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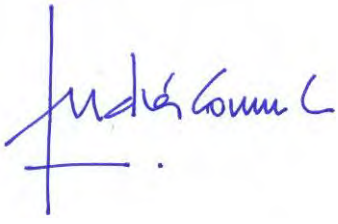	

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1. 1.1 Executive summary

The Biomedical Neuroscience Institute (BNI) has secured a position as a broad umbrella that brings together a critical mass of leading neuroscientists, clinicians and mathematicians to explore the structure and function of the brain under normal physiology and disease, from cells to whole organisms.

2016 marked the beginning of our second 5-year period. New strategies were the result of an exhaustive introspective analysis and a thorough *on site* evaluation by our *Scientific Advisory Board*. During this second term we will consolidate successful initiatives while providing room for significant improvements, thus combining continuity and novelty. We reorganized BNI membership based on productivity, scientific/experimental approach, and philosophy convergence in training, education/outreach and technology. The key objectives that build upon the existing institute's achievements and started driving BNI's activities for the second period 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.

We have improved the overall research structure of the institute to highlight some of its strengths. Six lines now conduct research on the relationship between structure and function of the brain, following a bottom up, multi-scale approach in complementing model organisms (flies, zebrafish, mice, rats, and humans). Clinical studies now constitute a thematic platform promoting the bridge to basic research. Two transversal research lines foster the collaborative strategy conducting research and development in biomathematics (BioMat) and neuropathology. A new operative *Applied Neuromedicine and Technology Platform* accelerates the development of novel technological advances. BNI's research is supported by students, postdocs, young investigators, clinicians, and a team of highly qualified staff. We believe these organizational modifications prepare BNI to consolidate an ambitious long-term plan.

Staring this year the productivity of BNI includes the achievements of six Associated Investigators, two Senior Investigators, and nine Adjunct Investigators. During 2016 more than 200 people constituted the core of the institute. 136 young scientists, from undergraduate through postdoctoral, were associated with research activities at BNI. These included 12 undergraduate students, 45 master's students, 52 PhD students and 28 postdoctoral fellows. We received 14 international students from several countries in South America, Spain, France, Germany and Japan. During 2016, 11 students completed their dissertation work and more than 10 theses were co-directed by BNI Investigators. 13 BNI students carried short-term research and training periods abroad, including research activities in USA, Italy, Germany, France, Switzerland and Japan. As part of their comprehensive scientific training, more than 10 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. 7 graduates have remained in science and academia.

BNI Investigators published 42 scientific articles (38 ISI) with an average ISI impact factor of 5.10, which compares favorably to similar centers in the developed world. Many BNI papers were published with students as co-authors (13/42). Additionally, BNI researchers continued their strong presence in national and international meetings, with 116 posters or oral presentations during 2016.

Two new patents and two new brands were filed for protection demonstrating a successful collaboration between our technology transfer area and the central R&D office at U Chile.

Intellectual property protection, together with increasing funding from the private sector, has begun to consolidate our approach to industry.

During 2016 a number of national and international scientific events contributed to create an exciting multidisciplinary atmosphere at BNI. We organized 19 regular seminars, *Conversations in Neuromedicine*, in topics connecting Neuroscience and medicine, which included local and internationals speakers. We also continued to promote monthly internal seminars. We combined our two formal networks thus maximizing resources and opportunities. As a result we hosted the 4th version of *NeuroSur*, which included (i) the international workshop and course *Optics, Forces and Development;* (ii) the symposium *The Living Brain*; (iii) a technological symposium; and (iv) the *NeuroSur* business meeting. We also organized the workshop *Small Brains Big Ideas* that covered recent advances and modern techniques in neurosciences, focusing on invertebrate models. In order to reinforce the identity of the Institute and to promote the interaction between teams from different laboratories we organized a BNI retreat near Olmué, Chile.

We continue to allocate significant Millenium funds to common strategic aims such as animal facilities, a BioMat team, infrastructure, equipment, education/outreach, innovation and technology transfer and administration. Two formal networks, *NeuroSur* and *Optics & Microscopy*, and now an international course, *Small Brains Big Ideas,* continue to improve research and technological capabilities through international collaborations with emphasis in South American students. Testing of new ideas and attraction of young investigators continued through dedicated *Seed Grants* and *Bridge Fellowships*.

Two strong areas continue to differentiate BNI's impact: *Loligo*, an established outreach and education program targets high-school students and teachers, while our *Applied Neuromedicine and Technology Platform* focuses on applied projects, innovation, fundraising and translational efforts. Together with active media appearances, they have positioned BNI as a resource center for neuroscientists, clinical practitioners, high-school students, entrepreneurs and the general public.

During 2016 BNI investigators received exciting individual awards and recognitions. **CHz** was awarded the *University Scientific Research Award* by the Santander Bank and El Mercurio. Young investigators M Oñate and H Urra won the annual Dr. F Leighton Prize for Best Master's Thesis and Best Doctoral Thesis respectively. **AC** won the *Best Old Georgian 2016: Sciences* during the 80th anniversary of Saint George's College in Santiago. **SH** was recognized for his contribution to innovation during the commemoration of the 174 years of the U Chile. He also received the recognition *Virtual Microscopy in School Education* during the XVIII Chilean Congress of Medical Technology and the FHIR Developer Days 2016. Press coverage of the institute's activities has continued to excel. Written press alone was valued in approximately USD 460,000 with 86 appearances, including newspapers in Santiago (29), regional newspapers (8), magazines (11), online newspapers (28), webpages (8), and electronic radios (2).

Our new building, the *Connector Cube*, is now fully operative. V Vio, who leads our communications approach and S Reyes, head of Technology Transfer and Innovation are now based in the new building. Additionally, it has served as venue for national and international seminars, *NeuroSur*, *Science Education Program for School Teachers, Open Labs* visits, weekly BNI meetings, lab meetings, informal interactions and is rapidly becoming 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) ha asegurado su calidad de amplio paraguas que reúne a una masa crítica de neurocientíficos, médicos y matemáticos para explorar la estructura y función del cerebro en fisiología y enfermedad, desde las células hasta organismos completos. 2016 marcó el comienzo de nuestro segundo período de 5 años. Las nuevas estrategias fueron el resultado de un exhaustivo análisis introspectivo y de una evaluación por parte de nuestro Consejo Asesor Científico. Durante este segundo periodo consolidaremos iniciativas exitosas, al tiempo que brindaremos espacio para mejoras significativas, combinando continuidad y novedad. Reorganizamos la membresía de BNI basándonos en productividad, enfoque científico/experimental y la convergencia de filosofía en la formación, la educación/extensión y tecnología. Los objetivos claves que impulsan las actividades para el segundo período son: (i) mejorar la calidad de la investigación interdisciplinaria y colaborativa como sello BNI; ii) promover la investigación traslacional y las interacciones con el sector privado; iii) ampliar el impacto de la formación y la creación de capacidades; iv) fortalecer la educación y la difusión.

Hemos modificado la estructura general de investigación del instituto para resaltar algunas de sus fortalezas. Seis líneas ahora realizan investigaciones sobre la relación entre estructura y función del cerebro, siguiendo un enfoque ascendente y multi-escala en organismos modelo. Los estudios clínicos constituyen una plataforma temática que promueve el puente hacia la investigación básica. Dos líneas de investigación transversales fomentan la estrategia colaborativa de investigación y desarrollo en biomatemática (BioMat) y neuropatología. Una nueva *Plataforma Aplicada de Neuromedicina y Tecnología* acelera el desarrollo de nuevos avances tecnológicos. La investigación de BNI está respaldada por estudiantes, posdoctorados, investigadores jóvenes, clínicos y un equipo de personal altamente calificado. Creemos que estas modificaciones organizativas preparan a BNI para consolidar un ambicioso plan a largo plazo.

A partir de 2016 la productividad de BNI incluye los logros de seis Investigadores Asociados, dos Investigadores Senior y nueve Investigadores Adjuntos. Durante 2016 más de 200 personas constituyeron el núcleo del instituto. 136 jóvenes científicos, de pregrado a postdoctoral, se asociaron con actividades de investigación. Éstos incluyeron 12 estudiantes de pregrado, 45 estudiantes de MSc, 52 estudiantes de doctorado y 28 becarios posdoctorales. Recibimos 14 estudiantes internacionales de varios países de América del Sur, España, Francia, Alemania y Japón. Durante 2016, 11 estudiantes completaron su trabajo de tesis doctoral y más de 10 tesis fueron co-dirigidas por investigadores de BNI. 13 estudiantes llevaron a cabo estadías cortas en el extranjero, incluyendo actividades en EEUU, Italia, Alemania, Francia, Suiza y Japón. Como parte de su formación científica integral, más de 10 estudiantes de BNI participaron en actividades de divulgación. Un número de jóvenes dejó BNI, continuando sus trayectorias profesionales en otras instituciones nacionales o en el extranjero, mientras que otros se han quedado para buscar un grado más alto o una posición postdoctoral. 4 postdocs continuaron sus carreras científicas en otros lugares, incluyendo posiciones académicas en Chile y EEUU. 7 graduados han permanecido en la ciencia y la academia.

Investigadores BNI publicaron 42 artículos científicos (38 ISI) con un factor de impacto ISI promedio de 5.10, que se compara favorablemente con centros similares en el mundo desarrollado. Muchos artículos de BNI fueron publicados con estudiantes como co-autores (13/42). Además, los investigadores BNI marcaron una fuerte presencia en reuniones nacionales e internacionales, con 116 posters o presentaciones orales durante 2016.

Se presentaron dos nuevas patentes y dos nuevas marcas para protección demostrando una colaboración exitosa entre nuestra área de transferencia tecnológica y la oficina central de I+D en

U Chile. La protección de la propiedad intelectual, junto con el creciente financiamiento desde el sector privado, han comenzado a consolidar nuestro enfoque hacia la industria.

Una serie de eventos científicos nacionales e internacionales contribuyeron a crear una vibrante atmósfera multidisciplinaria en BNI. Organizamos 19 seminarios regulares, *Conversaciones en Neuromedicina*, en temas relacionados con la Neurociencia y la medicina, que contó con oradores locales e internacionales. También continuamos realizando seminarios internos mensuales. Combinamos nuestras dos redes formales maximizando recursos y oportunidades. Como resultado, acogimos la 4ª versión de *NeuroSur*, que incluyó: (i) el taller internacional y el curso *Óptica, Fuerzas y Desarrollo*; (ii) el simposio *El Cerebro Viviente*; iii) un simposio tecnológico; y (iv) la reunión de negocios de *NeuroSur*. También organizamos el taller *Pequeños Cerebros Grandes Ideas* que cubrió avances recientes y técnicas modernas en neurociencias, centrándose en modelos de invertebrados. Para reforzar la identidad del Instituto y promover la interacción entre equipos de diferentes laboratorios organizamos un retiro BNI cerca de Olmué, Chile.

Continuamos asignando importantes fondos Milenio a objetivos estratégicos comunes como manejo de animales, el equipo BioMat, infraestructura, instrumentos, educación/extensión, innovación y transferencia, y administración. Dos redes formales, *NeuroSur* y *Óptica & Microscopía*, y ahora el curso internacional, *Pequeños Cerebros Grandes Ideas*, continúan mejorando la investigación y la capacidad tecnológica a través de colaboraciones internacionales con énfasis en estudiantes sudamericanos. El cultivo de nuevas ideas y la atracción de jóvenes investigadores continuaron a través de *Becas Puente* y *Subvenciones Semilla*.

Dos áreas fuertes siguen diferenciando el impacto de BNI: *Loligo*, un programa establecido de extensión y educación se enfoca en estudiantes y profesores de enseñanza media, mientras que nuestra *Plataforma de Neuromedicina Aplicada y Tecnológica* se centra en proyectos aplicados, innovación, levantamiento de fondos y esfuerzos de transferencia. Junto con presencia activa en medios de comunicación, éstos han posicionado a BNI como un centro de recursos para neurocientíficos, clínicos, estudiantes, emprendedores y el público en general.

Durante el 2016, investigadores BNI recibieron premios y reconocimientos individuales. **CHz** fue galardonado con el *Premio de Investigación Científica Universitaria* por el Banco Santander y El Mercurio. Los jóvenes investigadores M Oñate y H Urra ganaron el *Premio Dr F Leighton* de Mejor Tesis de MSc y Mejor Tesis Doctoral respectivamente. **AC** ganó el *Mejor Georgiano 2016: Ciencias* durante el 80 aniversario del Colegio Saint George en Santiago. **SH** fue reconocido por su contribución a la innovación durante la conmemoración de los 174 años de la U Chile. También recibió el reconocimiento *Microscopía Virtual en Educación Escolar* durante el XVIII Congreso Chileno de Tecnología Médica y el FHIR Developer Days 2016. La cobertura de prensa de las actividades del instituto ha continuado sobresaliendo. Durante 2016, sólo la prensa escrita fue valorada en aproximadamente USD 460,000 con 86 apariciones, incluyendo periódicos en Santiago (29), periódicos regionales (8), revistas (11), periódicos en línea (28), páginas web (8) y radios electrónicas (2).

Nuestro nuevo edificio, el *Connector Cube*, está ahora plenamente operativo. V Vio, quien lidera nuestro enfoque de comunicaciones y S Reyes, director de Transferencia de Tecnología e Innovación, ahora se encuentran en el nuevo edificio. Además, ha sido sede de seminarios nacionales e internacionales, *NeuroSur*, *Programa de Educación Científica para Maestros Escolares*, visitas guiadas, reuniones semanales BNI, reuniones de laboratorio, interacciones informales y se está convirtiendo rápidamente en un centro centralizado y un escenario ideal para vinculación con la comunidad. La Oficina Ejecutiva contribuyó a conectar con otros sectores, una Oficina de Gestión de Proyectos fue 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) has secured a position as a broad umbrella that brings together a critical mass of leading neuroscientists, clinicians and mathematicians to explore the structure and function of the brain under normal physiology and disease, from cells to whole organisms. We have been true to our fundamental aims: (i) to accomplish world-class scientific research; (ii) to train and host a new generation of leading researchers and clinicians in a vibrant, solid 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 and the general public. 2016 marked the beginning of our second 5-year period. We developed a strategy for this period after a thorough process of introspection in collaboration with our *Scientific Advisory Board* (R Brown, J Henley, M Raff, C Soto and C Zuker). We now aim to consolidate successful initiatives while providing room for significant improvements combining continuity and novelty. Thus, BNI membership was reorganized based on productivity, scientific/experimental approach, and philosophy convergence in education, outreach and technology. The key objectives that build upon the existing institute's achievements and started driving BNI's activities for the 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, and investigation at multiples scales from genes to behavior. A special focus is placed on areas that foster *in vivo* approaches and connect phenomenological scales. We significantly expand our capabilities in the areas of development, plasticity and cognitive Neuroscience, our clinical capabilities in the area of neurology, and our national and international networks. The integration of BNI platforms into a network-type facility for animal experimentation and advanced scientific equipment (REDECA) professionalize the impact of research. In addition, expanded opportunities foster the sense of belonging, and a unique and intense scientific culture.

(ii) To promote translational research and interactions with the private sector. A *Neuromedicine and Technology Operative Platform* was established in 2016 to develop internationally competitive and innovative solutions in biotechnology, neuro-systems, and data science that impact health and other areas. This platform also promotes a culture of innovation through increased interactions with technology developers, investors and intellectual property professionals. It also seeks the participation of the private sector through philanthropy.

(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 through improved advertisement and by establishing visiting programs for internships. Our training capabilities diversify to attract not only basic and clinical researchers in biology and mathematics but also engineers and biotechnologists.

(iv) To strengthen the impact of outreach activities. During 2016 we started implementing strategies to strengthen our science culture program. These include initiatives to establish closer working interactions with teachers and students, new strategic alliances with national and international science education and outreach agencies, and increased connectivity with the community to consolidate social impact and influence public policies.

The overall research structure of the institute was modified to highlight some of the institute's strengths. Thus, 6 platforms (research lines) now conduct research on the relationship between

structure and function of the brain, following a bottom up, multi-scale approach in complementing model organisms. Clinical studies now constitute a thematic platform strengthening the bridge between basic research and the clinic. Two transversal platforms foster the collaborative strategy conducting research and development in biomathematics and neuropathology. An *Applied Neuromedicine and Technology Platform* accelerates the development of novel technological advances. BNI's research is supported by students, postdocs, young investigators, young clinicians, and shared facilities; and steered by a renovated Board of Directors. Research is 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)

We changed the organization and composition 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.

