Shu-Bing Qian

Web Bio

Information

Biography

Biographical Statement

Professor Shu-Bing Qian received 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). Dr. Qian joined 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. In 2013, Dr. Qian received Peter Reeds Young Investigator Award. In 2014, Dr. Qian received DOD Idea Award.

Most of the research work in Dr. Qian's laboratory is broadly interdisciplinary, with a primary emphasis on protein synthesis, nutrient signaling pathway, and stress response. Using biochemical, genetic, and cell biological approach, the Qian laboratory investigates translational control of gene expression, molecular mechanisms of adaptive stress response, and the implications in human health and diseases. Specific disease aspects include but are not limited to, diabetes, cancer, aging and neurodegenerative disorders.

Teaching

Teaching and Advising Statement

Teaching is an exciting, enriching, and an integral component of an academic career, and I am firmly committed to excellence in teaching. My primary goal is to instill interest and to expose students to the course topics, which in turn enables me to achieve a better understanding of the material taught, which then provides all parties an opportunity to learn new material. Overall, I enjoy teaching and respect this responsibility as a core value and of critical importance to society.

Professional

Current Professional Activities

Graduate Field Membership: Nutrition; Genetics & Development; Biochemistry, Molecular & Cellular Biology, Biological and Biomedical Sciences

Faculty Member: Center for Vertebrate Genomics
Faculty Member: Chemical Biology Interface (CBI) Program
Faculty Member: Leadership Program for Veterinary Students

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 high resolutionribosomal profiling analysis to monitor mRNA translation, which allows us to investigate ribosome dynamics as well as co-translational events. By focusing on chaperone network and the translation machinery, we are dedicated to elucidate fundamental principles of protein homeostasis.

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

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

Websites

Related Websites

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

Administration

Administrative Responsibilities

Member of DNS Seminar Committee
Member of BMCB Admission Committee

Publications

Selected Publications

Gao X, Wan J, Liu B, Ma M, Shen B, and Qian SB. Quantitative profiling of initiating ribosomes in vivo. **Nat Methods** 2015; 12(2):147-53. PMCID: in process

Han Y, Gao X, Liu B, Wan J, Zhang X, and Qian SB. Ribosome profiling reveals sequence-independent post-initiation pausing as a signature of translation. **Cell Res** 2014; 24(7):842-51. PMCID: PMC4085768

Liu B and Qian SB. Invited review: Mechanisms of translational regulation during stress. **Wiley Interdiscip Rev RNA** 2014; 5(3):301-5. PMCID: PMC3991730

Wan J and Qian SB. TISdb: a database for alternative translation initiation in mammalian cells. **Nucleic Acids Res** 2014; 42(1):D845-50. PMID: 24203712

Liu B and Qian SB. Translational reprogrammin in cellular stress response. **WIREs RNA** 2013 (in press). PMID: 24375939

Sherman MY and Qian SB. Less is more: Improving proteostasis by translation slow-down. **Trends Biochem Sci** 2013; 38(12):585-91. PMID: 24126073

Conn CS and Qian SB. mTORC1 in protein homeostasis: increase in protein quantity at the expense of quality. **Sci Signal** 2013; 6(271):ra24. PMID: 23592839

Liu B, Han Y, and Qian SB. Co-translational response to proteotoxic stress by elongation pausing of ribosomes. **Mol Cell** 2013; 49(3):453-463. PMID: 23290916

Liu B, Conn CS, and Qian SB. Viewing folding of nascent polypeptide chains from ribosomes. **Expert Rev Proteomics** 2012; 9(6):579-81. PMID: 23256666

Stern-Ginossar N, Weisburd B, Michalski A, Le VT, Hein MY, Huang SX, Ma M, Shen B, Qian SB, Hengel H, Mann M, Ingolia NT, Weissman JS. Decoding human cytomegalovirus. **Science** 2012; 338(6110):1088-93. PMID: 23180859

Lee S, Liu B, Lee S, Huang SX, Shen B, and Qian SB. Global mapping of translation initiation sites in mammalian cells at single-nucleotide resolution. **Proc Natl Acad Sci USA**. 2012; 109(37):E2424-32. PMID: 22927429

Han Y, David A, Liu B, Magadán JG, Bennink JR, Yewdell JW, and Qian SB. Monitoring co-translational protein folding in mammalian cells at codon resolution. **Proc Natl Acad Sci USA**. 2012; 109(31):12467-72. PMID: 22802618

Park WJ, Kothapalli KS, Reardon HT, Lawrence P, Qian SB, Brenna JT. A novel FADS1 isoform potentiates FADS2-mediated production of eicosanoid precursor

fatty acids. **J Lipid Res** 2012; 53(8):1502-12. PMID: 22619218

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

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

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

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

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)

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)

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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