Shu-Bing Qian

Web Bio

Information

Biography

Biographical Statement

Dr. Shu-Bing Qian received his MSc and PhD degrees in Molecular Biology & Biochemistry with honors in 1997 and 2000, respectively, from Shanghai Jiaotong University Medical School (formerly Shanghai Second Medical University). He then conducted two postdoctoral fellowships at the National Institutes of Health (Bethesda, MD) and University of North Carolina (Chapel Hill, NC) in the field of Biochemistry. Dr. Qian became an Assistant Professor in the Division of Nutritional Sciences at Cornell University in July 2008. In 2009, he received Young Investigator Award from Ellison Medical Foundation, and NIH Director's New Innovator Award. In 2010, Dr. Qian received DOD Development Award.

Most of the research work in Dr. Qian's laboratory is broadly interdisciplinary, with a primary emphasis on the nutrient signaling pathway, protein synthesis, and their implications in human diseases. Using biochemical, genetic, and cell biological approach, the Qian laboratory investigates nutritional and genetic determinants of adaptive stress response in growth and aging. Specific research interests include chaperone network and ubiquitin/proteasome system, nutrient sensing pathway mTOR (the mammalian target of rapamycin), and translational regulation of gene expression. Elucidation of regulatory mechanisms may help develop therapeutic strategies for human diseases, such as diabetes, cancer, and neurodegenerative disorders.

Professional

Current Professional Activities

Graduate Field Membership: Nutrition; Genetics & Development; Biochemistry, Molecular & Cellular Biology
Faculty Member: Center for Vertebrate Genomics
Faculty Member: Chemical Biology Interface (CBI) Program

Research

Current Research Activities

How is mRNA translation controlled by nutrient signaling? How does protein folding and degradation occur during protein synthesis? How do cells get rid of misfolded proteins? These are a few of the problems we would like to understand. Elucidation of the molecular mechanisms underlying protein quality

and quantity control will ultimately define new therapeutic strategies to human diseases such as cancer, diabetes, and neurodegenerative disorders.

Specifically, we use biochemistry, cell biological, and genetic approaches to study translational control of gene expression and protein triage (folding, degradation, and aggregation) using mammalian system. We established multi-dimensional ribosomal profiling analysis to monitor mRNA translation at a sub-codon resolution, which allows us to investigate ribosome dynamics as well as co-translational events. In addition, we are applying genome-wide high-content RNAi screen to dissect protein triage decision. By focusing on chaperone network and ubiquitin ligases, we are dedicated to identify novel regulators of protein quality control.

Extension

Education

Education

PostDoc, 2004 ~ 2006 University of North Carolina, Chapel Hill, NC
PostDoc, 2000 ~ 2004 National Institutes of Health, Bethesda, MD
Ph.D., 2000 Shanghai Jiaotong University Medical School, Biochemistry
M.Sc., 1997 Shanghai Jiaotong University Medical School, Biochemistry

Courses

Courses Taught

BIOG4990 - Independent Research in Biology II
NS4010 - Empirical Research
NS3200 - Human Biochemistry
NS7030 - Seminar in Nutritional Sciences

Websites

Related Websites

Qian Lab http://qian.human.cornell.edu

Administration

Administrative Responsibilities

Graduate admission committee for Nutritional Sciences

Member of DNS Curriculum Committee

Publications

Selected Publications

1.

Liu B, and Qian SB. Translational regulation in nutrigenomics. **Adv Nutr** 2011; 2(6):511-9

2.

Zhang X, and Qian SB. Chaperone-mediated hierarchical control in targeting misfolded proteins to aggresome. **Mol Biol Cell** 2011; 22(18):3277-88

3.

Conn CS and Qian SB. mTOR signaling in protein homeostasis: less is more? **Cell Cycle** *2011;* 10(12):1940-7

4.

Sun J, Conn CS, Han Y, Yeung V, and Qian SB. PI3K-mTORC1 attenuates stress response by inhibiting cap-independent Hsp70 mRNA translation. **J Biol Chem** *2011*; 286(8):6791-800

5.

Qian SB, Zhang X, Sun J, Bennink JR, Yewdell JW, Patterson C. mTORC1 links protein quality and quantity control by sensing chaperone availability. **J Biol Chem** *2010*; 285(35):27385-95 (co-correspondence author)

6.

