

## University of California, San Francisco

### CURRICULUM VITAE

**Name:** **Esteban González Burchard, M.D., M.P.H.**  
**Position:** Professor and Vice Chair  
 Harry Wm. and Diana V. Hind Distinguished Professorship in Pharmaceutical Sciences  
 Departments of Bioengineering and Therapeutic Sciences and Medicine  
 Schools of Pharmacy and Medicine

**Address:** Room 584D, Box 2911  
 University of California, San Francisco  
 San Francisco, CA 94143-2911

Voice: (415) 514-4365  
 Email: [Esteban.Burchard@ucsf.edu](mailto:Esteban.Burchard@ucsf.edu)  
 www: <http://pharm.ucsf.edu/burchard/>

#### EDUCATION:

1990	San Francisco State University, CA	BS	Cellular & Molecular Biology
1995	Stanford University School of Medicine, CA	MD	Medicine
1997	Harvard School of Public Health, MA	Certificate	Program in Clinical Effectiveness
1995-1998	Brigham and Women's Hospital, MA	Resident	Internal Medicine
1998-2001	University of California, San Francisco	Fellow	Medicine
2001-2002	Stanford University		Genetic Epidemiology
2005-2006	University of California, Berkeley	MPH	Epidemiology

#### LICENSES, CERTIFICATION:

1997	DEA Certification – BB5352632
1998	California Medical License – A065084
1999	Board Certified, Internal Medicine
2000	Board Certified, Pulmonary Medicine
2001	Board Eligible, Critical Care Medicine

#### PRINCIPAL POSITIONS HELD:

2001-04	University of California San Francisco	Asst. Adjunct Professor	Pulmonary & Critical Care
2004-08	University of California, San Francisco	Asst. Professor	Biopharmaceutical Sciences
2008-2011	University of California San Francisco	Assoc. Professor	Biopharmaceutical Sciences
2010-present	University of California San Francisco	Vice Chair	Bioengineering and Therapeutic Sciences
2011-present	University of California San Francisco	Professor	Bioengineering and Therapeutic Sciences

**OTHER POSITIONS HELD CONCURRENTLY:**

2001-present	UCSF	Director, UCSF Asthma Collaboratory
2001-2010	UCSF	Director, DNA Bank Core Facility
2004-2008	UCSF	Associate Director, Clinical Pharmacology Training Program
2007-2014	Kaiser Permanente	Adjunct Investigator, Division of Research
2008-present	UCSF	Director, Clinical Pharmacology Training Program T32
2008-present	UCSF	Director, Center for Genes, Environments & Health
2010-present	UCSF	Co-Director, UCSF Career Development Program in Omics of Lung Diseases (K12)

**HONORS AND AWARDS:**

1988, 1989	NCAA Div. II Academic All-American Honors, Wrestling
1990	Stanford Medical Scholar
1991	Pfeiffer Research Scholar
1992-93	National Hispanic Scholarship Fund
1992-93	National Medical Association Fellowship
2005-10	Robert Wood Johnson Amos Medical Faculty Development Scholar
2009	American Society of Clinical Investigators
2009	Guest Speaker, Tavis Smiley Show
2010	Guest Speaker, NPR's Science Friday, hosted by Ira Flatow
2011	Athletic Hall of Fame, San Francisco State University
2013	Harry Wm. and Diana V. Hind Distinguished Professor in Pharmaceutical Sciences II
2013	American Museum of Natural History (AMNH) Documentary on Esteban Burchard and his research. This documentary will be exhibited at the AMNH for two years and distributed to all U.S. public high schools.
2013	Guest Speaker, Smithsonian Institution National Museum of Natural History (NMNH)
2014	UCSF Medal. The UCSF Medal is UCSF's most prestigious award, given to individuals who have made outstanding personal contributions in the areas associated with the University's mission, goals and values.
2015	National Academy of Sciences, Engineering and Medicine, Committee on Incorporating 21 <sup>st</sup> Century Science into Risk-Based Evaluations
2015	Precision Medicine Initiative, Advisory Committee to the Director
2016	Innovations in Health Equality - Lifetime Achievement Award

**KEYWORDS/ AREAS OF INTEREST:**

Asthma, Pharmacogenetics, Admixture, Population Genetics, Race/Ethnicity and Genetics, Pulmonary & Critical Care Medicine, Underserved Populations, Minority Recruitment

**PROFESSIONAL ACTIVITIES****SUMMARY OF CLINICAL ACTIVITIES**

Attending Physician, Pulmonary Consult Service, San Francisco General Hospital

**PROFESSIONAL ORGANIZATIONS:****Memberships**

1998	California Thoracic Society
1998	American Thoracic Society
1998	American College of Chest Physicians
1995	American College of Physicians
2001	American Society of Human Genetics

