

Isaac E. García Carrillo

PhD in Sciences, mention Neuroscience
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EDUCATION

2010-2014: Ph.D in Biological Sciences, Major in Neuroscience, Universidad de Valparaíso, Chile.
2003-2007: Medical Technologist, mention in Laboratory, Hematology and Blood Bank,
Universidad de Chile, Santiago, Chile.
2001-2002: Bachelor in Applied Sciences, Universidad de Chile, Santiago, Chile.

CURRENT POSITION

- **Associate Professor**, Escuela de Odontología, Facultad de Odontología Universidad de Valparaíso, Chile 01/2018-to date
- **Lab Head**, Laboratory of Molecular Physiology and Biophysics, Facultad de Odontología, Universidad de Valparaíso
- **Adjunct Researcher**, Centro Interdisciplinario de Neurociencias de Valparaíso

RESEARCH PROJECTS

- **Principal Investigator Fondecyt de Iniciación # 11180531** 2018-2020
- **Co-PI Fondecyt Regular # 1190775** 2019-2022
- **Co-PI Fondecyt Regular # 1211045** 2021-2024
- **Principal Investigator PAI Project**, Facultad de Odontología, Universidad de Valparaíso, Chile 2017-to date
- **Adjunct Investigator CINV**, Universidad de Valparaíso, Chile 2017-to date

RESEARCH EXPERIENCE

- Principal Investigator Project FONDECYT Post-Doctoral # 3150634:** 2014 - 2017
"Molecular determinants of the interaction between the amino termini and the water pocket of Cx26 hemichannels during gating". Laboratory of Molecular Sensors, Centro Interdisciplinario de Neurociencias de Valparaíso, CINV, Universidad de Valparaíso (2014-2017)
- Visiting Researcher, Department of Pharmacology and Physiology, Rutgers University, Newark, NJ, USA. 12/2013 - 03/2014
- Laboratory Technician, Laboratory of Cell Biology and Connexins Centro Interdisciplinario de Neurociencias de Valparaíso. 04/2009 - 03/2010
- *Traffic, oligomerization and function of connexins.*
- Laboratory Technician, Laboratory of Cell Physiology Institute of Biomedical Science, University of Chile 09/2003 – 01/2009
- *Expression and localization of inositol 1,4,5-trisphosphate in RCDMD dystrophic cells.*
- Laboratory Technician, Laboratory of Cell Endocrinology Institute of Biomedical Science, University of Chile 03/2006 – 10/2006
- *Expression of Chromogranin-B in rat cardiomyocytes.*

SKILLS

- Electrophysiology, Biophysics, Molecular Biology, Confocal Microscopy, Biochemistry, Immunocytochemistry, Immunohistochemistry, Immunoblots, Calcium imaging, Cell Culture.

AWARDS, FELLOWSHIPS AND HONORS

- **FONDECYT INICIACIÓN # 11180531, 2018-2021, CONICYT**
- **PAI, 2018-2020** Programa Atracción e Inserción de Capital Humano a la Academia, CONICYT

- **FONDECYT POSTDOCTORAL #3150634, 2014-2017**
- **CONICYT** Fellowship to attend to the 57th Annual Meeting of the Biophysical Society Meeting, Philadelphia 2013.
- **CONICYT** Fellowship "Apoyo Tesis Doctoral 2012 - 2014".
- **CONICYT** Fellowship for Doctoral Studies in Chile.
- **CORFO Fellowship** 2011 "Inglés para Servicios Globales".
- **MECESUP2** Fellowship to attend to the 50th Annual Meeting of the American Society for Cell Biology, December 11-15, 2010, Philadelphia, PA, USA.
- **Travel Award** from the Argentine Society for Biochemistry and Molecular Biology to attend to the 10th Congress of the Panamerican Association for Biochemistry and Molecular Biology; Pinamar, Buenos Aires, Argentina, December 3-6, 2005.
- **President of the Republic of Chile Fellowship**, for Secondary School Studies

