

# FOURTH ANNUAL EUROPEAN 3D ADVANCED FIBER DISSECTION COURSE: ACQUIRING THE MENTAL IMAGERY NECESSARY TO OPERATE THE BRAIN

Santander. 15, 16 and 17 October 2020



European 3D advanced  
fiber dissection course



The white matter of the cerebrum underlies the outer cortex of gray matter, and is composed of densely packed axons that are organized in fascicles or fiber tracts. These tracts have a complex three-dimensional (3D) configuration within the hemispheres, the brainstem and the spinal cord. A detailed knowledge of the architectural anatomy of the white matter tracts is paramount, for strategically planning for surgical management of parenchymal brain lesions, such as gliomas. Neuroanatomical laboratory training is very valuable to study and understand the anatomy of white matter fibers. In particular, cortex-sparing fiber dissection facilitates knowledge of this complex anatomy. None of the recently developed surgical guides such as neuronavigation, intraoperative magnetic resonance imaging or ultrasonography can provide a similar comprehensive understanding of the 3D fiber pathways organization.

In the present course, the participants will learn the technique of cortex-sparing fiber dissection in order to acquire the mental imagery of the main white matter tracts. We wanted to give a practical perspective to the course; therefore, in the second and third days, the participants will directly apply the knowledge acquired to practice surgical approaches in the laboratory. We choose two challenging approaches to eloquent areas: an insular approach to a fronto-temporo-insular glioma, and a posterior basal temporal approach to the parahippocampus and cingulum.

The congress will be held in the prestigious School of Medicine at the University of Cantabria.

We look forward to welcoming you in Santander.

**Juan Martino**  
Course director



## COURSE DIRECTOR

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## HONORED GUEST

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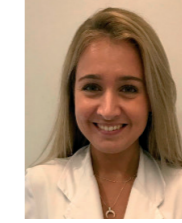
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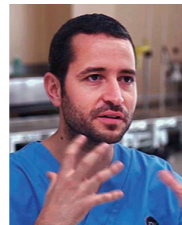
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Santander. Spain.

**Maximal number of participants per course:** 12

**Course dates:** 15, 16 and 17 October 2020

### Course equipment and facilities:

- Course equipment and facilities:
- Anatomy laboratory at the University of Cantabria.
- Two cerebral hemispheres for each participant. The specimens were previously selected to ensure the quality for dissection. The specimen's vessels were injected with red and blue colorants for greater similarity with a real brain.
- 3D Microscope Kinevo 900 Carl Zeiss: one for the course.
- Microscopes (techno-scopes) Carl Zeiss: one for each participant.
- Ultrasonic aspirators CUSA Clarity (Integra): one for each participant.
- 3D television (75 inches, Full HD): one for the course.
- Medtronic StealthViz Neuronavigation system: one for the course.
- Medtronic Echography system: one for the course.
- Video camera: one for the course.
- 3D Glasses: one for each participant.
- Instruments for dissection for each participant.

### Accreditation:

- This teaching activity is accredited by the Commission for Continuing Education of the Health Professions of the Community of Cantabria. 6,5 credits in 2019.
- The scientific and educational content of this event has been endorsed by the Sociedad Española de Neurocirugía (SENEC).

### Target Audience and Objectives:

This activity was designed for Neurosurgeons, Neurologists, Neuroradiologists, Residents/Fellows in these specialties, and Neuro-nurses.

After the conclusion of this activity, participants will be able to:

- Identify the anatomy of the white matter fiber tracts.
- Comprehensive understanding of the 3D anatomical relationships between the white matter connections.
- Evaluate surgical approaches to challenging areas: the dominant insular lobe and the posterior parahippocampus.
- Discuss surgical cases and analyze different treatment options of tumors located within eloquent areas.

### Course venue:

Anatomy Laboratory.  
Department of Anatomy and Cellular Biology.  
School of Medicine. Cantabria University.  
Av. Herrera Oria, s/n. 39011. Santander (Cantabria). Spain.

### Registration fees:

- Full hands-on registration: 2.500 € + VAT. Includes lectures attendance, dissection of cerebral hemispheres and simulation of surgical approaches, lunch and refreshments breaks, and course dinner on Friday.

### Technical Secretariat:

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**09:00** Registration.

