

BIOGRAPHICAL SKETCH

NAME Xu, Xiaolei, Ph.D.	POSITION TITLE Professor of Biochemistry and Molecular Biology/Medicine		
eRA COMMONS USER NAME XIAOLEIXU			
EDUCATION/TRAINING			
INSTITUTION AND LOCATION	DEGREE	YEAR(s)	FIELD OF STUDY
Department of Genetics and Genetic Engineering, Fudan University, Shanghai, China	B.S.	1989	Genetics
Institute of Genetics, Fudan University, Shanghai, China	M.S.	1992	Genetics
Mount Sinai School of Medicine, New York City, NY	Ph.D.	1999	Developmental Genetics
Cardiovascular Research Center, Massachusetts General Hospital, Harvard Medical School, Boston, MA	Post-doc	2003	Molecular Cardiology

A. Positions and Honors

Positions and Employment

2004-2012	Assistant Professor, Department of Biochemistry and Molecular Biology / Division of Cardiovascular Diseases, Department of Medicine, Mayo Clinic College of Medicine, Rochester, MN
2007-2012	Senior Associate Consultant, Department of Biochemistry and Molecular Biology / Division of Cardiovascular Diseases, Department of Medicine, Mayo Clinic College of Medicine, Rochester, MN
2012-	Associate Professor, Department of Biochemistry and Molecular Biology, Mayo Clinic College of Medicine, Rochester, MN
2012-	Consultant, Department of Biochemistry and Molecular Biology, Mayo Clinic College of Medicine, Rochester, MN
2018-	Professor, Department of Biochemistry and Molecular Biology, Mayo Clinic College of Medicine, Rochester, MN

Honors and Services

2005	Ad hoc member, ZRG1 MOSS-E(02)M study section, NIH
2006	Ad hoc member, ZHL1 CSR-O (M1) study section, NIH
2009 – 2014	Member, Cardiovascular Development 2 Study Section, AHA
2009	Ad hoc member, NIGMS MBRS SCORE study section, NIH
2010-2012 (X4)	Ad hoc member, ZRG1 CVRS study section, NIH
2011-2016 (X5)	Reviewer, National Natural Science Foundation of China (NSFC) study section
2011-Present	Fellow, AHA
2011	Chair, Session I, Midwest Regional Zebrafish Conference
2011- Present	Editorial Board, PLoS ONE
2013	Ad hoc member, ZRG1 CB-Z(55), ZRG1 CB-Z (56) study section, NIH
2013	Reviewer, National Science Foundation (NSF) study section
2014 (X2)	Ad hoc member, CCHF study section, NIH
2014	Member, Biomedical Discovery Faculty search committee, Department of Biochemistry and Molecular Biology, Mayo Clinic
2014	Co-chair, Cardiovascular Omics Session, Scientific Sessions, BCVS, AHA
2014	Reviewer, the Marsden Fund review panel, New Zealand
2014	Reviewer, the Vici grant review panel, The Netherlands Organization for Scientific Research

2016 Reviewer, National Science Center Poland
2015 - Present Member, Mayo Clinic Research Personnel Subcommittee
2015 - Present Oversea Member, Circulation study section, National Natural Science Foundation of China (NSFC)
2015 - Present Chartered Member, Cardiac Contractility and Heart Failure study section (CCHF), NIH