PEER-REVIEWED WOS PUBLICATIONS

1. Flores-Muñoz C, Maripillán J, Vásquez-Navarrete J, Novoa-Molina J, Ceriani R, Sánchez HA, Abbott AC, Weinstein-Oppenheimer C, Brown DI, Cárdenas AM, **García IE**, Martínez AD (2020) *Restraint of human skin fibroblast motility, migration, and cell surface actin dynamics, by Pannexin 1 and P2X7 receptor signaling*. *Int J Mol Sci*. 2021 Jan 22;22(3):1069. doi: 10.3390/ijms22031069
2. Valdez Capuccino JM, Chatterjee P, **García IE**, Botello-Smith W, Zhang H, Harris AL, Luo Y, Contreras (2019) *The connexin26 mutation N14K disrupts cytosolic inter-subunit interactions and promotes channel opening*. *J Gen Physiol Mar 4; 151(3): 328-341*. doi: 10.1085/jgp.201812219 Epub 2018 Dec 7.
3. **García IE**, Villanelo F., Contreras GF., Pupo A., Pinto BI., Contreras JE., Pérez-Acle T., Alvarez A., Latorre R., Martínez AD., González C (2018) *The syndromic deafness mutation G12R impairs fast and slow gating in Cx26 hemichannels*. *J Gen Physiol Apr 11*. Pii: jgp.201711782. doi: 10.1085/jgp.201711782
4. Pinto BI., Pupo A., **García IE**, Agustín D. Martínez, Ramón Latorre and Carlos González (2017) *Calcium binding and voltage gating in Cx46 hemichannels*. *Sci Rep Nov 20;7(1):15851*. doi: 10.1038/s41598-017-15975-5
5. **García, IE**; Sáchez, HA; Martínez, AD; Retamal, AD (2017) *Redox-mediated regulation of connexin proteins; focus on nitric oxide* **Biochim Biophys Acta Oct 7**.doi: 10.1016/j.bbamem.2017.10.006
6. **García IE**, Prado, P., Pupo A., Jara, O., Rojas, D., Mujica, P., Flores-Muñoz, C., Gonzalez, J., Soto, C., Pinto, B., Retamal, MA., Gonzalez, C., Martínez AD (2016) *Connexinopathies: a structural and functional glimpse*. **BMC Cell Biol; May 24;17 Suppl 1:17**. doi: 10.1186/s12860-016-0092-x
7. Pinto BI., **García IE**, Pupo A., Martínez AD., Latorre R., Gonzalez C (2016) *Charged residues at the first transmembrane region contribute to the voltage dependence of connexins slow gate*. **J Biol Chem, May 3**. pii: jbc.M115.709402.
8. Retamal, M.A*, **García, I.E***, Pinto, B., Báez-Nieto, D., Stehberg, J., Del-Río, R., González, C (2016) *Extracellular cysteines in connexins: a role as redox sensors*. **Front Physiol**. 2016 Jan 28;7:1. doi: 10.3389/fphys.2016.00001. eCollection 2016. ***Equally contributed**
9. **García IE**, Bosen F., Pupo A., Mujica P., Flores-Muñoz, C., Jara, O., González, C., Willecke K., Martínez AD (2016) *From hyperactive Connexin26 hemichannels to impairments in epidermal calcium gradient and permeability barrier in the Keratitis-Ichthyosis-Deafness syndrome*. **J Invest Dermatol**. 2016 Mar;136(3):574-83. doi: 10.1016/j.jid.2015.11.017. Epub 2016 Jan 8. Review
10. Retamal MA., Reyes EP., **García IE**, Pinto B., Martínez AD., González C (2015) *Diseases associated with leaky hemichannels*. **Front Cell Neurosci**. 2015 Jul 27;9:267. doi: 10.3389/fncel.2015.00267. eCollection 2015. Review.
11. **García IE**, Maripillán J., Jara O., Ceriani R., Palacios-Muñoz A., Ramachandran J., et al. (2015) *Keratitis-Ichthyosis-Deafness syndrome-associated Cx26 mutants produce*

nonfunctional gap junctions but hyperactive hemichannels when co-expressed with wild type Cx43. **J Invest Dermatol.** 2015 May;135(5):1338-47. doi: 10.1038/jid.2015.20. Epub 2015 Jan 27

