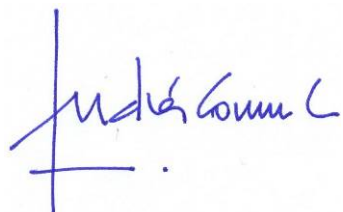




<i>Name of the Center: BIOMEDICAL NEUROSCIENCE INSTITUTE</i>	
Acronym	BNI
Code	ICM P09-015-F
Reported period	January 1 to December 31, 2017
Starting date of the Center	June 28, 2011
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Andrés Couve Correa	Claudio Hetz Flores
<i>Principal Researcher's Signature</i>	<i>Deputy Principal Researcher's Signature</i>
	

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1. 1.1 Executive Summary

The Biomedical Neuroscience Institute (BNI) has become a reference center in Latin America that brings together a critical mass of leading neuroscientists, clinicians, mathematicians, physicists, engineers, entrepreneurs, and education and health professionals to explore the structure and function of the brain under normal physiology and disease, from cells to whole organisms, and strongly interact with the community. 2017 corresponded to our second year of our second 5-year period. New strategies proposed in the mid-term review were consolidated during this period. The key objectives that build upon the existing institute's achievements and currently drive BNI's activities are: (i) to further enhance the quality of BNI trademark inter-disciplinary and collaborative research; (ii) to promote translational research and interactions with the private sector; (iii) to expand the impact of training and capacity building; (iv) to strengthen education and outreach.

According to our renovated structure, six lines conduct research on the relationship between structure and function of the brain, following a bottom up, multi-scale approach in complementing model organisms (flies, multiple fish models, mice, rats, and humans) including clinical research. Two transversal research lines promote a highly collaborative strategy conducting research and development in biomathematics (BioMat) and neuropathology. Our *Applied Neuromedicine and Technology Platform (NeuroTech)* concentrates our growing capacity in technology transfer and innovation. Our outreach and education platform *Loligo* connects BNI with school-students, science teachers and the general community. BNI's research is supported by students, postdocs, young investigators, engineers, entrepreneurs, clinicians, and a team of highly qualified and motivated staff.

The productivity of BNI includes the achievements of six Associated Investigators, two Senior Investigators, and nine Adjunct Investigators. During 2017 more than 200 people constituted the core of the institute. Adjunct investigators, who have academic positions and independent and funded research lines have successfully fulfilled their role to bridge, strengthen and expand research areas and build the sustainability. Additionally Adjunct Investigators with MD degrees conduct studies in animal models and humans in the areas of neurological and psychiatric disorders providing a practical strategy to achieve one of our main aims related to translational research and the clinic.

13 young investigators, 31 postdocs, 45 PhD, 37 Master, 10 undergraduate students and a team of 70 technical and professional staff complete BNI's multidisciplinary research team. During 2017, 19 students completed their dissertation work and 12 theses were co-directed by BNI Investigators. 11 students visited foreign laboratories to conduct collaborative research. BNI hosted 9 international students from countries in South America and Europe, including Uruguay, Venezuela, Germany, Ireland, and Netherlands. As part of their comprehensive scientific training, 69 BNI students participated in outreach activities. A number of trainees left BNI, continuing their career paths in other national institutions or abroad, while others have stayed to pursue a higher degree or a postdoctoral position. 4 postdocs continued their scientific careers elsewhere, including academic positions in Chile and USA. 5 graduates remained in science and academia.

During 2017 BNI Investigators published 47 articles, all of them ISI with an average ISI impact factor of 5.5, which compares favorably to similar centers in the developed world and maintains our excellent trend. High impact factor articles in journals such as *Nature Communications* and *Acta Neuropathologica* and reviews in prestigious journals of wide circulation for example *Nature Reviews Neurology*, *Nature Structural and Molecular Biology*, *Traffic* and *Circulation* demonstrate

the international impact of research at BNI. In addition BNI researchers continued their strong presence in national and international meetings, with 129 posters or oral presentations during 2017.

One new patent was filed for protection and another entered Patent Cooperation Treaty (PCT) national phases demonstrating a successful collaboration between our *NeuroTech* area and the central R&D office at U Chile. Intellectual property protection, regular trust-based interactions with business owners, CEOs, entrepreneurs, together with increasing funding from the private sector (approximately \$ 525,314 USD during 2017) have begun to consolidate our approach to industry.

During 2017 a number of national and international scientific events contributed to create an exciting multidisciplinary atmosphere at BNI. We organized 14 regular seminars, *Conversations in Neuromedicine*, in topics connecting Neuroscience and medicine, which included local and international speakers. We continued to promote monthly internal seminars fully organized and executed by young investigators and postdocs with full support of our professional staff. We carried out the 5th version of *NeuroSur*, which included (i) the symposium *Neurobiology of Consciousness and Altered States*; (ii) the international workshop and course *Tools for Temporal Series Analysis*; (iii) the technological symposium *Brain Monitoring during Anesthesia*; and (iv) the *NeuroSur* business meeting. In order to reinforce the identity of the Institute and promote the interaction between teams of different laboratories we organized our annual two-day BNI retreat at Termas del Corazón near Los Andes, with a program of lectures (*Research at BNI, Science and Experience*), presentation and evaluation of *Seed Grants*, discussions around relevant scientific and ethical topics (for example authorship, experimentation in animals, working conditions, and research at BNI), and stimulating social excursions and recreational activities.

We continue to allocate significant Millennium funds to common strategic aims such as animal facilities, a BioMat team, infrastructure, equipment, education/outreach, innovation and technology transfer and administration. Testing of new ideas and attraction of young investigators continued through our successful programs of *Seed Grants* and *Bridge Fellowships*.

During 2017 BNI investigators received exciting awards and recognitions. **AC**, Director of BNI, was awarded the *Sofofa Andrés Concha Prize* for his contribution to bridge science with other spheres of society. **AC** and **CHz** were recognized for their contribution to research, innovation and artistic creation; publishing in top rank journals; achievements in innovation and technology transfer; and contribution to value creativity and for advocating the role of science and technology in the sustainable development of Chile at the 175th anniversary ceremony of U Chile. Young researchers V Valenzuela, won the 2nd *Contest of patenting and technology transfer*, awarded by the Vicerrectoría de Investigación y Desarrollo, U Chile and R Castillo won 1st prize in the *Free Studies in Psychiatry*.

Press coverage of the institute's activities has firmly established BNI as a reference center in Chile and Latin America. BNI press appearances were valued in an outstanding \$ 1,770,053 USD, with 84 appearances in newspapers, 4 in weekly magazines, 57 online, 9 on radio, and 21 on television. Press coverage has contributed to position BNI as a resource center for neuroscientists, clinical practitioners, high-school students, entrepreneurs and the general public.

Our new BNI building and garden are now fully operative and host a number of regular academic activities such as seminars, workshops, courses, weekly BNI meetings, lab meetings, *Scientific Visit Day* activities, the education program for science teachers, and formal and informal meetings. V Vio, who leads the Communications Office and S Reyes, head of Technology Transfer and Innovation are based in the new building. The site has consolidated as a centralized hub and an ideal setting to engage with the community. An Executive Office contributed to connect with other sectors, a Grant Management Office is responsible for the financial administration, and a Board of Directors continues to steer the Institute's strategy.

1.2 Resumen Ejecutivo

El Instituto de Neurociencia Biomédica (BNI) se ha convertido en un centro de referencia en América Latina al reunir una masa crítica de neurocientíficos, clínicos, matemáticos, físicos, ingenieros, empresarios, profesionales de la educación y de la salud para explorar la estructura y función del cerebro en fisiología y enfermedad, desde las células hasta organismos completos, e interactuar con la comunidad. 2017 correspondió al segundo año de nuestro segundo período. Las nuevas estrategias propuestas durante la renovación se consolidaron durante esta etapa. Los objetivos claves del instituto, y que actualmente impulsan las actividades de BNI, son: (i) mejorar la calidad de la investigación interdisciplinaria y colaborativa como señal exclusiva de la cultura BNI; (ii) promover la investigación traslacional y las interacciones con el sector privado; (iii) expandir el impacto de la formación y el desarrollo de capacidades; (iv) fortalecer la educación y la divulgación.

De acuerdo a nuestra estructura renovada, seis líneas de investigación estudian la relación entre la estructura y la función del cerebro, siguiendo un enfoque ascendente y multiescala en organismos complementarios (moscas, múltiples modelos de peces, ratones, ratas y humanos), incluida la investigación clínica. Dos líneas de investigación transversales promueven una estrategia altamente colaborativa para la investigación y desarrollo en biomatemática (BioMat) y neuropatología. Nuestra *Plataforma de Neuromedicina y Tecnología Aplicada (NeuroTech)* concentra nuestra creciente capacidad en transferencia tecnológica e innovación. La plataforma de divulgación y educación *Loligo* conecta a BNI con escolares, profesores de ciencias y la comunidad en general. La investigación en BNI cuenta con el apoyo de estudiantes, postdocs, jóvenes investigadores, ingenieros, emprendedores, clínicos y un equipo de personal motivado y altamente calificado.

La productividad de BNI incluye los logros de seis Investigadores Asociados, dos Investigadores Principales y nueve Investigadores Adjuntos. Durante 2017, más de 200 personas constituyeron el núcleo del instituto. Los Investigadores Adjuntos, que tienen cargos académicos y una línea de investigación independiente y financiada, han cumplido con éxito su función de tender puentes, fortalecer y ampliar las áreas de investigación y construir la sostenibilidad del instituto. Además, los Investigadores Adjuntos con formación médica realizan estudios en modelos animales y humanos en áreas de trastornos neurológicos y psiquiátricos, proporcionando una estrategia práctica para lograr uno de nuestros principales objetivos relacionados con la investigación traslacional y la clínica.

13 jóvenes investigadores, 31 postdoctorados, 45 estudiantes de doctorado, 37 estudiantes de magíster, 10 estudiantes de pregrado y un equipo de 70 profesionales y técnicos completan el equipo de investigación multidisciplinario de BNI. Durante 2017, 19 estudiantes completaron su trabajo de tesis, 12 de éstas fueron codirigidas por investigadores BNI. 11 estudiantes visitaron laboratorios extranjeros para realizar investigaciones colaborativas. BNI recibió a 9 estudiantes internacionales de países de América del Sur y Europa, incluidos Uruguay, Venezuela, Alemania, Holanda e Irlanda. Como parte de su formación científica integral, 69 estudiantes de BNI participaron en actividades de divulgación. Algunos continuaron sus carreras en otras instituciones nacionales o en el extranjero, mientras que otros se han quedado para obtener un título superior o como postdoc. 4 postdocs continuaron sus carreras científicas en puestos académicos en Chile y Estados Unidos, mientras que 5 con grado de doctor recién recibido permanecieron en la ciencia y la academia.

Durante 2017 los investigadores BNI publicaron 47 artículos, todos ellos ISI, con un factor de impacto ISI promedio de 5.5, que se compara favorablemente con centros similares en el mundo desarrollado y mantiene nuestra excelente tendencia. Artículos de alto impacto en revistas como *Nature Communications* y *Acta Neuropathologica* y revisiones en revistas de amplia circulación, por ejemplo, *Nature Reviews Neurology*, *Nature Structural* y *Molecular Biology, Traffic* y *Circulation* demuestran el impacto internacional de la investigación. Además, los investigadores de BNI continuaron su fuerte presencia en reuniones nacionales e internacionales, con 129

presentaciones durante 2017. Durante 2017 se presentó una nueva patente para protección y otra entró en las fases nacionales (PCT) demostrando una colaboración exitosa entre nuestra área *NeuroTech* y la oficina central de I+D en la U Chile. La protección de la propiedad intelectual, las interacciones periódicas basadas en confianza con empresas, ejecutivos y emprendedores, junto con el aumento del financiamiento del sector privado (aproximadamente \$ 525,314 USD durante 2017) han comenzado a consolidar nuestro enfoque con la industria.

Durante 2017, una serie de eventos nacionales e internacionales crearon un ambiente multidisciplinario vibrante en BNI. Organizamos 14 seminarios regulares, *Conversaciones en Neuromedicina*, en temas que conectan la investigación y medicina, que incluyeron oradores locales e internacionales. Continuamos promoviendo seminarios internos mensuales organizados por jóvenes investigadores y postdoctorados con el apoyo de nuestro personal profesional. Llevamos a cabo la quinta versión de *NeuroSur*, que incluyó (i) el simposio *Neurobiología de la conciencia y estados alterados*; (ii) el taller y curso internacional *Herramientas para el Análisis de Series Temporales*; (iii) el simposio tecnológico *Monitoreo cerebral durante la anestesia*; y (iv) la reunión de coordinación de *NeuroSur*. Con el fin de reforzar la identidad del Instituto y promover la interacción entre equipos de diferentes laboratorios, organizamos nuestro retiro anual de dos días en Termas del Corazón, Los Andes, con un programa de conferencias (*Ciencia en BNI, Ciencia y Experiencia*), presentación y evaluación de *Proyectos Semilla*, debates sobre temas científicos y éticos (e.g. autoría, experimentación en animales, condiciones de trabajo e investigación en BNI) y estimulantes excursiones sociales y actividades recreativas.

Continuamos asignando importantes fondos de Milenio a objetivos estratégicos comunes, como instalaciones para animales, equipo de BioMat, infraestructura, equipamiento, educación/divulgación, innovación y transferencia, y administración de tecnología. El incentivo a nuevas ideas y la atracción de jóvenes investigadores continuaron a través de nuestros exitosos programas de *Proyectos Semilla* y *Becas Puente*.

Durante 2017, los investigadores de BNI recibieron importantes premios y reconocimientos. **AC**, Director de BNI, fue galardonado con el *Premio Sofofa Andrés Concha* por su contribución al acercamiento de la ciencia con otras esferas de la sociedad. Durante la ceremonia del 175 aniversario de U Chile **AC** y **CHz** fueron reconocidos por su contribución a la investigación, la innovación y la creación artística; publicación en revistas de alto impacto; logros en innovación y transferencia tecnológica; y por contribuir a valorizar la creatividad y defender el papel de la ciencia y la tecnología en el desarrollo sostenible de Chile. El joven investigador V Valenzuela ganó el 2º *Concurso de Patentes y Transferencia Tecnológica*, otorgado por la Vicerrectoría de Investigación y Desarrollo, U Chile, mientras que R Castillo ganó el 1º premio de *Estudios Libres en Psiquiatría*.

La cobertura en prensa de las actividades del instituto estableció a BNI como un centro de referencia en Chile y América Latina. Las apariciones en prensa fueron valoradas en \$ 1,770,053 USD, con 84 apariciones en periódicos, 4 en revistas semanales, 57 en medios digitales, 9 en radio y 21 en televisión. La cobertura de prensa ha contribuido a posicionar a BNI como un centro de recursos para neurocientíficos, clínicos, escolares, educadores, empresarios y público en general.

Nuestro nuevo edificio y jardín BNI están completamente operativos y albergan una serie de actividades académicas regulares como seminarios, talleres, cursos, reuniones semanales de BNI, reuniones de laboratorio, *Día de Visita Científica*, el programa de educación para profesores de ciencias y reuniones formales e informales. V Vio, quien dirige la Oficina de Comunicaciones y S Reyes, jefe de Transferencia Tecnológica e Innovación, están ubicados en el nuevo edificio. El lugar se ha consolidado como un centro y un entorno ideal para interactuar con la comunidad. Una Oficina Ejecutiva contribuyó a conectar con otros sectores, una Oficina de Administración de Proyectos y Contabilidad es responsable de la administración financiera, y un Directorio continúa dirigiendo la estrategia del Instituto.

2. Introduction

a) **Description of the Institute**

The Biomedical Neuroscience Institute (BNI) is a reference center in Latin America that brings together a critical mass of leading neuroscientists, clinicians, mathematicians, physicists, engineers, entrepreneurs, and education and health professionals to explore the structure and function of the brain under normal physiology and disease, from cells to whole organisms, and strongly interact with the community. Four fundamental aims have remained as BNI's backbone: (i) to accomplish world-class scientific research; (ii) to train and host the new generations in a vibrant - but demanding - and unique transdisciplinary environment; (iii) to produce high-standard clinical research and transfer its impact to society; and (iv) to become a resource center for specialized clinical practitioners, teachers and the general public. During 2017 we consolidated our renovated structure with a highly integrated team of Principal, Senior and Adjunct Investigators, professional staff and motivated young researchers. The key objectives driving BNI's activities during this second period are:

(i) To further enhance the quality of BNI trademark inter-disciplinary and collaborative research. This approach is based on the use of complementary animal models, mathematics to uncover hidden biological phenomena, advanced scientific equipment and investigation at multiples scales from genes to behavior. A special focus is placed on areas that foster *in vivo* approaches, connect phenomenological scales, and promote clinical research in neurology and psychiatry. We have also promoted a strong sense of belonging, and a unique and intense scientific culture to inspire younger generations.

(ii) To promote translational research and interactions with the private sector. A *Neuromedicine and Technology Platform*, that promotes a culture of innovation, was established in 2016 to develop internationally competitive and innovative solutions in biotechnology, neuro-systems, and data science that impact health and other areas. Technology transfer and interaction with industry grew rapidly at BNI. A full time specialist, five institutional projects with the private sector (total approximately \$ 525,314 USD) and other collaborative applied projects with the Faculty of Physical and Mathematical Sciences at Universidad de Chile are part of our achievements.

(iii) To expand the impact of training and capacity building. Training efforts continue to focus on attracting young talent through formal university graduate programs, and bridge initiatives for postdocs. We promote incorporation of young international investigators, and basic and clinical researchers in biology and mathematics. BNI is also becoming a hotspot for engineers conducting applied research.

(iv) To strengthen the impact of outreach activities. Interaction with school students and teachers is at the heart of BNI's scientific culture. *From motivation to education* is the thread that connects our online and onsite activities for kids with a growing focus on high school teachers through our international alliance with Howard Hughes Medical Institute / Biointeractive. To date approximately 500 science teachers have received complementary training at BNI.

Our overall structure includes six research lines that conduct studies on the relationship between the structure and function of the brain, following a bottom up, multi-scale approach in complementing model organisms including clinical studies, and two transversal research lines that explore biomathematics and neuropathology. An *Applied Neuromedicine and Technology Platform* seeks to connect the scientific knowledge produced at BNI with the growing needs of industry in the areas of biotechnology applied to human health, medical devices, brain-machine interfaces, psychology and behavior and remote health monitoring. *Loligo*, our outreach and education initiative reaches students and high-school teachers throughout the country. BNI's research is supported by students, postdocs, young investigators, young clinicians, and shared facilities.

Approximately 30% of funds are allocated directly to individual researchers for operational expenses whereas the remaining 70% is invested in common undertakings. Millennium funding constitutes approximately 25% of the total operating costs for scientific activities (excluding salaries for Investigators, CONICYT fellowships and use of University infrastructure). Funds from 17 national and international projects, from public and private sources contribute to the overall impact of the institute. An International Advisory Board helps steer the institute's research and a Board of Directors contributes to invigorate the interactions with the F Med and with U Chile. All activities at BNI are supported by a team of 12 professionals in the areas of Education/Outreach, Technology Transfer and Innovation, Executive management, and Grant management.

b) Research lines (RLs)

During 2017 we consolidated our organizational model of research lines. To facilitate the revision process in this and other sections we have used initials to refer to BNI Associate or Senior Investigators involved in a particular project, publication or other activity: A Couve (**AC**), C Hetz (**CHz**), M Concha (**MC**), S Härtel (**SH**), C Hidalgo (**CH**), P Maldonado (**PM**), J Sierralta (**JS**), H Silva (**HS**). BNI Adjunct Investigators are indicated by bold initials and last name.

