



Mediterranean Neuroscience Society School

**In collaboration with the European Graduate School of Neuroscience Course (EURON),
and Turkish Society for Stereology (TSS), and FENS-IBRO (support requested)**

Neuroscience school on "Stereotactical surgery in neurological and psychiatric disorders"

4-8 July 2011

Ondokuz Mayıs University, Samsun, Turkey

[For interested participants, 9 July 2011, Stereology Course
Ondokuzmayis University, Samsun, Turkey \(for information see below\)](#)

MNS

This course is organised by the Mediterranean Neuroscience Society (MNS). The MNS board members and some invited colleagues will teach in the course.

Target group

BSc, MSc and PhD students, technicians and interested clinicians and scientists.

Background

Clinical application

Since the introduction of human stereotaxy, patients suffering from neurological and psychiatric disorders have been treated by stereotactical operations. In the beginning, these were mainly ablative procedures (such as thalamotomy and pallidotomy in Parkinson's disease patients or leucotomy in Tourette's syndrome patients), later electrical stimulation delivered by implanted electrodes (deep brain stimulation: DBS), and recently by local drug delivery (such

as GDNF injection into the striatum in Parkinson's disease patients). Stereotaxy is an important method in neurosurgery and neuroscience research for locating anatomical targets within the brain using an external, three-dimensional frame of reference.

The principle of stereotactic surgery depends on a three-dimensional (X,Y,Z) Cartesian coordinate system. Descartes observed that it is possible to define the location of an individual point in space by relating it to three planes intersecting at right angles to each other. These historical theoretical developments have eventually resulted in the introduction of a device that could be used for exploring and changing brain functions. Robert Henry Clarke and Victory Horsley are acknowledged as having published the most definitive description of the principles and a device for stereotaxy. They explored the function of the cerebellum in an animal by stereotaxy. Aubrey Mussen, from Montreal, had an adaptation of the Horsley-Clarke device to be used in humans. However, according to Robert Leyv, Mussen's stereotactic instrument was never used clinically as he was never able to convince a neurosurgeon to use the device.

In 1947, Ernst Spiegel and Henry Wycis reported the use of a human stereotactic device. Interestingly, they did not relate the coordinate system to external landmarks, which was the case in animal stereotaxy, but to internal landmarks based on pneumencephalograms. This has been the basis for the development of human stereotaxy. At present several human stereotaxy systems exist and several atlases are available.

Stereotaxic or stereotactic? Both words have been used in the past, and in Greek stereotaxic refers to *three-dimensional* and *system*. However, in 1973, the *International Society for Research in Stereoencephalotomy* has decided to change its name in *World Society for Stereotactic and Functional Neurosurgery*. Therefore, it is recommended to use the word stereotactic.

Translational aspects of stereotactical surgery for neurological and psychiatric disorders

In research conditions, stereotaxy is frequently used to deliver substances locally, or to implant cannulae (e.g. for repeated/chronic infusion of drugs or for neurochemical detection of neurotransmitters) or electrodes (for electrical stimulation or electrophysiological recording) with submillimetric precision. In other words, this technique allows the scientist to study research targets in the brain with high accuracy in animal models of neurological and psychiatric disorders.

Scientific and practical course

In this course, participants will receive comprehensive tuition in the relevant scientific theory, and will have an opportunity to apply their knowledge during 'hands-on' training in key stereotactic applications. The course is composed of two parts. In the first part, the participants will receive lectures about the most common stereotactical procedures for neurological and psychiatric disorders. In the second session, participants will receive a hands-on training to apply their knowledge in research conditions.

The scientific part will focus on the following subjects:

- Ethics in Neuroscience.

Here, the lecturer will not only focus on the use of animals, but also on the ethics of data publishing and collaborating with other scientists and industry.

- General principles of stereotactical surgery

- General principles of in vivo electrophysiology: extracellular recordings and local field potential
- Stereotactical surgery in Parkinson's disease and dystonia
- Stereotactical surgery in Tourette's syndrome
- Stereotactical surgery in depression and OCD
- Stereotactical surgery in epilepsy with video EEG

In the practical part of the course, we will focus on the three main scientific applications of stereotaxy, which are related to the abovementioned clinical applications.

