

**CURRICULUM VITAE  
OREGON HEALTH & SCIENCE UNIVERSITY**

<b>NAME</b>	<b>Show-Ling Shyng</b>	<b>DATE</b>	<b>August 2022</b>
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**PRESENT POSITION AND ADDRESS**

<b>Academic Rank:</b>	<b>Professor</b>
<b>Department/Division:</b>	<b>Chemical Physiology and Biochemistry</b>
<b>Professional Address:</b>	<b>MRB 624, L334, 3181 SW Sam Jackson Park Road, Portland OR 97239</b>
<b>E-Mail Address:</b>	<b>shyngs@ohsu.edu</b>

**II. EDUCATION**

1984	BS, Zoology, National Taiwan University, Taiwan
1990	PhD, Neurobiology & Behavior, Cornell University
1990-1	Postdoctoral training, Neurobiology, California Institute of Technology
1992-4	Postdoctoral training, Cell Biology & Physiology, Washington University

**III. PROFESSIONAL EXPERIENCE**

1986- 1988	Teaching Assistant, Cornell University
1994- 1997	Postdoctoral Research Associate, Department of Cell Biology & Physiology, Washington University School of Medicine
1997- 1999	Research Assistant Professor, Department of Cell Biology & Physiology Washington University School of Medicine
1999- 2004	Assistant Professor, Center for Research on Occupational & Environmental Toxicology, Oregon Health Sciences University
2005- 2008	Associate Professor, Center for Research on Occupational & Environmental Toxicology, Oregon Health & Science University
2008- 2010	Professor, Center for Research on Occupational & Environmental Toxicology (CROET), Oregon Health & Science University
2011- 2019	Professor, Department of Biochemistry and Molecular Biology, School of Medicine, Oregon Health & Science University
2019-	Professor, Department of Chemical Physiology and Biochemistry, School of Medicine, Oregon Health & Science University

**IV. SCHOLARSHIP**

**Area(s) of Research/Scholarly Interest:**

I am broadly interested in ion channels, from their molecular structure, gating mechanisms, trafficking regulation, to their role in health and disease. For the past twenty-two years, research

in my lab has focused on the ATP-sensitive K<sup>+</sup> (K<sub>ATP</sub>) channel. K<sub>ATP</sub> channels couple cell metabolism to membrane excitability and have many vital physiological functions. In pancreatic β-cells, K<sub>ATP</sub> channels play a key role in coupling blood glucose levels to insulin secretion. Dysfunction of K<sub>ATP</sub> channels underlies a number of endocrine and neurological diseases, including congenital hyperinsulinism, neonatal diabetes, DEND (Developmental delay, Epilepsy, and Neonatal Diabetes) syndrome, and increased risk for type 2 diabetes. We are interested in understanding how K<sub>ATP</sub> channel biogenesis, trafficking and gating are regulated and how mutations disrupt these processes to cause disease. We use a multidisciplinary approach that combines molecular biology, biochemistry, electrophysiology, chemical biology, genetics, structural biology and computational biology. Our work on pancreatic K<sub>ATP</sub> channels has been supported by two long-standing R01s. More recently, we have initiated new projects to study K<sub>ATP</sub> channels in the cardiovascular system. K<sub>ATP</sub> channel subtypes expressed in the heart and vascular smooth muscle have been implicated in several cardiovascular diseases including hypertension, ventricular arrhythmias, sudden infant death syndrome, and Cantú syndrome. Current efforts are focused on resolving high resolution structures of the various K<sub>ATP</sub> channel isoforms to gain insights into the mechanistic basis of their functional differences. An ultimate goal is to apply our knowledge towards developing new and improved therapeutic agents for diseases caused by K<sub>ATP</sub> channel dysfunction. To this end, we have recently established industrial partnership with Atomwise to conduct artificial intelligence-powered virtual screens to discover isoform-specific K<sub>ATP</sub> channel modulators.

### Grants and Contracts:

#### Federal

##### *Active*

- NIH-R01DK066485-14 02/07/20 –1/31/25  
Principal Investigator: Show-Ling Shyng (30%)  
Title: Structural Basis of K<sub>ATP</sub> channel gating  
Direct costs: \$287,511/year
- NIH- R01 GM145784-01 6/01/22 –5/31/26  
Principal Investigator: Show-Ling Shyng  
Title: Correlating structure and function in K<sub>ATP</sub> channel isoforms
- Pacific Northwest CryoEM Center (PNCC): 160002 03/15/21 –3/14/23  
Principal Investigator: Show-Ling Shyng Title: CryoEM structures of K<sub>ATP</sub> channels in the cardiovascular system Note: this award provides microscope and computational time at PNCC

##### *Completed*

- Pacific Northwest CryoEM Center (PNCC): 51311 03/15/20 –3/14/22  
Principal Investigator: Show-Ling Shyng Title: CryoEM structures of pancreatic K<sub>ATP</sub> channels Note: this award provides microscope and computational time at PNCC
- NIH-R01DK57699-19 1/01/01 –7/31/21  
Principal Investigator: Show-Ling Shyng  
Title: ATP-sensitive potassium channels and insulin secretion
- NIH-R01DK066485-01 3/01/06 – 11/30/15

Principal Investigator: Show-Ling Shyng  
 Title: Structural Basis of K<sub>ATP</sub> channel gating

- NIH R01DK066485-01S1 1/15/10 – 3/31/11  
 Principal Investigator: Show-Ling Shyng  
 Title: Structural Basis of K<sub>ATP</sub> channel gating
- NIH F31 DK105800-01 4/01/15 - 5/12/18  
 Principal Investigator: Gregory Martin  
 Sponsor: Show-Ling Shyng  
 Title: Pharmacological Rescue of Trafficking-Impaired K<sub>ATP</sub> Channels
- NIH F30DK081305-01 3/1/08 - 2/29/12  
 Principal Investigator: Emily Pratt  
 Sponsor: Show-Ling Shyng  
 Title: SUR1 mutations and Inter-Subunit Associations in ATP-Sensitive Potassium Channels  
 The goal of the project is to isolate and characterize two specific SUR1--Kir6.2 inter-subunit interactions in K<sub>ATP</sub> channels.
- NIH F31NS065688-01 12/1/09 - 11/30/11  
 Principal Investigator: Jeremy Bushman  
 Sponsor: Show-Ling Shyng  
 Title: Structural mechanisms of gating in K<sub>ATP</sub> channels

**Non-Federal National Foundations**

*Completed*

- March of Dimes Birth Defects Foundation (\$80K/year) 6/01/08 – 5/31/11  
 Principal Investigator: Show-Ling Shyng (20%)  
 Title: Pharmacological Rescue of Misfolded Mutant K<sub>ATP</sub> Channels
- Sponsor of American Heart Association Predoctoral Fellowship 7/01/04 – 6/30/06  
 Principal Investigator: Yu-Wen Lin  
 Title: Structural basis of K<sub>ATP</sub> channel gating
- Juvenile Diabetes Research Foundation (\$124K/year) 10/01/01 – 9/30/04  
 Principal Investigator: Show-Ling Shyng  
 Title: K<sub>ATP</sub> channel trafficking and insulin secretion diseases
- March of Dimes Birth Defects Foundation (\$50K/year) 6/1/00 – 12/31/03  
 Principal Investigator: Show-Ling Shyng  
 Title: Defects in K<sub>ATP</sub> channel function as a molecular basis for insulin secretory
- American Diabetes Association Research Grant (\$75K/year) 7/01/97 – 6/30/01  
 Principal Investigator: Show-Ling Shyng  
 Title: K<sub>ATP</sub> channels and insulin secretory disease: functional and cell biological analysis of PHHI-associated mutations in the K<sub>ATP</sub> channel. diseases.

**State and Local**

*Active*

- OHSU Faculty Initiative Pool (\$131K) 2021  
Principal Investigator: Show-Ling Shyng  
Title: Aurora Ion Channel Reader 8100 for ion channel and ion transporter research and drug discovery

*Completed*

- OHSU Emerging Technology Fund (\$500K) 2017  
Principal Investigator: Show-Ling Shyng  
Title: K2 Summit Direct Electron Detector with upgrade to K3 for the Arctica Transmission Electron Microscope
- University Shared Resource Core Pilot Grant (\$9K) 1/01/16 – 6/30/16  
Principal Investigator: Cathrin Bruederle  
Mentor: Show-Ling Shyng  
Title: Phosphoproteomic analysis of insulinoma cells stimulated with leptin
- Collins Medical Trust (\$29K) 3/01/10 – 2/28/11  
Principal Investigator: Cathrin Bruederle  
Mentor: Show-Ling Shyng  
Title: Role of Derlin-1 complex in ER-associated degradation of K<sub>ATP</sub> channel and K<sub>ATP</sub> channel folding mutants
- Collins Medical Trust (\$29K) 4/01/09 – 3/31/10  
Principal Investigator: Feifei Yan  
Mentor: Show-Ling Shyng  
Title: Role of Derlin-1 complex in ER-associated degradation of K<sub>ATP</sub> channel and K<sub>ATP</sub> channel folding mutants
- Medical Research Foundation of Oregon (\$30K) 12/01/04 – 11/30/05  
Principal Investigator: Show-Ling Shyng  
Title: Defective trafficking of ATP-sensitive potassium channels in congenital hyperinsulinism.
- Medical Research Foundation of Oregon (\$30K) 9/01/99 – 8/31/00  
Principal Investigator: Show-Ling Shyng  
Title: Regulation of insulin secretion by K<sub>ATP</sub> channels and membrane lipids.

