Theoretical and practical course on clinical and surgical applications of structural and functional connectivity

LOCAL SCIENTIFIC COMMITTEE
Luciano Annicchiarico (Azienda Provinciale per i Servizi Sanitari, Trento)
Paolo Avesani, (Nilab, Bruno Kessler Foundation)
Barbara Cassone (CIMEC, University of Trento)
Ludovico Coletta (Bruno Kessler Foundation)
Francesco Corsini (Azienda Provinciale per i Servizi Sanitari, Trento)
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COURSE DIRECTORS
Silvio Sarubbo
Luca Zigiotto
Department of Neurosurgery
Azienda Provinciale per i Servizi Sanitari (APSS), Trento, Italy
### Introduction

The field of neurosurgery and neurology has undergone a remarkable evolution, closely paralleling the advancements in clinical and basic neurosciences worldwide. Specifically, neuro-oncology and surgery have fostered close collaborations with various disciplines such as neurophysiology, advanced imaging, neuroradiology, neuropsychology, and rehabilitation.

These interactions have facilitated the development, testing, and daily utilization of both invasive and non-invasive techniques in our departments for the study and treatment of patients with brain tumors. The integration of our clinical and scientific worlds has never been more evident, emphasizing the critical importance of interdisciplinary expertise in planning safe and effective treatments and enhancing our understanding of the intricate wiring diagram of the human brain and the neural physiopathology of brain tumors.

In 2015, ConnectBrain was established with the aim of providing a comprehensive course that caters to a diverse audience, including professionals from neurosurgery, neurology, neurophysiology, neuropsychology, rehabilitation medicine, and basic neurosciences. Building upon the success of the second edition in 2019, which attracted an international audience, we are proud to announce the launch of ConnectBrain Vol. III.

For this upcoming edition, we have meticulously assembled a distinguished international faculty comprising experts in the field. These esteemed individuals will enlighten us on the latest methodological advancements in the study of brain structure and function. Their valuable insights will enable us to gain a comprehensive understanding of these breakthroughs and explore their practical applications in the treatment of brain diseases.

### Theoretical Session

**Thursday June 13th, 2024**

**Sala Filarmonica**

Via Giuseppe Verdi, 30 - Trento

**08:30 - 09:00**  
Registration

**09:00 - 10:00**  
Opening - Authorities

**10:00 - 10:30**  
Lecture introduced by Silvio Sarubbo  
(Department of Neurosurgery, APSS, Trento)  
*The brain before and the brain today*  
Stephanie Forkel (Radboud University, The Netherlands)

**10:30 - 11:15**  
SESSION I  
Introduction to advanced imaging  
Chairmen: Annalisa Trianni (Department of Medical Physics, APSS, Trento), Carlo Cosimo Quattrocchi (CISMed, University of Trento)

- **Principles of resting-state fMRI for human brain mapping**  
  Bharat Biswal (Department of Radiology, New Jersey Institute of Technology, USA)

- **Techniques and limitations in tractography of the human brain white matter**  
  Francois Rehault (University of Sherbrooke, Canada)

- **How to track the brain: tools**  
  Paolo Avesani (Neuroinformatics Lab, Fondazione Bruno Kessler, Trento)

**11:15 - 11:30**  
Discussion and Questions

**11:30 - 12:00**  
Coffee Break

**12:00 - 12:45**  
SESSION II  
Applications of advanced functional mapping imaging in glioma  
Chairmen: Yuri Bozzi (Center for Mind and Brain Sciences, University of Trento), Giuseppe Della Pepa (Department of Neurosurgery, La Cattolica University, Rome)

- **Extracting brain networks by resting-state fMRI**  
  Jorge Jovicich (Center for Mind Brain Sciences, University of Trento)

- **Anatomy and features of brain networks at resting state**  
  Francesca Saviola (Center for Mind Brain Sciences, University of Trento)

- **Tools and principles for analysis of functional connectivity and brain plasticity**  
  Ludovico Coletta (Neuroinformatics Lab, Fondazione Bruno Kessler, Trento)

**12:45 - 13:00**  
Discussion and Questions

**13:00 - 14:30**  
Lunch
Thursday June 13th, 2024

14:30 - 15:15  SESSION III
Evidences of brain connectivity
Chairmen: Carlo Miniussi (Center for Mind Brain Sciences, University of Trento), Gianantonio Spena (Department of Neurosurgery, Pavia University-Hospital)

Dorsal and ventral pathways of the human brain by tractography
Laurent Petit (GIn-IMN, University of Bordeaux)
Exploring structural connection with BraDiPho
Laura Vavassori (Department of Neurosurgery, APSS, Trento)

Brain connections explored by TMS
Sandro Krieg (Department of Neurosurgery, University of Munich)

15:15 - 15:30 Discussion and Questions

15:30-16:15  SESSION IV
Invasive mapping
Chairmen: Alessandro Olivi (Department of Neurosurgery, La Cattolica University, Rome), Giuseppe Barbagallo (Department of Neurosurgery, University of Catania)

Direct electrical stimulation of the human brain for awake surgery
Emmanuel Mandonnet (Lariboisiere Hospital, University of Paris 7 Diderot)
Intraoperative monitoring for asleep surgery
Andrea Szélenyi (Neurophysiology Unit, University of Munich)
Intraoperative monitoring for exploring supra- and infra-tentorial connections
Francesco Sala (Department of Neurosurgery, University of Verona)

16:15 - 16:30 Discussion and Questions
16:30 - 17:00 Coffee Break
17:00 - 17:30 Lecture introduced by Jorge Jovicich (Center for Mind Brain Sciences, University of Trento)
The era of connectomics: the present and future for clinics
Michael D. Fox (Department of Neurology, Harvard Medical School, Boston, MA, US)

