

Dr. Karen Castillo, PhD – Young Scientist (karen.castillo@cinv.cl)

EDUCATION

INSTITUTION AND LOCATION	DEGREE	CONFERRED	FIELD OF STUDY
University of Chile, Chile	B.S Biotechnology	2003	Biology and Biotechnology
University of Chile, Chile	Molecular Biotechnology Engineer	2005	Biology and Biotechnology
University of Chile, Chile	PhD in Molecular/Cell Biology and Neuroscience	2008	Biology and Neuroscience

CURRENT POSITION

Young Research Scientist at Centro Interdisciplinario de Neurociencia de Valparaíso, CINV (www.cinv.cl). ThermoTRP ion channels from biophysics to physiology: focus on temperature sensors. Principal researcher in FONDECYT grant 1180999: “Thermosensitive structures in thermoTRP channels”.

PAST POSITION

Postdoctoral Researcher Senior Anillo Project ACT-1104: “Voltage sensor of ion channels: from structure to function”.

Laboratory of Molecular Sensors. Centro Interdisciplinario de Neurociencias de Valparaíso, Facultad de Ciencias, Universidad de Valparaíso, Chile. Advisor: Dr. Carlos González (carlos.gonzalezl@uv.cl)

Postdoctoral Researcher FONDECYT #3100112: “Induction of autophagy protects against motoneuron degeneration in Amyotrophic Lateral Sclerosis induced by mutant SOD1 aggregation”.

Laboratory of Cellular Stress and Biomedicine, Instituto de Ciencias Biomédicas, Facultad de Medicina, Universidad de Chile. Advisor: Dr. Claudio Hetz (chetz@hsph.harvard.edu)

SELECTED AWARDS

- 2020: BEN BARRES SPOTLIGHT AWARDS, RUNNER-UP PRIZE. This award is awarded by the *eLife* scientific journal in support of diversity, inclusion and visibility of underrepresented groups in science.
- 2018-2023: Elected as Young Scientist Affiliated to The World Academy of Science (TWAS).
- 2018-2022: FONDECYT Regular. Grant from the Science and Technology Committee of the Chilean government.
- 2016-present: Young Researcher Scientist at Centro Interdisciplinario de Neurociencia de Valparaíso, CINV.
- 2015: Awarded as Outstanding Young Scientist, in Young Neuroscientist Symposium at XI Annual Meeting of the Chilean Society of Neuroscience. Coquimbo-Chile, Sept-2015.
- 2010-2012: FONDECYT Postdoctoral Fellowship.
- 2010 EMBO J fellowship.
- 2007 Travelling fellowship - VICERRECTORIA ACADEMICA UNIVERSIDAD DE CHILE.
- 2007 REGULAR FELLOW UNIVERSITY OF COLORADO DENVER.
- 2007 MECESUP TRAINING RESEARCH FELLOWSHIP.
- 2006 ACHEMS AWARDS FELLOWSHIP.
- 2005 IBRO ADVANCED SCHOOL IN NEUROSCIENCE FELLOWSHIP.
- 2004-2007 CONICYT DOCTORAL FELLOWSHIP.
- 2004 MILLENIUM INSTITUTE DOCTORAL FELLOWSHIP.

- 1998-2002 MINEDUC UNDERGRADUATED FELLOWSHIP.
- 1994-1997 PRESIDENTE DE LA REPUBLICA FELLOWSHIP.

