CURRICULUM VITAE (as of July28, 2008)

Family name: Toyoshima
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Date of birth: 17 July 1954

Place of birth: Akita, Japan

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Education:

1975-1978 Department of Physics, Faculty of Science, University of Tokyo. Awarded the degree of BSc in physics.

1978-1980 Department of Physics, Division of Science, University of Tokyo. Awarded the degree of MSc in physics. Supervisor: Prof. S. Ebashi.

1980-1983 Department of Physics, Division of Science, University of Tokyo. Awarded the degree of DSc in physics. Supervisor: Prof. S. Ebashi.

Research and professional experience:

1984-1986 Research Associate at the Department of physics, University of Tokyo, working with Dr. T. Wakabayashi.

1986-1988 Postdoctoral fellow at the Department of Cell Biology, Stanford University, working with Profs. P.N.T. Unwin and J. A. Spudich.

1988-1989 Scientific staff at the Medical Research Council Laborartory of Molecular Biology, Cambridge, UK, working with Dr. Nigel Unwin.

1989-1989 Research scientist at the Frontier Research Project (RIKEN).

1990-1994 Associate professor at the Department of Biological Sciences, Faculty of Bioscience and Biotechnology, Tokyo Institute of Technology

1994- now Professor at the Institute of Molecular and Cellular Biosciences, The University of Tokyo

2000-now Director of the Center for Bioinformatics, Institute of Molecular and Cellular Biosciences, The University of Tokyo.

Awards

Human Frontier Science Program Research Grants (2002)
Foreign Associate of the National Academy of Sciences, USA (2005)
National Lecturer, Biophysical Society, USA (2007)
Sacconi Lecture in Chemistry, University of Florence, Italy (2007)
Hitchcock Professor, University of California, Berkeley, USA (2008)

Lectureship:

2006 Steinberg/Wylie Lecture in Biochemistry, Baltimore, USA

2007 National Lecture, Biophysical Society, USA

2007 Sacconi Lecture in Chemistry, Florence, Italy

2008 Hitchcock Professor at University of California, Berkeley, USA

Invited speaker at international meetings:

1996 International symposium on membrane proteins—structure, function and expression control, Fukuoka, Japan

1997 Gordon Research Conference on Mechanisms of Membrane Transport, Holderness

1998 International Congress on Electron Microscopy, Cancun, Mexico

1999 Gordon Research Conference on Three Dimensional Electron Microscopy, Henniker, New Hampshire

International Conference on Na, K-ATPase and Related Cation Pumps, Sapporo, Japan

International Symposia on Calcium Binding Proteins, Kazusa, Japan

2000 European Biophysics Congress, München, Germany

European Symposium on Calcium Binding Proteins, Paris, France

2001 Scandinavian Physiological Society Meeting, Aarhus, Denmark

International Conference on Biological Physics, Kyoto, Japan

FASEB Summer Research Conference on Transport ATPases, Snowmass, Colorado

Keystone Symposium on Membrane and Protein Structure/ Function Relationships, Tahoe City

Instituto Juan March Workshop on Pump, Channels and Transporters, Madrid, Spain

2002 International Conference on Na, K-ATPase and Related Cation Pumps, Elsinore, Denmark

2003 FASEB Summer Research Conference on Transport ATPases, Saxton River, Vermont

Nobel Symposium on Membrane Proteins: Structure, Function and Assembly, Friiberghs Herrgård, Sweden

Symposium of the NCCR Structural Biology, Zürich, Switzerland

2004 International Conference on Biology and Synchrotron Radiation, Himeji, Japan

2005 International Congress of International Union of Crystallography, Florence, Italy

International Conference on Biological Inorganic Chemistry, Ann Arbor, USA

2006 International Symposium of the Special Research Center 642, GTP and ATP dependent membrane processes, Bochum, Germany