B. Selected Peer-reviewed Publications

1. Zhou Y, **Xu X**, Liu Z, Zhao S. Analysis of the transcriptional regulation by the 5'-upstream sequences of Tumor Necrosis Factor. *Chinese Science Bulletin* 1992; 37(1):74-7.
2. Yin Z, **Xu X**, Frasch M. Regulation of the twist target gene tinman by modular cis-regulatory elements during early mesoderm development. *Development* 1997 Dec; 124(24):4971-82. PMID:9362473.
3. **Xu X**, Yin Z, Hudson JB, Ferguson EL, Frasch M. Smad proteins act in combination with synergistic and antagonistic regulators to target Dpp responses to the Drosophila mesoderm. *Genes Dev* 1998 Aug 1; 12(15):2354-70. PMID:9694800.
4. Nguyen HT, **Xu X**. Drosophila mef2 expression during mesoderm development is controlled by a complex array of cis-acting regulatory modules. *Dev Biol* 1998 Dec 15; 204(2):550-66. PMID:9882489.
5. **Xu X**, Meiler SE, Zhong TP, Mohideen M, Crossley DA, Burggren WW, Fishman MC. Cardiomyopathy in zebrafish due to mutation in an alternatively spliced exon of titin. *Nat Genet* 2002 Feb; 30(2):205-9. PMID:11788825.
6. Zaffran S, **Xu X**, Lo PC, Lee HH, Frasch M. Cardiogenesis in the Drosophila model: control mechanisms during early induction and diversification of cardiac progenitors. *Cold Spring Harb Symp Quant Biol* 2002; 67:1-12. PMID:12858517.
7. Bos JM, Poley RN, Ny M, Tester DJ, **Xu X**, Vatta M, Towbin JA, Gersh BJ, Ommen SR, Ackerman MJ. Genotype-phenotype relationships involving hypertrophic cardiomyopathy-associated mutations in titin, muscle LIM protein, and telethonin. *Mol Genet Metab* 2006 May; 88(1):78-85. Epub 2005 Dec 13. PMCID: 2756511.
8. Wang L, Mukhopadhyay D, **Xu X**. C terminus of RGS-GAIP-interacting protein conveys neuropilin-1-mediated signaling during angiogenesis. *FASEB J* 2006 Jul; 20(9):1513-5. PMID:16754745.
9. Wang L, Dutta SK, Kojima T, **Xu X**, Khosravi-Far R, Ekker SC, Mukhopadhyay D. Neuropilin-1 modulates p53/caspases axis to promote endothelial cell survival. *PLoS One* 2007; 2(11):e1161. Epub 2007 Nov 14. PMCID:2048754.
10. Seeley M, Huang W, Chen Z, Wolff WO, Lin X, **Xu X**. Depletion of zebrafish titin reduces cardiac contractility by disrupting the assembly of Z-discs and A-bands. *Circ Res* 2007 Feb 2; 100(2):238-45. Epub 2006 Dec 14. PMCID: 2756513.
11. Rich A, Leddon SA, Hess SL, Gibbons SJ, Miller S, **Xu X**, Farrugai G. Kit-like immunoreactivity in the zebrafish gastrointestinal tract reveals putative ICC. *Dev Dyn* 2007 Mar; 236(3):903-11. PMID:17295318.