**Industry**

*Completed*

- Atomwise AIMSTM award (A19-848) 2019-2021  
Principal Investigator: Show-Ling Shyng Shyng, Show-Ling 3 Title: Identification of small molecule pharmacological chaperone of KATP-SUR1.

**Publications/Creative Work:**Peer reviewed

1. **Shyng SL**, Salpeter MM. (1989). Degradation rate of acetylcholine receptors inserted into denervated vertebrate neuromuscular junctions. *J. Cell Biol.* 108: 647-651.
2. **Shyng SL**, Salpeter MM. (1990). Effect of reinnervation on the degradation rate of junctional acetylcholine receptors synthesized in denervated skeletal muscles. *J. Neurosci.* 10: 3905-3915.
3. **Shyng SL**, Xu R, Salpeter MM. (1991). Cyclic AMP stabilizes the degradation of original junctional acetylcholine receptors in denervated muscle. *Neuron* 6: 469-475.
4. Harris DA, Huber MT, van Dijken P, **Shyng SL**, Chait BT, Wang R. (1993). Processing of a cellular prion protein: identification of N- and C-terminal cleavage sites. *Biochemistry* 32:1009-1016.
5. **Shyng SL**, Huber MT, Harris DA. (1993). A prion protein cycles between the cell surface and an endocytic compartment in cultured neuroblastoma cells. *J. Biol. Chem.* 268: 15922-15928.
6. **Shyng SL**, Heuser JE, Harris DA. (1994). A glycolipid-anchored prion protein is endocytosed via clathrin-coated pits. *J. Cell Biol.* 125: 1239-1250.
7. **Shyng SL**, Moulder K, Lesko A, Harris DA. (1995). The N-terminal domain of a glycolipid-anchored prion protein is essential for its endocytosis via clathrin-coated pits. *J. Biol. Chem.* 270: 14793-14800.
8. **Shyng SL**, Lehmann S, Moulder K, Harris DA. (1995). Sulfated glycans stimulate endocytosis of the cellular isoform of the prion protein, PrP<sup>c</sup>, in cultured cells. *J. Biol. Chem.* 270: 30221-30229.
9. Harris DA, Gorodinsky A, Lehmann S, Moulder K, **Shyng SL**. (1996). Cell biology of the prion protein. *Curr. Top. Microbiol. Immunol.* 207:77-93.
10. Nichols CG, **Shyng SL**, Nestorowicz A, Glaser B, Clement J IV, Gonzalez G, Aguilar-Bryan L, Permutt AM, Bryan JP. (1996). Adenosine diphosphate as an intracellular regulator of insulin secretion. *Science* 272: 1785-1787.
11. **Shyng SL**, Sha Q, Ferrigni T, Lopatin A, Nichols CG. (1996). Depletion of intracellular polyamines relieves inward rectification of potassium channels. *Proc. Natl. Acad. Sci. U.S.A.* 93: 12014-12019.
12. **Shyng SL**, Ferrigni T, Nichols CG. (1997). Control of rectification and gating of cloned K<sub>ATP</sub> channels by the Kir6.2 subunit. *J. Gen. Physiol.* 110: 1-153.
13. **Shyng SL**, Ferrigni T, Nichols CG. (1997). Regulation of K<sub>ATP</sub> channel activity by diazoxide and by MgADP: distinct functions of the two nucleotide binding folds of the sulfonylurea receptor. *J. Gen. Physiol.* 110: 643-654.
14. **Shyng SL**, Nichols CG. (1997). Octameric stoichiometry of the K<sub>ATP</sub> channel complex. *J. Gen. Physiol.* 110: 5-664.
15. Nestorowicz A, Glaser B, Wilson BA, **Shyng SL**, Nichols CG, Stanley CA, Thornton PS, Permutt MA. (1998). Genetic heterogeneity in familial hyperinsulinism. *Hum. Mol. Genet.* 7:1119-1128.
16. **Shyng SL**, Ferrigni T, Shepard J, Nestorowicz A, Glaser B, Permutt MA, Nichols CG. (1998). Functional analyses of novel mutations in the sulfonylurea receptor 1 associated with familial hyperinsulinism. *Diabetes* 47: 1145-1151.

17. **Shyng SL**, Nichols CG. (1998). Membrane phospholipids control nucleotide-sensitivity of  $K_{ATP}$  channels. *Science* 282: 1138-1141.
18. Koster J, Sha Q, **Shyng SL**, Nichols CG. (1999). ATP inhibition of  $K_{ATP}$  channels: Control of nucleotide sensitivity by cytoplasmic domains of the Kir6.2 subunit. *J. Physiol.* 515:19-30.
19. **Shyng SL**, Nichols CG. (1999). Nucleotides and insulin secretion. *Nutrition* 9: 717-719.
20. **Shyng SL**, Barbieri A, Gumusboga A, Cukras C, Pike L, Davis JN, Stahl PD, Nichols CG. (2000). Modulation of nucleotide sensitivity of ATP-sensitive potassium channels by phosphatidylinositol-4-phosphate 5-kinase. *Proc. Natl. Acad. Sci. U.S.A.* 97: 937-941.
21. Enkvetchakul D, Loussouarn G, Makhina E, **Shyng SL**, Nichols CG. (2000). The kinetic and physical basis of  $K_{ATP}$  channel gating: Towards a unified molecular understanding. *Biophys. J.*, 78: 2334-48.
22. **Shyng SL**, Cukras C, Harwood J, Nichols CG. (2000). Structural determinants of  $PIP_2$  regulation of inward rectifier  $K_{ATP}$  channels. *J. Gen. Physiol.*, 116:599-608.
23. Cartier EA, Conti LR, Vandenberg CA, **Shyng SL**. (2001). Defective trafficking and function of  $K_{ATP}$  channels caused by a sulfonylurea receptor 1 mutation associated with persistent hyperinsulinemic hypoglycemia of infancy. *Proc. Natl. Acad. Sci. U.S.A.*, 98:2882-2887.
24. Conti LR, Radeke CM, **Shyng SL**, Vandenberg CA. (2001). Transmembrane topology of the sulfonylurea receptor SUR1. *J. Biol. Chem.*, 276: 41270-41278.
25. Taschenberger G, Mougey A, Shen S, Lester L, LaFranchi S, **Shyng SL**. (2002). Identification of a familial hyperinsulinism-causing mutation in the sulfonylurea receptor 1 that prevents normal trafficking and function of  $K_{ATP}$  channels. *J. Biol. Chem.*, 277:17139-17146.
26. Huopio H, **Shyng SL**, Otonkoski T, Nichols CG. (2002).  $K_{ATP}$  channels and insulin secretion disorders. *Am. J. Physiol. Endocrinol. Metab.*, invited review, 283: E207-E216.
27. Cartier EA, Shen S, **Shyng SL**. (2003). Modulation of the trafficking efficiency and functional properties of ATP-sensitive potassium channels through a single amino acid in the sulfonylurea receptor. *J. Biol. Chem.*, 278: 7081-7090.
28. Lin YW, Jia T, Weinsoft A, **Shyng SL**. (2003). Stabilization of the activity of ATP-sensitive potassium channels by ion pairs formed between adjacent Kir6.2 subunits. *J. Gen. Physiol.*, 122: 225-37.
29. Yan F, Lin CW, Weisiger E, Cartier EA, Taschenberger G, **Shyng SL**. (2004). Sulfonylureas correct trafficking defects of ATP-sensitive potassium channels caused by mutations in the sulfonylurea receptor. , *J. Biol. Chem.* 279:11096-105.
30. Magge SN, **Shyng SL**, Ganguly A, MacMullen C, Steinkrauss L, Katz L, Stanley CA. (2004). Familial leucine-sensitive hypoglycemia of infancy due to a dominant mutation of the beta cell sulfonylurea receptor. *J. Clin. Endocrinol. Metab.*89:4450-4456.
31. Yan F, Lin CW, Cartier EA, **Shyng SL**. (2005). A role of the ubiquitin-proteasome degradation pathway in determining the biogenesis efficiency of  $\beta$ -cell ATP-sensitive potassium channels. *Am. J. Physiol. Cell Physiol.*289: C1351-C1359.  
**\*\* Selected as Editorial Focus Article with Accompanying Preview**
32. Lin CW, Yan F, Shimamura S, Barg S, **Shyng SL**. (2005). Membrane phosphoinositides control insulin secretion through their effect on  $K_{ATP}$  channel activity. *Diabetes* 54: 2852-2858.

