INCT for Excitotoxicity and Neuroprotection (INCT-EN)
REPORT 2009/2010

1. HEAD COMMITTEE - MEETINGS AND DECISIONS MADE.

The HEAD Committee is composed of five members:
Prof. Diogo Onofre Gomes de Souza (General Coordinator)
Prof. Carlos Alberto Gonçalves (Vice-General Coordinator)
Prof. Susana Tchernin Wofchuk (Coord. Group Diffusion of Knowledge)
Prof. João Batista Teixeira da Rocha (Coord.do CIP - Interinstitutional Council of Researchers)
Prof. Jean Pierre Oses (Coordinator of the emergent research groups)

The Head Committee of our INCT meets regularly every month to evaluate the progress of the activities of the Institute, such as:
1. Interactions between groups (travel, joint seminars);
2. Quality and quantity of publications;
3. Allocation of financial resources.
4. As a result of the collective actions arising from decisions of the Head Committee, our INCT reached the next level (see characterization below):

CHARACTERIZATION OF THE GROUP

The researchers group coordinators:

1 - During the first half of 2009 and 2010 (18 months), 173 scientific papers were published, nearly all of them in indexed international journals (Fig. 1).

2 – The profile of articles published by INCTEN (Fig.2) is close to the published in Brazil in the area of Biological Sciences II CAPES (Fig. 3).

3 - There was a significant increase in the number of articles citing INCTEN from 2009 (5%) to 2010 (50%). This increase is reasonable, considering it is the end of the period of published articles resulting from the use of the Institute resources. This is obviously a trend towards full citation INCT in papers.

4 – Scientific collaborations are increasing, both among researchers from the same institution and among different institutions (Figs. 4 and 5). This mindset was triggered by INCT, and is gradually taking place in a productive maner.

5 - Observe that the group has a tradition of expressive human resources training (Figs. 6 and 7), on the direction of theses and dissertations completed and in progress. From early 2009 to June 2010 28 PhD theses and 42 Master's Theses were completed, and 66 Theses and Dissertations 31are underway. This demonstrates the trend towards training more PhD students.