We are currently executing 8 research lines: **RL1.** Sub-cellular functional dynamics (**AC/SH/CHz/CH/JS/P Olguín**). **RL2.** Cellular identity and morphology (**MC/SH/CHz/JS/P Olguín**). **RL3.** Supra-cellular development and circuits: (**MC/SH/M Cerda/P Olguín**). **RL4.** Plasticity and behavior (**AC/CHz/CH/A Paula-Lima/JL Valdés**). **RL5.** Systems Neuroscience (**CHz/CH/ PM/R Fuentes/JL Valdés**). **RL6.** Clinical studies (**CHz/PM/HS/R Fuentes/P Gaspar/JM Matamala/S Matus/A Paula-Lima/JL Valdés/R Vidal**). **RL7.** Biomathematics (**MC/AC/SH/CH/M Cerda**). **RL8.** Neuropathology (**MC/CHz/CH/JS/R Fuentes/P Gaspar/JM Matamala/S Matus/ Paula-Lima/R Vidal**).

c) Organization of researcher's team

BNI consists of 6 Associated Investigators that conduct research at different biological scales or with different disciplinary approaches (**MC/AC/SH/CHz/PM/JS**). Additionally, one Senior Investigator leads clinical studies (**HS**) and another (**CH**) conducts research and provides internal strategic advice. 9 Adjunct Investigators bridge, complement and expand research areas in mathematics, biology and clinical studies in neurology and psychiatry (**M Cerda, R Fuentes, P Gaspar, JM Matamala, S Matus, P Olguín, A Paula-Lima, JL Valdés, R Vidal**). Average age of the team of 17 leading investigators is 46.8. 13 young investigators, 31 postdocs, 45 PhD, 37 Master, 10 undergraduate students and a team of technicians and professionals complete the multidisciplinary research team.

Specific strategies to foster interactions include: (i) definition of leaders that coordinate platforms for collaborative research lines, technology and animal models; (ii) co-mentorship of students/postdocs/young investigators/young clinicians; (iii) shared infrastructure including the fully operational BNI building and common facilities; (iv) organization of scientific events, theoretical/practical courses, educational activities and an annual retreat; and (v) weekly planning meetings and monthly *Science+Strategy* meetings with Associate, Senior and Adjunct Investigators. Funds allocated to strategic aims such as facilities, postdoctoral *Bridge Fellowships*, *Seed Grants*, infrastructure, equipment, innovation, education/outreach and administration are reviewed every year to comply with strict interaction criteria. For example *Bridge Fellowships* are advertised as collaborative and proposed interactions represent an important evaluation criteria. BNI investigators are responsible for specific tasks such as reviewing *Bridge Fellowships*, *Seed Grants*, networks, education/outreach, connecting with clinicians, or organization of *Science+Strategy* meetings and other scientific events.

3. Scientific and Technological Research

a) Current status of research lines

Each research line (RL1-8) involves the interaction of multiple laboratories. We've discussed publications and presentations within this section to enrich the discussion.

RL1. Sub-cellular functional dynamics. We have continued our studies in endoplasmic reticulum function and dynamics. This year influential reviews were published (**AC/CHz/CH**) confirming the leading role of BNI groups in understanding the role of the endoplasmic reticulum (ER) in local axonal translation, the unfolded protein response and calcium homeostasis (*Luarte et al., Dev Neurobiol 2017*; *Cornejo et al., Traffic 2017*; *Urta and Hetz, Nat Struct Mol Biol 2017*; *Carreras-Sureda et al., Front Oncol 2017*; *Hidalgo, Circulation 2017*). **AC** in collaboration with **CHz/JS/SH** currently explores different aspects of the role of the ER in the regulation of the axonal proteome with 3 postdocs, 3 PhD students and 1 Masters student. One study involves the use of our new superresolution Vutara microscope (**AC/M Cerda**). Additionally, our highly collaborative work led by **CHz** describing the physical association between IRE1- α and Filamin A in cell migration (*Urta et al.*) and the new interaction between IRE1- α and Hsp47, discovered using an RNAi screen and validated in cell culture *in vitro* and in fly models *in vivo* (*Sepulveda et al.*) will be published in high-impact factor journals during 2018. In the *Drosophila* model, we have found that phosphatidic acid modulates binary cell fate decisions during development of sensory organs by regulating Notch trafficking (manuscript under preparation) (**P Olgúin**) and the mechanical control of myotendinous junction formation and tendon differentiation during development (*Valdivia et al., Front Cell Dev Biol 2017*) (**P Olgúin**). Our contributions were presented at the XIII Annual Meeting of the Chilean Society of Neuroscience and the XXXI Annual meeting Society of Cellular Biology of Chile among others.

RL2. Cellular identity and morphology. We have continued to investigate the presynaptic function of DLG proteins in the context of a new FONDECYT grant. Additionally, our studies on lactate metabolism and glia-neuron relationship resulted in a recent publication characterizing a novel lactate transporter in *Drosophila* glial cells (*Delgado et al., Sci.Rep 2018*) (**JS**). **JS** and **P Olgúin** labs are advancing the study of the consequences of prenatal malnutrition in adult behavior and in the development of the nervous system, using *Drosophila* as animal model. Part of this work has been published recently (*Contreras et al., PlosOne 2018*) (**JS**). In addition, we continue to study the regulation of *Drosophila* brain wiring in collaboration with C Oliva, through an ECOS-Conicyt grant (Fondecyt #11150610, Characterization of the function of the Slit/Robo signaling pathway in the morphogenesis of the optic lobe of *Drosophila melanogaster*) awarded to C Oliva (**JS** is co-IP). A manuscript with some of these findings is currently under review (*Contreras et al., Sci Rep JS/C Oliva*). We have continued the study of atlastin in a *Drosophila* model of hereditary spastic paraplegias and published a collaborative study (*De Gregorio et al., J Cell Sci 2017, AC/JS*). We are finishing a functional screen for *atlastin* genetic modifiers (*Candia et al., under preparation, AC/JS/P Olgúin*). Although the international grant that financed the initial stages of the study ended the project continues with 1 PhD student (MF Bertin) and 1 Masters student (A. Ibacache) (**AC/JS/P Olgúin**).

RL3. Supra-cellular development and circuits. We continued studying the mechanisms that direct supra-cellular organization and circuit formation using live imaging and genetic manipulation in model organisms. We also continued to improve new technologies for *in vivo*

imaging of nervous system development (light sheet fluorescent microscopy) and imaging tools (4D tracking) in collaboration with the BioMat platform. Some results include:

Left-right asymmetry of the brain: we continued studying the genetic and morphogenetic mechanisms that generate left-right asymmetry in the zebrafish epithalamus, in particular dissecting the role for Nodal in inducing changes in cell contractility that results in asymmetric nucleogenesis (MC/SH). We also studied the ontogeny and neurochemistry of the parapineal organ from larval to adult stages demonstrating that this brain nucleus has the potential to modulate the habenular-interpeduncular (Hb-IPN) circuit at adult stages (MC/SH). We also performed a comparative study of Hb-IPN among Actynopterigians, finding that the likely ancestral pattern of Hb-IPN connectivity is bilaterally symmetric and that the laterotopic organization seen in zebrafish is a derived character (MC/SH). Finally, we continued to study the role of chemokine and Robo signaling in habenular-IPN connectivity, and dissected the specific ligand-receptor interactions that occur *in vivo* to guide the exit of habenular projections in zebrafish (MC/SH/CHz).

Tissue morphogenesis *in vivo*: we completed a study that combines *in vivo* imaging, biomechanical manipulation and mathematical modeling to demonstrate a developmental strategy that preserves cell fate specification of progenitor cells as they move to the terminal site of differentiation in zebrafish. This new mechanism links the origin of progenitors through epithelial delamination to their movement and fate specification by tissue-tissue mechanical interactions (MC/SH/M Cerda). We also described the mechanical control of the myotendinous junction formation and tendon differentiation during the development of *Drosophila* (Valdivia *et al Front Cell Dev Biol* 2017) (P Olgúin). Finally, we continued to study morphogenesis *in vivo* in the annual killifish (a model recently developed in our institute) and described the unique process of gastrulation in this species (Pereiro *et al., Dev Dyn* 2017) (MC/SH/M Cerda). A young investigator that developed the killifish model (G Reig) secured two grants (Fondecyt *Iniciación* and Conicyt *Inserción*) and was appointed Assistant Professor at F Med, U Chile.

New fish models to study neural circuits in physiology and disease: We incorporated *Nothobranchius furzeri* as a new killifish model with an accelerated aging process, and started to investigate the molecular, cellular and tissue-level changes associated to physiological aging in this species (MC/SH/CHz). We also developed a facility and our own tracking software to study behavior in fish (larvae and adults) and implemented this tool to analyze locomotor, circadian and cognitive behaviors in the context of pharmacological and genetic models of neurodegenerative diseases in zebrafish (MC/SH/CHz).

Hippocampal neurogenesis: We explored the role of Klotho, a protein related to aging, in adult neurogenesis using transgenic mice and stereotaxic delivery of viral particles to modulate the expression of Klotho in the hippocampus (AC and young MD/PhD investigator F Salech). We demonstrated that local Klotho enhances neuronal progenitor proliferation in the adult dentate gyrus (Salech *et al., J Gerontol A Biol Sci Med Sci* 2017).

Our contributions were presented in international and national meetings such as International: *18th International Congress of Developmental Biology* (Singapore), *The MBL Zebrafish 20th Anniversary Symposium* (US), *Current Topics and Emerging Models in Developmental Biology* (Colombia), *IX Latin American Society for Developmental Biology Meeting* (Colombia), *9th course on Cytoskeleton Institute Curie* (France); National: *XIII Reunion Anual de la Sociedad Chilena de Neurociencia*, *XXXI Annual Meeting of the Chilean Society for Cell Biology*.

RL4. Plasticity and behavior. This research line explores the role of calcium release from the endoplasmic reticulum (ER) on hippocampal long-term potentiation (LTP) and long-term depression (LTD), structural plasticity and hippocampal-dependent learning and memory processes. We have centered our efforts in deciphering the role of calcium release mediated by ryanodine-receptor (RyR)/calcium release channels in these neuronal processes. In the reported period **CH, SH**, Adjunct Investigators **JL Valdés** and **A Paula-Lima**, together with BNI research associate T. Adasme, other collaborators, postdocs A. Arias-Cavieres and O. García-Beltrán and graduate students R. Torres and P. Lobos, generated the following results:

i) A study performed in young and aged rats showed that aged rats display impaired LTP and hippocampal dependent recognition memory, increased basal RyR2/RyR3 protein contents in the hippocampus, more oxidized RyR2 channels than young rats, and do not present the memory-associated RyR channel upregulation exhibited by young rats (*Arias-Cavieres et al., Front Aging Neurosci 2017*). ii) In an additional study – carried out in a rodent model of Alzheimer's disease – we described that addition of Amyloid β Peptide Oligomers (A β Os) to primary hippocampal neuronal cultures triggers calcium release mediated specifically by the RyR2 channel isoform; the resulting cytoplasmic calcium increase promotes mitochondrial calcium uptake, leading to enhanced mitochondrial generation of reactive oxygen species (ROS) that contribute to the synaptic dysfunction induced by A β Os (*San Martín et al., Front Mol Neurosci 2017*). These results highlight the specific participation of RyR2-mediated calcium release on A β Os-induced mitochondrial malfunction. iii) In a parallel study, we generated an iron-selective antioxidant probe that exhibits protective effects on neuronal function (*García-Beltrán et al., PLoSOne 2017*); this coumarin-based probe is currently being tested as a good candidate to protect neurons from the synapto-toxic effects of A β Os. iv) Moreover, we reported that MECP2, a multifunctional protein first identified by its ability to bind to methylated DNA, mediates the experience-dependent transcriptional upregulation of the RyR3 channel isoform (*Torres et al., Front Mol Neurosci 2017*). v) **CH** was invited to write an article in the journal *Circulation*, addressing her long experience in the calcium-signaling field (*Hidalgo, Circulation 2017*).

CH and collaborators submitted additional manuscripts. One of them describes the central role of calcium release mediated by redox-sensitive RyR2 channels in hippocampal structural plasticity and spatial memory (*More et al., Antioxid Redox Signal, in press*). Two additional manuscripts are under revision. In one of them we describe how contextual fear memory formation/destabilization induces hippocampal RyR2 calcium channels up-regulation (*Haeger et al., Neural Plasticity, under revision*). In the other, we report how induction of hippocampal long-term depression (LTD) requires RyR-mediated calcium release from the ER (*Arias-Cavieres et al., Frontiers in Neuroscience, under revision*). We have completed studies showing that the widely-used antimicrobial agent Triclosan impairs hippocampal LTP and structural plasticity and causes severe defects in a previously learned spatial memory task (*Arias-Cavieres et al., in preparation*). We are also in the process of completing studies regarding the contribution of RyR2-mediated calcium release to the propagation of activity-generated calcium signals from the synapse to the nucleus. A study including LTP and behavior was published uncovering the unanticipated role of IRE1 in the pathogenesis of Alzheimer's disease (*Foley et al., Acta Neuropathologica 2017*). This study was executed in collaboration with multiple investigators including A Palacios from Centro Interdisciplinario de Neurociencia de Valparaíso demonstrating the collaborative spirit of both Millenium Institutes. We presented our work in multiple national and international meetings.

RL5. Systems Neuroscience. This line of research includes studies performed in the laboratories of **PM, CH, A Paula-Lima, JL Valdés, P Gaspar** and **R Fuentes**. Projects include collaborations between two or more BNI scientists. It also includes the work of four young scientists, four post-

docs, ten Ph.D. students, 12 Masters students, and 2 engineering students. **PM** and **JL Valdés** continue their collaborations to understand the relationship of hippocampus oscillation and learning. We found that spatial memory, among many other brain processes, shows hemispheric lateralization. We hypothesize that ripple events between both hippocampi exhibit different temporal dynamics and published one study on this topic (*Villalobos et al., PLoS One 2017*). **JL Valdés** jointly with M. Herrera-Marschitz, a former principal investigator of BNI, published a study on the effect of perinatal asphyxia and the targeting of sentinel proteins and extrasynaptic glutamate receptors (*Herrera-Marschitz et al., Neurotoxicity Research 2017*). We have also continued a series of studies to determine the mechanisms related to visual perception and active sensing. We are running three dissertations in this area by PhD students M Concha, J Rios, and E Lorca. We completed a study in human active sensing currently under review and published in www.biorxiv.org. We also published two studies in autonomic pupillary modulation that resulted from Masters theses, one of them on the effects of the incorporation of meditative practices. We found that the pupillary responses of mindfulness meditation practitioners (MP) and subjects without such practices (non-meditators (NM)) differ in emotional processing (*Vasquez-Rosati et al., Front Human Neurosci 2017*). In a similar study, we explored spinal cord injury (SCI) hypothesizing that subjects diagnosed with SCI, who are experiencing a period of adaptation and socio-labor insertion, suffer alterations in an emotion recognition task, a component of social cognition, which correlate with poor with autonomic nervous system regulation. We found that while both groups have similar general performance in the test, healthy subjects responded with greater certainty during a neurocognitive tasks (*Varas-Díaz et al., Front Human Neurosci 2017*). In addition, this year we published another cognitive study relating finger temperature an attention. Thermal stress has been shown to increase the chances of unsafe behavior during industrial and driving performances due to reductions in mental and attention resources. We measured tympanic, forehead, finger and environmental temperatures accompanied by a battery of attention tasks. We found a decrement in finger temperature due to instruction and task engagement that was absent when the subject was instructed to relax. Moreover, changes were observed in tympanic or forehead temperatures, while the environmental temperature remained almost constant for each subject. These results suggest that finger temperature can be used as a predictor of alertness (*Vergara et al, Front Human Neurosci 2017*).

In a collaborative project led by **A Paula-Lima** (with **CH**, **JL Valdés**, and **PM**) we examined different aspects of the pathology of Alzheimer's disease from cellular to cognitive aspects. We performed EEG and eye movement recordings in patients while navigating a virtual maze and found that eye movement patterns and EEG signals in patients with cognitive impairments are good markers for early diagnosis. Patients were entrained to learn a trajectory in space, based on visual cues. The results show that subjects do not exhibit spatial learning along the task, that their patterns of visual exploration are altered and the electrical activity associated with visual information extraction is significantly lower. A manuscript is currently under preparation. 4 other manuscripts are under revision (*Rivera et al., submitted to Neurology; Rojas-Libano et al., Journal of Neurophysiology; and Burgos et al., in the final revision in Neuroimage; Juricic et al., in Revista Médica de Chile*).

RL6. Clinical studies. A central goal of BNI is to conduct clinical brain research sustained by cutting-edge basic Neuroscience. We recently searched for neurophysiological markers of Schizophrenia (**HS/PM**) and we are promoting the use of eye movements and EEG signals in the early detection in ultra-high Psychosis risk populations and First episode of Psychosis (**PM/HS/P Gaspar**). We will extend this approach to identify EEG and behavioral markers for Alzheimer's disease (**PM/A Paula-Lima/JL Valdés**). Clinical approaches will expand to innovative new

therapeutic tools in the area of neurology, focusing on the development of therapies for Parkinson's disease based on two different methods of electrical neuromodulation of the spinal cord. Single electrical pulses delivered epidurally to the spinal cord are able to uncouple pathological long-range synchronization of the sensory-motor circuit by differential phase-shift of ongoing oscillatory activity in the different areas, providing, for the first time, a mechanism that explains the observation that electrical neuromodulation methods interrupt pathological synchronization in Parkinson's disease (**R. Fuentes**). Additionally, the effects of regular spinal cord neuromodulation on gene expression are studied by differential expression analysis of mRNA (**R Fuentes/R Vidal**). We are also interested in describing new and specific biomarkers such as gene, protein or metabolites in Chilean Parkinson's disease patients in prodromal stage (**R Vidal**).

The therapeutic potential of unfolded protein response components to treat neurodegenerative diseases are also being explored. We are focusing on the role of the ATF6-XBP1 heterodimer in Parkinson's and Huntington's diseases using *in vivo* models through a gene therapy approach. In addition, we are evaluating the impact of IGF2 growth factor in Parkinson's and Huntington's animal models of disease (**CHz/R Vidal**). Using pharmacological and genetic approaches, we are exploring the role of the integrated stress response, an adaptive pathway aimed at restoring cellular homeostasis in neurodegeneration. We are studying the consequences of targeting integrated stress response kinases of this signaling pathway in different cellular populations in the neurodegenerative process in ALS and aging (**CHz/S Matus/R Vidal**). We are focusing in the integrated stress response nutrient sensor kinase, GCN2, as an integrator of metabolic signals and proteostatic pathways, analyzing the consequences of the modulation of GCN2 in synaptic maintenance, neurodegeneration and aging.

We are developing a basic-clinical study in Chilean patients affected by Huntington's disease in collaboration with the *Center for Movement Disorders* (CETRAM) led by P Chana (**CHz/R Vidal**). This center is associated with the international EnRoll program dedicated to connecting research centers in the study of Huntington's disease, in order to accelerate discovery and therapeutic approaches. We are seeking molecular blood markers in Huntington's patients to better understand the underlying molecular mechanisms of this disease.

