



ESRS - EU "Marie Curie" Project
2007-2010



Training in Sleep Research and Sleep Medicine

- **1) Max Planck Institute for Psychiatry, Munich, Germany**
Researchers in charge: Prof. Thomas Pollmächer
Specific training responsibility: Sleep in patients with psychiatric and neurological disorders, in particular sleep-related movement disorders, parasomnias and narcolepsy
- **2) Sleep and Wake Disorders Center, Department of Neurology, University Hospital Zürich, Switzerland**
Researchers in charge: Prof. Claudio Bassetti, Dr. Esther Werth, PD Dr. Christian Baumann
Specific training responsibility: narcolepsy, hypersomnia, sleep related movement disorders and sleep disorders in neurological diseases and animal models of stroke and trauma
- **3) Sleep and Wake Disorders Center, Neurology Department, Gui de Chauliac Hospital, Montpellier, France**
Researcher in charge: Dr. Yves Dauvilliers
Specific training responsibility: narcolepsy, central hypersomnias and sleep disorders in neurological diseases
- **4) Polysomnographic laboratory, Department of Neurological Sciences, University of Bologna, Italy**
Researcher in charge: Prof. Pasquale Montagna
Specific training responsibility: sleep disorders in neurological diseases, sleep apnea syndrome
- **5) Unit of Sleep Medicine, Scientific Institute H San Raffaele, Vita-Salute University, Milan, Italy**
Researcher in charge: Prof. Luigi Ferini-Strambi
Specific training responsibility: insomnia, sleep apnoea, parasomnia
- **6) Unit for human and animal sleep research, Institute of Pharmacology and Toxicology, University of Zurich, Switzerland**
Researchers in charge: Animal Research Unit: Prof. Irene Tobler; Human Research Unit: Prof. Peter Achermann and Dr. Hans Peter Landolt.
Specific training responsibility: animal models in sleep research, standard polysomnography in humans, signal analysis, modeling sleep and sleep regulation
- **7) Sleep Research Laboratory, Institute of Biomedicine, University of Helsinki, Finland**
Researcher in charge: Dr. Tarja Porkka-Heiskanen.
Specific training responsibility: sleep regulation at molecular level, animal models
- **8) Molecular Genetics of Sleep and Sleep Disorders Unit, Center for Integrative Genomics, University of Lausanne, and the Center for Investigation and Research in Sleep (CIRS), Centre Hospitalier Universitaire Vaudois, Lausanne, Switzerland.**
Researchers in charge: Prof. Mehdi Tafti, Dr. Paul Franken, Dr. Raphaël Heinzer
Specific training responsibility: Molecular and quantitative genetic methods in sleep research and sleep medicine.
- **9) Physiological Regulation in the Wake-Sleep Cycle Laboratory, Department of Human and General Physiology, University of Bologna, Italy**
Researcher in charge: Prof. Roberto Amici
Specific training responsibility: physiological regulation in sleep in animal models
- **10) Chronobiology Laboratory, Faculty of Health and Medical Sciences, University of Surrey, Guildford, UK**
Researchers in charge: Human chronobiology: Prof. Debra J. Skene and Dr. Benita Middleton. Molecular & animal chronobiology: Dr. Simon Archer
Specific training responsibility: human, animal and molecular chronobiology
- **11) Pathophysiology of Neuronal Networks Responsible for the Sleep-Waking Cycle Laboratory, CNRS, UMR5167, University of Lyon, France**
Researcher in charge: Dr. Pierre-Hervé Luppi,
Specific training responsibility: animals models in sleep research, narcolepsy, learning and sleep, polysomnography in animals, molecular biology



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Program of the Practical Training

1) Max Planck Institute for Psychiatry, Munich, Germany

Researchers in charge: Prof. Thomas Pollmächer

Specific training responsibility: Sleep in patients with psychiatric and neurological disorders, in particular sleep-related movement disorders, parasomnias and narcolepsy.

Description of the Unit: The unit is a 6-bed sleep lab performing about 1000 sleep recordings yearly. Those include studies in psychiatric patients and a huge amount of research studies in healthy people. The unit is one of the very few world wide being able to do sleep recordings in the fMRI scanner enabling exciting new insights in brain function during sleep.

