



## School Report

**School Name:** *"ISN-IBRO Latin American School: Molecular and Cellular Mechanisms of Sensory Transduction"*

**Host Institution:** Instituto de Fisiología Celular (IFC), Universidad Nacional Autónoma de México (UNAM)

**School location:** Circuito Exterior s/n, Ciudad Universitaria, Coyoacán. Mexico City, Mexico. ZIP 04510

**Dates:** from 10-22-2023 to 10-28-2023

**Twitter:** [https://twitter.com/LaNca\\_UNAM](https://twitter.com/LaNca_UNAM)

**Webpage:** <https://sites.google.com/ifc.unam.mx/sensory-school/home?authuser=0>

### Organizers:

- Enoch Luis, PhD (<https://orcid.org/0000-0001-8522-190X>)  
Investigador por México CONAHCYT– Instituto de Fisiología Celular, UNAM
- María Luisa Durán-Pastén, PhD (<https://orcid.org/0000-0002-2630-8084>)  
Postdoctoral Student. Laboratorio Nacional de Canalopatías. Instituto de Fisiología Celular, UNAM
- Yaneri A. Ayala, PhD (<https://orcid.org/0000-0002-7031-6970>)  
Postdoctoral Researcher. University of Iowa Hospital & Clinics

### Participating Laboratories:

- Laboratorio Nacional de Canalopatías (LaNCa): <https://canalopatias.ifc.unam.mx/>
- Microscopy unit at Instituto de Fisiología Celular, UNAM: <https://sites.google.com/email.ifc.unam.mx/imagenologa-ifcunam>
- Arturo Hernández's Lab: <https://www.ifc.unam.mx/investigadores/arturo-herandez>

**Host hotel:** Radisson Paraíso Hotel. Cúspide 53, Parques del Pedregal, Tlalpan, 14010 Ciudad de México, CDMX.



## Purpose of School

The ISN-IBRO Latin American School "Molecular and Cellular Mechanisms of Sensory Transduction" was a seven days theoretical and practical course held at Instituto de Fisiología Celular (IFC) in the Universidad Nacional Autónoma de México (UNAM) in Mexico City. The School focused on recent advances in sensory transduction, particularly in the somatosensory, vestibulocochlear, and visceral systems. The objectives of the School were:

- 1) The Study of the molecular and cellular entities that detect physical and chemical stimuli in the sensory organs, as well as understanding basic concepts involved in sensory transduction phenomena. The course included the somatosensory, vestibulocochlear, and visceral systems.
- 2) Understand the functional role of ion channels, receptors, and second messengers in sensory physiology.
- 3) Bring together students from the Latin American region with leading neuroscience researchers.

Through generous support from ISN and IBRO, the School received 20 outstanding students (MSc and early PhD): 13 from different regions of Mexico and seven from Latin American countries. Students were selected by an external committee formed by three researchers who were not involved directly with the organization of the School.



## Summary of the School

From Monday (October 23) to Thursday (October 26) from 9:00 a.m. to 5:00 p.m., six theoretical sessions covered the systems proposed in the application: somatosensory, vestibulocochlear, and visceral systems. In these four days, 18 different speakers showed us a current overview of the diverse mechanisms of sensory transduction in the sensory systems mentioned and the technologies that have contributed to developing this area of neuroscience. During these days, there was a round table about the different challenges a doctoral student has, as well as an overview of each international speaker's experience in their doctorates and how they dealt with the existing problems. There were also talks with speakers who completed doctorates in neuroscience and currently carry out activities other than academia. The hands-on sessions were held from 5:00 p.m. to 8:00 p.m. The first sessions on immunofluorescence techniques in sensory neurons and PC-3 cell line were held on Monday. This session was carried out in the Institute of Cellular Physiology microscopy unit, where Dr. Ruth Rincón Heredia was responsible for this session.

