

# CURRICULUM VITAE

## ELYSSA B. MARGOLIS

Date prepared: 5-20-11

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### EDUCATION

**Ernest Gallo Clinic & Research Center, USCF**, postdoctoral training 2004-2006

**UCSF/UC Berkeley Joint Graduate Group in Bioengineering** Ph.D. 2003

Major: Neuroscience

Minors: Transport, Drug Design

**Harvey Mudd College, Engineering** BS 1999,

Emphases: Chemical Engineering and Psychology

### CURRENT RESEARCH

*Associate Investigator (January 2010 – Present)*

*Assistant Research Scientist (January 2007 – December 2009)*

*Postdoctoral Fellow (January 2004 - December 2006)*

**Ernest Gallo Clinic & Research Center**

*Advisor: Howard L. Fields, M.D., Ph.D.*

Research in addiction neuroscience investigating the characteristics of neurons sensitive to  $\mu$ ,  $\delta$  and  $\kappa$  opioid receptor agonists in the ventral tegmental area (VTA), a source of dopamine in the reward circuitry of the brain. Focus on determining the specific anatomical targets of opioid sensitive VTA neurons, characterizing the physiological properties of VTA neurons by neurotransmitter content, determining how opioid sensitivities change following alcohol consumption and/or stress, and finding a reliable technique for identifying dopaminergic neurons *in vitro*. Additional effort focused on identifying potential targets for more effective treatments for alcohol abuse, including *in vitro* screening.

- *In vitro* whole cell electrophysiology
- Stereotaxic surgery
- Retrograde tracing of neurons in live animals
- Immunocytochemical methods including TH, GAD, and biocytin/avidin staining
- Confocal microscopy
- Laser capture tissue sampling
- Real time RT-PCR
- siRNA vector design
- iontophoresis

*Doctoral Research*

**UCSF/UC Berkeley Joint Graduate Group in Bioengineering at the Ernest Gallo Clinic & Research Center (April 2000 – December 2003)**

*Advisor: Howard L. Fields, M.D., Ph.D.*

Research in addiction neuroscience determined the effects of  $\kappa$  opioid receptor activation in the VTA. Contrasted these effects with those elicited by  $\mu$  opioid agonists.

- *In vitro* whole cell electrophysiology
- Immunohistochemical methods including TH and biocytin staining
- Time and frequency analysis of spontaneous cell firing during recordings
- *In vivo* microdialysis of dopamine in awake animals

## INVITED LECTURES and TALKS

INRC, Hollywood, FL 2011

Winter Conference on Brain Research, Copper Mountain, CO 2009

INRC, Charleston, SC 2008

Albert Einstein College of Medicine of Yeshiva University, NY, NY 2007

Dopamine 50 Years Congress, Sweden, 2007

Workshop on Neurosystems, Stanford University, Stanford, CA 2007

National Institute of Drug Abuse, Baltimore, MD 2004

## PUBLICATIONS:

### Manuscripts Published in Peer-Reviewed Journals

**Margolis EB**, Hjelmstad GO, Bonci A, Fields HL (2003) Kappa-opioid agonists directly inhibit midbrain dopaminergic neurons. *J Neurosci* 23:9981-9986.

*(EBM contribution: participated in experiment design, collected all data, completed all data analyses, created all figures, and responsible for first draft of manuscript and revisions, corresponding author)*

**Margolis EB**, Hjelmstad GO, Bonci A, Fields HL (2005) Both kappa and mu opioid agonists inhibit glutamatergic input to ventral tegmental area neurons. *J Neurophysiol* 93:3086-3093.

*(EBM contribution: participated in experiment design, collected all data, completed all data analyses, created all figures, and responsible for first draft of manuscript and revisions, corresponding author)*

**Margolis EB**, Lock H, Chefer VI, Shippenberg TS, Hjelmstad GO, Fields HL (2006) Kappa opioids selectively control dopaminergic neurons projecting to the prefrontal cortex. *Proc Natl Acad Sci U S A* Feb 21;103(8):2938-42.

*(EBM contribution: participated in experiment design and hypothesis development, collected electrophysiological data, completed electrophysiological data analyses, created all figures, and responsible for first draft of manuscript and revisions, corresponding author)*

**Margolis EB**, Lock H, Hjelmstad GO, Fields HL (2006) The ventral tegmental area revisited: is there an electrophysiological marker for dopaminergic neurons? *J Physiol* Dec 15; 577(Pt 3):907-24.

