


Bingwei Lu

Professor of Pathology

 NIH Biosketch available Online

Bio

ACADEMIC APPOINTMENTS

- Professor, Pathology
- Member, Bio-X
- Member, Stanford Cancer Institute
- Member, Wu Tsai Neurosciences Institute

HONORS AND AWARDS

- Research Fellow, The Alfred P. Sloan Foundation (2002)
- Young Investigator Award, The Arnold and mabel Beckman Foundation (2002)
- Speaker's Fund for Biomedical Research Award, New York Academy of Sciences (2002)
- Career Scientist Award, Monique Weill-Caulier Trust (2002)
- McKnight Scholar Award, The McKnight Endowment Fund for Neurosciences (2002)
- Brain Disorders Award, The McKnight Endowment Fund for Neurosciences (2008)

PROFESSIONAL EDUCATION

- Ph.D., Cornell University , Genetics and Development (1995)
- B.S., Fudan University , Genetics (1987)

LINKS

- Lu Lab Website: <http://med.stanford.edu/lulab.html>

Research & Scholarship

CURRENT RESEARCH AND SCHOLARLY INTERESTS

Our laboratory is interested in understanding how the diverse neuronal cell types are generated and maintained in the nervous system. We are taking a combined molecular, cellular, genetic, and genomic approach in the model organisms *Drosophila* and mouse. To study how neuronal diversity is generated, we focus on investigating the mechanisms of asymmetric division of neural stem cell that balances the self-renewal and differentiation potentials of neural stem cells. Of particular interest to us is the mechanism by which aberrant regulation of neural stem cell asymmetric division leads to brain tumor-like phenotypes. To study how neurons are properly maintained after they are integrated into neural networks, we are creating neurodegenerative phenotypes in *Drosophila* similar to that observed in Alzheimer's and Parkinson's diseases in humans. We are employing the power of fly genetics to identify genetic modifiers that can suppress or enhance these disease phenotypes. Given the unanticipated high level conservation of

signaling pathways, regulatory mechanisms, and physiological processes between flies and mammals, our research promises to provide insights into fundamental mechanisms that control the generation and maintenance of neuronal diversity in humans.

Teaching

STANFORD ADVISEES

Postdoctoral Faculty Sponsor

Sunil Bhurtel, Ehsaneh Khodadadi, Jaehyuk Lee, Pooja Rai

Doctoral Dissertation Co-Advisor (AC)

Sopida Pimcharoen

GRADUATE AND FELLOWSHIP PROGRAM AFFILIATIONS

- Cancer Biology (Phd Program)
- Neurosciences (Phd Program)

Publications

PUBLICATIONS

- **PINK1 and Parkin Control Localized Translation of Respiratory Chain Component mRNAs on Mitochondria Outer Membrane.** *Cell metabolism*
Gehrke, S., Wu, Z., Klinkenberg, M., Sun, Y., Auburger, G., Guo, S., Lu, B.
2015; 21 (1): 95-108
- **Roles of PINK1, mTORC2, and mitochondria in preserving brain tumor-forming stem cells in a noncanonical Notch signaling pathway.** *Genes & development*
Lee, K., Wu, Z., Song, Y., Mitra, S. S., Feroze, A. H., Cheshier, S. H., Lu, B.
2013; 27 (24): 2642-2647
- **Tricornered/NDR kinase signaling mediates PINK1-directed mitochondrial quality control and tissue maintenance** *GENES & DEVELOPMENT*
Wu, Z., Sawada, T., Shiba, K., Liu, S., Kanao, T., Takahashi, R., Hattori, N., Imai, Y., Lu, B.
2013; 27 (2): 157-162
- **Parkinson's Disease-Associated Kinase PINK1 Regulates Miro Protein Level and Axonal Transport of Mitochondria** *PLOS GENETICS*
Liu, S., Sawada, T., Lee, S., Yu, W., Silverio, G., Alapatt, P., Millan, I., Shen, A., Saxton, W., Kanao, T., Takahashi, R., Hattori, N., Imai, et al
2012; 8 (3)
- **Regulation of cell growth by Notch signaling and its differential requirement in normal vs. tumor-forming stem cells in Drosophila** *GENES & DEVELOPMENT*
Song, Y., Lu, B.
2011; 25 (24): 2644-2658
- **Pathogenic LRRK2 negatively regulates microRNA-mediated translational repression** *NATURE*
Gehrke, S., Imai, Y., Sokol, N., Lu, B.
2010; 466 (7306): 637-U9
- **Pink1 regulates mitochondrial dynamics through interaction with the fission/fusion machinery** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
Yang, Y., Ouyang, Y., Yang, L., Beal, M. F., McQuibban, A., Vogel, H., Lu, B.
2008; 105 (19): 7070-7075
- **Polo inhibits progenitor self-renewal and regulates Numb asymmetry by phosphorylating Pon** *NATURE*
Wang, H., Ouyang, Y., Somers, W. G., Chia, W., Lu, B.
2007; 449 (7158): 96-U70