Figure 1

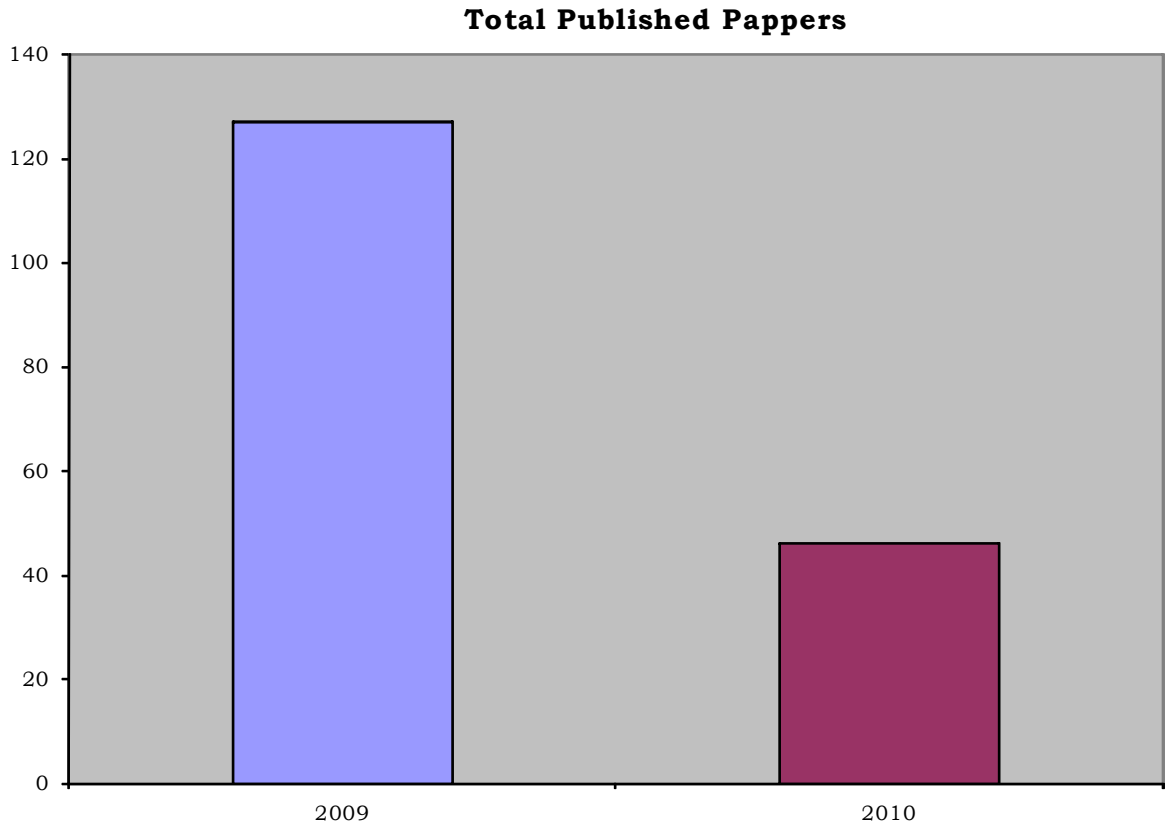


Figure 2

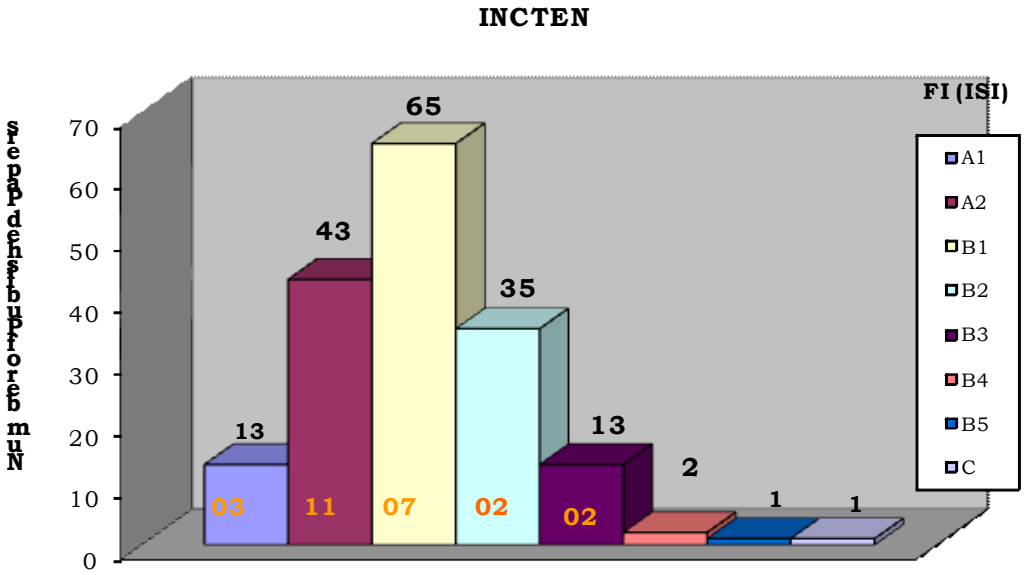


Figure 3

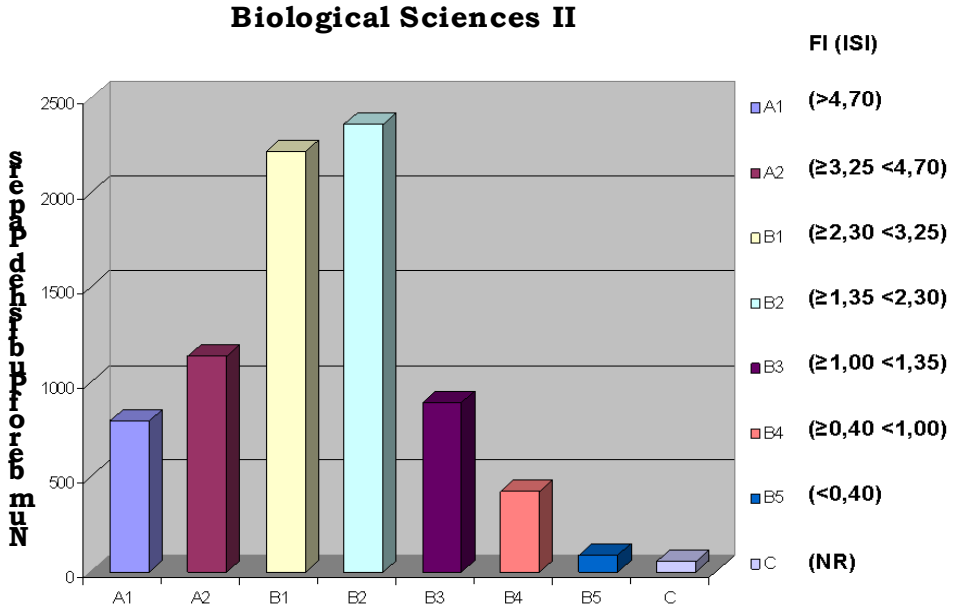


Figure 4

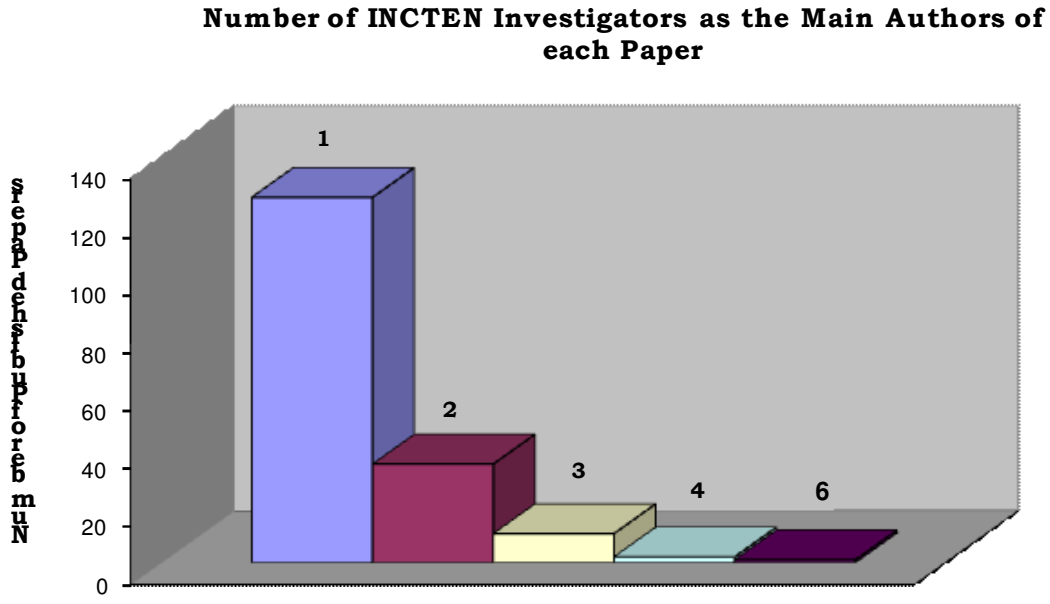