For the training sessions on Tuesday and Wednesday (October 24 and 25, respectively), the students were divided into two groups; in this way, both groups alternated visiting the National Laboratory of Channelopathies (LaNCA) and the laboratory of Dr. Arturo Hernández. At LaNCA, students could perform calcium imaging and electrophysiological assays using manual and automated equipment, using primary cultures from DRG neurons and cell lines with stable expression of the Nav1.7 and Kv10.1 channels. On the other hand, in Dr. Hernández's laboratory, students could perform amperometry experiments and evaluate live/dead fluorescence assays in chromaffin cells. Additionally, before Wednesday's end, the students performed cell migration through the wound healing assay using the ImageXpressXL automated microscope. On Thursday, the practical sessions were concluded with taking images in a confocal microscope and the 24-hour images of wound closure.

Finally, on Friday, the last three theoretical sessions of the School were held, where a talk about research ethics was held. Furthermore, taking advantage of the institutional seminar, the students could listen to Dr. Yale Cohen's Parsing the Auditory Stream talk. The School closed with a summary of the School and brief feedback from some students.



## List of Students

#	email	Name	Surname	Age	Nationality	Gender	Academic Degree
1	cupae_030315@hotmail.com	Karla Aketzalli	Hernández Contreras	29	Mexican	Female	PhD student
2	atzinbmorales@gmail.com	Atzin	Balderas Morales	33	Mexican	Female	PhD student
3	carrobautista@gmail.com	Mario Alberto	Bautista Carro	25	Mexican	Male	Master in Sciences
4	sabrina.qader@acad.ufsm.br	Sabrina	Qader Kudsi	27	Brazilian	Female	PhD student
5	valeriacarolinacastagna@gmail.com	Valeria	Castagna	28	Argentine	Female	PhD student
6	mca87@hotmail.com	María del Carmen	Aguilar	35	Mexican	Female	PhD student
7	ares.cuellar@ipicyt.edu.mx	Ares Orlando	Cuellar Santoyo	28	Mexican	Male	Master in science
8	elenalp30@gmail.com	Ana Elena	López Romero	29	Mexican	Female	PhD student
9	cesar.amaya@up.ac.pa	César Abdiel	Amaya Rodríguez	26	Panamanian	Male	PhD student
10	zS20022668@estudiantes.uv.mx	Juan Gabriel	Torres Pasillas	28	Mexican	Male	PhD students
11	emmanuelhernandezalvarado8@gmail.com	Emmanuel Salvador	Hernandez Alvarado	30	Mexican	Male	PhD student
12	lopezcj@cicese.edu.mx	Joaquín	López Carrillo	28	Mexican	Male	Master in science
13	karina.carvajal@postgrado.uv.cl	Karina	Carvajal	30	Chilean	Female	PhD student
14	elizabeth.mendoza.a@usach.cl	Elizabeth	Mendoza Atuesta	27	Colombian	Female	PhD student
15	suriagonzalez94@gmail.com	Suria	González Ochoa	32	Mexican	Female	PhD student
16	mary_carl123@hotmail.com	María del Carmen	Hernández Zamora	31	Mexican	Female	PhD student
17	carolina.alvarezr08@gmail.com	Poulette Carolina	Álvarez Rosales	25	Mexican	Female	Master in science
18	luanacm1999@gmail.com	Luana	Carvalho Martins	24	Brazilian	Female	PhD student
19	ricardo.cespedes@postgrado.uv.cl	Ricardo	Céspedes Jara	24	Chilean	Male	PhD student
20	david.lozano@alumnos.udg.mx	David Arturo	Lozano López	27	Mexican	Male	PhD student