- 2004 National Medical Association
- 2004 American Society for Clinical Pharmacology and Therapeutics

**SERVICE TO PROFESSIONAL PUBLICATIONS:**

**Reviewer:**

- 2001-present New England Journal of Medicine
- 2001-present Journal of the American Medical Association
- 2001-present American Journal of Human Genetics
- 2001-present Nature Genetics
- 2001-present Pediatrics
- 2001-present American Journal of Respiratory and Critical Care Medicine
- 2001-present Genes and Immunity
- 2001-present European Respiratory Journal
- 2001-present Human Genetics
- 2001-present Journal of Allergy and Clinical Immunology
- 2001-present Chest
- 2001-present Journal of the National Medical Association

**INVITED PRESENTATIONS:**

**INTERNATIONAL**

- 2010 Puerto Rico - U.S. Food and Drug Administration. First Latin American Conference on Pharmacogenetics, Invited Speaker
- 2010 Taiwan - Academia Sinica, Invited Speaker
- 2014 Imperial College, London, England
- 2014 University of Laguna, Canary Islands, Spain
- 2015 India Genomics, Hyderabad, India
- 2015 Precision Medicine Peru, Lima, Peru

**NATIONAL**

- 2010 American Society of Human Genetics, Invited Speaker
- 2011 University of Pennsylvania, Pulmonary Grand Rounds
- 2011 University of Puerto Rico, Medical Grand Rounds
- 2011 American Thoracic Society
- 2011 Key Note Speaker, UCLA Department of Genetics Retreat
- 2011 Society for the Advancement of Chicanos & Native Americans (SACNAS), Invited Speaker
- 2012 University of Miami, Invited Speaker
- 2012 Pharmacogenetic Research Network
- 2012 California Asthma Summit
- 2013 Harvard's Brigham and Women's Hospital, Asthma Grand Rounds
- 2014 American Thoracic Society, International Meeting
- 2015 Medical Grand Rounds, UCLA – Olive View, Invited Speaker
- 2015 Medical Grand Rounds, Chicago Memorial, Invited Speaker
- 2015 Exponential Medicine 2015 Conference, Invited Speaker
- 2016 American Thoracic Society

**REGIONAL AND OTHER INVITED PRESENTATIONS**

- 2010 Grand Opening, Department of Bioengineering & Therapeutic Sciences, Invited Speaker
- 2010 Stanford University Department of Medicine Retreat, Keynote Speaker

2010 San Francisco State University Alumni Day, Invited Speaker  
 2011 Medical Grand Rounds, UCSF, Invited Speaker  
 2011 Genentech Invited Speaker  
 2013 Genentech Invited Speaker  
 2014 University of San Francisco, Symposium on Race & Genetics  
 2015 Stanford University Medical School Alumni Reunion, Invited Speaker  
 2015 Genentech, Invited Speaker  
 2015 Dreamforce 2015 Health Disparities, Invited Speaker  
 2015 University of California, San Francisco Otolaryngology Conference, Invited Speaker

#### **GOVERNMENT AND OTHER PROFESSIONAL SERVICE:**

2004	NIH	Ad Hoc Advisor: NIH/NIGMS: Committee on Race & Genetics
2004	NIH	Ad Hoc Advisor: NIH/NCI/NIGMS/NHGRI Latino Genetics Community Consultation Network
2004-05	Amer. Thoracic Society	Advisor: Environment and Occupational Health Assembly
2004-present	NIH	Ad Hoc Reviewer, NIH/NCI
2004-present	NIH	Ad Hoc Reviewer, NIH/NHLBI
2005	NIH	Ad Hoc Advisor: NIH/NCI: Committee on Admixture and Latino Populations
2007	NIH	Observational Study Monitoring Board (OSMB) for the Hispanic Community Health Study - Study of Latinos (HCHS-SOL)
2009-present	NIH	Study Section Member, Genetics of Health & Disease
2013-present	Amer. Thoracic Society	Health Equity Committee
2015	NIH	Advisor to the NIH Deputy Director, President Obama's Precision Medicine Initiative
2015	NIH	Advisor, National Academy of Sciences, Board on Environmental Studies and Toxicology

