

BIOGRAPHICAL SKETCH

Provide the following information for the key personnel and other significant contributors in the order listed on Form Page 2.
Follow this format for each person. **DO NOT EXCEED FOUR PAGES.**

NAME Tomoyoshi Kobayashi	POSITION TITLE Research Associate Professor of Physiology and Biophysics		
eRA COMMONS USER NAME tomoyoshi			
EDUCATION/TRAINING (<i>Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.</i>)			
INSTITUTION AND LOCATION	DEGREE (if applicable)	YEAR(s)	FIELD OF STUDY
Tohoku University (Sendai, Japan)	B.S	1982	Biology/Biochemistry
Tohoku University (Sendai, Japan)	M.S.	1984	Biology/Biochemistry
Tohoku University (Sendai, Japan)	Ph.D.	1987	Biology/Biochemistry
Tohoku University (Sendai, Japan)	Post. Doc.	1987-1989	Biochemistry

A. Positions and HonorsPositions and Employment

- 1989-1993 Faculty Research Associate (University of Maryland School of Medicine and University of Maryland Biotechnology Institute, Baltimore, MD).
- 1993-1997 Senior Research Associate (International Institute of Advanced Research, Matsushita El. Ind. Co., Kyoto, Japan).
- 1997-1999 Visiting Researcher (University of Maryland Biotechnology Institute, Baltimore, MD).
- 1999-2001 Faculty Senior Research Associate (University of Maryland Biotechnology Institute, Baltimore, MD).
- 2001-2001 Visiting Research Assistant Professor (University of Illinois at Chicago, Chicago, IL).
- 2001-2007 Research Assistant Professor (University of Illinois at Chicago, Chicago, IL).
- 2004-2008 Assistant to the Director, Research Resource Center (University of Illinois at Chicago).
- 2007-present Research Associate Professor (University of Illinois at Chicago, Chicago, IL).

Professional Experience

- 2007 NSF SBIR/SBTT programs, Reviewer/Panelist.

B. Selected Peer-reviewed Publications (in chronological order).

(Publications selected from 50 peer-reviewed publications)

- Kobayashi, T.**, Takagi, T., Konishi, K. and Cox, J. A. (1989) "Amino Acid Sequence of Crayfish Troponin I." *J. Biol. Chem.* **264**, 1551-1557. PMID: 2912973.
- Kobayashi, T.**, Takagi, T., Konishi, K., Morimoto, S. and Ohtshuki, I. (1989) "Amino Acid Sequence of Porcine Cardiac Muscle Troponin C." *J. Biochem.* **106**, 55-59. PMID: 2777752.
- Kobayashi, T.**, Takagi, T., Konishi, K. and Wnuk, W. (1989) "Amino Acid Sequences of the Two Major Isoforms of Troponin C from Crayfish." *J. Biol. Chem.* **264**, 18247-18259. PMID: 2681191.
- Kobayashi, T.**, Tao, T., Grabarek, Z., Gergely, J. and Collins, J. H. (1991) "Cross-linking of Residue 57 in the Regulatory Domain of a Mutant Rabbit Skeletal Muscle Troponin C to the Inhibitory Region of Troponin I." *J. Biol. Chem.* **266**, 13746-13751. PMID: 1856208.
- Kobayashi, T.**, Tao, T., Gergely, J. and Collins, J. H. (1994) "Structure of the Troponin Complex: Implications of the Photocross-Linking of Troponin I to Troponin C Thiol Mutants." *J. Biol. Chem.* **269**, 5725-5729. PMID: 8119911.