- **PAR-1 kinase phosphorylates Dlg and regulates its postsynaptic targeting at the Drosophila neuromuscular junction** *NEURON*
Zhang, Y., Guo, H., Kwan, H., Wang, J., Kosek, J., Lu, B.
2007; 53 (2): 201-215
- **Mitochondrial pathology and muscle and dopaminergic neuron degeneration caused inactivation of Drosophila Pink1 is rescued by by Parkin** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
Yang, Y., Gehrke, S., Imai, Y., Huang, Z., Ouyang, Y., Wang, J., Yang, L., Beal, M. F., Vogel, H., Lu, B.
2006; 103 (28): 10793-10798
- **Inactivation of Drosophila DJ-1 leads to impairments of oxidative stress response and phosphatidylinositol 3-kinase/Akt signaling** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
Yang, Y. F., Gehrke, S., Haque, M. E., Imai, Y., Kosek, J., Yang, L. C., Beal, M. F., Nishimura, I., Wakamatsu, K., Ito, S., Takahashi, R., Lu, B. W.
2005; 102 (38): 13670-13675
- **PAR-1 kinase plays an initiator role in a temporally ordered phosphorylation process that confers tau toxicity in Drosophila** *CELL*
Nishimura, I., Yang, Y. F., Lu, B. W.
2004; 116 (5): 671-682
- **Adherens junctions inhibit asymmetric division in the Drosophila epithelium** *NATURE*
Lu, B. W., Roegiers, F., Jan, L. Y., Jan, Y. N.
2001; 409 (6819): 522-525
- **Partner of numb colocalizes with numb during mitosis and directs numb asymmetric localization in Drosophila neural and muscle progenitors** *CELL*
Lu, B. W., Rothenberg, M., Jan, L. Y., Jan, Y. N.
1998; 95 (2): 225-235
- **The myriad roles of Miro in the nervous system: axonal transport of mitochondria and beyond** *FRONTIERS IN CELLULAR NEUROSCIENCE*
Lee, K., Lu, B.
2014; 8
- **RNA metabolism in the pathogenesis of Parkinson's disease** *BRAIN RESEARCH*
Lu, B., Gehrke, S., Wu, Z.
2014; 1584: 105-115
- **Synergistic contribution of SMAD signaling blockade and high localized cell density in the differentiation of neuroectoderm from H9 cells** *BIOCHEMICAL AND BIOPHYSICAL RESEARCH COMMUNICATIONS*
Liu, C., Sun, Y., Arnold, J., Lu, B., Guo, S.
2014; 452 (4): 895-900
- **Zinc binding directly regulates tau toxicity independent of tau hyperphosphorylation.** *Cell reports*
Huang, Y., Wu, Z., Cao, Y., Lang, M., Lu, B., Zhou, B.
2014; 8 (3): 831-842
- **Targeting PINK1 and MQC in brain tumors.** *Oncotarget*
Lee, K., Lu, B.
2014; 5 (10): 2864-2865
- **Molecular chaperones protect against JNK- and Nmnat-regulated axon degeneration in Drosophila** *JOURNAL OF CELL SCIENCE*
Rallis, A., Lu, B., Ng, J.
2013; 126 (3): 838-849
- **Phospho-dependent ubiquitination and degradation of PAR-1 regulates synaptic morphology and tau-mediated A beta toxicity in Drosophila** *NATURE COMMUNICATIONS*
Lee, S., Wang, J., Yu, W., Lu, B.
2012; 3
- **Closing the gap between clinic and cage: Sensori-motor and cognitive behavioural testing regimens in neurotoxin-induced animal models of Parkinson's disease** *NEUROSCIENCE AND BIOBEHAVIORAL REVIEWS*
Pienaar, I. S., Lu, B., Schallert, T.