**Number of domestic students: 13**

**Number of International students: 7**

**Gender Distribution: 60% females and 40% males**

**Students' levels of education: 4 masters' in science and 16 PhD students**



**Countries represented by students:** Mexico, Colombia, Argentina, Chile, Brazil, Panama

## List of Faculty and lectures

1. Angélica Almanza, PhD. Instituto Nacional de Psiquiatría Ramón de la Fuente. "Research ethics lecture."
2. Diego V. Bohórquez, PhD. Duke University. "The wisdom of the gut."
3. Arturo Hernández-Cruz, PhD. Instituto de Fisiología Celular, UNAM. "Chromaffin Cells: Model cells for Neuronal Cell Biology."
4. Rodolfo Madrid, PhD. Universidad de Santiago de Chile. "Molecular and neural mechanisms of cold allodynia in neuropathic pain."
5. Tzitzitlini Alejandro García, PhD. Columbia University. "Exploring the surprises of neurophysiology: Methods and Applications."
6. Francisco Mercado, PhD. Instituto Nacional de Psiquiatría Ramón de la Fuente. "Sensory coding of the nociceptive pathway and its modulation."
7. Sara Luz Morales-Lázaro, PhD. Instituto de Fisiología Celular, UNAM. "The role of sex steroids in pain: the effects on TRPV1 regulations."
8. María Cristina Pérez Flores, PhD. University of Nevada. "Mechanisms of the Sensorial Systems in the Inner Ear: update and paradigm shifts."
9. María Pertusa, PhD. Universidad de Santiago de Chile. "Molecular bases of cold thermotransduction."
10. Adriana Pliego, PhD. Universidad Autónoma del Estado de México. "Galvanic Vestibular Stimulation to study the integrity for the vestibular pathways."
11. Cesar Poot Hernández, PhD. Instituto de Fisiología Celular, UNAM. "Application of bioinformatics to sensory transduction research."
12. Pedro Segura Chama, PhD. CONAHCYT – INPRFM. "The somatosensory system."
13. Rocio Servin, PhD. The Scripps Research Institute. "Mechanoelectrical transduction and its physiological functions" and "Gut to move: the role of PIEZO2 in gastrointestinal transit."
14. María José López González, PhD. Freelancer. "Life after a PhD (Round table)."
15. Hugo Cruces, PhD. Boehringer Ingelheim. "Life after a PhD (Round table)."
16. Tamara Rosenbaum, PhD. Instituto de Fisiología Celular, UNAM. "Modes of activation of two TRPV channels."
17. Enrique Soto, PhD. Benemérita Universidad Autónoma de Puebla. "The vestibular system."
18. Karel Talavera, PhD. Leuven University. "Assessing the role of sensory ion channels in physiological reflexes" and "Irritating stories: from spices to clinics."





19. Yaneri A. Ayala, PhD. University of Iowa Hospital & Clinics. "Neuroscience of sensory systems."
20. Irene Lu, PhD. Nanion Technologies. "Automated patch-clamp... in neuroscience?."

### **Hands-on Instructors**

1. Ruth Rincon Heredia, PhD. Instituto de Fisiología Celular, UNAM.
2. Diana Alicia Millán Aldaco, M.Sc. Instituto de Fisiología Celular, UNAM.
3. Angélica Martínez Becerril, M.Sc. Instituto de Fisiología Celular, UNAM.
4. César Oliver Lara Figueroa, M.Sc. Instituto de Fisiología Celular, UNAM.
5. Oscar Javier Parada Parra, PhD student. Instituto de Fisiología Celular, UNAM.
6. Jesús Emiliano Covarrubias Lobatón. Master student. Instituto de Fisiología Celular, UNAM.
7. Enikar M. M. Patlán, Master student. Instituto de Fisiología Celular, UNAM.

