

CURRICULUM VITAE  
University of California, San Francisco  
Updated: October 23, 2008

NAME Robert Owen Messing

BIRTH November 11, 1952, Tucson, AZ

NATIONALITY USA

CURRENT TITLE Professor  
Department of Neurology  
University of California, San Francisco

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Emeryville, CA 94608  
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EDUCATION

|         |                         |                 |                   |
|---------|-------------------------|-----------------|-------------------|
| 1970-74 | Stanford University     | 1974 B.A.       | History           |
| 1975-79 | Stanford University     | 1979 M.D.       | Medicine          |
| 1979-80 | University of Virginia  | Intern          | Internal Medicine |
| 1980-81 | University of Virginia  | Resident        | Internal Medicine |
| 1981-83 | Univ. CA, San Francisco | Resident        | Neurology         |
| 1983-84 | Univ. CA, San Francisco | Chief Resident  | Neurology         |
| 1984-86 | Univ. CA, San Francisco | Research Fellow | Neurology         |

LICENSES AND CERTIFICATIONS

|      |  |
|------|--|
| 1980 | National Board of Medical Examiners                    |
| 1981 | Medical license, California G046801                    |
| 1986 | American Board of Psychiatry and Neurology (Neurology) |

EMPLOYMENT

|           |  |
|-----------|--|
| 1984-86   | Clinical Instructor, Neurology, UCSF   |
| 1986-94   | Assistant Professor of Neurology, UCSF   |
| 1986-now  | Principal Investigator, Ernest Gallo Clinic & Research Center, UCSF  |
| 1994-2000 | Associate Professor of Neurology, UCSF   |
| 1984-now  | Attending Neurologist, University of California Hospitals (currently inactive), San Francisco General Hospital (active), San Francisco VA Med. Center (currently inactive) |
| 1995      | Interim Chief of Service, Dept. of Neurology, San Francisco General Hospital   |
| 1995-2000 | Faculty Member, UCSF Program in Biomedical Sciences  |

1997-now Faculty Member, UCSF Center for the Neurobiology of Addiction  
 1997 Consultant, Terrapin Technologies, South San Francisco, CA  
 1997-now Faculty Member, UCSF Graduate Program in Neuroscience  
 1997-now Faculty Member, UCSF Program in Biological Sciences  
 1998-99 Assistant Director, Ernest Gallo Clinic & Research Center at UCSF  
 2000-now Associate Director, Ernest Gallo Clinic & Research Center at UCSF  
 2000-now Professor of Neurology, UCSF  
 2007-now Faculty Member, UCSF Graduate Group in Oral and Craniofacial Sciences  
 2007-now Director, Gallo Center Translational Clinical Research Unit  
 2008-now Director, Alcohol Center for Translational Genetics, NIAAA  
 2008 Adjunct Scientist, Children's Hospital Oakland Research Institute

HONORS AND AWARDS

1972 Phi Beta Kappa  
 1974 Honors in History, Stanford University  
 1984 Sandoz Award for Outstanding Neurology Resident  
 1984-86 National Research Service Award, NIAAA  
 1986-91 Clinical Investigator Development Award, NINDS  
 1988-90 March of Dimes Basil O'Connor Starter Scholar Research Award  
 1995 Robert B. Layzer "Golden Toe" Award for Outstanding Neurology Resident Teaching  
 1999 Visiting Professor, Dept. of Pharmacology, University of Texas, San Antonio, TX  
 2000 Visiting Professor, Dept. of Pharmacology, Univ. of Colorado Health Sciences Center, Denver, CO and Institute for Behavioral Genetics, Univ. of Colorado, Boulder, CO  
 2000 Visiting Professor, Institute for Cellular & Molecular Biology, Univ. of Texas, Austin, TX  
 2002-2012 MERIT Award, NIAAA  
 2002 Visiting Professor, Dept. of Physiology and Neuroscience, Medical University of South Carolina, Charleston, SC  
 2002 Visiting Professor, Bowles Center for Alcohol Studies, University of North Carolina, Chapel Hill, NC  
 2004 Visiting Professor, Department of Neuroscience and Physiology, SUNY, Syracuse, NY  
 2004 Nominee, Kaiser Awards for Excellence in Teaching  
 2004-now Endowed Chair in Neurology in Honor of the Gallo Family  
 2007 Alberta Heritage Foundation for Medical Research Visiting Lecturer Award  
 2007 UCSF Medical Student Nominee for AOA Faculty Membership

PROFESSIONAL ACTIVITY

MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS:

1981-now American Academy of Neurology  
 1984-2006 American Association for the Advancement of Science  
 1985-now Society for Neuroscience

1989-now Research Society on Alcoholism  
 1991-now International Society for Biomedical Research on Alcoholism  
 1992-now American Society for Biochemistry and Molecular Biology  
 1994-2000 American Epilepsy Society  
 1996-now American Neurological Association  
 2004-now American Society for Pharmacology and Experimental Therapeutics

SERVICE FOR PROFESSIONAL ORGANIZATIONS:

1991-93 Research Society on Alcoholism, Publications Committee  
 1992 Research Society on Alcoholism Annual Meeting, Session Co-chair  
 1992 Research Society on Alcoholism, Program Committee, *ad hoc* Member  
 1992, 2002 The Wellcome Trust, Grant Reviewer  
 1993 Research Society on Alcoholism, symposium “Neurotrophic factors and cell adhesion molecules in alcohol neurotoxicity” (Organizer)  
 1995 Research Society on Alcoholism, symposium “Phosphorylation of Membrane Transporters and Channels” (Organizer)  
 1995-96, 2002 Research Society on Alcoholism, Member Program Committee  
 1997 *Ad Hoc* Reviewer for Spinal Cord Research Foundation  
 1997-99 Research Society on Alcoholism, Co-Chair Program Committee (two years)  
 1999 Ohio Cancer Research Associates, Grant Reviewer  
 2000-01 Research Society on Alcoholism, Secretary (two years)  
 2000-2004 Alzheimer’s Association, Initial Review Board of the Medical and Scientific Advisory Council  
 2001-2008 Member, Scientific Advisory Board, The Epilepsy Therapy Development Project  
 2002-now Research Society on Alcoholism, Awards Committee  
 2002 Zaffaroni Innovation Fund for Addiction Research, Stanford University, Grant Reviewer  
 2002 Waggoner Center for Alcohol and Addiction Research, Univ. of Texas at Austin, Grant Reviewer  
 2003-now Medical Advisory Council: Alcoholic Beverage Medical Research Foundation; Chair, 2006-2007  
 2004-2006 Research Society on Alcoholism, Priorities Committee  
 2005 U.K. Medical Research Council, Grant Reviewer  
 2006-now Research Society on Alcoholism, Board of Directors  
 2006-now Research Society on Alcoholism, Nominations Committee  
 2007 Research Society on Alcoholism, symposium “PKC Pathways and Ethanol: from Cells to Behavior” (Co-organizer)  
 2007 Research Society on Alcoholism NIH Peer Review Task Force

SERVICE TO PROFESSIONAL PUBLICATIONS:

1995, 1999-now Editorial Board *Alcoholism: Clinical and Experimental Research*  
 1996-98 Associate Editor *Alcoholism: Clinical and Experimental Research*  
 2005-now Associate Editor *Annals of Neurology*

2007-now

Editorial Board

*Addiction Reviews*

*Ad Hoc Referee To:*

|  |  |
|--|--|
| <i>Alcohol</i>                           | <i>Journal of Neuroscience Research</i>                        |
| <i>Alcohol and Alcoholism</i>            | <i>Journal of Pharmacology &amp; Experimental Therapeutics</i> |
| <i>American Journal of Medicine</i>      | <i>Molecular and Cellular Biology</i>                          |
| <i>Annals of Neurology</i>               | <i>Molecular Biology of the Cell</i>                           |
| <i>Biochemical Pharmacology</i>          | <i>Molecular Pharmacology</i>                                  |
| <i>Biological Psychiatry</i>             | <i>Nature Medicine</i>   |
| <i>Brain Research</i>                    | <i>Nature Neuroscience</i>                                     |
| <i>Chemical Reviews</i>                  | <i>Neurology</i>   |
| <i>Epilepsia</i>                         | <i>Neuron</i>  |
| <i>Gene</i>                              | <i>Neuropsychopharmacology</i>                                 |
| <i>Genes, Brain and Behavior</i>         | <i>Neuroscience and Biobehavioral Reviews</i>                  |
| <i>Journal of AIDS</i>                   | <i>Pharmacology, Biochemistry and Behavior</i>                 |
| <i>Journal of Biological Chemistry</i>   | <i>Pharmacology and Therapeutics</i>                           |
| <i>Journal of Clinical Investigation</i> | <i>Proc. Nat. Acad. Sci. USA</i>                               |
| <i>Journal of Comparative Neurology</i>  | <i>Psychopharmacology</i>                                      |
| <i>Journal of Neurochemistry</i>         | <i>Western Journal Medicine</i>                                |
| <i>Journal of Neuroscience</i>           |  |

INVITED PAPERS, LECTURES, AND PRESENTATIONS:

1988

University of Utah, Neurology Grand Rounds, "Neurocysticercosis"  
University of Utah, Neurology Research Seminar, "Calcium Channels and Adaptation to Alcohol"  
Children's Hospital of San Francisco, "Lyme Disease"  
Kaiser-Permanente Hospital, Oakland, CA, Neurology Rounds, "Neurocysticercosis"  
International Medical Advisory Conference, Alcoholic Beverage Medical Research Foundation,  
"Calcium Channels and Adaptation to Alcohol"

1989

San Francisco Neurological Society, "Lyme Disease"  
St. Mary's Hospital, San Francisco, Grand Rounds, "Lyme Disease"  
Winter Conference on Brain Research, Snowbird, UT, "Calcium Channels and Adaptation to Alcohol"

1990

Kaiser-Permanente Hospital, Oakland, CA, Neurology Rounds, "Lyme Disease"  
NIAAA Conference on Pharmacologic Aspects of Ion Channel Function, Annapolis, MD, "Calcium Channels and Adaptation to Alcohol"

1991

Sutter Neuroscience Center Annual Symposium, Sacramento, CA, "Coma: An Update"

1992

International Society for Biomedical Research on Alcoholism, Bristol, UK, "Calcium Channels, PKC and Adaptation to Alcohol"

Symposium: "Alcohol, Cell Membranes and Signal Transduction", University of Lund, Sweden, "Calcium Channels, PKC and Adaptation to Alcohol"

University of Colorado Neurology Grand Rounds, Denver, CO, "Regulation of Calcium Channels by Alcohol"

University of Colorado, Department of Pharmacology Seminar, Denver, CO, "Adaptive Responses to Ethanol Mediated by PKC Delta and Epsilon"

1993

Amgen Inc., Thousand Oaks, CA, "Adaptive Responses to Ethanol Mediated by PKC Delta and Epsilon"

86th Nobel Symposium, Karolinska Institutet, Stockholm, Sweden, "Adaptive Responses to Ethanol Mediated by PKC Delta and Epsilon"