12. Palacios-Munoz A., Escobar MJ., Vielma A, Araya J, Martínez AD, Astudillo A, Valdivia G, **García IE.**, Schmachtenberg O., Hurtado J., Palacios AG (2014) *Role of Connexin Channels in Retinal Light Response in a Diurnal Rodent.* **Front Cell Neurosci.** 2014 Aug 25;8:249. doi: 10.3389/fncel.2014.00249. eCollection 2014.
13. Araya-Secchi R., Perez-Acle T., Seung-gu Kang, Huynh T., Escalona Y., Garate JA., Martínez AD., **García IE.**, Sáez JC., Zhou R (2014) *Characterization of a novel water pocket inside the human Cx26 hemichannel structure.* **Biophys J.** 2014 Aug 5;107(3):599-612. doi: 10.1016/j.bpj.2014.05.037.
14. Jara O., Acuña R., **García IE.**, Maripillán J., Figueroa V., Sáez JC., Araya R., Lagos C., Perez-Acle T., Berthoud V., Beyer E., Martínez AD (2011) *Critical role of the first transmembrane domain of Cx26 in regulating oligomerization and function.* **Mol Biol Cell.** 2012 Sep; 23(17): 3299-311.
15. Cárdenas C., Juretic N., Bevilacqua JA., **García IE.**, Figueroa R., Hartley R., Taratuto AL., Gejman R., Riveros N., Molgó J., Jaimovich E (2010) *Abnormal distribution of inositol 1,4,5-trisphosphate receptors in human muscle can be related to altered calcium signals and gene expression in Duchenne dystrophy-derived cells.* **FASEB J.** Apr 21.

BOOK CHAPTER

Agustín D. Martínez, Oscar Jara, Ricardo Ceriani, Paula Mujica, and **Isaac E. García (2016)** "Methods to determine the formation of heteromeric hemichannels" in Gap Junctions and Pannexin channels. A volume in the methods in signal transduction series" CRC Press, Taylor and Francis Group, Boca Raton, FL, USA

CONGRESS PRESENTATIONS

1. **Isaac E. García**, Gustavo Contreras, Amaury Pupo, Bernardo Pinto, Ramón Latorre, Jorge E. Contreras, Agustín D. Martínez, and Carlos González. "**Molecular determinants underlying the pathogenic mechanism of KID syndrome elicited by Cx26G12R mutation**". The 60th Annual Meeting of the Biophysical Society, February 26-March 3, 2016. Los Angeles, CA, USA.
2. **Isaac E. García**, Carlos González, Jorge E. Contreras and Agustín D. Martínez. "**Slow deactivation kinetics of Hyperactive Heteromeric Hemichannels formed by Cx26 N-terminus KID-associated mutants and Cx43**". International Gap Junction Conference, March 28th-April 2nd 2015, Valparaíso, Chile.
3. **Isaac E. García**, Jayalakshmi Ramachandran, Agustín D. Martínez, Jorge E. Contreras. "**Human mutations at the N-terminus of Cx26 reveal novel gating properties when forming heteromeric connexin hemichannels**". The 59th Annual Meeting of the Biophysical Society, February 2-6, 2015. Baltimore, MD, USA.
4. **Isaac E. García**, Oscar Jara, Jaime Maripillán, Juan C. Sáez, Agustín D. Martínez. "**Gain of function of hemichannels produced by aberrant interactions between Cx43 and deafness-associated Cx26 mutants**". International Gap Junction Conference July 12-18, 2013, Charleston, South Caroline, USA.
5. **Isaac E. García**, Retamal MA, Carlos González and Agustín D. Martínez. "**Is the gain of function hemichannel a common feature shared by Cx26 syndromic deafness mutants?**". The 57th Annual Meeting of the Biophysical Society, February 2-6, 2013, Philadelphia, PA, USA.
6. Oscar Jara, **Isaac E. García**, Jaime Maripillán, Juan C. Sáez, Vania Figueroa, Viviana M. Berthoud, Eric C. Beyer, Agustín D. Martínez. "**Deafness-associated Cx26 mutants demonstrate the importance of the first transmembrane domain in connexin oligomerization and channel function**". International Gap Junction Conference August 6-11, 2011, Ghent, Belgium.
7. **Isaac E. García**, Ricardo A. Ceriani, Oscar R. Jara, Jaime M. Maripillan, and Agustín D. Martínez. "**Syndromic and non-syndromic deafness mutations in the Cx26 amino terminus differentially alter the function of hemichannel and gap junction**". The 50th Annual Meeting of the American Society for Cell Biology, December 11-15, 2010, Philadelphia, PA, USA.