**Number of faculty and any other attendees:** 19 guest speakers and seven hands-on instructors

**Countries represented by faculty and instructors:** Mexico, Chile, Spain, Belgium, EEUU, Germany



## Final Program

	Monday 23	Tuesday 24	Wednesday 25	Thursday 26	Friday 27
9:00 - 10:00	School Introduction by co-chairs	Modes of activation of two TRPV channels. <b>Tamara Rosenbaum, PhD.</b>	Life after a PhD (Round table). <b>María José López González, PhD; Hugo Cruces, PhD.</b>	The vestibular system. <b>Enrique Soto, PhD</b>	Research ethics lecture. <b>Angélica Almanza, PhD</b>
10:00 - 11:00	Neuroscience of sensory systems. <b>Yaneri A. Ayala, PhD</b>	Sensory coding of the nociceptive pathway and its modulation. <b>Francisco Mercado, PhD.</b>		Galvanic Vestibular Stimulation to study the integrity for the vestibular pathways. <b>Adriana Pliego, PhD</b>	Irritating stories: from spices to clinics. <b>Karel Talavera, PhD.</b>
11:00 - 11:20	Coffee break				
11:20 - 12:20	Exploring the surprises of neurophysiology: methods and Applications. <b>Tzitzitlani Alejandro García, PhD</b>	Sensory coding of the nociceptive pathway and its modulation. <b>Francisco Mercado, PhD.</b>	The role of sex steroids in pain: the effects on TRPV1 regulations. <b>Sara Luz Morales Lazaro, PhD.</b>	Mechanisms of the Sensorial Systems in the Inner Ear: update and paradigm shifts. <b>Ma. Cristina Pérez-Flores, PhD.</b>	12:00-13:30 IFC's seminar
12:20 - 13:20	The somatosensory system. <b>Pedro Segura Chama, PhD</b>	Molecular and neural mechanisms of cold allodynia in neuropathic pain. <b>Rodolfo Madrid, PhD</b>	Application of bioinformatics to sensory transduction research. <b>A. Cesar Poot Hernández, PhD</b>		14:00 - 15:00 Conclusions by co-chairs
13:30 - 15:00	Lunch				
15:00 - 16:00	Molecular bases of cold thermotransduction. <b>María Pertusa, PhD</b>	Gut to move: the role of PIEZO2 in gastrointestinal transit. <b>Rocio Servin, PhD</b>	The wisdom of the gut. <b>Diego V. Bohórquez, PhD.</b>	Assessing the role of sensory ion channels in physiological reflexes. <b>Karel Talavera, PhD.</b>	Free time activity
16:00 - 17:00	Mecanoelectrical transduction and its physiological functions. <b>Rocio Servin, PhD</b>	Automated patch-clamp... in neuroscience? <b>Irene Lu, PhD. Nanion Technologies</b>		Chromaffin Cells: Model cells for Neuronal Cell Biology. <b>Arturo Hernandez, PhD.</b>	
17:00 - 20:00	Hands-on (practical sessions in groups)				19:00 Closing dinner

**Arrivals:** October 22

**Departure:** October 28



### Hands-on sessions

1. *Manual patch-clamp electrophysiology and calcium imaging experiments.* Students could perform patch-clamp electrophysiology on dorsal root ganglia (DRG) neurons. Through this method, they could observe the electrical properties of these neurons, e.g., how neurons can fire action potential when depolarizing stimuli are applied. Also, students can observe the morphological differences between all the DRG populations under the microscope. In conjunction with electrophysiology, students also performed calcium imaging experiments using the fluorophore Fluo4-AM. Applying a plethora of stimuli, the students were able to observe the response of DRG neurons to menthol, AITC, and capsaicine, and determine what kind of neuronal population is responding.
2. *Automated patch-clamp electrophysiology.* In addition to manual patch-clamp electrophysiology, students used the port-a-patch system from Nanion Technologies to study the pharmacological modulation of Nav1.7 and Kv10.1 ion channels through this system. In this way, students could contrast the differences between manual and automated patch-clamp techniques. By knowing the pros and cons of both methods, students could see the past and the future of the gold standard for studying ion channels in neuroscience.
3. *Cell migration using an automated epifluorescence microscopy.* The wound healing assay allows the students to observe the behavior of cells and how they move until they establish new contacts at the edge of a wound generated by scraping the center of a monolayer of cells, thus closing the wound. In this sense, automated microscopy allows us to monitor the same field for prolonged periods, facilitating the test. HEK-293 cells were seeded in a 24-well plate at an 80% confluency. Each student made a wound, images were taken, and this was set as time 0; each of the wells was treated with different concentrations of Fetal Bovine Serum (0.5, 10 and 20%). After 24 hours, the cells with the different treatments were observed, and images were acquired to compare the wound size between 0 and 24 hours. Instruction on automated fluorescence microscopy and its applications was given by Dr. Penny Tavormina, who is a Latin America Distribution Manager and specialist in Molecular Device applications.
4. *Study of Piezo1 expression on DRGs and PC-3 cells by immunofluorescence.* Students could perform the dye of DRG neurons and PC-3 cancer cells using an antibody against the Piezo1 channel. Through 2 experimental days, students could follow all the steps to study the piezo1 expression in both cell lines. The antibody visualization were performed using the confocal





