



FINAL REPORT

The 1st joined ISN /IBRO Tunisia Neuroscience School: From basic brain functions to neurodegenerative diseases

Faculty of Sciences of Sfax, Tunisia

November 24th – December 1st, 2019

Prepared by

Dr. Brahim Gargouri

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1. School Overview

- **Overview:**

- We have successfully finished the 1st joined ISN /IBRO Tunisia Neuroscience School: From basic brain functions to neurodegenerative diseases, with very satisfactory results. The 4th The Tunisian first Neuroscience School took place at the Faculty of Sciences of Sfax, Tunisia, from November 24th to December 1st, 2019. Two major topics: "Brain functions" & "Neurodegenerative diseases", were selected and Brain anatomy, as well as the most common NDD such as Alzheimer's disease, Parkinson's disease, were highlighted.
- We have received 77 applications after a wide diffusion through announcements done in local organisms (the University of Sfax, Faculty of Sciences of Sfax, and the ATP-BE association), regional Societies of Neuroscience (e.g.; Tunisian Society of Neuroscience) and directly to the Toxicology, Environmental Microbiology and Health, lab's from colleagues and collaborators of Organizing Committee members.
- Separated by country, the final picture was 25 International students from all over Africa: Nigeria (4), Cameroon (2), Morocco (3), Algeria (3), Egypt (3), and Tunisia (10). The candidates had, in general, an excellent curriculum that made very difficult to select the finally accepted candidates: Students were selected based on the curriculum vitae, the relevance of its participation in the School for its scientific careers, taking into account a balanced distribution from different African countries and, according to the ISN/IBRO request, the special emphasis was taken in gender equilibrium.

- **Theme of the School**

The 1st Joined ISN/IBRO Basic Neuroscience School: "From basic brain functions to neurodegenerative diseases"

- **Details of Venue & Duration**

- **Venue:** The school took place at the University of Sfax - Faculty of Sciences of Sfax, Tunisia / Hotel Ibis. 7 days of training / November 24th – December 01st, 2019.
- **Accommodation and Transportation:** The students and Faculty were accommodated in the iBIS Sfax hotel which is located about 5 km from the faculty of sciences of Sfax (FSS). Buses



were provided to pick up and drop the students and Faculty members from the hotel and FSS and vice versa.

- **Aims and Scope**

- The week-long neuroscience school provided intensive day-to-day and face-to-face interactive program on basic principles of neuroscience, neural networks, and neurodegenerative diseases to understand the role of oxidative stress and Neuro-inflammation in the pathophysiology of neurodegenerative diseases. The school covered topics related to Neurodegenerative diseases with both theoretical knowledge and practical skills on the basic neuroanatomy, neurodegenerative processes, behavioral testing's and imaging techniques for the participants that can be used to understand the cellular and molecular mechanisms in brain functions. The school aims to build capacity in neurosciences in Africa especially for young African researchers that use a small animal as an experimental model in their studies. As well as to educate them in the field of neurodegenerative diseases, seen from conceptual and methodological points and make them aware of the therapeutic advances.

- **ISN/IBRO School Rules & Regulations**

- Lecture notes distributed at the beginning of the school. With a notice that the notes should be read prior to the lectures.
- The 25 International students will be divided into 5 groups and each group should prepare a concrete clinical project (Science fiction Project) to solve the issue of one of the following Neurodegenerative diseases (Alzheimer's Disease, Parkinson's Disease, Epilepsy, and Multiple Sclerosis).
- Students were asked to give a 10-15 minute presentation about their research projects. The presentations were scheduled during afternoon/evening sessions throughout the course.
- Student Presentations: Students presented an overview of their research projects, supervised by **Prof. Abdelhamid Benazzouz, France**.
- Students were asked to complete a lecture evaluation form. The forms must be filled out for each lecture session. All forms should be submitted anonymously, so do not write your name on the form. Please be frank in telling us what you thought about each instructor



and session. Completed forms should be handed to the organizers before the end of the school.

- All students were expected to arrive punctually for school in the morning and to arrive punctually for each lesson. A register was taken at the start of the day and during each lesson. Students arriving late were recorded as thus on the register, along with how many minutes late they were.

2. Short Description of the School

- **Organizing Committee Members :** 1) Pr. Hamadi Fetoui, 2) Pr. Radhouane Gdoura, 3) Dr. Yassine Chtourou, 4) Dr. Baktha Aouey, 5) Ms. Siwar Masrouki
- **Participants**

Name, Gender and Country of Students

	First Name	Last Name	Gender	Nationality
1	Amine	Bourzam	Male	Algeria
2	Brahim	Ben Aicha	Male	Algeria
3	Narcise Huguette	DONGMO	Female	Cameroon
4	JEAN PHILIPPE	DJIENTCHEU TIENTCHEU	Male	Cameroon
5	Abdelmagid	Elmatboly	Male	Egypt
6	Ahmed	Soliman	Male	Egypt
7	Ahmed	Abdelmaqsoud	Male	Egypt
8	Osama Elsayed Mohamed	Mohamed	Male	Egypt
9	Silas Acheampong	Osei	Male	Ghana
10	hajar	Ben mhammed	Female	Morocco
11	ISMAIL	LOURAGLI	Male	Morocco
12	Sofiane	AIT WAHMANE	Male	Morocco
13	Kabirat	Adigun	Female	Nigeria
14	NOSARIEME	ABEY	Female	Nigeria
15	OLALEKAN	OLADIMEJI	Male	Nigeria
16	Sadiq	ADEDAYO	Male	Nigeria
17	FARMANGA	NGOBEH	Female	Sierra Leone
18	Maisa	Shaban Mohamed	Female	Sudan
19	Fatma	Hamed	Female	Tunisia
20	Hela	Belgacem	Female	Tunisia
21	khadija	boukholda	Female	Tunisia
22	mohamed	elmraidh	Male	Tunisia
23	Raoua	JEMAI	Female	Tunisia
24	Sahar	Chakroun	Female	Tunisia
25	Ibrahim	Akid	Male	Tunisia
26	Wassim	GUIDARA	Male	Tunisia
27	Syrin	Ben Mabrouk	Female	Tunisia
28	Fida	OUKHAI CHTOUROU	Female	Tunisia
29	Zaineb	Chaoui	Female	Algeria



	First Name	Last Name	E-mail	Nationality
1	Pr. Abdelhamid	Benazzouz	abdelhamid.benazzouz@u-bordeaux.fr	France/bordeaux
2	Pr. Emmanuel	procyk	emmanuel.procyk@inserm.fr	France/Lyon
3	Dr. Amanda	Sierra	a.sierra@ikerbasque.org	Spain /BILBAO
4	Dr. Abid	Oueslati	Abid.Oueslati@neuro.ulaval.ca	Canada/Quebec
5	Dr. Abdelraheim	Attaai	attaai80@yahoo.com	Egypt/ CAIRO
6	Pr. Patel	Nilesh	npatel@uonbi.ac.ke	Kenya/NAIROBI
7	Dr. Harsharan	BHATIA	harsharan.bhatia@med.uni-muenchen.de	muenchen/GERMANY
8	Dr. Aissette	Baanannou	aissette.baanannou@yahoo.fr	Sfax/Tunisia
9	Mr. Yahia	Kchaou	Yahia@tajagency.com	Tunis/Tunisia

Names and affiliations of School Faculty

- Funding Agencies

- International Society of Neurochemistry (ISN)



The International Society for Neurochemistry (ISN) was our first sponsor for the 1st Joined ISN/IBRO Basic Neuroscience School: "From basic brain functions to neurodegenerative diseases" with funding award of 33,240 (\$). All students were supported through ISN funding.