8. **Isaac E. García**, Ricardo Ceriani, Oscar Jara, Jaime Maripillán, Andrés Canales, Juan Carlos Sáez and Agustín D. Martínez. "**Mutations in Cx26 amino terminus and his role in genetic hearing loss**". XXIV Reunión Anual de la Sociedad de Biología Celular de Chile. **Pucón** Chile, 1-5 de Noviembre, 2010.
9. Andrés Canales, David Gómez, Jaime Maripillán, Oscar Jara, **Isaac García**, Agustín D. Martínez. "**Modeling the dynamic of gap-junction plaque assembling through a self-organizing mechanism**". XXIV Reunión Anual de la Sociedad de Biología Celular de Chile. **Pucón** Chile, 1-5 de Noviembre, 2010.
10. Oscar Jara, **Isaac García**, Jaime Maripillán, Andrés Canales, Juan Carlos Sáez y Agustín D. Martínez. "**Altered permeability of gap junction channels and hemichannels formed by mutants of Cx26 related to non syndromic deafness**". XXIV Reunión Anual de la Sociedad de Biología Celular de Chile. **Pucón** Chile, 1-5 de Noviembre, 2010.
11. Enrique Jaimovich, Sonja Buvinic, Mariana Casas, Reinaldo Figueroa, **Isaac García**. "**Towards a Molecular Mechanism for Calcium-dependent Excitation Transcription Coupling in Skeletal Muscle**". The 36th Congress of the International Union of Physiological Sciences. July 27- August 1, 2009 **Kyoto**, Japan.
12. Mariana Casas, Reinaldo Figueroa, **Isaac García**, Enrique Jaimovich. "**Post-tetanic Calcium transients In Adult Skeletal Muscle Fibers Are Frequency-dependent And Fiber Type Specific**" Biophysical Society's 53rd Annual Meeting February 28, 2009 through March 4, 2009, **Boston**, Massachusetts, USA.
13. Casas M., Buvinic S., Figueroa R., **García I.**, Molgo J. & Jaimovich E. (Chili). "**IP₃-dependent post-tetanic calcium transients induced by electrostimulation in adult skeletal muscle fibers**". 10th Symposium of the European Ca²⁺ Society of Ca²⁺-binding Proteins in Normal and Transformed Cells. Campus Gasthuisberg K.U.Leuven, **Leuven**, Belgium, 17-20 September 2008.
14. **García, IE**; Casas, M; Jaimovich, E. "**IP₃Rs: differential expression in skeletal muscle from adult mouse**". Society of Physiology Annual Meeting, **Coquimbo**, Chile, October 12 – 16, 2008.
15. Enrique Jaimovich, Nevenka Juretic, **Isaac García**, Ricardo Hartley, Jose Luis Liberona, Reinaldo Figueroa, Nora Riveros, Jordi Molgó, and Julio César Cárdenas. "**Altered IP₃ receptors, IP₃-dependent Ca²⁺ transients and Ca²⁺-dependent gene expression in a Duchenne muscular dystrophy cell line**". Experimental Biology 2008, **San Diego**, California, April 5-April 9, 2008.
16. Casas, M., **García, I.**, Figueroa, R., y Jaimovich, E. "**Señales Lentas de Calcio Inducidas por Estimulación Eléctrica en Fibras Musculares Adultas**". Sociedad de Biología, **Pucón**, 2007.
17. Cárdenas C., **García I.**, Hartley., Liberona JL., Figueroa R., Molgó J and E Jaimovich E. "**Altered IP₃-dependent Ca²⁺ transients and ERK1/2 phosphorylation in a muscular dystrophy cell line**". 14th Congress of Ca²⁺ -Binding Proteins & Ca²⁺ Function in Health & Disease. La Palma, **Canary Islands**, Spain 16-21 October 2007.
18. **Isaac García** y Manuel Estrada. "**Testosterone induce cell death by misregulation of IP₃R type-1 mediated calcium signals**". XX Reunión Anual de la Sociedad de Biología Celular de Chile. **Pucón** Chile, 8-12 de Octubre, 2006.
19. **Isaac García**, César Cárdenas y Enrique Jaimovich. "**Localization and Expression Differences of IP₃ Receptors in Duchenne Muscular Dystrophy**". 10th Congress of the Panamerican Association for Biochemistry and Molecular Biology, 41th Annual Meeting of the Argentine Society for Biochemistry and Molecular Biology Research; 20th Annual Meeting of the Argentine Society for Neurochemistry; Pinamar, Buenos Aires, **Argentina**, 3 al 6 de Diciembre, 2005.
20. **Isaac García**, César Cárdenas y Enrique Jaimovich. "**Localization and expression changes of IP₃Rs; possible nexus with Duchenne muscular**". XIX Reunión Anual de la Sociedad de Biología Celular de Chile; **Pucón** Chile, 16-20 de Octubre, 2005.

