

The Danish Cardiovascular Research Academy and Faculty of Health Sciences, University of Copenhagen

PhD-course: Integrative Human Cardiovascular Control

Aim and Content: This course covers important theoretical and practical aspects of methods in integrative human cardiovascular studies. The purpose is to provide the participants with knowledge of advantages and pitfalls of these methods during morning lectures and to demonstrate methods and allow participants hands-on experience during afternoon practical sessions. Complete course program: www.dacra.dk

Participants: 20-30 PhD-students. The course is specifically designed for researchers performing studies in humans.

Form: 22 morning lectures. 18 hours of afternoon demonstrations and practical work. 3 workshops. Participant demonstrations. Homework required. Knowledge Review.

Teaching Language: English.

Course Directors:

Niels H. Secher, MD, DMSc, Department of Anaesthesia, The Abdominal Centre, Rigshospitalet, University of Copenhagen, Denmark. Tel: +45 3545 2242.

Mikael Sander, MD, PhD, Aviation Medicine, The Heart Centre, Rigshospitalet, University of Copenhagen, Denmark. E-mail: sanders@dadlnet.dk

Teachers: International capacities (In 2008 these were Peter Raven, Michael Joyner, Jerome Dempsey, Ben Levine, Craig Crandall, Gail Thomas, Russ Richardson, Scott Smith, and Dick Greene from USA; Gunnar Wallin from Sweden; Wouter Wieling and Johannes van Lieshout from Holland). The experts will lecture along with local speakers and also participate in the afternoon sessions.

Date: 6 Days, Sunday, May 2nd - Friday, May 7th, 2010.

ECTS: 7,0.

Place: Rigshospitalet and Panum Institute, Copenhagen, Denmark.

Course Fee: DKK 12.500. No fee for registered Danish PhD-students.

Course Secretary:

Mikael Sander, MD, PhD, Aviation Medicine, The Heart Centre, Rigshospitalet, University of Copenhagen, Denmark. E-mail: sanders@dadlnet.dk

Registration: By e-mail or fax to the course secretary before March 1st, 2010.

Sunday May 2nd: Introduction to integrative cardiovascular physiology.

- 10:00 – 10:30 Welcome
Niels Secher & Mikael Sander, directors of the course.
Introduction of the students and teachers.
- 10:30 – 12:30 Integrative human cardiovascular physiology:
Reflex control of the cardiovascular system in health and
disease.
Allyn Mark, Professor, MD, Iowa City, IO, USA.
- 12:30 – 13:30 Lunch.**
- 13.30 – 17.30 Workshop: Hypothesis-driven research in integrated
cardiovascular control: Planning and presenting your work.
Introduction by Mikael Sander (15 min)
Groupwork: 3-4 students (each with a teacher as “supervisor”):
Students give their presentations in the groups, the projects and
techniques of presentation are discussed (around 45 minutes for
each presentation).
“Supervisors”: Michael Joyner, Scott Smith, Russell Richardson,
Craig Crandall, Ben Levine, Peter Raven, Walter Wray, USA;
Wouter Wieling, Holland; Mikael Sander, Copenhagen.
- Coffee/Tea served during the workshop.**

Monday May 3rd: Central Hemodynamics.

- 08:30 - 09:45 Evolution of the cardiovascular system.
Tobias Wang, Professor Zoophysiology.
Aarhus, Denmark.
- 09:45 - 10:30 Blood pressure and cardiac output measurements.
Johannes Van Lieshout, MD PhD,
Amsterdam, Holland.
- 10:30 - 10:45 Coffee/Tea.**
- 10:45 - 11:30 Evaluation of the arterial baroreflex.
Peter Raven, PhD,
Fort Worth, Texas, USA.
- 11:30 – 12:30 Regulation of cardiac output at rest and during exercise.
Ben Levine, MD
Dallas, Texas, USA.
- 12:30 - 13:30 Lunch.**
- 13:30 - 15:00 Demonstration A: Blood pressure, cardiac output and brain blood
flow during tilting.
Johannes Van Lieshout, MD, PhD, Amsterdam, Holland.
- 15:00 – 16:30 Demonstration B: Baroreflex manipulations by neck suction and
pressure.
Peter Raven, PhD, Fort Worth, Texas, USA.
Niels Secher, MD, DMSc, Copenhagen, Denmark.
- 19.00 - Evening get-together at the Sechers.**

Tuesday May 4th: Blood Flow and Metabolic Indices.