*(EBM contribution: participated in experiment design and hypothesis development, collected all data, completed all data analyses, created all figures, and responsible for first draft of manuscript and revisions, corresponding author)*

**Margolis EB**, Mitchell JM, Ishikawa J, Hjelmstad GO, Fields HL (2008) Midbrain dopaminergic neurons: projection target determines action potential duration and dopamine D2 receptor inhibition. *J Neurosci* 28:8906-8913.  
*(EBM contribution: participated in experiment design and hypothesis development, collected all data, completed all data analyses, created all figures, and responsible for first draft of manuscript and revisions, corresponding author)*

**Margolis EB**, Fields HL, Hjelmstad GO, Mitchell JM (2008) Delta opioid receptor expression in the ventral tegmental area protects against elevated alcohol consumption. *J Neurosci* 12672-12681.  
*(EBM contribution: participated in experiment design, collected electrophysiological data, completed electrophysiological data analyses, created all figures, and co-wrote first draft of manuscript and participated in revisions, corresponding author)*

Dobi A, **Margolis EB**, Hui-Ling W, Harvey B, Morales M (2010) Glutamatergic and non-glutamatergic neurons of the ventral tegmental area establish local synaptic contacts with dopaminergic and non-dopaminergic neurons. *J Neurosci* 30(1):218-29.  
*(EBM contribution: responsible for design of electrophysiological experiments, collected electrophysiological data, completed electrophysiological data analyses, created electrophysiology figure, and co-wrote first draft of manuscript and participated in revisions, co-wrote responses to reviewers)*

Xia Y, **Margolis EB**, Hjelmstad GO (2010) Substance P inhibits GABA(B) receptor signaling in the ventral tegmental area. *J Physiol.* 588(9):1541-9.  
*(EBM contribution: participated in hypothesis development, assisted with data analyses, and manuscript writing)*

**Margolis EB**, Coker AR, Driscoll JR, Lemaitre AI, Fields HL (2010) Reliability in the identification of midbrain dopamine neurons. *PLoS One* 5(12):e15222

## Reviews

Fields HL, Hjelmstad GO, **Margolis EB**, Nicola SM (2007) Ventral tegmental area neurons in learned appetitive behavior and positive reinforcement *Annu Rev Neurosci* Mar 15.

## HONORS AND AWARDS

- Poster Award, INRC (2009)
- Winner of the Women's Technology Cluster BioBiz VC competition (2003)
- Finalist in the Berkeley Business Plan Competition (2002)
- Departmental Honors, Engineering Department, Harvey Mudd College (1999)
- Graduation with Distinction, Harvey Mudd College (1999)

## RESEARCH SUPPORT

Wheeler Center for the Neurobiology of Addiction Research Grant (2001)

## ADDITIONAL RESEARCH EXPERIENCE

### **Research Rotation, UCSF/UC Berkeley Joint Graduate Group in Bioengineering (October 1999 – February 2000)**

*Advisor: Theodore E. Cohn, Ph.D.*

UC Berkeley Vision Science Department. Designed and performed experiments testing threshold change light sensitivity in locust photoreceptors. Developed mathematical model of observations.

- *In vivo* intracellular electrophysiology
- Developed Monte Carlo modeling methods to simulate experimental results.
- Visual Basic programming of experimental procedure including noise and real time sensitivity analysis.

### **Engineering Clinic Project Team Leader, Harvey Mudd College (September 1998 – May 1999)**

*Academic Advisor: J. Richard Phillips, Ph.D., Harvey Mudd College*

*Industry Liaison: Marc Privitera, MS, Clorox Services Company*

Project for Clorox Services Company. Developed theoretical model of metal ion removal in filtration system. Empirically determined more effective filtration method.

- Full filtration experimental design including parameter identification, test matrix optimization, and procedure standardization.
- Developed analytical techniques utilizing cyclic voltammetry to measure ppb concentrations of metal ions in standard solutions (for methodological verification) and bleach samples from the filtration experiments.
- As team leader, I was specifically responsible for all project management.

### **Research Intern, National Institutes of Health (Summer 1998)**

*Advisor: Jay Knutson, Ph.D.*

Analyzed and modeled DNA protein fluorescence using least square non-linear regression fits and genetic algorithms. Developed data visualization software.

- Collaborated on statistical algorithms used to find best fit parameters for fluorescence data.
- Designed graphical user interface (Visual C++ on UNIX operating system) for the suite of data fit routines.
- Designed data visualization software optimized to effectively display the processed fluorescence data and to interface seamlessly with the suite of data fit routines.
- Updated, expanded (from 2 dimensions to 3 dimensions), and modified a genetic algorithm (Fortran 77) designed to determine optimal fitting parameters for balancing fit accuracy and data smoothing. Ran extensive testing with the algorithm to determine parameter limits for obtaining this desired balance.