Tampere Brain Research Center, University of Tampere, Finland, "Adaptive Responses to Ethanol Mediated by PKC Delta and Epsilon"

1994

SFGH Cardiology Division Seminar, "Calcium channels, PKC and Adaptation to Alcohol"

International Society for Biomedical Research on Alcoholism, Gold Coast, Australia, "Adaptive Responses to Ethanol Mediated by PKC Delta and Epsilon"

1996

Research Society on Alcoholism, Washington, DC, "Regulation of N-type Calcium Channels by Ethanol"

Terrapin Technologies, Inc., South San Francisco, CA, "Adaptive Responses to Ethanol Mediated by PKC Delta and Epsilon"

1997

Stanford University, Neurology Grand Rounds, "Adaptive Responses to Ethanol Mediated by PKC Delta and Epsilon"

Symposium "Ethanol and Protein Kinases", Research Society on Alcoholism, San Francisco, CA, "PKC Epsilon Dependent Enhancement of NGF Signaling by Ethanol"

Satellite Meeting of the RSA on "Ethanol and Intracellular Signal Transduction", San Francisco, CA

UCSF Program in Neurosciences Seminar, "PKC Delta and PKC Epsilon Mediate Adaptive Responses to Ethanol in PC12 cells"

1998

Scripps Research Institute, La Jolla, CA, "PKC Epsilon in Neuronal Function and Adaptation to Ethanol"

Research Society on Alcoholism, Hilton Head, SC, "PKC Epsilon in Neuronal Function and Adaptation to Ethanol"

International Society for Biomedical Research on Alcoholism, Copenhagen, Denmark, "PKC Epsilon in Neuronal Function and Adaptation to Ethanol"  
Satellite Meeting of International Society for Biomedical Research on Alcoholism on "Ethanol and Intracellular Signaling: From Molecular to Behavior", Lund, Sweden  
Imperial Cancer Research Fund, London, UK, "PKC Epsilon in Neuronal Function and Adaptation to Ethanol"  
Department of Laboratory Medicine, Molecular Medicine, University of Lund Hospital, Malmö, Sweden, "PKC Delta and Epsilon Regulate Multiple Responses to Alcohol *In Vivo* and *In Vitro*"  
FASEB Conference "Protein Kinase C", Tahoe City, CA, "The Role of PKC Epsilon in Nociception"  
Society for Neuroscience Satellite Symposium: Applications of Gene Knockout Techniques to Alcohol Research, Los Angeles, CA, "Knockout Mice to Study the Role of PKC Epsilon in Responses to Alcohol"  
10<sup>th</sup> International Conference on Second Messengers & Phosphorylation, Jerusalem, Israel, "Phenotypes in PKC Epsilon Null Mice"  
Weizmann Institute, Rehovot, Israel, "Phenotypes in PKC Epsilon Null Mice"

1999

UCSF Pain Research Group Seminar: "PKC Epsilon Modulates Nociceptor Sensitization"  
Fetal Alcohol Study Group, Research Society on Alcoholism, Santa Barbara, CA, "PKC Epsilon Regulates Anxiety and Alcohol Responses"  
ASBMB Fall Symposium: "Ethanol and Cell Signaling", Tahoe City, CA, "Decreased Anxiety and Downregulated HPA Axis in PKC Epsilon Null Mice"  
Department of Pharmacology, University of Texas, San Antonio, TX, "PKC Epsilon Regulation of GABA<sub>A</sub> receptors"  
NIEHS symposium "Calcium Channels: Critical Targets of Toxicants and Diseases", Durham, NC, "Calcium Channels and Alcohol"

2000

Eli Lilly, "Protein Kinase C Epsilon in Pain and Anxiety" Indianapolis, IN  
Keystone Symposium: Protein Kinase C, "Protein Kinase C  $\epsilon$  in Nervous System Function" Taos, NM  
Experimental Biology 2000, "PKC Isozymes: Lessons from Knockout Mice" San Diego, CA  
Institute for Behavioral Genetics, Univ. of Colorado, "PKC $\epsilon$  and the Nervous System" Boulder, CO  
Department of Pharmacology, Univ. of Colorado Health Sciences Center, "PKC $\epsilon$  in Neuronal Function" Denver, CO  
International Society for Biomedical Research on Alcoholism, "PKC Epsilon-Regulates Sensitivity of GABA-A receptors to Allosteric Agonists" and "Strategies for Targeted and Regulated Knockouts", Yokohama, Japan  
Dept. of Molecular Biology, Yokohama University, "Protein Kinase C Epsilon in Neuronal Function" Yokohama, Japan  
NIAAA Intramural Program, "Protein Kinase C Epsilon in Neuronal Function" Bethesda, MD  
Institute for Cellular and Molecular Biology, University of Texas, Austin, TX, "Protein Kinase C Epsilon in Neuronal Function"

2001

- UCSF Frontiers in Neurology and Neuroscience, San Francisco, CA, "Neurology of Addiction"
- NIAAA Intramural Program, Bethesda, MD, "Regulation of Alcohol Consumption, Anxiety and Pain by PKC Epsilon"
- UCSF/Gallo Center Symposium: Neurobiology of Alcoholism and Addiction, San Francisco, CA, "Regulation of GABA<sub>A</sub> Receptors and Alcohol Consumption by Protein Kinase C Epsilon"
- Research Society on Alcoholism, Montreal, Canada, "Tetracycline-regulated Expression of PKCε Regulates Alcohol Consumption"
- Molecular Mechanisms of Alcohol and Anesthetic Action, Philadelphia, PA, "Regulation of GABA<sub>A</sub> Receptors and Related Behaviors by Protein Kinase C"
- California Society of Addiction Medicine, Los Angeles, CA, "Transgenic Mouse Models in Discovering Drugs to Treat Addiction"
- Elan Pharmaceuticals, South San Francisco, CA, "PKCε Modulates Pain, Anxiety, and Alcohol Self-Administration"
- Society for Neuroscience, Satellite Symposium: Neurogenetics of Alcoholism, San Diego, CA, "Genetic Manipulations in Mice to Identify Proteins that Regulate Responses to Alcohol"
- American College of Neuropsychopharmacology, Waikaloa, HI, "PKCε Regulates Alcohol Consumption and Anxiety"

