

# Vikas N. Shah

Redwood City, CA 94063

web <http://www.shahlab.org>

---

**Citizenship:** U. S.

## Education:

### **Stanford University**

2008 – 2011 Residency, Anesthesiology (in progress)

### **Banner Good Samaritan Medical Center**

2007 – 2008 Internship, Preliminary Year in Internal Medicine

### **Vanderbilt University**

1998 – 2007 M.D. MCAT – 38; USMLE: Step 1 – 229; Step 2 CK – 236, CS – Pass; Step 3 – 215

1998 – 2005 Ph.D., Biochemistry. “Mechanisms by which calcium regulates the human cardiac voltage-gated sodium channel hH1.”

Advisor: Professor Walter J. Chazin, Ph.D.

### **Michigan State University**

1994 – 1998 B.Sc., Biochemistry, with Honor. Joint degree: Lyman Briggs School, Honors College

1994 – 1998 B.A., Philosophy, with Honor. Joint degree: College of Arts and Letters, Honors College

## Licensing:

Since 2009 DEA number issued for the prescription of controlled medications

Since 2008 Medical Board of California, Expiration 4/30/2012

## Honors and Awards:

2009 FAER/SEA Resident Scholar Award

2008 – 2011 Stanford Fellowship in Anesthesia Research and Medicine (FARM) Scholar

2007 Intern of the Month, Banner Good Samaritan Medical Center

2007 “Most connected CSSSer”, Santa Fe Institute Complex Systems Summer School

2007 Santa Fe Institute, Complex Systems Summer School, Research Scholar

2006 Sigma Xi, scientific research honor society, full member

1999 Microbes and Defense Academic Society, honor society for excellence in microbiology

1998 – 2007 Vanderbilt University Medical Scientist (M.D./Ph.D.) Trainee, NIH funded training grant providing medical and graduate school tuition plus stipend

1995 Highest GPA in Sophomore Class, Phi Kappa Phi Award, College of Natural Science

1994 – 1998 Michigan State University Alumni Distinguished Scholarship (ADS), full academic scholarship (tuition, room, board, stipend)

1994 – 1998 Michigan State University Mowbray Minority Scholar, educational activities, trips and funding for a summer personal educational project/research

1994 – 1996 Michigan State University Professorial Lab Assistant, stipended undergraduate research

## Publications:

### Peer-Reviewed Research Articles

Shah VN, Wingo TL, Weiss KL, Williams CK, Balsler JR, Chazin WJ. "Calcium-dependent regulation of the cardiac voltage-gated sodium channel hH1 is mediated by an IQ motif acting as a molecular switch in a dual role." *Proc Natl Acad Sci U S A*. 2006 Mar 7;103(10):3592-7.\*

\* Featured in Science's Signal Transduction Knowledge Environment: "Who's got the calcium?" *Sci STKE*. 2006 Mar 14;2006(326):tw95.

Nickols HH, Shah VN, Chazin WJ, Limbird LE. "Calmodulin interacts with the V2 vasopressin receptor: elimination of binding to the C terminus also eliminates arginine vasopressin-stimulated elevation of intracellular calcium." *J Biol Chem*. 2004 Nov 5;279(45):46969-80.

Wingo TL<sup>§</sup>, Shah VN<sup>§</sup>, Anderson ME, Lybrand TP, Chazin WJ, Balsler JR. "An EF-hand in the sodium channel couples intracellular calcium to cardiac excitability." *Nat Struct Mol Biol*. 2004 Mar;11(3):219-25. § These authors contributed equally to this work.

### Peer-Reviewed Review Articles

Shah VN, Chagot B, Chazin WJ. "Calcium-dependent regulation of ion channels." Review article. *Calcium Binding Proteins*, October/November/December 2006;1(4).

### Abstracts

Shah, VN. "Does the brain implement some form of delay coordinate embedding?" Association for the Scientific Study of Consciousness 12<sup>th</sup> Annual Conference, Taipei, Taiwan, June 2008.

Shah, VN. "Does the brain implement some form of delay coordinate embedding?" Towards a Science of Consciousness, Tucson, AZ, April 2008.