17:30 Take home messages and closure

Friday June 14th, 2024

09:00 - 09:30 Lecture introduced by Silvio Sarubbo
The surgery of brain gliomas across a century
Hugues Duffau (Department of Neurosurgery, University of Montpellier, France)

09:30 - 10:15 SESSION V
Anatomical challenges in brain surgery
Chairmans: Maurizio Fornari (Department of Neurosurgery, Humanitas University), Vincenzo Esposito (Department of Neurosurgery, University of Rome “La Sapienza”)

Insula and temporal stem anatomy
Federico Pessina (Department of Neurosurgery, Humanitas University, Milan)

Perisylvian language networks
Alessandro De Benedictis (Bambino Gesù Pediatric Hospital, Rome)

Subpial dissection and the access to the insula of Reil
Sandro Sabel (Department of Neurosurgery, University of Düsseldorf, Germany)

10:15 - 10:30 Discussion and Questions
10:30 - 11:00 Coffee Break
Friday June 14th, 2024

11:00 - 11:45  SESSION VI
Techniques for motor and cognitive mapping
Chairmans: Rocco Quatrale (Department of Neurology, ospedale dell’Angelo, ULSS 3 Serenissima, Venezia-Mestre), Diego Garbossa (Department of Neurosurgery, University of Turin)

Motor and higher motor mapping in asleep and awake surgery
Lorenzo Bello (Department of Neurosurgery, University of Milan)

Monitoring higher cognitive functions in awake surgery
Marco Fontanella (Department of Neurosurgery, University of Brescia)

Outcomes and perspectives in glioma surgery
Tamara Ius (Department of Neurosurgery, University Rome “La Sapienza”)

11:45 - 12:00  Discussion and Questions

12:00 - 12:30 Lecture introduced by Francesco Sala (Department of Neurosurgery, University of Verona)
Advancements in genetics and biology of brain tumors
Alessandro Quattrone (Department of Cellular Computational and Integrative Biology, University of Trento)

12:30-14:00 Lunch

Friday June 14th, 2024

14:00 - 14:45  SESSION VII
Cognitive testing and outcomes in brain tumor surgery
Chairmen: Filippo Flavio Angileri (Department of Neurosurgery, University of Messina), Jacopo Bonavita (Department of Reabilitation Medicine, APSS, Trento)

Neuropsychological testing and outcome
Luca Zigiotto (Department of Neurosurgery, APSS,Trento)

Novelties in intra-operative cognitive monitoring
Guillamme Herbet (Department of Neurosurgery, University of Montpellier, France)

Cognitive rehabilitation and brain plasticity
Lorella Battelli (Italian Institute of Technology, Trento)

14:45 - 15:00 Discussion and Questions

15:00-16:00  SESSION VIII
Standards and novelties in treatments of brain tumors
Chairmans: Mattia Barbareschi (CISMed, University of Trento), Valentina Vanoni (Department of Radiotherapy, APSS)

Neurosurgery and neuro-oncology: adapting medical treatments and surgical strategies
Marion Rapp (Department of Neurosurgery, University of Düsseldorf)

New frontiers in IDH-mutated gliomas treatment
Roberta Rudà (Department of Neurology, University of Torino)

New insights in the medical treatment of high-grade gliomas
Giuseppe Lombardi (Department of Oncology, Istituto Oncologico Veneto)

Radiotherapy and proton-beam therapy for treatment of intrinsic brain tumors
Dante Amelio (Department of Protontherapy, APSS, Trento)

16:00 - 16:30 Discussion and Questions

16:30 - 17:00 Coffee break

17:00 - 17:30 Lecture introduced by Emmanuel Mandonnet (Lariboisiere Hospital, University of Paris 7 Diderot)
New insights in neuro-oncological surgery: technical and conceptual
Nader Sanai (Ivy Brain Tumor Center, Barrow Neurological Insitute, Arizona, US)

17:30 Take home messages and Closure
Saturday June 15th, 2024
Sala Grande FBK
Via S. Croce, 77 - Trento

Tutors: Luciano Annicchiarico, Paolo Avesani, Ludovico Coletta, Francesco Corsini,
Alessandro De Benedictis, Stephanie Forkel, Jorge Jovicich, Manuela Moretto,
Laurent Petit, Francois Rheault, Laura Vavassori, Luca Zigiotto.

INTRODUCTION
09:00 – 09:15 Introduction of team and activities
S. Sarubbo
09:15 – 09:45 Tools for the study of perilesional structural and functional
organization and for neurosurgical planning
P. Avesani, L. Coletta, J. Jovicich, M. Moretto, L. Vavassori, L. Zigiotto

SESSION I
09:45 – 11:00 Structural characterization of language pathways: exploration and
visualization of microdissection (BraDiPho), virtual tracking of white
matter fibers (Tractome)
11:00 – 11:20 Coffee break
11:20 – 13:00 Functional distribution of language network: exploration and
visualization of DES-based functional network, extraction of resting
state fMRI network (ReStNeuMap)
13:00 – 14:00 Lunch

SESSION II
14:00 – 16:00 Structural characterization of motor pathways: exploration and
visualization of microdissection (BraDiPho), virtual tracking of white
matter fibers (Tractome)
16:00 – 16:20 Coffee break
16:20 – 18:00 Functional distribution of motor network: exploration and
visualization of DES-based functional network, extraction of resting
state fMRI network (ReStNeuMap)
18:00 Closure and certificates
<table>
<thead>
<tr>
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