

Post graduate course “Epigenetics in Reproduction 1.5 ECTS”, November 12-15, 2018

Organized by CRU with support from the SLU Research School GS-VMAS

Course leader: Ylva Sjunnesson

Course organizers: Göran Andersson, Theodora Kunovac Kallak, Anneli Stavreus-Evers, Malin Gustavsson.

Venue: SLU Campus, Ulls väg 26, Uppsala, VHC building, Room Ratatosk

Participants: 20 students and 15 lecturers (see schedule below).



Some of the lecturers and participants from Tuesday the 13th of November

The syllabus of the course can be found last in this document.

Summary of the course

The course included a brief biological background and basic genomics before dealing with the molecular background of epigenetics and methodologies used in epigenetic studies. Epigenetic modifications and their alterations were described in all steps of embryo production (*in vivo* and *in vitro*). Several species were exemplified (*e.g.* bovine, ovine, porcine, human, murine) and their similarities/diversities were discussed. The epigenetic control of pluripotency and the potential of artificially regulating gene expression and cell pluripotency by CRISPR/cas9-mediated epigenetic modifications were addressed. The impact of endocrine disrupting chemicals on epigenetic patterning during the early development was included as well as data on developmental exposures, adverse health outcomes and links to epigenetic changes in human as well as in animal models. As a specific example, the circumstances of the Dutch Hunger Winter Famine and epigenetic changes associated to this were discussed. Finally, the subject of cloning and epigenetics was approached. All participants gave at least a short oral presentation regarding their own work during the course and a workshop on ethics in assisted reproduction and epigenetics was held.

In addition to providing the participants with updated information in the field of epigenetics in reproduction, the participants were given an opportunity to network and discuss their work and ideas with each other. Most presentations were also attended by interested researchers who did not have the possibility to follow the entire course.

The course evaluation of the course was very positive with a mean score of 4.5 (on a scale 1 – 5 where 5 is the best possible score).

Schedule

Monday 12th of November

- 8.30 – 9.00 Registration
- 9.00 – 9.15 **Introduction**
Ylva Sjunnesson, Swedish University of Agricultural Sciences, Sweden.
- 9.15 – 10.00 **Basic cell biology**
Anneli Stavréus-Evers, Uppsala University, Sweden
- 10.00 – 10.30 COFFEE
- 10.30 – 11.15 **Basic genomics**
Göran Andersson, Swedish University of Agricultural Sciences, Sweden.
- 11.15 – 11.25 Break
- 11.25 – 12.00 **Introduction to epigenetics**
Poul Hyttel, University of Copenhagen, Denmark.
- 12.00 – 13.00 **LUNCH**
- 13.00 – 13.45 **Introduction to epigenetics cont.**
- 13.45 – 14.00 Break
- 14.00 – 15.00 **Student presentations (Theodora Kunovac Kallak)**
- 15.00 – 15.30 COFFEE and group discussions
- 15.30 – 16.15 **Methodologies in epigenetics**
Åsa Johansson, Uppsala University, Sweden.
- 16.15 – 16.25 Break

16.25 – 17.00 **Methodologies in epigenetics cont.**
17.00 **Get-together reception in the VHC building (light snacks)**

Tuesday 13th of November

09.00 – 09.45 **Epigenetics from a reproductive perspective**
Christine Wrenzycki, Justus-Liebig-Universität Gießen, Germany.
9.45 – 10.15 COFFEE
10.15 – 11.00 **Epigenetics from a reproductive perspective cont.**
11.00 – 11.15 Break
11.15 – 12.00 **Epigenetics and gametes.**
Marc- André Sirard, Université Laval, Canada.
12.00 – 13.00 **LUNCH**
13.00 – 13.45 **Epigenetics and gametes cont.**
14.00 – 15.00 **Student presentations (Ylva Sjunnesson)**
15.00 – 15.30 COFFEE and group discussions
15.30 – 15.45 **Epigenetic mechanisms involved in embryo development**
Nathalie Beaujean Bobineau, French National Institute for Agricultural Research, France.
15.45– 16.00 Break
16.00 – 16.45 **Epigenetic mechanisms involved in embryo development cont.**

17.45 – 18.45 **Social event: tour of the Uppsala modern art museum in the Castle (Drottning Christinas väg 1E)**

19.00 **Course dinner in Kitchen and Table (Dragarbrunnsgatan 23).**

Wednesday 14th of November

09.00 – 09.45 **Stem cell pluripotency**
Poul Hyttel, University of Copenhagen, Denmark.
09.45 – 10.00 COFFEE
10.00 – 11.00 **Using epigenetic to explore the early embryo environment**
Marc- André Sirard, Université Laval, Canada.
11.00 – 11.15 Break
11.15 – 12.15 **Student presentations (Anneli Stavréus-Evers)**
12.15 – 13.15 **LUNCH**
13.15 – 14.00 **Reproductive toxicology and epigenetics**
Joelle Rüegg and Pauliina Damdimopoulou, Karolinska Institutet, Sweden.
14.00 – 14.30 COFFEE and group discussions
14.30 – 15.30 **The Dutch Winter Famine**
L.H. Lumey, Columbia University Medical Center.
15.30 – 15.45 Break
15.45 – 16.30 **How SLUBI and NBIS can help you with your bioinformatics needs**
Juliette Hayer. Coordinator of the SLU Bioinformatics Infrastructure (SLUBI)

Uppsala, Sweden and Henrik Lantz NBIS/SciLifeLab, Uppsala

Thursday 15th of November

09.00 – 09.45 **Environmentally-induced transgenerational epigenetic effects and consequences on Reproduction**

Carlos Guerrero-Bosagna, Linköping University, Sweden

09.45 – 10.15 COFFEE

10.15 – 12.00 **Ethics in assisted reproduction and epigenetics Workshop**

Olle Torpman, SLU and Stockholm University

12.00 – 13.00 LUNCH

13.00 – 14.00 **Student presentations (Göran Andersson)**

14.00 – 14.30 COFFEE and group discussions

14.30 – 15.15 **Cloning and epigenetics**

William A. Ritchie, Fellowship Royal Society of Biology, United Kingdom.

15.15 – 15.25 Break

15.25 – 15.45 **Course summary and evaluation, Diploma**

15.45 – 16.30 Tour of the VHC building for those who are interested

Syllabus

Course name: Epigenetics and reproduction

Number of credits: 1,5

Subject (according to SLUkurs): Biology

Part of research school: GS-VMAS

Marking scale: Passed / Failed

Prerequisites:

Minimum master degree in biology, medicine, reproductive health, nursing, veterinary medicine, animal science or equivalent

Objective:

The aim of the course is to enhance the knowledge and understanding of epigenetic modifications and how they influence gene regulation in relation to reproduction

After completing the course the student shall be able to...

- 1) Explain how epigenetic factors influence reproductive mechanisms
- 2) Describe ethical aspects and use the knowledge in relation to epigenetics
- 3) Describe epigenetic changes after assisted reproduction
- 4) Explain mechanisms behind stem cells and their differentiation
- 5) Implement methodology in epigenetic studies

Content:

Comparative aspects of epigenetic modifications in humans and animals will be covered as well as ethical aspects. The course will include lectures, group work and student presentations.

Literature: Scientific articles and speaker presentations.

Examination:

Successful completion requires 80 % attendance. Participation in discussions during lectures, oral presentation of student's own research and oral presentations of group work

Responsible department: Department of clinical science / CRU

Location: Uppsala