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 now consists of six Associated Investigators (**MC/AC/SH/CHz/PM/JS**), two Senior Investigators consolidate clinical studies and serve a dual role for active research and group advising (**HS**/**CH**). MK was granted leave of absence (Current Dean F Med), while two others left the institute. Three new Adjunct Investigators now bridge, strengthen and expand research areas and build the sustainability of BNI (**M Cerda, R Fuentes, JM Matamala**) together with our previous young researchers (**P Gaspar, S Matus, P Olguín, A Paula-Lima, JL Valdés, R Vidal**). In total our team now includes nine Adjunct Investigators, average age 38. 28 postdocs, 52 PhD, 45 Master, 12 undergraduate students and technicians complete a vibrant and multidisciplinary research team.

Specific strategies to foster interactions include: (i) definition of leaders that coordinate platforms; (ii) co-mentorship of students/postdocs/young investigators/clinicians; (iii) shared facilities; (iv) organization of seminars and theoretical/practical courses; (v) weekly planning meetings; and (vi) an outstanding *Scientific Advisory Board*. BNI investigators are responsible for specific tasks such as reviewing *Bridge Fellowships*, *Seed Grants*, networks, education/outreach, connecting with clinicians, or scientific events. Significant Millenium funds are allocated to common strategic aims such as animal facilities, a BioMat team, postdoctoral *Bridge Fellowships*, *Seed Grants*, infrastructure, equipment, innovation, education/outreach and administration. Approximately 30% of funds are allocated directly to researchers for operational expenses. Millenium funding constitutes approximately 30% of the total operating costs for scientific activities. Other national and international funds contribute to the overall impact of the institute.

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. Our studies in endoplasmic reticulum function and dynamics have been published in leading journals. These include: that an autonomous secretory pathway for the processing of sodium channels is present in long axons of peripheral nerves (*González et al., 2016*) (**AC**); the role of the unfolded protein response in axonal regeneration in peripheral nerves (*Oñate et al., 2016*) (**CHz**); the role of ERp57 and other disulfide isomerases in motor function and their use as molecular markers for ALS (*Woehlbier et al., 2016*) (**CHz**); evidence that the antioxidant Astaxanthin protects primary neurons from the noxious effects of Amyloid β peptide oligomers (AβOs) through protection against reactive oxygen species (ROS) produced by the endoplasmic reticulum calcium pathway (*Lobos et al,. 2016*) (**CH**). We have additionally followed our work on Filamin A, which physically associates with IRE1-α, using a yeast two-hybrid screening, uncovering a novel role of the unfolded protein response in cell migration. This study will be submitted to *Cell* (**CHz/AC/MC**). Other interactions with IRE1-α were discovered using an RNAi screen (**CHz**) leading to the identification of Hsp47. The interaction was validated in cell culture *in vitro* and in fly models *in vivo* (**CHz/JS**). This study was recently submitted for publication (*Sepulveda et al., submitted*). In addition, 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 in preparation) (**P Olguín**) and that cytoskeleton regulation by Rho-kinase is required for the establishment of muscle-tendon interaction during development of the muscle-skeletal system (*Vega-Macaya et al., 2016*) (**P Olguín**). International recognition of the expertise of BNI investigators is demonstrated by reviews in leading journals (*Brain Research; Neuroscience Letter; APS Journal*); an issue of *Brain Research* edited by **CHz** (*Hetz and Saxena, 2016*) and editorial comments (*Front Aging Neurosci; Science Signaling; Cell; Current Biology*).

RL2. Cellular identity and morphology. We found that the multifunctional RNA binding protein SFPQ associates to the chromatin-modifying complex LSD1/CoREST during development of the cerebral cortex. By using *in utero* electroporation of shRNA in mice, we showed that SFPQ is required for radial migration of newborn pyramidal neurons and proliferation of progenitor cells (*Saud et al., in press*). In addition, we showed that CoREST/LSD1 negatively regulates notch pathway during cerebral cortex development (*López et al., 2016*). These two studies were performed by M Kukuljan during his active period at BNI, but they will be discontinued while he is acting as Dean of the F Med. We have recently demonstrated that DLG proteins are essential for efficient presynaptic neurotransmitter release and localization of voltage activated Ca^{2+} channels (*Astorga et al., 2016*) (**JS**/**P Olguín**). We continue investigating lactate metabolism and glia-neuron relationship with the study of a lactate transporter that is essential for viability expressed in *Drosophila* glial cells (*Delgado et al., under preparation*) (**JS**). In addition, the labs of **JS** and **P Olguín** are investigating the consequences of prenatal malnutrition in adult behavior and in the development of the nervous system, from transcription to morphology in *Drosophila*. These studies now receive complementary funds from CONICYT Associative Research Program (PIA) through an Anillo Grant awarded to **JS** and **P Olguín**. We are currently preparing two manuscripts: the role of genetic by prenatal-nutrition interaction in sleep and morphology of neural circuits

(*Olivares et al., under preparation*) (**P Olguín**); and the role of prenatal nutrition in neural stem cells differentiation (*Contreras et al., under preparation*) (**JS/P Olguín**). In addition, we have contributed to understand the regulation of *Drosophila* brain wiring by neuropil interactions via a Slit-Robo-RPTP signaling complex (*Oliva et al., 2016*) (**JS**). We have also continued the study of atlastin in a hereditary spastic paraplegias model in *Drosophila* (*De Gregorio et al., under review in J Cell Sci*) and the search for atlastin genetic modifiers (*Candia et al., under preparation*). This project is a collaboration between three BNI labs (**AC/JS/P Olguín**) and was funded by an International Collaboration CONICYT-USA Grant associated to UMASS (**AC/JS/P Olguín**).

RL3. Supra-cellular development and circuits. We continued the study of mechanisms that direct supra-cellular organization and circuit formation using live imaging and genetic manipulation in model organisms. We improved 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 in the brain: we published three papers in topics related to the origin and evolution of left-right asymmetry in the epithalamus of vertebrates: a post-mortem neuroanatomical study that demonstrated for the first time that the lateral habenula of humans is asymmetric (*Ahumada-Galleguillos et al., 2016*), a review that addressed the evolutionary role of Nodal signaling in CNS asymmetry across bilateria (*Signore et al., 2016*), and an hypothesis-driven paper that proposed heterochrony as a mechanism that generates morphological variation in epithalamic asymmetry among vertebrates (*Signore and Concha, 2016*) (**MC/SH**). We continued a study on the role of chemokine and Robo-Slit signaling in habenular-IPN connectivity, finding that two sub-variants of the Robo3 receptor have distinct ligand dependent and ligand independent activities in guiding habenular projections (soon to be submitted for publication) (**MC/SH/CHz**). Finally, we incorporated new fish species to investigate both the developmental role of Nodal signaling in epithalamic asymmetry of zebrafish, and the evolutionary origin of the laterotopic pattern of habenula-IPN nucleus connectivity of teleosts (**MC/SH**).

Role of mechanical stress in directing tissue morphogenesis *in vivo*: we focused on completing a study using annual killifish as an embryo model that demonstrates that mesenchymal-like tissues use mechanical input from cellular substrates to direct their motility *in vivo* (recently accepted in Nature Communications) (**MC/SH/M Cerda**). We also continued our *in vivo* studies that combine embryological and genetic experiments with mathematical modeling in zebrafish to link epithelial to mesenchymal transition, pulling forces, directed cell migration and protection of cell fate during the formation of the laterality organ. This study resulted in two independent stories, one of which will be soon submitted for publication (**MC/SH**).

New fish models to study the ontogeny of neural circuits in disease: we continued the development and characterization of new transgenic zebrafish developed in our lab that express the human wild type and G2019S mutant forms of LRRK2, as possible models of Parkinson's disease. We also built infrastructure to incorporate a new killifish model with an accelerated aging process (*Nothobranchious furzeri*) that will be used to study the role of aging in the ontogeny of monoaminergic neural circuits (**MC/SH/CHz**).

Our contributions were presented in international and national meetings such as International: Symposyum *Lateral Habenula under the spotlight* (France); *XII Congreso Nacional de la Sociedad Mexicana de Biología del Desarrollo* (Mexico); Symposium *Size in Development: Growth, Shape and Allometry* (Japan); *National: XXX Annual Meeting of the Chilean Society for Cell Biology*; *Cell Biology summer course Institut Curie*.

RL4. Plasticity and behavior. The focus of this research line continues to be the exploration of the role of calcium release from the endoplasmic reticulum on hippocampal long-term potentiation (LTP), structural plasticity and hippocampal-dependent learning and memory. We have centered our efforts in deciphering the role of calcium release mediated by ryanodine-receptor (RyR)/calcium release channels in these neuronal processes. **CH** generated the following results, in collaboration with **JL Valdés/A Paula-Lima**, and with young investigators T Adasme, A Arias and other collaborators and graduate students.

We found that Amyloid β peptide oligomers (AβOs) - toxic aggregates with pivotal roles in Alzheimer's disease - stimulate mitochondrial Ca^{2+}-uptake, ROS generation and mitochondrial fragmentation by inducing redox sensitive RyR-mediated Ca^{2+} release. Moreover, the antioxidants NAC and EUK-134 inhibited the mitochondrial ROS increase and the mitochondrial fragmentation induced by AβOs, while RyR2 knockdown with antisense oligonucleotides decreased by 40% Ca^{2+} release induced by a specific RyR agonist and significantly reduced the cytoplasmic and mitochondrial Ca^{2+} signals and the mitochondrial fragmentation induced by AβOs in primary hippocampal neurons. Based on these results, we propose that AβOs-induced Ca^{2+} entry and ROS generation jointly stimulate RyR2 activity, causing mitochondrial Ca^{2+} overload and fragmentation in a feed forward injurious cycle. These novel findings, submitted for publication in *Frontiers in Cellular Neuroscience* (*Lobos et al.*), highlight the specific participation of RyR2-mediated Ca^{2+} release on AβOs-induced mitochondrial malfunction.

We continued to investigate the role of RyR-mediated calcium release in young and aged rats. We found that aged rats display defective LTP and spatial memory, increased basal RyR2/RyR3 protein contents in the hippocampus, and more oxidized RyR2 channels than young rats. We submitted a manuscript describing these findings to *Frontiers in Aging Neuroscience* (*Arias-Cavieres et al.*).

In addition to studying the role of RyR-mediated calcium release on hippocampal synaptic plasticity and hippocampal-dependent learning and memory, we investigated the role of triclosan on hippocampal function. Triclosan is an antibacterial and antifungal agent present in toys and commonly used household products, such as toothpaste, detergents and soaps. The efficacy of triclosan is controversial; it has potential harmful effects and its use was banned in the US starting September 2017. Because further research on the effects of triclosan is required, we investigated the effects of triclosan on a range of hippocampal functions. Addition of 1 uM triclosan to hippocampal neurons in primary cultures decreased the enhancement in spine density produced by the neurotrophin BDNF. Pre-incubation with the same concentration inhibited LTP induced by theta burst stimulation (CA3 to CA1) of rat hippocampal slices by 40%; higher concentrations of triclosan exerted a more drastic inhibitory effect. In addition, daily bilateral injections for 3 consecutive days of triclosan into the hippocampal CA3 area (1 ul, 10 uM) markedly reduced the ability of rats to perform a spatial navigation task. Based on these results, we propose that triclosan, at very low concentrations, has significant noxious effects on hippocampal function (*Barrientos et al., under in preparation*).

Although the unfolded protein response (UPR) has ben extensively studied in the context of neurodegenerative diseases, its possible physiological role in the CNS remains elusive. Using a phenotypic screen we recently uncovered a new function of the UPR transcription factor XBP1 in behavior. XBP1 regulates BDNF expression, potentiating synaptic plasticity as monitored by LTP. In addition, using gain and loss of function approaches we demonstrated a selective role of XBP1 in learning and memory (*Martínez et al., 2016*)(**CHz/JL Valdés/R Vidal**).

We have presented our work in several national and international meetings.

RL5. Systems Neuroscience. This research line has expanded to include collaborative studies in the laboratories of **CH, PM**, **R Fuentes, P Gaspar, A Paula-Lima** and **JL Valdés**, and many young scientists including 5 post-docs, 9 PhD students, 10 MSc students, and 2 engineers. **PM** and **JL Valdés** continued their collaboration to understand the relationship between hippocampal oscillations and learning. We found that spatial memory, among other brain processes, shows hemispheric lateralization. We hypothesize that ripple events between both hippocampi exhibit different temporal dynamics. We tested this idea by using a modified "split-hyperdrive" that allows us to record simultaneous LFPs from both right and left hippocampi of rats during sleep. We detected individual events and found that ripples exhibited a different occurrence pattern between hemispheres during sleep. We propose that lack of synchrony between left and right hippocampi ripples underlies lateralization of spatial memory. This paper has been accepted, but will be reported next year. We also submitted an abstract to SFN 2016/Chicago reporting that histamine H1 receptor antagonist pyrilamine induces gamma oscillations *in vivo* in the rat hippocampus. **JL Valdés** jointly with M Herrera-Marschitz, a former Associate Investigator of BNI, published the effect of perinatal asphyxia on the density and neuronal activity of TMN neurons by double immunoreactivity for adenosine deaminase (ADA) and c-Fos, as a marker for histaminergic neurons and activity respectively (*Flores-Balter et al., 2016*). They also reported on the expression of the histamine-synthesizing enzyme, histidine decarboxylase (HDC), and thioperamide, an H3 histamine receptor antagonist, on object recognition. Asphyxia-exposed rats showed a decrease of ADA density and c-Fos activity in TMN, and decreased HDC expression in the hypothalamus. Asphyxia-exposed rats also showed low performance in object recognition memory compared to caesarean-delivered controls, which was reverted in a dose-dependent manner by the H3 antagonist thioperamide (5-10mg/kg, i.p.). The results show that the histaminergic system of the TMN is involved in the long-term effects induced by PA, affecting learning and memory.

We continued a series of studies to determine the mechanisms related to visual perception and active sensing. **PM** gave a report on the *Cooperation Conference Millennium Science Initiative – Max-Planck Society*, in coordination with the *Congress of the Future*. We initiated three PhD dissertations in this area (M Concha, J Rios, and E Lorca). In a collaborative project led by **A Paula-Lima,** with the participation of **CH**, **PM** and **JL Valdés** we examined different pathological aspects of Alzheimer's disease from cells to cognition. We presented an abstract at the *Advances & Breakthroughs in Calcium Signaling Meeting/Hawaii* showing that anomalous calcium/redox signaling in rats exposed to Amyloid β peptide oligomers (AβOs) show functional and behavioral correlates with early Alzheimer's patients. We also performed EEG and eye movement recording in patients while navigating a virtual maze and found that movement patterns and EEG signals in patients with cognitive impairments are good early markers for Alzheimer's disease. In this effort to link global neuronal activity and neurological problems, **R Fuentes** has advanced a noninvasive approach to relieve Parkinson's disease symptoms by electrically stimulating the spinal cord. Several posters on this theme were presented this year. We also completed the analysis of several studies performing pupillary responses to visual images. **PM** in collaboration with young investigator G Varas submitted a study showing that patients with radimedullar lesions have different pupillary responses during an emotional recognition task, suggesting relevant changes in autonomic function. Former MSc student A Vázquez also submitted a study showing that mindfulness meditation practices modulate the response of the autonomic nervous system, reflected in the pupillary response to negative images and faster physiological recovery to baseline levels, suggesting that pupillometry could be used to assess the health benefits of these practices.

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 promoted the use of eye movements and EEG signals in the early detection in 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. The development comprises the definition of stimulation parameters and the characterization of supraspinal electrophysiological, cellular/molecular and motor function effects in preclinical models (**R Fuentes/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 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 (**R Vidal**). This center is associated with the international EnRoll program that is 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. During 2016, the mathematics and biomedical informatics group (BioMat) and associated members of SCIAN-Lab (**SH/M Cerda**) advanced in the following: **M Cerda** performed a one month internship at Ecole Normale Superior de Cachan (France) to prepare a quantification algorithms (skeletons) paper in the context of ReRISiP project. Skeletons methods have been proposed and implemented by Computer MSc student A Lavado (**M Cerda**). J Mansilla (**M Cerda**) and former BioMat member L Briones (**SH**) finished their MScs (Medical Informatics) in data center management (FONDEQUIP *SASIBA: Sistema de Almacenamiento y Servicios Informáticos Biomédicos Avanzados*) and the *Center for Digital Pathology* (FONDEF, **SH**). We integrated advanced students from the Department of Computer Science, Medical Informatics and collaborators from the Departments of Electrical Engineering and Physics increasing our research and collaboration capacity.