Standing of the Unit: The unit is an active sleep research facility since the 1970s. It is part of the Max Planck Institute of Psychiatry, one of the most prestigious neurobiological research institutes in Germany. Studies performed during the last two decades range from those in depressive patients, numerous immunoendocrine studies up to studies in narcolepsy and studies investigating spontaneous and stimulation-associated changes in the BOLD response during sleep. The unit is Max Planck funded and has raised more than 2 Mio. soft money during the last 3 years.

Practical aspects of training: Students will be introduced to:

- i) Use of polygraphic systems to record human sleep and wakefulness during nocturnal recordings and daytime studies. Additional vigilance tasks including complex neuropsychological studies.
- ii) Trough-the wall blood drawing techniques in sleeping subjects.
- iii) Combined sleep-EEG fMRI measurements.
- iv) In vitro immunoendocrine laboratory studies to investigate the sleep-immunoendocrine interface.

Researchers involved in the practical training and teaching: The clinical sleep research group is headed by Thomas C. Wetter, M.D. Thomas Pollmächer, M.D. is a regular consulting scientist running also own experiments in the framework of the Marie Curie Research Training Network. In addition, there are post-doc researchers (Pierre Beitingger, M.D., Renate Wehrle, Ph.D., Elisabeth Zils, M.D.) and doctoral students (Stephany Fulda, M.Sc.) as well as one EU funded post-doc (Lucia Carriero, Ph.D.).

2) Sleep and Wake Disorders Center, Department of Neurology, University Hospital Zürich, Switzerland

Researchers in charge: Prof. Claudio Bassetti, Dr. Esther Werth and PD Dr. Christian Baumann

Specific training responsibility: narcolepsy, hypersomnia, sleep related movement disorders and sleep disorders in neurological diseases, animal models of stroke

Description of the Unit. The facility is embedded in the Department of Neurology and consists of (1) a 2-bedroom unit with recording rooms equipped with all methods for state-of-the-art polysomnography, video control and other ambulatory devices. The unit has both a clinical and a research orientation with a focus within sleep medicine on hypersomnia (narcolepsy and idiopathic hypersomnia), circadian rhythms sleep disorders, parasomnia and sleep disorders in neurological disorders (stroke, restless legs, parkinson and other neurodegenerative diseases). The Unit additionally consists of (2) of animal facilities and wet lab infrastructure. There the main focus is on rodent stroke and trauma models.

Standing of the Unit. The unit collaborates with the Sleep Laboratory of the Medical Department (Pneumology) and is part of a large Neuroscience Network of the University of Zürich.

Practical aspects of training. Students will be introduced to:

- i) clinical and research work of our sleep wake disorders center
- ii) theoretical and practical use of polygraphic systems which allow the recording of bioelectrical signals (EEG, EOG, EMG, EKG, respiration signals) and ambulatory devices
- iii) analysis of clinical polysomnographical data by using software, which permits scoring of wake-sleep stages, frequency analysis of bioelectrical signals, sleep associated breathing and movement patterns
- iv) current research projects of the unit
- v) rodent stroke and trauma models

Researchers involved in the practical training and teaching. The laboratory has 4 senior researchers, 1 physician in training, 2 postdoctoral research fellows (MD). The sleep laboratory is supported by 3 technicians. The senior researchers who will be involved in the practical training and teaching are: Dr. Esther Werth (PhD), PD Dr. Christian Baumann (MD), Prof. Claudio Bassetti (MD) and Dr. Bo Gao (MD).



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3) Sleep and Wake Disorders Center, Neurology Department, Gui de Chauliac Hospital, Montpellier, France

Researcher in charge: Dr. Yves Dauvilliers

Specific training responsibility: narcolepsy, hypersomnia, RLS, sleep disorders in neurological diseases.