Finally, we have made progress in the *Neuro-Psychiatric Diseases Biobank*, which aims to become an important resource for the characterization and investigation of major psychiatric and neurological illnesses in Chile. By collecting DNA and plasma/serum samples from groups of patients of interest in an orderly, safe and traceable manner, the *Biobank* will constitute an essential tool for clinical, genetic, and molecular studies and personalized medicine (**HS**).

RL7. Biomathematics. The biomedical mathematics and informatics group (BioMat) is guided by BNI investigator **SH** and adjunct investigator **M Cerda**. In 2017, BioMat intensified collaboration with SCIAN-Lab (www.scian.cl), and the Center of Medical Informatics and Telemedicine (CIMT, www.cimt.cl) to advance in the following: A Lavado (supervisor **M Cerda**) finished his Masters thesis, working in the comparison of skeleton algorithms for biological structures. Electrical engineer L Ale simplified light-sheet microscope calibration and advanced with multi-view scripting. P Llanos started her PhD in biophysical simulations of cytoskeleton (supervisors **SH/M Cerda**), and J Alegría started a Masters thesis in Computer Science (supervisor **M Cerda**) in machine learning for image classification applied to digital pathology. R Pezoa finished her PhD thesis in machine learning and tissue pattern segmentation (supervisor **SH**), and J Lopez finished her master thesis in medical informatics (supervisor **SH**) in digital pathology, now integrated into the University Hospital (HCUCH). Together, 5 telemedicine pilot projects are integrated into the new Telemedicine Lab at the HCUCH (**SH/P Gomez**, HCUCH academic director).

BioMat and associative members promote: (i) new imaging techniques: improvements acquisition speed and processing software to calibrate lasers, cameras and views for 4-lens light-sheet (L Ale), tracking and segmentation techniques (J Jara, R Pezoa, S Vargas, A Lavado), laser ablation (in collaboration with IST Vienna to build a custom system for in vivo microscopy (L Ale, V Castañeda). First results were obtained with STORM/PALM (C Reyes thesis **J Toledo/SH/AC**). New Data Center SASIBA with 300 Terabytes (**SH/M Cerda**) is operating on a regular basis for data storage, sharing, and server hosting with 10 GBps connectivity (BioMed-HPC) via REUNA, STI, and in collaboration with NLHPC (director **SH**). BioMed-HPC also connects REDECA (<http://redeca.med.uchile.cl>), our new platform for advanced scientific equipment and services. REDECA hosts advanced microscopes from different BNI researchers (**SH/MC/CH/AC**). REDECA was launched officially in September 2017 and offers advanced imaging and data related services to all BNI researchers and the regional scientific community. (ii) high-, mid-, and low-level mathematical-computational methods for microscopic image analysis in combination with high performance computing (HPC): applications of mathematical/computational algorithms contributed to a series of publications in the fields of development biology (*Pereiro et al., Dev Dyn 2017; Reig et al., Nat Commun 2017; Lemus et al., Brain Struct Funct 2017;*), neuron plasticity (*Posada-Duque et al., 2017 Cell Mol Life Sci; Bustos et al., Brain 2017; San Martín et al., Front Mol Neurosci 2017*), or remote image analysis for clinical diagnosis (*Chang et al., 2017a/b*). Two abstracts were selected for presentations (*Izquierdo et al., 2017; Palma et al., 2017, Mechanisms of Development*). Novel image processing algorithms in combination with force quantification during cell migration and medical imaging are tackled within the new FONDECYT project 2018-2021 *5D Image Processing and Physical Models for the Quantification of Cell Migration and Multicellular Architecture with 4-Lens Light Sheet Fluorescence Microscopy* (**SH**). (iii) Research and Development of internet assisted services for diagnosis and clinical research: after the 1st phase of clinical validation with Clínica las Condes, the spin-off for *Internet Assisted Medical Services CEDAI SpA* (**SH**) advances in the 2nd phase (*Subsidio Semilla de Asignación Flexible Fase 2: CORFO Innova*). Expansion of the service on an international level was successful with the Universidad Nacional de Cuyo, Mendoza, Argentina (laboratory G de Blas). The *Center for Digital Pathology* (CPDAI, **SH**) has started to be integrated within HCUCH for clinical practice and new courses in histo-pathology are continued with Chilean universities (U Talca and U Magallanes). Finally, the new *National Center for Health Information Systems* (CENS, www.cens.cl), funded by CORFO 2016-2021 (Director **SH**) initiated its research and development activities in January 2017 together with four universities (PUC, U Talca, U Concepción and U Valparaíso).

RL8. Neuropathology. We have performed genetic manipulation in models of neurological diseases to investigate pathogenic mechanisms and to identify novel targets for therapeutic interventions. For example, we described disease evolution on a model of ALS based in the expression of mutant TDP-43. We were able to describe the biological impact of the mutation at the level of biochemical changes, protein aggregation and motor dysfunction in mice. The project involved two BNI investigators (**CHz/S Matus; Bargsted et al., Scientific Reports 2017**).

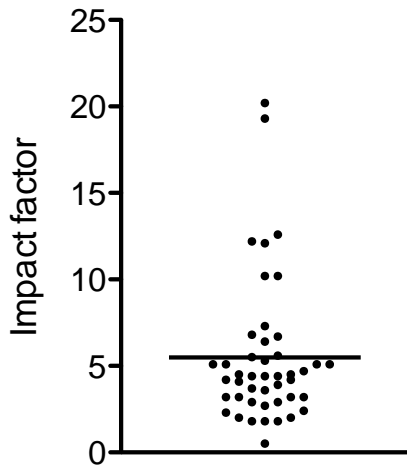
We have also tested novel therapeutic approaches in models of Parkinson's disease. These studies included collaboration with Glaxo Smith Kline (USA) to test a new drug that inhibits the ER stress sensor PERK to treat disease in mouse models. We also published our findings regarding the effects of electrical stimulation of the spinal cord in models of Parkinson's disease (**R Fuentes; Brys et al., Eur J Neuroscience 2017**). We are currently developing a FONDEF project in addition to a MJ Fox Foundation project to test a new gene therapy to treat Parkinson's disease in collaboration with GENZYME-SANOFI in Boston, USA.

CHz also reported the consequences of genetically ablating the ER stress sensor IRE1 in models of Alzheimer's disease. An outstanding protection was observed at the level of amyloid deposition, memory tasks and electrophysiology. In this study we also showed in collaboration with J Hoozemans that in Alzheimer's disease postmortem tissue the evolution of the histopathology directly correlated with the levels of ER stress markers. This study was published in a high impact journal and involved collaboration of advisory board member C Soto, A Palacios at U Valparaíso and an additional laboratory in Japan (*Durán et al., Acta Neuropathologica 2017*). Additionally, we showed that antioxidants protect against β -amyloid *in vitro* (**CH/A Paula-Lima, San Martin et al., 2017**). We also participated in a study showing that epigenetic changes at the level of synaptic genes in Alzheimer's disease impact cognition (**SH**). We are also studying other factors that modify the course of neurodegeneration including insulin growth factor 2 (IGF2) in models of Parkinson's (**R Vidal**) and Huntington's diseases (**CHz/R Vidal**). We are currently developing a FONDEF project to generate a novel gene therapy strategy for Parkinson's disease in collaboration with Genzyme Corporation (USA). In addition, a strong Amyotrophic Lateral Sclerosis gene therapy program is underway supported by the US Army and Amyotrophic Lateral Sclerosis Therapy Alliance. We also developed an additional collaboration with C Soto to show that ER chaperones influence prion pathogenesis *in vivo* (*Park et al., Scientific Reports 2017*)

Finally, we are developing and establishing new models of neurodegeneration, including transgenic mice of Alzheimer's disease, new models of Amyotrophic Lateral Sclerosis, in addition to genetically modified animals for several stress genes. We have identified additional gene mutations that may contribute to Amyotrophic Lateral Sclerosis in collaboration with R Brown (U MASS), and we have generated several transgenic mouse lines, and performed an initial analysis in zebrafish (**CHz/JS/MC**).

A novel platform was developed for drug discovery in Chile. Though FONDEQUIP support we acquired a high-throughput microscope (Cellomics, Thermofisher) and with support from the COPEC-UC Foundation we are consolidating a library of natural compounds from Chilean plants to screen for neuroprotective factors (**CHz/R Vidal**). Several reviews and editorial comments were published on the topic, highlighting papers in *Brain, Nature Reviews Neurology, Science Signaling, and Aging Cell* among others.

We are also currently developing an R&D project funded by CORFO to provide scientific support to the stem cell company CELLUS with the idea of testing a new therapy in Parkinson's disease.



Investigators published 47 articles, all of them co-authored by students with an average impact factor of 5.5. It is important to mention that 12 articles were co-authored by former students in the labs as junior postdocs to complete publications before moving to postdoctoral positions elsewhere. However, at the time of writing they were no longer students and, therefore, did not enter the Millennium statistics. Time spent on our PhD CONICYT fellowships together with research/publication delays increasingly result in publishing high quality papers during the period. The relevance and impact of our research have been described in the preceding section *Current status of research lines. See the table below.*

During 2017

	Number of Publications co-authored by students	Total Number of Publications
	7	35
	4	12
	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
Total of Publications	11	47

Other achievements

S Reyes, who is head of Technology Transfer and Innovation leads our *Neuromedicine and Technology Platform (NeuroTech)*. We have continued to promote intellectual property protection, technology transfer, applied research, private fundraising and collaboration with the central R&D office at U Chile.

Patents

As a result of the ongoing collaboration between our technology transfer specialist S Reyes and the central R&D office at U Chile one patent was filed during 2017:

1. *Use of Ugni molinae wild leaf extracts in the treatment of diseases associated with protein misfolding*. Chilean patent application number 3359-2017 of December 26, 2017. Inventors: **CHz** and A Rivas.

Additionally, our patent *Genetic treatment method named AAV/XBP1s-HA, which can be used to optimize and improve cognitive, memory and learning abilities* was presented to Patent Cooperation Treaty (PCT) national phases on June 30, 2017, in the US (15539826) and EPO (15874441).

Intellectual property

During 2017 we continued to protect the corporate image of BNI and a number of brands associated to the Institute. Our legal advisor J Díaz has efficiently led this process:

1. BNI: besides the current protection of our institute's corporate name and logo, we are currently pursuing a legal process to include our brand in trademark category 41, which has been contended by an international private company that uses the same acronym. Our argument is based on the different kinds of services that both institutions provide.

Congress presentations

During this funding period BNI Investigators and their teams attended and presented their work in 129 national and international events. Their relevance and impact have been described in the preceding section *3a Current status of research lines*. See **Summary Table below**.

Summary Table

Type of presentation	National Events [56]	International Events [73]
A. Associate Researchers		
Conferences, oral communications, poster communications, others (specify)	17	19
Invited presentations (not included in above row)	17	21
B. Other researchers (Adjunct Researchers, Senior Researchers, Young Researchers, Postdoctoral Researchers and Students)		
Conferences, oral communications, poster communications, others (specify)	11	14
Invited presentations (not included in above row)	11	19

Organization of scientific events

Meetings gathering Associated or all BNI investigators took place weekly or monthly respectively. These instances have been critical to exchange information of research lines and drive BNI's cross-disciplinary atmosphere into concrete collaborative projects. As in previous years we organized regular seminars, *Conversations in Neuromedicine*, in topics that connect Neuroscience and medicine, and which include local and international speakers. The list of 2017 topics included: An integrative view of cortico-basal ganglia circuits in health and disease; Neurophysiological features of cortico-basal ganglia activity associated with motor dysfunction in Parkinson's disease; Dopamine-driven inflammation in the gut and the brain; The mammalian habenula; Niemann-Pick disease: mechanisms and therapeutic targets; Uncovering the etiology of autism spectrum disorders; Transcriptional repression during development and plasticity of the CNS; A polyglutamine domain enables transcriptional reprogramming in response to pH change; Molecular motors and retroviral infection; Glutamate Transporter EAAT3 as a novel target in Obsessive-Compulsive Disorder; Adolescence as a vulnerable period in the pathophysiology of schizophrenia; Activity-based and synaptic-based memories in prefrontal cortex during spatial working memory; Neuromuscular junction and wnt signaling; Meaning of fear: EEG & tDCS language and anxiety.

SEMINARIO EXTRAORDINARIO
CONVERSACIONES
SOBRE **NEUROMEDICINA**

Martes 21
Noviembre
12:00 hrs

Rüdiger Veh
Institut für Integrative Neuroanatomie
Charité Universitätsmedizin
Berlin Germany

**The Mammalian Habenula:
Long Neglected -
Now Appreciated?**

Auditorio Danko Brncic
Sector C - 1er Piso
Facultad de Medicina
Universidad de Chile

ORGANIZA:
Miguel Concha Ph.D. BNI Chile, LEO, milenio, CSN

www.bni.cl - info@bni.cl

CONVERSACIONES
SOBRE **NEUROMEDICINA**
ENERO 2017

12:00 hrs

Auditorio Edificio BNI
(Entrada plaza Blest)
Facultad de Medicina
Universidad de Chile

09 LUN **SIMÓN BUSCH, MRes.**
University College London, Inglaterra
Significado del temor: EEG y tDCS aplicados al estudio del lenguaje y la ansiedad

10 MAR **PER PETERSSON, Ph.D**
Lund University, Suecia
An integrative view of cortico-basal ganglia circuits in health and disease

11 MIE **JUAN PABLO HENRÍQUEZ, Ph.D**
Universidad de Concepción, Chile
Sensitización Wnt en la unión neuromuscular madura: ¿alado o enemigo?

12 JUE **ALBERT COMPTÉ, Ph.D**
IDIBAPS, España
Activity-based and synaptic-based memories in prefrontal cortex during spatial working memory

ORGANIZA:
Psiquis Lab, BNI Chile, milenio

www.bni.cl - info@bni.cl

CONVERSACIONES
SOBRE **NEUROMEDICINA**

12.00 hrs Auditorio Edificio BNI
Facultad de Medicina - Universidad de Chile

28 JUN **Melanos retrovirales: ¿infección retroviral**
Gloria Ariagada Ph.D.
NANMED UNAB, Valparaíso

19 JUL **Moléculas de señal y moléculas que regulan la plasticidad neuronal**
Christian González Ph.D.
CERO CMF

02 AGO **A polyglutamine domain enables transcriptional reprogramming in response to pH change**
Juan Ignacio Gutiérrez Ph.D.
University of California Berkeley

30 AGO **Represión transcripcional en el desarrollo y plasticidad del SNC: el caso "Hela lentis" Colgate**
Mª Estela Andrés Ph.D.
Pontificia Universidad Católica de Chile

27 SEP **Uncovering the etiology of autism spectrum disorders: a neurodevelopmental perspective**
Gonzalo Cacerón Ph.D.
Universidad Mayor

18 OCT **Basquet de los Mecanismos Patofisiológicos y Nuevos Enfoques Terapéuticos para las Enfermedades Neurodegenerativas de Eje Motor**
Silvana Zanango Ph.D.
Pontificia Universidad Católica de Chile

29 NOV **Dopamine-driven inflammation in the gut and the brain**
Rodrigo Pacheco Ph.D.
Universidad Andrés Bello
Fundación Ciencia & Vida

ORGANIZA:
Valencia Vio Ph.D (C) BNI Chile, milenio

Más información www.bni.cl / info@bni.cl

A sample of posters from the Neuromedicine Conversations series (above).

As indicated in Networks, during 2017 we carried out another *NeuroSur* meeting, *Neurobiology of Consciousness and Altered States* (may 8-12, 2017) with 4 activities: a scientific symposium, a practical course, a technological symposium and a business meeting. *NeuroSur* represents a collaborative network strategy between BNI and centers of excellence in Neuroscience in Latin America (Brazil, Argentina, Uruguay and Chile). Speakers included L Melloni (USA), Matt Wilson (USA), P Purdon (USA), F Flores (Chile/USA), D Araujo (Brazil), P Torterolo (Uruguay), M Peña (Chile), T Ossandón (Chile), S Grün (Germany), M Diesmann (Germany), R Montefusco (BNI/Chile), R Vergara (BNI/Chile), C Devia (BNI/Chile), JI Egaña (BNI/Chile).

In order to reinforce the identity of the Institute and to promote the interaction between teams from different laboratories we organized a BNI retreat (Termas del Corazón, San Esteban, Valparaíso Region). Activities included the introduction *Science at BNI* by BNI Director **AC**, a *Science and Experience* talk by **CH**, short talks by students/postdocs to evaluate *Seed Grants*, a science-social activity *Science-Masks* to discuss relevant topics in science and social activities. More than 100 people participated in this 2-day retreat.

To browse through our extensive photographic record showing the exciting BNI atmosphere during scientific, innovation, education and outreach activities please visit:

<https://www.facebook.com/pg/InstitutoBNI/photos/>

Scientific editorial boards

Participation in BNI in editorial boards remained unchanged. Currently, BNI researchers are editors of *Frontiers in Synaptic Neuroscience* (**AC**, Review Editor), *Cell Death and Disease* (**CHz**, Associate Editor), *Cell Stress* (**CHz**, Editor), *Brain Research* (**CHz**, Editor), *Current Molecular Medicine* (**CHz**, Associate Editor), *Mechanisms of Development* (**MC**, Editor), *Open Behavioral Sciences Journal* (**MC**, Editor), *Frontiers in Skeletal Muscle Physiology* (**CH**, Editor), *Biochemical and Biophysical Research Communications* (**CH**, Editor), *Developmental Neurobiology* (**MK**, Editor), *Frontiers in Integrative Neuroscience* (**PM**, Editor), *The World Journal of Biological Psychiatry* (**HS**, Editor), *Asia-Pacific Psychiatry* (**HS**, Editor), *Revista Chilena de Neuro-Psiquiatría* (**HS**, Editor), *Gaceta de Psiquiatría Universitaria* (**HS**, Editor), *Trastornos del Ánimo* (**HS**, Editor), *Revista de Psiquiatría Clínica* (**HS**, Editor), *Acta Psiquiátrica y Psicológica de América Latina* (**HS**, Editor). BNI Adjunct Investigator **P Gaspar** is currently associated Editor in *Frontiers in Psychiatry*. Additionally BNI members are committed to raising the impact of *Biological Research*, an ISI indexed national journal (**CH/SH**, Editors).

Awards

During 2017 **AC**, Director of BNI, was awarded the *Sofofa Andrés Concha Prize* for his contribution to bridge science with other spheres of society. **AC** has become a reference figure in the construction of dialogues between science, industry, education, culture and politics and has promoted the need of a broad agreement to tackle an increasingly uncertain future.

Photograph (right): Andrés Couve receiving the Sofofa Andrés Concha Prize from the President Bernardo Larraín, and Andrés Concha's wife and daughters.



During the 175th anniversary of U Chile **AC** and **CHz** were recognized for their contribution *to research, innovation and artistic creation*. Indeed, **AC** and **CHz** published in journals that rank in the top 6% of their discipline according to the Thomson Reuters databank-October 2017. During the ceremony **CHz** was also recognized for his contribution to innovation and technology transfer through license agreements during 2016. Besides, **AC** received a special recognition for his institutional contribution to value creativity and for advocating the role of science and technology in the sustainable development of Chile.