SELECTED PUBLICATIONS

1. Pedro Martín, Melisa Moncada, **Karen Castillo**, Federico Orsi, Gerónimo Ducca, José Manuel Fernández-Fernández, Carlos Gonzalez, Verónica Milesi. 2020. Arachidonic acid stabilizes the activated state of voltage sensor domain and increases the intrinsic gating of $\alpha/\beta 1$ BK (Slo1) channels. **Accepted in BBA – Biomembranes**.
2. Jocelyn Solorza, Carolina Oliva, **Karen Castillo**, Gabriela Amestica, Xaviera Lopez, Constanza Maldifassi, Rafael Antonio Barra, Jimmy Stehberg, Matthias Piesche, Patricio Sáez-Briones, Wendy Gonzalez, Mauricio Arenas-Salinas and Trinidad Mariqueo. 2020. Effects of Interleukin-1 β in glycinergic transmission in the Central amygdala. **Accepted in Frontiers in Pharmacology**.
3. Klionsky D, et al. 2020. Guidelines for the Use and Interpretation of Assays for Monitoring Autophagy (4th edition). **Accepted in Autophagy**.
4. Díaz-Franulic I, Raddatz N, **Castillo K**, González-Nilo FD, Latorre R. 2020. A folding reaction at the C-terminal domain drives temperature sensing in TRPM8 channels. **Proc Natl Acad Sci U S A**. DOI: [10.1073/pnas.2004303117](https://doi.org/10.1073/pnas.2004303117).
5. Ramírez-Barrantes R, Carvajal-Zamorano K, Rodríguez B, Cordova C, Lozano C, Simon F, Díaz P, Muñoz P, Marchant I, Latorre R, **Castillo K**, Olivero P. 2020. TRPV1-Estradiol Stereospecific Relationship Underlies Cell Survival in Oxidative Cell Death. **Front Physiol**. DOI: [10.3389/fphys.2020.00444](https://doi.org/10.3389/fphys.2020.00444).
6. Mariqueo TA, Améstica G, Pino J, Barra R, Stehberg J, González W, **Castillo K**. 2020. Sex Differences In Central Inflammatory Pain Sensitization Are Associated With Differential Expression Of Glycine Receptors And Glp-1 At The Spinal Cord. **J Neurol Sci Res**. DOI: [10.1101/2019.12.31.892133](https://doi.org/10.1101/2019.12.31.892133).
7. Lorenzo-Ceballos Y, Carrasquel-Ursulaez W, **Castillo K**, Alvarez O, Latorre R. 2019. Calcium-driven regulation of voltage-sensing domains in BK channels. **Elife** 8: e44934. DOI: [10.7554/eLife.44934](https://doi.org/10.7554/eLife.44934).
8. Granados ST, **Castillo K**, Bravo-Moraga F, Sepúlveda RV, Carrasquel-Ursulaez W, Rojas M, Carmona E, Lorenzo-Ceballos Y, González-Nilo F, González C, Latorre R, Torres YP. 2019. The molecular nature of the 17 β -Estradiol binding site in the voltage- and Ca²⁺-activated K⁺ (BK) channel $\beta 1$ subunit. **Scientific Reports** 9(1): 9965. DOI: [10.1038/s41598-019-45942-1](https://doi.org/10.1038/s41598-019-45942-1).
9. **Castillo K**, Diaz-Franulic I, Canan J, Gonzalez-Nilo F, Ramon Latorre. Thermally-activated TRP channels: Molecular sensor for temperature detection. 2018. **Physical Biology** 15(2): 021001. DOI: [10.1088/1478-3975/aa9a6f](https://doi.org/10.1088/1478-3975/aa9a6f).
10. Latorre R, **Castillo K**, Diaz-Franulic I. Sensing Pain and Temperature. 2017. Cell Biology and Genetics, **Acta Vaticana Scripta Varia** 137: 44-63. URL: <http://www.hhmi.ucla.edu/derobertis/doc/Scripta%20Varia%20137%20PAS-ACAL%20Workshop.pdf>.
11. **Karen Castillo**, Vicente Valenzuela, Maritza Oñate, and Claudio Hetz. 2017. A molecular reporter for monitoring autophagic flux in nervous system in vivo. **Methods in Enzymology** 588: 109-131. DOI: [10.1016/bs.mie.2016.09.077](https://doi.org/10.1016/bs.mie.2016.09.077).
12. Ramón Latorre, **Karen Castillo**, Willy Carrasquel-Ursulaez, Romina V. Sepulveda, Fernando González-Nilo, Carlos Gonzalez and Osvaldo Alvarez. 2017. Molecular determinants of BK channel functional diversity and functioning. **Physiological Reviews** 97(1): 39-87. DOI: [10.1152/physrev.00001.2016](https://doi.org/10.1152/physrev.00001.2016).
13. **Karen Castillo**, Amaury Pupo, David Baez, Gustavo Contreras, Francisco Morera, Alan Neely, Ramon Latorre, Carlos Gonzalez. 2015. Voltage-gated proton (Hv1) channels, a singular voltage sensing domain. **FEBS letters** 589(22): 3471-8. DOI: [10.1016/j.febslet.2015.08.003](https://doi.org/10.1016/j.febslet.2015.08.003).
14. Francisco J. Morera, Julia Saravia, Juan Pablo Pontigo, Luis Vargas-Chacoff, Gustavo F. Contreras, Amaury Pupo, Yenisleidy Lorenzo, **Karen Castillo**, Cholpon Tilegenova, Luis G. Cuello and Carlos Gonzalez. 2015. Voltage-dependent BK and Hv1 channels: new therapeutic opportunities as targets in human diseases. **Pharmacological Research** 101: 56-64. DOI: [10.1016/j.phrs.2015.08.011](https://doi.org/10.1016/j.phrs.2015.08.011).