Description of the Unit. The Sleep and Wake disorders Center is part of the Neurology Department (Director: Prof. J. Touchon). It is a 7-bed facility with both clinical and research orientation. The clinical focus is on hypersomnias, sleep disorders in neurodegenerative diseases, parasomnias, sleep-related breathing disorders, insomnia, circadian rhythm sleep disorders, . The research focus is on narcolepsy, idiopathic hypersomnia, recurrent hypersomnia, hypersomnia associated with neurological disorders and normal aging. The staff includes 3 permanent physicians, 2 psychologists, 1 resident, 1 intern and 6 technicians

Standing of the Unit. The Unit has been active in sleep research and sleep medicine since many years under the guidance of Prof. Michel Billiard who was the President of the ESRS from 1996 to 2000.

Practical aspects of training. The trainees will participate in the activities of the sleep and wake disorders center including out-patient clinic, clinical interview, neuropsychological testing and physical examination prior to polysomnography, scoring of night and daytime recordings, video analysis and 32 to 48 hours polysomnography, prescribing treatments and participating in specialized meetings.

Researchers involved in the practical training and teaching. The persons who will participate in the practical training and teaching are Yves Dauvilliers (M.D.), Bertrand Carlander (M.D.), Béatriz Abril (MD), Sophie bayard (PhD), Alain Besset (Ph.D.).

4) Polysomnographic laboratory. Department of Neurological Sciences, University of Bologna, Italy

Researcher in charge: Prof. Pasquale Montagna

Specific training responsibility: sleep disorders in neurological diseases, sleep apnea syndrome

Description of the Unit. The laboratory consists of a patient preparation room, two air-conditioned and isolated rooms for sleep recording under audio and video control, communicating with a monitoring room next to the recording room and equipped with analogical and digital devices for simultaneous recording of polysomnographic parameters. Two other rooms are dedicated to the manual and automatic analysis of the video-polysomnographic recordings. The laboratory has also equipment for dynamic recording in inpatients and at home. The laboratory is equipped for the instrumental diagnosis of sleep disorders: impaired circadian sleep-wake rhythm, sleep-related breathing disorders, including ventilatory treatment, daytime somnolence and motor disorders during sleep. Patients undergo polysomnography as inpatients or outpatients after clinical examination by a sleep specialist, because the wide variety of sleep disorders requires different instrumental diagnostic procedures.

Standing of the Unit. The laboratory has been devoted to research in the field of sleep medicine since 40 years, under the guide of Prof. Elio Lugaresi, focusing on the clinical, epidemiological and polysomnographic characterization of sleep disorders and on the polysomnographic investigation of neurological diseases. The Laboratory has ongoing links with other institutions in Italy and abroad.

Practical aspects of training. Students will be introduced to research and clinical topics related to ongoing research projects which include studies on breathing disorders during sleep (in particular, obstructive sleep apnea syndrome), excessive daytime somnolence (in particular, diagnosis and epidemiology of narcolepsy), movement disorders during sleep (in particular nocturnal frontal lobe epilepsy, new parasomnias such as propriospinal myoclonus, oromandibular myoclonus, catathrenia, fragmentary excessive myoclonus, restless legs syndrome), feeding behaviour during sleep, agrypnia excitata (description of different clinical condition: delirium tremens, Morvan's chorea, fatal familial insomnia) and sleep disorders in neurodegenerative diseases such as multiple system atrophy. Particular attention will also be devoted to the modification in circadian rhythms in multiple system atrophy, Parkinson's disease, fatal familial insomnia and cluster headache..

Researchers involved in the practical training and teaching. The Laboratory is used for training students enrolled in the Degree Course for Neurophysiopathology Technicians and the PhD program in Sleep Medicine. Traditionally the laboratory is open to undergraduate and postgraduate students for experimental theses and training periods. 3 physicians (Prof. P. Montagna MD, Prof. Plazzi MD and Dr. Provini, MD PhD) and 6 PSG technologists are involved in teaching. Outpatients: Tuesday 12 am to 3 pm. Video- PSG recordings: two patients every Monday and Wednesday and one patient every Friday. 48-hour polysomnography ambulatory recordings begin on Monday and Tuesday. On Wednesday and Thursday: MSLT recordings. Ambulatory recordings: from Monday to Friday.