- The ISN has a proud history dating back to its establishment in 1965 and publishes the Journal of Neurochemistry.
- The International Society for Neurochemistry (ISN) is a nonprofit membership organization and the only international society focused on neurochemistry. With a proud history dating back to its establishment in 1965, ISN strives to promote all relevant aspects of molecular and cellular neuroscience.



- ISN members are scientists and physicians who are active in the field of neurochemistry, cell and molecular neuroscience or related areas and aims to facilitate the worldwide advancement of neurochemistry and related neuroscience disciplines; to foster the education and development of neuroscientists, particularly of young and emerging investigators, and to disseminate information about neurochemistry and neurochemists' activities throughout the world.
- ISN publishes The Journal of Neurochemistry (JNC), one of the leading sources for research into all aspects of neuroscience, with a particular focus on molecular, cellular and biochemical aspects of the nervous system, the pathogenesis of neurological disorders and the development of disease-specific biomarkers.

2. International Brain Research Organization (IBRO)



International Brain Research Organization (IBRO) was our second sponsor for the **1st Joined ISN/IBRO Basic Neuroscience School: "From basic brain functions to neurodegenerative diseases"** with funding award of **15,000 (€)**

- The International Brain Research Organization (IBRO) is the global federation of neuroscience organizations that aims to promote and support neuroscience around the world through training, teaching, collaborative research, advocacy, and outreach. More than 90 international, national and regional scientific organizations constitute IBRO's Governing Council which, together with the five IBRO Regional Committees, address the needs and advance the work of individual scientists and research communities everywhere. In addition, IBRO has partnerships with like-minded scientific societies and organizations to identify priorities and help bridge gaps in knowledge, investment, and resources in the field of brain research.

3. Partners

- Tunisian Association of Physiology & Environmental Bio-monitoring ATPBE
- Faculty of Sciences of Sfax– FSS
- University of Sfax
- Ministry of Higher Education and Scientific Research
- Tunisian Society of Neurosciences



4. Short Description of Lectures

Prof. Abdelhamid Benazzouz



Prof. Abdelhamid Benazzouz was born in 1961 in Morocco. He went to Bordeaux to prepare his Ph.D. diploma that he obtained in 1993. During his Ph.D., he pioneered the discovery of high-frequency stimulation of the subthalamic nucleus in a non-human primate model of Parkinson's disease. Then he moved to Grenoble to participate in the transfer of this neurosurgical therapy to patients. In 1998 he was appointed to a permanent INSERM position. In 2001 he joined the CNRS unit in Bordeaux. In 2005 he was promoted to Research Director Position. Dr. Benazzouz is

also the Head of Team: "Neurochemistry, DBS & Parkinson at the Institute of Neurodegenerative Diseases" He obtained the National Academy of Medicine award in 2003 and the Academy of Science award in 2007. Dr. Benazzouz's research project aims to better understand the pathophysiology of Parkinson's disease in order to improve the existing therapeutic approaches and to develop new therapies for the disease. Currently, his group focuses on the role of monoaminergic systems (noradrenaline, dopamine, serotonin) in the pathophysiology and therapy of Parkinson's disease. The team is acknowledged for its neurochemical and electrophysiological inputs unraveling the mechanisms of action of the deep brain stimulation of the subthalamic nucleus and L-DOPA medication in animal models of Parkinson's disease. Dr. Benazzouz has more than 119 publications in well-known and prestigious International high impacted Journals.



Dr. Amanda Sierra



Dr. Amanda Sierra graduated in Biology in 2000 from the Universidad Complutense de Madrid with a Best College Report in Biology (final marks 3.72/4). She obtained her Ph.D. in Neurosciences degree working in Luis Miguel García-Segura's lab at the Cajal Institute (Madrid 2000-2004), where she participated in 5 research projects and published 12 papers on the neuroprotective role of neurosteroids. Her postdoctoral training lasted 7.5 years in prestigious research centers in #USA. She first joined Bruce McEwen's lab at Rockefeller University (New York 2004-2006) where she started a new research line on the modulation of microglial activity by stress and gonadal hormones. She participated in two research

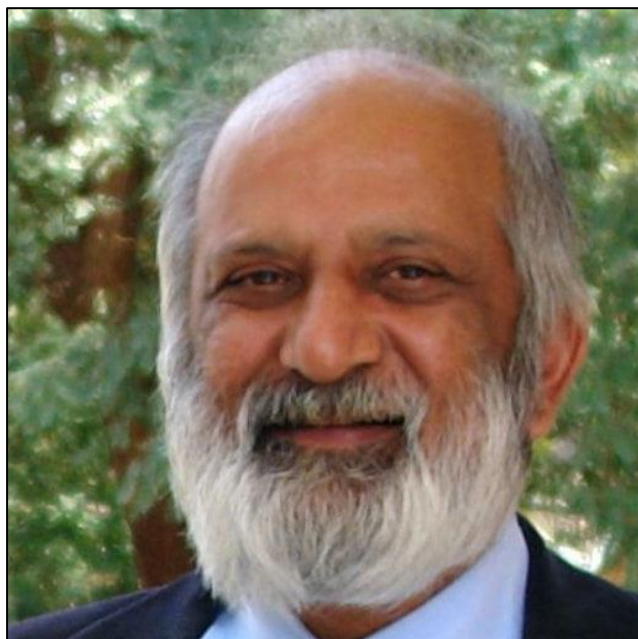
projects and published four papers, two of them as the first author (Glia, 2007; Glia 2008). She then became interested in the role of microglia in physiological conditions and joined Mirjana Maletic-Savatic lab at Stony Brook University (New York, 2006-2008) and later at Baylor College of Medicine (Houston, 2008-2011). There she participated in three research projects on neural stem cells and used her experience on microglia to start a new research line on the role of #microglia in the adult neurogenic cascade (Cell Stem Cell 2010; J Neurosci 2011). Since September 2011 she is an Ikerbasque Research Professor at the Achucarro Basque Center for Neuroscience and the Department of Neurosciences of the University of the Basque Country EHU/UPV. She is currently left of absence from this tenured position because of the incompatibility with a Ramon y Cajal Fellowship (2015-2019). Dr. Sierra has more than 33 publications in well-known and prestigious International high impacted Journals.