33. Lin YW, MacMullen C, Ganguly A, Stanley CA, **Shyng SL**. (2006). A novel KCNJ11 mutation associated with congenital hyperinsulinism reduces the intrinsic open probability of  $\beta$ -cell ATP-sensitive potassium channels. *J. Biol. Chem*, 281: 3006-12.
34. Lin CW, Lin YW, Yan F, Casey J, Kochhar M, Pratt EB, **Shyng SL**. (2006). Kir6.2 mutations associated with neonatal diabetes reduce expression of ATP-sensitive potassium channels: implications in disease mechanism and sulfonylurea therapy. *Diabetes*, 55: 1738-1746.
35. Yan F, Casey J, **Shyng SL\*** (2006). Sulfonylureas correct trafficking defects of disease-causing ATP-sensitive potassium channels by binding to the channel complex. *J. Biol. Chem*. 281: 33403-33413.
36. **Shyng SL**. (2007). Insulin in the balance:  $K_{ATP}$  channel expression and gating in diabetes and hyperinsulinism. *Cellscience Reviews* (ISSN 1742-8130) <http://www.cellscience.com/journal/journalindex.asp>, Jan. 27<sup>th</sup> issue.
37. Yan F, Lin YW, MacMullen C, Ganguly A, Stanley CA, **Shyng SL**. (2007). Congenital hyperinsulinism-associated *ABCC8* mutations that cause defective trafficking of ATP-sensitive potassium channels: identification and rescue. *Diabetes*, 56:2339-2348.
38. Lin YW, Bushman JD, Haidar S, MacMullen C, Ganguly A, Stanley CA, **Shyng SL**. (2008). Destabilization of ATP-sensitive potassium channel activity by novel *KCNJ11* mutations identified in congenital hyperinsulinism. *J. Biol. Chem.*, 283: 9146-56.
39. Abdulhadi-Atwan M, Bushman JD, Tornovsky-Babaey S, Perry A, Abu-Libdeh A, Glaser B, **Shyng SL**, Zangen DH. (2008). Novel de novo mutation in *SUR1* presenting as hyperinsulinism in infancy followed by overt diabetes in early adolescence. *Diabetes*, 57: 1935-40.
40. Pinney S, Lin YW, MacMullen C, O'Rourke S, Hanna C, **Shyng SL**, Stanley CA. (2008). Clinical and biochemical features of congenital hyperinsulinism associated with dominant  $K_{ATP}$  channel mutations. *J. Clin. Invest.*, 118: 2877-2886.
41. Pratt EB, Yan F, Gay JW, Stanley CA, **Shyng SL**. (2009). Sulfonylurea receptor 1 mutations that cause opposite insulin secretion defects upon chemical chaperone exposure. *J. Biol. Chem.*, 284: 7951-7959.
42. Fu Y, Tian W, Pratt EB, Dirling LD, **Shyng SL**, Meshul CK, Cohen DM. (2009). Down-regulation of *ZnT8* expression in *INS-1* rat pancreatic beta cells reduces insulin content and glucose-inducible insulin secretion. *PLoS ONE*, 4(5):e5679.
43. Bushman JD, Tewson P, Stanley CA, **Shyng SL**. (2010). Characterization and functional restoration of a potassium channel Kir6.2 pore mutation identified in congenital hyperinsulinism. *J. Biol Chem*. 285: 6012-23.
44. Yan F, Pratt EB, Chen PC, Wang F, Skach WR, David LL, **Shyng SL**. (2010). Role of Hsp90 in biogenesis of the  $\beta$ -cell ATP-sensitive potassium channel complex. *Mol. Biol. Cell*, 21:1945-54.
45. Zhou Q, Garin I, Castano L, Argente J, Munoz-Calvo MT, Perez de Nanclares G, **Shyng SL**. (2010). Neonatal diabetes caused by mutation in sulfonylurea receptor 1: interplay between expression and Mg-nucleotide gating defects of ATP-sensitive potassium channels. *J. Clin. Endocrinol. Metab.*, 95:E473-8.
46. Kang Y, Zhang Y, Liang T, Leung YM, Ng B, Xie H, Chang N, Chan J, **Shyng SL**, Tsushima R, Gaisano HY. (2011). ATP modulates syntaxin-1A binding to nucleotide binding folds of sulfonylurea receptor 1 to regulate pancreatic  $\beta$ -cell  $K_{ATP}$  channels. *J. Biol Chem*. 286:5876-83.

47. Chen PC, Bruederle CE, Gaisano HY, **Shyng SL**. (2011). Syntaxin 1A regulates biogenesis and trafficking of pancreatic ATP-sensitive potassium channels. *Am. J. of Physiol.-Cell Physiol.* 300:C506-16.
48. Pratt EB, Tewson P, Bruederle CE, Skach WR, **Shyng SL**. (2011). N-terminal transmembrane domain of SUR1 controls gating of Kir6.2 by modulating channel sensitivity to PIP<sub>2</sub>. *J. Gen. Physiol.* 137: 299-314.
49. MacMullen CM, Zhou Q, Snider KE, Tewson PH, Becker S, Aziz AR, Ganguly A, **Shyng SL**, Stanley CA. (2011). Diazoxide-unresponsive congenital hyperinsulinism in children with dominant mutations of the beta-cell sulfonylurea receptor, SUR1. *Diabetes* 60:1797-804.
50. Bruederle CE, Gay JW, **Shyng SL**. (2011). A role of the sulfonylurea receptor 1 in endocytic trafficking of ATP-sensitive potassium channels. *Traffic* 12: 1242-56.
51. Pratt EB, **Shyng SL**. (2011). ATP activates ATP-sensitive potassium channels composed of mutant sulfonylurea receptor 1 and Kir6.2 with diminished PIP<sub>2</sub> sensitivity. *Channels* 5: 314-9.
52. Shemer R, Avnon Ziv C, Laiba E, Zhou Q, Gay J, Tunovsky-Babaey S, **Shyng SL**, Glaser B, Zangen DH. (2012). Relative expression of a dominant mutated ABCC8 allele determines the clinical manifestation of congenital hyperinsulinism. *Diabetes*, 61:258-63.
53. Lynch CJ, Zhou Q, **Shyng SL**, Heal DJ, Cheetham SC, Dickinson K, Gregory PC, Firnges M, Nordheim U, Goshorn SD, Reiche D, Turski J, Antel J. (2012). Some cannabinoid receptor ligands and their distomers are direct acting openers of SUR1 K-ATP channels. *Am. J. Physiol. Endocrinol Metab.* 302: E540-51.
54. Wang F, Olson EM, **Shyng SL**. (2012). Role of Derlin-1 in proteostasis regulation of ATP-sensitive potassium channels. *J. Biol. Chem.* 287:10482-93.
55. Pratt EB, Zhou Q, Gay JW, **Shyng SL**. (2012). Engineered interaction between SUR1 and Kir6.2 that enhances ATP-sensitivity in K<sub>ATP</sub> channels. *J. Gen. Physiol.* **140**: 175-87.
56. Faletra F, Snider K, **Shyng SL**, Bruno I, Athanasakis E, Gasparini P, Dionisi-Vici C, Ventura A, Zhou Q, Stanley CA, Burlina A. (2013). Co-inheritance of two ABCC8 mutations causing an undresponsive congenital hyperinsulinism: clinical and functional characterization of two novel ABCC8 mutations. *Gene*, 516: 122-5.
57. Snider KE, Becker S, Boyajian L, **Shyng SL**, MacMullen C, Hughtes N, Ganapathy K, Bhatti T, Stanley CA, Ganguly A. (2013). Genotype and phenotype correlation in 417 children with congenital hyperinsulinism. *J. Clin. Endocrinol. Metab.*, 98: E355-63.
58. Sampson HM, Lam H, Chen PC, Zhang D, Mottillo C, Mirza M, Qasim K, Shrier A, **Shyng SL**, Hanrahan JW, Thomas DY. (2013). Compounds that correct F508del-CFTR trafficking can also correct other protein trafficking diseases: an in vitro studying using cell lines. *Orphanet J. Rare Dis.*, 8:11.
59. Bushman JD, Zhou Q, **Shyng SL**. (2013). A Kir6.2 pore mutation causes inactivation of ATP-sensitive potassium channels by disrupting PIP<sub>2</sub>-dependent gating. *PLoS ONE*, 8:e63733.
60. Zhou Q, Pratt EB, and **Shyng SL**. (2013). Engineered interactions between SUR1 and Kir6.2 that correct the trafficking defect of K<sub>ATP</sub> channels caused by specific SUR1 mutations. *Channels*, 7: 313-317.
61. Chen PC, Olson EM, Zhou Q, Kryukova Y, Sampson HM, Thomas DY, **Shyng SL**. (2013). Carbamazepine as a novel small molecule corrector of trafficking-impaired ATP-sensitive potassium channels identified in congenital hyperinsulinism. *J. Biol. Chem.*, 288: 20942-54.