V Valenzuela, a young researcher at BNI, won the 2nd *Contest of patenting and technology transfer*, awarded by the Vicerrectoría de Investigación y Desarrollo, U Chile, for his scientific contribution to novel gene therapy approaches to modify proteostasis in amyotrophic lateral sclerosis.

R Castillo, a PhD student won 1st prize in the *Free Studies in Psychiatry* for describing the behavioral (response speed and correct responses) and electroencephalographic (frontal gamma band) abnormalities during the first episode of psychosis and high-risk subjects while performing a working memory task.

4. Education and Capacity Building

a) Education and capacity building

BNI operates in the context of U Chile, the main public educational institution in the country, providing the largest and most diverse network of undergraduate and graduate programs in biomedical sciences, including Neuroscience. Currently, the F Med hosts 6 PhD and 16 Master programs. BNI has also strong research and teaching ties with other faculties of the University such as the Faculties of Sciences, Engineering, Chemistry, and Pharmacology. BNI provides advanced training, supporting institutional efforts in close collaborations with central administration and authorities of F Med. This year **AC** and **PM** initiated preliminary academic work to establish a new interdisciplinary PhD program in NeuroEngineering that will be a collaborative effort between two Faculties of U Chile (F Med and Physical and Mathematical Sciences). BNI Investigators play leading roles in doctoral and Masters programs, chairing some academic committees at the Medical, Chemical & Pharmaceutical Sciences, and Science Faculties, U Chile. BNI Investigators also organize Advanced Graduate Courses in Neuroscience and related disciplines, including Cognitive Neuroscience, Cell Physiology, Molecular Mechanisms of Neurodegenerative Diseases, Molecular & Clinical Pharmacology, and Topics in Biomedicine. Importantly, during 2017, 2 BNI Investigators served as members of the executive committee for the PhD Program in Biomedical Sciences, the largest in the country (**MC** and **CHz**) and the Masters in Neuroscience (**JS**, Director) and Medical Informatics Programs (**SH**, Director). Additionally, **PM** is member of the Graduate School Council, the Graduate School Coordination Committee (CCEP) and the Coordination Commission of Graduate Degrees (CCPGA) at F Med. BNI scientists also participate in graduate programs in other Faculties at U Chile (Engineering & Mathematics, Chemistry & Pharmaceutical Sciences, Sciences Dentistry, Veterinary) and programs in other universities in the metropolitan and regional areas. BNI scientists participate in multiple evaluation committees, warranting the excellence required by the graduate programs. Noteworthy, BNI was instrumental in the creation of the new Department of Neuroscience at the F Med, now fully operative. BNI also provides the intellectual, academic and technological framework for undergraduate and graduate students, carrying out their research rotations and theses in one or several BNI labs. Furthermore, BNI facilities and equipment are available for faculty members and students engaged in research elsewhere at F Med such as the Institute of Biomedical Sciences (ICBM) and multiple clinical campuses.

The training focus of BNI is on education and capacity building, and in preparing neuroscientists involved in basic and clinical research. One main contribution is on medical specialties, contributing to research training of psychiatrists, neurologists, neuro-pediatricians, pharmacologists and other clinical specialties. Initiatives involve American Universities, such as Columbia U, Harvard U, USA and McGill Canada, U of Osaka, Japan as well leading Universities and Institutes in the European Union: Gottingen, Heidelberg, Magdeburg, Mannheim Institute of Mental Health, Germany; Jülich Forschungszentrum, Germany; Cagliari University, Italy; Jaume I University, Castellón, Spain. International collaborations have provided a framework for research rotations of graduate students and associated scientists. Many graduate students receive full or partial complementary stipends, easing their progress and completion of their doctoral programs. Young scientists, especially from other institutions in Chile or abroad, holding a PhD degree are invited to apply for BNI *Bridge Fellowships* twice a year (fall and spring). Eligibility includes the commitment to apply for a Fondecyt postdoctoral fellowship during the corresponding academic period. Applications are managed and reviewed by BNI scientists according to a protocol that emphasizes competitiveness and minimizes conflicts of interest. BNI provides both full postdoctoral fellowships through *Bridge Fellowships* and also contributes indirectly to support other postdoctoral initiatives. The results of

this program are summarized in the attached tables. This year we granted three *Bridge Fellowships* with two investigators securing subsequent Fondecyt Postdoctoral Fellowships.

We run a funding program for students and postdocs named *Seed Grants*, where they compete for BNI's funds for one year to establish preliminary data or proof of concept of scientific or technological ideas, which may turn into mature research projects that may seek funding in external granting agencies. Criteria include, critically, the novelty aspect of the proposal and the impact on collaborative efforts within BNI.

We also encourage the interaction of students with more than one laboratory and mentor, as a manner to enrich the opportunities and cross-fertilizing fields. During 2017, more than 10 theses were co-directed by BNI Investigators. Students are encouraged to share BNI facilities, educational and technology transfer opportunities. Postdocs, graduate, and undergraduate students take the initiative and organize regular seminars and symposia in the framework of BNI, inviting foreign established scientists, or national postdocs carrying out research periods abroad. Investigators, trainees and staff attended our annual retreat as a means to share the research culture, which fosters a sense of belonging to a school of thought.



Photograph (above): The BNI team at the annual retreat in Termas del Corazón.

b) Achievements and results

During 2017 6 Associated Investigators, 2 Senior Investigators, 9 Adjunct Investigators, 13 young investigators, 10 undergraduate students, 37 master's students, 45 PhD students and 31 postdoctoral fellows worked at BNI. 12 students were co-tutored by two or more BNI researchers. The team at BNI includes 9 international students from countries in South America and Europe, including Uruguay, Venezuela, Germany, Ireland, and Netherlands. 19 students completed their dissertation work during this period. Some trainees have left BNI, continuing their careers paths in other national institutions or abroad, while others have stayed to pursue a higher degree or a postdoctoral position. Many BNI papers were published with students as authors (11/47, *but see note in Publications, Summary Table*). BNI students also participate regularly in national and international meetings, in poster and oral sessions (129, *see Congress Presentations Summary Table*).

BNI's financial support of students continues to allow the completion of projects, smoothing transitions and supporting students without CONICYT fellowship support. As part of our aim to internationalize BNI, we also promoted international experience for our students. During this period 11 students visited foreign laboratories to conduct collaborative research. More than 5 BNI students carried short-term research and trainee periods abroad, which included research activities in France, Germany, Puerto Rico and the Netherlands. We carried out 22 national and three international seminars and courses, which included international students from the Latin American region.

As part of their comprehensive scientific training, more than 69 BNI students participated in outreach activities organized by BNI, such as visits to schools, *Scientific Visit Day*, high students guidance and our *Loligo* and *Dendros* initiatives. More than 4000 students from elementary to high school levels participated in these initiatives.

c) Destination for students

BNI undergraduate and Masters students normally follow advanced studies (PhD, MD-PhD) or are directly involved in clinical research. Most BNI graduate students are recruited for scientific and academic careers, researching postdoctoral fellows or faculty members in Chile or abroad. 19 students graduated during 2017, and 4 postdocs continued their scientific careers elsewhere, including academic positions in Chile and USA. 5 graduate students have remained in science and academia. Some national institutions that have incorporated former BNI young investigators include U Chile, Pontificia U. Católica de Chile, U Alberto Hurtado, and U Diego Portales. It is worth mentioning that several young investigators now recruited as Adjunct Investigators (**R Fuentes, P Gaspar, S Matus, P Olguín, JL Valdés and R Vidal**) were former students or postdocs of current Associated Investigators at BNI who performed successful postdoctoral fellowships abroad and returned to establish independent laboratories in the country.

Destination of students as a means to broaden BNI's connections was complemented this year by sabbaticals of two Associated Investigators that carried our research at the Center for Brain and Cognition, U Pompeu Fabre, Barcelona, Spain (**PM**) and the Institut Curie and Center for Interdisciplinary Research (CRI), Paris, France (**AC**).

5. Networking and Other Collaborative Work

a) Networking

In 2017, scientific interactions, collaborative network formation, and consolidation on a regional and international scale continued to mark BNI's working philosophy. As in previous years we pursue three strategic lines:

(i) Enhance the dynamics and quality of collaborative projects within BNI. We continue to support our series of collaborative initiatives such as *Seed Grants* (4-6 per year), *Bridge Fellowships* (6-8 per year), and co-mentorship of students (6-10 per year). In addition, BNI continues to support co-application to external funding (e.g. Fondecyt grants and international grants), young investigator grants (Fondecyt initiation and insertion into the academia), equipment (e.g. Fondecyt), and networking for science and innovation (e.g. PCI Conicyt, CORFO).

(ii) Foster scientific interactions within a multidisciplinary environment. BNI fosters a multidisciplinary environment by promoting regular scientific activities such as internal seminars with young speakers (1 per month), seminars with invited speakers (1 per month), international courses and symposia (2-4 per year), and BNI retreats (1 per year). Our fully operative BNI building connects BNI laboratories and becomes an important component of the F Med and the Northern Campus of the University, which will be accessible through the new metro station *Hospitales* during 2018. In addition, together with the F Med Library and the *Public Library Pablo Neruda* of Independencia, the BNI building and interior garden will become an architectural hallmark of the newly designed *Plaza Blest*, which will be opened to the university community during 2018. The new discussion space of the BNI building is used for vibrant science & coffee meetings and discussions. Regular and informal meetings take place in an open, friendly, and lively atmosphere: (i) the seminar room (max capacity 60 participants) is equipped with modern infrastructure and connectivity, and it is used on a daily basis. It provides an important complementary working space, especially due to its flexible management by BNI for events after working hours and weekends, a service that has not been provided by the F Med before. The building welcomes students of the international Master for Medical Informatics (academic director **SH**), diploma, summer schools, participants of courses or events for continuous education, or outreach; (ii) the Board meeting room (with video conference equipment and capacity for 12-14 participants) is used for group meetings, lab meetings, or other strategic meetings with partners from associated scientific centers, projects, or industry. Seminar and board rooms are equipped with modern infrastructure, 10Gbps network connectivity that facilitates video conferencing or event streaming via the Chilean University Network REUNA (www.reuna.cl), or the Latin American Network, CLARA.

BNI fosters the first scientific platform for the optimal use of advanced equipment and services through REDECA (<http://redec.med.uchile.cl>). REDECA has been setup by BNI researcher **SH**, and hosts scientific equipment from different BNI members (**MC/CH/AC/SH**), but also other researchers of the Institute of Biomedical Science (ICBM). The initiative was officially launched during the 20th anniversary ceremony of the ICBM, F Med in September 2017. REDECA offers scientific equipment such as microcopy, flow cytometry, centrifuge, and data center, in combination with scientific services for image processing, diagnostics, or e-learning platforms for medical education to all BNI researchers and the regional scientific and academic community. The setup of the REDECA was an explicit topic of the 2017 meeting of the *Sociedad Uruguaya de Microscopía e Imagenología* (SUMI). As invited speakers, **SH** and **M Cerda** shared the experience of imaging and the REDECA platform with the participants of the Uruguayan *Congreso Nacional de Biociencias 2017*, and associated meetings with members of the Pasteur Institute and the *Universidad de la República*. These activities contribute to connect the scientific community inside and outside Chile based on complementary expertise.

(iii) Promote national and international scientific networks. Individual and collaborative multidisciplinary networks of BNI members continued to grow in 2017. Two formal networks continued to promote state-of-the-art imaging technology and neuroscience: (i) the *NeuroSur* initiative includes research institutions from Argentina, Brazil, Chile and Uruguay, and (ii) the *Network for Advanced Microscopy and Quantitative Developmental Biology* includes leading experts from Latin America, Europe, USA, and Japan. In addition, the National Center for Health Information Systems (CENS, www.cens.cl), funded by CORFO 2017-2021 (Director **SH**) initiated its research and development activities in January 2017. Besides U-Chile, CENS includes four national private and public Chilean universities (PUC, U Talca, U Concepción, and U Valparaíso), and international partners (U Heidelberg and U Heilbronn, Germany), both funded by independent DAAD grants (academic director, **SH**). The network activities of CENS and the Center of Medical Informatics and Telemedicine (CIMT, www.cimt.cl) are closely related to the BNI biomedical mathematics and informatics group (BioMat). The BNI network strategy is complemented by the internationalization activities performed with researchers from Latin America, EEUU, and Europe in the field of biomedical / medical informatics. In 2017, two academic internationalization symposia were organized by **SH**, the first in Santiago, Talca, and Valparaíso (May 2017), the second in Riberáo Preto, Sao Paulo, Brazil (September 2017). In 2018, a third international meeting will be organized in Europe. The meetings focus on novel scientific interactions and advanced human capital building towards an international PhD in Medical Informatics on the basis of the already established international Master in Medical Informatics within the BNI-BioMat group. The first international meeting in Santiago was also embedded in the MIT Sloan/U Chile Healthcare Forum *Strategic Analytics: Changing the Future of Healthcare*. **SH**, **AC** and T Payne (U Washington) were invited speakers at the event with over 300 participants from the field of Data Science and Healthcare.



Photographs: New Network for Biomedical / Medical Informatics organized by BNI-BioMat (**SH**) (left): participants of the Santiago Meeting (May 2017) from US, Europe and Latin America with Rector Ennio Vivaldi; (middle): Thomas Payne (U-Washington) at the MIT/U-Chile Forum Changing the Future of Healthcare (right): participants of the Sao Paulo Meeting (September).

During 2017, we carried out another version of our formal network *NeuroSur*. The main integrated 2017 activity *Neurobiology of Consciousness and Altered States* consisted of four chapters: a scientific symposium, a practical course, a technological symposium and a business meeting. **AC**, BNI young investigator J Egaña, P Fuentealba (P U Católica de Chile) and F Flores (MIT, USA) organized the scientific symposium with speakers from Uruguay, Brazil, Chile and the USA; J Egaña and F Flores coordinated the international training and practical course *Tools for Temporal Series Analysis* and the technological symposium *Brain Monitoring during Anesthesia*. 78 young investigators registered for the activities, 11 of which were students from Latin



America that traveled with short-term fellowships awarded by BNI (Argentina, Brazil, Uruguay). Finally, **AC** organized the 5th *NeuroSur Business Meeting* that included the participation of all speakers. The meeting focused on new ideas for the integrated training of researchers in a basic-clinic environment.

In 2017, BNI researchers continued promote interactions with scientific, clinical and governmental institutions such as CINV, ISCI, CMM, FONDAP-GERO, NLHPC, REUNA, MINSAL, INC, HCUCH, Clínica Alemana, CLC, and Neurounion. Interactions with clinicians continue through our Basic-Clinical network *Encounters*, although no formal meetings were held during 2017. New impact on clinical data science and management in terms of interoperability within the national health system is fostered by CIMT and CENS (BNI investigator **SH**, see above). CIMT and CENS associate private and public institutions (among others MINSAL, FONASA, ISP, Rayen, Intersystems, Christus Health), and support the public and the private health sector in Chile with topics on international interoperability standards, observatory on *e-health*, software certification, consulting, and formation of advanced human capital. Both centers improve infrastructure and common spaces within the perimeter of the BNI building. BNI-BioMat members (**SH/M Cerda**) also participated in national interdisciplinary forums like *Data Science for Frontier Astronomy, Biology and Medicine* (August 2017, Puerto Varas) or the *Jornada Tecnológica de Magallanes: New development opportunities of the austral fiber optic photonic network* (December 2017, Punta Arenas, Magallanes). These events combined interdisciplinary science, government, and partners from industry, which joined forces to improve national infrastructure and connectivity.

Two of our formal networks, namely *Network for Advanced Microscopy and Quantitative Developmental Biology* and *Small Brains Big Ideas* are organized every two years and did not have formal activities during 2017.

b) Other collaborative activities

Deeper integration of *e-health* related data science by BNI BioMat, also participated in new summer/winter school *La Serena School for Data Science: Applied Tools for Data-Driven Sciences*, at the interphase of health science, biomedicine, and astronomy. In 2017, we performed the first out of five common winter schools within this NSF founded collaborative initiative. La Serena Schools take place annually in August on the AURA Observatory campus in La Serena, Chile, with approximately 30 students from different disciplines including astronomy, computer science, statistics, mathematics, life science, biomedicine, or medicine, from Chile and the USA. We are presently preparing the next version of the Data School with further participation of teachers and students in biomedicine, neuroscience and health. In 2017, we further promoted the development of academic careers within the BioMat-disciplines within German-Chilean Center of Excellence for Innovative Research and Education in Medical Informatics (DAAD 57220037) with U Heidelberg, and the Chilean Interoperability and Process Challenge CHIP (DAAD 57168868) with U Heilbronn/U de la República (Uruguay), with additional workshops, scientific symposia, and the preparation for the third generation of Chilean students of the first international MSc in Medical Informatics in Latin America (34 applications end of 2017).

6. Outreach and connections with other sectors

a) Outreach

Our outreach program, *Loligo*, continues to develop in two main areas: outreach and education. In both areas digital resources are freely available for students, educators and the general public in our website www.loligo.cl. These online resources are complemented by our hands-on activities in-house and by our travelling brain-dome exhibition.

Our outreach digital resources are mainly motivational (web-comic *Dendros*, neuro-games, videoclips, etc). Our educational resources, on the other hand, comprise scientific short films with classroom activities developed in collaboration with our long-term allies Howard Hughes Medical Institute (HHMI)/Biointeractive. Our hands-on activities include school visits to our labs, workshops with school-teachers and our brain-dome exhibition which brings neuroscience to children and the general communities in schools and public places. During 2017 we carried out 6 workshops to complement the scientific training of high school teachers using our digital material along with inquiry-based activities to teach biology. All the material is freely available in our platform (www.loligo.cl/educacion). We have worked with 500 teachers thus far, reaching more than 5,000 students. We also carried out an intensive 3-day academy to train school-teachers in a *train-the-trainers* approach to promote the expansion of our workshops to other cities in Chile. This academy was organized in collaboration with three HHMI/Biointeractive experts, who participated in our academy in Santiago in June 2017.



Photographs (above): Workshop and academy activities for science teachers with HHMI/Biointeractive and BNI professionals.

In the context of an Explora-Conicyt Project we developed *Mentes Transformadoras*, a science book for school students, teachers and the general public. 12 scientific research projects developed in our country were explained in simple language, with infographics and illustrations, including also some activities for the classroom. We delivered 1,000 units of this book to schools and general public during different scientific events.



MENTES TRANSFORMADORAS

Proyecto Explora CONICYT de Valoración y Divulgación de la Ciencia y la Tecnología 2015-2016



*Photographs (above): 1000 copies of the book *Mentes Transformadoras* were delivered in a number of BNI activities.*

During 2017 six schools visited our labs. Participating students included primary, middle and high-school had a chance to visit several BNI labs for half a day, attend general lectures and perform simple experiments. PhD students at BNI were responsible for organizing and executing this activity, which we have termed *Scientific Visit Day*.



*Photographs (above): School students at BNI labs during a *Scientific Visit Day*.*

Our wider coverage activity is the brain-dome travelling exhibition that reached more than 30,000 visitors during 2017. The dome was installed in public and private schools, and public scientific events like *La Fiesta de la Ciencia*, organized by Explora in Parque Metropolitano, Santiago, *Ciencia Fest* in the Aeronautical Museum, and the Winter Break Fair at *Planetario de Santiago*. In addition, we established an alliance with Play-Doh (Hasbro) to create a stand inspired in our Dendros characters to motivate pre-school kids with neurons and their brains, which they model in multi-color plasticine.



