

CURRICULUM VITAE:**CURRENT POSITION**

Héctor Barajas-Martínez, Ph.D.

Research Scientist I - Experimental Cardiology

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EDUCATION

University of Colima, Mexico B.Sc. 1993 Chemistry-Pharmacobiology

University of Colima, Mexico M.Sc. 1997 Physiology

University of Guadalajara, Mexico Ph.D. *Summa cum laude* 2006 Human Genetics

PROFESSIONAL EXPERIENCE

Titular Research-Professor. Health Science Division, South University Center (CUSUR), University of Guadalajara, Cd. Guzman, Jalisco, Mexico. 2000-2007

Teacher in Medicine School: Physiology, Molecular Biology and Genetics. Health Science Division, South University Center (CUSUR), University of Guadalajara, Cd. Guzman, Jalisco, Mexico. 2000-2006

Research Assistant A. Biomedical Research Center (CUIB) University of Colima, México. 1996-1998

Predoctoral Training. Experimental Cardiology Department. Masonic Medical Research Laboratory, Utica, New York, USA. 2004-2005

Visiting Scientist. Molecular Cardiology Department, Fondazione Salvatore Maugeri, Pavia, Italy. 1999

Postdoctoral Training. Department of Physiology and Biophysics. Health Science, University of Sherbrooke, Sherbrooke, Québec, Canada. 2006-2007

Postdoctoral Training. Experimental Cardiology Department. Masonic Medical Research Laboratory, Utica, New York, USA. 2007-2008

AWARDS

Doctoral in Science Fellowship. National Research and Technology Council (CONACYT). Heath Science Center (CUCS), University of Guadalajara, Colima, México. 1998-2000

Master in Science Fellowship. National Council of Research and Technology (CONACYT). University Center of Biomedical Research (CUIB), University of Colima, México. 1994-1996

Nacional Research Fellow. National Research System (SNI), México, 1999-2003.

Scientist Development Grant. South University Center (CUSUR) of the University of Guadalajara, Cd. Guzman, Jalisco, Mexico. 2001

Research Assistant Fellowship. Human Genetics Department of the Biomedical Research Center and National Institut of General Health (CIBO-IMSS), Guadalajara, Jalisco. Mexico. 1999-2001

Dr. Juan Garcia Ramos Foundation Fellowship, Biomedical Research University Center, University of Colima, Bachelor scholarship, Colima Mexico 1992-1994.

AREA OF EXPERTISE and PRIMARY INTEREST

- Biophysical and molecular mechanism for different cardiac arrhythmias like Brugada, Short QT, Long QT and Sudden Infant Death Syndromes.
- Developmental and gender differences in cardiac electrophysiology and pharmacology.
- Confocal microscopy and Expression analysis by Real Time PCR

CURRENT RESEARCH

My work is focused on studies of ion channels responsible for the movement of ions like sodium, potassium and calcium across the membrane of cardiac cells. Abnormal function of these ion channels secondary to genetic mutations are responsible for the development of abnormal heart rhythms, known as cardiac arrhythmias.

I am also interested in how the function of ion channels changes with development. These studies examine differences the number and function of ion channels in neonate vs. adult hearts as well as differences between the sexes. These studies are critically important in advancing our understanding of cardiac arrhythmias believed to contribute to sudden infant death syndrome (SIDS) and abnormal heart rhythms that place infants and children at risk.

Interaction of antiarrhythmic drugs with mutated ion channels is another interest of mine. I am using patch clamp techniques to assess the interaction of the antiarrhythmic drug lidocaine with a mutated sodium channel responsible for the Brugada syndrome. While Class IB antiarrhythmic drugs like lidocaine usually do not unmask or aggravate the Brugada syndrome, we have uncovered a mutation that sensitizes the heart to lidocaine, permitting the drug to induce electrocardiographic changes that unmask the Brugada syndrome.

In another study, we have recently shown that compound mutations in SCN5A, the gene that encodes the α subunit of the sodium channel, leads to a more severe dysfunction of the sodium channel. Consistent with our biophysical results, members of the family who inherited the double mutation displayed a more severe clinical phenotype of the Brugada syndrome than the individuals inheriting only a single mutation.