JCR articles, h Index:

- 5000 total citations
- 530 annual citations in 2014-2018
- h index=30
- i10 index=35
- 33 papers in Q1 journals (total=41)



Prof Nilesh Patel



Prof Nilesh Patel was born in Nairobi, Kenya in 1954. On his mother's side, the family came to Kenya around 1915. His early education was at Nairobi School and Lindisfarne College (Wales). He obtained his BSc (Hons) degree from the University of Nairobi and proceeded to the University of California, Irvine, for a Ph.D. degree. After post-doctoral training at the University of California, Davis, Prof. Patel returned to Kenya and joined the University of Nairobi in 1989 where he has taught physiology and neuroscience. Prof. Patel is a member of several national and international scientific societies: Kenya Society of Neuroscientists, Society

of Neuroscientists of Africa (SONA), International Brain Research Organization (IBRO), and Society for Neuroscience (USA), New Year Academy of Science, and International Society for Neurochemistry. He was the Secretary-General of SONA for eight years and has served on the Africa Regional Committee of IBRO. He is the current Chairman of the Department of Medical Physiology, College of Health Science, and University of Nairobi. Prof Nilesh Patel has published research work on nerve synaptic formation, #Alzheimer's #Disease, trypanosomiasis and Catha edulis Forsk (miraa). His research interest is the use of neuroscience behavioral techniques to study neurobiology problems unique to Africa. With Dr. Andreas Kopf, Free University of Berlin, he edited "Guide to Pain Management in Low Resource Setting" for the International Association for the Study of Pain (IASP). Over the years, #Prof_Patel has organized workshops, schools, and conferences to promote research, training, and teaching in neuroscience in Kenya and Africa.



Dr Abid Oueslati



Dr. Abid Oueslati is a Tunisian Neuroscientist working as an assistant professor in the Department of Molecular Medicine at Université Laval, director of the "Molecular and cellular neurodegeneration" laboratory at the Centre de Recherche du CHU de Québec (CHUL site), and a member of the management committee of the Axe de Neurosciences-CHUL. Dr Oueslati obtained his Diploma of Advanced Studies (DEA) in Neurobiology (2004), as well as the Doctorate in Neurosciences (2008) at the University of the Mediterranean Aix-Marseille - Faculté des Sciences de Luminy,

Marseille-France. He then joined "The Brain and Mind Institute" at the École Polytechnique Fédérale de Lausanne (EPFL) in Switzerland for a postdoctoral fellowship in Dr Hilal A's group. Lashuel (2008-2014). After a short experience in the pharmaceutical industry at the "EPFL Innovation Park", he joined Laval University as an associate professor (2014) and then as an assistant professor from June 2015. The research program developed by Dr. Oueslati and his colleagues aims to understand the implication of protein misalignment and aggregation in neurodegenerative diseases, including Parkinson's disease and Alzheimer's disease. More specifically, Dr Oueslati's group is developing two areas of research: The role of post-translational modifications in regulating protein aggregation and toxicity in neurodegenerative diseases. The goal of this research axis is to understand how chemical changes (e. g. phosphorylation) affect the aggregation and toxicity of certain proteins in the brain, including alpha-synuclein in Parkinson's disease, and tau and amyloid-beta proteins in Alzheimer's disease. The results of this project will make it possible, on the one hand, to identify new markers for the early detection of neurodegenerative diseases, and on the other hand, to develop new therapeutic targets for these very disabling diseases. Role of prion propagation in the initiation and progression of neurodegenerative diseases. The aim of this project is to investigate how proteins involved in neurodegenerative diseases are able to be transmitted from one neuron to another and from one region of the brain to another, in the same way as prion disease. This spread of pathogenic proteins seems to play an important role in the initiation and progression of Parkinson's disease, and related diseases. The decortication of the molecular and cellular bases of this pathological propagation will make it possible to develop new therapeutic approaches aimed at stopping, or at least slowing down, the progression of these neurodegenerative diseases.



Dr. Brahim Gargouri



Dr. Brahim Gargouri was born in Sfax, Tunisia in 1987. He obtained his bachelor's degree in Biology Molecular and cellular and biotechnology from the Faculty of Sciences of Sfax. In 2014, Dr. Gargouri joined the Laboratory of Toxicology-Microbiology and Environmental Health to enroll his master thesis in neurotoxicology, and neurobehavioral, in which he wanted to unfold questions on the effect of occupational pesticides on human health. After the successful completion of Master Study in genomics and proteomics, He joined Albert-Ludwigs University at Freiburg, Germany to pursue Ph.D. in

Neuroscience with a special research focus on neuroinflammation and neurodegeneration in the Department of Psychiatry and Psychotherapy, group of neurochemistry and neuroimmunology (RG Fiebich). He then joined the Department of Physiology and Pathophysiology, at the Regenerative Medicine Program, at the University of Manitoba in Winnipeg, Canada as a postdoctoral fellow for a short experience. Brahim's research that time has been focussing on the development of stem cell and pharmacological therapies multiple sclerosis (MS) through immunomodulatory mechanisms such as microglia phagocytosis and astrocytes clearance myelin debris during pathological conditions. Currently, Dr. Gargouri is working as Head of Project Development and International collaboration as well as a senior scientist and advisor at VivaCell Biotechnology (GmbH). The company's main services include testing compounds related to pharmaceuticals, nutraceuticals, oral health care and cosmetics for inflammatory and neurodegenerative disorders and quality standards. Dr. Brahim Gargouri is a member of several national and international scientific societies: Tunisian Society of Neuroscience, International Brain Research Organization (IBRO), and International Society for Neurochemistry, Neurex network which is one of the most important European networks for fundamental, clinical and applied research in the field of neuroscience. Qatar Debate center member of Qatar Foundation. He is the co-founder of the Tunisian Society of Neuroscience and he Secretary-General of it. In addition, to his Academic career. Dr. Gargouri is an activist in the civil society, he was the Co-founder of the Debate network in North Africa, and one of the young Tunisian leaders who build the culture of Debating skills, Argumentation, and Critical thinking as well as the Chairman of the first Tunisian Debates Association for 7 years. Dr. Gargouri has published research work on Alzheimer's disease, environmental risk factors such as Pesticides, Nanoparticles, and Particulate matters (Air Pollution). His research interest



is the use of neuroscience behavioral techniques to study neurobiology problems unique to Tunisia. With #Pr_Hamadi_Fetoui from the University of Sfax, as well as with Dr. Yassine Chtourou from the same University, also with Pr. Michele Bouchard from the University of Montreal - Canada and Dr. Bernd L. Fiebich from the University of Freiburg im Breisgau Germany. Over the past 8 years, Dr. Gargouri has organized workshops, schools, and conferences to promote research, training, and teaching in #Capacity_building Debating Skills Neuroscience in Tunisia, Europe, the Middle East, and Africa. He is the Tunisian Neuroscience school idea Owner and responsible. This was in collaboration with Pr. Nouria Ghazel, Dr. Abdelhamid Benazzouz, and Pr. Hamadi Fetoui