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5) Unit of Sleep Medicine, Scientific Institute H San Raffaele, Vita-Salute University, Milan, Italy

Researcher in charge: Prof. Luigi Ferini-Strambi

Specific training responsibility: insomnia, sleep apnea, parasomnia

Description of the Unit. The Unit is a part of the Dept. of Neuroscience of the University Vita-Salute San Raffaele in Milan. The Unit collaborates with the Dept. of Pneumology, the Dept. of ENT and the Dept. of Psychiatry of the same University. The "Sleep Medicine" department and the "Sleep Laboratory" are available for the practical training period. The Sleep Medicine department has nine beds for in-patients: 9 (hospitalised patients/month= 75) while the Sleep lab has four recording rooms (for night-time video-PSG, MSLT, 24-hour video-polysomnography) and two rooms dedicated to ambulatory inpatient monitoring (ambulatory recordings: 5 patients \day from Monday to Saturday).

Standing of the Unit. The Unit has been established since 1979 and is directed by Prof. Luigi Ferini-Strambi, who is, at present, the President of the Italian Association of Sleep Medicine and member of the Research Committee of the ESRS.

Practical aspects of training. Students will be introduced to research and clinical topics mainly related to sleep apnea, nocturnal seizures, REM-sleep behaviour disorders, drug-resistant insomnia, and hypnotic abuse. Moreover they will have the opportunity to be introduced to theoretical and practical use of polygraphic systems which allow the recording of bioelectrical signals (EEG, EOG, EMG, EKG, respiration signals) and to the analysis of clinical polysomnographic data by means of a dedicated software, which allows to score wake-sleep stages and to make a frequency analysis of bioelectrical signals.

Researchers involved in the practical training and teaching. The Unit has five physicians, 1 psychologist, and 5 technologists. The teachers involved in the project are Prof. Luigi Ferini-Strambi MD, Dr. Marco Zucconi MD, Dr. Mauro Manconi MD, Dr. Cinzia Castronovo MD, Dr. Maria Livia Fantini MD.

6) Unit for human and animal sleep research, Institute of Pharmacology and Toxicology, University of Zurich, Switzerland

Researchers in charge: Animal Research Unit: Prof. Irene Tobler; Human Research Unit: Prof. Peter Achermann and Dr. Hans Peter Landolt.

Specific training responsibility: Animal models in sleep research, standard polysomnography in humans, signal analysis, modeling sleep and sleep regulation.

Description of the Unit. The Unit (<http://www.pharma.uzh.ch/research/chronobiology.html>) belongs to a large Neuroscience Network (<http://www.neuroscience.unizh.ch>) on the same campus. It belongs also to Life Science Zürich (<http://www.lifescience-zurich.ch>), a network of the University of Zurich and ETH Zurich, and to the Center for Integrative Human Physiology (<http://www.zihp.unizh.ch>). The laboratory is equipped with facilities for modern biomedical research and sleep recording in animals and humans.

1. Animal Research Unit: The unit consists of 4 isolation rooms equipped with 12 isolated chambers for polysomnography and 60-100 cages with equipment for continuous long-term recording of motor activity by infra red and running wheel activity. A climatic chamber (13-23 °C) equipped with 4 animal sleep-recording chambers and 15 isolation boxes for activity and body temperature recording is placed in one of the isolation rooms. Two portable polygraphic recording systems are available for sleep investigations in animals. Video recorders and test apparatus for behavioral assessment of learning and memory are available.

2. Human Research Unit: Facility consists of a 4-bedroom temporal isolation unit with kitchen and bathrooms, and a recording room equipped with all methods for state-of-the art polysomnography. Bedrooms are equipped with long-term digital, polygraphic recording systems with 24 channels (EEG, EMG, EOG, ECG, body and skin temperature, illuminance, breathing parameters, etc.). A 128- and a 32-channel polygraphic recording systems for brain mapping during sleep and waking are available, as well as portable polygraphic recording systems for use in clinical or home environments. Several rooms with computers are available to enable scoring and specialized, refined signal analysis of a broad diversity of biological signals such as EEG, ECG, motor activity, temperature, including statistical analyses.