Qian SB, Waldren L, Choudhary N, Klevit RE, Chazin WJ, Patterson C. Engineering a ubiquitin ligase reveals conformational flexibility required for ubiquitin transfer. **J Biol Chem** *2009*; 284(39):26797-802 (co-correspondence author)

7.

McDonough H, Charles PC, Hilliard EG, Qian SB, Min JN, Portbury AL, Cyr DM, Patterson C. Stress-dependent chip/DAXX interaction suppresses the p53 apoptotic program. **J Biol Chem** *2009*; 284(31): 20649-59

8.

Xia T , Dimitropoulou C , Zeng J , Antonova GN , Snead C , Venema RC , Fulton D , Qian SB , Patterson C , Papapetropoulos A , Catravas JD . Chaperone-dependent E3 ligase CHIP ubiquitinates and mediates proteasomal degradation of soluble guanylyl cyclase. **Am J Physiol Heart Circ Physiol** *2007*; 293:H3080-3087

9.

Qian SB, McDonough H, Boellmann F, Cyr DM, Patterson C. CHIP-mediated stress recovery by sequential ubiquitination of substrates and Hsp70. **Nature** *2006*; 440: 551-555

10.

Qian SB, Reits E, Neefjes J, Deslich JM, Bennink JR, and Yewdell JW. Tight linkage between translation and MHC-class I peptide ligand generation implies specialized antigen processing for defective ribosomal products. **J Immunol** *2006*; 177: 227-233

11.

Qian SB, Princiotta MF, Bennink JR, Yewdell JW. Characterization of rapidly degraded polypeptides in mammalian cells reveals a novel layer of nascent protein quality control. **J Biol Chem** *2006*; 281(1):392-400

12.

Dai Q, Qian SB, Li HH, McDonough H, Borchers C, Huang D, Takayama S, Younger JM, Ren HY, Cyr DM, Patterson C. Regulation of the cytoplasmic quality control protein degradation pathway by BAG2. **J Biol Chem** *2005*; 280(46):38673-38681

13.

Shaffer AL, Shapiro-Shelef M, Iwakoshi NN, Qian SB, Zhao H, Yu X, et al. XBP1 acts downstream of Blimp-1 to regulate ER biogenesis, oeganelle expansion, and protein synthesis during plasma cell differentiation. **Immunity** *2004*; 21(1):81-93

14.

Princiotta MF, Finzi D, Qian SB, Gibbs J, Schuchmann S, Buttgereit F, Bennink JR, Yewdell JW. Quantitating protein synthesis, degradation, and endogenous antigen processing. **Immunity** *2003*; 18(3):343-354

15.

Qian SB, Ott DE, Schubert U, Bennink JR, Yewdell JW. Fusion proteins with COOH-terminal ubiquitin are stable and maintain dual functionality in vivo. **J Biol Chem** *2002*; 277(41):38818-38826

16.

Qian SB, Li Y, Qian GX, and Chen SS. Efficient tumor regression induced by genetically engineered tumor cells secreting interleukin-2 and membrane-expressing allogeneic MHC class I antigen. **J Cancer Res Clin Oncol** *2001*; 127(1): 27-33

17.

Qian SB, and Chen SS. Blocked transport of soluble Kb molecules containing connecting peptide segment involved in calnexin association. **Int Immunol** *2000*; 12(10): 1409-1416

18.

Xie Q, Liao D, Zhou XQ, Qian SB, Cheng SS. Transduction of primary rat hepatocytes with bicistronic retroviral vector. **World J Gastroenterol** *2000*; 6(5):725-729

19.

Qian SB, Qian GX, and Chen SS. Enhanced immunogenecity of human hepatocellular carcinoma cells transduced with human gamma-interferon gene via retroviral vector. **Acta Univ Med 2nd Shanghai** *1999*; 11(2): 90-94

20.

Qian SB, and Chen SS. Transduction of human hepatocellular carcinoma cell lines transduced with human gamma-interferon gene via retroviral vector. **World J Gastroenter** *1998*; 4(3): 210-213

21.

Qian SB, Zhang TF, and Chen SS. Enhanced expression of HLA class I molecules in human hepatocellular carcinoma cell lines transduced with human gamma-interferon gene. **Chin Med J (Eng)** *1998*; 111(4): 319-322