Fortney K\*\*, Pahle J, Delgado J, Obernoster G, Shah V, Wojnowicz M, Qaisar N. "Small world neural networks are functionally robust to damage." *Computational Cognitive Neuroscience*, Nov 2007. \*\*Presenter

Menke N\*\*, Angus S, Cooper K, Shah V. "A simple 2-D model of cardiac tissue conduction." *Journal of Critical Care*. 2007 December;22(4):333. Presented at the Society for Complexity in Acute Illness Conference, Oct 2007. \*\*Presenter

Shah VN, Urkia IA. "Brain scans cannot read your mind (if you don't want to)." Association for the Scientific Study of Consciousness 11<sup>th</sup> Annual Conference, Las Vegas, NV, 2007.

Shah VN, Wingo TL, Anderson ME, Lybrand TP, Chazin WJ, Balsler JR. "Exploring the mechanism of voltage gated sodium channel regulation by calcium." 19<sup>th</sup> Annual MD/PhD Student Conference, Keystone, Colorado, 2003.

### Other Published Work

Menke N, Angus S, Cooper K, Shah V. "A simple 2-D model of cardiac tissue conduction." Proceedings of the Santa Fe Institute Complex Systems Summer School, August 2007.

Poynton MR, ShahVN, BeLue R, Mazzota B, Beil H, Habibullah S. "Computer terminal placement and workflow in an emergency department: An agent-based model." Proceedings of the Santa Fe Institute Complex Systems Summer School, August 2007.

Fortney K, Pahle J, Delgado J, Obernoster G, Shah V, Wojnowicz M, Qaisar N. "Effects of simulated brain damage on small-world neural networks." Proceedings of the Santa Fe Institute Complex Systems Summer School, August 2007.

Shah VN. "Managing diabetes beyond the doctor's office." Letter to the Editor. *The Washington Post*, Saturday June 17, 2006, pA18.

Shah VN. "Mechanisms by which calcium regulates the human cardiac voltage-gated sodium channel hH1." Ph.D. thesis, Vanderbilt University Department of Biochemistry, August 2005.  
<http://etd.library.vanderbilt.edu/ETD-db/available/etd-07292005-141559/>

### Manuscript Peer Reviews:

2005            Research manuscript, *Journal of Biological Chemistry*  
2004            Research manuscript, *Journal of Molecular Biology*

### Grants and Contracts:

2008 – 2011    Stanford FARM Scholar, as above  
2004 – 2005    Contributor, NIH R01 competitive grant renewal, funded  
Principal Investigator: Dr. Jeffrey Balsler. "Cardiac Sodium Channels"  
2004            Contributor, NIH R01 competitive grant renewal, not funded  
Principal Investigator: Dr. Walter Chazin. "Calcium Binding Proteins"  
1994 – 2007    Michigan State ADS/Mowbray and Vanderbilt MSTP as above

### Lectures and Presentations:

2010            "Twitch, Tetanus, and TOF as Indices of Recovery from Nondepolarizing NMB"  
*Short Talk*, Stanford CA2 Journal Club, with Eric Gross, Evan Serfass, and David Peng  
2009            "Intraoperative PTX During Esophageal Endoscopy Presents with Low Voltage EKG"  
*Poster*, Western Anesthesia Resident Conference, Palm Springs, CA  
2009            "Sudden Onset Low-Voltage EKG During Esophageal Endoscopy"  
*Grand Rounds Talk*, Stanford University Department of Anesthesia  
2008            "Does the brain implement some form of delay coordinate embedding?"  
*Presentation*, Bio-X Imitating Life Conference, Stanford University  
2008            "Does the brain implement some form of delay coordinate embedding?"  
*Presentation*, 12<sup>th</sup> Association for the Scientific Study of Consciousness Conference  
2005            "Mechanisms by which calcium regulates the voltage-gated sodium channel hH1"  
*Presentation*, Vanderbilt Medical Scientist Training Program Annual Retreat  
2005            "Biophysical and structural characterization of the role of calcium in the regulation of the human cardiac voltage-gated sodium channel hH1 (Scn5a, NaV1.5)"  
*Presentation*, Vanderbilt Medical Scientist Training Program Data Club Seminar Series  
2004            "Exploring the role of calcium in the regulation of the cardiac voltage gated sodium channel hH1"  
*Presentation*, Vanderbilt Molecular Physiology and Biophysics Seminar Series  
2004            "Regulation of cardiac voltage gated sodium channel by calcium"  
*Poster*, Vanderbilt Medical Scientist Training Program Annual Retreat  
2003            "Characterization of calcium in the regulation of the cardiac voltage-gated sodium channel hH1"  
*Presentation*, Vanderbilt Discoveries in Biochemistry Seminar Series  
2003            "Two-dimensional NMR spectroscopy"  
*Lecture*, Vanderbilt Biomolecular NMR User's Group Lecture Series  
2000            "Route to a methodology for direct, noninvasive, *in vivo* measurement of neural activity"  
*Presentation*, Vanderbilt Molecular Biophysics Training Program Seminar Series