Prof. Emmanuel Procyk



Prof. Emmanuel Procyk is a neurophysiologist, research director at the CNRS and Inserm team leader at the Institut Stem cell & brain (U1208) in Lyon, France. Among his Academic Achievements during the last years:

- 2014 Visiting Professor at University of Valparaiso, Faculty of Medicine, Chile
- 2013 Director of Research at CNRS (DR2)
- 2008 HDR (Habilitation à Diriger les Recherches) Claude Bernard University Lyon I
- 2007 Inserm team leader, team 'Neurobiology of executive functions', Stem-cell and Brain Research Institute
- 2002 Full-time researcher CNRS (CR1).
- 1999 Post-doctoral position, with Pr. P.S. Goldman-Rakic, Section of Neurobiology, Yale University, USA.
- 1999 PhD Neurosciences Université LYON I , department of human biology - INSERM U94 Vision et Motricité supervisor: Dr Jean-Paul Joseph.
- 1997 Montréal Neurological Institute / Brain Imaging Centre – McGill, Canada. with Dr M. Petrides, A.C. Evans, and G. Le Goualher. Automated extraction and variability analysis of sulcal neuroanatomy. Development of 3D probabilistic maps of human prefrontal cortex sulci.
- Among his Scientific and academic responsibilities:
- Co-Director of the CNRS GDR 2003 BioSimia: Multidisciplinary group of research on the use of non-human primates in biomedical research.



- Member of the organizing committee of Computational Properties of Prefrontal Cortex
- Member Executive Committee of Neurodis Foundation (since 2014). www.fondation-neurodis.org/
- Member of Ethical Committee for animal experimentation, CELYNE C2EA42, Lyon.

Research interest:

His research interest is about the neural mechanisms which producing higher cognitive functions and allowing flexible and voluntary behaviors? This is the main theme of his research. It addresses action and outcome valuation, cognitive control/working memory and sequential planning, and how these processes contribute to rapid adaptations, from behavioral, neurophysiological and neurochemical to computational levels. His research team is devoted to uncovering the functional specificities, relationships, and dynamics within frontal networks. Most approaches in his lab also aim at understanding the specificity of primate brain networks, function, organization, and computational abilities compared to other species. Dr. Emmanuel Procyk has published research work in Nature_Journals

- Frontal cortex provides insights into primate brain evolution, 2019
- Specific frontal neural dynamics contribute to decisions to check, 2016

Dr. Abdelraheim Attaai



Dr. Abdelraheim Attaai is graduated in veterinary medicine and animal surgery in 2002 from Assiut University, Egypt. He started his scientific career in the field of comparative neuroanatomy, and completed his MD thesis on (Comparative Morphological Studies on the Cerebellum in Some Bird Species) and obtained his Master's Degree (MSc) in 2010 from the Department of anatomy and histology, Assiut University. He conducted his Ph.D. in molecular neuroimmunology at the institute of anatomy and cell biology, Freiburg University, Germany, in January 2018. He is working now a lecturer of anatomy and embryology at the Department of anatomy and histology, Assiut University. He is

founding the neuroimmunology research at his current place. His research interest is in the field of neuroimmunology (development of microglia, a function of microglia in the nigrostriatal system, the role of TGF β in microglia development and targeting of microglia for



the treatment of neurodegenerative diseases). The great importance of his research is to better understand the role of microglia in the development of the nigrostriatal system, which may be targeted for the treatment of Parkinson's disease.

Expertise

- His expertise in molecular neuroimmunology specialized in microglia studies.
- Skillful in molecular techniques both in vivo and in vitro, PCR, RNA isolation and microarray analysis, flow cytometry, immunohistochemistry, histopathology and image analysis.

Main Achievements

- Serving as an editorial board member of JUMD
- Published 5 peer-reviewed articles.
- Presented a talk in the 111th Annual Meeting of the Anatomisches Gesellschaft -held in göttingen 2016- Germany, and is frequently invited as a speaker at some international conferences.
- Scientific reviewer for many journals such as Cells Tissues Organ, microscopy and microanalysis, micron, developmental biology, and scientific reports.
- Scholarship Award from the Egyptian ministry of higher education to conduct the Ph.D. abroad.

Dr. Abdelraheim Attaai recent selected publications:

- Brahim Gargouri, Nizar M. Yousif, Abdelraheim Attaai, Michèle Bouchard, Yassine Chtourou, Bernd L. Fiebicha, Hamadi Fetouib, "2018 Pyrethroid bifenthrin induces oxidative stress, neuroinflammation, and neuronal damage, associated with cognitive and memory impairment in murine hippocampus. " Neurochemistry International Volume 120, November 2018, Pages 121-133. Doi:10.1016/j.neuint.2018.08.004. Impact factor: 3.606
- Abdelraheim Attaai, Nicolas Neidert, Alexander von Ehr, Phani Potru, Tanja Zöller, Björn Spittau, 2018 "Postnatal Maturation of Microglia is Associated with Alternative Activation and Activated Tgf β Signaling." March 2018 Glia. Doi: 10.1002/glia.23332. Impact factor: 5.846
- Tanja Zöller, Abdelraheim Attaai, Phani Potru, Tamara Ruß, Björn Spittau, 2018 "Aged Mouse Cortical Microglia Display an Activation Profile Suggesting Immunotolerogenic Functions. " International Journal of Molecular Sciences, Mar 1;19(3). Doi: 10.3390/ijms19030706. Impact factor: 3.687
- Machado, Venissa, Tanja Zöller, Abdelraheim Attaai, Björn Spittau. 2016. "Microglia-Mediated Neuroinflammation and Neurotrophic Factor-Induced Protection in the



MPTP Mouse Model of Parkinson's Disease-Lessons from Transgenic Mice." International Journal of Molecular Sciences 17 (2): 151. Doi:10.3390/ijms17020151. Impact factor: 3.687

Dr. Aissette Baanannou



Dr. Aissette Baanannou was born in Tunisia in 1981. He obtains an Engineer degree in Biotechnology from the National Engineering School of Sfax in 2005, then two years later Master's degree in biotechnology research. In 2008, #Dr_Baanannou joined the University of Toulouse III (France) to pursue a Ph.D. in Molecular Genetics. He then joined the Biotechnology Centre Sfax -ITG-KIT in Germany for a 2 years Postdoctoral Fellow as part of the TUNGER project. Currently, Dr. Baanannou is working as Head of the PAQ-PAES T1-PAS7 project entitled: "a service provider specialized in genetic analysis and genomic publishing of model organisms". He is in charge of developing a Spin-off that offers genetic analysis and genomic editing services for freshwater fish as well as

embryo-toxicity tests to evaluate the safety of chemical compounds with pharmaceutical, cosmetic or nutritional potential. His target audience will be university laboratories, biomedical and pharmaceutical research companies and fish hatcheries that use genotyping for genetic improvement.