15. **Karen Castillo**, Gustavo F. Contreras, Amaury Pupo, Yolima P. Torres, Alan Neely, Carlos Gonzalez and Ramon Latorre. 2015. Molecular mechanism underlying β 1 regulation in voltage- and calcium-activated potassium (BK) channels. *Proc Natl Acad Sci U S A* 112(15):4809-14. DOI: [10.1073/pnas.1504378112](https://doi.org/10.1073/pnas.1504378112).
16. Francisco J. Morera, David Baez-Nieto, Yenisleidy Lorenzo, **Karen Castillo**, Verónica Milesi, Luis Vargas-Chacoff and Carlos Gonzalez. 2015. Role of ion channels in salt secretion by atlantic salmon gills during acclimation to seawater. *Physiological Mini Reviews* 8(1): 1-11. URL: <https://pmr.safisiol.org.ar/archive/id/74>.
17. Nassif M, Valenzuela V, Rojas-Rivera D, Vidal R, Matus S, **Castillo K**, Fuentealba Y, Kroemer G, Levine B, Hetz C. 2014. Pathogenic role of BECN1/Beclin 1 in the development of amyotrophic lateral sclerosis. *Autophagy* 10(7):1256-71. DOI: [10.4161/auto.28784](https://doi.org/10.4161/auto.28784).
18. Gustavo F. Contreras, **Karen Castillo**, Nicolás Enrique, Willy Carrasquel-Ursulaez, Juan Pablo Castillo, Verónica Milesi, Alan Neely, Osvaldo Alvarez, Gonzalo Ferreira, Carlos Gonzalez and Ramon Latorre. 2013. A BK (Slo1) Channel Journey from Molecule to Physiology. *Channels* 7(6): 442-58. DOI: [10.4161/chan.26242](https://doi.org/10.4161/chan.26242).
19. **Castillo K**, Nassif M, Mercado G, Valenzuela V, Rojas F, Court FA, Van Zundert B and Hetz C. 2013. Trehalose delays the progression of Amyotrophic Lateral Sclerosis by Enhancing Autophagy in Motoneurons. *Autophagy* 9(9): 1308-20. DOI: [10.4161/auto.25188](https://doi.org/10.4161/auto.25188).
20. **Castillo K**, Valenzuela V, Matus S, Nassif M, Oñate M, Fuentealba Y, Encina G, Irrazabal T, Parsons G, Court FA, Schneider BL, Armentano D and Hetz C. 2013. Measurement of autophagy flux in the nervous system *in vivo*. *Cell Death and Disease* 4 (11): e917. DOI: [10.1038/cddis.2013.421](https://doi.org/10.1038/cddis.2013.421).
21. Soledad Matus, **Karen Castillo**, Claudio Hetz. 2012. Hormesis: Protecting neurons against cellular stress in Parkinson's disease. *Autophagy* 8(6): 997-1001. DOI: [10.4161/auto.20748](https://doi.org/10.4161/auto.20748).