Figure 5

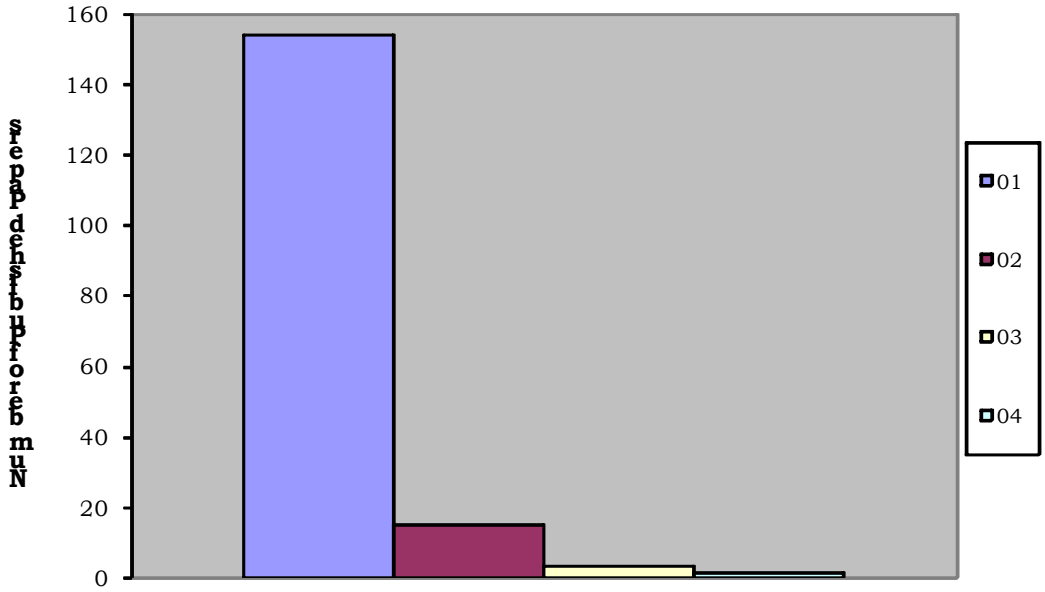


Figure 6

Number of Concluded Post-Graduation

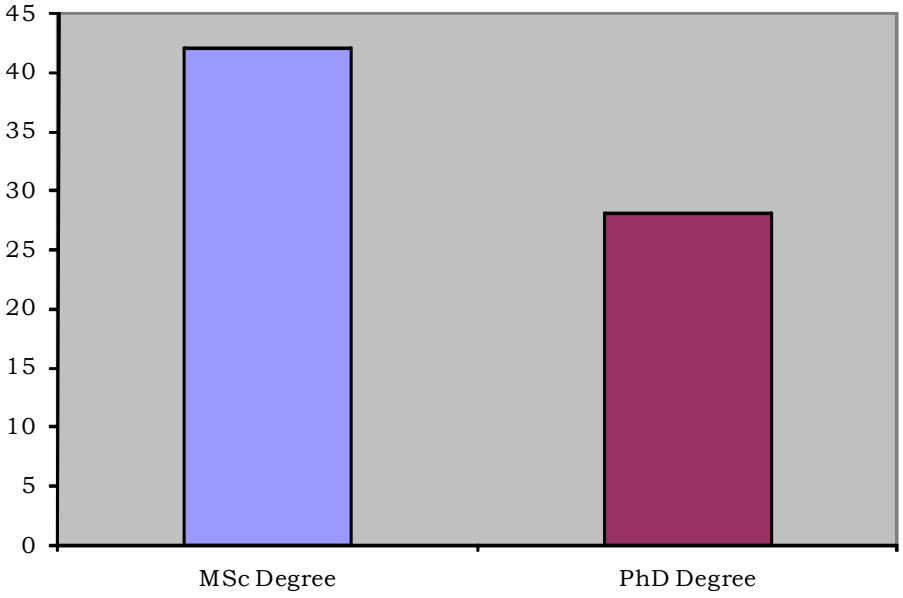
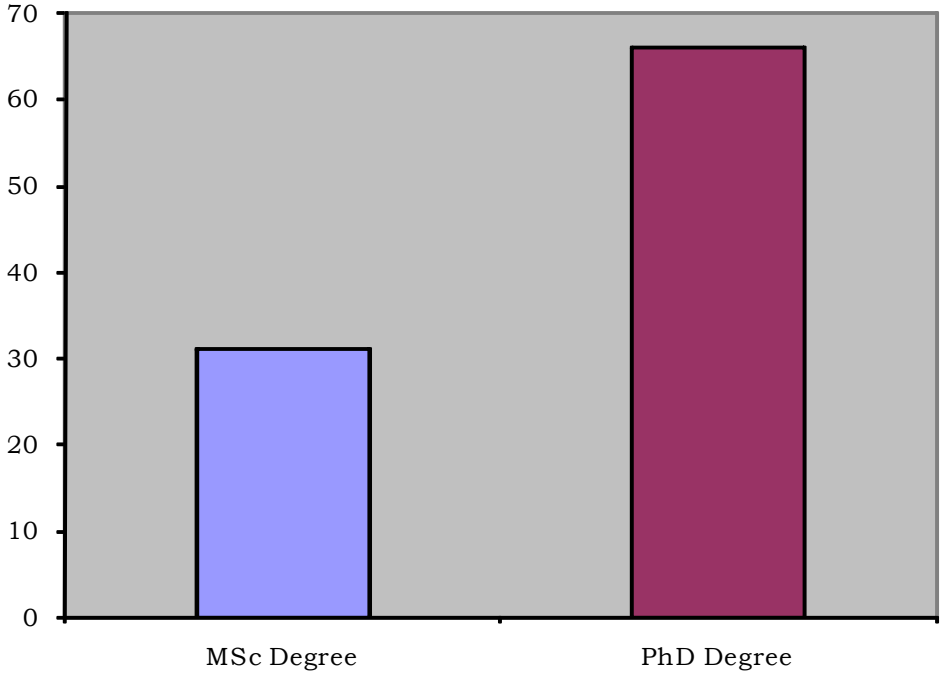