#### **UNIVERSITY AND PUBLIC SERVICE**

##### **UNIVERSITY SERVICE:**

##### UCSF CAMPUS-WIDE:

2003-05 Chancellor's Advisory Committee on Diversity

##### SCHOOL OF PHARMACY:

2005-present School of Pharmacy Diversity Task Force

##### DEPARTMENTAL SERVICE:

2006-present Member, Selection Committee for UCSF Pharmaceutical Sciences and Pharmacogenetics (PSPG) Graduate Student Program  
 2009 Faculty Search Committee, UCSF Cardiovascular Research Institute (CVRI)  
 2009 Faculty Search Committee, UCSF Department of Epidemiology & Biostatistics  
 2009 Chair, Faculty Search Committee, Bioengineering & Therapeutic Sciences (BTS)  
 2014 Chair, Faculty Council, School of Pharmacy

**PUBLIC SERVICE:**

1991-1993 Minority Student Recruiter, Stanford University School of Medicine  
 1991-1993 Graduate Student Council Member, El Centro Chicano de Stanford  
 1991-1993 President and Vice President, Stanford Raza Medical Association '92-'93, '91-'92, respectively  
 1992-1993 Founder, Stanford Raza Medical Association High School Tutorial Program  
 1992-1995 Committee on Admissions, Stanford University School of Medicine, Minority Admission's Advisory Panel, Member  
 1993-1995 Assistant Team Physician, Stanford University Wrestling Team.  
 1994-1995 Instructor - Student Rounds  
 1995-1997 Founder: Jamaica Plain Scholars, Jamaica Plain, MA  
 1995-1998 Host Family - house minority undergraduate students, medical students, and physicians at Stanford University Medical Center, Stanford University School of Medicine and Brigham and Women's Hospital, Boston  
 1995-1998 Medical Student Advisor - Harvard Medical School  
 1995-1998 House Staff Selection Committee, Brigham and Women's Hospital, Member  
 1995-1998 Presidential Oversight Committee on Diversity, Brigham and Women's Hospital, Member  
 1998-2000 UCSF Department of Medicine Diversity Task Force, Member  
 1999-present SF Unified School District, Volunteer Speaker  
 2000-present UCSF Department of Medicine Residency Program House-staff Selection Committee Member  
 2002-present UCSF Division of Pulmonary and Critical Care Fellowship Selection Committee Member  
 2009-2013 Wrestling Coach (Volunteer), Athenian High School

**SUMMARY OF SERVICE ACTIVITIES**

I have been very active in promoting the scientific benefits of including racially-diverse populations in clinical and biomedical research. I have been active in diversifying the clinical and biomedical work force. Part of my goal is to speak publicly about my science and my personal journey.

**TEACHING AND MENTORING****FORMAL SCHEDULED CLASSES FOR UCSF STUDENTS:**

Qtr	Academic Year	Course No. Title	Teaching Contribution	Units	Class Size
Winter	1999-2012	IDS 102AB, Organ Block	Lecturer	10	142
Spring	2004-present	PSPG245C/BTS 135, Principles of Pharmacogenomics	Lecturer	2	20
Spring	2004-present	BPS 134, Study Designs	Lecturer	2	8
Spring	2004-present	BTS 115, Genetics & Pharmacogenetics	Lecturer	10	122
Fall	2006-present	Med 140.22, Therapeutics	Lecturer	2	20
Fall	2011-present	Genetics	Lecturer	2	122

**FEATURED SCHEDULED CLASSES FOR UC BERKELEY STUDENTS:**

Qtr	Academic Year	Course No. Title	Teaching Contribution	Units	Class Size
Winter	2004-2008	PH295, Special Topics in Human Genetics and Genetic Epidemiology	Lecturer	2	25

**PREDOCTORAL STUDENTS SUPERVISED OR MENTORED**

<b>Dates</b>	<b>Name</b>	<b>Program or School</b>	<b>Role</b>	<b>Current Position</b>
2001-2003	Stacy Ly	Medical Student	Research Year Advisor	Physician, University California, Davis
2003-2005	Keyan Salari	Medical Student	Research Year Advisor	Urology Resident, Harvard Medical
2004-2006	Mariam Naqvi	Medical Student	Research Year Advisor	OBGYN Stanford University
2004-2006	Natalie Battle	Medical Student, III	Research Year Advisor	Internal Medicine, Washington University
2004-2008	Max Seibold	BMS, grad student	PhD Mentor	Asst. Prof., National Jewish Health Center
2006-2008	Anthony De Giacomo	Medical Student, III	Research Year Advisor	Orthopedic Surgeon, Boston University
2009	Vanessa Aguilera	UCSF SRTP, Graduate Student	Research Year Advisor	Sr. Manager, Quality Improvement & Risk Management, Industry
2006-2012	Katherine Drake	BMS, graduate student	PhD Mentor	Staff Scientist, GENSIGNIA
2009-2013	Chris Gignoux	BMS, graduate student	PhD Mentor	Post-doctoral, Stanford
2011-2014	Katherine Nishimura	graduate student	PhD Mentor	Post-doc, Fred Hutchinson Cancer Research Center
2013-2014	Nicolás E. Barceló	Medical Student, III	Research Year Advisor	Medical Student IV, UCSF
2013-2015	Melissa Spear	BMS, graduate student	PhD Mentor	Graduate Student, UCSF