2002

- American Society of Addiction Medicine 33<sup>rd</sup> Annual Meeting, Atlanta, GA, "Identification of Possible Therapeutic Targets by Gene Targeting in Mice"
- The Scripps Research Institute, La Jolla, CA, "Behavioral Responses to Alcohol in PKCε and ENT1 Null Mice"
- The Buck Institute, Novato, CA, "PKCε in the Nervous System: A Tale of Pain, Anxiety, and Addiction"
- Theravance, South San Francisco, CA, "Pain, Addiction and Anxiety: Studies with PKCε Null Mice"
- Dept. of Physiology and Neuroscience, Medical University of South Carolina, Charleston, SC, "Responses to Alcohol and Opiates in PKCε and ENT1 Knockout Mice"
- University of Arizona, Dept. of Neurology Grand Rounds, Tucson, AZ, "PKCε Regulation of GABA<sub>A</sub> Receptors in Anxiety and Addiction"
- NIAAA Workshop: Presynaptic Substrates of Alcohol Action, Bethesda, MD, "PKCε regulation of GABA-ergic Synapses on VTA Dopaminergic Neurons Modulates Alcohol and Opiate Reward"
- Bowles Center for Alcohol Studies, University of North Carolina, Chapel Hill, NC, "Drugs of Abuse in Mice With Altered Expression of PKCε, PKCδ or ENT1"

2003

- UCSF Neuroscience of Disease Seminar, San Francisco, CA, "Neurology of Addiction"
- Dept. of Neurology and Vollum Institute, Oregon Health and Science Univ., Portland, OR, "PKC Epsilon in Anxiety and Addiction"
- Roche Pharmaceuticals, Palo Alto, CA, "PKC Epsilon in Pain, Anxiety and Addiction"
- IGBMC, CNRS-INSERM, Strasbourg University, France, "PKC Epsilon in Anxiety and Addiction"
- Wheeler Center Fall Retreat, San Francisco, CA, "ENT1 in Alcohol Intoxication, Consumption, and

Relapse”

Dept. of Neurology, VA Health Care System, Harvard University, Boston, MA, “N-type Calcium Channels Modulate Acute Responses to Alcohol and Alcohol Consumption in Mice”  
Wyeth Pharmaceuticals, Cambridge, MA, “PKC $\epsilon$  in Pain, Anxiety and Addiction”

2004

UCSF Department of Psychiatry Grand Rounds, San Francisco, CA, “PKC $\epsilon$  in Anxiety and Addiction”  
Department of Neuroscience and Physiology, SUNY, Syracuse, NY, “Protein Kinase C Epsilon Regulates GABA $_A$  Receptors and Responses to Drugs of Abuse”  
UCSF Child Neurology Research Laboratory, San Francisco, CA, “PKC $\delta$  in Stroke and Responses to Alcohol”  
Research Society on Alcoholism, Vancouver, B.C., Canada, “PKC Epsilon and Delta in the Regulation of GABA $_A$  Receptors and Behavioral Responses to Ethanol”  
Molecular Advances in DAG Signaling, Juan March Foundation, Madrid, Spain, “CNS Phenotypes in PKC Delta Null Mice”  
Plexikon Inc., Berkeley, CA, “PKC $\epsilon$  as a Drug Target in Neurology and Psychiatry”

2005

Kai Pharmaceuticals, South San Francisco, CA, “PKC $\epsilon$  and PKC $\delta$  as Drug Targets in Neurology and Psychiatry”  
Eli Lilly, Indianapolis, IN, “PKC $\epsilon$  as a Drug Target in Neurology and Psychiatry”  
NIAAA, Rockville, MD, “Regulation of Alcohol Responses and GABA $_A$  Receptors by PKC $\epsilon$  and PKC $\delta$ ”  
NIDA, Baltimore, MD, “PKC $\epsilon$  and PKC $\delta$  in Responses to Alcohol, Opiates, and Cannabinoids”

2006

Bay Area General Counsel Group, San Francisco, CA, “Alcoholism and Substance Abuse”  
Dept. of Neuroscience, Univ. of New Mexico, Albuquerque, NM, “PKC $\epsilon$  and PKC $\delta$  in Anxiety and Alcoholism”  
Amgen Neuroscience Meeting, Mission Bay Campus, UCSF, “PKC $\epsilon$  Regulates Nociception and Ab Clearance”  
Frontiers in Neurology and Neuroscience, UCSF, “PKC $\epsilon$  as a Drug Target in Pain: Bench to Bedside”  
Roche, Palo Alto, CA, “PKC $\epsilon$  as a Drug Target in Pain and Anxiety”  
Neuromed Technologies, Vancouver, B.C., Canada, “PKC $\epsilon$  as a Drug Target in Pain and Anxiety”  
Dept. of Molecular and Medical Pharmacology, UCLA, “PKC $\epsilon$  and PKC $\delta$  Regulate GABA $_A$  Receptors, Anxiety and Behavioral Responses to Alcohol”  
Research Society on Alcoholism, Baltimore, MD “Amygdala PKC $\epsilon$  Regulates CRF, Anxiety-like Behavior and Alcohol Consumption”  
Renovis, South San Francisco, CA “PKC $\epsilon$  as a Drug Target in Pain and Anxiety”