2012; 36 (10): 2305-2324

- **The synaptic function of LRRK2** *BIOCHEMICAL SOCIETY TRANSACTIONS*
Lee, S., Imai, Y., Gehrke, S., Liu, S., Lu, B.
2012; 40: 1047-1051
- **Loss of Axonal Mitochondria Promotes Tau-Mediated Neurodegeneration and Alzheimer's Disease-Related Tau Phosphorylation Via PAR-1** *PLOS GENETICS*
Iijima-Ando, K., Sekiya, M., Maruko-Otake, A., Ohtake, Y., Suzuki, E., Lu, B., Iijima, K. M.
2012; 8 (8)
- **Kinase Signaling Dysfunction in Parkinson's Disease: A Reverse Genetic Approach in Drosophila** *JOURNAL OF NEUROGENETICS*
Huang, Y., Shenoy, S., Lu, B., Liu, W., Li, C.
2012; 26 (2): 158-167
- **Interaction of Notch Signaling Modulator Numb with alpha-Adaptin Regulates Endocytosis of Notch Pathway Components and Cell Fate Determination of Neural Stem Cells** *JOURNAL OF BIOLOGICAL CHEMISTRY*
Song, Y., Lu, B.
2012; 287 (21): 17716-17728
- **A critical role for the PAR-1/MARK-tau axis in mediating the toxic effects of A on synapses and dendritic spines** *HUMAN MOLECULAR GENETICS*
Yu, W., Polepalli, J., Wagh, D., Rajadas, J., Malenka, R., Lu, B.
2012; 21 (6): 1384-1390
- **Synapses and Dendritic Spines as Pathogenic Targets in Alzheimer's Disease** *NEURAL PLASTICITY*
Yu, W., Lu, B.
2012
- **Mitochondrial dynamics and mitophagy in Parkinson's disease: disordered cellular power plant becomes a big deal in a major movement disorder** *CURRENT OPINION IN NEUROBIOLOGY*
Imai, Y., Lu, B.
2011; 21 (6): 935-941
- **dp53 Restrains Ectopic Neural Stem Cell Formation in the Drosophila Brain in a Non-Apoptotic Mechanism Involving Archipelago and Cyclin E** *PLOS ONE*
Ouyang, Y., Song, Y., Lu, B.
2011; 6 (11)
- **The PINK1/Parkin pathway regulates mitochondrial dynamics and function in mammalian hippocampal and dopaminergic neurons** *HUMAN MOLECULAR GENETICS*
Yu, W., Sun, Y., Guo, S., Lu, B.
2011; 20 (16): 3227-3240
- **Pink1 regulates the oxidative phosphorylation machinery via mitochondrial fission** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
Liu, W., Acin-Perez, R., Geghman, K. D., Manfredi, G., Lu, B., Li, C.
2011; 108 (31): 12920-12924
- **Dronc caspase exerts a non-apoptotic function to restrain phospho-Numb-induced ectopic neuroblast formation in Drosophila** *DEVELOPMENT*
Ouyang, Y., Petritsch, C., Wen, H., Jan, L., Jan, Y. N., Lu, B.
2011; 138 (11): 2185-2196
- **Drosophila tao Controls Mushroom Body Development and Ethanol-Stimulated Behavior through par-1** *JOURNAL OF NEUROSCIENCE*
King, I., Tsai, L. T., Pflanz, R., Voigt, A., Lee, S., Jaeckle, H., Lu, B., Heberlein, U.
2011; 31 (3): 1139-1148
- **LRRK2 Kinase Regulates Synaptic Morphology through Distinct Substrates at the Presynaptic and Postsynaptic Compartments of the Drosophila Neuromuscular Junction** *JOURNAL OF NEUROSCIENCE*
Lee, S., Liu, H., Lin, W., Guo, H., Lu, B.