IUBMB International Congress of Biochemistry and Molecular Biology, Kyoto, Japan

Symposium on Recent Advances in Biophysics, Taipei, Taiwan

2007 International Symposium on Ancanced and Integarative Life Sciences, Univ. of Tokyo, Tokyo, Japan

1. C. Xu, A. M. Prasad, G. Inesi and C. Toyoshima: Critical role of Val-304 in conformational transitions that allow Ca^{2+} occlusion and phosphoenzyme turnover in the Ca^{2+} transport ATPase. *J.Biol.Chem.***283**, 3297-3304 (2008)

2. G. Inesi, D. Lewis, C. Toyoshima, A. Hirata and Leopoldo de Meis: Conformational fluctuations of the Ca^{2+}-ATPase in the native membrane environment-Effects of pH, temperature, catalytic substrates, and thapsigargin. *J.Biol.Chem.***283**, 1189-1196 (2008)

3. C. Toyoshima, Y. Norimatsu, S. Iwasawa, T. Tsuda and H. Ogawa: How processing of aspartylphosphate is coupled to lumenal gating of the ion pathway in the calcium pump. *Proc. Nat. Acad. Sci. USA.* **104**, 19831-19836 (2007)

4. K. Yonekura, C. Toyoshima: Structure determination of tubular crystals of membrane proteins. IV. Distortion correction and its combined application with real-space averaging and solvent flattening. Ultramicroscopy, **107**, 1141-1158 (2007)

5. Y. Hatori, E. Majima, T. Tsuda and C. Toyoshima: Domain organization and movements in heavy metal ion pumps: Papain digestion of CopA, a Cu^{+}-transporting ATPase. *J. Biol. Chem.* **282**, 25213-25221(2007)

6. M. Takahashi, Y. Kondou and C. Toyoshima: Interdomain communication in calcium pump as revealed in the crystal structures with transmembrane inhibitors. *Proc. Nat. Acad. Sci. USA.* **104**, 5800-5805 (2007)

7. G. Inesi, D. Lewis, H. Ma, A. Prasad and C Toyoshima: Concerted conformational effects of Ca^{2+} and ATP are required for activation of sequential reactions in the Ca^{2+} ATPase (SERCA) catalytic cycle. *Biochemistry* **46,** 13769-13778 (2006)

8. Y. Sugita, N. Miyashita, T. Yoda, M. Ikeguchi and C. Toyoshima: Structural changes of the cytoplasmic domain of phospholamban by phosphorylation at Ser16: A molecular dynamics study. *Biochemistry* **45**, 11752-61 (2006)

9. M. Picard, C. Toyoshima and P. Champeil: Effects of inhibitors on luminal opening of Ca^{2+} binding sites in an E2P-like complex of sarcoplasmic reticulum Ca^{2+}-ATPase with Be^{2+}-fluoride. *J. Biol. Chem.* **281**, 3360-3369 (2006)

10. K. Obara, N. Miyashita, C. Xu, I. Toyoshima, Y. Sugita, G. Inesi and C. Toyoshima: Structural role of countertransport revealed in Ca^{2+} pump crystal structure in the absence of Ca^{2+}. *Proc. Nat. Acad. Sci. USA.* **102**, 14489-14496 (2005)

11. M. Picard, C. Toyoshima and P. Champeil: The average conformation at micromolar [Ca^{2+}] of Ca^{2+}-ATPase with bound nucleotide *differs* from that adopted with the transition state analog ADP.AlFx or with AMPPCP under crystallization conditions at millimolar [Ca^{2+}]. *J. Biol. Chem.* **280,** 18745-18754 (2005)

12. Y. Sugita, N. Miyashita, M. Ikeguchi, A. Kidera, and C. Toyoshima: Protonation of the acidic residues in the transmembrane cation-binding sites of the Ca^{2+} pump. *J. Am. Chem. Soc.* **127,** 6150-6151 (2005)

13. H. Ma, D. Lewis, C. Xu, G. Inesi and C. Toyoshima: Functional and structural roles of critical amino acids within the "N", "P", and "A" domains of the Ca^{2+} ATPase (SERCA) headpiece. *Biochemistry* **44**, 8090-8100 (2005)

