annual Meeting of American Diabetes Association, San Diego |
| April 2002 | The First International Conference on NAD(P)H Oxidases, Giessen, Germany |
| April 2000 | Annual Meeting of American Physiology Society, San Diego |

Poster Presentation at Professional Meetings:

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| April 2011 | Annual Meeting of American Society of Biochemistry and Molecular Biology (EB 2011) “Structural basis of Ncb5or, a multi-domain redox enzyme implicated in diabetes and lipid |
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- metabolism” (by graduate student Bin Deng)
- April 2011 Annual Meeting of American Society of Biochemistry and Molecular Biology (EB 2011)
“*Ncb5or deficiency increases fatty acid catabolism, oxidative stress, and sensitivity to saturated fatty acid-induced cytotoxicity*” (by graduate student Ming Xu)
- July 2009 Gordon Research Conference on Molecular and Cellular Biology of Lipids, New Hampshire
“*ER-stress mediates beta-cell loss in Ncb5or null mice*”
“*NADH cytochrome b5 oxidoreductase is required for desaturation of dietary saturated fatty acids and the deficiency leads to mitochondrial overproliferation and lipotrophy*”
- June 2009 Annual Meeting of American Diabetes Association, New Orleans
“*Impaired desaturation for dietary long-chain saturated fatty acids leads to ER-stress and beta cell loss*” (by graduate student Ying Guo)
- April 2009 Annual Meeting of American Society of Biochemistry and Molecular Biology (EB 2009)
“*Characterization of inter-domain electron transfer in Ncb5or, a redox enzyme involved in fatty acid desaturation*”
- May 2008 The 8th Meeting of International Society for the Study of Fatty Acids and Lipids, Kansas City
“*Altered monounsaturated fatty acid metabolism in Ncb5or knock-out mice*”
- July 2007 Gordon Research Conference on Molecular and Cellular Biology of Lipids, New Hampshire
“*Lack of Ncb5or enzyme leads to loss of adiposity and diabetes in mice*”
- July 2007 FASEB Summer Research Conferences on Lipid Droplets - Metabolic Consequences of the Storage of Neutral Lipids, Vermont
“*Lack of Ncb5or enzyme leads to loss of adiposity and diabetes in mice*”
- October 2004 Redox Signaling in Biology and Disease, a Symposium sponsored by the American Society of Biochemistry and Molecular Biology (recipient of Best Poster award)
“*NCB5OR is a novel soluble NAD(P)H reductase localized in the endoplasmic reticulum*”

Invited Talks:

- February 2011 Seminar, Department of Physiology, University of Kansas Medical Center (KUMC)
- December 2010 Oral Biology Seminar, School of Dentistry, University Missouri Kansas City
- August 2010 Special Seminar, Division of Endocrinology, Metabolism and Lipid Research, Department of Internal Medicine, School of Medicine, Washington University in St. Louis
- April 2010 Liver Symposium, KUMC
- February 2009 Obesity Research Meetings, Children’s Mercy Hospital, University of Missouri Kansas City
- November 2008 Seminar, Center of Biomedical Research Excellence in Protein Structure & Function, University of Kansas Lawrence
- August 2008 Diabetes Research Group Meeting, KUMC
- March 2008 Liver Club, KUMC
- November 2007 Annual Research Presentation, Sigma Phi Society, KUMC
- November 2007 Medical Grand Round, Department of Medicine, KUMC
- February 2007 Liver Club, KUMC
- February 2007 Kidney Institute, KUMC
- September 2006 Research Talk, School of Allied Health Faculty Assembly, KUMC
- March 2006 Seminar, Department of Biochemistry and Molecular Biology, KUMC
- July 2005 School of Basic Medical Sciences, Beijing University Health Science Center, China
- April 2002 Biochemical Engineering Institute, Saarland University, Germany
- April 2002 Institute of Physiology, University of Essen, Germany
- June 1999 Research Talk, Hematology Division, Brigham & Women's Hospital, Boston

Teaching Experience:

- Fall, 2006-present Instructor, Molecular Biotechnology (lecture and laboratory, CLS710/711, M.S. program)
Department of Clinical Laboratory Sciences, KUMC
- Fall, 2006-present Guest Lecturer, Pathobiology of Human Function I (PTRS862, Ph.D. program)
Department of Physical Therapy and Rehabilitation Science, KUMC

1990-1991 Graduate Teaching Assistant, Genetics
Department of Zoology, The University of Texas at Austin

Mentees (in the University of Kansas Medical Center):

11/2011-present Haiping Wang, M.D., visiting scholar (13-month sabbatical)
Associate Professor, Plastic Surgery Division, Tongji Hospital
Huazhong University of Science and Technology, Wuhan, China

08/2006-08/2011 Bin Deng, Ph.D. student (Co-Mentor: David R. Benson)
Department of Physical Therapy and Rehabilitation Science, KUMC
Currently a Post-doctoral Research Fellow, Brigham and Women's Hospital,
Harvard Institutes of Medicine, Boston

08/2006-08/2011 Ming Xu, Ph.D. student (Co-Mentor: WenFang Wang)
Department of Physical Therapy and Rehabilitation Science, KUMC
Currently a Post-doctoral Research Fellow, Mayo Clinic, Rochester, Minnesota