Photographs (above): pre-school kids at the Dendros/Play-Doh stand and the brain-dome.

Finally, besides our regular outreach activities we organized one interactive workshop in collaboration with Pfizer, where participants directly experienced the process of developing new drugs and putting them into the market by working in teams with a 3D game. Additionally, a series of talks were organized for senior citizens about memory loss focusing in taking care of memory with nutritional tips and clues to identify memory impairment. BNI scientists (AC/CH) participated in *Jornadas de Ciencia e Innovación*, a forum organized by BNI students at Pontificia U Católica de Chile to discuss the future of science and technology in the country.

b) Connections with other sectors

According to our proposal for the second five-year period (2016-2021), during 2016 we launched the new *Applied Neuromedicine & Technology Platform*, which aims at establishing an effective connection with Chilean companies and the emerging biomedical industry in the country. This new area of BNI is led by innovation specialist S Reyes. Results of 2017 include signing a new research contract in the field of medical devices (Asociación Chilena de Seguridad, ACHS) and a CYTED grant for 4 years to consolidate our *NeuroSur* Network, for a total amount of \$ 122.000.000 CLP (approximately \$ 200,000 USD). The 2017 annual invoicing for projects applied with private sector reached \$ 227,000,000 CLP (approximately \$ 380,000 USD).

During 2017, several private or private-public initiatives are ongoing or were completed during this period. Direct research contracts with industry or private institutions (Tepillé, ACHS) or private contracts through CORFO (Solunova, CELLUS) provide scientific support to monitoring systems, devices for rehabilitation therapy or stem cell research. Strong links of collaboration and trust were established with the companies and the overall perception of the interaction with BNI has been positive.

New relationships were established with companies in the field of security, operational safety, transportation, malls and mining, with whom we are in the process of negotiating new research contracts for 2018.

Since 2017, BNI is member of the Know-Hub Chile project, a group of Chilean universities and research centers. This off-campus platform focuses on international transfer of national technologies. Three BNI's technologies available to be transferred were selected as prioritized technologies for Know-Hub Chile.

Press coverage of the institute's activities has firmly established BNI as a reference center in Chile and Latin America. BNI press appearances were valued in an outstanding \$ 1,770,053 USD, with 84 appearances in newspapers, 4 in weekly magazines, 57 online, 9 on radio, and 21 on television.

7. Administration and Financial Status

a) Organization and administration

BNI is a non-profit organization (RUT 65.059.721-4) and fulfills all legal requirements of the Ministry of Justice and the Municipalidad de Independencia. Current Board members include: **AC** (Pres), **CHz** (Vicepres), **MC** (Sec), **JS** (Tres), **PM** (Dir), A Maass (F Mathematical and Physical Sciences and Center for Mathematical Modelling, U Chile), and M Maggiolo (Vice-Dean, F Med U Chile). The annual Board meeting took place on July 14, 2017. Different areas are covered by professional staff with specialized responsibilities that provide continuity to our initiative. R Tapia, biochemist and BNI's artist in residence leads an established outreach and education program, *Loligo*. S Reyes focuses on applied projects, innovation, fundraising and technology transfer. The Executive Office is led by C Cubillos, an economy and finance professional who focuses on BNI administration, production of scientific events and group managing. V Vio, a young scientist trained in pharmacology focuses on web, social networks, internal cohesion, connections with high-school students combining scientific and media expertise. J Díaz, an experienced lawyer provides legal assistance. The Grant Management Office is constituted by A Timmermann, two assistant accountants, K Miranda and M Mogollón, and informatics expert M Moreno. Our monthly financial reports to the Ministerio de Economía continue to be of the highest quality. C Pardo is Assistant to the Director and manages the BNI building. N Vásquez, graphic designer, and I Llambías, journalist, contribute to consolidate BNI's corporate image and promote its activities. BNI staff work closely with administrative and technical personnel of all research groups. *See Summary Table below.*

Category	Female	Male	TOTAL
Assistant & Technicians	33	20	53
Administrative Staff	9	8	17
TOTAL	42	28	70

b) Financial status Millenium funds 2017

Item	2017 Expenses [\$]			
	Operative	Networks	Outreach	Total
Honoraria researchers and research personnel	440.233.482	0	0	440.233.482
Tickets and travel expenses	40.765.208	5.628.300	0	46.393.508
Materials and supplies	145.535.231	0	0	145.535.231
Goods and equipment	15.318.160	0	0	15.318.160
Infrastructure	14.938.167	0	0	14.938.167
Administrative expenses	58.593.091	0	0	58.593.091
Publications and subscriptions	7.300.000	0	0	7.300.000
Consultancies	13.434.000	0	9.236.818	22.670.818
Overhead	21.000.000	0	0	21.000.000
Others	11.097.309	2.020.983	1.968.800	15.087.092
Total	768.214.648	7.649.283	11.205.618	787.069.549

Annexes

Annex 1.- Institute Researchers

1.1 Associate Researchers

Full Name	Research Line	Nacionality	Gender	Date of birth	Profession	Academic Degree	Affiliation	Current Position	Relation with Center
Andrés Oscar Couve Correa	1. RL1 Sub-cellular functional dynamics . 4. RL4 Plasticity and behavior. 7. RL7 Applied mathematics and biomedical informatics. 8. RL8 Neuropathology.	Chilean	M	23/10/68	Biologist	D	Universidad de Chile	Full Professor	Full Time
Jimena Sierralta Jara	1. RL1 Sub-cellular functional dynamics . 2. RL2 Cellular identity and morphology. 8. RL8 Neuropathology.	Chilean	F	12/09/62	Biologist	D	Universidad de Chile	Full Professor	Part Time
Steffen Härtel Gründler	1. RL1 Sub-cellular functional dynamics . 2. RL2 Cellular identity and morphology. 3. RL3 Supra-cellular development and circuits. 7. RL7 Applied mathematics and biomedical informatics. 8. RL8 Neuropathology.	German	M	24/11/68	Physicist	D	Universidad de Chile	Full Professor	Part Time
Pedro Esteban Maldonado Arbogast	5. RL5 Systems Neuroscience. 6. RL6 Clinical studies. 8. RL8 Neuropathology.	Chilean	M	30/04/60	Biologist	D	Universidad de Chile	Full Professor	Part Time
Claudio Andrés Hetz Flores	1. RL1 Sub-cellular functional dynamics . 4. RL4 Plasticity and behavior. 8. RL8 Neuropathology. 6. RL6 Clinical studies. 2. RL2 Cellular identity and morphology. 5. RL5 Systems Neuroscience.	Chilean	M	24/03/76	Biotechnologist	D	Universidad de Chile	Full Professor	Part Time
Miguel Concha Nordemann	2. RL2 Cellular identity and morphology. 3. RL3 Supra-cellular development and circuits. 7. RL7 Applied mathematics and biomedical informatics. 8. RL8 Neuropathology.	Chilean	M	03/06/66	Physician	D	Universidad de Chile	Full Professor	Part Time

1.2 Young Researchers

Full Name	Research Line	Nacionality	Gender	Date of birth	Profession	Academic Degree	Affiliation	Current Position	Relation with Center
Tatiana Adasme Rocha	5. RL5 Systems Neuroscience. 4. RL4 Plasticity and behavior.	Chilean	F	21/02/77	Biochemist	D	Universidad Bernardo O'Higgins	Full Professor, Researcher at CIBQA.	Part Time
José Ignacio Egaña Tomic	6. RL6 Clinical studies. 5. RL5 Systems Neuroscience.	Chilean	M	10/09/73	Physician	D	Universidad de Chile	Assistant Professor	Part Time
Danilo Bilches Medinas	8. RL8 Neuropathology.	Brazilian	M	23/11/81	Chemist	D	BNI	Young Researcher	Part Time
Víctor Antonio Castañeda Zeman	7. RL7 Applied mathematics and biomedical informatics. 2. RL2 Cellular identity and morphology.	Chilean	M	29/08/80	Electrical Engineer	D	Hospital Clínico Universidad de Chile	Young Researcher	Part Time
Rodrigo Montefusco Siegmund	5. RL5 Systems Neuroscience. 4. RL4 Plasticity and behavior.	Chilean	M	02/01/80	Biochemist	D	Universidad de Chile	Young Researcher	Full Time
Claudia Durán Aniotz	4. RL4 Plasticity and behavior. 8. RL8 Neuropathology.	Chilean	F	04/01/82	Biologist	D	BNI	Young Investigator Hetz Lab	Full Time
Gabriela Martínez	4. RL4 Plasticity and behavior.	Chilean	F	04/01/83	Biologist	D	Universidad de Chile	Postdoc Hetz Lab	Full Time
German Flavio Reig	3. RL3 Supra-cellular development and circuits.	Argentinian	M	23/08/76	Agronomist	D	Universidad de Chile	Young Investigator	Full Time
Felipe Salech	6. RL6 Clinical studies.	Chilean	M	22/05/81	Physician	D	Hospital Clínico Universidad de Chile	Young Investigator Couve Lab	Part Time
María Gabriela Mercado Guerra	8. RL8 Neuropathology.	Chilean	F	29/03/81	Other	D	Universidad de Chile	Young Researcher Hetz Lab	Full Time
Enzo Brunetti	5. RL5 Systems Neuroscience.	Chilean	M	01/07/75	Physician	D	Hospital Clínico Universidad de Chile	Resident in Neurology	Part Time
Christ Devia Manriquez	5. RL5 Systems Neuroscience.	Chilean	F	10/03/82		D	Universidad de Chile	Associate Investigator Maldonado Lab	Full Time

1.3 Senior Researchers

Full Name	Research Line	Nacionality	Gender	Date of birth	Profession	Academic Degree	Affiliation	Current Position	Relation with Center
María Cecilia Hidalgo Tapia	4. RL4 Plasticity and behavior. 1. RL1 Sub-cellular functional dynamics . 5. RL5 Systems Neuroscience. 6. RL6 Clinical studies. 7. RL7 Applied mathematics and biomedical informatics. 8. RL8 Neuropathology.	Chilean	F	10/06/41	Biochemist	D	Universidad de Chile	Full Professor	Part Time
Hernán Silva Ibarra	6. RL6 Clinical studies. 8. RL8 Neuropathology.	Chilean	M	01/07/49	Psychiatrist	M.D.	Psychiatry and Mental Health, Faculty of Medicine, Universidad de Chile	Full Professor	Part Time

1.4 Adjunct Researchers

Full Name	Research Line	Nacionality	Gender	Date of birth	Profession	Academic Degree	Affiliation	Current Position	Relation with Center
José Luis Valdés Guerrero	4. RL4 Plasticity and behavior. 5. RL5 Systems Neuroscience. 6. RL6 Clinical studies.	Chilean	M	16/12/75	Biologist	D	Universidad de Chile	Assistant Professor	Part Time
Andrea Paula-Lima	4. RL4 Plasticity and behavior. 8. RL8 Neuropathology. 6. RL6 Clinical studies.	Brazilian	F	20/11/77	Pharmaceutical Chemist	D	Universidad de Chile	Assistant Professor	Part Time
Patricio Alejandro Olgún Aguilera	1. RL1 Sub-cellular functional dynamics . 8. RL8 Neuropathology. 2. RL2 Cellular identity and morphology. 3. RL3 Supra-cellular development and circuits.	Chilean	M	23/10/75	Biochemist	D	Universidad de Chile	Assistant Professor	Part Time

Full Name	Research Line	Nacionality	Gender	Date of birth	Profession	Academic Degree	Affiliation	Current Position	Relation with Center
Pablo Gaspar	6. RL6 Clinical studies. 8. RL8 Neuropathology.	Chilean	M	20/08/75	Psychiatrist	D	Universidad de Chile	Assistant Professor	Part Time
René Vidal	8. RL8 Neuropathology. 6. RL6 Clinical studies.	Chilean	M	05/03/79	Biochemist	D	U Mayor	Biochemical PhD in Sciences	Part Time
Soledad Matus	6. RL6 Clinical studies. 8. RL8 Neuropathology.	Chilean	F	23/06/74	Biochemist	D	Fundación Ciencia & Vida	Principal investigator of the laboratory of Biology of Neurodegeneration	Part Time
Mauricio Cerda Villablanca	7. RL7 Applied mathematics and biomedical informatics. 3. RL3 Supra-cellular development and circuits. 8. RL8 Neuropathology.	Chilean	M	23/11/82	Computer Science	D	Universidad de Chile	Assistant Professor	Part Time
Rómulo Antonio Fuentes Flores	5. RL5 Systems Neuroscience. 6. RL6 Clinical studies. 8. RL8 Neuropathology.	Chilean	M	28/10/74	Biochemist	D	Universidad de Chile	Assistant Professor	Part Time
Jose Manuel Matamala Capponi	6. RL6 Clinical studies. 8. RL8 Neuropathology.	Chilean	M	13/11/83	Neurologist	D	Neurology Sciences Depart. Faculty of Medicine, University of Chile	Neurology Assistant Professor	Part Time

1.5 Postdocs

Full Name	Research Line	Nacionality	Gender	Date of birth	Profession	Academic Degree	Affiliation	Current Position	Relation with Center
Carolina González	1. RL1 Sub-cellular functional dynamics .	Chilean	F	01/11/82	Biotechnologist	D	Universidad de Chile	Postdoc Couve Lab	Full Time
Rodrigo Clemente Vergara Ortúzar	5. RL5 Systems Neuroscience.	Chilean	M	23/11/86	Biologist	D	Universidad de Chile	Postdoc Neuro-system Lab.	Full Time
María de los Ángeles Juricic	5. RL5 Systems Neuroscience.	Chilean	F	02/10/83	Biochemist	D	Universidad de Chile	Postdoc Neuro-system Lab.	Full Time

Full Name	Research Line	Nacionality	Gender	Date of birth	Profession	Academic Degree	Affiliation	Current Position	Relation with Center
Eduardo Pulgar	2. RL2 Cellular identity and morphology. 7. RL7 Applied mathematics and biomedical informatics.	Chilean	M	23/10/81	Biochemist	D	Universidad de Chile	Postdoc Scian Lab.	Full Time
Violeta Chang Camacho	7. RL7 Applied mathematics and biomedical informatics.	Peruvian	F	20/11/77	Computer Science	D	Universidad de Chile	Postdoc Scian Lab.	Part Time
Amado Carreras Sureda	8. RL8 Neuropathology.	Spanish	M	25/06/86	Biologist	D	Universidad de Chile	Postdoc Hetz Lab	Full Time
Víctor Hugo Cornejo Corona	1. RL1 Sub-cellular functional dynamics .	Chilean	M	31/03/89	Other	D	Universidad de Chile	Postdoc Couve Lab	Full Time
Alejandro Ernesto Luarte Navarro	1. RL1 Sub-cellular functional dynamics .	Chilean	M	22/01/84	Biochemist	D	Universidad de Chile	Postdoc Couve Lab	Full Time
Andrés Enrique González	2. RL2 Cellular identity and morphology.	Chilean	M	07/07/79	Biochemist	D	Universidad de Chile	Postdoc Sierralta Lab.	Full Time
Esteban Contreras Sepúlveda	1. RL1 Sub-cellular functional dynamics .	Chilean	M	10/05/84	Biochemist	D	Universidad de Chile	Postdoc Sierralta Lab.	Full Time
Patricio Ahumada Galleguillos	3. RL3 Supra-cellular development and circuits.	Chilean	M	06/05/79	Biologist	D	Universidad de Chile	Postdoc Leo Lab.	Full Time
Almudena Laliena	8. RL8 Neuropathology.	Spanish	F	19/02/85	Biologist	D	Universidad de Chile	Postdoc Leo Lab.	Full Time
Karina Palma	2. RL2 Cellular identity and morphology.	Chilean	F	10/08/79	Veterinarian	D	Universidad de Chile	Postdoc Leo Lab.	Full Time
Carmen Gloria Lemus Cortes	3. RL3 Supra-cellular development and circuits.	Chilean	F	25/02/80	Biologist	D	Universidad de Chile	Postdoc Scian Lab.	Full Time
Gonzalo Olivares Herane	2. RL2 Cellular identity and morphology.	Chilean	M	11/02/78	Biochemist	D	Universidad de Chile	Postdoc Lab. Patricio Olguín	Full Time
Paula García	8. RL8 Neuropathology.	Spanish	F	18/12/81	Biochemist	D	Universidad de Chile	Postdoc Hetz Lab	Full Time
Alexis Alfonso Rivas Ahumada	8. RL8 Neuropathology.	Chilean	M	30/03/81	Biochemist	D	Universidad de Chile	Postdoc Hetz Lab	Full Time
Hery Urra	8. RL8 Neuropathology.	Chilean	M	13/02/84	Biochemist	D	Universidad de Chile	Postdoc Hetz Lab	Full Time
Felipe Cabral Miranda	4. RL4 Plasticity and behavior. 5. RL5 Systems Neuroscience.	Brazilian	M	14/09/87	Biotechnologist	D	Universidad de Chile	Postdoc Hetz Lab	Full Time

Full Name	Research Line	Nacionality	Gender	Date of birth	Profession	Academic Degree	Affiliation	Current Position	Relation with Center
Vicente Spiro Valenzuela	8. RL8 Neuropathology.	Chilean	M	08/07/83	Biotechnologist	D	Universidad de Chile	Postdoc Hetz Lab	Full Time
Janina Edith Borgonovo	8. RL8 Neuropathology.	Argentinian	F	14/02/78	Biochemist	D	Universidad de Chile	Postdoc Leo Lab.	Full Time
Paulina Falcón Urrutia	8. RL8 Neuropathology.	Chilean	F	05/10/87	Biotechnologist	D	Fundación Ciencia & Vida	Postdoc Soledad Matus Lab.	Full Time
Philippe Pihán	8. RL8 Neuropathology.	Chilean	M	04/06/86	Bioengineering	D	Universidad de Chile	Postdoc Hetz Lab	Full Time
Yannis Gerakis	8. RL8 Neuropathology.	France	M	22/03/89	Biotechnologist	D	Universidad de Chile	Postdoc Hetz Lab	Full Time
Jorge Toledo	7. RL7 Applied mathematics and biomedical informatics.	Chilean	M	31/07/84	Biochemist	D	BNI	Postdoc Scian Lab.	Full Time
Margarita Bórquez	5. RL5 Systems Neuroscience.	Chilean	F	28/02/79		D	BNI	Postdoc JLValdés Lab.	Full Time
Andrea González	3. RL3 Supra-cellular development and circuits.	Chilean	F	14/09/83	Biochemist	D	BNI	Postdoc LEO Lab.	Part Time
Younis Hazari	8. RL8 Neuropathology.	Indian	M	22/05/84	Biochemist	D	Universidad de Chile	Postdoc Hetz Lab	Full Time
Nancy María Farfán	3. RL3 Supra-cellular development and circuits.	Chilean	F	12/09/84	Biochemist	D	BNI	Postdoc LEO Lab.	Full Time
Alexis Martínez	8. RL8 Neuropathology.	Chilean	M	20/06/84	Biochemist	D	BNI	Postdoc Hetz Lab	Full Time
Alicia Ivonne Figueroa Barra	6. RL6 Clinical studies.	Chilean	F	27/02/71	Pedagogy	D	BNI	Postdoc Psiquis Lab.	Full Time