2007

Dept. of Physiology and Biophysics, University of Calgary, Calgary, Alberta, Canada, “PKC Regulation of GABA-A Pharmacology and Behavior”

American Psychiatric Association, San Diego CA, "Amygdala Protein Kinase C epsilon Regulates Corticotropin Releasing Factor, Anxiety and Alcohol Self-administration"  
 Dept. of Psychiatry, Yale University School of Medicine, New Haven, CT "Protein Kinase C Regulation of GABA-A Receptor Pharmacology and Behavior"  
 Dept. of Physiology, Northwestern University Feinberg School of Medicine, Chicago, IL, "Protein Kinase C Regulation of GABA-A Receptor Pharmacology and Behavior"  
 Research Society on Alcoholism, Chicago, IL, "PKC $\delta$  Regulates GABA-mediated Tonic Inhibition and Motor Responses to Ethanol"  
 Dept. of Neurology Grand Rounds, Stanford University, Stanford, CA, "Current and Novel Therapeutics for Alcohol Use Disorders"

2008

Central Institute of Mental Health, Dept. of Psychopharmacology, Mannheim, Germany "Protein Kinase C Isozymes as Targets for Anxiety and Alcohol Use Disorders"  
 Alcoholism and Stress: A Framework for Future Treatment Strategies, Volterra, Italy, "Opposing Roles of Amygdala PKC delta and epsilon on Neuropeptide Expression, Anxiety, and Alcohol Consumption"  
 Mayo Clinic College of Medicine, Dept. of Molecular Pharmacology and Experimental Therapeutics, "Sibling Rivalry in the Amygdala: PKC $\delta$  and PKC $\epsilon$  Compete to Control Anxiety and Alcohol Use"  
 International Symposium on Drug Addiction: Mechanisms and Therapeutic Approaches, Kunming, Yunnan, P. R. China, "Molecular Targets for Substance Abuse in the Amygdala"

SERVICE:

UNIVERSITY SERVICE:

UCSF School of Medicine

1985 Examiner, Third Year Medical Student Comprehensive Examination  
 1993 Committee on Curriculum & Educational Policy Course Directors Retreat  
 1993-94 Search Committee for Faculty, Gladstone Inst. of Cardiovascular Disease and Division of Endocrinology, SFGH  
 1993-94 Chair, Search Committee: Clinical Neurologist interested in Alcoholic Neurological Disease  
 1994-95 Search Committee: Chief of Neurology Service, SFGH  
 1994-95 Search Committee: Research Neurologist, SFGH  
 1994-95 Search Committee: AIDS Neurologist, SFGH  
 1994-95 Search Committee: Neuroscientist, Gladstone Institute of Cardiovascular Disease and Dept. of Neurology, UCSF  
 1994, 96, 98 Alpha Omega Alpha Selection Committee  
 1995 Working Group on Faculty Composition and Evaluation  
 1995-96 Search Committee: Associate Professor, Pulmonary Division, SFGH  
 1996-98 Member, Clinical Courses Operating Committee

1996-98 Member, Committee on Curriculum and Educational Policy  
 1998 Search Committee: Neurologist/Neuroscientist, Dept. of Neurology, UCSF and Gladstone Foundation  
 1998 Working Group: Educational Mission and Objectives of UCSF School of Medicine  
 1998 Search Committee: Neuroscience Program Representative, Neuroscience-Neurosurgery Regeneration Research, UCSF  
 1999-2000 Member, UCSF Committee on Animal Research (IACUC)  
 1999, 2000 Organizer, UCSF Neuroscience Annual Retreat  
 1999 Chair, Search Committee for Neurophysiologist, Gallo Center  
 1999 Chair, Search Committee for Mouse Geneticist, Gallo Center  
 2000-02 Search Committee for Vice Chair of Neurology and Chief of Neurology Service SFVAMC  
 2000-02 Search Committee for Director, Ernest Gallo Clinic & Research Center  
 2000-02 Search Committee for Behavioral Pharmacologist, Gallo Center  
 2001 Chair, *Ad Hoc* Promotion Review Committee  
 2002-2005 Steering Committee for Bay Area Screening Center  
 2004-now Search Committee for molecular pharmacologist, Gallo Center  
 2005-now Neuroscience Journal Club Screening Committee  
 2007-2008 Chair, Search Committee for Clinical Research Scientist, Gallo Center  
 2008 Member, Search Committee for faculty member, Gladstone Institute for Neurological Disease

San Francisco General Hospital

1991-95 SFGH Utilization Review Committee  
 1992-98 Member, General Clinical Research Center Advisory Committee  
 1993-95 Search Committee for Associate Director of General Clinical Research Center  
 1997-98 Chair, General Clinical Research Center Advisory Committee  
 1997-99 SFGH Research Committee  
 1997-99 Animal Care Facility SFGH Subcommittee

Department of Neurology

1986 Examiner, Neurology In-service Examination  
 1988-95 SFGH Neurology Service: EEG reading  
 1988, 92, 95 SFGH Neurology Service: Morning Report  
 1989-91, 95, 02, 08 UCSF Neurology Resident Selection Committee  
 1993-98 SFGH Site Director, Neurology 110 Core Clerkship  
 1994-now Neurology Resident Faculty Advisor  
 1996-98 Course Director, Neurology 110 Core Clerkship  
 2000-now Neurology Department Appointments and Promotions Committee  
 2000-2007 Chair, Department Review Committee for non-peer reviewed research proposals  
 2004-now Department Executive Committee