microscopes from the Microscopy Unit at Instituto de Fisiología Celular, UNAM.

5. *Chromaffin cell assays.* Students could visit Arturo Hernández's Lab, where they performed amperometry experiments to study the catecholamine release by chromaffin cells; here, they observed the technical requirements to perform this kind of assay. In Latin America, amperometry is not a common technique; therefore, students must know and perform this kind of experiment. Also, they can perform live/dead fluorescence assay in the same cell using a commercial kit.
6. *Fluorescence membrane potential assays.* Resting membrane potential is an essential parameter in neurons and excitable cells. Ion channels play a primordial role in establishing this parameter. For this reason, students performed measurements of changes in fluorescence associated with changes in the membrane potential of cell lines expressing Kv channels. These experiments were performed in a multi-plate reader, and cells were treated with different Kv modulators to identify whether these modulators influenced the fluorescence signal recorded. The FLIPR® membrane potential assay from Molecular Devices was used for this experiments.
- 7.

### Equipment used

- The Multiclamp 700B and the Axopatch 200B (Molecular Devices) amplifiers were used for manual patch-clamp electrophysiology.
- Two port-@-patch systems (Nanion Technologies) were used for automated patch-clamp electrophysiology.
- The ImageXpressXL (Molecular Devices) was used for the wound healing assay.
- The multi-plate reader FlexStation3 (Molecular Devices) was used for the membrane potential fluorescent assays.
- The LSM800 confocal microscope (Zeiss) was used for the immunofluorescence assays.
- The Leica DM600 B epifluorescence microscope was used for chromaffin cells' live/dead assays.
- The Nikon Ti microscope coupled to a Lambda HPX-L5 LED light source and a Hamamatsu camera were used for calcium imaging experiments.
- The EPC10 (HEKA) amplifier was used for the amperometry experiments.



## Itemized budget report

ISN funds: 24,300 dollars

Expenses	Amount (in dollars)
<b>Accommodation for 20 students and six international guest speakers.</b> Each participant was housed at Hotel Radisson Paraiso Pedregal for six nights. Students were booked in a double-bed hotel room, and guest speakers in a single-bed hotel room. Breakfasts were included in the booking.	9,500.00
<b>Meals and mobility expenses for 20 students and guest speakers.</b> Food expenses for six days and mobility (from the hotel to the institute and vice versa) were covered for all students and guest speakers.	2,000.00
<b>Material for hands-on experiments</b> DMEM culture medium, fetal bovine serum, antibiotic, antibody anti-piezo1	3,000.00
<b>Travel expenses for seven international speakers (round-plane tickets)</b> -María Pertusa (Chile - Mexico) -Rodolfo Madrid (Chile - Mexico) -Tzitzitline Alejandro García (New York - Mexico) -Yaneri A. Ayala (Iowa - Mexico) -Diego Bohorquez (North Caroline - Mexico) -Rocío Sevin (San Diego CA - Mexico) -Cristina Pérez Flores (Reno, Nevada - Mexico)	6,500.00
<b>Travel expenses for the 13 domestic students (round plane and bus tickets)</b>	1,800.00
<b>School materials for students and participants</b> Notebooks, cups, bags	1,500.00
<b>Total</b>	<b>24,300.00</b>