Figure 7

Number of Ongoing Post-Graduation



2. ACTIVITIES OF COOPERATION BETWEEN THE GROUPS OF PARTICIPANTS OF THE INCT.

a) National interactions:

UFRJ - UFRGS

Effect of the exercise and insulin on the mitochondrial bioenergetics and generation of reactive species of oxygen in cortex and hippocampus of mice. Contribution enters the groups of the Prof. Antonio Galina (UFRJ) and Professors Luis V. Portela (UFRGS) and Diogo. Souza (UFRGS).

From January 15th to 30th 2010:

Professor Antonio Galina of the Federal University of Rio De Janeiro, UFRJ, visited the laboratory of professor Luis Valmor Portela in the Department of Biochemistry, ICBS of the Federal University of the Rio Grande Do Sul, UFRGS, to carry on experiments on the neuroprotective effect insulin and physical exercise. Prof. Galina has wide experience in studies with oxidative stress and mitochondrial metabolism, and insulin/physical exercise is an important line of research of Prof. Portela.

From June 7th to 14th 2010:

The PhD student Alexandre Pastoral Muller and undergraduate student Clarissa Haas, under the supervision of Prof. Luiz Portela, visited the laboratory of the Prof. Galina in Rio De Janeiro to complement the work carried on in cooperation with this researcher. The students learned new techniques such as measuring oxygen consumption mitochondrial membrane potential, and the data generated during this period will be part of an showing that insuline diminishes the production of reactive species of oxygen in the brain. This result can have therapeutical implications in illnesses that attend a course with the cerebral degeneration. Moreover, the results complement another work where we intend to elucidate the effect of the physical exercise in the brain through insuline signalling.

Additionally, the Prof. Antonio Galina participated in the Workshop in Austria: Multi-sensor O2k-Workshop - 55 & 56th O2k- and Multi-sensor Workshop on High-Resolution Respirometry 2010, April 7-15, IOC55 & 56, Introductory and Multi-sensor O2k-Workshops on High-Resolution Respirometry.
Programme IOC55 and IOC56 [*download pdf* 1,64 MB; 2010-03-30]

UFRJ - UFSC

Effect of the ischemia - reperfusion in slices of hippocampus and protective effect of the guanosine: An analysis for high resolution respirometry. Collaboration between the groups of the Prof. Antonio Galina (UFRJ) and Profa. Carla Tasca (UFSC).

From May 02nd and 08th 2009:

The MSc student of the IBqM-UFRJ Clara Rodrigues Ferreira and Dr Antonio Galina Filho performed standardization experiments for the attaining diabetic rats with streptozotocine, calibration of the high resolution oxígraph

Oroboros O2K and experiments in slices of hippocampus of mice in collaboratioj with Dra Carla Tasca and Dra Alexandra Lattini.

From August 03rd to 11th 2009:

The PhD student of Dra. Carla Tasca (UFSC), Tharine Dal-Cim, visited the Bioenergetics and Mitochondrial Physiology lab of IBqM (UFRJ) and, together with the PhD student Juliana Camacho-Pereira, with the objective to evaluate for high resolution respirometry the effect of the ischemia and reperfusion in slices of hippocampus and the consequences treatment with guanosine. The evaluated parameters of the mitochondrial respiratory physiology in the slices of hippocampus had been the breath of routine of the tissue; the breath of emptying of protons (proton leak) for the maneuver of oligomicine addition; and the induced maximum breath for the sequential addition of ionophore of protons FCCP.

The analyses of the results if find limited by the best application in the attainment of samples and still they need one better standardization since certain variability in the attainment of the slices of hippocampus for the cutter made impracticable certain measures for the oxígrafo. Exactly having this methodological limitation efforts are in progress in the direction to improve the attainment of more homogeneous slices for the adjustment of the thickness of the cuts. To follow a brief summary of the main gotten results will be presented.

The group of the Dra. Tasca comes investigating the involved ways of signaling with the cellular death in slices of hippocampus and the effect of the inclusion of guanosina on this signaling with the objective of if understanding the mechanism of neuroprotection propitiated for the guanosina. The analyses of cellular viability had been basically carried through in histoquímica analysis of the cellular death for the coloration with propídeo iodide. We raise the possibility of if also evaluating the functionality of the mitocôndrias for a respirômetrica analysis of high resolution, since these organelles has its functionality modified in situations of death and cellular damage being these passíveis alterations of detention for the analysis of the breath of the fabric in the above-mentioned states.

UFSM - URCA

In the year of 2009 two visits of the Prof..João Batista Teixeira da Rocha (UFSM) had been made to URCA (Crato, CE) in April and September. In this period aspects related to the objectives of the INCT and also a visit from a MSc student of the URCA for the UFSM were arranged. (from June to November 2009). The MSc student of URCA Rogério Aquino has also been in Ribeirão Preto (working for the objectives of the INCT) and he is currently doing PhD degree in the UFSM.

In April of 2010 Prof. João Batista made his last visit to the URCA. The first resulting manuscript of the interaction is under review, and another manuscript will soon be submitted.

