

## CURRICULUM VITAE

### **RAMA RANGANATHAN**

Green Center for Systems Biology  
Department of Pharmacology  
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**DATE OF BIRTH:** December 15, 1963; Mayuram, India

**CITIZENSHIP:** USA

### **EDUCATION:**

<b><u>Degree</u></b>	<b><u>Institution</u></b>	<b><u>Date Conferred</u></b>	<b><u>Field of Study</u></b>
M.D.	University of California, San Diego School of Medicine	June, 1994	Medicine
Ph.D.	University of California, San Diego Department of Biology	December, 1992	Biology
B.S.	University of California, Berkeley School of Engineering	December, 1985	Bioengineering

### **PROFESSIONAL EXPERIENCE:**

**9/07-present:** Professor, Department of Pharmacology, University of Texas Southwestern Medical Center.

**3/04-present:** Director of the Cecil H. and Ida Green Center for Systems Biology, University of Texas Southwestern Medical Center.

**9/02-8/07:** Investigator, Howard Hughes Medical Institute, and Associate Professor, Department of Pharmacology, University of Texas Southwestern Medical Center.

**2/97-9/02:** Assistant Investigator, Howard Hughes Medical Institute, and Assistant Professor, Department of Pharmacology, University of Texas Southwestern Medical Center.

**11/95-2/97:** Postdoctoral Fellow in the Structural Biology Laboratory, The Salk Institute, in the laboratory of Joseph Noel, Ph.D.

**7/94-11/95:** Postdoctoral Fellow in the Department of Neurobiology, Harvard Medical School in the laboratory of Roderick MacKinnon M.D.

**8/88-12/92:** Graduate Student in the Department of Biology, University of California, San Diego in the laboratory of Charles Zuker Ph.D.

## **HONORS AND FELLOWSHIPS:**

Edith and Peter O'Donnell Award for Basic Science, 2008  
Cecil H. and Ida Green Chair in Biomedical Science, 2006-present  
Woodward Lecture in Chemistry, Harvard University, 2007  
Koshland Memorial Lecture, UC Berkeley, 2007  
William H. Stein Lecture, Rockefeller University, 2006  
University Lecture, UT Southwestern Medical Center, 2005.  
Participant, The National Academies, *Keck Futures Initiative*, 2004-2005.  
Edward Mallinckrodt, Jr. Foundation Scholar, 2001-2004.  
Burroughs-Wellcome Fellow of the Life Sciences Research Foundation, Postdoctoral Fellowship, 1995-1997.  
Participant, Neurobiology workshop, Santa Fe Institute, Santa Fe, New Mexico, 1992-1993.  
Fellow, Medical Scientist (M.D./Ph.D.) Training Program, NIGMS, NIH 1986-1994.  
Member, Tau Beta Pi, Engineering Honor Society.

## **ADVISORY BOARDS AND COMMITTEES:**

Editorial Board, *Cell*, 2009-present.  
UTSW Dean's 6-year Planning Committee for Research, 2007  
Review Committee, NIH New Innovator Award, 2007  
Editorial Board, *PLoS Computational Biology*, 2007-present  
Steering Committee, Shared Bioengineering Department, UTSW/UT Dallas, 2007-present  
Scientific Review Board, Damon-Runyan Cancer Research Foundation, 2006-present  
Advisory Board, Green Center for Systems Biology Science, UT Dallas, 2005-present  
Editorial Board, *Nature Molecular Systems Biology*, 2005-present  
UTSW Dean's 6-year Planning Committee for Research, 2005.  
Board Member, Protein Modules Consortium, 2005- present.  
Admissions Committee, UTSW Medical Scientist Training Program, 1999-present.  
Host Institution Advisory Committee for the Alliance for Cellular Signaling, 1999- 2005.  
UTSW Basic Science Information Resources Advisory Committee, 1999-2003.