**POSTDOCTORAL FELLOWS AND RESIDENTS DIRECTLY SUPERVISED OR MENTORED**

<b>Dates</b>	<b>Name</b>	<b>Fellow</b>	<b>Faculty Role</b>	<b>Current Position</b>
2003-2004	Natasha Coyle	Post-Doc Researcher	Research Advisor	Research Scientist, Applied Bio Systems
2003-2006	Hui Ju Tsai	Post-Doc Researcher	Research Advisor	Asst. Prof., Taiwan
2005	Yuhjung J. Tsai	Clinical Fellow	Research Advisor	Clinical Practice
2006-2008	Clarence Gillett	Post-Doc Researcher	Research Advisor	Research Scientist, Dow Chemical
2007-2010	Marc Via	Post-Doc Researcher	Research Advisor	Asst. Prof., University of Barcelona
2007-2010	Melinda Aldrich	Post-Doc Researcher	Research Advisor	Asst. Prof., Vanderbilt University
2010-2012	Sam Oh	Post-Doc Researcher	Research Supervision	Research Asst, UCSF
2012-2014	Maria Del Pino Yanes	Post-Doc Researcher	Research Advisor	Asst. Prof., Hospital Universitario N.S. de Candelaria
2013-Now	Meghan McGarry	Clinical Fellow	Research Advisor	UCSF, Pediatrics
2014-Now	Marquitta White	Post-Doc Researcher	Research Supervision	Post-doc

**INFORMAL CLINICAL TEACHING:**

2001-10/2006 Chest Clinic: 5 hours per week, 7 fellows  
 2001-2006 Intensive Care Unit: clinical teaching hours = 80 hrs.  
 2001-2013 Pulmonary Consult Service: clinical teaching hours = 80 hrs.  
 2004-present Clinical Pharmacology: 2 hours per week, 7 fellows

**FACULTY MENTORED**

<b>Dates</b>	<b>Name</b>	<b>Position while Mentored</b>	<b>Mentoring Role</b>	<b>Current Position</b>
2002-2007	Shannon Thyne	Prof., Pediatrics, UCSF	Academic and Research Collaborator/Advisor	Chief Medical Officer, UCLA, Olive View
2007-2008	Harriet Corvol	Asst. Prof., Pediatrics Hôpital Trousseau, Paris, France	Academic and Research Collaborator/Advisor	Asst. Prof., Pediatrics Hôpital Trousseau, Paris, France
2003-2009	Shweta Choudhry	Research Assistant	Academic and Research Advisor	Asst. Adjunct. Prof., Urology, UCSF
2007-Now	Joshua Galanter	Asst. Prof	Academic and Research Collaborator/Advisor	Asst. Prof., BTS and Pulmonary & Critical Care, UCSF
2010-2015	Dara Torgerson	Asst. Adjunct. Prof.	Academic and Research Collaborator/Advisor	Asst. Adjunct. Prof., UCSF
2011-Now	Neeta Thakur	Asst. Adjunct. Prof.	Academic and Research Collaborator/Advisor	Asst. Adjunct. Prof., Medicine-Pulmonary, UCSF

**SUMMARY OF TEACHING HOURS:**

2013-14 1000 total hours of teaching (including preparation)  
 Formal class or course teaching hours: 30 hours  
 Informal teaching hours: 100 hours  
 Mentoring hours: 400 hours

2014-15 1000 total hours of teaching (including preparation)  
 Formal class or course teaching hours: 30 hours  
 Informal teaching hours: 100 hours  
 Mentoring hours: 400 hours

2015-16 (anticipated) 1000 total hours of teaching

**TEACHING NARRATIVE**

**School of Pharmacy:** I teach two courses: a core genetics course to 122 first year Pharm.D. students and I direct a clinical pharmacology fellowship program for postdoctoral fellows. In the Pharm.D. course I focus on basic topics in genetics, pharmacogenetics, and clinical applications. I also teach novel topics such as the importance of race/ethnicity in biomedical research and clinical practice. I discuss how racial background could confound and enhance genetic studies. Finally, I discuss how racial background could modify response to pharmacologic therapies as well as genetic risk factors. We discuss possible causes for racial and ethnic specific differences in drug response.