Dr. Baanannou Organizational skills and competencies

- Responsible for the PAQ-PAES T1-PAS7 project: development of innovative services for biomedical research and aquaculture.
- In charge of the TUNGER project: design of experiments, commissions, co-supervision of two female thesis students and a technician in charge of the zebrafish animal house, report writing.
- Organizing the first two practical workshops on zebrafish in Tunisia in 2017 and 2018 as part of the TUNGER project
- Participating in the organization of the International Conference of Engineering Sciences for Biology and Medicine (ESBM)



Mr. Yahia Kchaou



Mr. Yahia Kchaou was born In Sfax in 1992. He obtained his Bachelor's Degree in Computer sciences applied in Management from the University of Tunis, High Institute of Management. In 2015, #Yahia got his Master's Degree in Quality, environment and security Management, and his Master thesis was about Strategic management, leadership and HR management, Integrated Quality, Security and Environment management, Integrated QSE audit, Environmental Economics, and Risks Management. After getting his master's degree Mr. Kchaou decided to start an international experience with AIESEC in India, where he learned how to succeed in a small digital business when

later he Founded and started TAJ Agency, which is a business booster for SMEs in 2017. Currently, Mr. Yahia Kchaou working in the cabinet of the minister of employment as a mission leader in charge of the national strategy of entrepreneurship. Over the last years, Mr. Yahia Kchaou has organized workshops, and conferences about Capacity_building and entrepreneurship.



5. School Timetable

School program (day by day activities): The School provided a 5-day program including both comprehensive lectures and hands-on techniques associated with Behavioral tests, Molecular techniques, Neurodegenerative diseases in vivo models and brain imaging.

Time	Sunday, November 24 th	Monday, November 25 th	Tuesday, November 26 th	Wednesday, November 27 th	Thursday, November 28 th	Friday, November 29 th	Saturday, November 30 th	Sunday, December 1 st
06:00-08:00	Arrival + Lunch	Breakfast & Registration	Breakfast & Registration	Breakfast & Registration	Breakfast & Registration	Breakfast & Registration	Breakfast & Registration	Breakfast
09:00-10:30		Opening Ceremony	SESSION 2 Lecture 4	SESSION 4 Lecture 9	SESSION 6 Lecture 12	SESSION 8 Lecture 14	SESSION 9 Lecture 16	Departure
10:30-11:00		Coffee Break	Coffee Break	Coffee Break	Coffee Break	Coffee Break	Coffee Break	
11:00-12:30		SESSION 1 Lecture 1	SESSION 2 Lecture 5	SESSION 4 Lecture 10	SESSION 6 Lecture 13	SESSION 8 Lecture 15	SESSION 9 Lecture 17	
12:30-14:00		Lunch	Lunch	Lunch	Lunch	Lunch	Lunch	
14:00-15:30		SESSION 1 Lecture 2	SESSION 2 Lecture 5 + SESSION 3 Lecture 7	SESSION 5 Lecture 11	SESSION 7 Course 1 Course 2	Open Day: Social Activity	Close Ceremony and Prizes	
15:30-16:00		Coffee Break	Coffee Break	Coffee Break	Coffee Break			
16:00-18:30		SESSION 1 Lecture 3	SESSION 3 Lecture 8	Students Presentations	SESSION 7 Workshop 1 Workshop 1			
18:30-20:00		Poster Presentation	Poster Presentation		Preparation Group work	Gala Dinner		
20:00-21:30	Dinner	Dinner	Dinner	Dinner		Dinner		



6. Detailed Program

DAY 1 - 24th NOVEMBER 2019 - Arrival of participants (Tunis-Carthage Airport), Tunisia

DAY 2 - 25th NOVEMBER 2019 - OPENING CEREMONY

- At 08:30 Registration of the Participants
- The opening started at 9:00 am with Prof. Abdelwahed Mokni, President of the University of Sfax in attendance. In his opening address, he gave the advocacy lecture where he stated that the Africa continent as a whole needs to give more attention to the subject “neuroscience” as there is an increase in neurological disorders in the continent. He advised that the University should take a lead in this regard and he used the Sfax University, Tunisia as a model.
- Then with Prof. Hammadi Khemakhem, Dean of the Faculty of Sciences of Sfax. Where he started by welcoming the students and Faculty of the ISN/IBRO School and wished them a wonderful stay at the University of Sfax.
- Finally, a presentation about ISN and IBRO programs (History, goals, rules, opportunities) by Dr. Brahim Gargouri, Head of R&D department VivaCell Biotechnology GmbH, Germany where encourage young scientists to take the chance and apply for several scholarships, collaborate and to be more about Africa region.
- The ceremony ended at 10:30 am

**DAY 2 - SESSION 1 - 26th NOVEMBER 2019 Morning & Afternoon Sessions - SESSION 1:
Neurodegenerative diseases: from mechanisms to therapies**

Lecture 1-3 by Dr. Abid Oueslati, University Laval, Canada

His lectures were titled “Parkinson’s disease”, “Protein aggregation”, & “New cellular and animal models”:

- He started with an overview of Parkinson’s disease
- He also observed that attention is been shifted to drugs from plant origin.
- He emphasized some central nervous system (CNS) drugs that are of natural origin (such as morphine, galantamine etc).
- He further stated that plants must be screened for biological activity, isolated, characterized, pass through clinical trials before they can be approved for use.
- He also emphasized the need for a post-clinical examination of some Parkinson’s disease. However, he observed that
- He encouraged the students that although the process of development of drugs is a long one, the result of such research is very rewarding.



In the second and third section,

- Abid stated the formation and accumulation of abnormal protein aggregates is a paramount pathological hallmark shared by several, if not all, neurodegenerative diseases. One example is α -synuclein-rich inclusions found in synucleinopathies, which are referred to as Lewy bodies.
- He then explained how these aggregates affect neuronal homeostasis remains elusive, in part because we lack the proper tools to undertake such investigations.
- He has therefore set out to tackle this question by developing a unique approach to fully control α -syn aggregation and LBs formation in cell culture and within cerebral tissue using light.
- He has termed this technique Light-inducible protein aggregation (LIPA) and herein provides the extent of applicability using both in vitro and in vivo contexts. In living cells, our LIPA system allows real-time induction of α -syn inclusion formation with remarkable spatial and temporal resolution.
- Finally, he concluded that this system constitutes a new and exceptional tool by which to generate, visualize and dissect the role of LBs in neurodegeneration and as such, identify new genetic and pharmacological inhibitors of α -syn aggregation for the treatment of α -synucleinopathies.