Other sponsor

- **IBRO:** 14,000 euros used to cover the international students' travel expenses and other hands-on practical costs.
- **AccesoLab:** cover the breakfast during the all-week School
- **ADInstruments:** cover the expenses of one guest speaker
- **UNAM:** support all the facilities for the School
- **Nanon:** cover the chips for the automated patch-clamp experiments
- **Inolab:** cover one day lunch for students



## Students Feedback

At the end of the School, a Google survey was applied to every student; 19 of 20 students answered the survey. We solicited and evaluated the School from 1 to 5, where 1 represent a terrible experience and 5 an excellent event. The 19 students considered the School as excellent. In addition, we ask for a brief comment about their experience during the all-week School, which is detailed in the following table.

Email	Student	Comments
ares.cuellar@ipicyt.edu.mx	Ares Orlando Cuellar Santoyo	This School helped me improve my skills in the field of electrophysiology, in addition, it allowed me to interact with high-level researchers and students from different countries. Thanks to these interactions, collaborations can be consolidated.
valeriacarolinacastagna@gmail.com	Valeria Castagna	The School provided me with fundamental theoretical knowledge in the field of sensory biology. This knowledge is fundamental for a better understanding of the results obtained in my research.
zS20022668@estudiantes.uv.mx	Juan Gabriel Torres Pasillas	<p>Thanks to the School, I was able to learn techniques such as amperometry, automated patch clamp, FLIPR, confocal microscopy, among others, which will help me gain a better understanding when reading scientific articles. Possibly, in the future, I can continue to learn about these techniques to apply them to my research.</p> <p>I had the opportunity to explore the diversity of national and international research in sensory transduction, which will undoubtedly enhance my understanding of the olfactory system, the central theme of my doctoral thesis.</p> <p>The advice provided by the speakers will be invaluable in furthering my development as a researcher. Additionally, I hope to have initiated communication with several researchers from the Institute of Cellular Physiology and the National Laboratory of Channelopathies to address technical, methodological, and knowledge-related questions.</p> <p>Finally, I am confident that attending this School will open more opportunities for me in the future.</p>
carolina.alvarezr08@gmail.com	Poulette Carolina Álvarez Rosales	The insights shared by the researchers have provided me with a new perspective on understanding the molecular mechanisms involved in cell communication and mechanotransduction, particularly involving ion channels and cell receptors. In addition, I consider that the most valuable information was the techniques employed to visualize real-time responses to different stimuli within the cell, such as patch clamp, amperometry, and calcium exchange. The extensive range of knowledge presented will facilitate my comprehension and execution of experiments within my thesis, enabling me to elucidate the mechanisms of cancer cells when exposed to conotoxins.
lopezcj@cicese.edu.mx	Joaquín López Carrillo	It helped me better understand the molecular and sensory basis in processes involved in nociception. Furthermore, it was an incredible tool to broaden my outlook in studying sensory processes, motivating my return to laboratory work.
sabrina.qader@acad.ufsm.br	Sabrina Qader Kudsí	The School will help me with exciting lectures and ideas about some aspects of my doctoral project that I had yet to think of in that way.



