

### BIOGRAPHICAL SKETCH

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NAME Colbran, Roger J.		POSITION TITLE Professor, Molecular Physiology/Biophysics	
eRA COMMONS USER NAME (credential, e.g., agency login) colbrarj			
EDUCATION/TRAINING (Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)			
INSTITUTION AND LOCATION	DEGREE (if applicable)	YEAR(s)	FIELD OF STUDY
University of Bristol, U.K	BSc	1982	Biochemistry
University of Newcastle, U.K	PhD	1985	Biochemistry
Vanderbilt University, Nashville, TN, USA	Postdoctoral	1986-89	Ca <sup>2+</sup> /CaM-dep. kinase II

#### A. Positions and Honors

##### Positions and Employment

1989-92 Research Instructor, Molecular Physiology/Biophysics, Vanderbilt University, Nashville, TN.  
1992-99 Ass. Professor (tenure-track), Molecular Physiology/Biophysics, Vanderbilt Univ., Nashville, TN  
1999-05 Assoc. Professor (tenured), Molecular Physiology/Biophysics, Vanderbilt Univ., Nashville, TN  
2006-pres Professor (tenured), Molecular Physiology/Biophysics, Vanderbilt Univ., Nashville, TN

##### Honors

1994-99 Established Investigator of the American Heart Association  
1995-99 Editorial Board of the Journal of Biological Chemistry  
2000-03 VA Merit Review Subcommittee for General Medical Science  
2002 NIH CSR Special Emphasis Panel, Molecular Cellular and Developmental Neurosciences  
2003 MDCN-5 Special Emphasis Panel (Tele-conference)  
2003 Ad Hoc Grant Reviewer, Biotechnology and Biological Sciences Research Council (UK)  
2004-05 Ad Hoc Grant Reviewer, Medical Research Council (UK)  
2004 Biophysical and Biochemical Sciences, CSR, NIH (ZRG1 F04B 20)  
2006 Grant Reviewer, Howard Hughes Medical Institute, International Research Scholars  
2006 Grant Reviewer, German-Israeli Foundation for Scientific Research and Development.  
2007 Ad Hoc member, Scientific Advisory Board, National Parkinson Foundation.

#### B. Selected Peer-Reviewed Publications (in chronological order)

- McNeill, RB & Colbran, RJ. Interaction of autophosphorylated Ca<sup>2+</sup>/calmodulin-dependent protein kinase II with neuronal cytoskeletal proteins: Characterization of binding to a 190-kDa postsynaptic density protein. (1995) *J. Biol. Chem.* 270:10043-49.
- Strack, S, Barban, MA, Wadzinski, BE & Colbran, RJ. Differential inactivation of postsynaptic density-associated and soluble Ca<sup>2+</sup>/calmodulin-dependent protein kinase II by protein phosphatases types 1 and 2A. (1997) *J. Neurochem.* 68, 2119-28.
- Strack S; Choi S; Lovinger DM; Colbran RJ. Translocation of Ca<sup>2+</sup>/calmodulin-dependent protein kinase II to postsynaptic densities. (1997) *J. Biol. Chem.* 272:13467-70.
- Strack S; Colbran RJ. Autophosphorylation-dependent targeting of calcium/calmodulin-dependent protein kinase II by the NR2B subunit of the N-methyl-D-aspartate receptor. (1998) *J. Biol. Chem.* 273:20689-92.
- Strack S; Kini, S; Ebner FF; Wadzinski, BE; Colbran RJ. Differential cellular and subcellular localization of protein phosphatase 1 isoforms in brain. (1999) *J. Comp. Neurol.* 413:373-84.
- MacMillan LB; Bass MA; Cheng N; Howard EF; Tamura M; Strack S; Wadzinski BE; Colbran RJ. Brain actin-associated protein phosphatase 1 holoenzyme (PP1<sub>A</sub>) containing spinophilin, neurabin and selected catalytic subunit isoforms. (1999) *J. Biol. Chem.* 274:35845-54.
- Dzhura I; Wu Y; Colbran RJ; Balser JR; Anderson ME. Calmodulin kinase determines calcium-dependent facilitation of L-type calcium channels. (2000) *Nature Cell Biol.* 2:173-77.
- Strack S; McNeill RB; Colbran RJ. Mechanism and regulation of calcium/calmodulin-dependent protein kinase II targeting to the NR2B subunit of the N-methyl-D-aspartate receptor. (2000) *J. Biol. Chem.* 275:23798-806.