The INCT also contributed for the approval of a DINTER between CB-BIOQUÍMICA TOXICOLÓGICA - UFSM and MESTRADO in BIOPROSPECÇÃO OF the URCA, supported by CAPES. This is the first PhD degree course in the

region of the Cariri and is important to diminish the asymmetries of post-graduation in the Brazilian northeast.

UFRGS - UFSM

In the year of 2009 there was a close interaction of the PPG CB-Biochemistry Toxicological of UFSM and the PPG Biochemistry of the UFRGS resulted in 1 Masters Degree (Ana Paula Ardais, supervised by Profª Lisiane Porciúncula/UFRGS and co-supervised by Prof. João Batista Teixeira da Rocha/UFSM). The results of this Dissertation were published in 2010 in one of the best journals of Toxicology: Toxicological Sciences (IF- 4,4).

UFRGS - UFSC

Courses and events of regional scope supported by the INCT-EN.

Courses given by researchers of the INCT-EM in the PPG-Neurociências in the UFSC

1. CellCulture, July 2009
2. Applied Immunological methods in Neurochemistry, December 2009

Techicnal training of students of PPG-Neurociências in the laboratories in Porto Alegre: **6 training periods** of graduate students, with duration of 1 month in 2009.

UCPel - UFRGS

Post-partum depression is an important of public health problem that is has been studied in the city of Pelotas/RS in collaboration between Prof. Jean Oses (UCPel) and Luiz Portela (UFRGS). We evaluated the potential diagnostic value of serum BDNF and S100B levels in individuals with post-partum depression. These studies was conducted by MSc students Marta Gazal and Juliana Mallman Talamini Dos Santos, who have concluded their degree, and the PhD degree Thesis (in progress) of Karen Pinheiro (all supervised of the Prof. Oses).

UNIPAMPA - UFRGS

In the first semester of 2009 Profª Lisiane Porciúncula/UFRGS received Biology students from UNIPAMPA to learn techniques and to participate in experiments, being supervised by Prof. Lucia Vinadé, who currently is Pro-Director of the UNIPAMPA. In these experiments, the students evaluated the effect caffeine on synaptic proteins such as calmodulin calcium kinase II (CamKII). The students used these results for the final essay in the graduation course. They were very satisfied and enthusiastic in knowing the routine of a research lab of high scientific standard and showed great interest in returning in 2010 for new experiments and for starting a MSc degree in the PPG in CB-Biochemistry/UFRGS.

PUCRS - UFRGS

Introduction of Neurociência in Zebrafish in the INCT. With regard to the studies involving zebrafish (*Rerio Danio*), the interaction of the Department of Bioquímica/UFRGS with the Laboratory of Neuroquímica and Psicofarmacologia and with the Laboratory of Biology Genômica and Molecular of the PUCRS gave

important contributions involving purinergic signaling and neuroprotection in this species ((Rosemberg et al., 2007; Rosemberg et al., 2008; Rosemberg et al., 2010; Rico et al., 2010). The data suggests that zebrafish is a valuabl model animal for the study of purinergic and glutamatergic signaling and neuroprotection.

b) International interactions:

UFRGS - PORTUGAL

The collaboration between laboratories of Prof. Diogo Souza (UFRGS/Brazil) and Prof. Rodrigo Cunha (Coimbra/Portugal) was strengthened, resulting in 2 joint publications, in high impact journals: Journal of Neurochemistry Journal of Neuroscience. The recognition of the high quality of these works resulted in a invitation to Prof Lisiane Porcinula for a international symposium about purines (www.purines2010.org), in Tarragona (2010, June). Morever, some involved students also presented posters.

UFRGS - CUBA

Scientific cooperation between the UFRGS (CA Gonçalves, LV Portela and DO Souza) with the International Center of Neurological Restoration, in CUBA (Maria Robinson-Agramonte) was stablished to investigate neurodegenerative diseases and the first resulting work has been published: Robinson-Agramonte MA, Gonçalves CA, Portela VL, Saiz-Hinarejos A, Oses PJ, Motta SL, Muller AP, Marquez Gonzalez ME, Gomes de Souza DO. Differential regulation of IgG-NMO autoantibodies on S100B protein and disability in relapsing neuromyelitis optica. Neuroimmunomodulation, 2010, 17:177-9.

UFRGS - CANADA

Cooperation between the UFRGS (CA Goncalves) with the University of British Columbia (Trevor Young) investigating biochemical features of bipolar patients resulted a in interesting joint publication: Andreazza AC, Kapczinski F, Kauer-Sant'Anna M, Walz JC, Bond DJ, Gonçalves CA, Young LT, Yatham LN. 3-Nitrotyrosine and glutathione antioxidant system in patients in the early and barks stages of bipolar to disorder. J Psychiatry Neurosci, 2009, 34: 263-271.

UFRGS - AUSTRALIA

The preexisting interaction between the UFRGS (CA Gonçalves) and the University of Newcastle, Australia (Peter Dunkley) was supported by INCT-EN. We had a publication in this periof resulting from this interaction: Leal RB, Posser T, Rigon AP, Oliveira CS, Gonçalves CA, Gelain DP, Dunkley PR. Cadmium stimulates MAPKs and adrenal Hsp27 phosphorylation in bovine chromaffin cells. Toxicology. 2007; 234: 34-43. This year, in February, DO Souza and CA Gonçalves were to Australia discus results and future cooperation.