BioMat and associative members continued to promote: (i) new imaging techniques: advanced equipment has been consolidated by improvements in acquisition speed and processing software (4-lens lightsheet, L Ale) and tracking and segmentation techniques (J Jara), better control of laser ablation (Cell Observer, J Toledo), and experimental protocols (STORM/PALM, J Toledo/**AC**). We finished setting up the *SASIBA Data Center* with storage capacity of 300 Terabytes (FONDEQUIP, **SH**/ **M Cerda**), installed at the university data center, taking advantage of the new 10 GBps connectivity to REUNA, NLHPC, and FCFM via the project BioMed-HPC (director **SH**). 3 members of BNI have started using the new data center services (**SH**/**MC**/**M Cerda**), which are

part of the REDECA platform; (ii) high-, mid-, and low-level mathematical-computational methods for microscopic image analysis in combination with high performance computing (HPC): we contributed to publications fostering the use of statistical supervised method for quantification of HER2 protein overexpression using *Support Vector Machines* (*Pezoa et al., 2016*) and classification by *Artificial Neural Networks* (*Rojas et al., 2016*). Applications of mathematical/computational algorithms were published in a series of collaborations in the fields of microbiology (*Scavone et al., 2016*), development biology (*Richarson et al., 2016; Ahumada et al., 2016*), and neuron plasticity (*Ampuero et al., 2016*). **M Cerda** contributed to medical ultrasound imaging (*Cruz-Montecinos et al., 2016*) and medical informatics (*Torres et al., 2016*). Novel image processing algorithms to quantify cell dynamics or medical imaging were proposed in the new FONDECYT iniciación project 2016-2019 *Breaking the brightness constancy constraint in optical flow methods for in vivo biomedical imaging* (**M Cerda**); (iii) R&D of internet assisted services for diagnosis and clinical research: after the first phase of clinical validation with Clínica las Condes the spin-off for *Internet Assisted Medical Services CEDAI SpA* (**SH**) entered the second phase (Subsidio Semilla de Asignacion Flexible Fase 2: CORFO Innova, 2016, Expansion of the service with a scalability plan on a national and international level). The *Center for Digital Pathology* (CPDAI, **SH**) was further integrated into remote services for image-based analytics for clinical practices and education of remote histopathology with two Chilean universities (U Talca and U Magallanes). Finally, the new *National Center for Health Information Systems* (CENS), funded by CORFO 2016-2021 (Director SH) fosters R&D explicitly.

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, using the mouse model we identified novel mutations in the endoplasmic reticulum chaperones PDIA1 and ERp57 that may drive ALS. This work was performed in collaboration with our advisory board member R Brown at U Mass. We were able to describe the biological impact of these mutations in cell culture and animal models. We also discovered that expression of ALS-linked mutations in zebrafish trigger motor dysfunction and alteration of neuromuscular junctions. Similarly, expression of mutant PDIs impaired dendritic outgrowth in motoneuron cell culture models using human iPS. Finally, targeting ERp57 in the nervous system led to a loss of neuromuscular synapses and severe motor dysfunction in mice. This study identified endoplasmic reticulum proteostasis imbalance as a risk factor for ALS, driving the initial stages of the disease. The project involved multiple BNI investigators, was published in *EMBO J* and was highlighted in an editorial comment (**CHz/MC/S Matus/R Vidal**; *Woehlbier et al., 2016*). We are currently developing transgenic mice for these ALS-related mutations. In addition, we are testing new drugs to target ALS that alter protein synthesis (**CHz/S Matus**) and UPR inhibitors (**CHz**) in collaboration with Optikira and GSK (USA).

We have also tested novel therapeutic approaches in models of peripheral nerve degeneration (**CHz**). These studies included collaboration with Genzyme Corporation (USA) to generate gene therapy tools to treat disease. Although growing evidence indicates that endoplasmic reticulum stress is a hallmark of the disease, its exact contribution is not well understood. We reported that the UPR factor XBP1 enhances axonal regeneration in the peripheral nerve in *Scientific Reports* (*Oñate et al., 2016*). This work derived from a MSc thesis and was awarded Best Thesis by Foundation for Chilean Cell Biology. We have developed a novel strategy to improve learning and memory by delivering active XBP1 into the hippocampus using AAVs (**CHz/R Vidal/JL Valdés**; *Martínez et al., 2016*) and a patent has been filed (**CHz**). This therapy is currently being tested in models of Alzheimer's disease. Additionally, we showed that asthaxantin protects against β-amyloid *in vitro* (**CH/A Paula-Lima**, *Lobos et al., 2016*). 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 Huntignton'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 ALS gene therapy program is underway supported by the US Army and ALS Therapy Alliance.

Finally, we are developing and establishing new models of neurodegeneration, including transgenic mice of Alzheimer's disease, new models of ALS, in addition to genetically modified animals for several stress genes. We have identified additional gene mutations that may contribute to ALS in collaboration with R Brown (U MASS), 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, Science Signaling,* and *Current Biology* (**CHz**). In addition, a special edition of *ER Stress and Neurodegeneration* was published in *Brain Research* where **CHz** was Guest Editor.

b) Publications

During this funding period BNI published 42 articles, 38 of them ISI and 13 coauthored by students. 9 ISI publications had more than one Associate, Senior or Adjunct Investigator. Their relevance and impact have been described in the preceding section *3a Current status of research lines*. ***See Summary Table below***.

Summary Table

Category of Publication	MSI Center Members	Number of Publications coauthored by students	Total Number of Publications
ISI Publications or Similar to ISI Standard	Associate Researchers	13	34
	Other Researchers	0	4
SCIELO Publications or Similar to SCIELO Standard	Associate Researchers	0	1
	Other Researchers	0	1
Scientific Books and chapters	Associate Researchers	0	0
	Other Researchers	0	2
Other Scientific Publications	Associate Researchers	1	0
	Other Researchers	0	0
Total of Publications		**13**	**42**

Other achievements

S Reyes, who is head of Technology Transfer and Innovation leads our *Applied Neuromedicine and Technology Platform*. 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 two patents were filed during 2016:

1. A method for identifying therapeutic candidates for the treatment of Alzheimer's disease through IRE1.
2. AAV/IGF2 virus, method of genetic treatment and its use in diseases related to unfolded proteins such as Huntington's disease.

Intellectual property

During 2016 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. New brands that were filed for protection during 2016 included:

1. BNI: our institute corporate name and logo in a new trademark category.
2. Proteostaser-1: trademark name and logo for a new treatment.

Congress presentations

During this funding period BNI Investigators and their teams attended and presented their work in 116 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 [59]	International Events [57]
A. Associate Researchers		
Conferences, oral communications, poster communications, others (specify)	20	10
Invited presentations (not included in above row)	21	13
B. Other researchers (Adjunct Researchers, Senior Researchers, Young Researchers, Postdoctoral Researchers and Students)		
Conferences, oral communications, poster communications, others (specify)	12	19
Invited presentations (not included in above row)	6	15

Organization of scientific events

During 2016 we continued our weekly BNI Investigator Meetings. These have included not only Associate and Senior Investigators, but also Adjunct Investigators 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 2016 topics and speakers included: PALM, Photoactivated Localization Microscopy (C Ebeling, Bruker Corporation); Evolution and development of a bilateral connectivity map in the mammalian neocortex (R Suárez, U Queensland, Australia); Participación de la ruta endocítica en señales locales y a larga distancia en neuronas (F Bronfman, Pontificia U Católica de Chile); Determinantes moleculares de la sensibilidad térmica y química del canal de iones TRPM8 (M Pertussa, U Santiago de Chile); Rol del sistema endocanabinoide en la retina de vertebrados (A Chavez, U Valparaiso, Chile); Evolution of structural and functional properties in TRP channels (S Brauchi, U Austral de Chile); Spinal dis-inhibition in chronic pain (G Yévenes, U Concepción); Bases celulares y moleculares de la transducción del frío (R Madrid, U Santiago de Chile); Rol del tráfico vesicular y las uniones adherentes en el desarrollo del SNC (F Batiz, U Austral de Chile); Interacciones epitelio-estroma en cáncer y cultivos 3D (M Pinto, Pontificia U Católica de Chile); Diet, behavior and neurodegeneration (A Calixto, U Mayor, Chile); Los canales TRP de la transducción de la luz en fotoreceptores de Drosophilia: cómo son, cómo son activados, cómo participan (J Bacigalupo, U Chile); Señalización Wnt en la unión neuromuscular (JP Henríquez, U Concepción, Chile). To foster cooperation between BNI laboratories an internal seminar series was also held every month. Each seminar included presentations of three students or postdocs from different laboratories that described their main discoveries. They received enthusiastic feedback from investigators and students from other labs of the institute.

Photograph (above): ***AC,*** *G Delgado (organizer of the 2016 Conversations in Neuromedicine series), speaker A Calixto,* ***MC****,* ***CHz****,* ***JS*** *and* ***P Olguín****.*

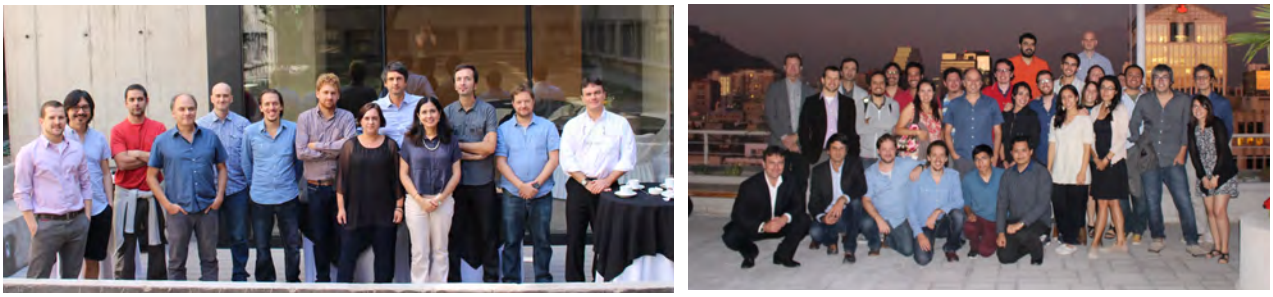
In addition to our regular seminars, we organized the workshop and symposium *Small Brains Big Ideas* (November, 2016, Valparaíso, Chile) that covered recent advances and modern techniques in neurosciences, primarily focusing on the use of *Drosophila melanogaster*, *Caenorhabditis elegans*, Monarch butterflies and bees for biomedical research. Participants included T Kurzchalia (Max Planck Institute, Germany), M Mlodzik (Mount Sinai, USA), C Benard (U Massachusetts, USA), B Smith (Arizona State U, USA), G Wright (Newcastle U, UK), M Alkema (U Massachusetts, USA), P Emery, C Rezaval (U Oxford, UK), U Heberlein (HHMI, Janelia, USA), S Waddell (U Oxford, UK) and **JS** (U Chile/BNI), who also organized the workshop. Graduate students, postdocs and young investigators actively participated in this activity (47 attendees).

Photograph (above): ***JS*** *with national and international researchers participating in Small Brain Big Ideas.*

Additionally, we organized the international workshop and course *Optics, Forces and Development* (March 14-21, 2016, Santiago, Chile). This course trained a group of students, postdocs and young investigators from Latin America in theoretical and practical aspects of *in vivo* microscopy and strategies of visualization and manipulation of cell and tissue morphodynamics in developing organisms. Participants included: S Fraser (U Southern California USA), U Kubitscheck (U Bonn, Germany), S Nonaka (NIBB, Okazaki Japan), J Amigo (Pontificia U Católica de Chile), R Assar (U Chile), **M Cerda** (U de Chile/BNI), R Soto (U Chile), V Castañeda (U Chile/BNI), CG Lemus (U Chile/BNI), K Palma (U Chile/BNI), E Pulgar (U Chile/BNI), G

Reig (U Chile/BNI), J Toledo (U Chile/BNI) and the organizers: **MC** (U Chile/BNI), **SH** (U Chile/BNI).

In order to enhance collaborations between Latin American Institutions and researchers, the IV version of NeuroSur Meeting took place (March 21-22, 2016, Santiago, Chile). NeuroSur represents a collaborative network strategy between BNI and centers of excellence in Neuroscience in Latin America (Brazil, Argentina, Uruguay and Chile). 2016 participants included E Kropff (Leloir Institute, Argentina), D Refojo (IbioBA, Argentina), T Ossandón (Pontificia U Católica de Chile), **JL Valdés** (U Chile/BNI), C González (U Chile), S Ferreira (Federal U of Rio de Janeiro, Brasil), F Lecumberry (Pasteur Institute, Uruguay), F Bronfman (Pontificia U Católica de Chile), M Dietrich (Yale U, USA), S Fraser (U Southern California, USA) and P Oteiza (Harvard University, USA).



Photographs: NeuroSur: BNI members and neuroscientists from Brazil, Uruguay, Argentina and USA in at the Connector Cube (left) and during the reception at the Ministry of Foreign Affairs (right).

In order to reinforce the identity of the Institute and to promote the interaction between teams from different laboratories we organized a BNI retreat (April 8-9, 2016, Olmué, Chile). Activities included an introduction by BNI Director **AC**, a *Science and Experience* talk by **R Fuentes**, short talks by students/postdocs, a *Science-Speed-Dating* activity, thematic round tables on a range of topics (women in science, science and politics, innovation, education, careers, etc) and social activities. 87 people participated in this 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

BNI investigators continue to participate in editorial boards of general and specialized international journals covering Neuroscience and biomedical research. 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 2016 BNI investigators received exciting individual awards and recognitions. **CHz** was awarded the *University Scientific Research Award*, granted by the Santander Bank and El Mercurio national newspaper, for his scientific contribution in the development of preclinical therapeutic strategies for the treatment of neurodegenerative diseases. M Oñate and H Urra both young researchers at BNI won the annual Dr Federico Leighton Prize, awarded by the Foundation for Chilean Cell Biology, for Best MSc and Best Doctoral Thesis respectively.

Photograph (above): ***CHz*** *receiving the University Scientific Research Award from the Director of El Mercurio Cristián Zegers.*

AC won the *Best Old Georgian 2016: Sciences* during the 80th anniversary of Saint George's College in Santiago. Additionally, **SH** was recognized for his contribution to innovation during the commemoration of the 174 years of U Chile. **SH** was awarded this recognition for his contribution to the licensing of digital spermiograms at a distance. He also received the recognition *Virtual Microscopy in School Education* for his contribution to the education of children at an early age and his contribution to virtual microscopy, during the XVIII Chilean Congress of Medical Technology and the FHIR Developer Days 2016 - Student Track from Furore (www.fhirdevdays.com), which is the first international student award at FHIR DEV Days 2016 Student Track in the Netherlands.

4. Education and capacity building

a) Education and capacity building

BNI operates in the context of U Chile, the main public educational institution in Chile, 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 MSc programs. In addition, BNI has strong research and teaching ties with other Faculties such as the Faculties of Sciences, Physics and Mathematics, Chemistry and Pharmaceutics. BNI provides advanced training, supporting institutional efforts in close interaction with central administration and the Faculty's authorities. BNI investigators play a leading role in PhD and MSc programs, chairing some academic committees at the F Med. BNI investigators also organize Advanced Graduate Courses in Neuroscience and related disciplines, including Cognitive Neuroscience, Development, Microscopy, Cell Physiology, Molecular Mechanisms of Neurodegenerative Disease, Molecular & Clinical Pharmacology, Topics in Biomedicine and Neuropsychopharmacology. Importantly, during 2016, BNI investigators served as members of the executive committee for the PhD Program in Biomedical Sciences (**AC/MC/CHz/PM**), the MSc in Neuroscience (**JS,** Director) and MSc Medical Informatics Program (**SH,** Director). BNI scientists also participate in graduate programs in other Faculties at U Chile (Physics & Mathematics, Chemistry & Pharmaceutical Sciences, Sciences, Dentistry and Veterinary) and programs in other universities in the metropolitan and regional areas. BNI scientists also participate in multiple evaluation committees, warranting the excellence required by the graduate programs.

Our Institute provides a framework for undergraduate and graduate students, carrying out their investigation units or theses in one or several BNI labs. One unique contribution is on medical specialties, contributing to the training of psychiatrists, neurologists, neuro-pediatricians, pharmacologists and other clinical specialties. Initiatives also involve collaborations with international universities, such as Columbia, Harvard, USA and McGill Canada, University of Osaka, Japan as well leading universities and institutes in the European Union: Gottingen, Heidelberg, Magdeburg, Mannheim Institute of Mental Health, Jülich Forschungszentrum, Germany; Cagliari University, Italy; Jaume I University, Castellón, Spain. International collaborations provided a framework for research exchanges of students and associated scientists.