9. Strack S; Robison AJ; Bass MA; Colbran RJ. Association of calcium/calmodulin-dependent kinase II with developmentally regulated splice variants of the postsynaptic density protein densin-180. (2000) *J. Biol. Chem.* 275:25061-64.
10. Richman JG; Brady AE; Wang Q; Hensel JL; Colbran RJ; Limbird LE. Agonist regulated interactions between  $\alpha_2$ -adrenergic receptors and spinophilin. (2001) *J. Biol. Chem.* 276, 15003-07.
11. Wu Y; Colbran RJ; Anderson ME. A calmodulin-binding IQ Domain is a molecular determinant for L-type  $Ca^{2+}$  current facilitation and inactivation in ventricular myocytes. (2001) *J. Physiol.* 535:679-87.
12. Oliver CJ; Terry-Lorenzo RT; Bloomer WA; Li S; Elliott E; Brautigan DL; Colbran RJ; Shenolikar S. Targeting protein phosphatase-1 to the actin cytoskeleton: Neurabin I/PP1 complex regulates cell morphology. (2002) *Mol. Cell. Biol.* 22, 4690-701.
13. Terry-Lorenzo RT; Carmody LC; Voltz JW; Connor JH; Li S; Smith FD; Milgram SL; Colbran RJ; Shenolikar S. The neuronal actin-binding proteins, neurabin I and neurabin II, recruit specific isoforms of protein phosphatase 1 catalytic subunits. (2002) *J. Biol. Chem.* 277, 27716-24.
14. Dzhura I; Wu Y; Colbran RJ; Corbin JD; Balser JR; Anderson ME. Cytoskeletal disrupting agents prevent calmodulin kinase, IQ domain, and voltage-dependent facilitation of L-type  $Ca^{2+}$  channels. (2002) *J. Physiol.* 545:399-406.
15. Wang H; Welsby PJ; Wolfe JT; Colbran RJ; Johnson ML; Barrett PQ. A mechanism for direct potentiation of  $T_{H}$  (T-type) channels by  $Ca^{2+}$ /calmodulin-dependent protein kinase II. (2003) *J. Neurosci.* 23:10116-21.
16. Brady AE; Wang Q; Colbran RJ; Allen PB; Greengard P; Limbird LE. Spinophilin stabilizes cell surface expression of  $\alpha_2B$ -adrenergic receptors. (2003) *J. Biol. Chem.* 278:32405-12.
17. Colbran RJ. Targeting of  $Ca^{2+}$ /calmodulin-Dependent Protein Kinase II. (2004) *Biochem. J.* 378:1.
18. Carmody LC; Bauman PA; Bass MA; Mavila N; DePaoli-Roach AA; Colbran RJ. A protein phosphatase-1 isoform-selectivity determinant in dendritic spine-associated neurabin. (2004) *J. Biol. Chem.* 279:21714-23.
19. Colbran RJ; Brown, AM. Calcium/calmodulin-dependent protein kinase II and synaptic plasticity. (2004) *Curr. Opin. Neurobiol.* 14:318.
20. Colbran RJ. Protein phosphatases and CaMKII-dependent synaptic plasticity. (2004) *J. Neurosci.* 24:8404.
21. Norman, ED; Colbran RJ; Winder DG. A potassium channel blocker induces a long-lasting enhancement of corticostriatal responses. (2005) *Neuropharmacology* 48:311-21.
22. Zhang R; Khoo MSC; Wu Y; Yang Y; Grueter CE; Ni G; Price EE Jr; Thiel W; Guatimosim S; Song L-S; Madu EC; Shah AN; Vishnivetskaya TA; Atkinson JB; Gurevich VV; Salama G; Lederer WJ; Colbran RJ; Anderson ME. Calmodulin kinase II inhibition protects against structural heart disease. (2005) *Nat. Med.* 11:409-17.
23. Sikes S; Honse Y; Lovinger DM; Colbran RJ. CaMKII Enhances The Desensitization of NR2B-containing NMDA Receptors by an Autophosphorylation-dependent Mechanism. (2005) *Mol. Cell. Neurosci.* 29:139-47.
24. Bordelon JR; Smith Y; Nairn AC; Colbran RJ; Greengard P; Muly EC. Differential Localization of Protein Phosphatase-1,  $\delta$ , and  $\gamma$  Isoforms in Primate Prefrontal Cortex. (2005) *Cereb Cortex* 15:1928-37.
25. Zhang R; Dzhura I; Grueter CE; Thiel W; Colbran RJ; Anderson ME. A dynamic  $\alpha$ -inter-subunit agonist signaling complex is a novel feedback mechanism for regulating L-type  $Ca^{2+}$  channel opening. (2005) *FASEB J.* 19:1573-5.
26. Brown AM; Deutch AY; Colbran RJ. Regulation of Striatal Postsynaptic Density-Associated Proteins in the Dopamine Denervated Rat. (2005) *Eur. J. Neurosci.* 22:247.
27. Robison AJ; Bass MA; MacMillan LB; Carmody LC; Bartlett RK; Colbran RJ. Multivalent interactions of calcium/calmodulin-dependent protein kinase II with the postsynaptic density proteins NR2B, Densin-180 and  $\gamma$ -actinin-2. (2005) *J. Biol. Chem.* 280:35329-36.
28. Robison AJ; Bartlett RK; Bass MA; Colbran RJ. Differential modulation of  $Ca^{2+}$ /calmodulin-dependent protein kinase II activity by regulated interactions with NMDA receptor NR2B subunits and  $\gamma$ -actinin. (2005) *J. Biol. Chem.* 280:39316-23.
29. Fog JU; Khoshbouei H; Holy M; Bjerggaard C; Sen N; Nikandrova Y; McMahon DG; Colbran RJ; Sitte HH; Javitch JA; Galli A; Gether U. Calmodulin kinase II interacts with the dopamine transporter and regulates amphetamine-induced reverse transport. (2006) *Neuron* 51:417-29.
30. Grueter CE; Abiria S; Dzhura I; Wu Y; Ham A-J; Mohler PJ; Anderson ME; Colbran RJ. L-type  $Ca^{2+}$  channel facilitation mediated by phosphorylation of the  $\alpha$  subunit by CaMKII. (2006) *Mol. Cell* 23:641-50.
31. Yao J; Howard JD; Davies LA; Adney SK; Welsby PJ; Howell N; Carey RM; Colbran RJ; Barrett PQ. Molecular basis for the modulation of native T-type  $Ca^{2+}$  channels *in vivo* by  $Ca^{2+}$ /calmodulin-dependent protein kinase II. (2006) *J. Clin. Inv.* 116:2403-12.