06/2010 Minghan Chang, summer intern (incoming sophomore)
University of Massachusetts at Amherst

10/2007-10/2009 Ying Guo, M.D., exchange Ph.D. student from Sun Yat-Sen University, China
Recipient of one-year scholarship from the Chinese Scholarship Council
Department of Clinical Laboratory Sciences, KUMC (Co-Mentor: HeLing Ding)

06/2008-07/2008 Ren-How Harn, summer intern (incoming sophomore)
University of Kansas at Lawrence

2/2008-5/2008 Jin Wei, M.D., visiting scholar (3-month sabbatical)
Associate Professor, Department of Cardiology, Second Affiliated Hospital
Xi'an Jiaotong University, School of Medicine, Xi'an, China

05/2007 Yongzhao Zhang, Ph.D., visiting scientist
Postdoctoral Research Fellow, Hematology Division, Brigham & Women's Hospital, Boston

08/2006-12/2006 Eric Kweku Otoo, exchange B.S. student from Univ. of Wolverhampton, United Kingdom,
Department of Clinical Laboratory Sciences, KUMC (Honours Project Thesis)

Trainees (in Dr. Frank Bunn's laboratory, Brigham and Women's Hospital, Harvard Medical School):

1998-2005 Newton Lee (University of Pennsylvania, Pre-Med)
Kimberly Malecka (University of Pennsylvania, Ph.D.)
Andrew Styperek (Emory University Medical School, M.D.)
Jane Park (MIT, M.S.)
Shuning Huang (MIT, Ph.D.)
Hae-Won Patti Yoon (Columbia University, MPH / MBA)
All the above Research Assistants were later enrolled in respective graduate programs

08/2004-11/2004 William Royer, Ph.D., 3-month sabbatical visit
Professor, Department of Biochemistry and Molecular Pharmacology
University of Massachusetts Medical School, Worcester

2001-2002 Stephanie J. Gros, exchange M.D. student from University of Bonn, Germany

1997-2000 Timothy A. Jackson, M.D. student, HST program, Harvard Medical School, Boston

Academic Service – Thesis Committee:

08/2011-present Eva Selfridge, Ph.D. dissertation (Mentor: Russell Swerdlow)
Department of Molecular and Integrative Physiology, KUMC

07/2011-present Le Zhan, Ph.D. dissertation (Mentor: Grace Guo)
Department of Pharmacology and Toxicology, KUMC

06/2011-present Sudharsan Parthasarathy, Ph.D. dissertation (Mentor: David R. Benson)
Department of Molecular Biosciences, University Kansas

12/2010-present Susan Scholtz, Ph.D. dissertation (Mentor: Susan E. Carlson)
Department of Nutrition and Dietetics, KUMC

- 07/2010-present Zidong Fu, Ph.D. dissertation (Mentor: Curtis D. Klaassen)
Department of Pharmacology and Toxicology, KUMC
- 07/2010-present Hemantkumar Chavan, Ph.D. dissertation (Mentor: Partha Krishnamurthy)
Department of Pharmacology and Toxicology, KUMC
- 06/2009-present Huan Yang, Ph.D. dissertation (Mentor: Ho Yi Mak)
Department of Molecular and Integrative Physiology, KUMC
- 05/2009 Suzanne McIcer, M.S. thesis
Department of Clinical Laboratory Sciences, KUMC
- 05/2008-04/2009 Pengli Bu, Ph.D. dissertation (Mentor: Yvonne Wan)
Department of Pharmacology and Toxicology, KUMC
- 05/2008 Kevin Grantham, M.S. thesis
Department of Clinical Laboratory Sciences, KUMC

Professional Service – *Ad hoc* Reviewer for Scientific Journals:

- 1999-present *Blood,*
Gene,
Journal of Biological Chemistry,
Journal of Nutritional Biochemistry,
European Journal of Lipid Science and Technology

Professional Service – Others:

- April 2011 Judge, Student Research Forum, KUMC
- May 2009 Member, Grant Review Committee, Biomedical Research Training Program, KUMC
- April 2009 Judge, Student Research Forum, KUMC
- 2009-present Member, Radiation Safety Committee, KUMC
- 2008 Member, Faculty Search Committee, Department of Clinical Lab Sciences, KUMC
- April 2008 Judge, Student Research Forum, KUMC
- 2007-2010 Member, Chair (2009-2010), School of Allied Health Faculty Research Committee, KUMC
- 2006-present Host for summer research shadowing by high school students
(Eddie Cao, Ren-how Harn, Jennifer Li, Vivek Menon, and Haokun Ren)
- 2006-present *Ad hoc* Reviewer, international applications of the Interdisciplinary Graduate Program in Biomedical Sciences (IGPBS), KUMC
- 2004 Co-organizer, *RiggsFest* (<http://bioinst.cm.utexas.edu/riggsfest/>), a mini-symposium to honor and celebrate Prof. Austen Riggs' fifty years in hemoglobin research
- 2000-2005 Organizer, weekly journal club, Hematology Division, Brigham and Women's Hospital