- 08:30 - 09:30 Ultrasound Doppler.
Dick Greene, PE, PhD.
UNM, Las Vegas, New Mexico, USA.
- 09.30 - 10.30 Tissue oxygenation.
Russell Richardson, PhD
USCD, San Diego, California, USA.
- 10:30 - 11:00 Coffee/Tea.**
- 11:00 - 12:30 Measurements of brain blood flow and sympathetic control
of brain blood flow.
Johannes van Lieshout MD PhD, Amsterdam, Holland.
Niels Secher, MD, DMSc, CMRC, Copenhagen
- 12:30 - 13:30 Lunch.**
- 13:30 - 16:30 Demonstration B: Doppler – tricks of the trade.
Students will try Doppler measurements on each other.
Dick Greene, PE, PhD, Las Vegas, New Mexico, USA.
Ben Levine, MD, Dallas, Texas, USA.
Mikael Sander, MD PhD, Copenhagen, Denmark.

Wednesday May 5th: Integrative Cardiovascular Control 1

- 08.30 – 09:15 Central blood volume
Niels H. Secher, MD, DMSc,
Copenhagen, Denmark.
- 09:15 – 09:30 Coffee/Tea.**
- 09:30 – 12:00 Demonstration: Central haemodynamics in the pig.
Responses to haemorrhage.
Torben Krantz, MD,
Morten Zahr, MD,
Copenhagen, Denmark.
- 12:00 – 13:00 Lunch.**
- 13:00 - 14:00 Cardiovascular regulation during heat stress
Craig Crandall, PhD
Dallas, Texas, USA.
- 14:00 - 14:45 Muscle blood flow during exercise.
Stefan Mortensen
CMRC, Copenhagen.
- 14:45 – 15:00 Coffee/Tea.**
- 15:00 – 15:45 The exercise pressor reflex
Scott Smith, PhD.
Dallas, Texas, USA
- 15:45 – 16:30 Control of blood flow in patients with neuromuscular disease
John Vissing MD, DMSc
CMRC, Copenhagen.

Thursday May 6th: Autonomic Nervous System.

- 08:00 – 09:00 Sympathetic nerve activity by microneurography.
Gunnar Wallin, MD, DMSc,
Göteborg, Sweden.
- 09:00 – 09:15 Coffee/Tea.**
- 09:15 – 10:15 Sympathetic activity by noradrenaline spillover
Murray Esler, MD
Melbourne, Australia
- 10:15 – 10:30 Short break.**
- 10:30 – 11:45 Pharmacologic manipulation of the autonomic nervous system.
Michael Joyner, MD,
Rochester, MN, USA.
- 11:45 – 13:15 Autonomic disorders.
Wouter Wieling, MD
Amsterdam, Holland.
- 13:15 – 13:45 Lunch.**
- 14:00 – 19:00 Social excursion:
- 19:00 – 01:30 Course-dinner.**

Friday May 7th: Integrative Cardiovascular Control 2

- 08.30 – 10:00 Respiratory cardiovascular interactions.
Jerome Dempsey, PhD,
Madison, Wisconsin, USA.
- 10:00 – 10:30 Coffee/Tea.**
- 10:30 – 13:00 Control of vascular resistance during exercise
Protocol design in cardiovascular studies.
Mikael Sander, MD, PhD, Copenhagen, Denmark.
Walter Wray, PhD, Salt Lake City, USA
- 11:30 – 11:45 Short break.**
- 13:00 – 13:30 Lunch.**
- 13:30 – 16:30 Examination – Knowledge Review – Course Certificates.
Mikael Sander, MD, PhD, Copenhagen, Denmark.

Saturday May 10th:**Symposium: Cardiovascular and ventilatory adjustments to hypoxia during rest and exercise.**

- 09:00 – 09:15 Welcome. Mikael Sander,
Introduction of the participants and presenters.
- 09:30 – 10:15 Respiratory cardiovascular interactions during hypoxic exposure.
Jerry Dempsey, Madison, Wisconsin.
- 10:30 – 11:15 Responses to intermittent hypoxia.
Barbara Morgan, Madison, Wisconsin.
- 11:30 – 12:15 Responses to prolonged hypoxia.
Mikael Sander, Copenhagen.
- 12:30 – 13:15 Chemoreflex sensitization produced by hypoxic exposure.
Peter Robbins, Oxford, UK.
- 13:30 – 14:00 Lunch.**
- 14:00 – 14:45 Oxygen uptake during rest and exercise in normoxia and hypoxia.
José Calbet, Las Palmas, Gran Canaria.
- 15:00 – 15:45 Exercise performance during hypoxic exposure.
Carsten Lundby, Copenhagen.
- 15:45 – 16:45 Discussion – Next frontiers in this research field.
- Fruit and softdrinks served during the symposium.**
- 19:00 – Evening meal for presenters**