SYMPOSIUMS AND WORKSHOPS

- Simposio "Ion Channels In the Valley", Montegrande, Valle del Elqui, 8-10 de Abril 2015.
- International Workshop "Biophysics of Hemichannels and Gap Junctions Channels: A theoretical and practical training " March 24-27, 2015, Santiago-Valparaíso, Chile.
- II Workshop of Structural Biology and Nanophysiology, Núcleo Milenio de Biología Estructural, Facultad de Ciencias de la Pontificia Universidad Católica de Chile, 10-12 Diciembre, 2014.
- Simposio "Neuroscience meets Valparaíso" Noviembre 28-29, 2012. Parque Cultural Ex-Cárcel, Valparaíso.
- Simposio "40 Years of Ions Channels" A marriage of convenience, Octubre 25-27, 2011; Centro Interdisciplinario de Neurociencias de Valparaíso.
- International Workshop "Regulation and Function of free Intracellular Calcium" Facultad de Ciencias Biológicas, Pontificia Universidad Católica de Chile; 60 horas entre el 9 y el 20 de

Enero del 2006.

- Curso "Desarrollo, Genética y Evolución", dictado por el Profesor John Ewer, PhD, Centro Interdisciplinario de Neurociencias de Valparaíso; Agosto a Diciembre de 2010.

TEACHING EXPERIENCE

Universidad de Valparaíso, Facultad de Odontología

- Lecturer Metabolismo Normal y Patológico 2017-to date

Universidad Adolfo Ibañez, Facultad de Artes Liberales (coordinator)

- Lecturer and Coordinator Neurociencia y Comportamiento 2013-2014
- Lecturer and Coordinator Neuropsicología 2013-2014
- Lecturer and Coordinator Ciencias I y II 2013-2014

Universidad Adolfo Ibañez, Facultad de Artes Liberales

- Lecturer assistant Cátedra Ciencias I 2012-2012

Universidad del Bio-Bio, Facultad de Ciencias de la Salud

- Invited Lecturer Cátedra de Medicina Transfusional for Nursing 2007-2008

Universidad Andrés Bello, Facultad de Medicina

- Lecturer of General Physiology, Facultad de Ciencias de Salud 2006-2007

THESIS ADVISOR

- Co-advisor, Jorge Castex, Magister of Neuroscience, Universidad de Valparaíso, Chile 2017-2018
- Advisor, Cristian Malhue, Magister of Neuroscience, Universidad de Valparaíso, Chile 2017-to date

CLINICAL EXPERIENCE

- Medical Technologist, Blood Bank and Immunohematology Hospital Clínico de la Pontificia Universidad Católica de Chile. Part time modality. 01/2006-03/2013

SCIENTIFIC SOCIETY MEMBERSHIP

- Biophysical Society 2011- to date