62. Chen PC, Kryukova YN, **Shyng SL**. (2013). Leptin regulates  $K_{ATP}$  channel trafficking in pancreatic  $\beta$ -cells by a signaling mechanism involving AMPK and PKA. *J. Biol. Chem.* 288(47):34098-109. **\*Journal Cover, JBC "Paper of the Week"**
63. Martin GM, Chen PC, Devaraneni P, **Shyng SL**. (2013). Pharmacological rescue of trafficking-impaired ATP-sensitive potassium channels. *Front Physiol.* 4:386.
64. Saint-Martin C, Zhou Q, Martin GM, Vaury C, Leroy G, Arnoux JB, de Lonlay P, **Shyng SL**, Bellanné-Chantelot C. (2014). Monoallelic ABCC8 mutations are a common cause of diazoxide-unresponsive diffuse form of congenital hyperinsulinism. *Clin. Genet.* May 12, Epub ahead of print.
65. Zhou Q, Chen PC, Devaraneni PK, Martin GM, Olson EM, **Shyng SL**. (2014). Carbamazepine inhibits ATP-sensitive potassium channel activity by disrupting channel response to MgADP. *Channels*, 8:376-82.
66. Xie L, Liang T, Kang Y, Lin X, Sobbi R, Xie H, Chao C, Backx P, Feng ZP, **Shyng SL**, Gaisano HY. (2014). Phosphatidylinositol 4,5-bisphosphate ( $PIP_2$ ) modulates syntaxin-1A binding to sulfonylurea receptor 2A to regulate cardiac ATP-sensitive potassium ( $K_{ATP}$ ) channels. *J. Mol. Cell. Cardiol.*, 75:100-10.
67. Devaraneni P, Martin GM, Olson EM, **Shyng SL**. (2015). Structurally distinct ligands rescue biogenesis defects of the  $K_{ATP}$  channel complex via a converging mechanism. *J. Biol. Chem.*, 290: 7980-91.
68. Wu Y, **Shyng SL\***, Chen PC\*. (2015). Concerted trafficking regulation of  $Kv2.1$  and  $K_{ATP}$  channels by leptin in pancreatic  $\beta$ -cells. *J. Biol. Chem.* 290:29676-90. **\*Co-corresponding author; \*\*JBC Paper of the Week, featured in JBC Paper of the Week Podcast.**
69. Martin GM, Rex E, Devaraneni P, Denton JS, Boodhansingh KE, DeLeon DD, Stanley CA, **Shyng SL**. (2016). Pharmacological correction of trafficking defects in ATP-sensitive potassium channels caused by sulfonylurea receptor 1 mutations. *J. Biol. Chem.* 291:21971-83. **\*Selected to appear in a special virtual issue on Ion Channels at JBC.**
70. Martin GM, Yoshioka C, Rex EA, Fay JF, Xie Q, Whorton MR, Chen JZ, **Shyng SL**. (2017). Cryo-EM structure of the ATP-sensitive potassium channel illuminates mechanisms of assembly and gating. *eLife*, 6: e24149. Doi: 10.7554/eLife.24149. **\*Webpage image: a close look at a closed channel, March 9, 2017; accompanying "Insight" editorial piece "From ions to insulin" by Voula Kanelis, eLife, 6: e25159. Recommended for F1000Prime.**
71. **Shyng SL**. (2017). Targeting the gut microbiota-FXR signaling axis for glycemic control: does a dietary supplement work magic? *Diabetes*, 66:571-73.
72. Wu Y, Fortin DA, Cochrane VA, Chen PC, **Shyng SL**. (2017). NMDA receptors mediate leptin signaling and regulate potassium channel trafficking in pancreatic  $\beta$ -cells. *J. Biol. Chem.* 292:15512-15524.
73. Martin GM, Kandasamy B, DiMaio F, Yoshioka C, **Shyng SL**. (2017). Anti-diabetic drug binding site in  $K_{ATP}$  channels revealed by cryo-EM. *eLife*, 6: e31054. Doi:10.7554/eLife.31054.
74. Devaraneni P, Rex EA, **Shyng SL**. (2018). Probing subunits interactions in  $K_{ATP}$  channels using photo-crosslinking via genetically encoded *p*-azido-L-phenylalanine. *Methods in Molecular Biology*, Potassium Channels, 1684: 51-61.
75. Kandasamy B, **Shyng SL**. (2018). Methods for characterizing disease-associated ATP-sensitive potassium channel mutations. *Methods in Molecular Biology*, Potassium Channels, 1684: 85-104.
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- characterization of activating mutations in the sulfonylurea receptor 1 (ABCC8) causing neonatal diabetes mellitus in Asian Indian children.. *Pediatr Diabetes*. 20:397-407.
77. Cochrane V, **Shyng SL**. (2019). Leptin-induced trafficking of K<sub>ATP</sub> channels: a mechanism to regulate pancreatic  $\beta$ -cell excitability and insulin secretion. *Int. J. Mol. Sci.* 20:2660. Doi: 10.3390/ijms20112660.
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  79. Boodhansingh KE, Kandasamy B, Mitteer L, Givler S, DeLeon DD, **Shyng SL**, Ganguly A, Stanley CA. (2019). Novel dominant K<sub>ATP</sub> channel mutations in infants with congenital Hyperinsulinism: Validation by in vitro expression studies and in vivo carrier phenotyping. *Am. J. Med. Genet.* 179:2214-2227.
  80. Jacobson DA, **Shyng SL**. (2020). Ion channels of the islets in type 2 diabetes. *J. Mol. Biol.* 432: 1326-1346. Doi: 10.1016/j.jmb.2019.08.014.
  81. Martin GM, Sung MW, **Shyng SL**. (2020). Pharmacological chaperones of ATP-sensitive potassium channels: Mechanistic insight from cryoEM structures. *Mol. Cell. Endocrinol.* 502:110667. Doi: 10.1016/j.mce.2019.110667.
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  87. Sung MW, Yang ZY, Driggers CM, Patton BL, Mostofian B, Russo J, Zuckerman DM, and **Shyng SL**. Vascular K<sub>ATP</sub> channel structural dynamics reveal regulatory mechanism by Mg-nucleotides. (2021). *PNAS*, 2021 Nov 2;118(44):e2109441118.
  88. **Shyng SL**. K<sub>ATP</sub> Channel Function: More than Meets the Eye. *Function* (Oxf). 2022 Jan 10;3(1):zqab070. doi: 10.1093/function/zqab070.
  89. Boodhansingh KE, Yang Z, Li C, Chen P, Lord K, Becker SA, States LJ, Adzick NS, Bhatti T, **Shyng SL**, Ganguly A, Stanley CA, DeLeon DD. Localized islet nuclear enlargement hyperinsulinism (LINE-HI) due to *ABCC9* and *GCK* mosaic mutations. (2022) *Eur. J.*

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90. Yang HQ, Echeverry FA, ElSheikh A, Gando I, Arredondo SA, Samper N, Gardozo T, Delmar M, **Shyng SL**, Coetzee WA. Subcellular trafficking and endocytic recycling of  $K_{ATP}$  channels. (2022) *Am J Physiol.-Cell Physiol.* 322:C1230-1247.
91. Sung MW, Driggers CM, Mostofian B, Russo JD, Patton BL, Zuckerman DM, and **Shyng SL**. Ligand-mediated structural dynamics of a mammalian pancreatic  $K_{ATP}$  channel. *Journal of Molecular Biology*, *in press*.  
bioRxiv 2022.03.02.482692; doi: <https://doi.org/10.1101/2022.03.02.482692>.

#### Book and Book chapters

1. **Shyng SL**, Lopatin AN, and Nichols CG. (2001). Molecular biology of inward rectifier and ATP-sensitive potassium channels. In: Archer, S.L. and Rusch, N.J. (Eds.) *Potassium Channels in Cardiovascular Biology*. Kluwer Academic/Plenum Publishers, New York, pp.71-88.
2. Nichols CG, Koster JC, Marshall BA, and **Shyng SL**. (2004). ATP-sensitive potassium channels and insulin secretion diseases. In: Maue RA (Ed.) *Molecular and cellular insights to ion channel biology*. Elsevier Science, Amsterdam, pp.1-14.
3. **Shyng S**, Bushman JD, Pratt EB, and Zhou Q. *Frontiers in Diabetes*. Stanley CA, De Leon DD, editors. Basel, Switzerland: Karger; 2012. Molecular Defects of ATP-Sensitive Potassium Channels in Congenital Hyperinsulinism; p.30-42.
4. **Shyng SL**, Valiyaveetil F, and Whorton MR (Eds.). *Potassium Channels*. Series: Methods in Molecular Biology, Springer, 2017.
5. Driggers CM, Sung MW, **Shyng SL**. Inward rectifier potassium channels. In Zheng J and Trudeau MC (Eds) *Handbook of Ion Channels*. 2<sup>nd</sup> edition, 2021. *In process*.