Young scientists, especially from other institutions in Chile or abroad, holding a PhD degree are invited to apply to BNI *Bridge Postdoctoral Fellowships* twice a year (fall and spring). Eligibility includes commitment to apply for a Fondecyt postdoctoral fellowship during the corresponding academic period. Applications are managed and reviewed by BNI scientists according to guidelines that invite to work on fundamental unresolved questions in a range of topics from subcellular, cellular, and developmental Neuroscience, through plasticity and cognition and the molecular and functional basis of psychiatric and neurological diseases. We encourage the use of complementary model organisms (Drosophila, zebrafish, rodents, and humans), multiscale analysis of biological phenomena, *in vivo* approaches, or state-of-the-art technological capabilities, especially in the areas of advanced light microscopy and signal processing. Applicants are expected to contribute to a differentiating scientific culture that cultivates and blends these strategies through intense, highly collaborative, multidisciplinary and cohesive work, with the broad aim of having a significant impact on research, technology and education. This year we granted three *Bridge Postdoctoral Fellowships* with two investigators securing subsequent Fondecyt Postdoctoral funding.

We also offer *Seed Grants*, a one-year funding program to promote young investigator leadership, and proof of concept initiatives. We encourage new, highly collaborative and risky scientific ideas, which may turn into full-fledge projects eligible for national or international funding. We also encourage the interaction of students with more than one laboratory and mentor, as a means to enrich the opportunities for cross-fertilizing fields.

During 2016 more than 10 theses were co-directed by BNI members. Students also share the facilities and educational opportunities, including BNI daily activities. Indeed, BNI facilities and equipment are available for faculty members and students of the larger Institute of Biomedical Sciences (ICBM) and associated clinical campuses. Combined, these strategies are increasingly stimulating co-authored publications, co-directed grants and co-guided theses. Adjunct Investigators, postdocs, graduate, and undergraduate students take the initiative and organize regular seminars and symposia, inviting national and international scientists (G Delgado, D Rojas, **R Vidal**).

Importantly, during 2016 8 BNI investigators participated in the creation of the new Department of Neuroscience at the F Med. This new Department will provide significant support to students and the research activities at BNI.

b) Achievements and results

136 students (undergraduate through postdoctoral) are currently associated with research activities at BNI. We are training 12 undergraduate students, 45 MSc students, 52 PhD students and 28 postdoctoral fellows. They include 14 international students from countries in South America and Europe. During 2016, 11 students completed their dissertation work. Some trainees left BNI, continuing their career paths in other national institutions or abroad, while others stayed to pursue a higher degree or a postdoctoral position. 13 out of 42 BNI papers were published with students as authors (*see Publications Summary Table*). BNI students continued their strong presence in national and international meetings, with 116 posters or oral presentations during 2016 (*see Congress Presentations Summary Table*).

Full or partial BNI financial support to students has allowed completion of projects, smoothing transitions, and providing funds for students without graduate fellowships. BNI was instrumental in creating and running the first International MSc in Medical Informatics at the F Med, U Chile (**SH**). This program is implemented in collaboration with Heidelberg U (Germany) and includes the support of four visiting professors per semester, student exchanges, and a double degree in 2015/2016. As part of our aim to internationalize BNI, we promoted international experiences for our students. 13 BNI students carried short-term research and training periods abroad, which included research activities in USA, Italy, Germany, France, Switzerland and Japan. Additionally, we received 5 international students from Spain, France, Germany and Japan who performed research at BNI. We also carried out 19 national seminars and courses to train students and two international workshops, with attendance of international students (*NeuroSur* and *Small Brains Big Ideas*).

As part of their comprehensive scientific training, more than 10 BNI students participated in outreach activities organized by BNI, such as visits to schools, in-lab training at BNI facilities, high-school student guidance together with our established *Loligo* and *Dendros* initiatives.

c) Destination of students

BNI undergraduate and MS 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, conducting research as postdoctoral fellows or faculty members in Chile or abroad. 11 students graduated during 2016, and 4 postdocs continued their scientific careers

elsewhere, including academic positions in Chile and USA. 7 graduates remained in science and academia. Some national institutions that have incorporated former BNI young investigators include U Chile, Pontificia U Católica de Chile, and U Valparaíso.

Photograph: The 2016 BNI retreat in Olmué. Most BNI scientists are young researchers in training.

5. Networking and other collaborative work

a) Networking

Scientific interactions and collaborative networking continues to evolve as the strong backbone of BNI. We have continued to pursue and strengthen three strategic lines:

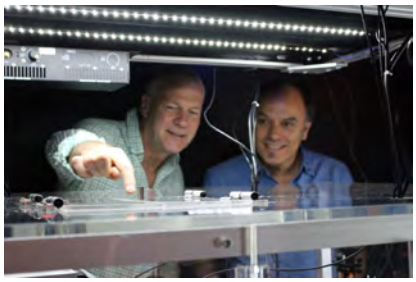
(i) Enhance the dynamics and quality of collaborative projects within BNI. We continue to support our series of collaborative initiatives such as *Seed Grants* (4-6 per year), *Bridge Fellowships* (6-8 per year), and co-mentorship of students (6-10 per year). In addition, BNI continuous to support co-application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

(ii) Foster scientific interactions in a multidisciplinary environment. From the beginning, BNI fosters a multidisciplinary environment by 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 (1-2 per year). Beginning in 2016 our new and improved infrastructure connects BNI laboratories (*Connector Cube*). The *Connector Cube* provides discussion space (science + coffee) where regular and informal meetings take place in a friendly and lively atmosphere. Currently, the *Cube* provides a seminar room for 60 people, a Board meeting room with video conference capacity for 12-14 participants, ideal for BNI weekly meetings, lab meetings, strategic meetings, etc, and an open coffee space. In addition to the novel infrastructure for regular scientific meetings, the network for advanced scientific equipment (REDECA, http://redeca.med.uchile.cl) has been set up by BNI researchers and started to operate, offering equipment units (microcopy, flow cytometry, centrifuge, and data center) to BNI researchers and users outside the Institute through the online booking system.

(iii) Promote national and international scientific networks. Individual and collaborative efforts to expand and enrich the multidisciplinary collaborative network of BNI continue successfully:

Formal international networks: We have continued to strongly support our two formal networks, the ***NeuroSur*** initiative that includes research institutions from Argentina, Brazil, Chile and Uruguay and the ***Network for Advanced Microscopy and Quantitative Developmental Biology***, which includes leading experts from Latin America, Europe, USA, and Japan, and promotes the use of state-of-the-art technology for Latin American science. During 2016 we carried out a series of initiatives focusing on *in vivo* approaches in Neuroscience. These included the combination of efforts from *NeuroSur* and *Network for Advanced Microscopy and Quantitative Developmental Biology* (see *Organization of scientific events* for list of participants). The main integrated 2016 activity consisted of four chapters: a scientific symposium, a practical course, a technological symposium and a business meeting. **MC/AC** organized the scientific symposium *The Living Brain* with 7 speakers from Argentina, Brazil, Chile and the US; **MC/SH** coordinated the international advanced training and practical course within the framework of *Optics, Forces and Development*. 16 students attended this BNI course. For the first time, the experience was shared in Uruguay, where scientists and students attended the international workshop *Processing and Analysis of Fluorescence Microscopy Images* (30 students), organized by the *NeuroSur* partner Pasteur Institut of Montevideo (Uruguay). **MC/SH** organized the technological symposium *Crossing New Frontiers with Light Sheet Fluorescent Microscopy*. Finally, **AC** organized the *4th NeuroSur Business Meeting* that included the participation of all Latin American speakers in addition to researchers from FONDAP-GERO (C González), CINV (A Chávez), U Federal Rio de Janeiro (S Ferreira), Pasteur Institute (F. Lecumberry), Milenio-MINREB (F Bronfman) and the Director for Energy, Science & Technology and Innovation, Ministry of Foreign Affairs, Chile (Ambassador G

Rodríguez). The success of this integrated strategy is direct evidence of the consolidated regional network that strengthens the scientific community inside and outside Chile.



Photographs: Network for Advanced Microscopy and Quantitative Developmental Biology. U Kubitscheck and ***MC*** *at the light sheet microscope (left); participants of the advanced training and practical course (middle);* ***SH*** *(right).*

With additional support from IBRO, EMBO organization, and the Center for Integrated Neuroscience of Valparaiso **JS** organized the fourth version of the international course ***Small Brains Big Ideas***, with participating scientists form Latin America and USA. *Small Brains Big Ideas* is a graduate course and symposium that focuses on invertebrate models and targets Latin American students. Small Brains attracted an important number of international scientists (see *Organization of scientific events* for list of participants) who visited Chile to teach a 10-day course and to participate in a one-day symposium.

National networks: BNI researchers set up new impulses and scientific connections with science, clinical and governmental institutions such as CINV, ISCI, CMM, FONDAP-GERO, NLHPC, REUNA, MINSAL, CIMT, INC, HCUCH, Clínica Alemana, CLC and Neurounion. Interactions with clinicians continue through our Basic-Clinical network assembled around our *Encounters*, although no formal meetings were held during 2016. New impact on infrastructure and science on the basis of clinical data and health interoperability was fostered through the successful generation of the *Center of Medical Informatics and Telemedicine* (F Med, U Chile) and the *National Center for Health Information Systems* (CENS, www.cens.cl), founded in 2016 by BNI investigator **SH** as a nation-wide research network between five private and public Universities (U Chile, PUC, U Valpo, U Talca, and U de C) and associate private and public institutions (among others MINSAL, FONASA, ISP, Rayen, Intersystems, Christus Health), and funded by CORFO 2016-2021. *CENS* supports the public and the private sector in Chile on interoperability standards, as an observatory on *e*-health, software certification, consulting, and formation of advanced human capital, and will further improve infrastructure and common spaces within the perimeter of the BNI *Connector Cube* at U Chile. In 2016, two summer schools and six hands-on workshops on interoperability and standards for connected health with more than 120 participants from all over Chile took place supported by MINSAL (Santiago/Talca/Concepción). Besides the deeper integration of *e*-health related data science by the BioMat-platform, BNI also continued to foster new data science techniques at the interphase of biomedicine and astronomy, together with international partners.

In summary, BNI deepened networking and collaborations with national and international partners on the level of science, scientific platforms and technology, and formation of a new generation of multidisciplinary professionals within the field.

b) Other collaborative activities

In addition to our formal networks, during 2016 the BNI BioMat-platform supported the application to a five year NSF-grant which provides co-funding for five international summer schools (35 participants), contributing to a new series of the *La Serena School for Data Science*

2017-2021: Applied Tools for Astroinformatics, Biomedical Informatics, and Other Sciences, opening new alliances for the use of statistical tools and image processing software for clinical data, epidemiology/genetics, and hospital information systems that create new opportunities and visibility within and beyond the region. This project consolidates our regional efforts to foster the generation of platforms for *Reproducible Scientific Software in Image and Signal Processing* ReRISiP (publications in IPOL-Journals) that have been co-funded by a STIC-AMSUD project 2015-2016 between the Universidade de Alagoas (Brazil), U Chile (Chile), U de la República/Católica (Uruguay), UBA (Argentina), and the CMLA, UMR 8536, École Normale Supérieure de Cachan (France). In addition, we 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), focusing on summer schools, workshops, scientific symposia, and the first international MSc in Medical Informatics in Latin America that hosted approximately 30 MSc students in 2016. Also in 2016, U Chile opened the door for double degrees for the first generation of MSc students with skills in informatics, applied mathematics, statistics, bioinformatics, and information systems, which fosters skills of the BNI-BioMat platform towards data science and information management in the *e*-health sector, a critical landmarks in this period.

6. Outreach and connections with other sectors

a) Outreach

The central aim of our program is to promote a scientific culture in Chile. We have accumulated sufficient expertise in these areas and we now cover two complementary but distinct topics: education and outreach. During April 2016 we launched our web platform for scientific culture *Loligo* (www.loligo.cl) where all our digital resources are availaible (web-comic *Dendros*, neuro-games, animations, etc).

Regarding our education efforts, *Loligo* includes educational content implemented in collaboration with our long-term partners *Biointeractive-Howard Hughes Medical Institute* (HHMI). All resources have been translated to Spanish and are freely available in our platform (www.loligo.cl/educacion). During 2016 we launched our on-site *Science Education Program for School Teachers* in collaboration with *Biointeractive-HHMI*. Two international *Biointeractive-HHMI* staff, J Robalino and J Bricken, participated in the activity. During 2016 we also carried out 5 workshops to train school teachers in the use of digital material, mainly short films, along with inquiry-based activities to teach biology. We worked with a group of 60 teachers addressing different subjects in each workshop (evolution, ecology, genetics, cell biology, etc), to widen the topics and fulfill the teacher's requirements for the school year's curriculum. A number of teachers have started using our material in the classroom, and the numbers are growing as we continue the workshop, giving us the possibility of reaching more than 5,000 students. During 2017 we will expand our *Science Education Program* to other cities in the country. Another initiative that continued to bring us closer to school teachers and students was our *Open Labs* initiative. Here, students participated in hands-on activities inside BNI labs guided by young BNI scientists (C San Martín, C Astudillo, P Cabrera, G Delgado). During 2016 we opened our labs for 8 schools. We will expand and further organize this initiative in 2017. **AC** continued to direct BNI's *Virtual Lab*. During 2016 three students from Liceo Javiera Carrera and three students from Instituto Nacional, two public high-schools of excellence, carried out a science project in the area of visual attention and distractors, using a combination of eye-tracking technology and face-to-face surveys. This project was led by young BNI scientist R Montefusco.

Photographs: Our new Loligo website (left) and a Science Education Workshop for School Teachers with R Tapia, and teachers at the Connector Cube (right).

Regarding our outreach program, the *Brain Dome* continues to promote motivation and interest in Neuroscience in the general public. This exhibit is equipped with games and apps, and in 2016 it received a donation of 2 microscopes from the private company Arquimed. With our accumulated material we now create a unique experience that combines enjoyment and education inside the

dome, including observation of brain preparations. During 2016, the *Brain Dome* visited 5 schools from the PACE program (*Programa de Acompañamiento y Acceso Efectivo a la Educación Superior*), reaching more than 2,500 students from vulnerable environments. The *Brain Dome* was exhibited for 2 weeks during winter holidays in the *Planetario de Santiago* where more than 20,000 people, mainly families, attended. We also participated in two big Science Festivals, *La Fiesta de la Ciencia de Explora* at the *Museo Interactivo Mirador* and *Congreso Futuro para Jóvenes,* which took place in the Ex-Congress in Santiago. We received more than than 20,000 visitors during these activities. Once again, the *Brain Dome* travelled outside Santiago, this time to Casablanca, where the Municipality funded a 10-day exhibit at the *Municipal Cultural Center*. All schools of Casablanca and many families visited our exhibit. In total the *Brain Dome*, our most important outreach activity, reached more than 40,000 people during 2016.

Other outreach activities, such as talks for the general public and talks for high-school students, were carried out by BNI scientists. In addition, R Tapia was scientific consultant for the new Brain Exhibit at the *Museo Interactivo Mirador*. This activity involved BNI scientists **AC/PM**.

Photographs: Students during Lab Visits (left) and Brain Dome exhibits (center and right).

b) Connections with other sectors

According to our proposal for the next 5-year period, 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 our initial efforts include signing 3 research contracts in the field of biotechnology (Cellus), medical devices (ACHS) and brain-machine interfaces (Solunova), for a total amount of $260 million CLP (approximately USD 400,000).

In the donations and philanthropy area, a proof-of-concept fundraising campaign was conducted to equip our new corporate building to raise $1.5 million CLP (approximately 2,300 USD) through a Chilean incentive program of cultural donations.

Both areas, *Applied Neuromedicine & Technology* and philanthropy, were the focus of the RAD Urban Expedition - BNI with more than 90 participants from influential private and public sectors.