UFRGS - USA

University of Colorado, Pediatric Department, Denver, USA

Professors Stephen I. Goodman e Michael Woontner, of the University of the Colorado, Department of Pediatrics, Denver, the USA, recently developed a knockout model of glutaric acidemia type I and kindly offered these animals modified genetically with this model to the Department of Biochemistry, ICBS, UFRGS, so that we could develop a colony to make possible colaborative studies between our Departments. Indeed, we have already initiated experiments with these animals, with the initial objective to compare the ontogenetic expression of glutamate receptors and transporters in these animals with those of wild mice of the same ancestry. We will also study some parameters of the glutamatergic system, mitochondrial energy homeostasis and biological oxidations in vaious cerebral structures (cortex, striatum, hippocampus and cerebellum) in these animals. Currently, Prof. Goodman is working in my laboratory as a Visiting Professor to close our academic linkds and research projects.

Furhermore, in november 2009 I was in Montervideo, Uruguai, through na invitation of Prof. Luis Hector Barbeito, from Instituto Clemente Pinto e Instituto Pasteur, Montevideo, Uruguai, in order to evaluate and extend our collaborative studies on glutaric acidemia type I. We have decided to start to study the in vitro effects of various organic acids accumulating in organic acidemias on viability, morphology and biochemical parameters in cultured neural cells, as well as neuroprotetion of the possible deleterious effects caused by these compounds. It was also agreed that we will perform in vivo studies with 1-7-day-old rats through intracerebroventricular injections, analysing biochemical and morphologic parameters.

Finally, during the 2010 SBBq Meeting at Foz do Iguaçu, we establish with Prof. Goodman and Prof. Barbeito a protocol of collaborative studies in the genetic knockout model of glutaric acidemia developed by Prof. Goodman in order to investigate biochemical and morphological parameters in varioujs brain strudctures.

Yale University School of Medicine, Section of Comparative Medicine, USA

The preexisting cooperation between UFRGS (DO Souza, LV Portela) with the Prof. Tamas Yale University School of Medicine (Tamas Horvath) was strongly supported by INCT-EN. Two PhD students from Souza's laboratory (Marcelo Dietrich and Catiele Antunes) are currently working in laboratory of the Prof. Horvath, in a project involving glutamatergic modulation of appetite. This interaction resulted in 5 publications: 1) NIE, Y. ; ERION, D.M. ; YUAN, Z. ; Dietrich, Marcelo; SHULMAN, G.I. ; HORVATH, T.L. ; GAO, Q. STAT3 inhibition of gluconeogenesis is downregulated by SirT1. Nature Cell Biology, 11: 492-500, 2009 ; 2) DIETRICH, M. . ; HORVATH, T.L. . An Appetite BRAGS Keeps Up will be Life. Cell (Cambridge), v. 137, P. 1177-1179, 2009; 3) Dietrich, Marcelo . ; HORVATH, T.L. The rolls of mitochondrial uncoupling proteins in lifespan. Pfluegers Archiv, 459:269 - 275, 2010; 4) Dietrich, Marcelo . ; HORVATH, T.L. Feeding signals and brain circuitry. European Journal of Neuroscience, 30: 1688-1699, 2009; 5) MAEJIMA, Y. ; SEDBAZAR, U. ; SHIGETOMO, S. ; KOHNO, D. ; ONAKA, T. ; TAKANO, E. ; YOSHIDA, N. ; KOIKE, M. ; UCHIYAMA, Y. ;

FUJIWARA, K. ; YASHIRO, T. ; HORVATH, T.L. ; DIETRICH, M. . ; TANAKA, S. ; DEZAKI, K. ; OH-I, S. ; HASHIMOTO, K. ; SHIMIZU, H. ; NAKATA, M. ; MORI, M. ; YADA, T. . Nesfatin-1-Regulated Oxytocinergic Signaling in the Paraventricular Nucleus Causes Anorexy through the Leptin-Independent Melanocortin Pathway. Cell Metabolism, 10: 355-365, 2009

UFRGS - ITALY

Interaction between the UFRGS (CA Goncalves) and the University of Perugia, Italy (Rosario Donato) was supporeted bu INCT-EN. Two PhD students (Patrician Nardin and Andre Quincozes-Santos) spent 4 months in Donato's laboratory as part of their education and training. In this period, this interaction resulted in a publication Nardin P, Tortorelli L, Quincozes-Santos A, Almeida LM, Leite MC, Thomazi AP, Gottfried C, Wofchuk ST, Donato R, Gonçalves CA. S100B secretion in acute brain slices: modulation by to extracellular levels Here of $^{2+}$ and K^{+}. Neurochem. Res. 2009, 34: 1603-1611.

3. Activities of cooperation between INCT-EN and other institutions

A. National Net of Education in Sciences.

The INCT-EN has a strong interaction with **National Net of Education in Sciences**, which involves 21 groups, in 18 Brazilian universities. This net, idealized and guided by Prof. Leopoldo de Meis, UFRJ, have as goal science diffusion in the basic schools in all country, aiming to motivate students and teachers to scientific education and to attract young people for the scientific research. Many researchers of the INCT-EN are involved in these activities of science diffusion, particularly involving biochemistry and neuroscience issues.

Some activities in public basic schools, called of Experimental Activities of Short Duration - AECD), involve groups of UFRGS and from two other universities (UFSM and FURG), including professors, teachers, plastic artists, basic students, undergraduated students, MSc and PhD students and post-doc fellows.

Two AECD were offered, about Memories, Learnings and Constitution of the Identities, in October of 2009 and in May of 2010, involving at least 80 basic students and 40 teachers.

As results until now, we observed an easy integration of the students and professors from basic schools and universities; joint reflections about to make and teach sciences.

Other productions: homepage of the INCTEN, divulging notice on the activities developed for the Institute, as well as presentation of the institucional body, projects, events, photos of the activities and *link* for contact; video *Access to Science* (*link* available in the page of INCTEN).