#### **Invited Lectures, Conference Presentations or Professorships:**

##### International and National Invited Lectures

- 1998- National Yang-Ming University, Taiwan: Molecular physiology of  $K_{ATP}$  channels.
- 1998- National Taiwan University School of Medicine, Taiwan: Molecular physiology of  $K_{ATP}$  channels.
- 2003- American Diabetes Association meeting: symposium speaker in the scientific session:  $K_{ATP}$  channels in new places.
- 2004- NIH workshop on “The role of protein misfolding and misprocessing in disease”: Defective trafficking of  $K_{ATP}$  channels in congenital hyperinsulinism.
- 2004- Oregon State University:  $K_{ATP}$  channels and insulin secretion. Host: Anthony Collins
- 2005- University of Michigan:  $K_{ATP}$  channels and insulin secretion diseases. Host: Peter Arvan
- 2005- Washington University:  $\beta$ -cell  $K_{ATP}$  channels in health and disease. Host: Colin Nichols
- 2006- Speaker and Faculty in Symposium on Congenital Hyperinsulinism and Related Disorders of Insulin Secretion-Clinical, Biochemical and Genetic Advances. June 15-16, 2006.
- 2007- University of Illinois at Chicago: ATP-sensitive potassium channels and insulin secretion diseases. Host: Yong Zhou

- 2008- University of California at Davis Frontiers in Physiology seminar series:  $K_{ATP}$  Channelopathies. Host: Dr. Pam Pappone
- 2008- University of Miami School of Medicine, Department of Physiology and Biophysics:  $K_{ATP}$  channels in health and disease. Host: Dr. Gerhard Dahl
- 2008- Indiana University School of Medicine Department of Cellular and Integrative Physiology: ATP-sensitive Potassium Channels in Health and Disease. Host: Jeffrey Elmendorf
- 2008- Invited Speaker and Faculty in American Society of Nephrology conference on Advances in Renal Research entitled “ Human Disorders of Protein Processing: Mechanisms, Consequences & Therapeutic Implications”
- 2008- Emory University School of Medicine, Department of Physiology:  $K_{ATP}$  channels and insulin secretion disease. Host: Martin Pinter
- 2009- Invited Speaker and meeting organizer, NIDDK workshop: Protein mis-folding and mis-processing in diseases.
- 2009- University of Nantes, France:  $K_{ATP}$  channels in health and disease. Host: Gildas Loussouarn
- 2009- Servier Research Institute in Paris: Sulfonylureas and  $K_{ATP}$  channels: past and present. Host: Antoine Bril and Beatrice Guardiola
- 2010- Washington University, Koster Memorial Symposium: Understanding  $K_{ATP}$  channels: lessons learned from disease mutations
- 2010- FASEB summer research conference on Transport ATPases: Biogenesis and trafficking defects of SUR1/ABCC8 in insulin secretion disease
- 2011- FASEB summer research conference on Ion Channel Regulations.
- 2012- University of British Columbia
- 2012- Invited speaker and faculty, Symposium on Congenital Hyperinsulinism and Related Disorders of Insulin Secretion-Clinical, Biochemical and Genetic Advances. Philadelphia, March 2012.
- 2013- National Taiwan University, College of Medicine, Department of Anatomy and Cell Biology:  $K_{ATP}$  channels and insulin secretion. Host: Yuh-Lien Chen
- 2013- Taiwan Tunghai University: Regulation of  $K_{ATP}$  channel trafficking in pancreatic  $\beta$ -cells. Host: Yu-Wen Lin
- 2014- Gordon Research Conference on Ion Channels. Invited speaker, Title: Pharmacological chaperoning of trafficking-impaired  $K_{ATP}$  channels. July, 2014.
- 2014- Vanderbilt University, School of Medicine, Department of Molecular Physiology and Biophysics, Diabetes Research and Training Center: Trafficking regulation of  $K_{ATP}$  and  $Kv2.1$  channels by leptin in pancreatic  $\beta$ -cells. Host: David Jacobson.
- 2016- University of Michigan. Title: Potassium channel regulation in pancreatic  $\beta$ -cells. Host: Leslie Satin.
- 2016- Invited speaker and faculty, Symposium on Congenital Hyperinsulinism Disorders. Philadelphia, April 2016.
- 2017- Invited speaker, Gordon Research Conference on Mechanisms of membrane transport: Cryo-EM structure of the  $K_{ATP}$  channel. June 25-30, 2017.
- 2017- Invited speaker, Symposium on electron microscopy techniques organized by David Veessler and Justin Kollman, University of Washington, Title: Cryo-EM structure of the  $K_{ATP}$  channel, August 30, 2017.

- 2017- Invited Plenary lecture speaker, 2017 OXION Day symposium, September 23, 2017, University of Oxford. Title: K<sub>ATP</sub> channels: Correlating structure with function.
- 2017- Invited speaker, “Frontiers in Membrane Protein Structural Dynamics” Conference, Nov. 10-12, 2017, The APS Conference Center at Argonne national Lab, sponsored by NIH sponsored Membrane Protein Structural Dynamics Consortium.
- 2017- Invited speaker, University of Iowa, Dec. 8, Abboud Cardiovascular Research Center Seminar Series. Title: K<sub>ATP</sub> channels: understanding the structural basis of assembly and gating.
- 2018- Invited plenary IUBMB (International Union of Biochemistry and Molecular Biology) speaker, ABC2018 7<sup>th</sup> special meeting: ABC proteins-from Genetic Disease to Multidrug Resistance. March 6-12, Innsbruck, Austria.
- 2018- Gordon Research Conference on Membrane Transport Proteins: from physiology to disease. Invited speaker, June 10-15, 2018.
- 2018- Gordon Research Conference on Ion Channels. Invited speaker, July 9-13, 2018.
- 2019- Invited speaker, Simon Fraser University, March 1. Title: Getting up close and personal with K<sub>ATP</sub> channels: the making and breaking of a metabolic sensor revealed by cryoEM.
- 2019- The 10<sup>th</sup> Annual Koster Memorial Lecture, Washington University in St. Louis: The molecular basis of insulin secretion and diabetes therapy: K<sub>ATP</sub> channels revealed by cryoEM. May 8.
- 2019- Invited symposium speaker for “The Excited  $\beta$ -cell-Novel Insight into Hormone Secretion” session, American Diabetes Association 79<sup>th</sup> Scientific Sessions, June 9. Title: Structural and Cellular Mechanisms Controlling K<sub>ATP</sub> channel Biogenesis and Trafficking in the Islet.
- 2019- Invited speaker, “Updates in the Diagnosis and Management of Hyperinsulinism and Neonatal Hypoglycemia” Symposium, Children’s Hospital of Philadelphia. Sep. 5-6, Title: K<sub>ATP</sub> channel regulation.
- 2020- Gordon Research Conference on Ligand Recognition and Molecular Gating, invited speaker, March 15-20, Lucca, Italy (To be rescheduled in year 2022 due to COVID-19).
- 2020- Gordon Research Conference on Ion Channels, invited session leader, July 12-17, Mount Holyoke College, USA (To be rescheduled in year 2022 due to COVID-19).
- 2021- Gordon Research Conference on Mechanisms of Membrane Transport, Invited speaker, June 20-25, Les Diablerets, Switzerland (To be rescheduled due to COVID-19).
- 2021- Invited speaker, University of Missouri, Nov.5, Department of Biochemistry. Title: Correlating structure and function in K<sub>ATP</sub> channels. Hosts: Xiao Heng and Michael Chapman.
- 2022- Gordon Research Conference on Ligand Recognition and Molecular Gating, invited speaker, March 20-25, Lucca, Italy.
- 2022- Invited speaker, University of Chicago, May 4, Department of Biochemistry and Molecular Biology. Title: K<sub>ATP</sub> channels in metabolic sensing. Hosts: Wei-Jen Tang and Eduardo Perozo.

- 2022- Society of General Physiologists 75<sup>th</sup> annual meeting, invited speaker, Sep. 7-11, Woods Hole, MA. Title: Correlating structure and function in ATP-sensitive potassium channels.
- 2023- Biophysical Society 67<sup>th</sup> Annual Meeting, Feb 18-22, 2023, San Diego. Chair and speaker of the symposium “Unholy Matrimony of Channels and Transporters”
- 2023- Invited speaker, “Updates in the Diagnosis and Management of Hyperinsulinism and Neonatal Hypoglycemia” Symposium, Children’s Hospital of Philadelphia. April 13-14.