DAY 2 - SESSION 1 - 26th NOVEMBER 2019 Morning & Afternoon Sessions - SESSION 1: Neurodegenerative diseases: from mechanisms to therapies

Lecture 4: DISCO Tissue Clearing: A holistic approach to investigate Neurodegeneration at sub-cellular level. (Dr. Harsharan S. Bhatia, Institute for Tissue Engineering and Regenerative Medicine. Helmholtz Zentrum München, Germany)

- He started his speech by introducing the DISCO Technology which is a line tissues transparency technology, which has been a great utility for scientists from diverse biomedical research fields. Overall, this approach provides a holistic view of interconnected biological systems to perceive biological mechanisms in an unbiased way.
- He then showed the main idea behind this technology through his current works in ERTURK Lab which is trying to understand the key mechanisms leading to neurodegeneration after acute brain injuries, mainly stroke and dementia.

DAY 3 - 26th NOVEMBER 2019 – Morning Session - SESSION 2: Microglia in Health and Disease

Lecture 5: “Postnatal maturation of microglia is associated with alternative activation and activated TGF- β signaling” - Dr. Abdelrahman attaa, University of Assiut, Egypt:



- The first lecture for the day was by Dr. Abdelrahman attai titled what have we learned about postnatal maturation of microglia. He gave a lecture on his past research studies which were majorly aimed at determining the involvement of microglia in a widespread set of physiological and pathological processes and which further play important roles during neurodevelopmental events.
- He stated that postnatal maturation of microglia has been associated with the establishment of microglia-specific gene expression patterns.
- He emphasized the mechanisms governing microglia maturation are only partially understood but and for that TGF- β has been suggested to be one important mediator.
- In his recent study, Abdelrahman demonstrate that early postnatal microglia maturation is associated with alternative microglia activation, increased engulfment of apoptotic cells as well as activated microglial TGF- β signaling.
- Interestingly, he stated microglial TGF- β 1 signaling preceded the induction of the microglia-specific gene expression indicating the importance of TGF- β 1 for postnatal microglia maturation.
- Moreover, he provided evidence that TGF- β 1 is expressed by neurons in postnatal and adult brains defining neuron-microglia communication via Tgf β 1 as an important event. Finally, we introduce the recently identified microglia marker Tmem119 as a direct TGF- β 1 -Smad2 target gene.
- Taken together, his data presented further increase the understanding of TGF- β 1 - mediated effects in microglia and place emphasized on the importance of TGF- β 1 for microglia maturation and maintenance.

Lecture 6: “Microglia and adult neurogenesis: the role of the phagocytosis secretome” - Dr. Sierra Amanda, University del País Vasco, Spain

- Dr. Sierra started his lectures by explaining process of adult hippocampal neurogenesis.
- She emphasized that most newborn cells undergo apoptosis and are rapidly phagocytosed by resident microglia to prevent the spillover of intracellular contents.
- She further highlighted that phagocytosis is not merely passive corpse removal but has an active role in maintaining neurogenesis.



- Then she explained that her team first found that neurogenesis was disrupted in mice chronically deficient for two phagocytosis pathways: the purinergic receptor P2Y12; and the tyrosine kinases of the TAM family MerTK/Axl).
- In contrast, Dr. Sierra stated that neurogenesis was transiently increased in mice in which MerTK expression was conditionally downregulated.
- Next, she performed a transcriptomic analysis of the changes induced by phagocytosis in microglia in vitro and identified genes involved in metabolism, chromatin remodelling, and neurogenesis-related functions.
- Finally, she discovered that the secretome of phagocytic microglia limits the production of new neurons both in vivo and in vitro. the data suggest that microglia are reprogrammed by phagocytosis to act as a sensor of local cell death, modulating the balance between proliferation and survival in the neurogenic niche, thereby supporting the long-term maintenance of adult hippocampal neurogenesis.

Lecture 7: “Phagocytosis as a therapeutic strategy in neurodegeneration” - Dr. Sierra Amanda, University del País Vasco, Spain:

- Dr. Sierra started her lectures by defining the “Microglia” which are considered the main brain phagocytes involved in all neurodegenerative diseases, but the evidence for this statement is largely indirect and based on morphological criteria (“activated” or ameboid cells) or expression of “phagocytosis markers” such as the lysosomal protein CD68.
- She, however, stated that over the last few years her group has developed a quantitative approach that has allowed us to directly assess phagocytosis efficiency under different apoptotic challenges in vivo.
- She discussed her recent findings showing that microglia is an efficient phagocyte in physiological conditions, as they do not need to be challenged to readily engulf apoptotic debris.
- Then she emphasized the role of microglia plastically respond by increasing their phagocytic capacity, maintaining apoptosis and phagocytosis tightly coupled and this is when challenged with increased numbers of apoptotic cells, 3, microglial phagocytosis is chronically impaired in pathological conditions such as epilepsy and stroke, resulting in accumulation of apoptotic cells and inflammation.
- Amanda concluded that because of neuronal death and inflammation are hallmarks of all major brain diseases, such as ischemic stroke, Alzheimer’s, Parkinson’s, or Multiple Sclerosis, harnessing microglial phagocytosis may serve to control tissue damage and inflammation as a novel strategy to accelerate brain recovery.

DAY 3 - 26th NOVEMBER 2019 - Afternoon Session - SESSION 3: Fundamentals of Brain Functions

Lecture 8: “Neuroanatomy: general principles and focus on the neocortex” - Pr. Emmanuel Procyk, University Lyon 1, France



- Dr. Procyk started his lectures by defining the brain neuroanatomy, which is a highly complex organ in which global, local and microscopic levels of organizations provide specific functional properties.
- Then during his lecture, he emphasized the role of some these anatomical features in mammalian brains and show how they relate to functional organizations and information processing properties. Finally, he focused on the cortex in the context of large connections with subcortical structures.

Lecture 9: Functional neuroanatomy of basal ganglia in Parkinson's disease pathological conditions: Part 1 by Prof. Abdelhamid Benazzouz, University of Bordeaux, France

DAY 4 - 27th NOVEMBER 2019 - SESSION 4: Fundamentals of Brain Functions

Lecture 10: Functional neuroanatomy of basal ganglia in Parkinson's disease pathological conditions: Part 2 by Dr. Abdelhamid Benazzouz, University of Bordeaux, France

- Dr. Benazzouz started his lectures by explaining the pathology of Parkinson's disease which is the second most common neurodegenerative disorder, characterized by the manifestation of motor symptoms, which are mainly attributed to the degeneration of dopamine neurons in the pars compacta of the substantia nigra, and based on advancements in the understanding of the pathophysiology of the disease, especially in animal models, basal ganglia and especially the subthalamic nucleus has been pointed as a major target for deep brain stimulation in the treatment of motor symptoms.
- First, he explained the development of the PD in non-human primates and then he showed that successfully transferred to parkinsonian patients. In addition to that Dr. Benazzouz stated the beneficial effects of deep brain stimulation in parkinsonian patients are due to silencing and/or normalization of the firing pattern of the hyperactive neurons in the target nucleus, by a mechanism still under debate. Nevertheless, he shed the light that despite the focus on motor deficits, Parkinson's disease is also characterized by the manifestation of non-motor symptoms, which can be due to the additional degeneration of norepinephrine, serotonin, and cholinergic systems. Further, he emphasized that the pathophysiology of the non-motor symptoms is understudied and consequently not well treated.
- Furthermore, he showed data from the literature about the impact of sub-thalamic deep brain stimulation on non-motor disorders are controversial and still under debate. Similarly, he showed the risk of mood disorders post-deep brain stimulation surgery remains also controversial.
- Finally, he provided evidence that the interaction of the monoaminergic systems with the beneficial effect of deep brain stimulation.