Standing of the Unit. The particular strength of this laboratory, which was founded by Prof. A.A. Borbély in 1972, is its combination of basic sleep and chronobiology research at the level of both animals and humans. Its research led to the formulation of the 2-process model of sleep regulation which has stimulated numerous experiments around the world. A further pillar of the lab's reputation is based on the development and application of methods ranging from signal analysis of the sleep EEG (spectral analysis, EEG mapping) to mathematical modeling. Prof. I. Tobler, member of the unit since 1975, and head of the animal sleep laboratory is Past-President of ESRS, and Past President of the Swiss Society for Sleep Medicine, Sleep Research and Chronobiology. Prof. P. Achermann and Dr. H.P. Landolt, co-directors of the human sleep facility, both hold positions on the board or scientific committees of national and international Sleep



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Practical aspects of training. Students will be introduced to:

- i) All aspects regarding behavioral definition, scoring of rest-activity and sleep and corresponding analyses (long-term infra-red recordings of activity in rodents; video recording and scoring of behavior);
- ii) methods for recording and combining EEG, EMG and body and brain temperature in rodents; topographic aspects of sleep in rodents;
- iii) methods for recording of EEG, EMG and EOG in humans in sleep and waking (brain mapping: 36 channels);
- iv) spectral analysis of the EEG in humans and rodents;
- v) performance tests in humans, e.g. PVT
- vi) performance of simple behavioral learning tests in rodents
- vii) several standard chronobiology methods: circadian aspects of rest-activity based on IR-activity records and running wheels

Researchers involved in the practical training and teaching. The laboratory currently has 5 senior researchers, 4 postdoctoral fellows and 9 PhD students. The persons who will participate in the practical training and teaching are: Prof. Irene Tobler, Prof. Peter Achermann, Dr. H.P. Landolt, Prof. R. Huber (Children's hospital).

7) Sleep research laboratory, Institute of Biomedicine, University of Helsinki, Finland

Researcher in charge: Dr. Tarja Porkka-Heiskanen

Specific training responsibility: sleep regulation at molecular level, animal models

Description of the Unit. The research group works in Biomedicum Helsinki (<http://www.biomedicum.fi>), a modern research complex of about 1200 researchers dedicated to biomedical research with excellent core facilities and supporting services for research. The sleep research group has two sound isolated rooms with polysomnography equipment for human research and three isolated rooms with polysomnography for rodent sleep recordings. In addition, a zebra fish unit with movement recording facilities and analysis equipment is provided as core facility service. Normal laboratory space with equipment for biochemical and molecular biology work as well as in vivo microdialysis/HPLC work are included.

Standing of the Unit. The unit has worked on the molecular mechanisms of sleep for more than 20 years. Led by Dr. Porkka-Heiskanen it has pursued research on both humans and animal models and gained international recognition particularly for adenosine research. Dr. Porkka-Heiskanen, former secretary of the ESRS and present president of the Finnish Brain Research Society, has been active in training young scientists both at her own laboratory and internationally. Presently she is a coordinator of an EU funded Marie Curie consortium, which will train eighteen young scientists in the course of four years. The laboratory receives funding from the European Union (QLK6-CT-2000-00499, MCRTN-CT-2004-512362 and LSHM-CT-2005-518189), NIH (P50 HL60292-08), The Academy of Finland and several private foundations. International collaborations consist of 12 European laboratories in the two consortia that Dr. Porkka-Heiskanen is coordinating and Harvard Medical School.

Practical aspects of training. Students will be introduced to:

- i) theory and practice of in vivo microdialysis, including training the animals, operating animals for experiments, executing experiments and analyzing data
- ii) analysis of neurotransmitters and molecules associated with energy metabolism using high performance liquid chromatography (HPLC)
- iii)
- iv) Basics in working with non-mammalian animal models – theory and recordings of zebra fish movement activity and analysis of the data

Researchers involved in the practical training and teaching. The laboratory has two senior researchers, two postdoctoral fellows and six PhD students. The following researchers will be involved in the teaching: Dr. Tarja Porkka-Heiskanen (M.D., PhD), Dr. Anna Kalinchuk (PhD), Dr. Andrey Kostin (PhD) and PhD students Henna-Kaisa Wigren and Natalia Gass. In addition, the practical animal work is instructed by Dr. Ernst Mecke.