#### Regional and Local

- 1999- Oregon Health & Science University, Molecular Colloquium: Molecular physiology of K<sub>ATP</sub> channels. Host: Peter Rotwein
- 1999- Invited speaker, Neuroscience Graduate Program retreat, Oregon Health & Science University
- 2005- Society of Chinese Biologists in America-Oregon Chapter, Mini-Symposium: K<sub>ATP</sub> channels and insulin secretion disease.
- 2006- MD/PhD lunch seminar on “Bench side to bed side”, Oregon Health & Science University
- 2009- Lewis and Clark College: K<sub>ATP</sub> channels and insulin secretion disease—the promises and challenges of translating benchside research to bedside reality. Host: Deborah Lycan
- 2010- Invited panelist, Grant writing workshop, Oregon Health & Science University
- 2010- Invited speaker, MD/PhD Program retreat, Oregon Health & Science University
- 2016- Oregon Health & Science University, Department of Biochemistry & Molecular Biology. Title: Potassium channel trafficking regulation in pancreatic  $\beta$ -cells. Host: Maureen Hoatlin.
- 2016- Lewis & Clark College. Title: Pharmacological chaperoning of K<sub>ATP</sub> channels. Host: Nikolaus Loening.
- 2017- Invited speaker, KCVI retreat, Oregon Health & Science University, Title: Leptin signaling mobilizes potassium channels in pancreatic  $\beta$ -cells to suppress insulin secretion.
- 2018- Department of Biochemistry and Molecular Biology, Oregon Health & Science University, Title: Toward understanding K<sub>ATP</sub> channel assembly and gating: insight from cryoEM structures.
- 2018- Department of Physiology and Pharmacology, Oregon Health & Science University, Title: Potassium channels on the move: a mechanism to regulate pancreatic  $\beta$ -cell excitability.
- 2021- Guest lecturer for Transport molecules and channels course at Portland State University
- 2022- Chemical Physiology and Biochemistry Department Retreat
- 2022- Division of Nephrology and Hypertension Multidisciplinary Conference, Title: Mechanisms of K<sub>ATP</sub> channel function and dysfunction, insights from cryoEM structures

**Honors and Awards for Scholarship:**

- Cornell University Biotechnology Program Fellowship, 1986
- Drown Postdoctoral fellowship from the Biology Department of California Institute of Technology, 1990-1991
- Postdoctoral fellowship from the McDonnell Center for Cellular and Molecular Neurobiology at Washington University, 1992-1994
- NIH postdoctoral training grant, 1994-1996
- Career Development Award from the American Diabetes Association, 1997
- Career Development Award from the Juvenile Diabetes Research Foundation, 1997 (declined).

**V. SERVICE**

**Membership in Professional Societies:**

- American Diabetes Association
- American Society for Biochemistry and Molecular Biology
- Biophysical Society
- Juvenile Diabetes Research Foundation International
- Society of General Physiologists
- Society for Neuroscience
- Secretary of Society of Chinese Bioscientist in America-Oregon Chapter, 2005-2007

**Granting Agency Review Work:**

- Grant reviewer for Welcome Trust 2001- 2010, 2015, 2017
- Grant reviewer for MRC, UK 2010- 2013
- NIH Metabolism study section Ad hoc reviewer, 2002-2003
- NIH CADO (Cellular Aspects of Diabetes and Obesity) study section Ad hoc reviewer, 2004- 2006
- NIH Special Emphasis Panel, ZDK1 GRB-7, Ad hoc reviewer, 2003
- NSF Ad hoc reviewer, 2006-2007
- NIH CADO study section regular member, 2006-2010
- Ad hoc reviewer for Washington University NIH sponsored DRTC Pilot & Feasibility Awards Application, 2010
- NIH MCE (Molecular and Cellular Endocrinology) study section Ad hoc member, 2012
- American Heart Association, 2012-2013, 2015
- NIH Special Emphasis Panel, ZRG1 CVRS-N, Ad hoc reviewer, 2012
- NIH CADO (Cellular Aspects of Diabetes and Obesity) study section Ad hoc reviewer, 2013
- NIH MCE study section regular member, 2013-2019
- NIH Intellectual and Developmental Disabilities Research Center Grants (U54) study section, Ad hoc reviewer and application leader, 2013.
- Murdock Charitable Trust research grant review, 2016.
- NIH NINDS Special Emphasis Panel ZNS1 SRB-M(01) for P30 and R24 applications, May, 2017.

- NIH Director's New Innovator Award Review Panel (ZRG1-MOSS-R70), mail reviewer 2017.
- University of Pennsylvania Diabetes Research and Training Center Reviewer Pilot and Feasibility grants, 2018.
- French National Research Agency (ANR) grant review, 2018, 2021.
- NIH NIDDK17-035 Microphysical Systems (MPS) for Modeling Diabetes (UG3/UH3), Aug, 2018.
- Pacific Northwest CryoEM Center (PNCC) proposal review, 2020-2022.
- NIH Director's Early Independence Award Review Panel (ZRG1-PSE-H70), mail reviewer 2020.
- NIH Special Emphasis Panel for RFA-TR-21-001: New Chemistries for Un-drugged Targets through A Specialized Platform for Innovative Research Exploration (ASPIRE) Collaborative Research Program (UG3/UH3) and RFA-TR-21-002: Virtual Approaches Towards New Chemistries for Un-drugged Targets through A Specialized Platform for Innovative Research Exploration (ASPIRE) Collaborative Research Program (U18). Sep, 2021.
- Integrated Islet Distribution Program (IIDP) proposal reviewer, 2022

**Editorial Board member:**

- Journal of Biological Chemistry: 2009-2014
- Frontiers in Endocrinology: 2013-2018
- Diabetes: 2017-2019
- Journal of General Physiology: 2019-2025
- Function: 2020-

**Ad Hoc Journal Review Activities:**

- American Journal of Physiology, Biochemical Journal, Biochemistry, Biophysics Colab, British Journal of Pharmacology, Cell Death & Disease, Cell Proliferation, Cell Research, Cell Metabolism, Cellular and Molecular Life Sciences, Cell Reports, Circulation, Circulation Research, Diabetes, Diabetes Care, eLife, Expert Opinion on Orphan Drugs, European Journal of Neuroscience, Frontiers Endocrinology, Frontiers Pharmacology, Function, Journal of Biological Chemistry, Journal of Cell Science, Journal of Clinical Endocrinology and Metabolism, Journal of Clinical Investigation, Journal of General Physiology, Journal of Physiology, Journal of Neurophysiology, Journal of Neuroscience, Journal of Pharmacological and Experimental Therapeutics, Journal of Physical Chemistry, Molecular Pharmacology, Nature, Nature Communications, Nature Chemical Biology, Nature Reviews Endocrinology, Nature Neuroscience, Nature Structural and Molecular Biology, Neuron, PLoS Medicine, PLoS One, PNAS, Proteomics, Science Signaling, Trends in Endocrinology and Metabolism

**Committees:**

International/National

- 2006- Symposium on Congenital Hyperinsulinism and Related Disorders of Insulin Secretion-Clinical, Biochemical and Genetic Advances. June 15-16, 2006. Co-Chair on Session "Clinical and In vitro Manifestations of K<sub>ATP</sub> hyperinsulinism and diabetes".



- 2007- American Diabetes Association meeting: Invited Chair for the Oral Presentation Session “Channels and Exocytosis”.
- 2009- Co-organizer of NIH workshop on Protein mis-folding and mis-processing in diseases.
- 2012- Faculty of Symposium on Congenital Hyperinsulinism and Related Disorders of Insulin Secretion-Clinical, Biochemical and Genetic Advances. Philadelphia, March. 2012.
- 2017- External Advisory Board for the Center for Investigation of Membrane Excitability Diseases (CIMED) at Washington University in St. Louis.
- 2017- Member of American Diabetes Association’s Scientific Sessions Meeting Planning subcommittee on Islet Biology/Insulin Secretion.
- 2021- Inaugural member of the Congenital Hyperinsulinism International Collaborative Research Network Genetics work group

#### Regional

- 2005- Society of Chinese Bioscientists in America-Oregon Chapter Second Mini-symposium co-organizer.
- 2003-2008 Oregon Medical Research Foundation grant review committee
- 2012- Oregon Medical Research Foundation Tartar Trust Fellowship application review

#### Institutional

- Organizer for Ion channel focus group meetings 2000-2002
- Organizer for campus-wide membrane protein folding and trafficking group meetings 2008-2011.
- Oregon Health & Science University Presidential Bridge Funding review committee: 2006-7, 2011, 2015, 2016, 2017, 2018
- Oregon Health & Science University Research Roadmap Blueprint Task Force 5 committee, 2011-14
- School of Medicine Promotion and Tenure committee, 2014-2020
- School of Medicine Basic Science Organization Task Force member, 2014-2015.
- Search committee for faculty recruitment: Physiology and Pharmacology/Knight Cardiovascular Institute, 2014-2015; 2016-2017
- Search committee for faculty recruitment: Physiology and Pharmacology, 2017.
- Search committee for Biochemistry & Molecular Biology department chair, 2016-2017.
- Invited panel member: Presentation and discussion on changes in NIH application review criteria, Nov. 2016.
- Invited speaker: OHSU Cell, Developmental & Cancer Biology Department Junior Faculty Advancement Group meeting on the topic of Promotion and Tenure, March 2017.
- Invited panelist on diversity in science, OHSU Research Week, 2017.
- Faculty development-promotion and tenure task force committee, Nov. 2017 (Leslie Kahl).
- Chair of search committee for cryoEM faculty in the Knight Cancer Institute and the Center for Spatial Systems Biomedicine at OHSU, 2019.