- Zhao, X., **Kobayashi, T.**, Malak, H., Gryczynski, I., Lakowicz, J., Wade, R. and Collins, J. H. (1995) "Calcium-Induced Troponin Flexibility Revealed by Distance Distribution Measurements Between Engineered Sites." *J. Biol. Chem.* **270**, 15507-15514. PMID: 7797544.
- Kobayashi, T.**, Grabarek, Z., Gergely, J. and Collins, J. H. (1995) "Extensive Interactions Between Troponins C and I: Zero-Length Cross-Linking of Troponin I and Acetylated Troponin C." *Biochemistry* **34**, 10946-10952. PMID: 7662676.
- Kobayashi, T.**, Leavis, P. C. and Collins, J. H. (1996) "Interaction of a Troponin I Inhibitory Peptide with Both Domains of Troponin C." *Biochim. Biophys. Acta* **1294**, 25-30. PMID: 8639710.
- Takeda, S., **Kobayashi, T.**, Taniguchi, H., Hayashi, H. and Maéda, Y. (1997) "Structural and Functional Domains of the Troponin Complex Revealed by Limited Digestion." *Eur. J. Biochem.* **246**, 611-617. PMID: 9219516.
- Miki, M., **Kobayashi, T.**, Kimura, H., Hagiwara, A., Hai, H. and Maéda, Y. (1998) "Ca²⁺-Induced Distance Change between Points on Actin and Troponin in Skeletal Muscle Thin Filaments Estimated by Fluorescence Energy Transfer Spectroscopy." *J. Biochem.* **123**, 324-331. PMID: 9538210.
- Kobayashi, T.**, Zhao, X., Wade, R. and Collins, J. H. (1999) "Ca²⁺-Dependent Interaction of the Inhibitory Region of Troponin I with Acidic Residues in the N-terminal Domain of Troponin C." *Biochim. Biophys. Acta* **1430**, 214-221. PMID: 10082949. PMID: 10082949.
- Kobayashi, T.**, Zhao, X., Wade, R. and Collins, J. H. (1999) "Involvement of Conserved, Acidic Residues in the N-terminal Domain of Troponin C in Calcium-Dependent Regulation." *Biochemistry* **38**, 5386-5391. PMID: 10220325.
- Kobayashi, T.**, Kobayashi, M., Gryczynski, Z., Lakowicz, J. R. and Collins, J. H. (2000) "Inhibitory Region of Troponin I: Ca²⁺-Dependent Structural and Environmental Changes in the Troponin-Tropomyosin Complex and in Reconstituted Thin Filaments." *Biochemistry* **39**, 86-91. PMID: 10625482.
- Zhao, X., **Kobayashi, T.**, Gryczynski, Z., Gryczynski, I., Lakowicz, J., Wade, R. and Collins, J. H. (2000) "Calcium-Induced Flexibility Changes in the Troponin C-Troponin I Complex." *Biochim. Biophys. Acta* **1479**, 247-254. PMID: 11004542.
- Digel, J., Abugo, O., **Kobayashi, T.**, Gryczynski, Z., Lakowicz, J. R. and Collins, J. H. (2001) "Calcium- and Magnesium-Dependent Interactions between the N-terminal Domain of Troponin C and the C-terminal Region of Troponin I." *Arch. Biochem. Biophys.* **387**, 243-249. PMID: 11370847.
- Kobayashi, T.**, Kobayashi, M. and Collins, J. H. (2001) "Ca²⁺-Dependent, Myosin Subfragment 1-Induced Proximity Changes between Actin and the Inhibitory Region of Troponin I." *Biochim. Biophys. Acta* **1549**, 148-154. PMID: 11690651.
- Burkart, E. M., Sumandea, M. P., **Kobayashi, T.**, Nili, M., Martin, A. F., Homsher, E. and Solaro, R. J. (2003) "Phosphorylation or Glutamic Acid Substitution at Protein Kinase C Sites on Cardiac Troponin I Differentially Depress Myofilament Tension and Shortening Velocity." *J. Biol. Chem.* **278**, 11265-11272. PMID: 12551921.
- Sumandea, M. P., Pyle, W. G., **Kobayashi, T.**, de Tombe, P. P. and Solaro, R. J. (2003) "Identification of a Functionally Critical PKC Phosphorylation Residue of Cardiac Troponin T." *J. Biol. Chem.* **278**, 35135-35144. PMID: 12832403.
- Yang, X., Wu, H., **Kobayashi, T.**, Solaro, R. J., and van Breemen, R. B. (2004) "Enhanced Ionization of Phosphorylated Peptides During MALDI-TOF Mass Spectrometry." *Anal. Chem.* **76**, 1532-1536. PMID: 14987115.
- Kobayashi, T.**, Dong, W.-J., Burkart, E. M., Cheung, H. C., and Solaro, R. J. (2004) "Effects of Protein Kinase C Dependent Phosphorylation and a Familial Hypertrophic Cardiomyopathy-Related Mutation of Cardiac Troponin I on Structural Transition of Troponin C and Myofilament Activation." *Biochemistry*, **43**, 5996-6004. PMID: 15147183.
- Kobayashi, T.**, Yang, X., Walker, L. A., van Breemen, R. B., and Solaro, R. J. (2005) "A Non-Equilibrium Isoelectric Focusing Method to Determine States of Phosphorylation of Cardiac Troponin I: Identification of Ser23 and Ser24 as Significant Sites of Phosphorylation by Protein Kinase C." *J. Mol. Cell. Cardiol.* **38**, 213-218. PMID: 15623438.
- Kobayashi, T.**, and Solaro, R. J. (2005) "Calcium, Thin Filaments, and the Integrative Biology of Cardiac Contractility" *Annu. Rev. Physiol.* **67**, 39-67. PMID: 15709952.