- 1999 “Usage of voltage sensitive dyes in the determination of the electrical continuity of cells in pancreatic islets”  
*Presentation*, Vanderbilt medical student Introduction to Biomedical Research forum
- 1999 “Progress in protein structure prediction”  
*Lecture*, Vanderbilt Medical Scientist Training Program Seminar Series
- 1998 “The role of alpha-synuclein in Parkinson’s disease pathogenesis”  
*Lecture*, Vanderbilt Medical Scientist Training Program Seminar Series

### Conferences and Workshops:

- 2009 SEA 2009/ASA 2009, New Orleans, LA.
- 2009 WARC 2009, Palm Springs, CA.
- 2008 12<sup>th</sup> Association for the Scientific Study of Consciousness Conference, Taipei, Taiwan.
- 2008 Towards a Science of Consciousness, Tucson, AZ.
- 2007 11<sup>th</sup> Association for the Scientific Study of Consciousness Conference, Las Vegas, NV.
- 2006 Brain Voyager, fMRI Data Analysis Beginner’s Workshop. Nashville, TN.
- 2006 American Society of Anesthesiologists 2006 Annual Conference, Chicago, IL. Medical Student Component delegate from Vanderbilt University.
- 2006 Society for Education in Anesthesia Fall 2006 Conference, Chicago, IL.
- 2006 Vanderbilt University Department of Anesthesia Airway Workshop.
- 2006 10<sup>th</sup> Association for the Scientific Study of Consciousness Workshop and Conference, St. Anne’s College, Oxford, England.
- 2006 Society for Education in Anesthesia Spring 2006 Conference, Nashville, TN.
- 2006 2<sup>nd</sup> Regional Anesthesia and Acupuncture Workshop, Vanderbilt University Department of Anesthesia. Volunteer and participant.

### Professional Organizations:

- AAAS (since 2006)
- Society for Neuroscience (since 2006)
- American Society of Anesthesiologists (since 2006)
- Association for the Scientific Study of Consciousness (since 2005)

### Community and Volunteer Experience (since 1998):

- 2006 – 2007 Anesthesia Interest Group coordinator  
Service on the Department of Anesthesia Medical Student Education Committee
- 2006 Delegate from Vanderbilt University to the American Society of Anesthesiologists Medical Student Component
- 2006 Shade Tree Clinic, student-run volunteer free family clinic
- 2006 Contributor, *The Oar*, guidebook for rising 3<sup>rd</sup> year medical students, “PDA’s”
- 2003 – 2004 Trail work for the Southeastern Climber’s Coalition @ King’s Bluff and T-Wall
- 1999 – 2000 Undergraduate tutoring / mentoring, Vanderbilt University

## **Professional and Research Experience:**

### **Independent Programmer**

Android Application Development

*Redwood City, CA*

Dec 09 – present

- Applications include a voice recognition based task/shopping list manager and text messaging automatic responder

### **Resident – Stanford University Hospitals**

Anesthesiology

*Palo Alto, CA*

June 08 – present

- Research tracked residency in anesthesiology
- Research in the lab of Dr. Sean Mackey working on analyzing fMRI data for evidence of chaotic behavior, analyzing using both region-of-interest and independent component analysis approaches

### **Intern – Banner Good Samaritan Medical Center**

Internal Medicine

*Phoenix, AZ*

June 07 – June 08

- Standard preliminary internship in internal medicine with 7 call months (6 general medicine, 1 ICU)
- Electives included 1 month each of: neurology, ER, cardiology, ICU, and anesthesiology

### **Research Scholar – Santa Fe Institute Complex Systems Summer School**

Complex Systems Theory and Nonlinear Dynamics

*Nashville, TN*

June 07

- Month-long introductory course in the behavior and analysis of chaotic and complex systems.
- Gave tutorial “Introduction to consciousness science”
- Initiated and led a small group project focused on modeling cardiac arrhythmias
- Participated on two other small group projects focused on (1) modeling the effects of aging and pathological brain disorders using simulated damage to artificial neural networks and (2) modeling the effect of computer terminal placement on patient care in the Emergency Room setting using an agent based model.