PUBLICATION

- 1) **Barajas-Martínez H**, Elizalde A and Sánchez-Chapula JA. (2000) Developmental differences in delayed rectifying outward current in feline ventricular myocytes. *Am J Physiol Heart Circ Physiol*; 278(2):H484-92. PMID: 10666079
- 2) Elizalde A, **Barajas-Martínez H**, Ricardo Navarro-Polanco N and Sánchez-Chapula JA. (1999) Frequency-Dependent Effects of 4-Aminopyridine and Almolant on Action-Potential Duration of Adult and Neonatal Rabbit Ventricular Muscle. *Journal of Cardiovascular Pharmacology*; 33(3):352-9. PMID: 10069668
- 3) Sanchez-Chapula JA, Elizalde A, Navarro-Polanco N and **Barajas-Martínez H** (1994) Differences in outward currents between neonatal and adult rabbit ventricular cells. *Am J Physiol Heart Circ Physiol*; 266(3 Pt 2):H1184-94. PMID: 8160822
- 4) Cordeiro JM, **Barajas-Martínez H (co-first author)**, Hong K, Burashnikov E, Oliva A, Pfeiffer R, Orsino AM, Wu YS, Dan H, Brugada J, Antzelevitch C, Dumaine R, Brugada R. (2006) Compound heterozygous mutations P336I and I1660L in the human cardiac sodium channel determine the severity of Brugada syndrome. *Circulation*; 114(19):2026-33. PMID: 17075016
- 5) Pascale K, Lepage, Marc P, Lussier, **Hector Barajas-Martínez**, Simon M, Bousquet, Alexandre P, Blanchard, Nancy Francoeur, Robert Dumaine and Guylain Boulay. (2006) Identification of two domains involved in the assembly of TRPC channels. *J Biol Chem*; 281(41):30356-64. PMID: 16916799
- 6) Hu D, Viskin S, Oliva A, Cordeiro JM, Brugada R, Hong K, Sicouri S, **Barajas-Martínez H**, Wu YS, Burashnikov E, Antzelevitch C (2007) A novel mutation in the SCN5A gene associated with arrhythmic storm developing Post-MI. *Heart Rhythm*; 4(8):1072-80. PMID: 17675083
- 7) Martínez-Ibarra JA, Ventura-Rodríguez LV, Meillon-Isais K, **Barajas-Martínez H**, Alexandre-Aguilar R, Lupercio-Coronel P, Rocha-Chávez G, Noguera-Torres B. (2008) Biological and genetic aspects of experimental hybrids from species of the Phyllosoma complex (Hemiptera: Reduviidae: Triatominae). *Mem Inst Oswaldo Cruz*, ;103(3):236-43.
- 8) **Barajas-Martínez H**, Hu D, Cordeiro JM, Wu Y, Kovacs R, Henry Meltser, Hong K, Burashnikov E, Brugada R, Antzelevitch C, Dumaine R. (2008) Lidocaine-induced Brugada Syndrome Phenotype Linked to a Novel Mutation and Polymorphism in the Cardiac Sodium Channel. *Circulation Research*; 15;103(4):396-404.

Submitted (in preparation) manuscripts

1) **Barajas-Martínez H**, Haufe V, Cordeiro JM, Fecteau MH, Dumaine R. Larger dispersion of sodium current in female dog ventricle as a potential mechanism for gender-specific incidence of cardiac arrhythmias. *Cardiovascular Research*; In second minor vision, 2008

Published Abstracts

1) **Barajas-Martínez H**, Hu D, Cordeiro JM, Hong K, Antzelevitch C, Brugada R. and Dumaine R. Lidocaine-induced Brugada Syndrome Phenotype Linked to a Novel Mutation and Polymorphism in the Cardiac Sodium Channel. *Upstate New York Cardiac Electrophysiology Society*, Rochester, New York, USA, 2007.

2) **Barajas-Martínez H**, Hu D, Brugada R, Cordeiro JM, Wu Y, Kovacs R, Meltser H, Hong K, Burashnikov E, Antzelevitch C, Dumaine R. Lidocaine-induced Brugada Síndrome phenotype linked to a novel double mutation in the cardiac sodium channel. *Heart Rhythm (Suppl)* 2(9):S294. New Orleans, USA, 2005.

3) Hu D, Oliva A, Viskin S, Cordeiro JM, **Barajas-Martínez H**, Wu YS, Burashnikov E, Guerchicoff A, Pollevick G, Antzelevitch C A novel mutation in the SCN5A gene associated with arrhythmic storm developing Post-MI. *Upstate New York Cardiac Electrophysiology Society*, Syracuse, New York, 2005.

4) Cordeiro JM, Hong K, **Barajas-Martínez H**, Dumaine R, Burashnikov E, Oliva A, Wu YS, Orsino AM, Pfeiffer R, Hu D, Brugada J, Antzelevitch C, Brugada R. A SCN5A Double Mutant P336L/I1660V Results in Different Phenotype Expressions in a Brugada Syndrome Family. *Circulation (Suppl)*. Vol 112, 17:II-90. October 25, Dallas Tx, USA, 2005.