B. Brazil –Interaction.

The CNPq, recently through the Program of Cooperation Brazil/Switzerland (Process: 590011/2010-3) approved de Project: **Impact of the style of life and the aging on cerebral functions through its effect in cerebral energy parameters: paper of the transporters of acid cerebral monocarboxílicos**. This project is an interaction between the laboratories of Professors Diogo Souza and Luc Pellerin (from Département de Physiologie, Université de Lausanne, Lausanne, Switzerland).

Le Département de physiologie décroche un Fonds de coopération avec le Brésil

L'équipe du professeur Luc Pellerin, Directeur du Département de physiologie de l'Université de Lausanne (UNIL), a été choisie parmi une vingtaine d'autres candidatures pour participer au nouveau Programme de coopération bilatéral Suisse-Brésil lancé par le Secrétariat d'Etat à l'éducation et à la recherche (SER), en partenariat avec l'Unité de coopération de l'EPFL. Le groupe lausannois bénéficiera ainsi d'un Fonds de Coopération d'un montant de 195'000 CHF pour une durée de deux ans afin d'approfondir ses recherches en matière de neuroénergétique.

Le Brésil, pays prioritaire

Dans son message relatif à l'encouragement de la formation, de la recherche et de l'innovation pour les années 2008 à 2011, le Conseil fédéral a ajouté une nouvelle composante à la politique scientifique extérieure de la Confédération: les relations scientifiques bilatérales doivent être développées et approfondies, tout particulièrement avec huit pays extra-européens désignés comme prioritaires, dont fait partie le Brésil. Ce pays compte en effet parmi ceux dont les activités de publication ont augmenté de manière très significative ces dernières années.

La neuroénergétique ou comment le cerveau gère ses «calories»

Le projet soumis par le professeur Luc Pellerin et son partenaire brésilien, le professeur Diogo Onofre Gomes de Souza de l'Universidade Federal do Rio Grande do Sul (Porto Alegre), est intitulé «*Impact of lifestyle and ageing on brain function via their effects on neuroenergetics: role of brain monocarboxylate transporters*». Il vise à mieux comprendre les interactions entre environnement cellulaire cérébral, mode de vie et vieillissement. «Bien que l'on soupçonne que notre style de vie influe grandement sur la santé de notre cerveau, les mécanismes moléculaires à l'origine des variations de l'activité neuronale sont encore mal connus», détaille Luc Pellerin.

Spécialiste mondialement reconnu en matière de recherche sur les transporteurs de monocarboxylates dans le système nerveux central, le professeur de l'UNIL s'intéresse depuis plus de vingt ans à la problématique de la neuroénergétique. Il cherche plus spécifiquement à élucider non seulement comment le système nerveux central régit son apport en substrats énergétiques, mais aussi de quelle manière il en dispose pour produire l'énergie nécessaire à soutenir ses diverses fonctions.

Vers une amélioration de la santé publique

Le projet suisso-brésilien, qui débutera en septembre 2010 par un symposium organisé dans le cadre du Congrès des neurosciences brésiliennes, se déroulera ensuite parallèlement à Lausanne et à Porto Alegre avec des visites régulières entre partenaires. Ceci afin d'échanger expertises et savoir-faire dans les domaines moléculaires, cellulaires et comportementaux. Ce projet permettra d'évaluer dans quelle mesure l'âge et le mode de vie peuvent avoir un effet bénéfique ou délétère sur l'activité neuronale en modulant les paramètres énergétiques. «Outre une meilleure compréhension des mécanismes fondamentaux, ces travaux devraient fournir aux agences gouvernementales les données nécessaires à l'établissement de nouvelles directives visant à améliorer la santé publique», conclut Luc Pellerin.

http://www.unil.ch/Jahia/site/fbm/cache/off/lang/en/pid/2701;jsessionid=D953B3B8B66F7EAA37496509C8F30430.jvm1?actunilParam=news&showActu=1276777459352.xml&showFrom=1

4. MAIN RESULTS: Publications, Scientific meetings, etc

A - Scientific publications, in 2009 (total of 127) and 2010 (total of 46).

In boldface, we pointed out the main reserchers of the INCT, as shown in Figures 6 and 7 (at the beginning of this report).

Publications

2009

1. MAZZINI, G ; **PORTELA, L ; SOUZA, DO** . The ischemic heart as an extracerebral source for S100B. Resuscitation, v. 80, p. 144-144, 2009.

2. QUINCOZESSANTOS, A ; BOBERMIN, L ; KLEINKAUFROCHA, J ; **SOUZA, DO** ; RIESGO, R ; **GONCALVES, C** ; **GOTTFRIED, C** . Atypical neuroleptic risperidone modulates glial functions in C6 astroglial cells. Progress in Neuro-Psychopharmacology & Biological Psychiatry, v. 33, p. 11-15, 2009.

3. VICENTE, E ; DEGERONE, D ; BOHN, L ; SCORNAVACA, F ; PIMENTEL, A ; LEITE, M ; SWAROWSKY, A ; RODRIGUES, L ; NARDIN, P ; VIEIRADEALMEIDA, L ; **GOTTFRIED, C. ; SOUZA, DO ; Netto CA ; GONÇALVES, C. A**. . Astroglial and cognitive effects of chronic cerebral hypoperfusion in the rat. Brain Research, v. 1251, p. 204-212, 2009.

4. SCHMIDT, A ; TORT, A ; SILVEIRA, P ; BOHMER, A ; HANSEL, G ; KNORR, L ; SCHALLENBERGER, C ; DALMAZ, C ; ELISABETSKY, e ; CRESTANA, R ; **LARA, D. SOUZA, DO.**

5. **D R ; SOUZA, DO** . The NMDA antagonist MK-801 induces hyperalgesia and increases CSF excitatory amino acids in rats: Reversal by guanosine. Pharmacology, Biochemistry and Behavior, v. 91, p. 549-553, 2009.