### **Environmental Engineering Research Assistant, Harvey Mudd College (May 1997 – December 1997)**

*Advisor: Mary Cardenas, Ph.D.*

Developed simulations of sediment transport and hydrodynamics of aquatic systems and sorption, convection, and diffusion in saturated soil systems.

- Wrote subroutines (Fortran 77) simulating 3 dimensional flow, secondary flow characteristics and centrifugal centripetal particle acceleration under curved flow conditions for the SEDZYL sediment transport and hydrodynamic modeling program.
- Verified these simulations by modeling experimental data from straight and annular laboratory flow configurations.
- Collaborated on algorithm development for 2-dimensional (space and time), convection, and diffusion model.
- Used the above model to determine the partition, diffusion, and transfer coefficients for various soil and contaminant systems tested at UCSB.

**Engineering Research Assistant, Harvey Mudd College  
(January 1998 – May 1998)**

Developed data processing routines for optical coherence microscope (OCM).

- Built image processing routines using standard *AVS Express* modules.
- Wrote custom modules for *AVS Express* in order to take full advantage of the OCM's simultaneous detection of 3 dimensional tissue layers during image recovery and processing.

**TEACHING AND MENTORING EXPERIENCE**

*Ernest Gallo Clinic & Research Center*

**Mentor** to college research interns (2006, 2009, 2010)

*The United Department of Labor Women's Bureau*

**Mentor**, (2002)

Girls E-Mentoring in Science, Engineering, & Technology (GEM-SET) Program

*UC Berkeley/UCSF Joint Graduate Group in Bioengineering*

**Peer Advisor**, (Spring 2000, 2001)

*Harvey Mudd College*

**Teaching Assistant**, Department of Engineering

Introduction to Chemical Engineering (Spring 1998, 1999)

Chemical Reaction Engineering (Fall 1998)

**Writing Center Consultant** (September 1996 – May 1999)

Responsibilities included one on one non-directive tutoring in all writing genre and presentation styles and leading writing workshops.

*Hudson River Park Conservancy*

**Environmental Supervisor** (Summer 1996)

Responsibilities included designing and implementing an environmental awareness program consisting of scientific research and public educational activities completed on the Hudson River piers in Manhattan.

**PROFESSIONAL MEMBERSHIPS AND CERTIFICATIONS**

Society for Neuroscience, member (2001-present)

Board for Professional Engineers and Land Surveyors, state of CA, EIT Certification (2000)

Society of Women Engineers member (1995-present), President (97-99), Secretary (96-97) of Harvey Mudd College Section

**SERVICE TO PROFESSIONAL PUBLICATIONS**

Journal reviewer, *Journal of Neuroscience*, *European Journal of Neuroscience*, *Neuroscience Letters*

**SERVICE TO OTHER PROFESSIONAL ORGANIZATIONS**

Grant reviewer, *NWO*

## COMMITTEES AND LEADERSHIP POSITIONS

Representative to the Bioengineering Association of Students at UCB/UCSF (2003)

Organizer of the Bioengineering Research Forum at UCB/UCSF (2003)

Qualifying Exam Advisor for the UCSF/UC Berkeley Joint Graduate Group of  
Bioengineering (2001-2002)

Head Peer Advisor for UCSF/UC Berkeley Joint Graduate Group in Bioengineering  
(2000-2001)

Outdoors Event Coordinator for UCB/UCSF bioengineering graduate students (1999-2000)

## COMMUNITY/PUBLIC SERVICE

Berkeley Art Center web mistress (2001-2009)

Empowering Women of Color Conference: organizing committee member & web mistress  
(2000-2002)

## SKILLS

**Laboratory Techniques:** Intracellular and whole cell electrophysiology, brain tissue immunocytochemistry, laser capture tissue sampling, real time RT-PCR, stereotaxic surgery, confocal and fluorescent microscopy, iontophoresis

**Operating Systems:** UNIX, Windows 2000 and XP, Mac OS X

**Programming Languages:** C/C++, FORTRAN, UNIX Shell Scripts, Perl, Motif, HTML, Visual Basic, PHP

**Software Packages:** Mathematica, AVS Express, Microsoft Office, Matlab, Simulink, IGOR, MySQL, AxioVision, Adobe Creative Suite