22. **Castillo K**, Rojas-Rivera D, Lisbona F, Caballero B, Nassif M, Court FA, Schuck S, Ibar C, Walter P, Sierralta J, Glavic A, Hetz C. 2011. BAX inhibitor-1 regulates autophagy by controlling the IRE1 α branch of the unfolded protein response. *EMBO Journal* 30:4465-78. DOI: [10.1038/emboj.2011.318](https://doi.org/10.1038/emboj.2011.318).
23. Torres M, **Castillo K**, Armisen R, Stutzin A, Soto C, Hetz C. 2010. Prion protein misfolding affects calcium homeostasis and sensitizes cells to endoplasmic reticulum stress. *PLoS One* 5(12):e15658. DOI: [10.1371/journal.pone.0015658](https://doi.org/10.1371/journal.pone.0015658).
24. **Castillo K**, Restrepo D, Bacigalupo J. 2010. Cellular and molecular Ca²⁺ microdomains in olfactory cilia support low signaling amplification of odor transduction. *European Journal of Neurosci* 32(6):932-8. DOI: [10.1111/j.1460-9568.2010.07393.x](https://doi.org/10.1111/j.1460-9568.2010.07393.x).
25. Nassif M, Matus S, **Castillo K**, Hetz C. 2010. Amyotrophic lateral sclerosis pathogenesis: a journey through the secretory pathway. *Antioxidants Redox Signaling* 13(12):1955-89. DOI: [10.1089/ars.2009.2991](https://doi.org/10.1089/ars.2009.2991).
26. Saavedra MV, Smalla KH, Thomas U, Sandoval S, Olavarria K, **Castillo K**, Delgado MG, Delgado R, Gundelfinger ED, Bacigalupo J, Wyneken U. 2008. Scaffolding proteins in highly purified rat olfactory cilia membranes. *Neuroreport* 19(11):1123-6. DOI: [10.1097/WNR.0b013e3283086797](https://doi.org/10.1097/WNR.0b013e3283086797).
27. **Castillo K**, Delgado R, Bacigalupo J. 2007. Plasma membrane Ca²⁺-ATPase in the cilia of olfactory receptor neurons: possible role in Ca²⁺ clearance. *European Journal of Neuroscience* 26(9):2524-31. DOI: [10.1111/j.1460-9568.2007.05863.x](https://doi.org/10.1111/j.1460-9568.2007.05863.x).
28. Muñoz P, Zavala G, **Castillo K**, Aguirre P, Hidalgo C, Núñez MT. 2006. Effect of iron on the activation of the MAPK/ERK pathway in PC12 neuroblastoma cells. *Biological Research* 39(1):189-90. DOI: [10.4067/s0716-97602006000100021](https://doi.org/10.4067/s0716-97602006000100021).
29. **Castillo K**, Bacigalupo J, Wolff D. 2005. Ca²⁺-dependent K⁺ channels from rat olfactory cilia characterized in planar lipid bilayers. *FEBS Letters* 579(7):1675-82. DOI: [10.1016/j.febslet.2005.01.079](https://doi.org/10.1016/j.febslet.2005.01.079).

