



UNIVERSITY OF L'AQUILA  
DEPARTMENT OF  
BIOTECHNOLOGICAL AND APPLIED CLINICAL SCIENCES



## *LABORATORY OF ELECTROPHYSIOLOGY AND BEHAVIOUR I*

Responsible: Prof. Eugenio Scarnati

Staff: Prof. Eugenio Scarnati, PhD; Dr. Annamaria Capozzo, PhD; Dr. Flora Vitale, PhD student, Dr. Claudia Mattei, PhD student

Location: Building Coppito II, 2<sup>nd</sup> floor, Via Vetoio - L'Aquila

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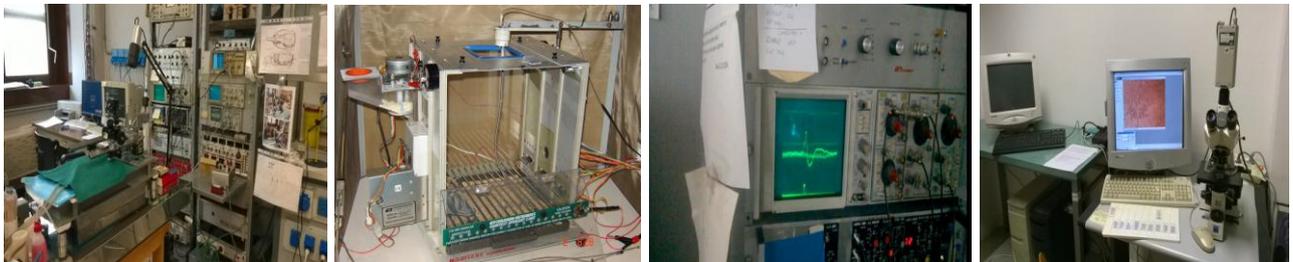
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### Activities

- Innovative research programs in functional neurosciences and neurodegenerative disorders
- Training and education for graduating students in Biological Sciences or Medicine, and PhD neuroscience programs

### Scientific activity

Research interests span the areas of functional neurophysiology and behavioural neuroscience. Main work focuses on the functions of basal ganglia nuclei and their

connections with other regions. These brain systems are relevant to movement and cognitive disorders as Parkinson's, Alzheimer's disease and ballistic syndromes. A variety of electrophysiological and behavioral methods for studying these systems are used, including paradigms for investigating motor and non motor functions in the rat, both in normal conditions and following degeneration of specific neuronal populations. Selective neurotoxins are used in order to replicate main neuronal loss seen in human neurodegenerative disorders. Data obtained from these experiments may contribute to our understanding of how basal ganglia are involved in the physiological control of learned motor acts and in neurodegenerative disorders. We are also interested to study the effects of substances or tools intended for neuroprotection. The laboratory is equipped with a full complement of utilities, including climate control, vacuum, compressed air, and a certified fume hood. Housed in close proximity in independent rooms there are facilities for animal housing, surgical procedures, immunohistological processing, light microscopy and for constructing glass or metal microelectrodes and microinfusion devices.

#### Postgraduate education

PhD courses: Neurobiology of Neurodegenerative Disorders , Experimental Medicine (Neuroscience program)

#### Equipments

- Three Colbourn Habitest Operant Chambers
- Computerized systems for on-and off line evaluation of motor and behavioral parameters
- Narishige and Unimecanique stereotaxic frames and precision micromanipulators
- Five-channels Neurophore apparatus for iontophoretic or pressure application of neurotropic substances onto single neurons.
- DataWave Technologies Workbench and SciWorks systems for realtime acquiring and analyzing neuronal signals
- Basilink for acquiring and analyzing behavioural data
- Thermoregulatory systems for surgical purposes
- Six analogic and digitized oscilloscopes
- Digitimer, WPI, and A-M System modules for amplifying, filtering and digitizing neuronal activity.
- Vertical and horizontal pullers
- WPI, Grass and Digitimer stimulators equipped with constant current isolators.
- Nikon microscope equipped with a KS400 Zeiss image analyzer software
- Leitz microtome



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## ***LABORATORY OF ELECTROPHYSIOLOGY AND BEHAVIOUR 2***

Responsible: Prof. Eugenio Scarnati

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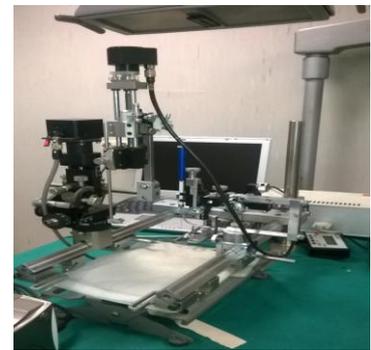
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### Activities

- Innovative research programs in functional neurosciences and neurodegenerative disorders
- Training and education for graduating students in Biological Sciences or Medicine, and PhD neuroscience programs

### Scientific activity

In this laboratory we conduct electrophysiological and behavioral experiments to explore: 1) how electrical neuronal activity in basal ganglia nuclei changes following

degeneration of specific neuronal populations, 2) at what extent the abnormal activity arising from such damages may be remodulated through deep brain stimulation of some regions in the brain, and 3) if continuous stimulation of structures in the pontine region may correct motor and attentive deficits which appear in experimental animals following degeneration of the dopaminergic nigrostriatale pathway. The lab is equipped with state of art neurophysiological recording, stereotaxic micropositioning of chronic stimulating electrodes, continuous stimulus control and evaluation system from operant chamber or rotometer. The lab has its own unique and relevant set of major equipment items and is one of very few that records simultaneous behavior while stimulating neurons at multiple levels of the basal ganglia. The project is part of a collaboration with the Functional Neurosurgery Unit of the CTO Hospital in Rome headed by Prof. Paolo Mazzone where, in parallel, patients affected by motor disorders are being treated with deep brain stimulation of innovative targets in the brain. Our attention is currently devoted to the pedunculopontine tegmental nucleus which, although involved in several functions, might also serve as a direct output from the basal ganglia to lower brainstem and spinal motor centres. If so, it might have a key role in a system involved in gait and postural control, bypassing the widely accepted dopamine-dependent thalamocortical route. This idea of a “lower” relay structure between basal ganglia and spinal cord might explain the lack of effectiveness of dopaminergic drugs in controlling gait and postural instability as it happens in Parkinson’s disease.

#### Postgraduate education

PhD courses: Neurobiology of Neurodegenerative Disorders , Experimental Medicine (Neuroscience program)

#### Equipments

- One Colbourn Habitest Operant Chamber equipped with rotating connector for continuous stimulation in freely moving rats
- Computerized for operant conditioning and realtime control of movement parameters
- Computerized systems for on-and off line evaluation of motor and behavioral parameters
- Unimecanique stereotaxic frame and precision micromanipulators
- DataWave Technologies SciWorks system for programming different pattern of continuous stimulation
- Storage oscilloscopes
- Digitimer and WPI constant current isolation units
- Rotometer for evaluation of rotational behavior