6. Roos, Daniel H. ; Puntel, Robson L. ; Santos, Matheus M. ; **SOUZA, DO ; Farina, Marcelo** ; Nogueira, Cristina W. ; Aschner, Michael ; Burger, Marilise Escobar ; Barbosa, Nilda B.V. ; **Rocha, João B.T**. . Guanosine and synthetic organoselenium compounds modulate methylmercury-induced oxidative stress in rat brain cortical slices: Involvement of oxidative stress and glutamatergic system. Toxicology in Vitro, v. 23, p. 302-307, 2009.

7. Viola, Giordano G. ; Rodrigues, Letícia ; Américo, João C. ; Hansel, Gisele ; Vargas, Rafael S. ; Biasibetti, Regina ; Swarowsky, Alessandra ; **Gonçalves, Carlos A**. ; Xavier, Léder L. ; Achaval, Matilde **; SOUZA, DO** ; AMARAL, O B . Morphological changes in hippocampal astrocytes induced by environmental enrichment in mice. Brain Research, v. 1274, p. 47-54, 2009.

8. Schmidt, André P. ; Böhmer, Ana Elisa ; Schallenberger, Cristhine ; Antunes, Catiele ; Pereira, Mery Stéfani L. ; Leke, Renata ; **Wofchuk, Susana T**. ; Elisabetsky, Elaine ; **SOUZA, DO** . Spinal mechanisms of antinociceptive action caused by guanosine in mice. European Journal of Pharmacology, v. 613, p. 46-53, 2009.

9. MORETTO, M B ; Boff, B. ; LAVINSKY, D ; **Netto CA** ; **ROCHA, J B T ; SOUZA, DO ; WOFCHUK, S T** . Importance of Schedule of Administration in the Therapeutic Efficacy of Guanosine: Early Intervention After Injury Enhances Glutamate Uptake in Model of Hypoxia-ischemia. Journal of Molecular Neuroscience, v. 38, p. 216-219, 2009.

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B - Scientific meetings

SBNEC (Brazilian Society for Neuroscience) – Symposium: Excitotoxicity and Neuroprotections; 2010, September, Caxambu, MG, Brazil. Chairman: DO Souza

- The effect of guanosine on neuroprotection.
  Diogo Onofre Gomes de Souza (UFRGS)
- Astrocyte-neuron lactate shuttle hypothesis.
  Luc Pellerin (University of Lausanne, Switzerland)
- Injuria axonal difusa em trauma encefálico.
  Douglas H. Smith (University of Pennsylvania, EUA)
- Proteínas desacopladoras de mitocôndria no SNC: suporte na função e sobrevivência.
  Tamas L. Horvath (University of Yale, EUA)

SBNEC (Brazilian Society for Neuroscience) – Symposium: Glial alterations in psychiatric diseases; 2010, September, Caxambu, MG, Brazil. Chairman: CA Gonçalves

- Role of glial abnormalities in schizophrenia and affective disorders.
  Natalya Uranova (Mental Health Research Center, Moscou, Rússia)
- Microglia in depression and schizophrenia.
  Johann Steiner (University of Magdeburg, Alemanha)
- Glial alterations in patients with suicidal ideation.
  Tatiana Falcone (Clevelad Clinic, Cleveland, USA)
- Astroglial antioxidant defense alterations in psychiatric disorders.
  Carlos Alberto Gonçalves (UFRGS)

International Meeeting on Brain Diseases and Neuroprotection 2010, Porto Alegre, Brazil

Speakers: Diogo O Souza, Luis V Portela, Luc Pellerin (Switzerland), Douglas Smith (USA), Tamas Horvath (USA), João B Rocha

Participation in International Events supported by INCT- EN

1. Paris, France,9th World Congress Of Biological Psychiatry 2009 (CA Gonçalves)
2. Gunzburg, Germany, 10th Psychoimmunology Expert Metting 2009 (CA Gonçalves)
3. Newcastle, Australia, Symposium: Glutamatergic Neurotransmission, 2010 (DO Souza and CA Gonçalves)

4. ACTIVITIES OF FORMATION AND QUALIFICATION OF HUMAN RESOURCES

Our data demonstrates that the research team that conducts this project is succeeding in the formation and qualification of human resources (Figures 6 and 7). This includes the number and quality of PhD and MSc woks concluded between 20009 and June 2010 (42 PhD thesis and 28 MSc concluded, besides 66 PhD thesis and 31 MsC thesis in progress. The figures clearly reflect the increase of production of PhD thesis, with new well qualified doctors.

6. PERSPECTIVES AND FUTURES UNFOLDINGS.

5. Increase the knowledge of the molecular and cellular bases of brain disorders involving glutamatergic neurotransmission in human and experimental animal models of these disorders.

6. Allow the developmentof new preventive and therapeutical strategies for brain disorders, including the use of guanosine, GMP, adenosinergic modulators nd antioxidants.
7. Increase the number and quality of the scientific production, through publication of excellent articles in Journal of high impact index product of interaction between the various reserch groups of INCTEN, reinforcing therefore the scientific net, one of the objectives of this project.

8. Increase the formation of Masters (MSc), doctors (PhD) and the scientific qualification of undergraduates and therefore the qualification of human resourcesof INCTEN.

9. Improve and extend the advertisement of topics in Neurosciences related to the INCTEN to the society in general, with emphasis to the Secondary Schools in Brazi, aiming to stimulate teenagers and high school students to enter the scientific career. We also aim to advertise topics in Neuroscience to people involved with health community.