BOOK CHAPTER

1. When the good turns bad: Challenges in the targeting of autophagy in neurodegenerative diseases. 2013. Melissa Nassif, Danilo Medinas, **Karen Castillo**, Camila Gherardelli and Claudio

Hetz. In Volume Series "Autophagy: Cancer, Other Pathologies, Infection, Inflammation and Immunity". *Elsevier/Academic Press*. Edited by Eric Hayat.

2. A molecular reporter for monitoring autophagic flux in nervous system in vivo. 2017. **Karen Castillo**, Vicente Valenzuela, Maritza Oñate, and Claudio Hetz. *Methods in Enzymology* 588: 109-131. In Molecular Characterization of Autophagic Responses, Part B. *Elsevier/Academic Press*. Edited by Lorenzo Galluzzi, José Manuel Bravo-San Pedro and Guido Kroemer.

3. Methods for investigating TRP channel gating. 2019. Osvaldo Alvarez, Carlos Gonzalez, **Karen Castillo**, Emerson Carmona, Ramon Latorre. In *Methods in Molecular Biology: for an edition on TRP channels of the lab protocol series*. *Springer Nature*. Edited by Antonio Ferrer-Montiel and Tim Hucho.

LINKS

1. <https://scholar.google.com/citations?user=gDDer88AAAAJ&hl=en>
2. https://www.researchgate.net/profile/Karen_Castillo4/publications?sorting=newest
3. <https://www.ncbi.nlm.nih.gov/pubmed/?term=Castillo+Karen>

COURSES

- **2002**: Bioética y sus implicancias en la Ciencia y Sociedad. Curso avanzado de discusión de aspectos bioéticos relacionados con el quehacer científico y su impacto en la sociedad Instituto Milenio CBB, Facultad De Ciencias, Universidad de Chile. 2002
- **2005**: IBRO Advanced School in Neuroscience. BUENOS AIRES-ARGENTINA, NOV-DIC.
- **2006**: Advanced Course of Neurosciences: Ca²⁺ Measurements in Slices of Central Nervous System, Theory and Practice. Lecturer by Drs. Isabel Llanos and Alain Marti from The Brain Physiology Labs University Paris 5 and 7. Centro de Neurociencias de Valparaíso, Valparaíso University. DIC-2006. VALPARAISO-CHILE
- **2007**: Advanced Course in Microscopy Techniques and Applications, Theory and Practice. Lecturer by Juan Fernandez. Faculty of Sciences, University of Chile. ENE-2007. SANTIAGO, CHILE.
- **2007**: Advanced Course: Biophysics of Single Molecules Manipulation. Faculty of Sciences, University of Chile. Lecturer by Carlos Bustamante from University of Barkley. 10-12 DIC, 2007. SANTIAGO, CHILE.
- **2008**: Internacional Course: Calcium Signalling and Plasticity. Department of Biology, Faculty of Sciences, University of Chile. 10-15 ENE, 2008. SANTIAGO, CHILE.
- **2008**: Summer School of Cell Biology. Intensive Course, Institute Curie-University of Chile. 21-25 ENE, 2008. SANTIAGO, CHILE.
- **2013**: Latin American school on ion channels biophysics. Ion channels: structure, function and disease. CINV-Universidad de Valparaíso. 23-30 SEPT, 2013. VALPARAISO, CHILE.
- **2015**: Biochemical, Spectroscopic and Crystallographic approaches used to study the functional-structural correlations of membrane proteins. By Dr. Luis Cuello, CINV-Universidad de Valparaíso. 25-29 JUL, 2015. VALPARAISO, CHILE.
- **2017**: Young Programmers Course Biblioredes.
- **2018**: Flow cytometry Accuri6 capacitation course.
- **2018**: Learn and Built your own chemical tools for Biomedical Research. By Dr. William Kobertz, CINV-Universidad de Valparaíso. 8-19 OCT, 2018. VALPARAISO, CHILE.

8. RESEARCH EXPERIENCE

(1) Research Experience

Institution: Laboratorio de Fisiología Celular, Facultad de Ciencias, Universidad de Chile, CHILE.

Charge: Undergraduate Thesis Student

Experimental approaches: Western blot, single channel recordings in planar lipid bilayers
Permanence: 2003-2005

(2) Research Experience

Institution: Laboratorio de Fisiología Celular, Facultad de Ciencias, Universidad de Chile.

Charge: Graduate Thesis Student

Experimental approaches: Western blot, calcium imaging, immunofluorescence, patch clamp

Permanence: 2004-2008

(3) Research Experience

Institution: Taste and Smell Center, University of Colorado Denver, USA.

Charge: Graduate Thesis Fellow

Experimental approaches: multiphoton microscopy and calcium imaging.

Permanence: 2007-2008

(4) Research Experience

Institution: Laboratorio de Estres Celular y Biomedicina, Facultad de Medicina, Universidad de Chile, CHILE.

Charge: Postdoctoral Fellow

Experimental approaches: Western blot, immunoprecipitation, cell culture, animal model handling, *in vitro* and *in vivo* drug delivery, calcium imaging, immunofluorescence, immunohistochemistry, fluorescence imaging, AAVs technology.

Permanence: 2009-2013

(5) Research Experience

Institution: Laboratorio de Sensores Moleculares, CINV, Universidad de Valparaíso, CHILE.

Charge: Senior Postdoctoral Fellow

Experimental approaches: patch clamp, molecular biology, two-electrode voltage clamp, voltage clamp fluorometry, gating current recordings, molecular modeling

Permanence: 2013-2016

(6) Research Experience

Institution: Laboratorio de Sensores Moleculares, CINV, Universidad de Valparaíso, CHILE.

Charge: Young Research Scientist

Experimental approaches: patch clamp, molecular biology, two-electrode voltage clamp, voltage clamp fluorometry, gating current recordings, molecular modeling, patch clamp fluorometry, western blot, flow cytometry, immunofluorescence, calcium imaging, animal models, flow cytometry

Permanence: 2017-Present