## **BIBLIOGRAPHY:**

- (1) Ranganathan, R., G.L. Harris, C.F. Stevens, and C.S. Zuker (1991). A *Drosophila* Mutant Defective in Extracellular Calcium-Dependent Photoreceptor Deactivation and Rapid Desensitization. *Nature* 354: 230-232.
- (2) Ranganathan, R., W.A. Harris and C.S. Zuker (1991). The Molecular Genetics of Invertebrate Phototransduction. *Trends in Neuroscience* 14: 486-493.
- (3) Smith, D.P., R. Ranganathan, R.W. Hardy, J. Marx, T. Tsuchida, and C.S. Zuker (1991). A Photoreceptor Specific Protein Kinase C Mediates Calcium-Dependent Photoreceptor Deactivation and Light-Dependent Retinal Degeneration in *Drosophila*. *Science* 254: 1458-1465.
- (4) Dolph, P.J., R. Ranganathan, N.J. Colley, R.W. Hardy, M. Socolich, and C.S. Zuker (1993). Arrestin Function in Inactivation of G-protein Coupled Receptor Rhodopsin in vivo. *Science* 260: 1910-1916.
- (5) Ranganathan, R., B.J. Backsai, R.Y. Tsien, and C.S. Zuker (1994). Cytosolic Calcium Transients: Spatial Localization and Role in *Drosophila* Photoreceptor Function. *Neuron* 13: 1-20.

- (6) Ranganathan, R. (1994). Evolutionary Origins of Ion Channels. PNAS 91: 3484-3486.
- (7) Ranganathan, R. and C.F. Stevens (1995). Arrestin Binding Determines the Rate of Inactivation of the G-protein Coupled Receptor Rhodopsin in vivo. Cell 81: 841-848.
- (8) Ranganathan, R., D.M. Malicki, and C.S. Zuker (1995). Signal Transduction in *Drosophila* Photoreceptors. Annual Review of Neuroscience 18: 283-317.
- (9) Ranganathan, R., J.H. Lewis, R. MacKinnon (1996). Spatial Localization of the K<sup>+</sup> Channel Selectivity Filter By Mutant Cycle-Based Structure Analysis. Neuron 16: 131-139.
- (10) Ranganathan, R., K.P. Lu, T. Hunter, J.P. Noel (1997). Structural and Functional Analysis of the Mitotic Rotamase Pin1 Suggests Substrate Recognition Is Phosphorylation Dependent. Cell 89:875-886.
- (11) Ranganathan, R. and E.M. Ross (1997). PDZ Domain Proteins: Scaffolds for Signaling Complexes. Current Biology 7: R770-R773.
- (12) Lockless, S.W. and R. Ranganathan (1999). Evolutionarily Conserved Pathways of Energetic Connectivity in Protein Families. Science 286: 295-299.
- (13) Zuker, C.S. and R. Ranganathan (1999). Signal Transduction: The Path to Specificity. Science 283: 650-651.
- (14) Kiselev, A., M. Socolich, J. Vinos, R.W. Hardy, C.S. Zuker, and R. Ranganathan (2000). A Molecular Pathway for Light-Dependent Photoreceptor Apoptosis in *Drosophila*. Neuron, 28: 139-152
- (15) Wall, M.A., M. Socolich, and R. Ranganathan (2000). The Structural Basis for Red Fluorescence in dsRED, a Tetrameric Green Fluorescent Protein Homolog. Nature Structural Biology, 7: 1133-1138.
- (16) Russ, W. and R. Ranganathan (2002). Knowledge-based Potential Functions in Protein Design. Current Opinions in Structural Biology 12(4):447-452.
- (17) Suel, G., S. W. Lockless, M. A. Wall, R. Ranganathan (2003). Evolutionarily Conserved Networks of Residues Mediate Allosteric Communication in Proteins. Nature Structural Biology, 10(1): 59-69.
- (18) Jain, R.K., and R. Ranganathan (2003). Local Complexity of Amino-acid Interactions in a Protein Core. PNAS, 101(1): 111-116.
- (19) Hatley, M.E., S.W. Lockless, S.K. Gibson, A.G. Gilman, and R. Ranganathan (2003). Allosteric Determinants of the Guanine Nucleotide Binding Proteins. PNAS, 100(24): 14445-14450.
- (20) Ranganathan, R. (2003). A Matter of Life or Death. Science, 299: 1679-1680.
- (21) Shulman, A.I., C. Larson, D.J. Mangelsdorf, R. Ranganathan (2004). Structural Determinants of Allosteric Ligand Activation in RXR Heterodimers. Cell, 116: 417-429.
- (22) Russ, W., D.M. Lowery, P. Mishra, M.B. Yaffe, and R. Ranganathan (2005). Natural-like Function in Artificial WW Domains. Nature, 437:579-583.