Ernest Gallo Clinic & Research Center

1997-98 Web Site Manager  
 1999-2000 Chair, IACUC  
 1999-2000, 2008 Chair, Animal User's Committee  
 1999-2003 Chair, Drug Discovery Committee  
 1999-2003 Leader, Drug Discovery Program  
 1999-now Faculty Advisor for Transgenic and Gene Targeting Core  
 2000-2003 Vice Chair, IACUC  
 2001-now Faculty Advisor for Histology Core  
 2004-now Gallo Center Executive Committee  
 2005-now Medications Development Program Advisory Committee

**GOVERNMENT SERVICE:**

1986 Air Force Office of Scientific Research, Grant Reviewer  
 1989 Veterans Administration, Grant Reviewer  
 1990 Veterans Administration, Site Visit Team  
 1993 NIAAA, Center Grant Site Visit Team  
 1995 NIAAA, Special Grant Review Committee  
 1996 NIAAA, Special Grant Review Committee  
 1997 NIAAA, Center Grant Review Committee  
 1997 DRG AL/TX 3 Study Section, *ad hoc* Member  
 1998 Member, Special Emphasis Panel (ZAA1-EE-1)  
 1998-2002 DRG AL/TX 3 Study Section, Regular Member  
 2002-2008 Board of Scientific Counselors, NIAAA Intramural Program  
 2003 CSR IFCN1 Study Section  
 2003-now Scientific Advisory Board, Integrative Neuroscience Initiative on Alcoholism-  
 West, NIAAA  
 2003-now Scientific Advisory Board, Portland Alcohol Research Center, Oregon Health and  
 Science University, Portland, OR  
 2004 Special Emphasis Panel CSR ZRG1 IFCN-A (06) (M)  
 2004-2005 Scientific Advisory Board, Integrative Neuroscience Initiative on Alcoholism and  
 Stress, NIAAA

**TEACHING**

Formally Scheduled Classes for UCSF Students (2007-2008 year)

| <b>Course</b>   | <b>Class size</b> | <b>Hours (per yr.)</b> | <b>Contribution</b> |
|---|-------------------|------------------------|---------------------|
| Resident & Med Student Teaching<br>Neurology Core Clerkship | 4                 | 120                    | Attending Physician |

Postdoctoral teaching 8 hours/week (400 hours)

Mentoring of Graduate students, one neurology Resident (30 hours)

TOTAL TEACHING HOURS:

| Year    | Hours           |
|---------|-----------------|
| 2006-07 | 582             |
| 2007-08 | 550 (projected) |
| 2008-09 | 550 (projected) |

POSTGRADUATE COURSES SPONSORED BY UCSF:

|              |  |
|--------------|--|
| 1990         | UCSF Recent Advances in Neurology Course: "Lyme Disease" (1 lecture and syllabus)                            |
| 1992         | UCSF Recent Advances in Neurology Course: "AIDS Update: AIDS Dementia" (1 lecture and syllabus)              |
| 1997, 98, 99 | UCSF CME Course "Neurology for the Primary Care Practitioner: Geriatric Neurology" (2 lectures and syllabus) |

COMMUNITY-SPONSORED COURSES:

|      |  |
|------|--|
| 2005 | Bay Area General Counsel Group Continuing Legal Education Course "Substance Abuse" (1 lecture) |
|------|--|

UNDERGRADUATE STUDENTS MENTORED:

|          |                  | <u>Origin</u>                         |
|----------|------------------|---------------------------------------|
| 1988     | Elizabeth Kiyasu | Yale University                       |
| 1994     | Kamaljit Hundle  | Univ. of Westminster, UK              |
| 1998     | Reid Andersen    | Massachusetts Institute of Technology |
| 2006-now | Lilly Zeng       | University of CA Berkeley             |
| 2006-now | Sarah Paredes    | University of CA Berkeley             |
| 2006-now | Victoria Wang    | University of CA Berkeley             |

GRADUATE STUDENTS MENTORED:

|           |   |
|-----------|---|
| 2001      | Nam-Hee Kim (visiting Biochemistry PhD student from Yonsei Univ., Seoul, Korea) |
| 2002      | Gerard Honig (Ph.D. rotation Neuroscience student, UCSF)                        |
| 2005-2006 | Judith Wong (M.D. student with HHMI Fellowship, UCSF)                           |

NEUROLOGY RESIDENTS MENTORED:

|           |                            |
|-----------|----------------------------|
| 1998-2001 | Asa Abeliovich M.D., Ph.D. |
| 2001-2004 | Anita Koshy, M.D.          |
| 2004-2006 | Anthony Kim, M.D.          |
| 2005-2008 | Emily Ho, M.D., Ph.D.      |
| 2008-now  | Amy Gelfand, M.D.          |

GALLO CENTER SCIENTISTS MENTORED: Origin

|           |   |                            |
|-----------|---|----------------------------|
| 2001-2003 | Janice Williams, Ph.D.  | UCLA; Onyx Pharmaceuticals |
|           | Recent Position: Technical Director, Small Molecule Discovery Center, Dept. of Pharmaceutical Chemistry, UCSF |                            |

2001-now Wen-Hai Chou, Ph.D. University of Texas, San Antonio  
 Current Position: Associate Investigator, Gallo Center at UCSF

2002-now Viktor Kharazia, Ph.D. Stanford University  
 Current Position: Histology Core Director, Gallo Center at UCSF