**09:10** Opening.

*Dr. Juan A. Montero Simon, Dr. Juan Martino*

**09:15** 3D LECTURE: Introduction to brain Diffusion tensor imaging (DTI) tractography.

*Dr. Christian de Quintana Schmidt*

**09:45** Hands-on. Introduction to StealthViz software.

*Dr. Christian de Quintana Schmidt*

**10:15** 3D LECTURE: DTI tractography. How I do it.

*Dr. Christian de Quintana Schmidt*

**11:15** Hands-on. DTI tractography reconstruction of the main white matter connections.

*Dr. Christian de Quintana Schmidt*

**12:15** DTI tractography as an important tool to study the subcortical anatomy and presurgical planning of glioma surgery.

*Dr. Enrique Marco de Lucas*

**13:00** Lunch

**14:00** 3D LECTURE: How to prepare the brains for fiber dissection.

*Dr. David Mato*

**14:15** 3D LECTURE: sulco-gyral anatomy. The cerebral lobes.

*Dr. Pablo González-Lopez*

**15:00** 3D LECTURE: anatomy of the dorsal associative tracts of the brain: superior longitudinal fasciculus, arcuate fasciculus, middle longitudinal fasciculus.

*Dr. Juan Martino*

**15:30** Functional roles of the dorsal associative tracts of the brain.

*Dr. Alejandro Fernandez-Coello*

**15:45** Hands-on: Fiber dissection of the dorsal associative tracts. Each participant will have one hemisphere to dissect. The participants will learn how to remove the arachnoid membranes and the cortex without damaging the underlying white matter. The participants will dissect the dorsal associative tracts: the subcomponents of the superior longitudinal fasciculus, arcuate fasciculus and middle longitudinal fasciculus.

*Professor Hugues Duffau, Dr. Juan Martino, Dr. Alejandro Fernandez-Coello, Dr. Emmanuel Mandonnet, Dr. Pablo González-Lopez, Dr. David Mato, Dr. Carlos Velasquez, Dr. Carlos Santos, Dra. Carla Mora, Dr. Jesus Esteban, Dra. Patricia Lopez, Dra. Aranzazu Sanchez, and Monserrat Fernández-Calderón.*

## PROGRAM. Friday, 16<sup>th</sup> of October 2020

**09:00** 3D LECTURE: anatomy of the ventral associative tracts and the fascicles related to the insula: inferior longitudinal fasciculus, inferior fronto-occipital fasciculus and uncinate fasciculus.

*Dr. Juan Martino*

**09:30** Functional roles of the ventral associative tracts and the fascicles related to the insula.

*Dr. Alejandro Fernandez-Coello*

**09:45** 3D LECTURE: anatomy of the brain isthmus and the temporal stem: a crucial anatomical concept that is often forgotten.

*Dr. Carlos Velasquez and Dr. Pablo Gonzalez*

**10:15** Hands-on: Fiber dissection of the ventral associative tracts and the fascicles related to the insula. Each participant will have one hemisphere to dissect. The participants will dissect the ventral associative tracts and the tracts related to the insula region: inferior longitudinal fasciculus, inferior fronto-occipital fasciculus and uncinate fasciculus.

*Professor Hugues Duffau, Dr. Juan Martino, Dr. Alejandro Fernandez-Coello, Dr. Emmanuel Mandonnet, Dr. Pablo González-Lopez, Dr. David Mato, Dr. Carlos Velasquez, Dr. Carlos Santos, Dra. Carla Mora, Dr. Jesus Esteban, Dra. Patricia Lopez, Dra. Aranzazu Sanchez, and Monserrat Fernández-Calderón.*

**13:00** Lunch.

**14:00** Intraoperative electrical stimulation mapping of associative fiber pathways.

*Professor Hugues Duffau*

**14:30** 3D LECTURE: limbic and paralimbic tumors. Anatomy and related surgical approaches.

*Dr. Pablo González-Lopez*

**15:00** 3D LECTURE: presentation of the parahippocampal surgical case.

*Dr. Juan Martino*

**15:15** Hands-on: Approach to the posterior parahippocampus and cingulum. Professor Hugues Duffau will perform a step by step posterior basal and temporal approach to the posterior parahippocampus and cingulum. Simultaneously, each participant will perform the approach in the specimens. The participant will use a real MRI of a glioma infiltrating the basal temporal lobe to guide the resection. In this approach, the deep functional connections are the arcuate fasciculus, inferior longitudinal fasciculus, inferior fronto-occipital fasciculus and optic radiations.