Lecture 11: Neurobiology of the frontal lobes and basics of frontostriatal functions - Pr. Emmanuel Procyk, University Lyon 1, and France

- Emmanuel started his lecture by explaining the role of frontal lobes which are fundamentally involved in all aspects of the production and control of behaviors, from simple motor acts to complex reasoning.
- Then during his lecture he centered on the organization and function of the frontal lobes with a focus on the prefrontal cortex and its role in higher cognitive functions and decision making.

DAY 4 - 27th NOVEMBER 2019 - SESSION 5: Professional Development

Course 1: Educational and Career Opportunities in Neuroscience and Brain Research: students and faculty open discussion led by a discussion leader by Dr. Abdelhamid Benazzouz, University of Bordeaux, France

Afternoon SESSION - Student Presentations: Students present an overview of their research projects supervised by:

- Dr. Abdelhamid Benazzouz, University of Bordeaux, France
- Prof. Emmanuel Procyk, University Lyon 1, France
- Prof. Nilesh Patel, University of Nairobi, Kenya
- Dr. Abderaheim ATTAI, University of Assiut, Egypt

DAY 5 - 28th NOVEMBER 2019 – Morning Sessions - SESSION 6: Behavioural and Brain Functions

Lecture 12: Learning and decision making (behavior and neurophysiology) - Pr. Emmanuel Procyk, University Lyon 1, France

- Pr. Emmanuel Procyk started his lecture by explaining the adapting decisions and behavior is a central element of survival and of the success of animals in resisting and mastering new or changing environments.
Then during his lecture he stated some basic elements of decision making and learning, looking in particular at action-outcome associations, value-based decision making, and the role of the reward system

Lecture 13: Neurobiology of Psychostimulants (Pr. Nilesh Patel, University of Nairoubi, Kenya)

- Pr. Nilesh Patel started his lecture by giving a historical background about psychostimulants during the late 19th century,



- He stated that psychostimulants were widely used for medical and recreational purposes. However, he also showed effects of psychostimulants 'dark side', namely its frequent, regular use could lead in vulnerable individuals to compulsive uncontrolled use despite conscious awareness of the negative social and health consequence of its use.
- Then during his lecture, he emphasized the current understanding of the neural substrates involved and the neuroadaptation these undergo with drug exposure.
- He also explained that there were different neural circuits involved in the 3 stages of the addiction cycle – binge/intoxication (rewarding stage), negative emotional state (withdrawal stage), and anticipation/preoccupation (craving stage) and that the progress of these stages involves a sequential series of neuroadaptation and neuroplastic changes both within and between the different neural circuits.
- Finally, he concluded that the study of the changes taking place in the neural substrates influenced by psychostimulants will provide novel protocols for treatment of addicted individuals.

DAY 5 - 28th NOVEMBER 2019 –AFTERNOON SESSION 7: Experimental models for Neurodegenerative Diseases

Short Descriptions on Practical Sessions and Workshops

- The Afternoon started with three parallel sessions:
 - The students were divided into 2 groups ten students participated in each practical workshop along the course and presented a summary with results the last day of the School. The selection of the student for each seminar was done based on their skills in neuroscience, nationality, and gender.
1. Immunohistochemical techniques and their applications in the histopathology of the brain demonstrated by Dr. Abdelraheim Attaai (Faculty of sciences of sfax)
 2. Freshwater fish a neurodegenerative disease model to test to evaluate the safety of chemical compounds with pharmaceutical, cosmetic or nutritional potential demonstrated Dr. Aissette Baanannou (Center of Biotechnology of sfax)

DAY 6 - 29th NOVEMBER 2019 – Morning sessions - SESSION 8: Neurobiology and Physiology



Lecture 14: Catha edulis Forsk (khat) – a natural source of the psychostimulant cathinone (Pr. Nilesh Patel, University of Nairobi, Kenya)

- The first lecture for the day was by Pr. Nilesh Patel entitled " Catha edulis Forsk (khat) – a natural source of the psychostimulant cathinone"
- He started by defining Catha edulis Forsk which is a plant cultivated in the southern part of the Arabian Peninsula and south down to eastern Africa. Its fresh young leaves and twigs (khat) are chewed for its psychostimulant effects.
- Then during his lecture covered the biosynthesis of its main active compound, cathinone, and its effect on the nervous system which are similar to amphetamine. In addition, he stated its effects on the cognitive and behaviour parameters and its dependence and addictive potential will be discussed.
- Finally he concluded that due to its legality and culture practise, the use of khat is geographically limited to the areas where it is grown and so is uniquely an African issue.

Lecture 15: The Importance of Astrocytes in the Research of CNS Diseases (Dr. Abdelrahman Attaai, University of Assiut, Egypt)

- The Second lecture for the day was by Dr. Abdelrahman attaai entitled "Astrocytic heterogeneity". He defined the astrocytes and explained their abundance as part of the glial cells in the central nervous system (CNS) and which important players are in synaptic function, neural circuit, and behavioral functions.
- He stated that astrocytes communicate with neurons, via chemical messengers such as released neurotransmitters and gliotransmitters. They have long been considered morphologically homogeneous populations tiling the entire CNS.
- He reviewed their former classifications were; physiologically, the subdivision into fibrous and protoplasmic types; and pathologically, the reactive astroglia when the nervous tissue exposed to an insult. However, he emphasized the recent progress is challenging this conventional view especially after the development of new animal models, immunohistochemistry, advanced imaging techniques such as electron microscopy,



confocal and two-photon microscopy, morphological reconstruction, in vivo isolation approaches and availability of genome-wide RNA expression methods.

- He concluded that the studies have greatly propelled molecular profiling of astrocytes and characterized region- and circuit-specific morphological and functional heterogeneity of astrocyte in different brain areas.