12. Lin X, Rinaldo L, Fazly AF, **Xu X**. Depletion of Med10 enhances Wnt and suppresses Nodal signaling during zebrafish embryogenesis. *Dev Biol* 2007 Mar 15; 303(2):536-48. PMID:17208216.
13. Sun X, Zhang R, Lin X, **Xu X**. Wnt3a regulates the development of cardiac neural crest cells by modulating expression of cysteine-rich intestinal protein 2 in rhombomere 6. *Circ Res* 2008 Apr 11; 102(7):831-9. Epub 2008 Feb 21. PMID:18292601.
14. Chen Z, Huang W, Dahme T, Rottbauer W, Ackerman MJ, **Xu X**. Depletion of zebrafish essential and regulatory myosin light chains reduces cardiac function through distinct mechanisms. *Cardiovasc Res* 2008 Jul 1; 79(1):97-108. Epub 2008 Mar 14. PMID: 2724891.
15. Sun X, Hoage T, Bai P, Ding Y, Chen Z, Zhang R, Huang W, Jahangir A, Paw B, Li YG, **Xu X**. Cardiac hypertrophy involves both myocyte hypertrophy and hyperplasia in anemic zebrafish. *PLoS One* 2009; 4(8):e6596. Epub 2009 Aug 12. PMID:2719798.
16. Lin X, **Xu X**. Distinct functions of Wnt/beta-catenin signaling in KV development and cardiac asymmetry. *Development* 2009 Jan; 136(2):207-17. PMID:19103803.
17. Zhang R, **Xu X**. Transient and transgenic analysis of the zebrafish ventricular myosin heavy chain (vmhc) promoter: an inhibitory mechanism of ventricle-specific gene expression. *Dev Dyn* 2009 Jun; 238(6):1564-73. PMID: 2756512.
18. Huang W, Zhang R, **Xu X**. Myofibrillogenesis in the developing zebrafish heart: A functional study of tnnt2. *Dev Biol* 2009 Jul 15; 331(2):237-49. Epub 2009 May 07. PMID: 2756512.
19. Zhang R, Yang J, Zhu J, **Xu X**. Depletion of zebrafish Tcap leads to muscular dystrophy via disrupting sarcomere-membrane interaction, not sarcomere assembly. *Hum Mol Genet* 2009 Nov 1;18(21):4130-40. Epub 2009 Aug 12. PMID: 2758143.
20. Clark KJ, Balciunas D, Pogoda HM, Ding Y, Westcot SE, Bedell VM, Greenwood TM, Urban MD, Skuster KJ, Petzold AM, Ni J, Nielsen AL, Patowary A, Scaria V, Sivasubbu S, **Xu X**, Hammerschmidt M, Ekker SC. In vivo protein trapping produces a functional expression codex of the vertebrate proteome. *Nat Methods*. 2011 Jun; 8(6):506-15. Epub 2011 May 08. PMID:21552255.
21. Hoage T, Sun X, **Xu X**. Functions of the Wnt/ β -Catenin Pathway in an Anemia-Induced Zebrafish Model of Cardiomyopathy are Location Dependent. *Biochem Biophys Res Commun*. 2011 415(3):490-6 PMID: 22056559
22. Ding Y, Sun X, Huang W, Hoage T, Redfield M, Kushwaha S, Sivasubbu S, Lin X, Ekker S, **Xu X**. Haploinsufficiency of Target of Rapamycin Attenuates Cardiomyopathies in Adult Zebrafish. *Circ Res*. 2011 109(6):658-69. PMID:21757652.
23. Caron A, **Xu X**, Lin X. Wnt/beta-catenin signaling directly regulates Foxj1 expression and ciliogenesis in zebrafish Kupffer's vesicle. *Development* 2012 Feb;139(3):514-24 PMID: 22190638
24. Yang J and **Xu X**. Alpha-Actinin2 is required for the lateral alignment of Z-discs and ventricular chamber enlargement during zebrafish cardiogenesis. *FASEB J* 2012 26(10):4230-42
25. Ding Y, Sun X, **Xu X**. TOR-Autophagy Signaling in Adult Zebrafish Models of Cardiomyopathy. *Autophagy*. 2012 Jan 1;8(1) PMID: 22186229