#### Departmental

- Goal-setting committee, 2000
- Space committee, 2000
- Equipment committee, 2000

- Budget committee (cost containment) 2002
- Research track faculty appointment committee, 2005
- Tissue culture core usage survey, 2007
- Technical operations advisory committee, 2008
- Senior scientists advisory committee, 2008-2010
- Biochemistry and Molecular Biology P&T committee Chair, 2017-present
- Biochemistry and Molecular Biology Equipment committee, 2018
- Chemical Physiology and Biochemistry Steering Committee, 2019-present
- Faculty in Structural Biology search committee for the Department of Chemical Physiology and Biochemistry, 2019.
- Faculty in Chemical Physiology search committee for the Department of Chemical Physiology and Biochemistry, 2020-2021.
- Review committee for CPB department pilot proposals, 2021
- CPB department award committee, 2021
- Chair, Faculty in Structural Biology search committee for the Department of Chemical Physiology and Biochemistry, 2022.

#### **Community Service:**

- Classroom science projects at West Tualatin Elementary School, 2002-2006
- Annual Science Fair at West Tualatin Elementary School, 2004-2010
- Judge for the Intel Northwest Science Expo, 2006
- Invited speaker at the Rachael Carson Environmental Middle School Science Fair, 2011

## **VI. TEACHING**

### **Teaching Activities (Didactic):**

NEUS/NGP: Neuroscience Graduate Program; IBMS: Integrative Biomedical Science Graduate Program; PMCB: Program in Molecular and Cellular Biosciences

- Lecturer, NEUS 636: Research topics in Neuroscience, 1999-2000.
- Lecturer, IBMS Cellular Homeostasis course, 2001-2002.
- Lecturer and Course Director, IBMS 605-1: Ion channel trafficking, 2003.
- Lecturer, NEUS 631: Structure and Function of Electrogenic Proteins, 2004, 2006, 2008, 2010.
- Lecturer, PMCB Ion Channels and Genetic Diseases, 2004.
- Lecturer, PMCB Literature Club, 2005, 2007, 2008
- Lecturer, PMCB, PHPH 618: Molecular Pharmacology-Pharmacodynamics (Drugs in Action), 2006.
- Lecturer, PMCB, CONJ661: Structure and Function of Biological Molecules, 2011-21
- Medical school teaching: “Channelopathy” small group tutorial, 2008-14.
- Medical school teaching: “CFTR” small group tutorial, 2010, 2012.
- Medical school teaching: “Wilson’s and Menkes disease” small group tutorial, 2010-2014.
- Medical school teaching: “Enzymes in Medicine” small group tutorial, 2010-2014.
- Medical school teaching: “Herceptin” small group tutorial, 2010-2014.
- Medical school teaching: “Hypercholesterolemia” small group tutorial, 2012.

- Medical school teaching: “Gaucher’s Disease” small group tutorial, 2011-2014.
- Graduate students teaching: CONJ650: The practice and ethics of science, discussion leader, 2013.
- Medical students teaching: Regulation of insulin secretion, lecturer and case study facilitator, 2014, 2015.

#### **Curriculum Development:**

- Co-designed “Channelopathy” small group tutorial teaching material for Medical School teaching, 2008-10 (with Dr. Martin Kelly).
- Medical School course “Cell Structure and Function” steering committee, 2010-2012.
- PMCB, CONJ661 Structure and Function of Biological Molecules: redesigned lectures on metabolic regulation.
- Medical Curriculum: Participate in the development of a case study for first-year medical students on the topic of insulin secretion regulation. 2014.

#### **Mentoring and Advising:**

##### Graduate students

- Ph.D. Graduate student (NGP): Etienne Cartier, July 1999-May 2004.  
Thesis title: Cell biological and physiological characterization of a  $K_{ATP}$  channel mutation linked to congenital hyperinsulinism.  
Current position: Research Assistant Professor at UT Southwestern.
- Ph.D. Graduate student (IBMS now part of PMCB): Yu-Wen Lin, July 2001-May 2006.  
Thesis title: Structure-function analysis of pancreatic  $K_{ATP}$  channels.  
Current position: Assistant Professor at Tunghai University, Taiwan
- Ph.D. Graduate student (M.D/Ph.D program): Emily Pratt, June 2005-2010  
Thesis title: Functional and structural interactions within pancreatic ATP-sensitive potassium channels  
Current position: Pediatrician in Portland OR
- Ph.D. Graduate student (NGP): Jeremy Bushman, Aug. 2006-2012.  
Thesis title: Study of a glycine hinge in ATP-sensitive potassium channels  
Current position: Staff Scientist, Gene Tools, LLC.
- Ph.D. Graduate student: Fang Wang (Exchange program from Beijing University), Oct. 2009-2011.  
Thesis title: Role of Derlin-1 in proteostasis regulation of  $K_{ATP}$  channels  
Current position: Clinical faculty in Endocrinology, Beijing Tiantan Hospital, Capital Medical University.
- Graduate student (PMCB): Gregory Martin, July, 2013 to June 2018.  
Thesis title: Illuminating the structure of the pancreatic ATP-sensitive potassium channels by single particle cryo-electron microscopy.  
Current position: Postdoctoral fellow with Andrew Ward at Scripps.
- Graduate student (PMCB): Veronica Cochrane, March, 2016 to Feb. 2021. Thesis title: Leptin signaling in pancreatic  $\beta$ -cells: a mechanism to regulate  $K_{ATP}$  channel trafficking and  $\beta$ -cell electrical activity.  
Current position: Postdoctoral fellow with Matthias Hebrok at UCSF.
- Graduate student (PBS): Assmaa El Sheikh, 2020-

- Exchange graduate student: Yi-Ying Kuo from National Cheng-Kung University, Taiwan, 2021
- Rotation Graduate student (NGP): Adriana Weissmann, 2000.
- Rotation Graduate student (NGP): Wei-Sheng Lee, 2001.
- Rotation Graduate student (PMCB): Quinn Roth-Carter, Spring, 2013.
- Rotation Graduate student (PMCB): Erika Riederer, Fall, 2014.
- Rotation Graduate student (PMCB): Timothy Bates, Winter, 2018.
- Rotation Graduate student (NGP): Prashant Rao, Winter, 2018.
- Rotation Graduate student (PMCB): Tyler Franklin, Winter, 2018.
- Rotation Graduate student (PMCB): Janelle Tobias, Winter, 2018.
- Rotation Graduate student (PMCB): Ivan Rodriguez Siordia, 2019.

#### Postdoctoral fellows

- Postdoctoral fellow: Grit Taschenberger, March 2000-June 2002
- Postdoctoral fellow: Feifei Yan, Oct 2002 – April 2008  
Current position: Head of LAS (Lab Animal Service), Novartis Institute for Biomedical Research (NIBR), Shanghai
- Postdoctoral fellow: Yu-Wen Lin, July 2006-2007  
Current position: Assistant Professor at Tunghai University, Taiwan
- Postdoctoral fellow: Qing Zhou, June 2008-2012
- Postdoctoral fellow: Sriharsha Vemana, June 2008-2009 (This is a short-term arrangement to accommodate a fellow who was unable to find a home because of disassembly of the NSI)
- Postdoctoral fellow: Cathrin Bruederle, Nov. 2008-2011
- Postdoctoral fellow: Pei-Chun Chen, Aug. 2009-2014  
Current position: Associate Professor at National Chengkung University, Taiwan
- Postdoctoral Research Associate: Prasanna Devaraneni, June 2012-2014  
Current position: Principal Scientist and Team Lead Formulation Development, Lupin Biotech, India
- Postdoctoral Research Associate: Yelena Kyrukova, July 2012-Sep. 2013.
- Postdoctoral fellow: Yi Wu, March 2014-2018.
- Postdoctoral fellow: Amy Servid, Nov. 2015-May 2016.
- Postdoctoral Research Associate: Dale Fortin, Feb. 2016-2018  
Current position: Assistant Professor, Washington State University, Vancouver WA.
- Postdoctoral fellow: Laura Innes, July 2016-2018.
- Postdoctoral fellow: Balamurugan Kandasamy, Sep. 2016-2018.  
Current position: Research Associate, University of Chicago
- Postdoctoral fellow: Min Woo Sung, April, 2018-2022  
Current position: Senior Scientist, Pfizer CryoEM center
- Postdoctoral fellow: Camden Driggers, Jan, 2020-

#### Undergraduates and high school students

- Undergraduate summer research student: Adrienne Pascale Totier de la Poterie, 2004
- Undergraduate summer research student: Joshua Eaton, summer 2005
- Undergraduate summer research student: Sara Haidar, summer 2006
- Dutch undergraduate intern: Marijn Schouten, Sep. 2007-June 2008
- Undergraduate summer research student: Laura Thomas, summer 2009

- Visiting graduate student: Intza Garin from Spain, July 2009-Oct. 2009
- Undergraduate summer research student: Molly Leonard, summer 2010
- OHSU Equity Summer Intern undergraduate student: Gisela Gonzalez-Montiel, summer 2014
- High School students: Minhtam Tran, Alexandra Crew, summer 2015
- OHSU Equity Summer Intern undergraduate student: Urom Chidozie, summer 2016
- OHSU Equity Summer Intern undergraduate student: Forrest Kwong, summer 2017

Faculty mentoring/grant writing advisory committee

- Matt Whorton, Vollum Institute, 2017-2020
- Larry David, Department of Biochemistry and Molecular Biology, 2017.
- Francis Valiyaveetil, Department of Physiology and Pharmacology, 2018.
- Karina Nakayama, Department of Biomedical Engineering, 2020-
- Liman Zhang, Department of Chemical Physiology and Biochemistry, 2020-
- Tom Scanlan, Department of Chemical Physiology and Biochemistry, 2020.
- Aurelien Laguerre, Department of Chemical Physiology and Biochemistry, NIGMS K99 award advisory committee member (Mentor: Carsten Schultz).