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8) Molecular Genetics of Sleep and Sleep Disorders Unit, Center for Integrative Genomics, University of Lausanne, and the Center for Investigation and Research in Sleep (CIRS), Centre Hospitalier Universitaire Vaudois, Lausanne, Switzerland

Researchers in charge: Prof. Mehdi Tafti, Dr. Paul Franken, Dr. Raphaël Heinzer

Specific training responsibility: Molecular and quantitative genetic methods in sleep research, sleep apnea, narcolepsy, parasomnia, and neurological disorders

Description of the Unit. Our laboratory is equipped with state-of-the-art equipment to record sleep and circadian rhythms in mice. This lab consists of four rooms of which two are dedicated to record EEG/EMG signals and brain temperature and monitor behavior (video and activity) in 32 mice simultaneously, one is dedicated to monitor circadian rhythms in activity through passive infrared sensors and/or wheel running in 36 mice, and one houses all the recording and analysis computers. We have three 'wet-lab' rooms for molecular and biochemical analysis. In addition, the Center for Integrative Genomics provides access and support to a variety of platforms for micro-array analysis, proteomics, microscopy, imaging, histology, and animal housing, breeding, and genotyping. Lab techniques in use: Recording and analysis of EEG and EMG signals, brain temperature, activity, video, and video-tracking in mice, molecular biology of DNA and RNA, PCR, gene cloning, microsatellite genotyping, RFLP, SNP, micro-array (Affymetrix), quantitative RT-PCR (TaqMan), in situ hybridization and immunohistochemistry, QTL (quantitative trait loci) and GWA (genome wide association) analyses. Our Center for Investigation and Research in Sleep (CIRS) is a new sleep unit at the university hospital with 6 recording rooms. Sleep-related respiratory disorders are the major topic of this center. We do also basic human research and pharmacology in normal control subjects.

Standing of the Unit. Twelve years ago the 'Researchers in charge', Mehdi Tafti and Paul Franken, were the first to set up a lab (at Geneva University) dedicated solely to the identification of genes involved in the normal regulation and expression of sleep and the sleep EEG. Dr. Tafti was appointed as Associate Professor at the University of Lausanne where he moved in September 2004 and Dr. Franken as a MER ('Reader') in March 2005. The work already discovered several novel signaling and metabolic pathways implicated in sleep which were reported in Science, Nature, and Genes & Dev. The laboratory is recognized world-wide as a pioneer and leader in the emerging field of sleep genetics. The Unit receives funding from the University of Lausanne, the Swiss National Science Foundation, the National Institutes of Health (US), and industry. Several national (Universities of Basel, Geneva, Lausanne, and Zurich) and international (Universities of Kentucky, Stanford, and Texas; SRI international) collaborations are ongoing. The CIRS has been established by Mehdi Tafti and Raphaël Heinzer in 2007 where two third of the activity concerns diagnosis and treatment of sleep disorders with a special focus on sleep apnea and related clinical research, and one third concerns basic aspects, genetics, and pharmacology of normal sleep.

Practical aspects of training. Students will be introduced to:

- i) available genetic approaches used in sleep research;
- ii) methods to record, quantify, and analyze sleep, the EEG, and circadian rhythms in mice;
- iii) methods used to quantify and localize expression of genes in the brain
- iv) methods to map and identify genes underlying normal sleep-wake regulation and the EEG in mice and sleep disorders in humans (QTL-analysis, Linkage).
- v) Training in sleep medicine and respiratory physiology and pathophysiology
- vi) Polysomnography, MSLT, MWT, actigraphy, tests of vigilance and performance
- vii) Pharmacology of sleep and sleep disorders

Researchers involved in the practical training and teaching. The 'basic' laboratory has 3 senior researchers, 3 postdoctoral fellows, 5 PhD students and employs 3 full-time technicians. The researchers who will be involved in the practical training and teaching are: Prof. Mehdi Tafti (PhD), Dr. Paul Franken (PhD), and Dr. A. Vassalli (PhD). The human sleep laboratory includes two senior sleep specialists, two part-time neurologists, one full-time internal medicine fellow, one MD-PhD post-doc, one PhD student, and 4 PSG technicians. Are involved in the practical training: Prof. Mehdi Tafti, Dr. Raphaël Heinzer, Dr. Andreas Rossetti, Dr. Hyun Hor.