**School of Medicine:**

- 1) I teach pulmonary physiology and clinical pathophysiology. We use clinical vignettes to teach in small group settings of approximately 20-25 students. Each class is 2 hours and I teach four classes. I also teach clinical pharmacology.
- 2) I direct the Clinical Pharmacology Training Program. We have weekly didactic teaching sessions, which I either direct or supervise.

**RESEARCH AND CREATIVE ACTIVITIES****RESEARCH AWARDS AND GRANTS:**CURRENT

- T32 GM007546 (PI: Burchard) 07/01/08 - 06/30/20 0.12 CM (1%); without salary  
NIH/NIGMS \$253,028  
Role: Project PI  
Project title: UCSF Clinical Pharmacology and Therapeutics Training Grant  
Goal: To train physician, pharmacist and Ph.D. scientists in clinical and therapeutic actions of drugs in humans.
- 1P60 MD006902 (PI: Bibbins-Domingo) 08/27/12-02/28/17 1.51 CM (10%)  
NIH/NIHMD \$173,527  
Role: Project PI  
Program title: Addressing Disparities in Chronic Disease with a Teen and Young Adult Focus  
Project title: The Genetics of Asthma and Obesity Using Admixture Mapping in Latinos  
Goal: To identify novel genetic variants associated with both asthma and obesity by deep re-sequencing of candidate regions identified through admixture mapping
- R01 HL 117004 (PI: Burchard) 09/01/13-08/31/18 2.51 CM (20.94%)  
NIH/NHLBI \$474,218  
Role: Project PI  
Project title: Pharmacogenomics of Bronchodilator Response in Minority Children with Asthma  
Goal: 1) To perform "Exome Plus" DNA sequencing on the extremes of bronchodilator response among minority children with asthma. 2) To identify genetic variation associated with bronchodilator response. 3) To determine whether promoter variants associated with bronchodilator response modulate gene expression in primary airway smooth muscle cells
- 1K12 HL119997-01 (PI: Erle/Burchard) 09/01/13-5/31/18 0.60 CM (5%)  
NIH/NHLBI \$115,000  
Role: Co-PI  
Project title: UCSF Career Development Program in Omics of Lung Diseases  
Goal: To launch the careers of an outstanding group of next generation scientists equipped to use omics approaches to help transform lung research and pulmonary medicine
- U01 OD019769-01 (PI: Erle/Woodruff) 07/01/14-06/30/19 0.60 CM (5%)  
NIH \$449,517  
Role: Co-PI  
Project title: Defining a Comprehensive Reference Profile of Circulating Human Extracellular RNA  
Goal: To profile extracellular RNAs in multiple body fluids from healthy individuals



U54MD009523 (Marquez-Magana/Bibbins-Domingo) NIH/NIMHD San Francisco State University-Subcontract Role: Subcontract Co-Investigator Project title: "SF State BUILD: Enabling Students to Represent in Science" Goal: Collaborative efforts between UCSF CVP and SFSU to enhance the academic qualifications of the underrepresented minority BUILD scholars and also promote faculty exchanges between the two institutions, thereby transforming both institutions, and strengthening the existing long-term partnership	9/26/14-6/30/19 \$504,731	1.2 CM (10%)
R21ES24844-01 (PIs:Burchard/Gauderman) NIH/NIEHS Role: Co-PI Project title: Gene-Environment Analyses of Early Life Exposures and Asthma in Ethnically Diverse Children Goal: To perform a GxE analyses of early life exposures secondhand tobacco smoke and air pollution vs. incident and prevalent asthma in five racially/ethnically diverse populations of children.	12/1/14-11/30/17 \$132,354	1.2 CM (10%)
(Ballard) Ikaria, Inc Role: Co-investigator Project title: Clinical Trials to Prevent Bronchopulmonary Dysplasia (BPD) in Preterm Infants: Genetic Studies of Response to Inhaled Nitric Oxide Goal: To identify genes related to racial difference in drug response to bronchopulmonary dysplasia in children	03/01/15-02/28/16 \$170,000	1.2 CM (10%)
24RT-0025 (Burchard) TRDRP Role: PI Project title: Air Pollution, Tobacco Smoke, and Asthma in Minority Children Goal: To determine how tobacco smoke and air pollution exposures affect asthma attacks in minority populations, which may lead to more targeted therapies.	07/01/15-06/30/18 \$203,821	0.60 CM (5%)
(PI: Burchard) Center of Youth Wellness Role: Project PI Project title: The Bay Area Research Consortium on Toxic Stress and Health Goal: 1) To validate the adverse childhood experiences (ACEs) screening tool by (a) assessing the validity of the tool's association with physical and behavioral health indicators and biomarkers of stress, (b) determining the internal consistency of the tool, and (c) accessing the feasibility of universal implementation of the screening tool in a pediatric health care setting. 2) To estimate the association between ACEs and biomarkers of stress. 3) To evaluate whether (a) brief and (b) intensive primary care-based interventions for children at risk of toxic stress can lead to detectable changes in stress physiology	09/01/15-08/30/16 \$69,205	0.60 CM (5%)
R01HI128439 (Seibold) NIH-Subcontract (#2020100601) Role: Subcontract PI Project Title: Genetic Control of Airway Epithelium Gene Expression in Childhood Asthmatics Goal: To participate and advise the design, performance, interpretation of all proposed sequencing and genetic analyses.	08/15/15-05/30/20 \$52,462	0.60 CM (5%)