32. Khoo MSC, Li J, Yang Y, Kannankeril P, Grueter CE, Oddis CV, Zhang R, Mendes L, Ni G, Madu E, Yang J, Bass MA, Gomez RJ, Wadzinski BE, Olson EN, Colbran RJ, Anderson ME. Death, cardiac dysfunction and arrhythmias due to up-regulation of calmodulin kinase II in calcineurin-induced cardiomyopathy. (2006) *Circulation* 114:1352-1359.
33. Robinson AJ, Winder DG, Colbran RJ, Bartlett RK. Oxidation of Calmodulin Alters Activation and Regulation of CaMKII. (2007) *Biochem. Biophys. Res. Commun.* 356:97-101.
34. Khoo MSC, Grueter CE, Eren M, Yang J, Zhang R, Bass MA, Lwin ST, Mendes LA, Vaughan DE, Colbran RJ, Anderson ME. Calmodulin kinase II inhibition disrupts cardiomyopathic effects of enhanced green fluorescent protein. (2007) *J. Mol. Cell. Cardiol.* 44:405-410.
35. Grueter CE, Abiria S, Wu Y, Anderson ME, Colbran RJ. Differential regulated interactions of calcium/calmodulin-dependent protein kinase II with isoforms of voltage gated calcium channel beta subunits. (2008) *Biochemistry* 47:1760-1767.
36. Jiao Y, Robinson AJ, Bass MA, Colbran RJ. Developmentally-regulated alternative splicing of densin modulates protein-protein interactions and subcellular localization. (2008) *J. Neurochem.* 105:1746-1760.
37. Erickson JR, Joiner ML, Guan X, Kutschke W, Yang J, Oddis CV, Bartlett RK, Lowe JS, O'Donnell SE, Aykin-burns N, Zimmerman MC, Zimmerman K, Ham AJ, Weiss RM, Spitz DR, Shea MA, Colbran RJ, Mohler PH, Anderson ME. A dynamic pathway for calcium-independent activation of CaMKII by methionine oxidation. (2008) *Cell* 133:462-474.
38. Brown AM, Baucum AJ, Bass MA, Colbran RJ. Association of protein phosphatase 1<sub>γ1</sub> with spinophilin suppresses phosphatase activity in Parkinson disease model. (2008) *J. Biol. Chem.* 283:14286-14294.
39. Carmody L, Baucum AJ, Bass MA, Colbran RJ. Selective targeting of PP1<sub>γ1</sub> to F-actin in intact cells requires multiple domains in spinophilin and neurabin. (2008) *FASEB J* 22:1660-1671.
40. Binda F, Dipace C, Bowton E, Doughty SE, Lute BJ, Fog JU, Zhang M, Sen N, Colbran RJ, Gnegy ME, Gether U, Javitch JA, Erreger K, Galli A. Syntaxin1A Interaction with the dopamine Transporter Promotes Amphetamine-Induced Dopamine Efflux. (2008) *Mol. Pharm.* 74:1101-1108.
41. Colbran, R.J. Ca<sup>2+</sup>/calmodulin-dependent protein kinase II. In "Learning and Memory – a Comprehensive Reference". (Eichenbaum, H., Menzel, R., Roediger H. & Sweatt, D., eds.). Elsevier, Oxford. *In press*.

