

Institute of Clinical Neurosciences of Southern Switzerland – Neurocenter (NSI)

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The Neurocenter of Southern Switzerland (NSI) hosts the Services of Neurology, Neurosurgery, Neuroradiology, Pain management Center as well as the Laboratory for Biomedical Neurosciences. It is a priority for the NSI to implement basic and clinical research. Both an exceptional publication activity and several academic nominations reflected this scientific endeavour in 2018. Furthermore, the NSI actively contributed to the development of the new Faculty of Biomedical Sciences of the Università della Svizzera Italiana, among other with the creation of two new PhD programs. The pertaining projects are summarised in the following sections.

Laboratory for Biomedical Neurosciences (LBN)

Our translational research focusses on the elucidation of the molecular mechanisms involved in the initiation, progression and consequences of motor disorders such as Parkinson's Disease (PD) or other neurodegenerative diseases collectively defined as proteinopathies. Another important objective is training and education of young scientists. This year, the laboratory hosted five PhD students affiliated with the universities of Bern, Zurich, Basel and USI and two master students.

Neurodegeneration Research Group

The main focus is on aberrant post-translational modifications, subcellular localisation and self-assembly of the proteins involved in the development of neurodegenerative disorders such as frontotemporal lobe dementia, PD, or Alzheimer's disease.

Parkinson and Basal Ganglia Research Group

A translational research project performed in collaboration with the Movement Disorders group, searches for early biomarkers in skin samples. This project is possible thanks to the creation at the NSI of a biobank and a PD database in Ticino. The first results have been published in 2018.

Movement Disorders Center

The priority relies on dyskinesias in Parkinson's Disease (PD) and the influence of neuronal plasticity changes during sleep. Furthermore, a translational research project in patients affected by cervical dystonia using non-invasive transcranial magnetic stimulation started in 2018 and is the first PhD project in Human

Neurosciences of the USI, under the supervision of PD Dr. S. Galati who received his "venia legendi". In addition, a translational research project using skin biopsy to diagnose PD was continued in 2018.



Multiple Sclerosis Center

The research focuses on early diagnosis, exploring pioneering MRI techniques, understanding better MS symptoms like fatigue or searching for innovative treatments of overactive bladder. We also participate to a nationwide investigator initiated project on MS epidemiology. The Center is also collaborating with the industry for international studies on innovative treatments. The responsible of the Center (Prof. Dr. C. Gobbi) was nominated titular professor at the USI and PD Dr. C. Zecca, received the "venia legendi".

Neuromuscular Unit, Myosuisse

The Neuromuscular Unit participates in the Swiss Register of Neuromuscular Disorders. In 2018, a multi-center, international study on Neuralgic Amyotrophy, comparing the idiopathic and the HEV-related form was continued and the investigator, Dr. P. Ripellino received the important Baasch-Medicus Award.

Neuropsychology and Behavioural Neurology Research Unit

Several collaborative projects are underway, mainly in collaboration with other research group, for example for the "MoCA-DCI study", which analyses the impact of delayed cerebral ischemia on neuropsychological



outcome after aneurysmal subarachnoid haemorrhage. An external project with Prof. Dr. E. Albanese (USI) is also ongoing to investigate the distribution and determinants of dementia in Ticino.

Neuroradiology

The main projects in diagnostic neuroradiology were on high resolution MRI in Multiple sclerosis, in cooperation with the NSI Multiple Sclerosis Center (founded by ABREOC and Swiss Multiple Sclerosis Society), data analysis for the project "Role of multimodal CT in differentiating stroke from stroke mimics in the acute setting" and the MRI project "High-resolution post-contrast imaging at 3 Tesla: a comparison of three different techniques" (funded by ABREOC).

The main projects in interventional neuroradiology were mainly on the treatment of vertebral lesions with a minimally invasive vertebral body stenting reconstruction and treatment of severe osteoporotic or neoplastic vertebral fractures with an innovative stent-screw assisted internal fixation (SAIF technique).

Neurosurgery

The priority is on topics that are already tested in local clinical trials or are short of coming into clinical use such as improving the intraoperative visibility of tumor cells for enhanced surgical resection; A new microscope permitting a more sensible and promising detection of tumor cells by fluorescence otherwise was built together with the company Zeiss. Clinical research in 2018 focused on improving patient safety during surgical resection by intraoperative neuromonitoring in collaboration with the "Italian national committee of research", during aneurysm surgery (funded by ABREOC). Two prospective multi-centric studies evaluate the indication of decompressive hemicraniectomy in patients with intracerebral hematoma and the neuropsychological impact of post-aneurysmal SAH vasospasm, respectively. The research focus in spinal neurosurgery is on new minimally invasive technologies.

Pain Management Center

The Center promotes research to reduce or manage pain. Academic cooperation with the University of Maastricht and the VUMC (Amsterdam) has been continued in 2018 and is related to the effects of dorsal root ganglion stimulation for treatment of diabetic neuropathy. Research collaboration on other different research projects also started with Prof. M. Barbero (SUPSI) in 2018.

Sleep and epilepsy group

Our group is internationally recognised for its results in the area of sleep related movement disorders such as restless legs syndrome. The 2018 has been an exceptional year in term of publications, including one paper in Nature reporting important findings in the pathogenesis of narcolepsy. These results have been obtained thanks to consolidated local and external collaborations, to the financial support of 3 grants from the SNF, 1 grant from the Italian Ministry of University and 2 locals grant. A full PhD program started this year with the aim of exploring the state dissociation of brain function during parasomnia and an international new postdoc Master in Sleep and Consciousness started with success. The responsible of the Center (Prof. Dr. M. Manconi) was nominated titular professor at the new Faculty of Biomedical Sciences at the USI.

Stroke Center

The group performs mainly clinical research and is interested in understanding the role of multimodal advanced neuroimaging for the diagnosis and in selecting best treatment for acute ischemic stroke. The Center also participates in numerous national and international projects mainly dedicated to acute stroke management, stroke prevention and stroke recovery in the acute phase. The center also offers a platform for industry promoted international trials.