*Professor Hugues Duffau, Dr. Emmanuel Mandonnet, Dr. Juan Martino, Dr. Alejandro Fernandez-Coello, Dr. Pablo González-Lopez, Dr. David Mato, Dr. Carlos Velasquez, Dr. Carlos Santos, Dra. Carla Mora, Dr. Jesús Esteban, Dra. Patricia Lopez, Dra. Aranzazu Sanchez, and Monserrat Fernández-Calderón.*

**21:00** Course dinner.

**09:00** Surgical anatomy of the insula.

*Dr. Emmanuel Mandonnet*

**09:30** Insula glioma surgery: the transopercular approach.

*Professor Hugues Duffau*

**10:00** 3D LECTURE: presentation of the insular surgical case.

*Dr. Juan Martino*

**10:15** Hands-on: Transopercular approach to the insula. Professor Hugues Duffau will perform a step by step transopercular approach to the insula in the specimen. Simultaneously, each participant will perform the approach in the specimens. The participants will use a real magnetic resonance image (MRI) of a fronto-temporo-insular glioma to guide the resection. We will have a unique opportunity to ask Professor Duffau many questions about the challenges of this approach: how to preserve the deep functional connections (inferior fronto-occipital fasciculus, uncinate fasciculus, pyramidal pathway, etc.), and vascular structures (lenticulostriate arteries).

*Professor Hugues Duffau, Dr. Emmanuel Mandonnet, Dr. Juan Martino, Dr. Alejandro Fernandez-Coello, Dr. Pablo González-Lopez, Dr. David Mato, Dr. Carlos Velasquez, Dr. Carlos Santos, Dra. Carla Mora, Dr. Jesús Esteban, Dra. Patricia Lopez, Dra. Aranzazu Sanchez, and Monserrat Fernández-Calderón.*

**13:00** Lunch.

**14:00** Hands-on: Transopercular approach to the insula. Professor Hugues Duffau and participants will complete the transopercular approach to the insula.

**19:00** Closing remarks.

The present course is intimately linked with the “Bellvitge Mapping Course” that takes place at the Bellvitge University Hospital in Barcelona, and that is organized by Andreu Gabarros. The Santander’s course delves in subcortical anatomical study, and simulation of surgical approaches in the cadaver. On the other hand, Bellvitge’s course is more focused in intraoperative mapping techniques, neurophysiologic intraoperative monitoring, and live broadcast surgeries. Therefore, in order to have a broader perspective of mapping techniques for resection of brain tumors within eloquent areas, we strongly recommend the participants to assist to both courses in a consecutive order.

Bellow you can see a resume of the Bellvitge Mapping Course program.

### Juan Martino and Andreu Gabarros

#### First day

Laboratory brain fiber dissection

#### Second day

DTI tractography

#### Third day

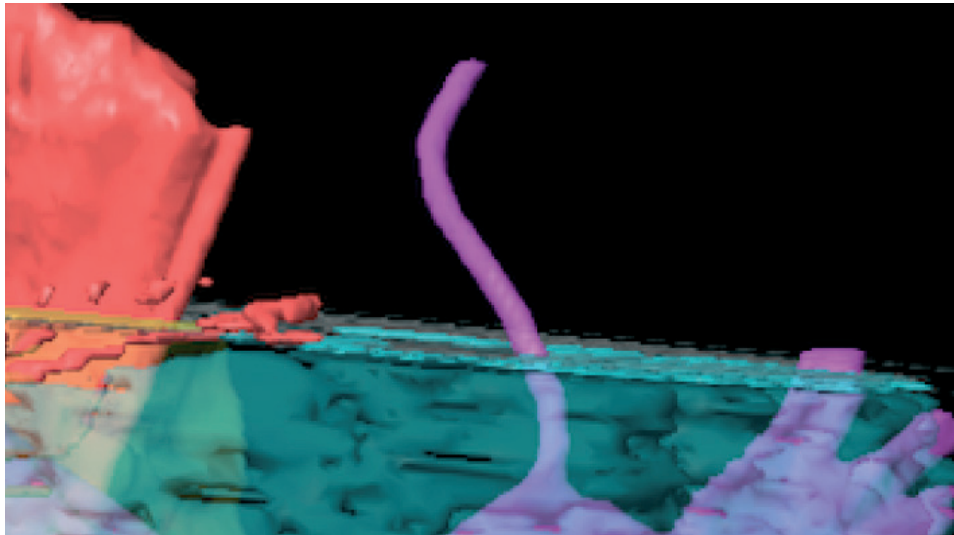
Lectures: intraoperative mapping techniques and neurophysiologic intraoperative monitoring

#### Fourth day

Live surgeries of tumors within eloquent areas

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