2010; 30 (50): 16959-16969

- **Reduction of Protein Translation and Activation of Autophagy Protect against PINK1 Pathogenesis in *Drosophila melanogaster*** *PLOS GENETICS*
Liu, S., Lu, B.
2010; 6 (12)
- **The Loss of PGAM5 Suppresses the Mitochondrial Degeneration Caused by Inactivation of PINK1 in *Drosophila*** *PLOS GENETICS*
Imai, Y., Kanao, T., Sawada, T., Kobayashi, Y., Moriwaki, Y., Ishida, Y., Takeda, K., Ichijo, H., Lu, B., Takahashi, R.
2010; 6 (12)
- **Activation of FoxO by LRRK2 induces expression of proapoptotic proteins and alters survival of postmitotic dopaminergic neuron in *Drosophila*** *HUMAN MOLECULAR GENETICS*
Kanao, T., Venderova, K., Park, D. S., Unterman, T., Lu, B., Imai, Y.
2010; 19 (19): 3747-3758
- **Atypical Cadherins Dachsous and Fat Control Dynamics of Noncentrosomal Microtubules in Planar Cell Polarity** *DEVELOPMENTAL CELL*
Harumoto, T., Ito, M., Shimada, Y., Kobayashi, T. J., Ueda, H. R., Lu, B., Uemura, T.
2010; 19 (3): 389-401
- **Leucine-rich repeat kinase 2 interacts with Parkin, DJ-1 and PINK-1 in a *Drosophila melanogaster* model of Parkinson's disease** *HUMAN MOLECULAR GENETICS*
Venderova, K., Kabbach, G., Abdel-Messih, E., Zhang, Y., Parks, R. J., Imai, Y., Gehrke, S., Ngsee, J., LaVoie, M. J., Slack, R. S., Rao, Y., Zhang, Z., Lu, et al
2009; 18 (22): 4390-4404
- **Mitochondrial Morphogenesis, Distribution, and Parkinson Disease: Insights From PINK1** *JOURNAL OF NEUROPATHOLOGY AND EXPERIMENTAL NEUROLOGY*
Yang, Y., Lu, B.
2009; 68 (9): 953-963
- **Neuroprotective effects of compounds with antioxidant and anti-inflammatory properties in a *Drosophila* model of Parkinson's disease** *BMC NEUROSCIENCE*
Faust, K., Gehrke, S., Yang, Y., Yang, L., Beal, M. F., Lu, B.
2009; 10
- **Recent advances in using *Drosophila* to model neurodegenerative diseases** *APOPTOSIS*
Lu, B.
2009; 14 (8): 1008-1020
- **Mitochondrial dynamics and neurodegeneration** *CURRENT NEUROLOGY AND NEUROSCIENCE REPORTS*
Lu, B.
2009; 9 (3): 212-219
- ***Drosophila* Models of Neurodegenerative Diseases** *ANNUAL REVIEW OF PATHOLOGY-MECHANISMS OF DISEASE*
Lu, B., Vogel, H.
2009; 4: 315-342
- **Phosphorylation of 4E-BP by LRRK2 affects the maintenance of dopaminergic neurons in *Drosophila*** *EMBO JOURNAL*
Imai, Y., Gehrke, S., Wang, H., Takahashi, R., Hasegawa, K., Oota, E., Lu, B.
2008; 27 (18): 2432-2443
- **Activation of PAR-1 kinase and stimulation of tau phosphorylation by diverse signals require the tumor suppressor protein LKB1** *JOURNAL OF NEUROSCIENCE*
Wang, J., Imai, Y., Lu, B.
2007; 27 (3): 574-581
- **Activation of PAR-1 Kinase and Stimulation of Tau Phosphorylation by Diverse Signals Require the Tumor Suppressor Protein LKB1** *The Journal of Neuroscience*
Wang, J-W., Imai Y., Lu, B.
2007; 27 (3): 574-581

- **HSP induction mediates selective clearance of tau phosphorylated at proline-directed Ser/Thr sites but not KXGS (MARK) sites** *FASEB JOURNAL*
Dickey, C. A., Dunmore, J., Lu, B., Wang, J., Lee, W. C., Kamal, A., Burrows, F., Eckman, C., Hutton, M., Petrucelli, L.
2006; 20 (2): 753-?
- **Understanding and treating neurodegeneration: insights from the flies** *AGE*
Lu, B.
2005; 27 (3): 225-239
- **Putting a PARKING brake on neurodegeneration** *MOLECULAR PSYCHIATRY*
Lu, B. W.
2004; 9 (1): 6-7
- **RNA interference technologies for understanding and treating neurodegenerative diseases** *NEUROMOLECULAR MEDICINE*
Lu, B. W.
2004; 6 (1): 1-12
- **Parkin suppresses dopaminergic neuron-selective neurotoxicity induced by Pael-R in Drosophila** *NEURON*
Yang, Y. F., Nishimura, I., Imai, Y., Takahashi, R., Lu, B. W.
2003; 37 (6): 911-924
- **PAR-1 is a Dishevelled-associated kinase and a positive regulator of Wnt signalling** *NATURE CELL BIOLOGY*
Sun, T. Q., Lu, B. W., Feng, J. J., Reinhard, C., Jan, Y. N., Fantl, W. J., Williams, L. T.
2001; 3 (7): 628-636
- **Drosophila par-1 is required for oocyte differentiation and microtubule organization** *CURRENT BIOLOGY*
Cox, D. N., Lu, B. W., Sun, T. Q., Williams, L. T., Jan, Y. N.
2001; 11 (2): 75-87
- **Control of cell divisions in the nervous system: Symmetry and asymmetry** *ANNUAL REVIEW OF NEUROSCIENCE*
Lu, B. W., Jan, L., Jan, Y. N.
2000; 23: 531-556
- **Modes of protein movement that lead to the asymmetric localization of partner of numb during Drosophila neuroblast division** *MOLECULAR CELL*
Lu, B. W., Ackerman, L., Jan, L. Y., Jan, Y. N.
1999; 4 (6): 883-891
- **Flamingo controls the planar polarity of sensory bristles and asymmetric division of sensory organ precursors in Drosophila** *CURRENT BIOLOGY*
Lu, B. W., Usui, T., Uemura, T., Jan, L., Jan, Y. N.
1999; 9 (21): 1247-1250
- **Asymmetric cell division: Lessons from flies and worms** *CURRENT OPINION IN GENETICS & DEVELOPMENT*
Lu, B. W., Jan, L. Y., Jan, Y. N.
1998; 8 (4): 392-399