**Educational Leadership and Administration (includes educational committees):**

Thesis and Exam Committee Participation

- Master graduate thesis committee: Zhaoping Liu (Mentor: John Adelman and James Maylie), 2002  
Thesis title: Single-channel properties of episodic ataxia type 1 mutations in the human voltage-gated potassium channels.
- Ph.D. graduate thesis committee: Sonal Das (Mentor: Gary Banker), 2002-2005.  
Thesis title: The expression and trafficking of the metabotropic glutamate receptor mGluR1a in cultured hippocampal neurons.
- Ph.D. graduate thesis committee: Greta Glover (Mentor: Gary Banker), 2003-2005.  
Thesis title: Polarized protein sorting in hippocampal neurons.
- Ph.D. graduate thesis committee (chair): Wei-Sheng Lee (Mentor: John Adelman), 2003-2006  
Thesis title: Interaction between SK channel calmodulin binding domain and calmodulin.
- Ph.D. graduate thesis committee: Teresa Buck (Mentor: William Skach) 2004-2006  
Thesis title: Molecular analysis of early aquaporin biogenesis and folding events.
- Ph.D. graduate thesis committee: James Brady (Mentor: Lane Brown) 2005-2006.  
Thesis title: Lipid regulation of olfactory cyclic nucleotide-gated channels.
- Ph.D. graduate thesis committee: Gregory Scott (Mentor: Gary Thomas) 2005-2006.  
Thesis title: Regulation of PACS-1-directed protein trafficking.
- Ph.D. graduate thesis committee: Sriharsha Vemana (Mentor: H. Peter Larsson) 2007.  
Thesis title: Gating mechanisms in hyperpolarization-activated cyclic nucleotide ion channels.
- Ph.D. graduate thesis committee: William Birdsong (Mentors: John Adelman and Edwin McCleskey) 2007-2008  
Thesis title: Acid sensing ion channels: coincident detection of ischemia through a channel-channel interaction.

- PMCB qualifying exam committee for Christopher Severyn (MD/PhD, Peter Rotwein's lab) and Xiao Shi (Beth Habecker's lab), 2007
- Ph.D. graduate thesis committee: Yuil Kim (Mentor: Larry Trussell) 2009.  
Thesis title: Studies on the electrical properties of the dorsal cochlear nucleus cartwheel neurons.
- Ph.D. graduate thesis committee: Isebella Bacongus (Mentor: Eric Gouaux) 2009-2012.  
Thesis title: Structural plasticity and dynamic selectivity of acid sensing ion channel - toxin complexes.
- PMCB qualifying exam committee for Diala Abu-Hassan (PhD, Peter Rotwein lab), 2010.
- Ph.D. graduate thesis committee: Nathan Klett (Mentor: John Adelman), 2010.
- PMCB qualifying exam committee for Nathan Montgomery (PhD, Peter Rotwein lab), 2011.
- PMCB qualifying exam committee for Danielle Williamson (PhD, Ujwal Shinde lab), 2012.
- PMCB qualifying exam committee for Rebecca Lazelle (PhD, David Ellison lab), 2012.
- PMCB qualifying exam and thesis committee for Kang Wang (PhD, John Adelman lab), 2012-2015.  
Thesis title: Distinct Ca<sup>2+</sup> sources in dendritic spines of hippocampal CA1 neurons couple to SK and Kv4 channels.
- Ph.D. graduate thesis advisory committee, Chair: Gukhan Kim (PhD, John Adelman lab) 2013-2016.  
Thesis title: Membrane palmitoylated protein 2 as a synaptic scaffold protein required for synaptic SK2-containing channel function.
- Ph.D. graduate thesis exam committee: Jinzhi Wang (Mentors: Peter Mayinger) 2013.  
Thesis title: Regulation of subcellular localization of lipid phosphatase SAC1.
- Ph.D. graduate thesis advisory committee: Yuhan Wang (Mentor: Markus Grompe) 2013-2017.  
Thesis title: Cellular plasticity within the endoderm: Lessons learned from direct lineage reprogramming into pancreatic  $\beta$ -cells.
- Ph.D. graduate thesis advisory committee: Benjamin Rakela (Mentor: Paul Brehm and Gail Mandel) 2014-2017.  
Thesis title: Astrocytic modulation of excitatory neuronal signaling in a mouse model of RETT syndrome.
- Ph.D. graduate thesis exam committee: Jessica Martin (Mentor: Buddy Ullman) 2015  
Thesis title: Molecular mechanisms underlying the adaptive response of *Leishmania* to purine stress.
- Ph.D. graduate thesis advisory committee: Nathan Yoder (Mentor: Eric Gouaux) 2015-2019. Thesis title: Gating and modulation of acid-sensing ion channels.
- PMCB qualifying exam committee for Erika Riderer (PhD, Francis Valiyaveetil lab), 2016.
- PMCB qualifying exam committee for Jonathan Savage (PhD, Ujwal Shinde lab), 2016.
- PMCB qualifying exam committee for Hannah Sanford-Crane (PhD, Xiangshu Xiao lab), 2017-
- PMCB qualifying exam committee for Samuel Berk (PhD), 2017

- Ph.D. graduate thesis advisory committee: Erika Riderer (Mentor: Francis Valiyaveetil), 2016-2021. Thesis title: The transport mechanism of a glutamate transporter homolog
- Ph.D. graduate thesis advisory committee: Sigrid Noreng (Mentor: Isabelle Bacongus), 2016-2019. Thesis title: Structure and function of the epithelial sodium channel
- Ph.D. graduate thesis advisory committee: Hannah Sanford-Crane (Mentor: Xiangshu Xiao) 2017-2018.
- Ph.D. graduate thesis advisory committee, Chair: Jonathan Flores (Mentor: Steve Reichow) 2018-2022. Thesis title: Structural & Functional Effects of the Ageing Lens Environment on Cx46/50 Gap Junctions
- Ph.D. graduate thesis advisory committee: Anh Ngo (Mentor: Owen McCarty) 2018-2020. Thesis title: Platelet signaling in hemostasis and vascular inflammation
- NGP qualifying exam committee: Prashant Rao, (PhD, Eric Gouaux lab), 2019
- Phys/Pharm qualifying exam committee: Kaya Keutler, (PhD, Carsten Schultz lab), 2019
- Ph.D. graduate thesis advisory committee: Kaya Keutler, (Mentor: Carsten Schultz), 2019-
- Ph.D. graduate thesis advisory committee: Julia Huey, (Mentor: Carsten Schultz), 2020
- Ph.D. qualifying exam committee: Janelle Tobias, (Mentor: James Frank), 2020
- Ph.D. graduate thesis advisory committee: Janelle Tobias, (Mentor: James Frank), 2020-
- Ph.D. qualifying exam committee: Ivan Rodriguez Siordia, 2021.
- Ph.D. graduate thesis advisory committee: Ivan Rodriguez Siordia, (Mentor: Michael Cohen and Liman Zhang), 2022-
- Ph.D. qualifying exam committee: Weekie Yao, 2021.
- Ph.D. graduate thesis advisory committee: Triona Matheson, (Mentor: David Farrens), 2022-

### Educational Committees

#### *External*

- Advisory committee for NINDS T32 training grant on excitability research, PIs: Colin Nichols and Baron Chanda, Washington University in St. Louis, Center for the Investigation of Membrane Excitability Diseases (CIMED), 2021-

#### *Institutional*

- Neuroscience Graduate Program 1<sup>st</sup> year exam committee, 2000-2003
- IBMS graduate program operating committee, 2001-2002
- IBMS student progress committee, 2002-2004
- Neuroscience Graduate Program admissions committee, 2003-2006
- PMCB steering committee, 2005-2010, 2015-present
- NIH Predoctoral Training Grant in Neuroscience (PI: Gary Banker) steering committee, 2006
- Developed minority recruitment plan for NIH Predoctoral Training Grant in Neuroscience, 2008
- Chair of PMCB first year students advisory committee, 2007-2010
- PMCB first year students advisory committee, 2007-2015
- PMCB Training grant recipients selection review committee, 2014, 2017
- IDEAS Graduate Program Research community committee, 2017

**Honors and Awards for Education:**

- 2018, Graduate student Gregory Martin won John Resko thesis award and Best Article of the Year award by a graduate student.