- (23) Socolich, M., S.W. Lockless, H.L. Lee, K. Gardner, and R. Ranganathan (2005). Evolutionary Information for Specifying a Protein Fold. Nature, 437: 512-518.
- (24) Natarajan, M, P.C. Sternweis, Alliance for Cellular Signaling Laboratories, and R. Ranganathan (2006). A Global Analysis of Cross-talk in a Mammalian Cellular Signaling Network. Nature Cell Biology, 8: 571-580.
- (25) Poole, AM and R. Ranganathan (2006). Knowledge-based potentials in protein design. Current Opinion in Structural Biology, 16: 508-513.
- (26) Ferguson, A.D., C.A. Amezcuca, N.M. Halabi, Y. Chelliah, M.K. Rosen, R. Ranganathan, J. Deisenhofer (2007). Signal Transduction Pathway of TonB-dependent Transporters. PNAS, 104: 513-518.
- (27) Ranganathan, R. (2007). Signaling across the cell membrane. Science, 318: 1253-4.
- (28) Laidlaw J, Gelfand Y, Ng KW, Garner HR, Ranganathan R, Benson G, Fondon JW 3rd. (2007) Elevated basal slippage mutation rates among the Canidae. J Hered., 98:452-60.
- (29) Mishra, PM, M. Wall, M. Socolich, J. Graves, ZF Wang, and R. Ranganathan (2007). Dynamic scaffolding in a G Protein coupled signaling system. Cell, 131:80-92 .
- (30) Pumar, A., J. Graves, R. Ranganathan, and B.I. Shraiman. (2008) Systems analysis of the single photon response in invertebrate photoreceptors. PNAS, 105: 10354-9.
- (31) Lee, J., Natarajan, M., Nashine, V.C., Socolich, M., Vo, T., Russ, W.P., Benkovic, S.J., and Ranganathan, R. Surface Sites for Engineering Allosteric Control in Proteins. (2008) Science, 322: 438-42.
- (32) Halabi, N., O. Rivoire, S. Leibler, and R. Ranganathan. Protein sectors: functional units of tertiary structure. Manuscript under review.
- (33) Smock R., J.F. Swain, W.P. Russ, R. Ranganathan, and L.M. Gierasch. Evolutionarily Coupled Residues in Hsp70 Proteins Point to Networks of Allosteric Communication. Manuscript under review.
- (34) Larson, C., M.A. Stiffler, G. MacBeath, and R. Ranganathan. Correlation-based design of functional PDZ domains. Manuscript in preparation.
- (35) Larson, C. and R. Ranganathan. Sufficiency of Constraints Imposed in the Evolution-Based Design of WW Domains. Manuscript in preparation.
- (36) Sharma, R., and R. Ranganathan. Structural Basis for Long-Range Evolutionary Coupling Within the PDZ Domain. Manuscript in preparation.

### **INVITED TALKS:**

- 7/97 Burroughs-Wellcome New Investigators Meeting.  
11/97 Department of Biology, University of Houston, Departmental Seminar.