*Photograph: C Bobadilla, Vicepresident of Fundación RAD, and **AC** during the RAD Urban Expedition at BNI.*

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. The Board was revised during 2016 and its members are: **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). Management areas are covered by professional staff with specialized responsibilities. Two strong sections continue to differentiate BNI's impact: 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 translational efforts. 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, press activities, 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 J Mansilla. 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 *Connector Cube*. 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	20	15	35
Administrative Staff	9	6	15
TOTAL	**29**	**21**	**50**

b) Financial status Millenium funds 2016

Item	Operative	Networks	Outreach	Total 2016
Honoraria researchers & personnel	412.104.691	0	0	412.104.691
Tickets and travel expenses	35.805.886	8.402.281	1.400.749	45.608.916
Materials and supplies	84.044.541	0	0	84.044.541
Goods and equipment	25.684.921	0	0	25.684.921
Infraestructure	52.037.463	0	0	52.037.463
Administrative expenses	54.794.853	0	0	54.794.853
Publications and subscriptions	6.363.279	0	2.255.995	8.619.274
Consultancies	5.900.000	0	10.289.333	16.189.333
Overhead	44.477.152	0	0	44.477.152
Others	13.895.549	370.188	16.352.202	30.617.939
Total	**735.108.335**	**8.772.469**	**30.298.279**	**774.179.083**

Annexes

Annexx 1: Institute Researchers

1.1.Associate Researchers

Full Name	Research Line	Nationality	Gender	Date of birth	Profession	Academic Degree	Affiliation	Current Position	Relation with Center
Andrés Oscar Couve Correa	RL1. Sub-cellular functional dynamics. RL2. Cellular identity and morphology. RL3. Supra-cellular development and circuits. RL4. Plasticity and behavior. RL7. Applied mathematics and biomedical informatics. RL8. Clinical research.	Chilean	M	23-10-1968	Biologist	D	University of Chile	Director Biomedical Neuroscience Institute (BNI)	Full Time
María Cecilia Hidalgo Tapia	RL4. Plasticity and behavior. RL6. Neural dysfunction and pharmacological targets.	Chilean	F	10-6-1941	Biochemist	D	University of Chile	Associated Investigator	Part Time
Jimena Sierralta Jara	RL2. Cellular identity and morphology. RL3. Supra-cellular development and circuits. RL7. Applied mathematics and biomedical informatics.	Chilean	F	12-9-1962	Biologist	D	University of Chile	Associated Investigator	Part Time
Hernán Silva Ibarra	RL5. Systems Neuroscience. RL7. Applied mathematics and biomedical informatics. RL8. Clinical research .	Chilean	M	01-07-1949	Psychiatrist	Medical Doctor	Psychiatry and Mental Health, Faculty of Medicine, University of Chile	Associated Investigator	Part Time
Steffen Härtel Gründler	RL1. Sub-cellular functional dynamics. RL3. Supra-cellular development and circuits. RL5. Systems Neuroscience. RL6. Neural dysfunction and pharmacological targets. RL7. Applied mathematics and biomedical informatics.	German	M	24-11-1968	Physicist	D	University of Chile	Associated Investigator	Part Time
Pedro Esteban Maldonado	RL5. Systems Neuroscience. RL7. Applied mathematics and biomedical informatics.	Chilean	M	30-04-1960	Biologist	D	University of Chile	Full Professor	Part Time

Full Name	Research Line	Nationality	Gender	Date of birth	Profession	Academic Degree	Affiliation	Current Position	Relation with Center
Claudio Andrés Hetz Flores	Sub-cellular functional dynamics. Plasticity and behavior. Neural dysfunction and pharmacological targets. Clinical research.	Chilean	M	24-03-1976	Biotechnologist	D	University of Chile	Full Professor	Part Time
Miguel Concha Nordemann	Sub-cellular functional dynamics. Cellular identity and morphology. Supra-cellular development and circuits. Applied mathematics and biomedical informatics. Clinical research.	Chilean	M	06-03-1966	Physician	D	University of Chile	Full Professor	Part Time
Mario Herrera Marschitz	Sub-cellular functional dynamics. Supra-cellular development and circuits. Neural dysfunction and pharmacological targets. Clinical research.	Chilean	M	25-06-1944	Physician	D	University of Chile	Full Professor	Part Time
Lisette Leyton Campos	Sub-cellular functional dynamics. Supra-cellular development and circuits. Neural dysfunction and pharmacological targets.	Chilean	F	22-07-1959	Biochemist	D	University of Chile	Associate Professor	Part Time

2.2 Young Researchers

Full Name	Research Line	Nationality	Gender	Date of birth	Profession	Academic Degree	Affiliation	Current Position	Relation with Center
Tatiana Adasme Rocha	RL5. Systems Neuroscience. RL4. Plasticity and behavior.	Chilean	F	21-02-1977	Biochemist	D	University of Chile	Young Researcher	Part Time
Carlos Oliva Olave	RL3. Supra-cellular development and circuits. RL2. Cellular identity and morphology.	Chilean	M	17-01-1982	Biochemist	D	Biomedical Neuroscience Institute	Young Reseacher	Full Time
Daniel Rojas	RL7. Applied mathematics and biomedical informatics.	Chilean	M	01-09-1975	Biologist	D	University of Chile	Researcher	Part Time
José Ignacio Egaña Tomic	RL5. Systems Neuroscience. RL6. Clinical studies.	Chilean	M	9-10-1973	Physician	D	University of Chile	Assistant Professor	Part Time
Danilo Bilches Medinas	RL8. Neuropathology.	Brazilian	M	23-11-1981	Chemist	D	Biomedical Neuroscience Institute	Young Reseacher	Part Time
Víctor Antonio Castañeda Zeman	RL7. Applied mathematics and biomedical informatics. RL2. Cellular identity and morphology.	Chilean	M	29-08-1980	Engineer	D	Hospital Clínico /University of Chile	Young Reseacher	Part Time
Rodrigo Montefusco Siegmund	RL5. Systems Neuroscience. RL4. Plasticity and behavior.	Chilean	M	01-02-1980	Biochemist	D	University of Chile	Young Reseacher	Full Time
Claudia Durán Aniotz	RL4. Plasticity and behavior. RL8. Neuropathology.	Chilean	F	04-1-1982	Biologist	D	University of Chile	Young Reseacher	Full Time
German Flavio Reig Cardarella	RL3. Supra-cellular development and circuits: .	Argentinean	M	23-08-1976	Agronomist	D	University of Chile	Young Reseacher	Full Time
Felipe Salech	RL6. Clinical studies.	Chilean	M	22-05-1981	Physician	D		Young Reseacher	Part Time
María Gabriela Mercado Guerra	RL8. Neuropathology.	Chilean	F	29-03-1981	Molecular biotechnology engineering	D	University of Chile	Young Reseacher	Full Time

1.3 Senior Researchers

Full Name	Research Line	Nationality	Gender	Date of birth	Profession	Academic Degree	Affiliation	Current Position	Relation with Center
María Cecilia Hidalgo Tapia	RL4. Plasticity and behavior. RL3. Supra-cellular development and circuits	Chilean	F	10-6-1941	Biochemist	D	University of Chile	Full Professor	Part Time
Hernán Silva Ibarra	RL6. Clinical studies.	Chilean	M	1-7-1949	Psychiatrist	Medical Doctor	Psychiatry and Mental Health, Faculty of Medicine, University of Chile	Principal Researcher	Part Time

1.4 Others

Full Name	Research Line	Nationality	Gender	Date of birth	Profession	Academic Degree	Affiliation	Current Position	Relation with Center
José Luis Valdés	Plasticity and behavior. RL5. Systems Neuroscience.	Chilean	M	16-12-1975	Biologist	D	University of Chile	Assistant Professor	Part Time
Andrea Paula-Lima	RL4. Plasticity and behavior. RL6. Neural dysfunction and pharmacological targets.	Brazilian	F	20-11-1977	Pharmaceutical Chemist	D	University of Chile	Assistant Professor	Part Time
Patricio Alejandro Olguín Aguilera	RL3. Supra-cellular development and circuits. RL2. Cellular identity and morphology.	Chilean	M	23-10-1975	Biochemist	D	University of Chile	Assistant Professor	Part Time
Pablo Gaspar	RL5. Systems Neuroscience.	Chilean	M	20-08-1975	Physician	D	University of Chile	Assistant Professor	Part Time
René Vidal	RL1. Sub-cellular functional dynamics. RL6. Neural dysfunction and pharmacological targets.	Chilean	M	03-05-1979	Biochemist	D	Neurounion Biomedical Foundation	Researcher R&D area	Part Time
Soledad Matus	RL1. Sub-cellular functional dynamics. RL6. Neural dysfunction and pharmacological targets.	Chilean	F	23-06-1974	Biochemist	D	Neurounion Biomedical Foundation	Principal Investigator Neurounion Biomedical Foundation	Part Time
Carolina González	RL1. Sub-cellular functional dynamics .	Chilean	F	01-11-1982	Biotechnologist	D	University of Chile	Postdoc Couve Lab	Full Time
Rodrigo Clemente Vergara Ortúzar	RL5. Systems Neuroscience.	Chilean	M	23-11-1986	Biologist	D	University of Chile	Postdoc Neurosystem's Lab.	Full Time
María de los Ángeles Juricic	RL5. Systems Neuroscience.	Chilean	F	02-10-1983	Biochemist	D	University of Chile	Postdoc Neurosystem's Lab.	Full Time
Eduardo Pulgar	RL2. Cellular identity and morphology. RL7. Applied mathematics and biomedical informatics.	Chilean	M	23-10-1981	Biochemist	D	University of Chile	Postdoc Scian Lab.	Full Time
Víctor Antonio Castañeda Zeman	RL2. Cellular identity and morphology. RL7. Applied mathematics and biomedical informatics.	Chilean	M	29-08-1980	Engineer	D	University of Chile	Postdoc Scian Lab.	Full Time

Full Name	Research Line	Nationality	Gender	Date of birth	Profession	Academic Degree	Affiliation	Current Position	Relation with Center
Violeta Chang Camacho	RL7. Applied mathematics and biomedical informatics.	Peruvian	F	20-11-1977	Computer Scientist	D	University of Chile	Postdoc Scian Lab.	Part Time
Mauricio Cerda	RL7. Applied mathematics and biomedical informatics.	Chilean	M	23-11-1982	Computer Scientist	D	University of Chile	Postdoc Scian Lab.	Full Time
Mauricio Cerda Villablanca	RL7. Applied mathematics and biomedical informatics.	Chilean	M	23-11-1982	Computer Scientist	D	University of Chile	Assistant Professor	Part Time
Amado Carreras Sureda	RL8. Neuropathology.	Spanish	M	25-06-1986	Biologist	D	University of Chile	Postdoc Hetz Lab	Full Time
Rómulo Antonio Fuentes Flores	RL5. Systems Neuroscience.	Chilean	M	28-10-1974	Biochemist	D	University of Chile	Assistant Professor	Part Time
Víctor Hugo Cornejo Corona	RL1. Sub-cellular functional dynamics .	Chilean	M	31-03-1989	Bachelor Science	D	University of Chile	Postdoc Couve Lab	Full Time
Alejandro Ernesto Luarte Navarro	RL1. Sub-cellular functional dynamics .	Chilean	M	22-01-1984	Biochemist	D	University of Chile	Postdoc Couve Lab	Full Time
Andrés Enrique González Gutiérrez	RL2. Cellular identity and morphology.	Chilean	M	07-07-1979	Biochemist	D	University of Chile	Postdoc Sierralta Lab.	Full Time
Esteban Contreras Sepúlveda	RL1. Sub-cellular functional dynamics .	Chilean	M	10-05-1984	Biochemist	D	University of Chile	Postdoc Sierralta Lab.	Full Time
Patricio Ahumada Galleguillos	RL3. Supra-cellular development and circuits: .	Chilean	M	06-05-1979	Biologist	D	University of Chile	Postdoc Leo Lab.	Full Time
Almudena Laliena Izquierdo	RL8. Neuropathology.	Spanish	F	19-02-1985	Biologist	D	University of Chile	Postdoc Leo Lab.	Full Time
Karina Palma	RL2. Cellular identity and morphology.	Chilean	F	10-08-1979	Physician Veterinarian	D	University of Chile	Postdoc Leo Lab.	Full Time
Carmen Gloria Lemus Cortes	RL3. Supra-cellular development and circuits: .	Chilean	F	25-02-1980	Biologist	D	University of Chile	Postdoc Scian Lab.	Full Time
Gonzalo Olivares Herane	RL2. Cellular identity and morphology.	Chilean	M	11-02-1978	Biochemist	D	University of Chile	Postdoc	Full Time
Gabriela Martinez	RL4. Plasticity and behavior.	Chilean	F	01-04-1983	Biologist	D	University of Chile	Postdoc Hetz Lab	Full Time
Paula García	RL8. Neuropathology.	Spanish	F	18-12-1981	Biochemist	D	University of Chile	Postdoc Hetz Lab	Full Time
Evelyn Cristina Pardo Huguet	RL8. Neuropathology.	Chilean	F	09-06-1978	Biotechnologist	D	University of Chile	Postdoc Soledad Matus	Full Time
Alejandra Carolina Arias Cavieres	RL4. Plasticity and behavior. RL5. Systems Neuroscience.	Chilean	F	11-5-1979	Pedagogy	D	University of Chile	Postdoc Laboratorio Cecilia Hidalgo	Full Time
Alexis Alfonso Rivas Ahumada	RL8. Neuropathology.	Chilean	M	30-03-1981	Biochemist	D	University of Chile	Postdoc Hetz Lab	Full Time

Full Name	Research Line	Nationality	Gender	Date of birth	Profession	Academic Degree	Affiliation	Current Position	Relation with Center
Hery Urra	RL8. Neuropathology.	Chilean	M	13-02-1984	Biochemist	D	University of Chile	Postdoc Hetz Lab	Full Time
Felipe Cabral Miranda	RL4. Plasticity and behavior. RL5. Systems Neuroscience.	Brazilian	M	14-09-1987	Biotechnologist	D	University of Chile	Postdoc Hetz Lab	Full Time
Vicente Spiro Valenzuela Paterakis	RL8. Neuropathology.	Chilean	M	8-7-1983	Biotechnologist	D	University of Chile	Postdoc Hetz Lab	Full Time
Gabriele Giuseppe Pedruzzi	RL4. Plasticity and behavior. RL7. Applied mathematics and biomedical informatics.	Italian	M	09-05-1986	Biologist	D	University of Chile	Postdoc Leo Lab.	Full Time
Jose Manuel Matamala Capponi	RL6. Clinical studies.	Chilean	M	13-11-1983	Physician	D	Neurology Sciences Department, Faculty of Medicine, University of Chile	Neurology Assistant Professor	Part Time
Janina Edith Borgonovo Grosso	RL8. Neuropathology.	Argentinean	F	14-02-1978	Biochemist	D	University of Chile	Postdoc Leo Lab.	Full Time
Pablo Mardones Hiche	RL8. Neuropathology.	Chilean	M	23-11-1974	Biochemist	D	University of Chile	Postdoc Hetz Lab	Full Time

NOMENCLATURE:	
[Gender] [M] Male [F] Female	**[Academic Degree]** [U] Undergraduate [M] Master [D] Doctoral

Annex 2: Research Lines

N°	Research Line	Research Line Objectives	Description of Research Line	Researcher	Research Discipline	Starting Date	Ending Date
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 . Víctor Hugo Cornejo. Esteban Contreras.	Biofísica. Biología celular. Bioquímica. Fisiología biofísica. Biotecnología. Genética y evolución.	1/7/2016	
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 Carlos Oliva. Gonzalo Olivares Víctor Castañeda Eduardo Pulgar . Karina Palma .	Biología celular. Bioquímica. Biotecnología. Física. Biofísica. Fisiología biofísica.	1/7/2016	

N°	Research Line	Research Line Objectives	Description of Research Line	Researcher	Research Discipline	Starting Date	Ending Date
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 Olguín); 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).	Carmen Gloria Lemus Patricio Ahumada Cecilia Hidalgo German Reig	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.	1/7/2016	
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 Martinez Gabriele Pedruzzi Alejandra Arias	Biología celular. Biología molecular. Fisiología biofísica. Biología del desarrollo. Histología. Morfología.	1/7/2016	

N°	Research Line	Research Line Objectives	Description of Research Line	Researcher	Research Discipline	Starting Date	Ending Date
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 Juricic Rodrigo Vergara Alejandra Arias.	Bioquímica. Biotecnología. Biofísica. Oftalmología. Métodos numéricos y computación. Probabilidades, matemáticas aplicadas y estadísticas. Fisiología biofísica.	1/7/2016	
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).	Jose Manuel Matamala José Egaña Felipe Salech . Hernán Silva	Otras especialidades de la biología. Biología del desarrollo. Biología cellular Medicina psicosomática (incluyendo psiquiatría). Biología molecular. Bioquímica farmacología. Farmacología. Otras especialidades de la medicina.	1/7/2016	

N°	Research Line	Research Line Objectives	Description of Research Line	Researcher	Research Discipline	Starting Date	Ending Date
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 LSFM (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.	Mauricio Cerda . Gabriele Pedruzzi . Víctor Castañeda Violeta Chang Mauricio Cerda. Eduardo Pulgar .	Métodos numéricos y computación. Biofísica. Biología celular. Fisiología biofísica. Ingeniería en computación.	1/7/2016	

N°	Research Line	Research Line Objectives	Description of Research Line	Researcher	Research Discipline	Starting Date	Ending Date
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 Evelyn Pardo. Gabriela Mercado Hery Urra . Pablo Mardones Hiche. Paula García . Vicente Valenzuela Amado Carreras Janina Borgonovo Danilo Bilches 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.	1/7/2016	