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9) Physiological Regulation in the Wake-Sleep Cycle Laboratory, Department of Human and General Physiology, University of Bologna, Italy

Researcher in charge: Prof. Roberto Amici

Specific training responsibility: Physiological regulation in sleep

Description of the Unit. The Unit is formed by two integrated sub-units, i.e. the "Laboratory of Behaviour" and the "Laboratory of Neurochemistry". The former consists of two isolated rooms, each of which contains two thermoregulated boxes for animal recording, in which the architecture of the wake-sleep cycle under different environmental challenges is studied. The latter can analyse the biochemistry of the nervous system either on microsamples or whole slices and explants.

Standing of the Unit. The Unit is active in the field of sleep research since 40 years under the guide of Pier Luigi Parmeggiani, who was the President of the ESRS from 1984 to 1988. The Researcher in Charge is Roberto Amici, who is the Scientist in Charge of the present Project and, at present, is Vice President of the ESRS and Secretary of the Italian Society of Sleep Research. The Unit receives funding for the research activity from the Ministry of University and Research of Italy and from the University of Bologna. At present, two international scientific collaborations are open with the Department of Anaesthesiology- Research Division of the University of Michigan and the Neurological Science Institute of the Oregon Health and Science University.

Practical aspects of training. Students will be introduced to:

- i) theoretical and practical use of polygraphic systems which allow the recording of bioelectrical signals (EEG, EKG), hypothalamic and tail temperature (by means of thermistors and thermal infrared camera), and the motor activity of the animal (by means of a passive infrared detector);
- ii) data analog to digital conversion and PC data storing and analysis by using both commercial and user defined software, which permit the automatic scoring of the wake-sleep stages and the frequency analysis of the bioelectrical signals;
- iii) methods for the local injections of different substances in the central nervous system and the subsequent biochemical determination of either blood hormones or brain second messengers;
- iv) methods for immunocytochemical determination of either c-Fos or CREB.

Researchers involved in the practical training and teaching. The Laboratory has 4 senior researchers, 2 postdoctoral fellows, and 3 PhD students. The senior researcher who will be involved in the practical training and teaching are: Prof. Roberto Amici (MD), Dr. Matteo Cerri (MD-PhD), Prof. Emanuele Perez (MD), and Prof. Giovanni Zamboni (MD).

10) Chronobiology Laboratory, Faculty of Health and Medical Sciences, University of Surrey, Guildford, UK

Researcher in charge: Human chronobiology: Prof. Debra J. Skene and Dr. Benita Middleton. Molecular & animal chronobiology: Dr Simon Archer

Specific training responsibility: human, animal and molecular chronobiology

Description of the Unit. The research group works in the Faculty of Health and Medical Sciences. We are fully equipped to measure and analyse physiological (hormonal, metabolic, core body temperature) and behavioural (sleep/wake, activity, light exposure, mood, alertness, performance) circadian rhythms in humans, both in the laboratory and in home-based studies. We have access to a Clinical Investigation Unit (6-bedded ward) with controlled light (monochromatic and polychromatic) and temperature. An analytical laboratory is equipped to perform a range of hormonal assays (cortisol, melatonin, 6-sulphatoxymelatonin, insulin, caffeine). We also have a molecular biology laboratory that specialises in clock gene analysis which is equipped for RNA and DNA analysis, including genotyping (TaqMan, automated sequence analysis), gene expression profiling (RT-PCR, array screening), and functional gene expression studies (transcription/translation assays).