PENDING

R01HD085993 - 01 (Wu) 09/01/15-08/31/20 0.60 CM (5%)  
 NIH-Subcontract \$76,551

Role: Subcontract PI

Project Title: Age-Dependent Pharmacogenomics of Asthma Treatment (ADAPT)

Goal: to elucidate response to the two most commonly used medications for asthma, inhaled steroids and  $\beta_2$ -agonists. This research employs existing genetic, genomic, and metabolomics data from clinical trial and real-life populations. Linking genetic variants to the therapeutic responses with additional information from genomics and metabolomics will provide insight into the biologic pathways that may be activated. Knowledge gained from this research will advance the field of personalized medicine for pediatric asthma through the creation of a prediction model.

1R01MD010443 (Burchard) 04/01/16-03/31/21 1.80 CM (15%)  
 NIMHD \$76,551

Role: Project PI

Project Title: Genes, Air Pollution, and Asthma Severity in Minority Children

Goal: To understand the genetic basis of racial/ethnic differences in asthma severity and lung function. Results from this proposal will inform public health policy and clinical practice and aide in the mechanistic understanding of asthma severity (morbidity), which may lead to more targeted therapies.

PAST

1. Robert Wood Johnson, Harold Amos Medical Faculty Development Award (PI) 7/1/05-6/30/10  
\$365,400
2. U01 GM63190 (PI) 7/1/05-6/30/10  
NIH \$115,000  
Program Principal Investigator: Kathleen Giacomini.  
Project title: Study of Pharmacogenetics in Ethically Diverse Groups
3. RO1, HL078885 (PI) 7/1/05/6/30/10  
NIH \$1,250,000  
Project title: Genetic Confounding in Racially Admixed Populations
4. U01 GM61390 (PI: Giacomini), Co-Investigator 7/20/05-6/30/10  
Program title: Pharmacogenetics of Membrane Transporters  
Project title: Study of Pharmacogenetics in Ethically Diverse Groups
5. 1RC2 HL101651-01 –Subcontractor 9/30/09-09/29/11  
(Co-PIs: Ober, Nicolae) \$150,819  
Project title: The EVE Asthma Genetics Consortium: Building Upon GWAS
6. U19 AI077439 (Program PI: Sheppard) 04/01/08-03/31/13  
NIH/NIAID Program: \$1,033,456  
Project 3: \$274,366  
Program: Mechanisms of Initiation and Persistence of Allergic Asthma  
Project 3: Chitinases and TGF $\beta$  in Human Asthma

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| 7. R01 HL088133 (PI: Burchard)   | 03/01/08-02/28/14 |
| NIH/NHLBI  | \$477,675         |
| Project title: Whole Genome Analyses for Asthma in Latino Populations                            |                   |
| 8. R01 ES015794 (PI: Burchard)   | 09/1/08-05/31/14  |
| NIH/NIEHS  | \$1,186,919       |
| Project title: Gene-environments and Admixture in Latino Asthmatics (GALAI)                      |                   |
| 9. W81 XWH-13-1-044 (PI: Geoffrey Manley)  | 10/1/13-09/30/15  |
| NIH/DOD  | \$480,512         |
| Project title: Transforming Research and Clinical Knowledge in Traumatic Brain Injury            |                   |
| 10. HL104608-01A1 (PI: Barnes)   | 09/28/11-09/30/15 |
| NIH/NIEHS  | \$100,000         |
| Project title: New Approaches for Empowering Studies of Asthma in Populations of African Descent |                   |