Annex 3: Publications

Category of Publication	MSI Center Members	Reference
ISI Publications or Similar to ISI Standard	Associate Researchers	**Valenzuela V, Oñate M, Hetz C**, Court FA, (2016),Injury to the nervous system: A look into the ER., Brain Research
		Mardones P, Rubinsztein DC, **Hetz C,** (2016), Mystery solved: Trehalose kickstarts autophagy by blocking glucose transport., Science Signaling Logo
		Signore IA, Palma K, Concha ML, (2016),Nodal signalling and asymmetry of the nervous system, Phylosophical transactions of the royal society Biological Science
		Duran-Aniotz C, Cornejo VH, Hetz C, (2016), Targeting endoplasmic reticulum acetylation to restore proteostasis in Alzheimer's disease., Brain A Journal of Neurology
		Hetz C, Saxena S, (2016),PREFACE: Divergent roles of ER stress in neurodegeneration and brain disorders., Brain Research
		Rozas P, Bargsted L, Martínez F, Hetz C, Medinas DB, (2016),The ER proteostasis network in ALS: Determining the differential motoneuron vulnerability., Neuroscience Letters
		Valenzuela V, Martínez G, Duran-Aniotz C, Hetz C, (2016),Gene therapy to target ER stress in brain diseases., Brain Research
		Patricio Ahumada-Galleguillos, Carmen G. Lemus, Eugenia Díaz, María Osorio-Reich, **Steffen Härtel, Miguel L. Concha,** (2016),Directional asymmetry in the volume of the human habenula, Brain Structure and Function
		Ute Woehlbier, Alicia Colombo, Mirva J Saaranen, Viviana Pérez, Jorge Ojeda, Fernando J Bustos, Catherine I Andreu, Mauricio Torres, **Vicente Valenzuela, Danilo B Medinas, Pablo Rozas, Rene L Vidal,** Rodrigo Lopez-Gonzalez, Johnny Salameh, Sara Fernandez-Collemann, **Natalia Muñoz, Soledad Matus,** Ricardo Armisen, Alfredo Sagredo, **Karina Palma,** Thergiory Irrazabal, Sandra Almeida, Paloma Gonzalez-Perez, Mario Campero, Fen-Biao Gao, Pablo Henny, Brigitte van Zundert, Lloyd W Ruddock, **Miguel L Concha,** Juan P Henriquez, Robert H Brown, **Claudio Hetz,** (2016),ALS-linked protein disulfide isomerase variants cause motor dysfunction, The EMBO journal

Category of Publication	MSI Center Members	Reference
ISI Publications or Similar to ISI Standard	Associate Researchers	**Iskra A. Signore, Miguel L. Concha,** (2016),Heterochrony and Morphological Variation of Epithalamic Asymmetry, Journal of Experimental Zoology Part B: Molecular and Developmental Evolution
		Bargsted L, Hetz C, Matus S, (2016),ERp57 in neurodegeneration and regeneration., Neural Regeneration Research
		Hidalgo C, Arias-Cavieres A, (2016),Calcium, Reactive Oxygen Species, and Synaptic Plasticity., APS Journal (American Physiological Society)
		Xiang M, Kim H, Ho VT, Walker SR, Bar-Natan M, Anahtar M, Liu S, Toniolo PA, Kroll Y, Jones N, Giaccone ZT, Heppler LN, Ye DQ, Marineau JJ, Shaw D, Bradner JE, Blonquist T, Neuberg D, **Hetz C,** Stone RM, Soiffer RJ, Frank DA, (2016),Gene expression-based discovery of atovaquone as a STAT3 inhibitor and anti-cancer agent., Blood, The Journal of The American Society of Hematology
		Martínez G, Duran-Aniotz C, Cabral-Miranda F, Hetz C, (2016),Commentary: XBP-1 Is a Cell-Nonautonomous Regulator of Stress Resistance and Longevity., Frontiers in aging neuroscience
		Nivon M, Fort L, Muller P, Richet E, Simon S, Guey B, Fournier M, Arrigo AP, **Hetz C**, Atkin JD, Kretz-Remy C, (2016),NFκB is a central regulator of protein quality control in response to protein aggregation stresses via autophagy modulation., Molecular Biology of the Cell
		Mollereau B, Rzechorzek NM, Roussel BD, Sedru M, Van den Brink DM, Bailly-Maitre B, Palladino F, Medinas DB, Domingos PM, Hunot S, Chandran S, Birman S, Baron T, Vivien D, Duarte CB, Ryoo HD, Steller H, Urano F, Chevet E, Kroemer G, Ciechanover A, Calabrese EJ, Kaufman RJ, **Hetz C,** (2016),Adaptive preconditioning in neurological diseases – therapeutic insights from proteostatic perturbations, Brain research
		Lobos P, Bruna B, Cordova A, Barattini P, Galáz JL, Adasme T, Hidalgo C, Muñoz P, Paula-Lima A., (2016),Astaxanthin Protects Primary Hippocampal Neurons against Noxious Effects of Aβ-Oligomers, Neural Plasticity
		Duran-Aniotz C, Hetz C., (2016),Glucose Metabolism: A Sweet Relief of Alzheimer's Disease., Current Biology
		Oñate M, Court FA, **Hetz C.,** (2016),Bursting the unfolded protein response accelerates axonal regeneration., Neural Regeneration Research
		Hery Urra, Estefanie Dufey, Tony Avril, Eric Chevet, **Claudio Hetz,** (2016),Endoplasmic Reticulum Stress and the Hallmarks of Cancer, Trends in Cancer
		Hetz C. et all, (2016),Guidelines for the use and interpretation of assays for monitoring autophagy (3rd edition), Autophagy

Category of Publication	MSI Center Members	Reference
ISI Publications or Similar to ISI Standard	Associate Researchers	Sepulveda M, **Rozas P, Medinas DB, Hetz C,** (2016),ERp57 as a novel cellular factor controlling prion protein biosynthesis: Therapeutic potential of protein disulfide isomerases., Prion
		Garcia-Huerta P, Troncoso-Escudero P, Jerez C, **Hetz C, Vidal RL.,** (2016),The intersection between growth factors, autophagy and ER stress: A new target to treat neurodegenerative diseases?, Brain Research
		Oñate M, Catenaccio A, **Martínez G,** Armentano D, Parsons G, Kerr B, **Hetz C,** Court FA, (2016),Activation of the unfolded protein response promotes axonal regeneration after peripheral nerve injury., Scientific Reports
		Martínez G, Vidal RL, Mardones P, Serrano FG, Ardiles AO, Wirth C, Valdés P, Thielen P, Schneider BL, Kerr B, **Valdés JL,** Palacios AG, Inestrosa NC, Glimcher LH, **Hetz C,** (2016),Regulation of Memory Formation by the Transcription Factor XBP1., Cell Reports
		Mardones MD, Andaur GA, Varas-Godoy M, Henriquez JF, **Salech F**, Behrens MI, **Couve A**, Inestrosa NC, Varela-Nallar L., (2016),Frizzled-1 receptor regulates adult hippocampal neurogenesis., Molecular Brain
		Astorga C, Jorquera RA, Ramírez M, **Kohler A, López E,** Delgado R, Córdova A, **Olguín P, Sierralta J.,** (2016),Presynaptic DLG regulates synaptic function through the localization of voltage-activated Ca(2+) Channels., Scientific Reports
		González C, Cánovas J, Fresno J, Couve E, Court FA, **Couve A.,** (2016),Axons provide the secretory machinery for trafficking of voltage-gated sodium channels in peripheral nerve., Proceedings of the National Academy of Sciences of the United States of America
		Ampuero E, Jury N, **Härtel S,** Marzolo MP, van Zundert B, (2016),Interfering of the Reelin/ApoER2/PSD95 Signaling Axis Reactivates Dendritogenesis of Mature Hippocampal Neurons, Journal of Cellular Physiology

Category of Publication	MSI Center Members	Reference
ISI Publications or Similar to ISI Standard	Associate Researchers	Posada-Duque RA, Ramirez O, **Härtel S,** Inestrosa NC, Bodaleo F, González-Billault C, Kirkwood A, Cardona-Gómez GP, (2016),CDK5 downregulation enhances synaptic plasticity , Cellular and Molecular Life Sciences
		Richardson J, Gauert A, **Briones Montecinos L,** Fanlo L, Alhashem ZM, Assar R, Marti E, Kabla A, **Härtel** S, Linker C, (2016),Leader Cells Define Directionality of Trunk, but Not Cranial, Neural Crest Cell Migration , Cell Reports
		Scavone P, Iribarnegaray V, Caetano AL, Schlapp G, **Härtel S,** Zunino P., (2016),Fimbriae have distinguishable roles in Proteus mirabilis biofilm formation , Pathogens and Disease
		Mochizuki Y, Onaga T, Shimazaki H, Shimokawa T, Tsubo Y, Kimura R, Saiki A, Sakai Y, Isomura Y, Fujisawa S, Shibata K, Hirai D, Furuta T, Kaneko T, Takahashi S, Nakazono T, Ishino S, Sakurai Y, Kitsukawa T, Lee JW, Lee H, Jung MW, **Babul C, Maldonado PE**, Takahashi K, Arce-McShane FI, Ross CF, Sessle BJ, Hatsopoulos NG, Brochier T, Riehle A, Chorley P, Grün S, Nishijo H, Ichihara-Takeda S, Funahashi S, Shima K, Mushiake H, Yamane Y, Tamura H, Fujita I, Inaba N, Kawano K, Kurkin S, Fukushima K, Kurata K, Taira M, Tsutsui K, Ogawa T, Komatsu H, Koida K, Toyama K, Richmond BJ, Shinomoto S, (2016),Similarity in Neuronal Firing Regimes across Mammalian Species, The Journal of Neuroscience
		Oliva C, Soldano A, Mora N, De Geest N, Claeys A, Erfurth ML, **Sierralta J,** Ramaekers A, Dascenco D, Ejsmont RK, Schmucker D, Sanchez-Soriano N, Hassan BA, (2016),Regulation of Drosophila Brain Wiring by Neuropil Interactions via a Slit-Robo-RPTP Signaling Complex, Developmental Cell
	Others	**Garcia-Huerta P, Bargsted L, Rivas A, Matus S, Vidal RL, (**2016), ER chaperones in neurodegenerative disease: Folding and beyond , Brain Research
		Castillo RI, Rojo LE, Henriquez-Henriquez M, **Silva H,** Maturana A, Villar MJ, Fuentes M, **Gaspar PA**., (2016), From Molecules to the Clinic: Linking Schizophrenia and Metabolic Syndrome through Sphingolipids Metabolism., Frontiers in neuroscience

Category of Publication	MSI Center Members	Reference
ISI Publications or Similar to ISI Standard	Others	Flores-Balter G, Cordova-Jadue H, Chiti-Morales A, Lespay C, Espina-Marchant P, Falcon R, **Grinspun N**, Sanchez J, Bustamante D, Morales P, Herrera-Marschitz M, **Valdés JL.,** (2016), Effect of perinatal asphyxia on tuberomammillary nucleus neuronal density and object recognition memory: A possible role for histamine?, Behavioural Brain Research
		Vega-Macaya F, Manieu C, Valdivia M, Mlodzik M, **Olguín P**, (2016), Establishment of the Muscle-Tendon Junction During Thorax Morphogenesis in Drosophila Requires the Rho-Kinase. , Genetics
SCIELO Publications or Similar to SCIELO Standard	Associate Researchers	Ramírez M, Gallardo A, Vidal A, Cornejo S, Ramírez D, **Medinas D,** Bustamante G, Pasquali R, **Hetz C**, (2016), Creutzfeldt-Jakob disease: Report of one case , Revista médica de Chile
	Others	Juan Carlos Martínez-Aguayo; **Hernán Silva**;Marcelo Arancibia;Claudia Angulo y Eva Madrid, (2016), Antiosicóticos y suicidio, Revista Chilena de Neuropsiciquiatría; 54(2):141-150
Books & Chapters of Books	Associate Researchers	
	Others	Torres V, **Cerda M,** Knaup P, Löpprich M., (2016), Assessment of Automatically Exported Clinical Data from a Hospital Information System for Clinical Research in Multiple Myeloma. , IOS Press Ebooks
		Hernán Silva Ibarra, (2016), Manual de Psicofarmacología clínica (2da edición), http://mediterraneo.cl/products/manual-de-psicofarmacologia-clinica-2-ed
Other Publications	Associate Researchers	
	Others	

Annex 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	32	76,19%	2	4,76%	0	0,00%	0	0,00%
SCIELO Publications or Similar to SCIELO Standard	1	2,38%	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	33	78,57%	2	4,76%	0	0,00%	0	0,00%

Annex 6: Scientific events

Scope	Title	Type of Event	City	Country	Responsible Researcher
Internacional	Neurosur Meeting	Meeting	Santiago	Chile	Andrés Oscar Couve Correa
Internacional	International Symposium: "Crossing New Frontiers with Light Sheet Fluorescence Microscopy"	Symposium	Santiago	Chile	Miguel Concha Nordemann
Internacional	Neurosur IV: The Living brain	Symposium	Santiago	Chile	Andrés Oscar Couve Correa
Internacional	Small Brains Big Ideas	Workshop	Santiago, Las Cruces, Valparaiso	Chile	Jimena Sierralta Jara
Nacional	PALM, Photoactivated Localization Microscopy	Seminario	Santiago	Chile	Andrés Oscar Couve Correa
Nacional	Jornada de Discusión Científica e Integración de Equipo	Exposiciones científicas + actividades de integración	Santiago	Chile	Andrés Oscar Couve Correa
Nacional	Evolution and development of a bilateral connectivity map in the mammalian neocortex	Seminario	Santiago	Chile	Andrés Oscar Couve Correa
Nacional	Seminario Interno BNI - Mayo	Seminario	Santiago	Chile	Daniel Rojas
Nacional	Participación de la ruta endocítica en señales locales y a larga distancia en neuronas	Seminario	Santiago	Chile	Andrés Oscar Couve Correa
Nacional	Seminario Interno BNI - Agosto	Seminario	Santiago	Chile	Daniel Rojas
Nacional	Determinantes moleculares de la sensibilidad térmica y química del canal de iones TRPM8	Seminario	Santiago	Chile	Andrés Oscar Couve Correa
Nacional	Rol del sistema endocannabinoide en la retina de vertebrados	Seminario	Santiago	Chile	Andrés Oscar Couve Correa
Nacional	Evolution of structural and functional properties in TRP channels	Seminario	Santiago	Chile	Andrés Oscar Couve Correa
Nacional	Seminario Interno BNI - Diciembre	Seminario	Santiago	Chile	Carlos Oliva Olave
Nacional	Spinal dis-inhibition in chronic pain	Seminario	Santiago	Chile	Andrés Oscar Couve Correa
Nacional	Bases celulares y Moleculares de la Transducción del frío	Seminario	Santiago	Chile	Andrés Oscar Couve Correa
Nacional	Rol del tráfico vesicular y las uniones adherentes en el desarrollo del SNC	Seminario	Santiago	Chile	Andrés Oscar Couve Correa
Nacional	Experiencia de pasantía internacional en el BNI. Estudiando la neurogénesis hipocampal del adulto	Seminario	Santiago	Chile	Andrés Oscar Couve Correa
Nacional	Interacciones epitelio-estroma en cancer y cultivos 3D	Seminario	Santiago	Chile	Andrés Oscar Couve Correa
Nacional	Diet, behavior and neurodegeneration	Seminario	Santiago	Chile	Andrés Oscar Couve Correa
Nacional	Seminario Interno BNI - Septiembre	Seminario	Santiago	Chile	Carlos Oliva Olave
Nacional	Los canales TRP de la transducción de la luz en fotoreceptores de Drosophilia: Cómo son, como son activados, cómo participan	Seminario	Santiago	Chile	Andrés Oscar Couve Correa
Nacional	Seminario Interno BNI - Octubre	Seminario	Santiago	Chile	Carlos Oliva Olave

Annex 7: Organization of Scientific Events

Title of the Event	Type of Event	Date	City	Country	Scope	Number of Attendants	Number of MSI Expositors	Number of Foreing Expositors Non-MSI	National Number of Expositors Non-MSI	Duration (Days)	Target Audience	Responsible Researcher
PALM, Photoactivated Localization Microscopy	Seminario	22-04-16	Santiago	Chile	Nacional	37	0	1	0	1	Comunidad Científica. Profesores Universitarios. Estudiantes de Postgrado. Estudiantes Universitarios.	Andrés Oscar Couve Correa
Jornada de Discusión Científica e Integración de Equipo	Exposiciones científicas + actividades de integración	08-04-16	Santiago	Chile	Nacional	87	3	0	0	2	Estudiantes de Postgrado. Estudiantes Universitarios.	Andrés Oscar Couve Correa
Evolution and development of a bilateral connectivity map in the mammalian neocortex	Seminario	09-05-16	Santiago	Chile	Nacional	25	0	0	1	1	Estudiantes de Postgrado. Comunidad Científica.	Andrés Oscar Couve Correa