**UCSF FACULTY MENTORED:**

2003-2007 Vineeta Singh, M.D., Assistant Clinical Professor of Neurology  
 I am the mentor for the basic research component of her K23 award from NINDS  
 2008 Gil Rabinovici, M.D., Clinical Fellow in Neurology

| <b>PAST/CURRENT POSTDOCTORAL FELLOWS</b> | <b>TRAINING PERIOD</b> | <b>INSTITUTION DEGREE EARNED</b> | <b>POSITION OR SOURCE OF SUPPORT</b>   |
|--|------------------------|----------------------------------|--|
| Reina Roivainen, MD, PhD                 | 1991-1993              | U. Tampere, Finland              | Neurologist, Helsinki U. Hospital  |
| Bhupinder Hundle, PhD                    | 1992-1997              | U. California, Berkeley          | European Sales Director, Amaxa, UK   |
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#### PATENTS

##### AWARDED

1. "Use of Inhibitors of Protein Kinase C Epsilon to Treat Pain" US Patents No. 6,376,467, April 23, 2002 and No. 6,686,334, February 3, 2004.
2. "Protein Kinase C Epsilon as Modulator of Anxiety, Alcohol Consumption and Self-Administration of Drugs of Abuse", US Patent No. 6,717,030, April 6, 2004.
3. "Cells and Animals Deficient in Protein Kinase C Epsilon" South Africa Patent No. 2000/7780, May 29, 2002.

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1. "A Novel Signaling Pathway for the Production of Inflammatory Pain and Neuropathy", US Patent Application No. 20030008807, Jan 9, 2003.
2. "Methods for Modulating a Drug-related Effect on Behavior". US Patent Application No. 20050054574, August 5, 2004.
3. "Use of Inhibitors of Protein Kinase C Epsilon to Treat Pain" European Patent Application No. 99932296.9, 2006.
4. "Novel Protein Kinase C Epsilon Antagonists" US Patent Application No. 60/771,263, February 15, 2006.
5. "Protein Kinase C Epsilon as Modulator of Anxiety, Alcohol Consumption and Self-Administration of Drugs of Abuse", US Patent Application No. 20070039064, Feb. 15, 2007; US Patent Application No. 20070039063, Feb. 15, 2007.
6. "Modulation of Epac, phospholipase C epsilon, and phospholipase D to treat pain" US Patent Application No. 20070060548, March 15, 2007.

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- | **83-82.** Qi Z-H, Song M, Wallace MJ, Wang D, Newton PM, McMahon T, Zhang C, Shokat KM, **Messing RO**. Protein kinase C epsilon regulates γ-aminobutyrate type A receptor sensitivity to ethanol and benzodiazepines through phosphorylation of γ2 subunits. *J. Biol. Chem.* 282:33052-33063, 2007.
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## CURRENT RESEARCH INTERESTS

I am interested in discovering new molecular targets to modify behaviors related to substance abuse and co-morbid conditions, such as anxiety and pain. Studies in cell culture and in model systems such as *Drosophila melanogaster* have identified signaling proteins important for acute and chronic responses to ethanol and other drugs of abuse. We use gene targeting and RNA interference in rodents to understand the role of these proteins in behavior and to determine if they are targets for development of new therapeutic agents to treat addiction. Current projects include:

**Protein kinase C (PKC) $\epsilon$ :** We found that PKC $\epsilon$  null mice show: (1) supersensitivity to drugs that activate GABA $_A$  receptors; (2) decreased acute tolerance to ethanol and decreased ethanol self-administration; (3) decreased anxiety; and (4) decreased hyperalgesia associated with inflammation or alcoholic polyneuropathy. We are now investigating mechanisms by which PKC $\epsilon$  modulates GABA $_A$  receptors, are mapping brain regions where PKC $\epsilon$  regulates anxiety and alcohol-related behaviors, and are identifying PKC $\epsilon$  substrates in DRG neurons that mediate PKC $\epsilon$ -dependent hyperalgesia. We have also screened compound libraries and identified a new family of compounds that inhibit PKC $\epsilon$ .

**PKC $\delta$ :** We have generated PKC $\delta$  null mice and found that they are very resistant to intoxication by ethanol and show increased anxiety-like behavior. These findings are associated with reduced responses to drugs that act as agonists at extra-synaptic GABA $_A$  receptors. We are investigating how PKC $\delta$  regulates these receptors and whether this interaction contributes to the behavioral phenotypes we observe in PKC $\delta$  null mice.

**PKC $\zeta$ :** PKC $\zeta$  exists in two forms: the full length enzyme that is widely expressed outside of the nervous system, and a short form termed PKM $\zeta$  that arises from an internal promoter and is expressed mainly in the brain. PKM $\zeta$  has recently been shown to be crucial for the maintenance of spatial and gustatory memories. It may play important roles in persistence of habits, fear, and addictive behaviors. We have generated knockout mice that lack both PKC $\zeta$  and PKM $\zeta$  and are testing them for anxiety and addiction-related behaviors. We are also performing studies in rats using a peptide inhibitor of PKM $\zeta$  to determine if inhibiting PKM $\zeta$  in specific limbic brain regions reduces drug self-administration or prevents relapse to drug seeking after withdrawal.

**PKC substrates:** The catalytic domains of the PKC family are very similar and, as a result, *in vitro* studies have identified very few PKC isozyme-specific substrates. In collaboration with Kevan Shokat's laboratory at UCSF, we have generated PKC $\epsilon$ , PKC $\delta$ , and PKC $\zeta$  variants with mutations in their ATP binding domains to confer sensitivity to inhibitors that are inactive at native kinases. We are expressing these mutant kinases in cells and generating knock-in mice to identify PKC isozyme-specific substrates in neural tissues.