Standing of the Unit. The study of chronobiology in Surrey has a long standing history. Originally set up by Prof Josephine Arendt 30 years ago, the group is well known for its research on melatonin; human chronobiology and circadian rhythm sleep disorders (as experienced by shift workers and blind people). Research is primarily focussed on investigating the causes, consequences and treatment of circadian rhythm disorders. Optimisation of light and/or melatonin to phase shift circadian rhythms is a priority (Skene and Middleton). Identification of clock gene polymorphisms underlying sleep disorders and inter-individual responses to sleep loss are also long term goals (Archer).

Practical aspects of training. Students will be introduced to:

- i. the methodology and analysis of human circadian rhythms in field studies and clinical settings (eg core body temperature monitoring, blood sampling, actigraphy, mood, performance)



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- ii. theory and practice for measurement of hormones (melatonin, cortisol) in blood, saliva and urine
- iii. clock gene analysis (DNA and RNA extraction, PCR and sequencing)
- iv. analysis of circadian rhythms in animals (locomotor activity, temperature)

Researchers involved in the practical training and teaching. The laboratory has four academic members of staff; two senior researchers, four postdoctoral fellows and six PhD students. The following researchers will be involved in the teaching: Prof. Debra Skene (PhD), Dr. Simon Archer (PhD), Dr. Benita Middleton (PhD), Dr. Vikki Revell (PhD), Dr. Daan van der Veen (PhD).

11) Pathophysiology of Neuronal Networks Responsible for the Sleep-Waking Cycle Laboratory, CNRS, UMR5167, University of Lyon, France

Researcher in charge: Dr. Pierre-Hervé Luppi

Specific training responsibility: animals models in sleep research, narcolepsy, learning and sleep, polysomnography and electrophysiology in animals, molecular biology

Description of the Unit. The research group is located in the research building of one of the four medicine schools of Lyon (Faculté Laennec)(<http://www.univ-lyon1.fr/>), The building is a modern research facility with about 200 researchers dedicated to biomedical research with excellent core facilities and supporting services for research. The laboratory is also member of the “Neuroscience Federative Institute of Lyon” composed of 400 persons. The laboratory has two isolated rooms with polysomnography for rodent sleep recordings, three set-up for unit recording in anesthetized or head restrained rats, two set up for “in vitro” slice recordings, one set up for multiunit and multisite recordings and a room for rodent behavioral tests (Morris water maze, radial maze, open field). We have also a room with equipment for biochemical and molecular biology and a powerful image analysis system.

Standing of the Unit. Six of the eight researchers of the laboratory were members of the historical sleep laboratory of Michel Jouvet. The new laboratory has been created in 2002 by the CNRS and is directed by Pierre-Hervé Luppi. The laboratory is world-renowned for its contribution to the identification of the mechanisms responsible for the genesis of paradoxical sleep. We also introduced recently the study of the relationships between learning, memory and paradoxical sleep. Drs Pierre-Hervé Luppi and Patrice Fort has been highly successful to train young scientists since the nineties, four of them having since obtained a permanent position as researchers in France.

Practical aspects of training. Students will be introduced to:

- i) theory and practice of unit recordings during the sleep-waking cycle, including training the animals, operating animals for experiments, executing experiments and analyzing data.
- ii) Injections of anterograde and retrograde tracers combined with immunohistochemistry of neuroactives substances or C-Fos as a functional marker and “in situ” hybridization.
- iii) Recording, analysis of the EEG and EMG during the sleep-waking cycle in basal conditions, in transgenic animals and after local or systemic pharmacology
- iv) “in vitro” electrophysiological recordings (intracellular, patch clamp)
- v) molecular biology methods (real time RT-PCR, mRNA extraction, cDNA microarrays)

Researchers involved in the practical training and teaching. The laboratory has eight senior researchers, three technicians, one postdoctoral fellow and ten PhD students. The following researchers will be involved in the teaching: Dr. Pierre-Hervé Luppi (PhD), Dr. Patrice Fort (PhD), Dr. Christelle Peyron (PhD), Dr. Lucienne Leger (PhD) Dr. Damien Gervasoni (PhD) Dr. Paul Salin (PhD) Dr. Gaël Malleret (PhD) and Dr. Guy Chauvet (PhD).