Title of the Event	Type of Event	Date	City	Country	Scope	Number of Attendants	Number of MSI Expositors	Number of Foreing Expositors Non-MSI	National Number of Expositors Non-MSI	Duration (Days)	Target Audience	Responsible Researcher
Seminario Interno BNI - Mayo	Seminario	26-05-16	Santiago	Chile	Nacional	35	1	0	0	1	Estudiantes de Postgrado.	Daniel Rojas
Participación de la ruta endocítica en señales locales y a larga distancia en neuronas	Seminario	13-07-16	Santiago	Chile	Nacional	15	0	0	1	1	Estudiantes de Postgrado.	Andrés Oscar Couve Correa
Seminario Interno BNI - Agosto	Seminario	11/8/2016	Santiago	Chile	Nacional	29	2	0	0	1	Estudiantes de Postgrado.	Daniel Rojas
Determinantes moleculares de la sensibilidad térmica y química del canal de iones TRPM8	Seminario	7/9/2016	Santiago	Chile	Nacional	23	0	0	1	1	Estudiantes de Postgrado.	Andrés Oscar Couve Correa
Rol del sistema endocannabinoide en la retina de vertebrados	Seminario	9/11/2016	Santiago	Chile	Nacional	32	0	0	1	1	Comunidad Científica.	Andrés Oscar Couve Correa
Evolution of structural and functional properties in TRP channels	Seminario	19-10-2016	Santiago	Chile	Nacional	33	0	0	1	1	Comunidad Científica. Estudiantes de Postgrado.	Andrés Oscar Couve Correa

Title of the Event	Type of Event	Date	City	Country	Scope	Number of Attendants	Number of MSI Expositors	Number of Foreing Expositors Non-MSI	National Number of Expositors Non-MSI	Duration (Days)	Target Audience	Responsible Researcher
Seminario Interno BNI - Diciembre	Seminario	15-12-2016	Santiago	Chile	Nacional	40	1	0	0	1	Comunidad Científica. Estudiantes de Postgrado.	Carlos Oliva Olave
Spinal dis-inhibition in chronic pain	Seminario	7/12/2016	Santiago	Chile	Nacional	18	0	0	1	1	Comunidad Científica. Estudiantes de Postgrado.	Andrés Oscar Couve Correa
Neurosur Meeting	Meeting	22-03-2016	Santiago	Chile	Internacional	30	17	5	8	1	Profesores Universitarios.	Andrés Oscar Couve Correa
Bases celulares y Moleculares de la Transducción del frío	Seminario	20-04-2016	Santiago	Chile	Nacional	19	0	0	1	1	Comunidad Científica. Estudiantes de Postgrado. Estudiantes Universitarios.	Andrés Oscar Couve Correa

Title of the Event	Type of Event	Date	City	Country	Scope	Number of Attendants	Number of MSI Expositors	Number of Foreing Expositors Non-MSI	National Number of Expositors Non-MSI	Duration (Days)	Target Audience	Responsible Researcher
Experiencia de pasantía internacional en el BNI. Estudiando la neurogénesis hipocampal del adulto	Seminario	28-06-2016	Santiago	Chile	Nacional	23	1	0	0	1	Estudiantes de Postgrado.	Andrés Oscar Couve Correa
Interacciones epitelio-estroma en cancer y cultivos 3D	Seminario	27-07-2016	Santiago	Chile	Nacional	21	0	0	1	1	Estudiantes de Postgrado. Comunidad Científica.	Andrés Oscar Couve Correa
Diet, behavior and neurodegeneration	Seminario	17-08-2016	Santiago	Chile	Nacional	27	0	0	1	1	Estudiantes de Postgrado. Comunidad Científica.	Andrés Oscar Couve Correa
Seminario Interno BNI - Septiembre	Seminario	2/9/2016	Santiago	Chile	Nacional	22	1	0	0	1	Estudiantes de Postgrado.	Carlos Oliva Olave
Los canales TRP de la transducción de la luz en fotoreceptores de Drosophilia: Cómo son, como son activados, cómo participan	Seminario	5/10/2016	Santiago	Chile	Nacional	26	0	0	1	1	Estudiantes de Postgrado.	Andrés Oscar Couve Correa
Seminario Interno BNI - Octubre	Seminario	20-10-2016	Santiago	Chile	Nacional	18	1	0	0	1	Comunidad Científica. Estudiantes de Postgrado.	Carlos Oliva Olave
Small Brains Big Ideas	Workshop	10/11/2016	Santiago, Las Cruces, Valparaiso	Chile	Internacional	47	2	13	4	10	Estudiantes de Postgrado.	Jimena Sierralta Jara

Title of the Event	Type of Event	Date	City	Country	Scope	Number of Attendants	Number of MSI Expositors	Number of Foreing Expositors Non-MSI	National Number of Expositors Non-MSI	Duration (Days)	Target Audience	Responsible Researcher
International Symposium: "Crossing New Frontiers with Light Sheet Fluorescence Microscopy"	Symposium	17-03-2016	Santiago	Chile	Internacional	70	2	4	1	1	Estudiantes de Postgrado.	Miguel Concha Nordemann
Neurosur IV: The Living brain	Symposium	21-03-2016	Santiago	Chile	Internacional	100	2	8	2	1	Estudiantes de Postgrado. Estudiantes Universitarios. Comunidad Científica. Profesores Universitarios.	Andrés Oscar Couve Correa
Rol del tráfico vesicular y las uniones adherentes en el desarrollo del SNC	Seminario	18-05-2016	Santiago	Chile	Nacional	24	0	0	1	1	Estudiantes de Postgrado. Estudiantes Universitarios. Comunidad Científica.	Andrés Oscar Couve Correa

Annex 8: Capacity Building

Tutor	Undergraduated Student		Graduated Students						Total
			Master		Doctoral		Postdoctoral		
	F	M	F	M	F	M	F	M	
Pedro Esteban Maldonado Arbogast	0	3	1	5	2	5	0	0	16
Miguel Luis Concha Nordemann	0	0	1	0	1	1	0	0	3
María Cecilia Hidalgo Tapia	0	0	1	0	0	1	0	0	2
Steffen Härtel Gründler	0	0	2	4	1	2	0	0	9
Jimena Sierralta Jara	1	0	2	1	2	1	0	0	7
Claudio Andrés Hetz Flores	0	0	2	0	0	2	0	0	4
Andrés Oscar Couve Correa	1	0	1	1	1	1	0	0	5
Pedro Esteban Maldonado Arbogast Pablo Gaspar	0	0	0	0	1	0	0	0	1
Andres Oscar Couve Correa	0	0	0	0	1	0	0	0	1
Pedro Esteban Maldonado Arbogast José Luis Valdés	0	0	0	0	0	2	0	0	2
Hernán Silva Ibarra	0	0	1	0	0	0	0	0	1
Mauricio Cerda Villablanca	1	0	1	3	1	0	0	0	6
Patricio Alejandro Olguín Aguilera	0	1	0	2	1	1	0	0	5
Rómulo Antonio Fuentes Flores René Vidal Claudio Andrés Hetz Flores	0	0	0	0	1	0	0	0	1
Rómulo Antonio Fuentes Flores	0	0	1	4	1	0	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	0	0	0	0	0	1	0	0	1
Miguel Concha Nordemann	1	1	0	0	0	0	0	0	2
Andrea Paula-Lima	0	1	0	1	0	1	0	0	3
José Luis Valdés	0	0	1	2	2	3	0	0	8
Claudio Andrés Hetz Flores	1	0	1	1	2	2	0	0	7
René Vidal	0	0	0	0	1	0	0	0	1
Pablo Gaspar	0	1	4	3	1	2	0	0	11
Claudio Andrés Hetz Flores René Vidal	0	0	0	0	1	0	0	0	1
Andrea Paula-Lima José Luis Valdés	0	0	0	0	1	0	0	0	1
Total	**5**	**7**	**19**	**27**	**22**	**25**	**0**	**0**	**105**

Annex 9: Short-term Traineeships

Intern Type	Intern Name	Academic Degree	Home Institution	Destination Institution	Country	Project Description	Starting Date	Ending Date
Estudiante	Miriam Schwalm	Doctorado	Institute for Microscopic Anatomy and Neurobiology, University of Mainz	Laboratorio de Neurocircuitos (PM) y Laboratorio de Aprendizaje Memoria y Neuromodulacion (JLV)Universidad de Chile. Instituto de Neurociencia Biomédica	Germany	Beca de DAAD (Servicio Alemán de Intercambio Académico)	11-10-16	30-03-17
Estudiante	Gonzalo Sad	Doctorado	Universidad Nacional de Rosario	SCIAN-Lab, BNI, Universidad de Chile	Argentina	Procesamiento de la BD del proyecto MCC	27-11-16	10-12-16
Estudiante	Steffan Sigle Gebhard	Magister	Universidad de Heilbronn	Laboratorio de Análisis Científico de Imágenes (Scian-Lab) en Facultad de Medicina de la Universidad de Chile, BNI	Germany	Programa de Ciencias de la Computación Médica (Magister Informatica Medica)	01-10-16	28-02-17
Estudiante	Max Seitz Wolfgang	Magister	Universidad de Heilbronn	Laboratorio de Análisis Científico de Imágenes (Scian-Lab) en Facultad de Medicina de la Universidad de Chile, BNI	Germany	Programa de Ciencias de la Computación Médica (Magister Informatica Medica	01-10-16	31-01-17
Estudiante	Sebastian Hagmann	Magister	Universidad de Heilbronn	Laboratorio de Análisis Científico de Imágenes (Scian-Lab) en Facultad de Medicina de la Universidad de Chile, BNI	Germany	Programa de Ciencias de la Computación Médica (Magister Informatica Medica	01-10-16	31-10-16
Estudiante	Mariana Duque Quintero	Pregrado	Universidad CES	Laboratorio de neurobiología celular y molecular (Couve Lab)	Colombia	Estandarización de inmunofluorescencia con los marcadores Ki-67 y DCX en cortes de hipocampo humano	02-03-16	28-06-16
Estudiante	Helen Sakharova	Pregrado	MIT, USA	Laboratorio de neurobiología celular y molecular (Couve Lab)	Estados Unidos de America	Análisis de imágenes provenientes de muestras de nervio ciático de raton	01-06-16	30-08-16
Investigador	Michel Gho	Doctorado	Universidad Pierre et Marie Cuirie	Laboratorio Genética del desarrollo de Drosophila (Olguin Lab)	Francia	Visista para la discusión de resultados asociados con el proyecto ECOS/Conicyt C14B04. Participación en el curso Small Brains Big Ideas 2016	31-10-16	18-11-16

Student Name	Institution	Country	Advisor	Project Description	Starting Date	Ending Date
John Alex Córdova	Harvard University	USA	Adam Cohen	Dendrites have been considered for a long time as receiving units and integration places of synaptic, electrical and chemical signals, before being taken to the soma (reviewed by Branco et al 2010). In the same line, synapse to nucleus Ca2+ propagation is essential to regulate the expression of genes necessary to achieve long-term changes in complex phenomena such as memory, adaptation and neuroprotection (reviewed by Bading, 2013). Although numerous reports have established that there is a set of genes activated by nuclear calcium signals, the mechanisms underlying calcium signal propagation from synapses to the nucleus are still unknown. Most attention has centered on calcium signals induced by glutamate via NMDAR, or by VGCC activation. Glutamate also elicited calcium release from the ER by also provides calcium waves as possible mechanism Furthermore, recent studies showed that the spatiotemporal pattern of calcium signals due to NMDAR activation by glutamate uncaging is coupled to ryanodine receptor RyR by CICR (calcium induced calcium release) and it is fundamental for the spatiotemporal dynamic of the signal at dendrites (Lee et al 2016). Nevertheless, there are no reports to evaluate RyR contribution to calcium propagation towards the nucleus. The regenerative nature of RyR-mediated CICR provides an attractive mechanism for calcium signal propagation from the farthest synapse to the nucleus. We want to elucidate RyR contribution calcium propagation from synapse to the nucleus in hippocampal neurons Objectives 1) To evaluate RyRs and RyR2 participation in synapse to nucleus calcium propagation induced by glutamate uncaging, characterizing amplitude, propagation distance, rise, decay time and propagation velocities. 2) To evaluate RyRs and RyR2 participation in synapse to nucleus calcium propagation induced by backpropagated action potential, characterizing amplitude, propagation distance, rise, decay time and propagation velocities.	21-05-16	19-08-16

Annex 10: Networking and other collaborative work

10.1 Networking

Network Name	Network Scope	Researchers				Institutions
		From the Center		External		
		Researchers	Postdocs / Students	Researchers	Postdocs / Students	
Neurosur	International	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	International	11	20	8	6	BNI, U. Göttingen, Germany / IST, Vienna, Austria/ U.Bonn, Germany
Small Brains Big Ideas	International	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.

10.2 Other collaborative activities

Activity Name	Objective	Description	Co-Participants Institutions	Number of Research from the Center	Number of Postdocs/ Students from the Center	Number of External Research	Number of External Postdocs/ Students	Product	Name of the Center Associate Researchers Participating in the activity
Vive Chile	sociabilización científica	Vinculación ciencia sociedad	Fundación Vive Chile	1				Medios Audivisuales	Andrés Couve
Puerto Ideas	sociabilización científica	Vinculación ciencia sociedad	Fundación Puerto Ideas	1				2, Festivales científico cualturales	
Biointeractive -Loligo	difusión científica	Ciencia y educación	Howard Hughes Medical Institute/biointeractive	1			5	4, Material audivisual, talleres para profesores enseñanza media	Andrés Couve
Expedición Neurociencia, Filantropía Científica y Arquitectura	Conectar a diferentes personas del mundo social y empresarial con el que hacer científico.	Actividad social-científica desarrollada en el nuevo edificio de BNI y organizado por la Red de Alta Dirección (RAD).	Red de Alta Dirección (RAD)	17	10			2, Video, Entrevistas	Andrés Couve Claudio Hetz Steffen Härtel
Corporación ELA Chile	Colaboración recíproca entre investigación científica en ELA y redes de apoyo para pacientes y familiares	Acuerdo de colaboración para realizar actividades de difusión de la enfermedad e investigación científica	Corporación ELA Chile	1				Investigación científica, actividades de difusión conjunta	Andrés Couve.

Annex 11: Outreach

11.1 Outrearch Activities

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
Lanzamiento Plataforma Científica de Educación LOLIGO	Lanzamiento Plataforma de Educación	National	Secondary students	05-04-16	Chile	Metropolitana de Santiago		164	1	Andrés Couve / Claudio Hetz / Jimena Sierralta	Rodrigo Tapia, Director de Extensión y Educación BNI
Si va a volar, no beba: Estudio del alcoholismo en moscas	Conferencia	National	Secondary students / General Community	10-11-16	Chile	Metropolitana de Santiago	3	42	1	Jimena Sierralta	Jimena Sierralta
Visitas guiadas de colegios a los laboratorios de BNI – Colegio San Leonardo	Visita Guiada a Laboratorios	National	Secondary students	12-05-16	Chile	Metropolitana de Santiago	0	7	1	Andrés Couve	Carolina Astudillo, estudiante de doctorado
Visitas guiadas de colegios a los laboratorios de BNI – Colegio Bradford School Santiago	Visita Guiada a Laboratorios	National	Secondary students	03-05-16	Chile	Metropolitana de Santiago	4	18		Andrés Couve	Carolina Astudillo, estudiante de doctorado
Domo Cerebro en Fiesta de Ciencia y Tecnología Explora	Exhibición	National	Primary students / Secondary students / General Community	06-10-16	Chile	Metropolitana de Santiago		20000	3	Andrés Couve	Rodrigo Tapia, Director de Extensión y Educación BNI

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
Cine Arte Científico Película: The Fly Room	Exhibición de película de Cine Arte Científico	National	Secondary students / General Community	09-11-16	Chile	Metropolitana de Santiago	20	200	1	Patricio Olguín	Patricio Olguin
Expedición Urbana RAD	Expedición urbana	National	Industrial Community / Services / Public Services	05-10-16	Chile	Metropolitana de Santiago	10	80	1	Andrés Couve / Claudio Hetz / Andrea Paula-Lima / José Luis Valdés / María Cecilia Hidalgo / Mauricio Cerda / Miguel Concha / Patricio Olguín / Pedro Maldonado / Rómulo Fuentes / Soledad Matus / Steffen Härtel / Jimena Sierralta	Andrés Couve - Claudia Bobadilla (Directora Ejecutiva RAD)
Visitas guiadas de colegios a los laboratorios de BNI - Colegio Cristóbal Colón Melipilla	Visita Guiada	National	Secondary students	02-06-16	Chile	Metropolitana de Santiago	4	20	1	Andrés Couve	Carolina Astudillo, Ph.D. Student
Visitas guiadas de colegios a los laboratorios de BNI – San Fernando College, San Fernando	Visita guiada a laboratorios BNI	National	Secondary students	22-06-16	Chile	Metropolitana de Santiago	4	20	1	Andrés Couve	Carolina Astudillo, Ph.D. Student
Visita laboratorios BNI Colegio Viento Sur	Visita Guiada	National	Primary students /	08-08-16	Chile	Metropolitana de Santiago	4	12	1	Andrés Couve	Carolina Astudillo, Ph.D. Student