14. C. Toyoshima, H. Nomura and T. Tsuda: Lumenal gating mechanism revealed in calcium pump crystal structures with phosphate analogues. *Nature* **432**, 361-368 (2004)

15. C. Toyoshima and T. Mizutani: Crystal structure of the calcium pump with a bound ATP analogue. *Nature* **430,** 529-535 (2004)

16. C. Xu, H. Ma, G. Inesi, M.K. Al-Shawi and C. Toyoshima: Specific structural requirement for the inhibitory effect of thapsigargin on the Ca^{2+} ATPase SERCA. *J. Biol. Chem.* **279,** 17973-17979 (2004)

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19. C. Toyoshima, H. Nomura and Y. Sugita: Structural basis of ion pumping by Ca^{2+}-ATPase of sarcoplasmic reticulum. *FEBS Letters* **555,** 106-110 (2003).

20. H. Ma, G. Inesi and C. Toyoshima: Substrate-induced conformational fit and headpiece closure in the Ca^{2+}ATPase (SERCA). *J. Biol. Chem.* **278,** 28938-28943 (2003)

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22. C. Toyoshima and H. Nomura: Structural changes in the calcium pump accompanying the dissociation of calcium. *Nature* **418,** 605-611 (2002)

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26. J. V. Møller, G. Lenoir, C. Marchand, C. Montigny, M. le Maire, C. Toyoshima, B. S. Juul and P. Champeil: Calcium transport by sarcoplasmic reticulum Ca^{2+}-ATPase: role of the A-domain and its C-terminal link with the transmembrane region. *J. Biol. Chem.* **277,** 38647-38659 (2002)

27. S. Danko, K. Yamasaki, T. Daiho, H. Suzuki, C. Toyoshima: Organization of cytoplasmic domains of sarcoplasmic reticulum Ca^{2+}-ATPase in E1P and E1ATP states: a limited proteolysis study. *FEBS letters* **505,** 129-135 (2001)

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48. C. Toyoshima, H. Sasabe and D.L. Stokes: Three-dimensional cryo-electron microscopy of the calcium ion pump in the sarcoplasmic reticulum membrane. *Nature* **362,** 469-471 (1993)

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50. A. Sato, T. Furuno, C. Toyoshima and H. Sasabe: Two-dimensional crystallization of catalase on a monolayer film of poly (1-benzyl-L-histidine) spread at the air/water interface. *Biochim. Biophys. Acta* **1162,** 54-60 (1993)

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54. Y.Y. Toyoshima, C. Toyoshima and J.A. Spudich: Bidirectional movement of actin filaments along tracks of myosin heads. *Nature* **341,** 154-156 (1989)

55. T. Miyanishi, C. Toyoshima, T. Wakabayashi and G. Matsuda: Electron microscopic study on the location of 23K and 50K fragments in skeletal myosin head. *J. Biochem.* **103,** 458-462 (1988)

56. C. Toyoshima and N. Unwin: Contrast transfer for the frozen hydrated specimen: determination from pairs of defocused images. *Ultramicroscopy* **25,** 279-292 (1988)

57. N. Unwin, C. Toyoshima and E. Kubalek: Arrangement of the acetylcholine receptor subunits in the resting and desensitized states, determined by cryo-electron microscopy of crystallized *Torpedo* postsynaptic membranes. *J. Cell Biol.***107,** 1123-1138 (1988)

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61. C. Toyoshima and T. Wakabayashi: Three-dimensional image analysis of the complex of thin filaments and myosin molecules from skeletal muscle. IV. Reconstitution from minimal- and high-dose images of Actin-tropomyosin-myosin Subfragment-1 Complex. *J. Biochem.,* **97,** 219-243 (1985).

