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 Anaesthesiology, 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 2007 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; Jacques Lenders 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 5th - Friday, May 10th, 2008.

ECTS: 4.5. Knowledge review on the last day.

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, 2008.
Sunday May 5th: Introduction to integrative cardiovascular physiology.

09:30 – 10:00 Welcome
Niels Secher & Mikael Sander, directors of the course.
Introduction of the students and teachers.

10:00 – 12:30 Integrative cardiovascular physiology in the molecular era.
Niels V Olsen, MD, DMSc, Copenhagen, Denmark
Søren Peter Olesen, MD, PhD, Copenhagen Denmark
Michael Joyner, MD, Mayo Clinic, Rochester, MN, 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, Russel Richardson, Ben Levine, Gail Thomas, Craig Crandall, Peter Raven, USA; Wouter Wieling, Holland; Mikael Sander, Copenhagen.

Coffee/Tea served during the workshop.

17:30 – Cold drinks.
Monday May 6th: Central Hemodynamics.

08:30 - 09:30  Evolution of the cardiovascular system.
Tobias Wang, Professor Zoophysiology.
Aarhus, Denmark.

09:30 - 10:30  Hemodynamics in children with cardiac malformations.
Henrik Ørbæk Andersen.

10:30 - 11:00  Coffee/Tea.

11:00 - 11:45  Blood pressure and cardiac output measurements.
Johannes Van Lieshout, MD PhD,
Amsterdam, Holland.

11:45 - 12:30  Evaluation of the arterial baroreflex.
Peter Raven, PhD,
Fort Worth, Texas, USA.

12:30 - 13:30  Lunch.

13:30 - 14:30  Regulation of cardiac output at rest and during exercise.
Ben Levine, MD
Dallas, Texas, USA.

14:30 - 17:00  Demonstration A: Baroreflex manipulations by neck suction and pressure.
Peter Raven, PhD, Fort Worth, Texas, USA.
Niels Secher, MD, DMSoc, Copenhagen, Denmark.

14:30 - 17:00  Demonstration B: Blood pressure, cardiac output and brain blood flow during tilting.
Ben Levine, MD, Dallas, Texas, USA.
Johannes Van Lieshout, MD, PhD, Amsterdam, Holland.

19.00 -  Evening get-together.
Tuesday May 7th: Blood Flow and Metabolic Indices.

08:30 - 09:15 Plethysmography.  
Michael Joyner, PhD  
Rochester, Minnesota, USA.

09.15 - 10.30 Ultrasound Doppler.  
Dick Greene, PE, PhD.  
UNM, Las Vegas, New Mexico, USA.

10:30 - 11:00 Coffee/Tea.

11:00 - 12:00 Tissue oxygenation.  
Russell Richardson, MS, PhD  
USCD, San Diego, California, USA.

12:00 - 12:45 Microdialysis measurements of metabolic events  
Henning Langberg, MS, DMSc,  
Copenhagen, Denmark.

12:45 - 13:30 Lunch.

13:30 - 16:30 Demonstration A: Plethysmography and Doppler – forearm and leg.  
Niels Secher, MD, DMSc, Copenhagen, Denmark.  
Michael Joyner, MD, Rochester, Minnesota, USA.  
Mikael Sander, MD PhD, Copenhagen, Denmark.

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.
**Wednesday May 8th: Integrative Cardiovascular Control 1**

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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<tbody>
<tr>
<td>09:15 – 09:45</td>
<td><strong>Coffee/Tea.</strong></td>
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<tr>
<td>09:45 – 12:00</td>
<td>Demonstration: Central haemodynamics in the pig. Responses to haemorrhage. Torben Krantz, MD, Copenhagen, Denmark.</td>
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<td>12:00 – 13:00</td>
<td><strong>Lunch.</strong></td>
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<td>13:00 – 14:00</td>
<td>Skeletal muscle blood flow during rest and exercise. Bengt Saltin, MD, DMSc, Copenhagen, Denmark</td>
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<td>14:00 - 14:45</td>
<td>The metabolic events during exercise. Jens Bangsbo, DMSc, Copenhagen, Denmark.</td>
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<td>14:45 – 15:00</td>
<td><strong>Coffee/Tea.</strong></td>
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<td>15:00 – 15:45</td>
<td>The exercise pressor reflex. Scott Smith, PhD. Dallas, Texas, USA.</td>
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<td>15:45 – 16:45</td>
<td>Cardiovascular regulation during heat stress. Craig Crandall, PhD Dallas, Texas, USA.</td>
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Thursday May 8th: 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 – 11:30  Pharmacologic manipulation of the autonomic nervous system.
               Michael Joyner, MD
               Rochester, MN, USA.

11:30 – 11:45  Short break.

11:45 – 12:45  Sympathetic control of blood flow in exercising muscle
               Gail D Thomas, PhD
               Dallas, Texas.

12:45 – 13:45  Lunch.

               Wouter Wieling, MD
               Amsterdam, Holland.

19:00 –  Course-dinner.
Friday May 10th: Integrative Cardiovascular Control 2

08.30 – 10:00  Respiratory cardiovascular interactions.
Jerome Dempsey, PhD,
Madison, Wisconsin, USA.

10:00 – 10:30  Coffee/Tea.

Mechanisms underlying functional sympatholysis.
Gail Thomas, PhD, Dallas, Texas, USA
Mikael Sander, MD, PhD, Copenhagen, Denmark.

13:00 – 13:30  Lunch.

13:30 – 16:30  Examination – Knowledge Review
Mikael Sander, MD, PhD, Copenhagen, Denmark.