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
Visitas guiadas de colegios a los laboratorios de BNI Colegio Hispano Americano – 4to Medio	Visita guiada a laboratorios BNI	National	Secondary students	16-08-16	Chile	Metropolitana de Santiago	4	24	1	Andrés Couve	Carolina Astudillo, Ph.D. Student
Visitas guiadas de colegios a los laboratorios de BNI – Colegio Arturo Toro Amor	Visita guiada a laboratorios BNI	National	Secondary students	24-08-16	Chile	Metropolitana de Santiago	4	18	1	Andrés Couve	Carolina Astudillo, Ph.D. Student
Visitas guiadas de colegios a los laboratorios de BNI Colegio Cordillera	Visita guiada a laboratorios BNI	National	Secondary students	12-09-16	Chile	Metropolitana de Santiago	3	14	1	Andrés Couve	Carolina Astudillo, Ph.D. Student
Itinerancia Domo Cerebro a Colegios – Colegio Trewelas	Exhibition	National		13-10-16	Chile	Metropolitana de Santiago	1	300	1	Andrés Couve	Rodrigo Tapia, Director de Extensión y Educación BNI
Visitas guiadas de colegios a los laboratorios de BNI – Colegio Hispano Americano 3ro Medio	Visita guiada a laboratorios BNI	National	Secondary Students	06-09-16	Chile	Metropolitana de Santiago	4	22	1	Andrés Couve	Carolina Astudillo, Ph.D. Student
Visitas guiadas de colegios a los laboratorios de BNI – Colegio SSCC Alameda	Visita guiada a laboratorios BNI	National	Secondary Students	21-10-16	Chile	Metropolitana de Santiago	4	20	1	Andrés Couve	Carolina Astudillo, Ph.D. Student
Vacaciones de Invierno . Planetario Universidad de Santiago de Chile	Exhibition	National	Primary students / Secondary students / General Community	09-07-16 al 24-07-16	Chile	Metropolitana de Santiago	1	20000	16	Andrés Couve	Rodrigo Tapia, Director de Extensión y Educación BNI

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
Actividad Municipalidad de Casablanca, 1-12 de septiembre 2016	Exhibition	National	Primary students / Secondary students / General Community	02-09-16 al 11-09-16	Chile	Metropolitana de Santiago	0	2000	10	Andrés Couve	Rodrigo Tapia, Director de Extensión y Educación BNI
Itinerancia Domo Cerebro a Colegios . Colegio Ciudad de Brasilia (PACE)	Exhibition	National	Secondary students	28-07-16	Chile	Metropolitana de Santiago	2	500	2	Andrés Couve	Rodrigo Tapia, Director de Extensión y Educación BNI
Itinerancia Domo Cerebro a Colegios – Coelgio Valle Hermoso (PACE)	Exhibition	National	Secondary students	04-08-16	Chile	Metropolitana de Santiago	2	500	2	Andrés Couve	Rodrigo Tapia, Director de Extensión y Educación BNI
Itinerancia Domo Cerebro a Colegios – Colegio Malaquías Concha (PACE)	Exhibition	National	Secondary students	18-08-16	Chile	Metropolitana de Santiago	2	500	2	Andrés Couve	Rodrigo Tapia, Director de Extensión y Educación BNI
Itinerancia Domo Cerebro a Colegios – Colegio Gladys Valenzuela (PACE)	Exhibition	National	Secondary students	25-08-16	Chile	Metropolitana de Santiago	2	500	2	Andrés Couve	Rodrigo Tapia, Director de Extensión y Educación BNI
Itinerancia Domo Cerebro a Colegios – Colegio Mariano Latorre (PACE)	Exhibition	National	Secondary students	30-08-16	Chile	Magallanes y Antártica Chilena	2	500	2	Andrés Couve	Rodrigo Tapia, Director de Extensión y Educación BNI
Itinerancia Domo Cerebro - Congreso del Futuro	Exhibition	National	Primary students / Secondary students / General Community	17-11-16 al 19-11-16	Chile	Metropolitana de Santiago	2	1000	3	Andrés Couve	Rodrigo Tapia, Director de Extensión y Educación BNI

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
Education Program for school teachers in collaboration with Biointeractive-HHMI "Evolution and Natural Selection" (first group)	Course	National	Secondary Teachers	09-04-16	Chile	Metropolitana de Santiago	10	60	1	Andrés Couve	Rodrigo Tapia, Director de Extensión y Educación BNI
Education Program for school teachers in collaboration with Biointeractive-HHMI "Evolution and Natural Selection" (Second Group)	Course	National	Secondary Teachers	11-06-16	Chile	Metropolitana de Santiago	10	60	1	Andrés Couve	Rodrigo Tapia, Director de Extensión y Educación BNI
Education Program for school teachers in collaboration with Biointeractive-HHMI “Inheritance and Genetics”	Course	National	Secondary Teachers	15-10-16	Chile	Metropolitana de Santiago	10	60	1	Andrés Couve	Rodrigo Tapia, Director de Extensión y Educación BNI
Education Program for school teachers in collaboration with Biointeractive-HHMI “Ecology and Ecosystems”	Course	National	Secondary Teachers	19-11-16	Chile	Metropolitana de Santiago	10	60	1	Andrés Couve	Rodrigo Tapia, Director de Extensión y Educación BNI
Itinerancia Domo Cerebro – Fiesta de la Ciencia y Tecnología Explora Sur	Exhibition	National	Primary students / Secondary students / General Community	06-10-16 al 08-10-16	Chile	Metropolitana	2	20000	3	Andrés Couve	Rodrigo Tapia, Director de Extensión y Educación BNI

11.2 Products of Outreach

Name of Product	Product Objetive	Target Public	Type of Product"	Scope
Itinerancia Domo Cerebro	Con esto acercamos la neurociencia a escolares y público general	Secondary Students. General Community.	Exhibición con contenido científico	Nacional
Dendros cómic online, capítulo 9	Esta actividad tuvo por objetivo acercar la neurociencia a las audiencias jóvenes (8-17 años) abordando temas contingentes como la enfermedad de Parkinson y la terapia génica. El capítulo se encuentra disponible en la página web de nuestro cómic www.loligo.cl/dendros. Los recursos utilizados para realizar esta actividad fueron aportados por ICM y nuestro instituto.	Secondary Students.	Comic Online	Nacional
Impresión del cómic Dendro para distribución escolar - Todos los capítulos, incluye Nro. 9	Esta actividad tuvo por objetivo acercar la neurociencia a las audiencias jóvenes (8-17 años) abordando temas contingentes como la enfermedad de Parkinson y la terapia génica.	Secondary Students.	Comic Impreso	Nacional
1- Teacher Improvement Workshop :"Evolution and Natural Selection" (first group)	Support the development of play activities within the classroom, using the content of LOLIGo-Education. The workshops were held at the Faculty of Medicine of the University of Chile.	Teachers.	Taller de perfeccionamiento	Nacional
Teacher Improvement Workshop: Inheritance and Genetics.	Support the development of play activities within the classroom, using the content of LOLIGo-Education. This is a continuation course.	Teachers	Course	Nacional
Teacher Improvement Workshop: Ecology and Ecosystems. This is a continuation course.	Support the development of play activities within the classroom, using the content of LOLIGo-Education.	Teachers.	Course	Nacional
2- Teacher Improvement Workshop :"Evolution and Natural Selection" (Second Group)	Support the development of play activities within the classroom, using the content of LOLIGO-Education.	Teachers	Course	Nacional

Annex 12: Articles and Interviews

Type of Media and Scoupe	Local / Regional		National		International		
	N° Interviews	N° Articles	N° Interviews	N° Articles	N° Interviews	N° Articles	Total
Written	0	2	3	71	0	0	76
Internet	0	0	0	6	0	0	6
Audiovisual	0	0	17	0	0	0	17
Total	0	2	20	77	0	0	99

Annex 13: 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	Contrato de investigación	Desarrollo de Proyecto	Chile	Instituciones Públicas o Privadas	Actividades empresariales
Evaluación dela capacidad de las células Muse-AT en inducir neutoproyecccion y/o neuroregeneración en modelo preclínicos animales de la Enfermedad de Parkinson	Contrato de investigación	Desarrollo de Proyecto	Chile	Instituciones Públicas o Privadas	Biomedicina
Sistema portátil de retroalimentación y monitoreo telemétrico de actividad muscular vía smartphone	Financiamiento de proyecto de investigación	Desarrollo de Proyecto	Chile	Medicina/Seguridad Laboral	Medicina y salud humana

Annex 14: Outcome Structure

Item	Accumulated expenses to last year [$]	2016 Expenses [$]				Total expenses to 2016 [$]	%
		Operative	Networks	Outreach	Total		
Honoraria researchers and research personnel	1.582.413.889	412.104.691	0	0	412.104.691	1.994.518.580	46,0
Tickets and travel expenses	248.009.466	35.805.886	8.402.281	1.400.749	45.608.916	293.618.382	6,8
Materials and supplies	464.372.560	84.044.541	0	0	84.044.541	548.417.101	12,6
Goods and equipment	393.473.948	25.684.921	0	0	25.684.921	419.158.869	9,7
Infrastructure	381.616.230	52.037.463	0	0	52.037.463	433.653.693	10,0
Administrative expenses	211.786.176	54.794.853	0	0	54.794.853	266.581.029	6,1
Publications and subscriptions	13.621.209	6.363.279	0	2.255.995	8.619.274	22.240.483	0,5
Consultancies	87.988.607	5.900.000	0	10.289.333	16.189.333	104.177.940	2,4
Overhead	53.172.400	44.477.152	0	0	44.477.152	97.649.552	2,3
Others	124.819.854	13.895.549	370.188	16.352.202	30.617.939	155.437.793	3,6
Total	3.561.274.339	735.108.335	8.772.469	30.298.279	774.179.083	4.335.453.422	100,0

Annex 15: Financial Accounting

ITEM	2016 [$]				TOTAL TO 2015
	Operative	Networking	Outreach	Total	
Income	705.695.000	8.434.854	41.503.897	755.633.751	4.939.009.438
Outcome	735.108.335	8.772.469	30.298.279	774.179.083	4.335.453.422
Annual balance	-29.413.335	-337.615	11.205.618	-18.545.332	603.556.016

16. Exchange of Researchers

16.1 Researcher traveling abroad

Name of Researcher	Nationality	Activity	Stay [days]	Country from traveling	Funding (MSI, External, Mixed)
Javier Robalino	Ecuatorian	Course or school teachers	4	USA	External
Jennifer Bricken	American	Course or school teachers	4	USA	External
Marcelo Dietrich,	Brazilian	Speaker Neurosur IV: The Living Brain	3	USA	MIS
Emilio Kropff	Argentinian	Speaker Neurosur IV: The Living Brain	3	Argentina	MIS
Damian Refojo	Argentinian	Speaker Neurosur IV: The Living Brain	3	Argentina	MIS
Pablo Oteiza	Chilean	Speaker Neurosur IV: The Living Brain	4	Germany	MIS
Federico Lecumberry	Uruguayan	Speaker Neurosur IV: The Living Brain	3	Uruguay	MIS
Sergio Ferreira	Brazilian	Speaker Neurosur IV: The Living Brain	3	Brazil	MIS
Shigenori Nonaka	Japanese	Professor Course Optics, Forces and Development	5	Japan	Mixed
Scott Fraser	American	Professor Course Optics, Forces and Development	3	USA	Mixed
Ulrich Kubitscheck	German	Professor Course Optics, Forces and Development	5	Germany	Mixed
Carl G. Ebeling	American	PALM Photoactivated localization Microscopy	2	USA	External
Thomas Schwarz	American	Chilean Society for Cell Biology	5	USA	Mixed
Alkema, Mark, Ph.D.	Dutch	Teacher Small Brains Big Ideas 2016	10	USA	External
Claire Benard, Ph.D.	American	Teacher Small Brains Big Ideas 2016	10	USA	External
Kurzchalia,Teymuras, Ph.D.	Georgia	Teacher Small Brains Big Ideas 2016	10	USA	Mixed
Gho, Michel, Ph.D.	Frenchman	Teacher Small Brains Big Ideas 2016	10	France	External
Gorczyca, David, Ph.D.	American	Teacher Small Brains Big Ideas 2016	10	USA	External
Heberlein, Ulrike, Ph.D.	Chilean	Teacher Small Brains Big Ideas 2016	10	USA	Mixed
Mlodzik, Marek, Ph.D.	Swiss	Teacher Small Brains Big Ideas 2016	10	USA	Mixed
Rayes, Diego, Ph.D.	Argentinien	Teacher Small Brains Big Ideas 2016	10	Argentina	Mixed
Rezaval, Carolina, Ph.D.	Argentinien	Teacher Small Brains Big Ideas 2016	10	England	External
Smith, Brian, Ph.D.	American	Teacher Small Brains Big Ideas 2016	10	USA	External
Waddell, Scott,, Ph.D.	Englishman	Teacher Small Brains Big Ideas 2016	10	England	External
Wright, Geraldine, Ph.D.	Englishwoman	Teacher Small Brains Big Ideas 2016	10	England	External
Barría, Romina	Chilean	Teacher Small Brains Big Ideas 2016	10	USA	External
Foley, Lauren	American	Teacher Small Brains Big Ideas 2016	10	USA	External
Saver, Mathias	American	Teacher Small Brains Big Ideas 2016	10	USA	External

16.2 Researchers traveling from abroad

Name of Researcher	Nationality	Activity	Stay [days]	Country from traveling	Funding (MSI, External, Mixed)
Javier Robalino	Ecuatorian	Course or school teachers	4	USA	External
Jennifer Bricken	American	Course or school teachers	4	USA	External
Marcelo Dietrich,	Brazilian	Speaker Neurosur IV: The Living Brain	3	USA	MIS
Emilio Kropff	Argentinian	Speaker Neurosur IV: The Living Brain	3	Argentina	MIS
Damian Refojo	Argentinian	Speaker Neurosur IV: The Living Brain	3	Argentina	MIS
Pablo Oteiza	Chilean	Speaker Neurosur IV: The Living Brain	4	Germany	MIS
Federico Lecumberry	Uruguayan	Speaker Neurosur IV: The Living Brain	3	Uruguay	MIS
Sergio Ferreira	Brazilian	Speaker Neurosur IV: The Living Brain	3	Brazil	MIS
Shigenori Nonaka	Japanese	Professor Course Optics, Forces and Development	5	Japan	Mixed
Scott Fraser	American	Professor Course Optics, Forces and Development	3	USA	Mixed
Ulrich Kubitscheck	German	Professor Course Optics, Forces and Development	5	Germany	Mixed
Carl G. Ebeling	American	PALM Photoactivated localization Microscopy	2	USA	External
Thomas Schwarz	American	Chilean Society for Cell Biology	5	USA	Mixed
Alkema, Mark, Ph.D.	Dutch	Teacher Small Brains Big Ideas 2016	10	USA	External
Claire Benard, Ph.D.	American	Teacher Small Brains Big Ideas 2016	10	United States	External
Kurzchalia,Teymuras, Ph.D.	Georgia	Teacher Small Brains Big Ideas 2016	10	USA	Mixed
Gho, Michel, Ph.D.	Frenchman	Teacher Small Brains Big Ideas 2016	10	France	External
Gorczyca, David, Ph.D.	American	Teacher Small Brains Big Ideas 2016	10	United States	External
Heberlein, Ulrike, Ph.D.	Chilean	Teacher Small Brains Big Ideas 2016	10	USA	Mixed
Mlodzik, Marek, Ph.D.	Swiss	Teacher Small Brains Big Ideas 2016	10	USA	Mixed
Rayes, Diego, Ph.D.	Argentinien	Teacher Small Brains Big Ideas 2016	10	Argentina	Mixed
Rezaval, Carolina, Ph.D.	Argentinien	Teacher Small Brains Big Ideas 2016	10	England	External
Smith, Brian, Ph.D.	American	Teacher Small Brains Big Ideas 2016	10	USA	External
Waddell, Scott,, Ph.D.	Englishman	Teacher Small Brains Big Ideas 2016	10	England	External
Wright, Geraldine, Ph.D.	Englishwoman	Teacher Small Brains Big Ideas 2016	10	England	External
Barría, Romina	Chilean	Teacher Small Brains Big Ideas 2016	10	USA	External
Foley, Lauren	American	Teacher Small Brains Big Ideas 2016	10	USA	External
Saver, Mathias	American	Teacher Small Brains Big Ideas 2016	10	USA	External