NOMENCLATURE:

[Gender] [M] Male [F] Female	[Academic Degree] [U] Undergraduate [M] Master [D] Doctoral	[Relation with Center] [1] Full time [2] Part time
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Annex 2.- Research Lines

N°	Research Line	Research Line Objectives	Description of Research Line	Researcher	Research Discipline	Starting Date	Ending Date
1	1. RL1 Sub-cellular functional dynamics	To understand how the dynamic structures of the secretory pathway and the cytoskeleton are organized, and how this organization affects neuronal function.	Differentiation and maintenance of neural structure and function throughout the life of the organism requires an asymmetrical organization of intracellular components within neurons and glia. Thus, it is fundamental to understand how the dynamic structures of the secretory pathway and the cytoskeleton are organized, and how this organization affects neuronal function. We analyze subcellular components in vivo and in cultured neurons using transgenic mice, rat peripheral nerve, and Drosophila motoneurons. We combine genetic screens, genetic manipulation and high spatio-temporal resolution fluorescent microscopy to investigate the role of the endoplasmic reticulum and other organelles in local trafficking in long axons, and the consequences of altered organelle structure or loss of function of specific genes in neuronal protein trafficking, protein folding and calcium dynamics in normal animals and in models of human disease (AC/CH/CHz/JS/SH/P Olguín).	Alejandro Luarte, Carolina González, Claudio Hetz, Andrés Couve, Steffen Härtel, Cecilia Hidalgo, Jimena Sierralta, Patricio Olguín, Víctor Cornejo, Esteban Contreras, Gina Sánchez	Biofísica, Biología Celular, Bioquímica, Fisiología biofísica, Biotecnología, Genética y Evolución	07-01-16	
2	2. RL2 Cellular identity and morphology	To understand how gene expression determines morphofunctional features during development and the lifespan of neurons	Morpho-functional features of differentiated neurons define a structural backbone upon which connectivity is established, determining how electrical signals are shaped to integrate them into sophisticated computational-like devices and produce cell-to-cell communication. Neuronal morphogenesis is intimately linked to the control of cell specification and differentiation. A central question is how gene expression determines morphofunctional features during development and the lifespan of neurons. We use fluorescent microscopy, mathematical analysis of neurons and circuits, morphological-features and genetic/genomic approaches in Drosophila (genetic alteration of specific group of neurons), mice (in utero electroporation of siRNA) and zebrafish (focal electroporation of morpholino antisense oligonucleotides in the embryonic brain) to investigate genetic and epigenetic (chromatin remodeling) mechanisms involved in this process (JS/CHz/MC/SH/MK/P Olguín).	Andrés González, Gonzalo Olivares, Víctor Castañeda, Claudio Hetz, Steffen Härtel, Jimena Sierralta, Eduardo Pulgar, Karina Palma, Miguel Concha, Patricio Olguín	Biología celular, Bioquímica, Biotecnología, Física, Biofísica, Fisiología biofísica	07-01-16	

N°	Research Line	Research Line Objectives	Description of Research Line	Researcher	Research Discipline	Starting Date	Ending Date
3	3. RL3 Supra-cellular development and circuits	To understand how gene activity and mechanical forces control the process of brain morphogenesis that involves the formation of multi-cellular neuronal aggregates and the establishment of neuronal connectivity, among other cellular processes and how interaction among cells and their connectivity patterns modulate the shaping of developing circuits.	Brain morphogenesis involves the formation of multi-cellular neuronal aggregates and the establishment of neuronal connectivity, among other cellular processes. How this is achieved in vivo is still poorly understood. Central questions are how gene activity and mechanical forces control these processes, and how interaction among cells and their connectivity patterns modulate the shaping of developing circuits. We use recent advancements in genetics, laser microscopy, image analysis and modeling in zebrafish and Drosophila, to study: (i) the interplay of genetic and physical determinants that control processes of collective cell migration and epithelial morphogenesis underlying the formation and shaping of multi-cellular aggregates (MC/SH/M Cerda/P Olgúin); and (ii) the genetic/cellular mechanisms that break the initial morphological symmetry of the brain and then propagate asymmetric patterns of cell identity and connectivity within developing circuits (MC/SH/M Cerda).	German Reig, Andrés González, Nancy Farfán, Steffen Härtel, Mauricio Cerda, Carmen Gloria Lemus, Patricio Ahumada, Miguel Concha, Patricio Olgúin	Álgebra, Biología celular, Análisis de señales, Biofísica, Bioquímica, Métodos numéricos y computación, Ingeniería electrónica, Física, Otras especialidades de la física, Biología del desarrollo, Biología molecular	07-01-16	
4	4. RL4 Plasticity and behavior	To analyze the role of activity-induced calcium release on mitochondrial function and calcium signal propagation to the nucleus to control gene expression. To study spatial memory in aged rats and in rodent models of Alzheimer's disease. To analyze whether stress responses (ROS and protein misfolding) alter cell physiology leading to defective neuronal function, and the role of transcription factors involved in protein folding stress responses in learning and memory processes.	Hippocampal synaptic plasticity is an activity-dependent neuronal response associated with learning and memory that entails significant modifications in the efficacy of synaptic transmission. We recently found that endoplasmic reticulum-mediated calcium release is essential for hippocampal synaptic plasticity and spatial learning. We analyze the role of activity-induced calcium release on mitochondrial function and calcium signal propagation to the nucleus to control gene expression, using primary hippocampal neurons and slices from young and old animals. We also study spatial memory in aged rats and in rodent models of Alzheimer's disease, both of which display increased reactive oxygen species (ROS) generation and anomalous calcium release (CH/AC/JL Valdés/A Paula-Lima). We also analyze whether stress responses (ROS and protein misfolding) alter cell physiology leading to defective neuronal function (CH/CHz), and the role of transcription factors involved in protein folding stress responses in learning and memory processes (CHz).	Cecilia Hidalgo, Felipe Cabral, Claudia Durán, Rodrigo Montefusco, Gabriela Martínez, Claudio Hetz, Andrés Couve, Tatiana Adasme, José Luis Valdés, Andrea Paula-Lima	Biología celular, Biología molecular, Fisiología biofísica, Biología del desarrollo, Histología, Morfología	07-01-16	

N°	Research Line	Research Line Objectives	Description of Research Line	Researcher	Research Discipline	Starting Date	Ending Date
5	5. RL5 Systems Neuroscience	To incorporate behavioral testing and benchmarks of neurodegenerative disease (CHz/PM/R Fuentes) and measure behavioral consequences of modifying cellular calcium signaling on learning and memory tasks .	To understand the neuronal mechanisms involved in cognitive function it is fundamental to examine, compare and model neuronal activity when animals and humans engage in ecological experimental paradigms. We have studied neuronal activity in animals and patients to elucidate aspects of memory consolidation, active sensing and psychiatric conditions (PM/CH/JL Valdés). We now consolidate these research lines, but also add behavioral paradigms to test for additional mechanisms that have been approached from cellular or molecular levels. We incorporate behavioral testing and benchmarks of neurodegenerative disease (CHz/PM/R Fuentes) and measure behavioral consequences of modifying cellular calcium signaling on learning and memory tasks (CH/PM/JL Valdés).	Rodrigo Montefusco, Rómulo Fuentes, Felipe Cabral, Tatiana Adasme, María de los Angeles Juricic, Rodrigo Vergara, Enzo Brunetti, Christ Devia, Pedro Maldonado, José Ignacio Egaña, Cecilia Hidalgo, Margarita Bórquez, José Luis Valdés, Claudio Hetz	Bioquímica, Biotecnología, Biofísica, Oftalmología, Métodos numéricos y computación, Probabilidades, matemáticas aplicadas y estadísticas, Fisiología biofísica	07-01-16	
6	6. RL6 Clinical studies	To conduct clinical brain research sustained by cutting-edge basic Neuroscience To extend neurophysiological markers of Schizophrenia to identify EEG and behavioral markers. To expand to the general area of neurology, focusing on neurodegenerative diseases and the search for biomarkers for ALS and Alzheimer's disease. To explore the underlying molecular mechanisms of ALS, Alzheimer's and Parkinson's diseases and to search for novel therapeutic strategies using gene therapy and pharmacological approaches.	One central goal of BNI is to conduct clinical brain research sustained by cutting-edge basic Neuroscience. We recently searched for neurophysiological markers of Schizophrenia (HS/PM) and we now extend this approach to identify EEG and behavioral markers (PM/JL Valdés), and to promote the use of genetic markers, eye movements and EEG signals in Psychosis (PM/HS/P Gaspar). Clinical approaches expand to the general area of neurology, focusing on neurodegenerative diseases and the search for biomarkers for ALS and Alzheimer's disease (CH/JM Matamala/A Paula-Lima), as well as therapeutic approaches to treat Parkinson's patients through electrical micro-stimulation of the spinal cord (CHz/PM/R Fuentes). Recently recruited basic and clinical Adjunct Investigators work together in preclinical models to explore the underlying molecular mechanisms of ALS, Alzheimer's and Parkinson's diseases and to search for novel therapeutic strategies using gene therapy and pharmacological approaches (CHz/S Matus/R Vidal).	José Manuel Matamala, José Ignacio Egaña, Felipe Salech, Hernán Silva, Claudio Hetz, Pablo Gaspar, Cecilia Hidalgo, Pedro Maldonado, Rómulo Fuentes, René Vidal, Soledad Matus, Andrea Paula-Lima, José Luis Valdés, Alicia Figueroa	Otras especialidades de la biología, Biología del desarrollo, Biología celular, Medicina psicosomática (incluyendo psiquiatría), Biología molecular, Bioquímica farmacología, Farmacología, Otras especialidades de la medicina.	07-01-16	

N°	Research Line	Research Line Objectives	Description of Research Line	Researcher	Research Discipline	Starting Date	Ending Date
7	7. RL7 Applied mathematics and biomedical informatics	To decode physiological and behavioral patterns, and developing capacities in clinical research. To generate faster image processing routines to manage data from advanced microscopy within the new network for advanced scientific equipment. To integrate image processing with new physical and hybrid model approaches for interpretation of organelle dynamics.	The BNI-BioMat platform aims to unravel the architectonic and functional principles of neuronal processes on sub-cellular to supracellular levels, decoding physiological and behavioral patterns, and developing capacities in clinical research. We generate faster image processing routines (GPU and parallel) to manage data from advanced microscopy within the new network for advanced scientific equipment (REDECA). 10 GBps access from BNI-labs (SH) to HPC (via NLHPC) guarantees new design of fast data analysis tools (BioMed-HPC) within BNI and network for Reproducible Research in Image and Signal Processing (ReRISiP-IPOL, STIC-AmSud). We also integrate image processing with new physical and hybrid model approaches for interpretation of organelle dynamics (SH/AC) and cell migration with 4-lens LSM (SH/MC). Data analysis and storage for clinical data is addressed on the basis of a new data center (SH/MC/CH/M Cerda) and the new Center for Medical Informatics and Telemedicine (CIMT) in areas of clinical data, bioinformatics, and telemedicine directed by SH.	Víctor Castañeda, Violeta Chang, Mauricio Cerda, Jorge Toledo, Steffen Härtel, Cecilia Hidalgo, Andrés Correa, Eduardo Pulgar, Miguel Concha	Métodos numéricos y computación, Biofísica, Biología celular, Fisiología biofísica, Ingeniería en computación.	07-01-16	
8	8. RL8 Neuropathology	To develop an integrative approach centered on studying novel mechanisms underlying a group of neurodegenerative and psychiatric disorders.	This transversal platform aims to develop an integrative approach centered on studying novel mechanisms underlying a group of neurodegenerative and psychiatric disorders. We continue focusing on prevalent diseases involving protein misfolding and aggregation, including Alzheimer's (CH/CHz/A Paula-Lima), Parkinson's (MC/CHz/R Vidal/R Fuentes) and ALS (CHz/S Matus/ JM Matamala). We emphasize the use of in vivo approaches in complementary model systems through shared animal facilities to accelerate the use of Drosophila (JS), zebrafish (MC) and mouse models (CHz). This platform interacts with multiple research lines to uncover how disease-related genes alter common cellular processes leading to impaired neuronal connectivity and synaptic dysfunction. BNI provides a rich array of clinical research opportunities in Neuroscience, based on the access to patients and samples, reliable records, and motivated clinicians. To take full advantage of these resources we have recently incorporated Adjunct Investigators with MD degrees to bridge studies in animal models and humans in the areas of neurological (JM Matamala) and psychiatric disorders (P Gaspar).	Claudia Durán, Alexis Rivas, Almudena Laliena, G Mercado, Hery Urrea, P Pihán, Younis Hazari, Alexis Martínez, C Hetz, S Härtel, C Hidalgo, P Maldonado, Rómulo Fuentes, René Vidal, Paula García, J Matamala, J Sierralta, Mauricio Cerda, Pablo Gaspar, Patricio Olguín, Soledad Matus, Vicente Valenzuela, A Couve, Paulina Falcón, Yannis Gerakis, Amado Carreras, Janina Borgonovo, Miguel Concha, Andrea Paula-Lima, Hernán Silva, Danilo Medinas	Biofísica, Biología celular, Biología del desarrollo, Biología molecular, Bioquímica, Biotecnología, Farmacia, farmacología clínica, laboratorio, Fisiología biofísica, Medicina psicosomática (incluyendo psiquiatría), Otras especialidades de la biología.	07-01-16	

Annex 3.- Publications

Category of Publication	MSI Center Members	Reference
ISI Publications or Similar to ISI Standard	Associate Researchers	Cornejo VH, Luarte A, Couve A , (2017),Global and local mechanisms sustain axonal proteostasis of transmembrane proteins, Traffic
		Urta H, Hetz C , (2017),Fine-tuning PERK signaling to control cell fate under stress, Nature Structural and molecular biology
		Martínez G, Duran-Aniotz C, Cabral-Miranda F, Vivar JP, Hetz C , (2017),Endoplasmic reticulum proteostasis impairment in aging, Aging Cell
		Castillo K, Valenzuela V, Oñate M, Hetz C , (2017),A molecular reporter for monitoring autophagy flux in the nervous system, Methods Enzymol
		Pihán P, Carreras-Sureda A, Hetz C , (2017),BCL-2 family: Integrating stress responses at the ER to control cell demise, Cell Death and Differentiation
		SanMartín CD, <u>Veloso P</u> , Adasme T, <u>Lobos P</u> , <u>Bruna B</u> , Galaz J, García A, Hartel S , Hidalgo C, Paula-Lima AC, (2017),RyR2-Mediated Ca ²⁺ Release and Mitochondrial ROS Generation Partake in the Synaptic Dysfunction Caused by Amyloid β Peptide Oligomers, Frontiers in Molecular Neuroscience
		<u>De Gregorio C</u> , Delgado R, <u>Ibacache A</u> , Sierralta J , Couve A , (2017),Drosophila Atlastin in motor neurons is required for locomotion and presynaptic function, Journal of Cell Science
		Duran-Aniotz C, Cornejo VH, Espinoza S, Ardiles AO, Medinas DB, Salazar C, Foley A, Gajardo I, Thielen P, Iwawaki T6, Scheper W7, Soto C, Palacios AG, Hoozemans JJ, Hetz C , (2017),IRE1 signaling exacerbates Alzheimer's disease pathogenesis, Acta Neuropathologica
		<u>Bargsted L</u> , Medinas DB, Martínez Traub F, Rozas P, Muñoz N, Nassif M, Jerez C, Catenaccio A, Court F, Hetz C , Matus S°, (2017),Disulfide cross-linked multimers of TDP-43 and spinal motor neuron loss in a TDP-43A315T ALS/FTD mouse model, Scientific Reports
		Park K, Kim G, Morales R, Moda F, Moreno-Gonzalez I, Concha-Marambio L, Lee A.S, Hetz C , Soto C, (2017),The Endoplasmic Reticulum Chaperone GRP78/BiP Modulates Prion Propagation in vitro and in vivo, Scientific Reports
		González AE, Muñoz VC, Cavieres VA, Bustamante HA, Cornejo VH, Januário YC, González I, Hetz C , daSilva LL, Rojas-Fernández A, Hay RT, Mardones GA, Burgos PV, (2017),Autophagosomes cooperate in the degradation of intracellular C-terminal fragments of the Amyloid Precursor Protein via the MVB/lysosomal pathway, The Faseb Journal
		Obacz J , Avril T, Le Reste PJ, Urta H, Quillien V, Hetz C , Chevet E, (2017),Endoplasmic Reticulum proteostasis in glioblastoma? from molecular mechanisms to therapeutic perspectives, Science Signaling
		Medinas DB, Valenzuela V, Hetz C , (2017),Proteostasis disturbance in amyotrophic lateral sclerosis, Human Molecular Genetics
		Gerakis Y, Hetz C , (2017),A decay of the adaptive capacity of the Unfolded Protein Response exacerbates Alzheimer's disease, Neurobiology of aging
		Mercado G, Hetz C , (2017),Drug repurposing to target proteostasis and prevent neurodegeneration: accelerating translational efforts, Brain: A journal of neurology
		Guerrero N, Meynard MM, Borgonovo J, Palma K, Concha ML , Hetz C , (2017),Prion Function and Pathophysiology in Non-Mammalian Models, Curr Molecular Medicine
		Villalobos C, Maldonado PE , Valdés JL, (2017),Asynchronous ripple oscillations between left and right hippocampi during slow-wave sleep, PLoS One
		Reig G, Cerda M, Sepúlveda N, Flores D, Castañeda V, Tada M, Härtel S , Concha ML , (2017),Extra-embryonic tissue spreading directs early embryo morphogenesis in killifish, Nature Communications
Hetz C , Saxena S, (2017),ER stress and the unfolded protein response in neurodegeneration, Nature Reviews Neurology		