		Furthermore, the School allowed me to meet many researchers and young researchers and thus exchange ideas and suggestions for future projects.
david.lozano@alumnos.udg.mx	David Arturo Lozano López	I think School has expanded my perspectives about the studies that can be made and the new methodologies that can be applied on sensory transmission. I think it will be extremely useful to have had both practical and theoretical sessions with experts in the area, as it expands the possibilities of things that can be applied in my project.
carrobautista@gmail.com	Mario Alberto Bautista Carro	I'm currently studying the effect of depression on glial neuromorphology. Understanding the mechanisms of sensory transduction will help me to relate the comorbidity between pain and depression.
elenalp30@gmail.com	Ana Elena López Romero	I work on biophysics and structural aspects of ion channels, so I had to learn more about the physiological aspects of ion channels, specifically I am interested on their roles on sensory systems, because I would like to look for a postdoctoral position on this area.
emmanuelhernandezalvarado8@gmail.com	Emmanuel Salvador Hernandez Alvarado	Mainly, the School will help me to give a better focus to the discussion of my work. It will also allow me to rethink some of the final experiments that will serve the perspectives of my thesis.
luanacm1999@gmail.com	Luana Carvalho Martins	The School provided an exceptional opportunity to connect with research groups, engage in discussions about hypotheses, and be introduced to innovative techniques and insights that can greatly benefit the development of my research projects as a PhD student in Brazil. Moreover, the professors demonstrated their willingness to collaborate, a crucial element in enhancing scientific research efforts in Latin America.
ricardo.cespedes@postgrado.uv.cl	Ricardo Céspedes Jara	The School helped me learn new laboratory techniques to apply in my doctoral thesis. With this I will have the ability to be more efficient, increasing the number of my experiments, in addition to evaluating factors that I had not previously considered. It also helped me create networks with renowned researchers in Mexico, who offered me help and possible collaborations to carry out my doctoral work.
suriagonzalez94@gmail.com	Suria González Ochoa	The lectures I attended during the School program really helped me regain focus on the subject matter of my thesis, they gave me new approaches and novel ways of looking at the sensory systems
atzinbmorales@gmail.com	Atzin Balderas Morales	Listening to the researchers working in other countries allows me to face many possible situations, such as cultural and language barriers at the same time to take care of my emotional health. It's important to do networking and interdisciplinary work to grow up as a research.
cesar.amaya@up.ac.pa	César Amaya	I believe that the IBRO-ISN school will help me during my postgraduate studies to 1. To improve the presentation of my ideas; 2. To have a broader vision of the different techniques that can be used to answer the research question; 3. To realize that no matter how difficult the postgraduate degree may be, one must be consistent and, if necessary, rediscover why one has chosen this path; 4. Because of the connections that have been made between my colleagues and the exhibitors, as well as getting to know the people who do science in this field in Latin America.



karina.carvajal@postgrado.uv.cl	Karina Carvajal	Several of the topics covered during the School are closely related to my thesis, which had helped me a lot to think about new experiments and even to rethink some of them, as it has given me new perspectives on how to approach certain questions.
mary_car123@hotmail.com	María del Carmen Hernández Zamora	The School provided me with a diverse range of theoretical and practical knowledge. The well-equipped laboratories offered a wide array of facilities, equipment, techniques, and research resources, which will greatly support my doctoral work. Moreover, I had access to experienced speakers and mentors who contributed to my academic growth, offering opportunities for professional development, advisory services, and academic guidance. Additionally, the School facilitated networking and collaboration with fellow Latin American students and professionals in my field of study.
elizabeth.mendoza.a@usach.cl	Elizabeth Mendoza Atuesta	The knowledge acquired during the course helped me consolidate theoretical and practical knowledge, it also helped me acquire updated information about sensory systems and develop a more robust vision of the role that ion channels play within the somatosensory system, such as TRPM8, which is my specific research area, and other channels of great relevance such as TRPV1, TRPA1 and Piezo channels, among others. Likewise, this course allowed me to compare the transduction mechanisms in different sensory systems and understand how each of the cellular and molecular entities that regulate these processes affect neuronal excitability, which will allow me to extrapolate this knowledge and skills to my research project doctoral thesis.
mca87@hotmail.com	María del Carmen Aguilar Palacios	At School I acquired basic and current knowledge on topics related to sensory systems as well as techniques that I can implement in my project.