- 9/98 Department of Dermatology, UTSW, Departmental Seminar.
- 10/98 Ion Channel Structure and Function, Juan March Foundation (Madrid, Spain), Invited Seminar.
- 3/99 The Salk Institute, Institute Seminar Series.
- 3/99 Graduate Course (Frontiers in Interdisciplinary Biosciences), Stanford University, Invited Lecturer.
- 7/99 Woods Hole Physiology Course Seminar Series.
- 10/99 Department of Molecular Pharmacology, Stanford University, Departmental Seminar.
- 3/00 Department of Biology, Dartmouth University, Departmental Seminar.
- 7/00 Woods Hole Physiology Course, Course Instructor and Seminar Series Speaker.
- 7/00 FASEB meeting, Molecular Biophysics of Cellular Membranes, Invited Seminar.
- 9/00 Department of Molecular Pharmacology, Stanford University, Departmental Retreat Outside Speaker.
- 11/00 Department of Pathology, UTSW, Departmental Seminar.
- 12/00 Department of Biochemistry, Robert Wood Johnson Medical School, Departmental Seminar.
- 1/01 Division of Biology, California Institute of Technology, General Biology Seminar.
- 3/01 Department of Pharmacology, Mount Sinai Medical Center, Departmental Seminar.
- 4/01 Molecular Sensory Physiology (DFG program meeting), Reischensburg, Germany, Invited Speaker.
- 4/01 Merck Annual GPCR Retreat, Merck and Co. Inc., Invited Seminar.
- 6/01 Johns Hopkins Univ., Bioinformatics and Genomics Institute Inaugural Symposium, Invited Speaker.
- 8/01 Aspen Center for Physics, Modeling Signaling Systems, Organizer and Speaker.
- 12/01 Department of Embryology, Carnegie Institution of Washington, Departmental Seminar.
- 01/02 Department of Pharmacology, University of North Carolina, Departmental Seminar.
- 01/02 Conference: Navigating by Compass: Cell Polarity and Motility, Invited Speaker.
- 02/02 Salk Institute, Structural Biology Seminar.
- 02/02 Gordon Conference, Reversible Associations in Structural and Molecular Biology, Invited Speaker.
- 03/02 Dept. of Bioinformatics, Vanderbilt University, Departmental Seminar.
- 05/02 Mathematical Modeling in Biology Workshop, Duke University, Invited Speaker.
- 05/02 Graduate Program in Structural and Computational Biology and Molecular Biophysics, Baylor College of Medicine, Program Seminar.
- 05/02 Center for the Studies of Physics and Biology, Rockefeller University, Departmental Seminar.
- 11/02 Kimmel Cancer Center, University of Pennsylvania, Departmental Speaker.
- 11/02 Biophysics/Chemistry and Chemical Biology Seminar Series, University of California San Francisco, Invited Speaker.
- 1/03 Structural and Quantitative Biology Seminar Series, Depts. of Chemistry and Molecular and Cell Biology, and the Institute of Quantitative Biomedical Research, University of California Berkeley, Invited Speaker.
- 2/03 Gordon Conference, Molecular Pharmacology, Invited Speaker.
- 3/03 Workshop: "Dynamics, adaptation and fluctuations in bio-networks", Institute for Theoretical Physics, Santa Barbara, Invited Speaker.
- 3/03 2003 Johns Hopkins Folding Meeting, Invited Speaker.
- 4/03 Interdepartmental Program in Cell and Molecular Biology Research Conference, Baylor College of Medicine, Keynote Speaker.
- 4/03 Graduate Program Retreat, University of Texas at Dallas, Invited Speaker.
- 5/03 Alliance for Cellular Signaling Annual Meeting, Speaker.
- 7/03 Woods Hole Physiology Course, Invited Speaker.
- 7/03 FASEB Protein Society Meeting, Invited Speaker.
- 7/03 FASEB Protein Society Meeting, Invited Speaker (2<sup>nd</sup> talk).
- 11/03 Dept. of Pharmacology, Vanderbilt University, Departmental Seminar.