5) Hu D, Oliva A, Cordeiro JM, Brugada R, Hong K, Sicouri S, **Barajas-Martínez H**, Wu YS, Burashnikov E, Viskin S, Dumaine R, Charles Antzelevitch A novel mutation in the SCN5A gene associated with arrhythmic storm developing Post-MI. *Circulation (Suppl)*. Vol 112, 17: II-90. October 25, Dallas Tx, USA, 2005.

6) **Barajas-Martínez H**, et al., Lidocaine-induced Brugada Syndrome Phenotype Linked to a Novel Double Mutation in the Cardiac Sodium Channel. Great Wall International Congress of Cardiology & ACC Symposium: Cardiology Update. Beijing, China, 2005.

7) **Barajas Martínez H, et al.** Molecular Diagnostic in Long QT Syndrome in Mexican Patients. The Power of Comparative Physiology: Evolution, Integration and Application The Physiologist (The American Phy. Soc) Vol 45, Num 4. San Diego, California, USA, 2002.

8) **Barajas-Martínez H**, Haufe V, Chamberland C, Fecteau M.H, Dumaine R. Neuronal sodium channel isoforms are more abundant in epicardium than in endocardium of the dog heart ventricular. *Biophysic. J.* 51th Annual Meeting of the Biophysical Society (03/03/2007-03/07/2007), Baltimore, MD, USA, 2007.

9) Haufe V, **Barajas-Martínez H**, Cordeiro JM, Chamberland C, Blais-Roy MJ, Fecteau MH, and Dumaine R. Dispersion of the cardiac sodium current within the ventricular wall is stronger in female

than male canine hearts. *Biophysic. J.* 51th Annual Meeting of the Biophysical Society (03/03/2007-03/07/2007), Baltimore, MD, USA. 2007.

10) **Hector Barajas-Martínez**, Jonathan M Cordeiro, Kui Hong, Dan Hu, Elena Burashnikov, Ryan Pfeiffer, Anne-Marie Orsino, Yue Sheng Wu, Josep Brugada, Pedro Brugada, Ramon Brugada, Charles Antzelevitch, Robert Dumaine.(2006). Brugada syndrome associated to compound heterozygous mutations P336L and I1660V in the human cardiac sodium channel. *The 17th Great Wall International Congress of Cardiology ACC Symposium: Cardiology Update*, November 02 – 05, 2006, Beijing, China.

11) Guylain Boulay, Pascale Lepage, Marc Lussier, **Hector Barajas-Martínez**, Simon Bousquet, Alexandre Blanchard, Nancy Francoeur, and Robert Dumaine. (2006) Implication of the N- terminal and pore region of TRPC in the channel assembly. *Biochemical Society Focused Meeting – Cell and Molecular Biology of TRP Channels*. September 7-8, Bath, UK. (abstract will published in the Suppl. of the *Biochemical Society Transactions*). 2006

12) **Barajas-Martínez H**, Haufe V, Dumaine R. Tetrodotoxin-sensitive Sodium Channels Contribute Significantly To The Cardiac Late Sodium Current In Dog Ventricles. *Biophysic. J.* 51th Annual Meeting of the Biophysical Society (02/02/2007-02/07/2007), Long Beach, Ca, USA. 2008.

13) **Barajas-Martínez H**, Hu D, Burashnikov E, Antzelevitch C. Novel Mutation in the KCNQ1 Associated with Brugada Syndrome. *Circulation (Suppl)*. November 10, New Orleans, USA, 2008.

Presentations as guest speaker

1) **Barajas-Martínez H**. “Ionic Mechanism in New Mutation of Brugada Syndrome”. Biomedical Research Center, University of Colima, Colima, Mexico. January 25th, 2008.

2) **Barajas-Martínez H**, Hu D, Cordeiro JM, Wu Y, Kovacs R, Meltser H, Hong K, Burashnikov E, Brugada R, Antzelevitch C, Dumaine R (2006). Lidocaine-induced Brugada syndrome phenotype. *The 17th Great Wall International Congress of Cardiology ACC Symposium: Cardiology Update 2006* November 02 – 05, 2006, Beijing, China.

3) Genetics aspect of the cardiac arrhythmias. 10th Annual Meeting of Science of the CUCIenega-University of Guadalajara (12-16/11/2001), Jalisco; Mexico.

4) Molecular and genetics aspect of the cardiac arrhythmias: “Long QT syndrome and Atrial Fibrillation”. IX National Cardiology Congress (01-03/11/2000). Puerto Vallarta; Mexico.

5) Long QT syndrome; Presentation a Mexican familiar case. Workshop of Ionic Channels. University of Colima (12-16/11/2002). Colima; Mexico.