Category of Publication	MSI Center Members	Reference
ISI Publications or Similar to ISI Standard	Associate Researchers	Pereiro L, Loosli F, Fernández J, Härtel S , Wittbrodt J, Concha ML , (2017),Gastrulation in an annual killifish: Molecular and cellular events during germ layer formation in Austrolebias, <i>Developmental Dynamics</i>
		Varas-Díaz G, Brunetti EP, Rivera-Lillo G, Maldonado PE , (2017),Patients with Chronic Spinal Cord Injury Exhibit Reduced Autonomic Modulation during an Emotion Recognition Task, <i>Frontiers in Human Neuroscience</i>
		Borgonovo J, Allende-Castro C , Laliena A, Guerrero N, Silva H, Concha ML , (2017),Changes in neural circuitry associated with depression at pre-clinical, pre-motor and early motor phases of Parkinson's disease, <i>Parkinsonism & Related Disorders</i>
		Vergara RC, Moëñne-Loccoz C, Maldonado PE , (2017),Cold-Blooded Attention: Finger Temperature Predicts Attentional Performance, Vergara RC, Moëñne-Loccoz C, Maldonado PE
		Medinas DB, González JV, Falcon P, Hetz C , (2017),Fine-tuning the ER stress signal transducers to treat amyotrophic lateral sclerosis, <i>Frontiers Mol Neurosci</i>
		Carreras-Sureda A, Pihán P , Hetz C , (2017),The Unfolded Protein Response: At the Intersection between Endoplasmic Reticulum Function and Mitochondrial Bioenergetics, <i>Frontiers in Oncology</i>
		Cabral-Miranda F, Hetz C , (2017),ER stress in neurodegenerative disease: from disease mechanisms to therapeutic interventions, <i>Endoplasmic Reticulum Stress in Diseases</i>
		Vasquez-Rosati A, Brunetti EP, Cordero C, Maldonado PE , (2017),Pupillary Response to Negative Emotional Stimuli Is Differentially Affected in Meditation Practitioners, <i>Frontiers in Human Neuroscience</i>
		Chang V, García A, Hitschfeld N, Härtel S , (2017),Automatic classification of human sperm head morphology, <i>Computers in Biology and Medicine</i>
		Chang V, García A, Hitschfeld N, Härtel S , (2017),Gold-standard for computer-assisted morphological sperm analysis, <i>Computers in Biology and Medicine</i>
		Bustos F, Ampuero E, Aguilar R, Jury Nur, Varela-Nallar L, Falahi F, Toledo J, Ahumada J, Lata Jaelyn, Cubillos P, Henríquez B, Guerra M, Stehberg J, Neve R, Inestrosa N, Wyneken U, Fuenzalida M, Härtel S , Sena-Esteves M, Rots Marianne, Montencino M, van Zundert B, (2017),Epigenetic editing of the PSD95 gene improves cognition in aged and Alzheimer's disease mice, <i>BRAIN: A Journal of Neurology</i>
		Maldonado H, Calderon C, Burgos-Bravo F, Kobler O, Zuschratter W, Ramirez O, Härtel S , Schneider P, Quest AF, Herrera-Molina R, Leyton L, (2017),Astrocyte-to-neuron communication through integrin-engaged Thy-1/CBP/Csk/Src complex triggers neurite retraction via the RhoA/ROCK pathway, <i>Biochimica et Biophysica acta</i>
		Capurro D, Echeverry A, Figueroa R, Guíñez S, Taramasco C, Galindo C, Avendaño A, García A, Härtel S , (2017),Chile's National Center for Health Information Systems: A Public-Private Partnership to Foster Health Care Information Interoperability, <i>Studies in health technology and informatics</i>
		Cabral-Miranda F, Hetz C , (2017),ER Stress and Neurodegenerative Disease: A Cause or Effect Relationship, <i>Current Topics in microbiology and immunology</i>

Category of Publication	MSI Center Members	Reference
ISI Publications or Similar to ISI Standard	Others	Hidalgo C, (2017), Calcium Rules, Circulation
		Torres R, Hidalgo C, Kerr B, (2017), Mecp2 Mediates Experience-Dependent Transcriptional Upregulation of Ryanodine Receptor Type-3, Frontiers in Molecular Neuroscience
		Barrientos G, Sánchez-Aguilera P, Jaimovich E, Hidalgo C, Llanos P, (2017), Membrane Cholesterol in Skeletal Muscle: A Novel Player in Excitation-Contraction Coupling and Insulin Resistance, Hindawi Journal of Diabetes Research
		Arias-Cavieres A, Adasme T, Sánchez G, Muñoz P, Hidalgo C, (2017), Aging Impairs Hippocampal- Dependent Recognition Memory and LTP and Prevents the Associated RyR Up-regulation, Frontiers in Aging Neuroscience
		Herrera-Marschitz M, Perez-Lobos R, Lespay-Rebolledo C, Tapia-Bustos A, Casanova-Ortiz E, Morales P, Valdes JL, Bustamante D, Cassels BK, (2017), Targeting Sentinel Proteins and Extrasynaptic Glutamate Receptors: a Therapeutic Strategy for Preventing the Effects Elicited by Perinatal Asphyxia, Neurotoxicity Research
		Valdivia M, Vega-Macaya F, Olguin P, (2017), Mechanical control of myotendinous junction formation and tendon differentiation during development, Frontiers in cell and developmental biology
		Matamala JM, Geevasinga N, Huynh W, Dharmadasa T, Howells J, Simon NG, Menon P, Vucic S, Kiernan MC, (2017), Cortical function and corticomotoneuronal adaptation in monomelic amyotrophy, Clinical Neurophysiology
		Matamala JM, Dharmadasa T, Kiernan MC, (2017), Prognostic factors in C9orf72 amyotrophic lateral sclerosis, Journal of Neurology, Neurosurgery and Psychiatry
		Bustamante ML, Herrera L, Gaspar PA, Nieto R, Maturana A, Villar MJ, Salinas V, Silva H, (2017), Shifting the focus toward rare variants in schizophrenia to close the gap from genotype to phenotype, American journal of medical genetics
		Corral SA, de Angel V, Salas N, Zúñiga-Venegas L, Gaspar PA, Pancetti F, (2017), Cognitive impairment in agricultural workers and nearby residents exposed to pesticides in the Coquimbo Region of Chile, Neurotoxicology and Teratology
		Langer AI, Schmidt C, Mayol R, Díaz M, Lecaros J, Krogh E, Pardow A, Vergara C, Vergara G, Pérez-Herrera B, Villar MJ, Maturana A, Gaspar PA, (2017), The effect of a mindfulness-based intervention in cognitive functions and psychological well-being applied as an early intervention in schizophrenia and high-risk mental state in a Chilean sample, Trials
		García-Beltrán O, Mena NT, Aguirre P, Barriga-González G, Galdámez A, Nagels E, Adasme T, Hidalgo C, Núñez MT, (2017), Development of an iron-selective antioxidant probe with protective effects on neuronal function, PLoS One
		Brys I, Nunes J, Fuentes R, (2017), Motor deficits and beta oscillations are dissociable in an alpha-synuclein model of Parkinson's disease, European Journal of Neuroscience
SCIELO Publications or Similar to SCIELO Standard	Associate Researchers	
	Others	
Books & Chapters of Books	Associate Researchers	
	Others	
Other Publications	Associate Researchers	
	Others	

3.5.- Collaborative publications:

Category of Publication	1 researcher		2 researchers		3 researchers		4 or more	
	N°	%	N°	%	N°	%	N°	%
ISI Publications or Similar to ISI Standard	30	66,67%	4	8,89%	0	0,00%	0	0,00%
SCIELO Publications or Similar to SCIELO Standard	0	0,00%	0	0,00%	0	0,00%	0	0,00%
Books and chapters	0	0,00%	0	0,00%	0	0,00%	0	0,00%
Other Publications	0	0,00%	0	0,00%	0	0,00%	0	0,00%
Total of publications	30	66,67%	4	8,89%	0	0,00%	0	0,00%

Annex 4.- Organization of Scientific Events

Scope	Title	Type of Event	City	Country	Responsible Researcher
International	Technological Symposium : “Monitoring Brain Activity during General Anesthesia.”	Symposium	Santiago	Chile	José I. Egaña
International	V NeuroSur Symposium: Neurobiology of Consciousness and the Altered States of Consciousness.	Conference	Santiago	Chile	José I. Egaña
International	Latin American Seminar + Workshop: “Time-Series analysis of electrophysiological signals”	Workshop	Santiago	Chile	José I. Egaña
National	Significado del temor: EEG y tDCS aplicados al estudio del lenguaje y la ansiedad	Seminar	Santiago	Chile	Andrés Couve
National	Señalización Wnt en la unión neuromuscular madura ¿aliado o enemigo?	Seminar	Santiago	Chile	Andrés Couve
National	Activity-based and synaptic-based memories in prefrontal cortex during spatial working memory	Seminar	Santiago	Chile	Andrés Couve
National	Adolescence as a vulnerable period in the pathophysiology of schizophrenia: Insights from animal models	Seminar	Santiago	Chile	Andrés Couve
National	Glutamate Transporter EAAT3 as a novel target in Obsessive-Compulsive Disorder	Seminar	Santiago	Chile	Andrés Couve
National	Motores retrogradados infección retroviral	Seminar	Santiago	Chile	Andrés Couve
National	A polyglutamine domain enables transcriptional reprogramming in response to pH change	Seminar	Santiago	Chile	Andrés Couve
National	Represión transcripcional en el desarrollo y plasticidad del SNC: el caso de la familia CoREST	Seminar	Santiago	Chile	Claudio Hetz
National	Uncovering the etiology of autism spectrum disorders: a neurodevelopmental perspective	Seminar	Santiago	Chile	Claudio Hetz
National	Búsqueda de los Mecanismos Patogénicos y Nuevos Blancos Terapéuticos para las Enfermedades Neurodegenerativas de Niemann-Pick	Seminar	Santiago	Chile	Claudio Hetz
National	“The Mammalian Habenula: Long Neglected - Now Appreciated	Seminar	Santiago	Chile	Miguel Concha
National	“Dopamine-driven inflammation in the gut and the brain	Seminar	Santiago	Chile	Claudio Hetz
National	“Neurophysiological features of cortico-basal ganglia activity associated with motor dysfunction in P	Seminar	Santiago	Chile	Rómulo Fuentes
National	3er Encuentro de Investigadores en Biología del Desarrollo	Conference	Santiago	Chile	Esteban Contreras
National	From Genotype to Phenotype	Symposium	Santiago	Chile	Patricio Olgún A
National	Resguardando el conocimiento y la innovación	Workshop	Santiago	Chile	Claudio Hetz
National	Scientific Retreat BNI 2017	Retreat	San Felipe	Chile	Andrés Couve
National	An integrative view of cortico-basal ganglia circuits in health and disease	Seminar	Santiago	Chile	Andrés Couve

Annex 5.- Education and capacity building**5.1 Capacity Building**

Tutor	Undergraduated Student		Graduated Students						Total
			Master		Doctoral		Postdoctoral		
	F	M	F	M	F	M	F	M	
Pedro Esteban Maldonado Arbogast	0	0	1	5	2	6	0	0	14
Steffen Härtel Gründler	0	0	2	2	0	1	0	0	5
Jimena Sierralta Jara	0	0	0	0	1	2	0	0	3
Claudio Andrés Hetz Flores Soledad Matus	0	0	0	0	0	1	0	0	1
Pedro Esteban Maldonado Arbogast Pablo Gaspar	0	0	0	0	1	0	0	0	1
María Cecilia Hidalgo Tapia Andrea Paula-Lima	0	0	1	0	0	0	0	0	1
Pedro Esteban Maldonado Arbogast José Luis Valdés Guerrero	0	0	0	0	0	2	0	0	2
Mauricio Cerda Villablanca	0	1	0	4	0	0	0	0	5
Patricio Alejandro Olguín Aguilera	0	1	0	2	1	0	0	0	4
Rómulo Antonio Fuentes Flores René Vidal Claudio Andrés Hetz Flores	0	0	0	0	1	0	0	0	1
Rómulo Antonio Fuentes Flores	0	1	1	2	1	1	0	0	6
Rómulo Antonio Fuentes Flores Pedro Esteban Maldonado Arbogast	0	0	0	0	1	0	0	0	1
Steffen Härtel Gründler Andrea Paula-Lima María Cecilia Hidalgo Tapia	0	0	0	0	0	1	0	0	1
Miguel Concha Nordemann	2	1	1	0	1	2	0	0	7
Andrea Paula-Lima	0	1	0	0	0	3	0	0	4
José Luis Valdés Guerrero	0	0	2	2	1	3	0	0	8
Andrés Oscar Couve Correa	1	0	1	0	1	0	0	0	3
Claudio Andrés Hetz Flores	1	0	3	1	2	3	0	0	10
René Vidal	0	0	0	0	1	0	0	0	1
Pablo Gaspar	0	1	3	3	1	2	0	0	10
Claudio Hetz / René Vidal	0	0	0	0	1	0	0	0	1
Steffen Härtel Gründler Mauricio Cerda Villablanca	0	0	1	0	1	0	0	0	2
Andrea Paula-Lima José Luis Valdés Guerrero María Cecilia Hidalgo Tapia	0	0	0	0	1	0	0	0	1
Total	4	6	16	21	18	27	0	0	92

Annex 5.2. - Short-term Traineeships

Student Name	Institution	Country	Advisor	Project Description	Starting Date	Ending Date
Catalina Paz Manieu Seguel	Institut Curie, Paris, France	Francia	Yohanns Bellaiche	This projects aims to undersand the role of tissue-tissue interaction in tissue morphogenesis	01-08-16	31-03-17
Juan José Mariman	ICM (Institut du Cerveau et la Moelle), Université Paris VI	Chile	PhD, Dr. Antoni Valero-Cabré	Motor system involves multiples cortical and subcortical regions during operations such as adaptation to new conditions of the environment. This fact demands a precise coordination of neural activity at multi-scale levels, which would be supported by oscillatory neuronal discharges in a specific frequency. Cerebellum is a critical region for motor adaptations, then, its external modulation through tACS should affect the adaptation to external distortions. The objective of the study is to determine the effect of cerebellar tACS at 20 Hz, 50 Hz or sham on motor adaptation to visual distortion of feedback during a reaching task.	21-11-16	04-07-17
Nicolas Balmaceda Pascal	Universidad de Amsterdam	Holanda/Países Bajos	Michael D. Lee, Eric-Jan Wagenmakers	Experimental design and implementation of a gambling task for healthy human adults, and subsequent modeling of behavioral data using Bayesian methods for parameter estimation.	08-02-17	09-09-17
Francisca Cecilia Bertin Johnson	School of Medicine at Universidad Central del Caribe in Bayamon	Puerto Rico	Ramón A. Jorquera	To learn new skills that are applicated in Dr. Jorquera lad, including protocols of FM1-43 loading and unloading into synaptic vesicle and two-photon imaging of the Drosophila neuromuscular junction	19-03-17	25-03-17
Andrés Ignacio Köhler Solís	School of Medicine at Universidad Central del Caribe in Bayamon	Puerto Rico	Ramón A. Jorquera	To learn and put in practise teorical and practical concepts of electrophysiology in Drosophila Melanogaster larvae	19-03-17	25-03-17
Daniel del Aguila Herrera	IMBI - Universidad de Heidelberg	Alemania	Matthias Gietzielt	Master thesis project to prove that it is possible to generate a computer algorithm, based on machine learning (ML), capable of suggesting which treatment scheme could lead to a better prognosis for a patient, according to their initial clinical and biochemical data. This will be done in the context of multiple myeloma (MM), a cancer disease.	01-09-17	28-02-18

5.3.- Annex: Short-term external Traineeships at BNI

Intern Type	Intern Name	Academic Degree	Home Institution	Destination Institution	Country	Project Description	Starting Date	Ending Date
Student	Eoghan McGrath	Doctoral	National University of Ireland, Galway	Laboratory of Proteostasis Control and Biomedicine, Instituto de Neurociencia Biomédica (BNI)	Ireland	Secondment as part of INSPIRED EU Grant	11-01-17	31-10-18
Student	Eileen Cors	Undergraduate	University Reutlingen	Laboratory of Proteostasis Control and Biomedicine, Instituto de Neurociencia Biomédica (BNI)	Germany	Undergraduate Thesis	08-10-17	02-10-18
Student	Tim Miedema	Magister	University of Groningen	Laboratory of Proteostasis Control and Biomedicine, Instituto de Neurociencia Biomédica (BNI)	Netherlands	Investigation of the IRE1/XBP1s arm of the UPR in aging.	09-04-17	19-05-18
Student	Leslie Verónica Vargas Saturno	Magister	Instituto Venezolano de Investigaciones Científicas, IVIC	Couve Lab. "Cellular and molecular neurobiology" Instituto de Neurociencia Biomédica (BNI)	Venezuela	Síntesis local de proteínas de membrana y axones de sistema nervioso periférico	07-10-17	08-10-17
Student	Miriam Schwalm	Doctoral	University of Mainz, Germany	Laboratorio of Neurosistemas, Instituto de Neurociencia Biomédica	Germany	DAAD funded fellowship for doctoral students	01-01-17	25-03-17
Student	Julian Quevedo Pütter	Undergraduate	University of Mannheim, Germany	Neurosystems Lab, Instituto de Neurociencia Biomédica	Germany	Assistance in a project investigating the possible lateralization of the episodic long-term memory in rats	10-02-17	17-12-17
Student	Victoria Iribarnegaray	Doctoral	Instituto de Investigaciones Biológicas Clemente Estable	Scian Lab	Uruguay	Evaluar el uso de catéteres recubiertos con cobre en la formación de biofilms de bacterias uropatógenas.	21-08-17	11-03-17
Student	Teresa Cramer	Doctoral	UCL, Institute of Neurology	Laboratory of Experimental Ontogeny (LEO lab)	Germany	Working on the migration of Pineal progenitor cells	10-01-17	06-01-18
Student	Maxs Mendez	Doctoral	Universidad Central de Venezuela	Laboratory for Motorcontrol and Neuromodulation	Venezuela	Protocols of deep brain stimulation	08-03-17	21-03-17
Student	Silvia Getze	Posgrado	University of Jena	Laboratory for Motorcontrol and Neuromodulation	Germany	Studies in Parkinson's Disease	01-10-17	31-01-18

Annex 6.- Networking and other collaborative work

6.1 Networking

Network Name	Network Scope	Researchers				Institutions
		From the Center		External		
		Researchers	Postdocs / Students	Researchers	Postdocs / Students	
Neurosur	LA	11	0	25	0	Instituto Leloir (Buenos Aires) , Instituto de BioMedicina de Buenos Aires-CONICET-Parter Sociedad Max Planck , INGEBI-CONICET Buenos Aires, Universidad de Buenos Aires, Instituto de Investigación Medica Mercedes y Martín Ferreyra, Universidad Católica de Argentina, Buenos Aires-CONICET, Federal University of Rio de Janeiro, Instituto Oswaldo Cruz, Fundação Oswaldo Cruz, Instituto Pasteur Montevideo, Instituto Clemente Estable, Universidad de la República, Montevideo,
Network for Advanced Microscopy and Quantitative Developmental Biology	I	11	20	8	6	BNI, U. Göttingen, Germany / IST, Vienna, Austria/ U.Bonn, Germany
Small Brains Big Ideas	I	1	0	0	0	Universidad Mayor, Santiago, CHILE; Arizona State University, USA; University of Oxford, Centre for Neural Circuits and Behaviour Oxford, UK; University of Massachusetts, USA; INIBIBB, ARGENTINA; Fundación Instituto Leloir, ARGENTINA; Universidad de Chile, CHILE; Universidad de Valparaiso, CHILE; Pontificia Universidad Católica de Chile, CHILE; University of Massachusetts Medical School, USA; University of Massachusetts Medical School, USA; Universidad Santo Tomás, Santiago CHILE; University of Oxford, Centre for Neural Circuits and Behavior Oxford, UK.