11/03 Dept. of Biochemistry, Brandeis University, Departmental Seminar.  
11/03 National Academies Keck Futures Initiative Signaling Conference, Invited Speaker.  
12/03 Protein Phosphorylation Workshop, Invited Speaker.  
1/04 Dept. of Pharmacology, University of Washington School of Medicine, Departmental Seminar.  
2/04 Lewis-Sigler Institute, Princeton University, Departmental Seminar.  
3/04 Salk Institute, Institute Seminar Series, Invited Speaker.  
3/04 Memorial Sloan-Kettering, Rockefeller University, Cornell Medical Center Tri-Institutional Seminar Series. Seminar Speaker.  
4/04 Department of Biochemistry, University of Massachusetts, Amherst, Departmental Seminar.  
4/04 Molecular and Cellular Biology Graduate Program, University of Massachusetts, Departmental Seminar.  
4/04 Markey Center for Structural Biology, Purdue University, Departmental Speaker.  
5/04 Alliance for Cellular Signaling Annual Meeting, Speaker.  
6/04 Symposium on Evolution of Biomolecular Structure, Michigan State University, Invited Speaker.  
6/04 Mathematical Models in Signaling Systems, Vanderbilt University Summer Conferences, Invited Speaker.  
10/04 Department of Mathematics, Southern Methodist University, Departmental Speaker.  
11/04 Department of Molecular and Cellular Biology, Harvard University, Departmental Seminar.  
1/05 Asilomar Enzyme Mechanisms Conference, Invited Speaker.  
2/05 Biophysical Society Meeting, Session chair and invited speaker.  
3/05 Department of Biochemistry, University of Colorado, Departmental Speaker.  
4/05 Department of Biological Chemistry, Johns Hopkins University, Departmental Speaker.  
5/05 Gordon Conference, Molecular Pharmacology, Pisa, Italy, Invited Speaker.  
6/05 Gordon Conference, Second Messengers and Protein Phosphorylation, Invited Speaker.  
7/05 Woods Hole Physiology Course, Invited Speaker.  
7/05 Institute for Complex Adaptive Matter, University of California San Diego, Invited Speaker.  
9/05 Federation of Biochemical Societies, Modular Protein Domains workshop, Seefeld, Austria, Invited Speaker.  
10/05 Rockefeller University's Biochemical and Biophysical Methods Course, Invited Lecturer.  
10/05 Department of Biochemistry, University of San Carlos, San Carlos, Brazil, Invited Speaker.  
10/05 Structural Molecular Biology and Bioinformatics Conference, Caxambu, Brazil, Invited Speaker.  
10/05 Sixth International Conference on Systems Biology, Boston, MA, Invited Speaker.  
12/05 UTMB Biological Chemistry GSO, Invited Speaker.  
12/05 UTSouthwestern Medical Center, University Lecture.  
2/06 DARPA "Control of Protein Conformations" Workshop, Invited Speaker.  
3/06 Pennsylvania State University Chemistry Department, Invited Speaker.  
5/06 Department of Biochemistry, University of Oregon, Departmental Speaker.  
5/06 Society for Molecular Biology and Evolution, 2006 meeting, Invited Speaker.  
6/06 Gordon Research Conference, Biopolymers, Invited Speaker.  
7/06 Protein Society Meeting, Session Chair and Invited Speaker.  
8/06 FASEB meeting, Protein Folding in the Cell, Invited Speaker.  
9/06 Tennessee Structural Biology Symposium, Plenary Speaker.  
10/06 Department of Biochemistry, University of Missouri, Departmental Speaker.  
10/06 Institute for Advanced Study, Princeton, Invited Speaker.  
11/06 The Rockefeller University, William Stein Lecture Invited Speaker.  
12/06 International Conference on Bioinformatics, New Delhi, India, Invited Speaker  
12/06 NCBS, Bangalore, India, Invited Speaker

12/06 India Institute of Science, Bangalore, India, Invited Speaker  
01/07 Institute of the High Scientific Studies, Bures-Sur-Yvette, France, Invited Speaker  
03/07 Department of Biochemistry and Molecular Biophysics, University of Arizona,  
Departmental Speaker  
04/07 University of California at Berkeley, Koshland Lecture Series, Invited Speaker  
05/07 American Society for Biochemistry and Molecular Biology, Washington, D.C., Invited  
Speaker  
05/07 VII European Symposium of The Protein Society, Stockholm, Sweden, Invited Speaker  
06/07 Gordon Conference, Biddeford, ME, Invited Speaker  
06/07 Institut Pasteur, Paris, France, Invited Speaker  
09/07 US Frontiers of Engineering Symposium, Redmond, Washington, Invited Speaker  
10/07 California Institute for Quantitative Biosciences (QB3), University of California at San  
Francisco, San Francisco, CA , Invited Speaker  
11/07 Department of Chemistry, Harvard University, Woodward Lecture in Chemistry,  
Cambridge, MA  
02/08 Rockefeller University's Biochemical and Biophysical Methods Course, Invited Lecturer.  
03/08 Institute for Mathematics and its Applications, University of Minnesota, Invited Speaker  
03/08 Pasteur-Weizmann Symposium, The Weizmann Institute for Science, Israel, Keynote  
Speaker  
04/08 Dept. of Biochemistry, Texas A&M University, Invited Speaker  
05/08 Max-Planck Institute for Molecular Physiology, Dortmund, Germany, Invited Speaker  
08/08 Dept. of Biochemistry, Case Western Reserve Universtiy, Invited Speaker  
10/08 Loyola University (Chicago), Graduate Student Retreat, Keynote Speaker  
11/08 Molecular Physiology of GPCRs, Sydney, Australia, Invited Speaker  
12/08 Dept. of Computational Biology, University of Pittsburgh, Invited Speaker  
03/09 Samuel Lunenfeld Research Institute, Toronto, Canada, Invited Speaker  
03/09 Max-Planck Institute, Tuebingen, Invited Speaker  
05/09 Protein Structure and Engineering Symposium, Laval University, Canada, Keynote  
Speaker  
06/09 Keystone Symposium, "Protein Dynamics, Allostery, and Function", Invited Speaker  
07/09 FEBS 2009 Congress, Prague, Czech Republic, Invited Speaker