**PEER REVIEWED PUBLICATIONS:****Journal articles**

1. Whitehead B, Stoeher C, Wu C, Patterson G, **Burchard E**, Theodore J, Clayberger C, and Starnes V. Cytokine Gene Expression in Human Lung Transplant Recipients, *Transplantation*. 1993; 56(4):956-61. PMID: 7692639
2. Wu C, Kurbegov D, Lattin B, **Burchard E**, Finkle C, Valantine H, Billingham M, Starnes V, and Clayberger C. Cytokine Gene Expression in Human Cardiac Allograft Recipients, *Transplant Immunology*. 1994; 2(3):199-207. PMID: 8000848
3. **Burchard EG**, Silverman EK, Rosenwasser LJ, Borrish L, Yandava C, Pillari A, Weiss ST, Lilly CM, Ford J, Hasday J, Drazen JM. Association Between a Sequence Variant in the IL-4 Gene Promoter and FEV1 in Asthma. *American J Respiratory Critical Care Medicine*. 1999; 160(3):919-22. PMID: 10471619
4. Risch N, **Burchard E**, Ziv E, Tang H. Categorization of humans in biomedical research: genes, race and disease. *Genome Biol*. 2002 Jul 1; 3(7) PubMed PMID: 12184798; PubMed Central PMCID: PMC139378
5. **Burchard EG**, Ziv E, Coyle N, Gomez SL, Tang H, Karter AJ, Mountain JL, Pérez-Stable EJ, Sheppard D, Risch N. The importance of race and ethnic background in biomedical research and clinical practice. *N Engl J Med*. 2003 Mar 20; 348(12):1170-5. PubMed PMID: 12646676
6. Ziv E, **Burchard EG**. Human population structure and genetic association studies. *Pharmacogenomics*. 2003 Jul; 4(4):431-41. PubMed PMID: 12831322
7. Lind DL, Choudhry S, Ziv E, Ung N, Salari K, Coyle NE, Nazario S, Casal J, Torres T, Avila PC, Salas J, Selman M, Weiss ST, Ford JF, Boushey HA, Drazen JM, Silverman EK, Chapela R, Rodriguez-Cintron W, Sheppard D, Kwok PY and **Burchard, EG** from the Genetics of Asthma in Latino Americans (GALA) Study. ADAM33 is not associated with asthma in Puerto Rican or Mexican populations. *American J Respiratory Critical Care Medicine*. 2003; 168(11):1312-6. PMID: 12958057
8. **Burchard EG**, Avila PC, Nazario S, Casal J, Torres A, Rodriguez-Santana JR, Toscano M, Senter-Sylvia J, Alioto ME, Salazar M, Gomez I, Fagan JK, Salas J, Lilly C, Matallana H, Ziv E, Castro R, Selman M, Chapela R, Sheppard D, Weiss ST, Ford JG, Boushey HA, Rodriguez-Cintron W, Drazen JM and Silverman EK, from the Genetics of Asthma in Latino Americans (GALA) Study. Lower Bronchodilator Responsiveness in Puerto Rican than in Mexican Asthmatic Subjects. *Am J Respiratory Critical Care Medicine*. 2004; 169(3):386-92. PMID: 14617512
9. Salari K, Choudhry S, Tang H, Naqvi M, Lind D, Avila PC, Coyle NE, Ung N, Nazario S, Casal J, Torres-Palacios A, Clark S, Phong A, Gomez I, Matallana H, Perez-Stable EJ, Shriver MD, Kwok PY, Sheppard D, Rodriguez-Cintron W, Risch NJ, Ziv E, **Burchard EG**. Genetic admixture and asthma-related phenotypes in Mexican American and Puerto Rican asthmatics. *Genetic Epidemiology*. 2005; 29(1):76-86. PMID: 15918156
10. Choudhry S, Ung N, Avila PC, Ziv E, Nazario S, Casal, J Torres A, Gorman JD, Salari K, Rodriguez-Santana JR, Toscano M, Senter-Sylvia J, Alioto ME, Salazar M, Gomez I, Fagan JK, Salas J, Clark S, Lilly C, Matallana H, Selman M, Chapela R, Sheppard D, Weiss ST, Ford JG, Boushey HA, Drazen JM, Rodriguez-Cintron W, Silverman EK and **Burchard EG** from the Genetics of Asthma in Latino Americans (GALA) Study. Pharmacogenetic Differences in Response to Bronchodilators Between Puerto Rican and Mexican Asthmatics. *Am J Respiratory and Critical Care Medicine*. 2005; 171(6):563-70. PMID: 15557128
11. Pawlikowska L, Tran MN, Achrol AS, Ha C, **Burchard E**, Choudhry S, Zaroff J, Lawton MT, Castro R, McCulloch CE, Marchuk D, Kwok PY, Young WL; UCSF BAVM Study Project. Polymorphisms in