### **MSTP Trainee – Vanderbilt University Department of Biochemistry**

Calcium-dependent Regulation of Ion Channels

*Nashville, TN*

July 98-May 07

- Conducted hypothesis-driven research under the guidance of Dr. Walter J. Chazin, Ph.D.
- Characterized novel calcium-dependent pathways in the regulation of the channel hH1
- Collaborated with an electrophysiology group to characterize channel function
- Trained incoming students as a senior graduate student including one-on-one mentoring relationships
- Contributed “wisdom” web pages for perpetuation of knowledge/techniques commonly used in the lab
- Contributed to R01 grant applications and to the peer review of candidate articles for publication

### **Computer Programmer – New Century Technologies, Inc.**

Student Data Management

*Nashville, TN*

December 00-July 01

- Writing/troubleshooting ColdFusion web applications as part of the company's consulting services
- Aided in the design and development of a comprehensive web-based student data management system
- Aided in the design and implementation in C++ of a request-based student scheduler module

**Instructor – Kaplan, Inc.**

MCAT (multiple subjects), LSAT & GRE classes, was course director for one semester

*East Lansing, MI*

Spring 97-Spring 98

**Mowbray Minority Scholar – Michigan State/Temple/Vanderbilt**

Computational Design and Organic Synthesis of HIV Integrase Inhibitors

*Philadelphia, PA and Nashville, TN*

Summer 97

- Trained in the usage of molecular modeling software for rational drug design with Dr. Jerome Gabriel, Ph.D. (Temple University) and Dr. William Mitchell, M.D., Ph.D. (Vanderbilt University)
- Designed peptoid (peptide-like) HIV integrase inhibitors using the molecular modeling package InsightII (MSI) on IRIX based Silicon Graphics workstations
- Designed and carry out organic syntheses of peptoid inhibitors
- Developed assays for the identification of compounds effective in the inhibition of HIV integrase

**Professorial Lab Assistant – Michigan State University**

Dendromer Synthesis, supervised by Dr. Rawle Hollingsworth, Ph.D.

*East Lansing, MI*

Fall 94-Spring 96

**Laboratory Assistant – Givaudan-Roure Corp**

Process Development Lab, performing general lab work, including reactions, distillations, and analyses

*Whippany, NJ*

Summer 95

**Skills:**

Computer: Extensive experience with Intel/AMD based PC systems including programming in Visual Basic, ColdFusion, ASP, C++, PERL, SQL, Java/Android; UNIX/Linux and Windows OS operation; and applications such as Office, Adobe, Mathematica, MATLAB, TISEAN (nonlinear time series analysis)

Scientific: Biochemical techniques including bacterial expression, site-directed mutagenesis, protein purification; spectroscopic techniques including circular dichroism, NMR, fluorescence and mass spectrometry; data analysis in Excel, Mathematica; computational sequence analysis; homology modeling of protein structures and protein structure analysis; PubMed and other bioinformatic research tools; analysis of nonlinear/dynamical/chaotic systems

**Personal Interests:**

I enjoy rock climbing, in both sport and traditional styles. I've had the good fortune to be able to climb throughout the United States and would like eventually to tackle a 'big wall' (multi-day route).

I also enjoy traveling. During my leave-of-absence from Vanderbilt in 2001 I took a three month around-the-world trip. Highlights of my trip included visits to the Isle of Skye (Scotland), Rome and the Vatican City, Jerusalem, the Great Pyramids near Cairo, the Tibetan plateau, and Ayer's Rock in Australia. I spent a month in Jerusalem in 2007 doing a rotation at the Hadassah Ein Kerem Medical Center with the Department of Anesthesiology and Critical Care.

Last revision: 2/17/10