**N-type calcium channels:** We previously found that ethanol inhibits N-type calcium channels and chronic ethanol exposure increases N-type channel density in the brain. We recently found that mice lacking N-type channels show reduced sensitivity to the hypnotic effect of ethanol, altered ethanol reward and reduced ethanol preference compared with wild type mice. We are currently investigating whether novel small molecule N-type channel antagonists reduce ethanol intoxication and decrease drinking in rodents. We are also examining whether levetiracetam, an anticonvulsant that is a partial N-type channel antagonist, reduces drinking in humans.

**RESEARCH SUPPORT:**

**Active:**

63-46 (Messing) 07/01/00 - 06/30/09

Alcohol and Drug Abuse Research Program of the  
State of California/UCSF Dept. of Neurology

*Gene Targeted and Transgenic Mice*

The major goal of this project is to generate transgenic and null mouse models for study of specific genes in alcohol consumption and dependence.

This support is renewable on an annual basis.

5 R37 AA013588-03 (Messing) 05/01/02 - 04/30/12

NIH/NIAAA

*Regulation of GABA<sub>A</sub> Receptors by PKC epsilon*

The major goals of this project are: (1) to determine the mechanism by which PKC epsilon regulates sensitivity of GABA<sub>A</sub> receptors to allosteric agonists and (2) to identify PKC epsilon substrates involved in this process.

This project is a MERIT (Method to Extend Research In Time) award.

1 R01 AA013875-01A2 (3824sc, Levine) 08/01/04 - 05/31/09

NIH/NIAAA (UCSF Consortium)

*Ethanol-induced Symptomatic Peripheral Neuropathy*

The major goal of this project is to identify signaling pathways that mediate hyperalgesia in a rodent model of alcoholic polyneuropathy.

Role: Co-Investigator

W81XWH-05-1-0215 (Messing) 01/15/05-01/14/09

U.S. Department of the Army

*Implementation of a Clinical Translational Research Unit at the Ernest Gallo Clinic and Research Center*

This contract provides funds for infrastructure to facilitate clinical studies by Gallo Center investigators for evaluation of drugs that may decrease alcohol consumption in humans.

WB1XWH-06-1-0159 (Messing) 01/02/06 - 01/02/09

U.S. Department of the Army

*Responses to ethanol in mice lacking DGK $\zeta$ , DGK $\iota$ , or PDK1*

The goal of this project is to examine behavioral responses to alcohol in mice lacking each of the above genes and compare results with those from mice that lack PKC $\gamma$  or PKC $\epsilon$ .

W81XWH-07-1-0078 (Messing) 01/15/07 - 01/14/09

U.S. Department of the Army

*PKC Delta Regulation of Response to Ethanol*

The hypothesis to be tested in this project is that PKC delta regulates behavioral responses to ethanol through actions at the subtype of GABA<sub>A</sub> receptors that contain  $\alpha 4$  and  $\delta$  subunits and mediate tonic inhibition in neurons.

1P01 DE-04-006-01 (Levine)

09/01/07 – 6/30/12

NINDS

*Receptors and Second Messengers for Pain and Analgesia*

Role on Project: PI for Project 2 “PKC $\epsilon$  substrates that mediate nociceptor sensitization”

This is a component of a program project to examine whether the tetrodotoxin-resistant sodium channel Na<sub>v</sub>1.8, the N-type calcium channel Cav2.2, and the polymodal receptor TRPV1 are substrates of PKC $\epsilon$  in DRG neurons and mediate nociceptor sensitization by PKC $\epsilon$ .

1 P50 AA017072-01 (Messing)

05/20/08 – 04/19/13

NIAAA

*Alcohol Center for Translational Genetics*

Role on Project: Center Director and Co-Director for Transgenic and Imaging Core Component.

This is a center whose goals are (1) to determine the validity of novel proteins identified in invertebrate genetic screens or in *ex vivo* and *in vitro* studies as targets for development of therapeutics for treating alcohol use disorders and (2) to investigate whether the genes that encode these proteins are associated with risk of alcohol use disorders in humans.

2 R44 AA014843-02 (Wu)

09/20/2007 – 08/31/2009

NIAAA

*Preclinical Development of Selective PKC epsilon Inhibitors to Treat Alcoholism*

Role on Project: Collaborator.

This is an SBIR II to develop a hit compound as a PKC epsilon inhibitor through synthesis and evaluation of analogs *in vitro* and in animal models.

### **Pending**

1R01AA018316-01 (Messing)

*PKC Delta in Ethanol Regulation of GABA-A Receptors and Behavior*

The hypothesis to be tested is that PKC delta regulates behavioral responses to ethanol by decreasing the ethanol sensitivity of extrasynaptic GABA<sub>A</sub> receptors.

### **Completed (within last 3 years):**

W81XWH-04-1-0155 (Messing)

01/05/04 - 01/04/06

U.S. Department of the Army

*Identification of Alleles of PKC $\epsilon$  as Risk Factors in Alcohol Use Disorders*

The major goals of this project were to investigate whether (1) the high Level of Response (LR) to alcohol observed in PKC $\epsilon$  null mice reflects enhanced sensitivity or diminished acute tolerance to alcohol, (2) whether high LR in PKC $\epsilon$  null mice is associated with altered ethanol reward, aversion, and reinforcement in a gene dose-dependent manner, and (3) if there are functional coding variants of human PKC $\epsilon$  that are associated with altered LR and risk of alcoholism.

DAMD17-03-1-0058 (Messing)

01/15/03 - 01/15/07

U.S. Department of the Army

*Amygdala CRF in Reduced Anxiety and Alcohol Consumption in PKC $\epsilon$  Null Mice*

The major goal of this project was to investigate whether decreased amygdala CRF contributes to reduced anxiety-like behavior and alcohol preference in PKC $\epsilon$  null mice.