26. Yang, J., **Xu X**. Immunostaining of Dissected Zebrafish Embryonic Heart. *J. Vis. Exp.* 2012 (59), e3510, DOI: 10.3791/3510
27. Ding Y, Sun X, Redfield M, Kushwaha S, **Xu X**. Target of rapamycin (TOR)-based therapeutics for cardiomyopathy: insights from zebrafish genetics. *Cell Cycle* 2012 11(3) 1-2.
28. Hoage T, Ding Y, **Xu X**. Quantifying cardiac functions in embryonic and adult zebrafish. *Methods in Molecular Biology*. 2012;843:11-20. PMID:22222517
29. Klionsky D, et al, **Xu X**, et al. Guidelines for the use and interpretation of assays for monitoring autophagy. *Autophagy*. 2012 April; 8(4) 1-100.
30. Sun X and **Xu X**. Anemic zebrafish models of cardiomyopathy. *Methods in Pharmacology and Toxicology*. 2012; 41-54
31. Kushwaha S and **Xu X**. TOR-based therapy for cardiomyopathy: from zebrafish genetics to clinical studies. *Trends in Cardiovascular Medicine*. 2012 Feb; 22(2):39-43
32. Ding Y, Liu W, Deng Y, Jomok B, Yang J, Huang W, Clark KJ, Zhong T, Lin X, Ekker S, **Xu X**. Trapping cardiac recessive mutants via expression-based insertional mutagenesis screening. *Circ Res*. 2013 112(4):606-17.
33. Bisu K, Ogut O, Kushwaha S, Mohammed SF, Ohtani T, **Xu X**, Brozovich FV, Redfield MM. Anti-remodeling effects of rapamycin in experimental heart failure: dose response and interaction with angiotensin receptor blockade. *PLoS ONE*, 2013 Dec 3;8(12):e81325
34. Jarryd C, Hartjes K, Nelson T, **Xu X**, Ekker SC. The New and TALEnted Genome Engineering Toolbox. *Circ Res*. 2013 Aug; 113(5):571-87
35. Yang J, Hartjes K, Nelson T, **Xu X**. Cessation of contraction induces cardiomyocyte remodeling during zebrafish cardiogenesis. *Am J Physiol Heart Circ Physiol*. 2014 Feb;306(3):H382-95
36. Li X. Luo R. Gu H, Deng Y, **Xu X**, Wu X., Hua W. Cardiac troponin T (TNNT2) mutations in Chinese dilated cardiomyopathy patients. *BioMed Research International*. 2014: 907360
37. Yang J, Shih Y, **Xu X**. Understanding Cardiac Sarcomere Assembly With Zebrafish Genetics. *Anatomical Record*. 2014 Sep; 297(9):1681-93
38. Sun Y, Fang Y, **Xu X**, Lu G, Chen Z. Evidence of an Association between Age-Related Functional Modifications and Pathophysiological Changes in Zebrafish Heart. *Gerontology*. 2015;61(5):435-47.
39. Huo Z, Marshall L, Zhou W, He B, **Xu X**. Zebrafish models of heart development and cardiovascular diseases. *Journal of Perioperative Science* 2015; 2;1
40. Zhu P, **Xu X**, Lin X. Both ciliary and non-ciliary functions of Foxj1a confer Wnt/ β -catenin signaling in zebrafish left-right patterning. *Biol Open*. 2015 Oct 2;4(11):1376-86.
41. Shih Y, Zhang Y, Olson T, **Xu X**. The Cardiac Transcriptome and Dilated Cardiomyopathy Genes in Zebrafish. *Circulation: Cardiovascular Genetics*. 2015 8(2):261-9.
42. Yang J, Shah S, Olson T, **Xu X**. Assessment of *GATAD1* as a cardiomyopathy gene using the adult zebrafish model. *J Cardiovasc Dev Dis*. 2016 3(1), 6.