- Vahebi, S., **Kobayashi, T.**, Warren, C. M., de Tombe, P. P., and Soalro, R. J. (2005) "Functional Effects of Rho-Kinase-dependent Phosphorylation of Specific Sites on Cardiac Troponin." *Circ. Res.* **96**, 740-747. PMID: 15774859
- Kobayashi, T.**, and Solaro, R. J. (2006) "Increased Ca²⁺-affinity of Cardiac Thin Filaments Reconstituted with Cardiomyopathy-related Mutant Cardiac Troponin I" *J. Biol. Chem.* **281**, 13471-13477. PMID: 16531415.
- Engel, P. L., **Kobayashi, T.**, Biesiadecki, B., Davis, J., Tikunova, S., Wu, S., and Solaro, R. J. (2007) "Identification of a Region of Troponin I Important in Signaling Cross-Bridge Dependent Activation of Cardiac Myofilaments" *J. Biol. Chem.* **282**, 183-193.
- Davis, J. P., Norman, C., **Kobayashi, T.**, Solaro, R. J., Swartz, D. R., and Tikunova, S. B. (2007) "Effects of Thin and Thick Filament Proteins on Calcium Binding and Exchange with Cardiac Troponin C" *Biophys. J.* **92**, 3195-3206. PMID: 17293397.
- Biesiadecki, B. J., **Kobayashi, T.**, Walker, J. S., Solaro, R. J., and de Tombe, P. P. (2007) "The Troponin C G159D Mutation Blunts Myofilament Desensitization Induced by Troponin I Ser-23/24 Phosphorylation" *Circ. Res.* **100**, 1486-1493. PMID: 17446435.
- Mathur, M. C., **Kobayashi, T.**, and Chalovich, J. M. (2008) "Negative Charges at Protein Kinase C Sites of Troponin I Stabilize the Inactive State of Actin" *Biophys. J.* **94**, 542-549. PMID: 17872964.
- Solaro, R. J., Rosevear, P.R., and **Kobayashi, T.** (2008) "The Unique and Multiple Functions of Cardiac Troponin I in the Integrated Control of Cardiac Muscle Contraction and Relaxation" *Biochem. Biophys. Res. Commun.* **369**, 82-87. PMID: 18162178.
- Tachampa, K., **Kobayashi, T.**, Wang, H., Martin, A. F., Biesiadecki, B. J., Solaro, R. J., and de Tombe, P. P. (2008) "Increased Crossbridge Cycling Kinetics after Exchange of C-terminal Truncated Troponin-I in Skinned Rat Cardiac Muscle" *J. Biol. Chem.* **283**, 15114-15121. PMID: 18378675.
- Sumandea, M. P., Rybin, V. O., Hinken, A., Wang, C., **Kobayashi, T.**, Harleton, E., Sievert, G., Balke, C. W., Feinmark, S. J., Solaro, R. J., and Steinberg, S. F. (2008) "Tyrosine Phosphorylation Modifies Protein Kinase C-delta Phosphorylation of Cardiac Troponin I" *J. Biol. Chem.* **283**, 22680-22689. PMID: 18550549.
- Kobayashi, T.**, Jin, L., and de Tombe, P. P. (2008) "Cardiac Thin Filament Regulation" *Pflugers Archiv-Eur. J. Physiol.* **457**, 37-46. PMID: 18421471.
- Mathur, M. C., **Kobayashi, T.**, and Chalovich, J. M. (2009) "Some Cardiomyopathy Causing Troponin I Mutations Stabilize a Functional Intermediate Actin State" *Biophys. J.* **96**, 2237-2244. PMID: 19289050. PMCID: PMC2717271.
- Abraham, S. J., **Kobayashi, T.**, Solaro, R. J., and Gaponenko, V. (2009) Differences in Lysine pKa Values May Be Used to Improve NMR Signal Dispersion in Reductively Methylated Proteins" *J. Biomol. NMR* **43**, 239-246. PMID: 19280122. PMCID: PMC2736131.
- Warren, C. M., **Kobayashi, T.**, and Solaro, R. J. (2009) "Sites of Intra and Inter-Molecular Cross-Linking of the N-Terminal Extension of Troponin I in Human Cardiac Whole Troponin Complex" *J. Biol. Chem.* **284**, 14258-14266. PMID: 19321456. PMCID: PMC2682874.
- Kobayashi, T.**, Patrick, S. E., and Kobayashi, M. (2009) "Ala-scanning of the Inhibitory Region of Cardiac Troponin I" *J. Biol. Chem.* **284**, 20052-20060. PMID: 19483081. PMCID: PMC2740431.

C. Research Support

On-going Support.

- NIH/NHLBI P01 HL062426 (R.J. Solaro, P.I.). Jun/01/2005-May/31/2010
Role: Leader of Core C (Analytical Biochemistry).
"Integrated Mechanisms of Cardiac Maladaptation."
- NIH/NHLBI R01 HL082923 Sep/01/2006-Aug/31/2010
Role: P.I.
"Molecular Mechanism of Troponin Function in Health and Disease."