62. C. Toyoshima and T. Wakabayashi: Three-dimensional image analysis of the complex of thin filaments and myosin molecules from skeletal muscle. V. assignment of actin in the actin-tropomyosin-myosin Subfragment-1 complex. *J. Biochem.*, **97,** 245-263 (1985)

63 Y. Yano, T. Mohri, C. Toyoshima and T. Wakabayashi: Molecular structure of dynein arms. *J. Submicroscopic Cytol.*, **15,** 211-215 (1983)

64. T. Wakabayashi and C. Toyoshima: Three-dimensional image analysis of the complex of thin filaments and myosin molecules from skeletal muscle. II. The multi-domain structure of Actin-myosin S1 complex. *J. Biochem*, **90,** 683-701 (1981)

65 C. Toyoshima and T. Wakabayashi: Three-dimensional image analysis of the complex of thin filaments and myosin molecules from skeletal muscle. I. Tilt angle of myosin Subfragment-1 in rigor complex. *J. Biochem.*, **86**, 1887-1890 (1979)

Review articles

1. C. Toyoshima: Structural aspects of ion pumping by Ca^{2+}-ATPase of sarcoplasmic reticulum. *Arch. Biochem. Biophys.* **476** (2008) 3-11

2. C. Toyoshima: Structural aspects of ion pumping by Ca^{2+}-ATPase of sarcoplasmic reticulum. *In* "CALCIUM: A matter of Life or Death" (*eds*. J. Krebs and M. Michalak), pp. 219-228, Elsevier 2007 {New Comprehensive Biochemistry, Vol. 41}

3. C. Toyoshima: Ion pumping by calcium ATPase of sarcoplasmic reticulum. *In* "Regulatory mechanisms of striated muscle contraction. (*eds.* S. Ebashi & I. Ohtsuki), pp. 295-303, Springer 2007 {Advances in experimental medicine and biology, Vol. 592}

4. C. Toyoshima and G. Inesi: Structural basis of ion pumping by Ca^{2+}-ATPase of the sarcoplasmic reticulum. *Ann. Rev. Biochem.* **73** (2004) 269-92.

5. G. Inesi and C. Toyoshima: Catalytic and transport mechanism of the sarco-(endo)plasmic reticulum Ca^{2+}-ATPase (SERCA). *In*" Handbook of ATPases: Biochemistry, Cell Biology, Pathophysiology" *eds.* M. Futai, Y. Wada and J. H. Kaplan, Wiley-VCH Verlag GmbH & Co. KGaA, Weinheim, (2004) pp. 63-87.

6. C. Toyoshima: Calcium pump (ATPase) of sarcoplasmic reticulum. *In* "Handbook of Metalloproteions" Vol. 3 *eds.* Albrecht Messerschmidt, W. Bode and M. Cygler, John Wiley & Sons, Ltd, Chichester, (2004) pp. 667-676.

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9. G. Inesi, H. Ma, S. Hua and C. Toyoshima: Characterization of Ca^{2+} ATPase residues involved in substrate and cation binding. *In* "Na, K-ATPase and Related Cation Pumps: Structure, Function, and Regulatory Mechanisms (Annals of The New York Academy of Sciences Vol. 986)" *eds*. P.L. Jorgensen, S.J.D. Karlish and A.B. Maunsbach, New York (2003) pp.63-71.

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11. C. Toyoshima, M. Nakasako and H. Nomura: Three-dimensional structural study of Ca^{2+}-ATPase from sarcoplasmic reticulum. Na/K-ATPase and Related ATPases, *eds.* K. Taniguchi and S. Kaya, Elsevier, (2000) pp193-196.

12. C. Toyoshima and K. Tani: Electron crystallography of thin protein crystals. *In* " Electron Microscopy 1998", *eds*. H.A.C. Benavides and M.J.Yacaman, Institute of Physics Publishing, Bristol and Philadelphia (1998) pp.395-396.

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14. C. Toyoshima: Three-dimensional cryo-electron microscopy of calcium ion pump. *In* "MEMBRANE PROTEINS: structure, function and expression control." *eds.* N. Hamasaki and K. Mihara, Kyushu University Press, Japan and S. Karger AG, Switzerland. (1997) pp. 247-255.

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