DAY 6 - 29th NOVEMBER 2019 – Open Day

Open Day:

- **Social Activity:** Participants visited the Sfax old town
- **Gala Dinner:** at the TAMARIS Hotel in Mahrès Village 38 km far away from Sfax City. During this event, the ISN/IBRO Scientific Committee announced the awards prizes winners from both groups (Group I & Group II) as well as the acknowledgment of the international instructors.
- **Awards:**
 - **Gold prize:** Mrs. Hagar Ben Mhammed from **group I**
 - **Gold prize:** Dr. Mohamed Elmraidh from **group II**
- **IBRO ALUMNI**

The 1st join ISN/IBRO Neuroscience basic School in Tunisia had a transparency election process and from 8 nominated students we had:

- **President:** Jean Philippe DJIENTCHEU TIENTCHEU – Cameroon
- **Vice president:** Zaineb Chaoui – Algeria

DAY 7 - 30th NOVEMBER 2019 – MORNING SESSION 9: Soft skills & how to build Neuroscience Network

Lecture 16: How to build your Neuroscience Network (Soft skills) Part 1 by Mr. Yahia Kchou, Advisor, and Ministry of vocational training and Employment in charge of Entrepreneurship. Tunisia

- Mr. Kchaou started his interactive workshop with defining the soft-skills for Student trainees and demonstrated to them some experiential learning and practical training related to both Academia and Industry.
- Then during the workshop, Mr. Kchaou integrated the actual experience of both governmental and private sectors with the educational knowledge and experience in supervising their trainees and guiding them to innovatively address the needs/problems encountered them. Having such sustainable integration would ultimately improve the



'ISN/IBRO trainees' skills through gaining more practical exposure in the field of neuroscience and hence, would increase their employment opportunities in both academia and industries.

Lecture 17: How to build your Neuroscience Network (Soft skills) Part 2 by Mr. Yahia Kchou, Advisor, and Ministry of vocational training and Employment in charge of Entrepreneurship. Tunisia

- In the second part of his workshop Yahia introduced the concept of Tunisian Entrepreneurship which is the act of being an entrepreneur or "one who undertakes innovations, finance, and business acumen in an effort to transform innovations into economic goods." He stated that a young neuroscientist may start a new organization or may be part of revitalizing mature organizations in response to a perceived opportunity.
- Then, he explained the most obvious form of entrepreneurship which is that of starting new businesses (referred to his Startup Company TAJ Agency).
- Finally, he concluded that in recent years, the startup has been extended to include social and political forms of entrepreneurial activity.

DAY 7 - 30th NOVEMBER 2019 – AFTERNOON SESSION: Close Ceremony and Prizes

- Group Photo

DAY 8 – 1st DECEMBER 2019 – AFTERNOON SESSION: Close Ceremony and Prizes

- Return home trips

7. Media and advertising

- National Media (Radios, TVs, Newspapers, Electronic Magazines).
- <https://www.histoiredesfax.com/201902-%d9%84%d8%a7%d9%88%d9%84-%d9%85%d8%b1%d8%a9-%d9%85%d8%af%d8%b1%d8%b3%d8%a9-%d8%b9%d9%84%d9%85%d9%8a%d8%a9-%d8%af%d9%88%d9%84%d9%8a%d8%a9-%d8%ad%d9%88%d9%84%d8%a7%d9%84%d8%a7%d9%85%d8%b1%d8%a7%d8%b6/?fbclid=IwAR3Mwuj34BaQielYS8zRj1LntMk1VW1oVdkcBpeWkewMucxMWBMqJZzPTlg>
- Social Media (Facebook, Twitter, Youtube)
- School Pictures and Videos: Pictures and videos links:
- **Pictures:** <https://we.tl/t-RVQNZ8981r>
- **Video:** <https://we.tl/t-149mnhmoJo>
- Printing, Poster, Flyers, banners, Bloc-notes...
- For more details, videos, and pictures please check our Facebook: https://www.facebook.com/pg/Tunisian-Society-of-Neuroscience-113616386724978/posts/?ref=page_internal



8. Closing remarks by Organizers

9.

- Out of the 77 applicants, 30 students were selected by ISN/IBRO Scientific Committee and local organizers. It was very competitive in the selection because of the high quality of their achievement and records. This School is organized by the International Society of Neurochemistry (ISN), the International Brain Research Organization (IBRO) and the University of Sfax. The School will cover your travel expenses, all costs:
 - Airline tickets (All International Students)
 - Accommodation (At IBIS Hotel Sfax),
 - Meals (Breakfast at IBIS Hotel Sfax, Lunch, and Dinner at the restaurant outside the hotel and all the meals taken in the hotel will not be charged by the School)
 - Ground transportation: Bus from and to the University every day.

These fees are entirely supported by the International Society of Neurochemistry (ISN) & the International Brain Research Organization (IBRO).

- There was trouble in the VISA application and visiting to Sfax city Tunisia from abroad for 5 students:
 - Silas Acheampong Osei from Ghana
 - FARMANGA NGOBEH from Sierra Leone
 - Maisa Shaban Mohamed from Sudan
 - Osama Elsayed Mohamed from Egypt
 - Sofiane AIT WAHMANE Morocco
- The students really enjoyed the lectures regarding diverse fields of neuroscience from the International instructors at Sfax University. The 2 groups were made by 25 students and exercised new techniques in each Lab where they visited such:
 - **The center of biotechnology of Sfax**, Freshwater fish a neurodegenerative disease model by Dr. Aissette Baanannou (Center of Biotechnology of Sfax). Students enjoyed the round table discussion to review this school with Profs Abdelhamid Benazzouz, Nilesh Patel Emmanuel Procyk as a council member of ISN/IBRO School.
 - As well as the Immunohistochemical techniques practical workshop at the life science department (Faculty of sciences of Sfax) by Dr. Abdelraheim Attaai
 - Then, Prof Hamadi Fetoui organized the farewell party on the evening of November 30th.



- Finally, we sincerely express our thanks for ISN as well as the IBRO Organization for providing us with this funding supports which gave us this opportunity to communicate young investigators in Africa regions at the Faculty of Sciences of Sfax .
- **Ecozone Coworking Space:** Students were invited to discover more about entrepreneurship in Ecozone Coworking Space, where youth can meet, share ideas and create projects. We are happy to be part of such an enriching ecosystem.

Conclusion:

- We hope that this school contributed to build capacities in neuroscience, particularly by the exceptional quality of the program; most of the students enjoyed education about Neuroscience field, together with the very interactive sessions, the workshops proposed with simple methods that reproduced locally was very fruitful.
- In addition, we think that the special feature of this school by African lecturers were in the highly specialized field of neurodegenerative diseases and who perfectly know the difficulties of educational context and development of research in Africa countries.
- This gave an example of professional success and greatly facilitated the contact between teachers and students in general who provided a lot of advice on how to achieve quality training in neuroscience and how to get there despite the difficulties to conduct a research of quality in neuroscience.
- We hope to have more schools in the field of Neurochemistry, and Neuroscience which could ignite students' curiosity about the brain as an intricate physical organ in order:

Best wishes,

Dr. Brahim Gargouri (TSN, Chair)

10. Budget of the School

11. Recommendation letters from the instructors