43. Klionsky D, et al, **Xu X**, et al. Guidelines for the use and interpretation of assays for monitoring autophagy. *Autophagy*. 2016; 12(1) 1-222.
44. Fei P, Lee J, Packard R, Sereti K, Xu H, Ma J, Chen H, Kang H, Sung K, Kulkarni R, Ardehali R, Kuo C, **Xu X**, Ho C, Hsiai T. Cardiac Light-sheet fluorescent microscopy for multi-scale and rapid imaging of architecture and function. *Scientific Reports*. 2016 Mar 3;6:22489.
45. Long P, Zimmermann M, Kim M, Evans J, **Xu X**, Olson T. *de novo* RRAGC mutation activates mTORC1 signaling in fetal dilated cardiomyopathy. *Human Genetics*. 2016 Aug;135(8):909-17.
46. Li X, Luo R, Fang W, **Xu X**, Niu G, Xu Y, Fu M, Hua W, Wu X. Effects of ventricular conduction block patterns on mortality in hospitalized patients with dilated cardiomyopathy: a single-center cohort study. *BMC Cardiovasc Disord*. 2016 Jun 13;16:136. PMID: 27296108
47. Ding Y, Long PA, Bos JM, Shih YH, Ma X, Sundsbak RS, Chen J, Jiang Y, Zhao L, Hu X, Wang J, Shi Y, Ackerman MJ, Lin X, Ekker SC, Redfield MM, Olson TM, **Xu X**. A modifier screen identifies *DNAJB6* as a cardiomyopathy susceptibility gene. *JCI Insight*. 2016 Sep 8;1(14). pii: e88797.
48. Zhu, P. Sieben CJ, **Xu X**, Harris PC, Lin X. Autophagy activators suppress cystogenesis in an autosomal dominant polycystic kidney disease model. *Hum Mol Genet* 2016. (in press)
49. Shih Y, Dvornikov A, Zhu P, Ma X, Kim M, Ding Y, **Xu X**. Exon- and contraction dependent functions of *titin* in sarcomere assembly. *Development*. 2016 Nov 11. pii: dev.139246.
50. Fei Y, Li W, Hou J, Guo K, Chen X, Chen Y, Wang Q, **Xu X**, Wang Y, Li Y. Oxidative stress-induced afterdepolarizations and Protein Kinase C signaling. *International Journal of Molecular Sciences* 2017 Mar 30; 18(4).
51. Wang L, Ma X, **Xu X**, Zhang Y. Systematic identification and characterization of cardiac long intergenic noncoding RNAs in zebrafish. *Scientific Reports*. 2017 Apr 28;7(1):1250
52. Long PA, Theis JL, Shih YH, Maleszewski JJ, Aleff PC, Evans JM, **Xu X**, Olson TM. Recessive *TAF1A* mutations reveal ribosomopathy in siblings with end-stage pediatric dilated cardiomyopathy. *Hum Mol Genet*. 2017 Aug 1; 26(15):2874-2881
53. Lenning M, Fortunato J, Le T, Clark I, Sherpa A, Yi S, Hofsteen P, Thamilarasu G, Yang J, **Xu X**, Han HD, Hsiai TK, Cao H. Real-time Monitoring and Analysis of Zebrafish Electrocardiogram with Anomaly Detection. *Sensors*. 2017 Dec 28;18(1).
54. Ma X, Ding Y, Wang Y, **Xu X**. A doxorubicin-induced cardiomyopathy model in adult zebrafish. *J. Vis. Exp.* 2018
55. Dvornikov AV, de Tombe PP, **Xu X**. Phenotyping cardiomyopathy in adult zebrafish. *Progress in Biophysics and Molecular Biology*. 2018
56. Zhang H, Dvornikov AV, Huttner IG, Ma X, Santiago CF, Fatkin D, **Xu X**. A langendorff-like system to quantify cardiac pump function in adult zebrafish. *DMM* 2018

C. Research Support

Ongoing Research Support

R01 HL081753

Xu (PI)

08/01/05 - 07/30/21

NIH/NHLBI

“Genetic Studies of Sarcomere-based Cardiac Diseases”

The goals of this project are to elucidate TTNv-based cardiomyopathy and to seek therapies via zebrafish genetics.

R01 HL107304

Xu (PI)

04/01/11 - 04/30/19

NIH/NHLBI

“Discovering cardiomyopathy modifiers via zebrafish genetics”

We proposed to elucidate functions of *dnajb6b* and *sorbs2b*, two cardiomyopathy modifiers identified from a mutagenesis screen.

R01 HL111437

Hsiai (MPI)

03/12 - 02/21

NIH/NHLBI

“Microsensors to Study Electrical and Mechanical Coupling of Injured Myocardium”

Our goal is to integrate our precision technologies with genetic models of heart failure to provide new insights into cardiac electrical and mechanical integration to discover therapeutic modifiers capable of restoring heart function.

Role: MPI

RO1 GM63904

Ekker (PI)

08/01/12-05/31/20

NIH/NIGMS

“Systematic Vertebrate Functional Genomics”

The goal of this award is to annotate 500 mutant lines generated from a transposon-based insertional mutagenesis screen. My program is responsible to annotate about 50 mutant lines with cardiac expression.

Role: co-PI