- 1) Local drug delivery: stereotaxy is used to inject a drug in a large volume (part of a brain nucleus) or in a very small volume (few cells or one cell, usually iontophoretically). Local drug delivery is used to make lesions (a general lesion such as an excitotoxic lesion or a specific lesion such as neurotransmitter depletion) with high precision. In addition, this procedure is also used to deliver experimental drugs to modulate receptor activity. This technique will be discussed and shown.
- 2) Electrophysiological recordings: Electrophysiology is a widely used technique in neuroscience. It can provide vital information about the function of neurons under physiological conditions and in disease. For the majority of the electrophysiological approaches, implantation of electrodes with high precision is necessary. Single-cell extracellular recordings, local field potentials, and the concept of EEG and SEEG recordings will be discussed and shown.
- 3) Electrical brain stimulation: This is a relatively novel technique to modulate the neuronal activity of a brain region of interest. It is an alternative to a lesion. Lesions are irreversible and cannot be adjusted once performed. Electrical stimulation is reversible (switching on and off) and is adjustable (stimulation parameters can be adjusted). DBS is nowadays a frequently used procedure to treat patients suffering from severe neurological (e.g. Parkinson disease) and psychiatric (e.g. Obsessive-Compulsive disorder) conditions. This technique will be discussed and shown.

The subjects for the hands-on course will be laboratory rats. All the teaching experiments will be performed in line with the ethical standards of minimizing the number and suffering of laboratory animals, and permission will be asked to the local animal ethical committee.

Abstracts and poster sessions

Participants will be requested to submit an abstract of their own work. Poster sessions are the preferred format for presentations by the students since they facilitate informal interactions between faculty and student. There will also be poster prizes for the best three posters.

Course board

The course board (= faculty) will be consisting of the persons listed below. The board members have all confirmed their presence, except for one, and will spend the entire week with the students. The course board will be responsible for the selection of the participants and will take into account the gender and geography.

Board members:

Dr. Y. Temel, Maastricht, the Netherlands. Course director.

Prof. Dr. S. Kaplan, Samsun, Turkey. Course co-director.

Dr. Z. Altunkaynak, Samsun, Turkey

Dr. A. Benazzouz, Bordeaux, France

Prof. Dr. H. Bergman, Jerusalem, Israel

Dr. D. Boussaoud, Marseille, France

Dr. Sinan Canan, Ankara, Turkey

Prof. Dr. P. Chauvel, Marseille, France

Dr. A. Kaya, Samsun, Turkey

Prof. Dr. B. Sahin, Samsun, Turkey

Prof. Dr. H. Steinbusch, Maastricht, the Netherlands

Prof. Dr. V. Visser-Vandewalle, Maastricht, the Netherlands

Selection of participants

The maximum amount of participants will be 40. Participants from Europe will be encouraged as well as the participation of students outside Europe, such as the South Mediterranean regions.

We will provide a still to be determined number of selected participants, such as from the South Mediterranean regions, a grant (to cover their travel and accommodation costs) to participate to this Neuroscience school.

The final selection of the students will be approved by the liaisons officer for the school which will be nominated by the course board.

Participants interested in joining the Stereology course are requested to contact Professor S. Kaplan at skaplan@omu.edu.tr

Venue and facilities

The venue is the Faculty of Medicine, Ondokuz Mayıs University, Samsun, Turkey. Samsun is a key city in the Black Sea region of Turkey. The University is located on the hills of Samsun, again facing the black sea. It is one of the biggest universities of Turkey, with approximately 40 000 students.

The University has excellent facilities consisting of lecture rooms, space for poster sessions and small group discussions, laboratories, and common housing and dining facilities. In addition, the evening program will include recreational activities to facilitate interactions between participants and faculty.

We aim to create a forum of fruitful interaction between the participants and experts in the field of stereotaxy.