NOMENCLATURE:

[Network Scope]

[N] National [I] International [LA] Latin American

Annex 6.2.- Other collaborative activities

Activity Name	Objective	Description	Co-Participants Institutions	Form the Center		External		Product	Name of the Center Associate Researchers Participating in the activity
				Number of Researchers	Number of Postdocs / Students	Number of Researchers	Number of Postdocs / Students		
Ministry of Foreign Affairs of Chile	Generation of networking in an informal environment. Politicians, University authorities, PI's, postdocs, international and national students of the workshop were invited.	An networking with the Chilean Ministry of Foreign Affairs was established during the last Neurosur Meeting (2016). Since then they support us with a camaraderie cocktail which takes place on the roof terrace of the Ministry. The main goal of this activity is to strength in an informal environment scientific networking. Additionally, many students had the possibility of interact with authorities, symposium speakers and teachers of the workshop.	Ministry of Foreign Affairs of Chile	4	15	7	29	1, Camaraderie cocktail	Andrés Couve, José Ignacio Egaña, Rodrigo Montefusco, Andrea González, Christ Devia
V Neurosur Meeting	To enhance and promote new collaborative work with the new member of Neurosur network	To enhance and promote collaborative work with the new members of Neurosur network. To evaluate the scientific and technological symposium and receive feedback from the speakers. This meeting is always an instance for talk about the future of the network and talk about strenghs and weaknesses of the research in Latinamerica and how to improve this.	MIT, USA/ Harvard, MGH, USA/ UFRN, Brasil / Universidad de la República, Uruguay/ PUC, Chile	9	0	5	0	1, Networking Meeting	Andrés Couve
Internship at Laboratory of Experimental Psychology and Neuroscience, Universidad Favaloro, INECO Foundation	The target of the internship was to begin a long-time collaboration in order to get intracranial electrophysiological records (Electrocorticogram or ECoG) of patients with epilepsy disease.	This collaboration was established in 3 stages. The first one, the one was included in this internship looked for set-up and to teach regarding the use of an ocular movement record device or oculograph EyeLink II, SR - Research, Canada) with which we have extensive previous experience reflected in several publications	Laboratory of Experimental Psychology and Neuroscience (LPEN)	3	0	2		1, Internship	Rodrigo Montefusco, José Ignacio Egaña, Pedro Maldonado

Activity Name	Objective	Description	Co-Participants Institutions	Form the Center		External		Product	Name of the Center Associate Researchers Participating in the activity
				Number of Researchers	Number of Postdocs / Students	Number of Researchers	Number of Postdocs / Students		
Internship at Department of Neurology, University of Massachusetts	Determination of post-translational modifications mediating SOD1 aggregation in sporadic ALS model	Determination of post-translational modifications mediating SOD1 aggregation in sporadic ALS model	University of Massachusetts	1	0	1	0	1, Internship	Danilo Medinas
Internship at Center of Brain and Cognition, Universidad Pampeu Frabra, Barcelona, Spain	To develop a theoretical framework of Internally generated processes	To develop a theoretical framework of Internally generated processes	Universidad Pampeu Frabra, Barcelona, Spain	1	0	1	0	1, Internship	Pedro Maldonado
Visit to the Laboratory of Neurodegenerative Diseases	Set the behavioral protocols for the evaluation of cognitive impairment associated with aging in mice; To coordinate future visits and experiments from both sides in order to accomplish a vast range of approaches	A visit in the context of the recently awarded grant to Dr. Hetz lab and Dr. Sergio Ferreira Lab (Brazil) to study the aging process of the brain and its implications for the development of Alzheimers Disease.	Laboratory of Neurodegenerative Diseases Instituto de Bioquímica Médica, de la U. Federal de Río de Janeiro	1	1	1		2, Set behavioral protocols and to coordinate future experiments	Claudio Hetz, Felipe Cabral

Activity Name	Objective	Description	Co-Participants Institutions	Form the Center		External		Product	Name of the Center Associate Researchers Participating in the activity
				Number of Researchers	Number of Postdocs / Students	Number of Researchers	Number of Postdocs / Students		
Internship at Systems biology of cell polarity and cell division Group of Matthieu Piel -- UMR 144 Institut Curie/CNRS, Institut Curie, Paris & Centro de Investigación Interdisciplinaria (CRI), Paris	This experimental proposal sets off to uncover how the morphology of a cell directly impinges on the structural and functional organization of the endoplasmic reticulum (ER) and the Golgi apparatus (GA). Briefly, we will stretch a non-polarized fibroblast-type cell and examine the re-distribution and function of the ER and the GA in response to this mechanical stimulus	This experimental proposal sets off to uncover how the morphology of a cell directly impinges on the structural and functional organization of the endoplasmic reticulum (ER) and the Golgi apparatus (GA). Briefly, we will stretch a non-polarized fibroblast-type cell and examine the re-distribution and function of the ER and the GA in response to this mechanical stimulus	Institut Curie, Paris & Centro de Investigación Interdisciplinaria (CRI), Paris	1	0	1	0	1, Internship	Andrés Couve
Visit to Laboratory of Neuronal Physiopathology of the Faculty of Medicine of the University of Buenos Aires	To share research results and plan new experiments based on obtained results until now; to confirm protocol of bigenic mice TDP-43	To coordinate protocols in the University of Buenos Aires and contrast them with ours. Collected tissues will be studied in Chile to determinate levels of mRNA in makers of the endoplasmic reticulum. The final target is to publish the results of those experiments in high-impact-factor journals.	Laboratorio de Fisiopatología Neuronal de la Facultad de Medicina de la Universidad de Buenos Aires	0	1	2		3, Protocols, meetings, plan of publishing in high impact factor journals	Vicente Valenzuela

Annex 7. - Outreach**7.1. - Outreach activities throughout the period**

Event Title	Type of Event	Scope	Target Audience	Date	Country	Region	N° of Student from the Center	N° of Attendees	Duration in days	Participating Researchers	Responsible for the activity
3D Drug Discovery and development	Workshop	National	University Students, Industry / Services	19-12-17	Chile	Metropolitana de Santiago	5	22	1		Sebastián Reyes
¿Cómo cuido mi memoria después de los 60 años?	Conferencia	National	General Comunity	18-10-17	Chile	Metropolitana de Santiago	10	120	1		Nicole Rogers
Jornadas Ciencia e Innovación	Conferencia	National	University Students, High School Students, General Comunity, Industry / Services	04-05-17	Chile	Metropolitana de Santiago	20	200	2	A Couve, C Hidalgo, P Maldonado	Carolina Astudillo, Florencia Alamos, Alejandra Parra
Applied Statistics Workshop	Workshop	National	Industry / Services	16-01-17	Chile	Metropolitana de Santiago	4	26	1	Rodrigo Vergara	Rodrigo Vergara
Dendros: Domo cerebro	Exhibición	National	General Comunity, Primary Students	08-06-17	Chile	Metropolitana de Santiago	4	35000	24		Rodrigo Tapia
Experimental visits to BNI labs	Guided school visits to our laboratories	National	Primary Students	21-10-16	Chile	Metropolitana de Santiago	20	120	5		Valentina Vío
Talleres docentes	Workshop	National	Public Service	07-01-17	Chile	Metropolitana de Santiago	6	150	9		Rodrigo Tapia

7.2. - Products of outreach

Name of Product	Product Objective	Target Public	Type of Product	Scope
Teacher guides	To help teachers to plan their classes with new ways to teach science and biology content based on audiovisual resources.	Primary and High-School teachers, High School Students, Primary Students	Guide	National
Student working guides	To bring student new strategies to learn science and biology through audiovisual resources adapted to the Chilean educational system	High school students	Guide	National
DVD with audio visual resources	To give teachers in one DVD all the audiovisual material created for Bio-Interactive from HHMI which was translated into Spanish for being used all together with the teacher guides and the student working guides. This material is can also download from www.loligo.cl/education	High school students, Primary and High-School teachers	DVD	National
Book with national researches and science class activities adapted to chilean education system	As we were working with science content originated abroad, we found important to show Chilean researches that could help students to understand better the national science context and meanwhile to learn science content adapted to the national education system.	High school students, Primary and High-School teachers	Book	National
Intensive workshop for teachers	New educational strategies, audiovisual content, how to apply to an education project were items of the program of this intensive workshop offered. Four ambassador teachers from Bio-Interactive HHMI were the speakers and during 3 intensive days of workshop and exposure classes teachers from different cities, which have attended before to our workshops, received new knowledge for their classes.	Primary and High-School teachers	Workshop for teachers	National
Workshop for teachers (3)	To give science and biology teacher new strategies for the development of their classes and incorporating play activities within the classroom, using the content at www.loligo.com/educacion	Primary and High-School teachers	Workshop for teachers	National
Brain-dome exhibit	To bring Neuroscience closer to the general public, specially kids	General Community	Exhibition	National

7.3.- Articles and Interviews

Type of Media and Scope	Local / Regional		National		International		Total
	N° Interviews	N° Articles	N° Interviews	N° Articles	N° Interviews	N° Articles	
Written	0	25	2	78	0	0	105
Internet	0	3	0	47	0	15	65
Audiovisual	0	0	15	14	0	0	29
Total	0	28	17	139	0	15	199

Annex 8. - Connections with other sectors:

Activity	Type of Connection	Type of Activity	Institution Country	Agent Type	Economic Sector
Validación de la efectividad del nuevo sistema ECG Hitoe como aplicación médica y determinar sus ventajas versus los métodos utilizados hoy en clínicas y hospitales	Researchn agreement	Project development	Chile	Organizations and Public Services	Business activities
Evaluación dela capacidad de las células Muse-AT en inducir neutoproyeccion y/o neuroregeneración en modelo preclínicos animales de la Enfermedad de Parkinson	Researchn agreement	Project development	Chile	Organizations and Public Services	Biomedicine
Sistema portátil de retroalimentación y monitoreo telemétrico de actividad muscular vía smartphone	Funding for research project	Project development	Chile	Industry and Services	Medicine and human health
Uso de sensores inerciales como herramienta complementaria en Estudios de Puestos de Trabajo (EPT) en Chile	Funding for research project	Project development	Chile	Industry and Services	Medicine and human health
Red de colaboración NeuroSur: un cerebro para América Latina	Funding for international networking	Project development	Spain	International organization	Government

Annex 9.- Total incomes:

Funds 2017	Amount [\$]
MSI	847.000.000
CONICYT-ANILLO	450.000.000
CONTRATOS TECNOLOGICOS	135.000.000
CORFO	40.000.000
EXPLORA	30.000.000
FONDECYT - INICIACION	90.000.000
FONDECYT - POSTDOCTORADO	279.450.467
FONDECYT - REGULAR	263.654.333
INNOVA	865.912.470
INTERNATIONAL	416.043.285
PAGEL	107.250.000
Programa Regional STIC-AmSud	2.500.000
Proyecto FiOUCh	2.500.000
REDES-CONICYT	15.000.000
TELEMEDICINA	10.000.000
CONICYT-ECOS	1.280.000
FONDEF-IDEA	149.928.000
CNPq-Brasil/CONICYT	48.300.000
FONDAP	90.000.000
TOTAL	3.843.818.555

Outcome structure

Item	Accumulated expenses to last year [\$]	2017 Expenses [\$]				Total expenses to 2016 [\$]	%
		Operative	Networks	Outreach	Total		
Honoraria researchers and research personnel	1.994.518.580	440.233.482	0	0	440.233.482	2.434.752.062	47,5
Tickets and travel expenses	293.618.382	40.765.208	5.628.300	0	46.393.508	340.011.890	6,6
Materials and supplies	548.417.101	145.535.231	0	0	145.535.231	693.952.332	13,5
Goods and equipment	419.158.869	15.318.160	0	0	15.318.160	434.477.029	8,5
Infrastructure	433.653.693	14.938.167	0	0	14.938.167	448.591.860	8,8
Administrative expenses	266.581.029	58.593.091	0	0	58.593.091	325.174.120	6,3
Publications and subscriptions	22.240.483	7.300.000	0	0	7.300.000	29.540.483	0,6
Consultancies	104.177.940	13.434.000	0	9.236.818	22.670.818	126.848.758	2,5
Overhead	97.649.552	21.000.000	0	0	21.000.000	118.649.552	2,3
Others	155.437.793	11.097.309	2.020.983	1.968.800	15.087.092	170.524.885	3,3
Total	4.335.453.422	768.214.648	7.649.283	11.205.618	787.069.549	5.122.522.971	100,0

Financial accounting

ITEM	2017 [\$]				TOTAL TO 2016
	Operative	Networking	Outreach	Total	
Income	847.010.000	0	10.765.043	857.775.043	4.939.009.438
Outcome	768.214.648	7.649.283	11.205.618	787.069.549	5.125.905.191
Annual balance	78.795.352	-7.649.283	-440.575	70.705.494	-186.895.753

Annex 10.- Exchange:

10.1 Researchers from the center who go abroad.

Researcher	Name	Activity	Stay [days]	Destination Country	Funding (MSI, External, Mixed)
Adjunct Investigator	Patricio Olguín	Collaborative visit to the Laboratory of Dr. Yohanns Bellaice, Institut Curie and to the Laboratory of Michel Gho,	16	France	External
Associate Investigator	Pedro Maldonado	PUC-Rio - VI Mostra de Neuropsicologia Clinica- 2017	5	Brazil	External
Associate Investigator	Pedro Maldonado	Comision de estudio	120	Spain	Mixed
Associate Investigator	Pedro Maldonado	Trabajo colabarativo. Dr. Sonja GrŸn JŸlich Research Center.	10	Germany	Mixed
Adjunct Investigator	Mauricio Cerda	Conference presentation (Congreso Biociencias)	4	Uruguay	External
Adjunct Investigator	Mauricio Cerda	Invited seminar (Universidad de la RepŸblica)	3	Uruguay	External
Adjunct Investigator	Mauricio Cerda	Invited seminar (Universidad de Rosario)	3	Argentina	External
Associate Investigator	Miguel Concha	Visit the laboratory of Stephen Wilson at University College London, London (April 17-18).	2	UK	Mixed
Associate Investigator	Miguel Concha	Attend and give a talk at the "9th course on Cytoskeleton" and visit the labs of Ana-Maria Lennon and Mathieu Piel, at Institute Curie, Paris (April 19-27)	9	France	Mixed
Associate Investigator	Miguel Concha	Attend and present poster at the "18th International Congress of Developmental Biology", and visit the lab of Suresh Jesuthasan at the Institute of Molecular and Cell Biology, Singapore (June 16-24 2017).	9	Singapore	Mixed

Researcher	Name	Activity	Stay [days]	Destination Country	Funding (MSI, External, Mixed)
Associate Investigator	Miguel Concha	Visit the laboratory of Hitoshi Okamoto, at RIKEN Institute, Tokyo (July 10-13)	3	Japan	Mixed
Associate Investigator	Miguel Concha	Attend and give talk at the "MBL Zebrafish 20th Anniversary Symposium" in Woodshole. Then give lectures and visit the labs of Kat Hadjantonakis (Sloan Kettering Institute), Holger Knaut (NYU Langone Health Medical Center) and Stuart Newman (New York Medical College) in NYC (August 17-25)	9	USA	Mixed
Associate Investigator	Miguel Concha	Give classes at the course "Current Topics and Emerging Models in Developmental Biology" and attend and give lecture at the "LASDB Meeting 2017", both in Antioquia, Colombia (October 2-14).	12	Colombia	Mixed
Deputy Investigator	Claudio Hetz	Endoplasmic Reticulum functions in physiology and pathology	2	France	Mixed
Deputy Investigator	Claudio Hetz	25th ECDO Conference	2	Belgium	Mixed
Deputy Investigator	Claudio Hetz	Cancer Cell Death & Therapy	3	France	Mixed
Deputy Investigator	Claudio Hetz	Centre Eugene Markis	1	France	Mixed
Deputy Investigator	Claudio Hetz	12th International Calreticulin Workshop	4	Greece	Mixed
Deputy Investigator	Claudio Hetz	l'Institut de Pharmacologie Moléculaire et Cellulaire	1	France	Mixed
Deputy Investigator	Claudio Hetz	ICM 2017 - Proteostasis imbalance and neurodegenerative diseases	1	France	Mixed
Deputy Investigator	Claudio Hetz	Neuropathology seminar Amsterdam Research	1	Netherlands	Mixed
Deputy Investigator	Claudio Hetz	University Medical Center Groningen: Mol Med UMCG Seminar Series Voorjaar	1	Netherlands	Mixed
Deputy Investigator	Claudio Hetz	Endoplasmic Reticulum Functions in Physiology and Disease	5	Portugal	Mixed

Researcher	Name	Activity	Stay [days]	Destination Country	Funding (MSI, External, Mixed)
Deputy Investigator	Claudio Hetz	13th International Conference on Alzheimer's and Parkinson's Diseases and Related Neurological Disorders (ADPD 2017)	1	Austria	Mixed
Deputy Investigator	Claudio Hetz	Mechanisms of neurodegeneration	1	Germany	Mixed
Deputy Investigator	Claudio Hetz	The 13th International Conference on Alzheimer's and Parkinson's Diseases and Related Neurological Disorders	5	Austria	Mixed
Associate Investigator	Steffen Härtel	Workshop FHIR 2017 "Hands in an on towards the Fast Healthcare Interoperability Resources Framework"	14	Germany	External
Associate Investigator	Steffen Härtel	S. Härtel CENS 2017-2021 National Center for Information Systems in Health. conhIT Berlin: Connecting Healthcare IT, 25-27 April 2017.	9	Germany	External
Associate Investigator	Steffen Härtel	Congreso Nacional de Biociencias 2017.	5	Uruguay	External
Associate Investigator	Steffen Härtel	II International Academic Forum Medical Informatics 2017	4	Brazil	External

10.2 Researchers traveling from abroad to the center

Name of Researcher	Nationality	Activity	Stay [days]	Country from traveling	Funding (MSI, External, Mixed)
Trudy Mackay PhD	American	Collaborative visit, Symposium at BNI, Facultad de Medicina Universidad de Chile: Fron Genotype to phenotype: Insights from natural variation and epigenomics. Talk and Symposium at the Annual Meeting of the Chilean Society of Genetics 2017	7	USA	Mixed
Robert Anholt, PhD	American	Collaborative visit, Symposium at BNI, Facultad de Medicina Universidad de Chile: Fron Genotype to phenotype: Insights from natural variation and epigenomics. Symposium and educative talk at the Annual Meeting of the Chilean Society of Genetics 2017	7	USA	Mixed
Jose Luis Gomez Skarmeta, PhD	Spain	Collaborative visit, Symposium at BNI, Facultad de Medicina Universidad de Chile: Fron Genotype to phenotype: Insights from natural variation and epigenomics. Talk and Symposium at the Annual Meeting of the Chilean Society of Genetics 2017	7	Spain	Mixed
Rudiger Veh	German	Give a talk at BNI (The mammalian habenula: long neglected now appreciated?) and visit the laboratory of Dr. Miguel Concha (November 20-21)	2	Germany	External
Pablo Torterolo	Uruguayan	Symposium "Neurobiology of consciousness and the altered states of consciousness" (May 8-12)	4	Uruguay	External
Draulio Araujo	Brazilian	Symposium "Neurobiology of consciousness and the altered states of consciousness" (May 8-12)	5	Brazil	External
Francisco Flores	Chilean	Symposium "Neurobiology of consciousness and the altered states of consciousness" / Latin American Seminar + Workshop: "Time-Series analysis of electrophysiological signals" (May 8-12)	20	USA	External
Lucía Melloni	Chilean	Symposium "Neurobiology of consciousness and the altered states of consciousness" (May 8-12)	8	USA	External
Sonia Grün	German	Latin American Seminar + Workshop: "Time-Series analysis of electrophysiological signals"	4	Germany	Mixed
Markus Diensmann	German	Latin American Seminar + Workshop: "Time-Series analysis of electrophysiological signals"	4	Germany	Mixed
Mathew Wilson	American	Symposium "Neurobiology of consciousness and the altered states of consciousness" (May 8-12)	1	USA	MSI
Patrick Purdon	American	Symposium "Neurobiology of consciousness and the altered states of consciousness" (May 8-12)	2	USA	External
Ai-Hui Tang	Chinese	Seminar "Transsynaptic Nanocoulumm: Nanoscale interrogation of the synaptic structure-Function relation"	1	USA	External