## Guest speakers feedback

At the end of the School, a Google survey was also sent to the guest speaker; we received the answers of 6 of them. We solicited and evaluated the School from 1 to 5, where 1 represent a terrible experience and 5 an excellent event. The six speakers considered the School as excellent. In addition, we ask for a brief comment about their experience during the all-week School, which is detailed in the following table.

Email	Speaker	Comments
diego.bohorquez@duke.edu	Diego Bohórquez	Outstanding experience for students.
mariajlopezgonzalez@gmail.com	Maria Jose López Gonzalez	The School was very interesting and informative, satellite events around options and careers outside academia, should be incorporated in next editions
tzitzitlini9@gmail.com	Tzitzitlini Alejandre-García	To me, everything was pretty well organized. The speakers were very appropriate according to the school topic, and the selected students behaved very involved.
rodolfo.madrid@usach.cl	Rodolfo Madrid	A brief poster session of the students could be an excellent opportunity to share with them and talk about their ongoing projects.
maria.pertusa@usach.cl	María Pertusa	The ISN-IBRO School was excellent. It provided the students with different views about the research in the field of sensory transduction and several perspectives and strategies to answer their questions in the laboratory. One aspect that could be implemented in the future is to organize a poster session where the students present their thesis projects and/or results to give them feedback and increase our interaction with them.
segurapd@gmail.com	Pedro David Segura Chama	As a speaker in the ISN-IBRO Latin American School "Molecular and cellular mechanisms of sensory transduction", I consider that the School satisfactorily met the stated objectives, the students had the opportunity to interact with researchers who were always willing to share, not only their experience in techniques used in basic science, but also in academic and work environments. In the talks that I had the opportunity to listen to, they were all very interesting and very well explained. Being a small group, the students' doubts were clarified and it allowed us to interact with other researchers. I consider that one part in which it could be improved is the duration of the talks (no more than 45 minutes) because sometimes the time spent dedicated to the question section was extended and generated delays in programming.
yaneri.a.ayala@gmail.com	Yaneri A. Ayala	The students were active and curious, and the speakers were generous sharing not only their



		<p>scientific knowledge during the conferences but also their experience and challenges faced during their careers, which was much appreciated by the students. In this regard and for future schools, I will suggest to further strength the student-speakers interaction by having a formal group discussion session every day. This session will give to the participants the space to undergo in a deeper discussion on the rationale behind each experiment, alternative interpretations, or technical limitation authors faced to address each research question. Also, this after-day conversion will give to students more time and confidence to ask for strategies on how to build a career in science to the senior and former speakers.</p>
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## Conclusion

The ISN-IBRO Latin America School' Molecular and Cellular Mechanisms of Sensory Transduction' School held in Mexico City in October 2023 was an event that brought together state-of-the-art knowledge in the molecular and cellular physiology covering various levels and fields, including single-channel electrophysiology, calcium circuit activation, and behavior. The school topics highlighted the basic and translational aspects of every research line presented by national and international speakers. They gave a critical overview of the methodologies and techniques currently employed in these fields. Therefore, the School was a unique opportunity for young researchers coursing graduate studies to obtain in-depth and critical knowledge of the theory and experiments typically run in molecular and cellular neuroscience. Likewise, the School was a unique opportunity for the speakers and students to broaden their networking on shared interests to strengthen Latino-American research. Overall, the School was a fruitful activity to share ideas and think in new and joint endeavors to address common questions with complementary expertise.





## Photos











More pictures are available in the following link:

[https://drive.google.com/drive/folders/1H3urQjpO06tLy5ru3TY1sW-FL4xC2QvK?usp=drive\\_link](https://drive.google.com/drive/folders/1H3urQjpO06tLy5ru3TY1sW-FL4xC2QvK?usp=drive_link)