Detailed program:

Day 1 (4 July 2011)

Opening and welcome

Ethics in Neuroscience: (D. Boussaoud)

General principles of stereotactical surgery (Y. Temel)

General principles of in vivo electrophysiology: extracellular recordings and local field potential (D. Boussaoud and H. Bergman)

Stereotactical surgery in Parkinson's disease and dystonia (A. Benazzouz)

Stereotactical surgery in Tourette's syndrome (V. Visser-Vandewalle)

Stereotactical surgery in depression and OCD (H. Bergman)

Stereotactical surgery in epilepsy with video EEG (P. Chauvel, Marseille)

Day 2 (5 July 2011)

Hands-on deep brain stimulation in rats

Day 3 (6 July 2011)

Hands-on local drug delivery in rats

Day 4 (7 July 2011)

Hands-on electrophysiology I in rats

Postersessions

Day 5 (8 July 2011)

Hands-on electrophysiology II in rats

Closing remarks and poster prizes

Course director's address

Dr. Yasin Temel
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Course Address:

Pembe Salon
Medical School of
Ondokuz Mayıs University
55139, Kurupelit, Samsun,
Turkey
Phone and Fax: ++903623121919 ext. 2265 (S. Kaplan)

Local Contact Address (course co-director) and contact person for the Stereology course

Prof. Suleyman Kaplan
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The course is limited to a maximum of **40** participants.

For registration, please contact

Registration fee:

Registration fee: € 350. The fee includes attendance to all sessions, course booklet, lunch and coffee/tea/snacks during the coffee breaks, accommodation (5 nights including breakfast) social event. If you do not need accommodation the costs will be: € 200.

For registration please contact the course director by email (y.temel@maastrichtuniversity.nl). Please also send a CV.

[For the stereology course an additional fee of € 50 is requested.](#)

Accommodation:

We will make a reservation for some rooms at the Ondokuzmayıs University Guesthouse, Samsun, which is in walking distance to the course area about 10 min. Please indicate in your registration whether we shall register you for one of these rooms.

Stereology Course

9 July 2010

A basic course of neurostereology

Modern design-based stereological techniques, which are known to be the gold standard for morphological studies, are now crucial for all investigators working in the field of quantitative morphology. In our course, we are going to discuss basic subjects of modern stereology including the theoretical framework of stereological methods, systematic random sampling, volume and volume ratio estimations on radiologically sectioned material (MR or CT), particle number and particle density estimations, fractionator technique for estimations of total particle number. Basic hands-on applications will also have been made for better understanding of the issues mentioned in theoretical sessions.

Lecturers:

Süleyman Kaplan

President of Turkish Society for Stereology;
Dept. of Histology and Embryology, Faculty of Medicine, Ondokuz Mayıs University,
Samsun, Turkey
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Bünyamin Şahin

Vice-President of Turkish Society for Stereology;
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Sinan Canan

Member of Turkish Society for Stereology;
Dept. of Histology and Embryology, Faculty of Medicine, Turgut Özal University, Ankara,
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B.Zuhal Altunkaynak

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July 9, 2011
Course Program

Time	Topic	Lecturers
09:00-09:15	Opening remarks	S. Kaplan
09:15-10.15	1) The importance of quantitative morphology in experimental and clinical studies 2) Introduction to stereology and basic concept in unbiased quantitative morphology	S. Kaplan
10:15-10:30	Coffee Break	
10:30-11.00	Sampling strategies in stereology	S. Canan
11:00-12.00	Volume and volume ratio estimations on radiologically sectioned material	B. Şahin
12:00-13:00	Lunch Break	
13:00-14:00	Estimation of particle number on physical and optical sections: The physical and optical disector	S. Kaplan
14:00- 14.45	Physical disector: Practical exercises	S. Kaplan S. Canan Z. Altunkaynak
14:45- 15:00	Coffee Break	
15:00-16:00	Physical and optical fractionator	S. Canan
16:00- 16:30	Optical Fractionator: Practical exercises	S. Kaplan S. Canan Z. Altunkaynak,
16:30-18:30	Practical exercise in volume and volume ratio estimations on radiologically sectioned material	B. Şahin Z. Altunkaynak
18:30:19:00	Concluding remarks	