### **C. Research Support**

#### **Ongoing Research Support**

R01 MH63232 Colbran (PI) 04/01/06-01/31/11  
NIH/NIMH

#### ***Mechanisms of CaM Kinase II Signal Transduction***

This grant investigates the role of specific protein-protein interactions in targeting CaM Kinase II to specific subcellular locations in the brain and their impact on CaM kinase II signaling.

Role: PI.

#### **Completed Research Support**

R01 HL70250 Anderson (PI) 03/01/02-02/28/06  
NIH/NHLBI

#### ***Cardiac-targeted Calmodulin Kinase II Inhibition***

This grant examines the impact of transgenic cardiac-specific expression of a selective inhibitor of CaM kinase II in mice.

Role: Co-investigator

P01 HL46681 Roden (PI) 08/01/02-07/31/07  
NIH/NHLBI

#### ***Biology of Arrhythmia Susceptibility***

This grant determines the role of CaM kinase II signaling in arrhythmias and structural heart disease.

Role: Co-investigator

R01 HL62494 Anderson (PI) 04/01/03-03/31/08  
NIH/NHLBI

#### ***Calmodulin Kinase II and Early After Depolarizations***

This grant investigates the role of CaM kinase II in regulating cardiac L-type calcium channels and the underlying molecular mechanisms.

Role: Co-investigator

AHA 0415157B Grueter (PI) 07/01/04-06/30/06

AHA Fellowship

*Regulation of Cardiac L-type Calcium Channels by beta subunits and CaMKII*

This grant provides partial stipend support for Chad Grueter to study mechanisms of CaM Kinase II modulation of L-type calcium channels.

Role: Sponsor/Mentor.

AHA Fellowship Bartlett (PI) 07/01/06-03/31/07

AHA

*Structural Dynamics of CaMKII-NR2B Complexes*

Fellowship for Dr. Ryan Bartlett.

Role: Sponsor/Mentor