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## RESEARCH SUMMARY

Asthma varies widely among different racial and ethnic groups. In the U.S., asthma prevalence, morbidity and mortality are highest in Puerto Ricans, intermediate in Dominicans and Cubans, and lowest in Mexicans and Central Americans. Socioeconomic and environmental differences do not fully explain this observation. One potential explanation is that there may be gene-environment interactions which can differentially modify risk for asthma in different racial/ethnic groups. These gene-environment interactions can be tested using genetic ancestry as a surrogate for genetic risk factors. Although the relative ancestral contributions to the contemporary Latino gene pool make each Latino ethnic group unique, there is substantial overlap in ancestry. Therefore, individuals with similar ancestral proportions may still belong to different Latino subgroups. Furthermore, most Latinos are unaware of their precise ancestry and report their ancestry based on the national origin of their family and their physical appearance. The unavailability of precise ancestry and the genetic complexity among Latinos may complicate asthma research studies in this population. On the other hand, precisely because of this complexity, Latinos present a unique opportunity to disentangle the clinical, social, environmental, and genetic underpinnings of population differences in asthma prevalence, severity and bronchodilator drug responsiveness.

My research interests' center on determining why there are significant disparities in asthma prevalence, asthma severity and even drug responsiveness to common asthma medications among racial/ethnic populations in the U.S. Specifically, we are investigating the complex interaction of social, genetic and environmental factors and their impact on asthma and asthma-related traits. To this end, we initiated four independent and parallel studies recruitment efforts in Hispanic/Latino and African American children to study gene-environment interactions for asthma. The two parallel studies in Hispanic/Latino children are: 1) Genetics of Asthma in Latino Americans (GALA) Study and the Genes-environments & Admixture in Latino Americans (GALA II). The African American studies are Study of African Americans, Asthma, Genes & Environments (SAGE I & II). The GALA studies are ongoing multicenter international collaborative efforts, designed to identify and directly compare clinical and genetic risk factors associated with asthma and asthma severity among Latino children. The goal of SAGE is to identify ethnic specific, pharmacogenetic, and asthma associated genetic risk factors among African Americans.

**Five representative publications and description of role in project:**

1. Lower Bronchodilator Responsiveness in Puerto Rican than in Mexican Asthmatic Subjects. *AJRCCM*. 2004; 169(3):386-92

We demonstrated that Puerto Rican children have lower drug response to albuterol than Mexican children. I conceived the study; I recruited the patients, did the analyses and wrote the manuscript.

2. Pharmacogenetic Differences in Response to Bronchodilators Between Puerto Rican and Mexican Asthmatics. *AJRCCM*. 2005; 171(6):563-70

We demonstrated ethnic-specific differences in pharmacogenetic associations of bronchodilator drug responsiveness between Puerto Rican and Mexican children with asthma. I conceived idea to test the beta 2 adrenergic receptor ( $\beta$ 2AR) gene as part of the candidate gene list in the original GALA proposal.

3. Differential enzymatic activity of common haplotypic versions of the human acidic mammalian chitinase protein. *J Biol Chem*. 2009; 284(29):19650-8

We identified genetic variants in the asthma candidate gene, human acidic mammalian chitinase, which resulted in a gain of enzymatic function. I conceived the idea and oversaw the graduate student who performed the experiments.

4. Ancestry-related Assortative Mating in Latino Populations. *Genome Biology*. 2009; 10(11):R132

We used 'ancestry informative markers' (AIMs) to demonstrate ancestry-related assortative mating in contemporary human populations. We find that ancestral make-up is positively correlated with spouse choice within both populations studied (Puerto Ricans and Mexicans), but find no correlation with socioeconomic or geographic origins that might explain the correlation. I developed the study populations; my lab did the genotyping and assisted with the analyses.

5. Genetic ancestry and lung function predictions. *New England Journal of Medicine*. 2010; 363(4):321-30

We identified a significant inverse relationship between African ancestry and forced expiratory volume at one second ( $FEV_1$ ) and forced vital capacity (FVC) in CARDIA participants. These relationships were also observed among African American subjects in HABC and CHS. In predicting lung function, the ancestry-based model demonstrated a better fit of the observed data compared with standard models. Ancestry-based models reclassified asthma severity (based on percent predicted  $FEV_1$ ) in 4-5% of African American participants. Current predictive equations, which rely on self-identified race alone, may misestimate lung function among African American subjects. Incorporating ancestry into normative equations may improve lung function estimates and more accurately categorize disease severity. I conceived the idea to test genetic ancestry and lung function. Students, fellow and staff from my lab did the analyses.