DEPARTMENT OF LABORATORY MEDICINE

H5F3150, Embryology I, 1.5 credits (hec)

Embryologi I, 1,5 högskolepoäng

Third-cycle level / Forskarnivå

Approval

This syllabus was approved by the The Committee for Doctoral Education on 2024-02-08, and is valid from autumn semester 2024.

Responsible department

Department of Laboratory Medicine, Faculty of Medicine

Prerequisite courses, or equivalent

No prerequisite courses, or equivalent, demanded for this course.

Purpose & Intended learning outcomes

Purpose

The aim of the course is to instruct the participants in human reproductive biology with focus on assisted reproduction technologies (ART), as well as to give them practical experience through practical demonstrations in embryological and micro-manipulation techniques. To provide understanding of the components of culture systems used in ART, so that the student can evaluate, troubleshoot and improve existing systems.

Intended learning outcomes

At the conclusion of this course students should show a good understanding of:
Laboratory environment, input materials.
Physical-chemical properties of culture system.
Functional characteristics of different workstations for ART and their benefits.
The influence of the laboratory and clinic environment on embryo culture.
The morphology of oocytes, zygotes and cleavage stage embryos as well as morulae and blastocysts.
Developmental milestones.

Student should be aware of the general aspects and implication of the stem cells research and the

potentiality that this represent for clinical application.
Morphological aspects of the blastocysts for derivation of ICM and Derivation methods.
Characterization of the embryonic stem cells and the importance of the pluripotency of these cells.
The different differentiation assay on stem cells and what is ongoing in this field.
The production of isogonics embryonic stem cells by somatic cell nuclei transfer or therapeutic clone (SCNT).

Finally the students will improve their capacity to produce coherent, logical and concise explanations of data and concepts - both written and oral, through consideration of the course material.

Students will also develop their ability to criticize scientific literature related with ART and reproduction physiology in a constructive and informed fashion.

Course content

Sperm theory (lecture)
1. Anatomy of the testis, sperm production and maturation, fertilization.
2. Cryopreservation of spermatozoa.
3. Sperm preparation for IVF and ICSI, criteria for ICSI.

Embryology (Lecture)
1. Follicle growth and maturation, ovulation.
2. Cell biology and oocyte genetics.
3. Embryo development in-vitro, morphological evaluation of embryos.
4 Cryopreservation of embryos, theory and practice.
5. Embryonic stem cells.
6. Selection of embryos for transfer and cryopreservation.

Technical demonstrations (Lab)
1. How to work with sperm, oocytes and embryos.
2. Manipulation and training with mouse oocytes and mouse embryo handling.
3. Micro manipulation techniques, presentation.
4. Micromanipulation training. ICSI and embryo biopsy.

Genetics (Lecture)
1. Genetic aspects of prenatal diagnostics and PGD.
2. Cloning techniques.

Forms of teaching and learning

The course runs for one week with lectures, and practical demonstration in embryo-micro manipulation techniques (intra-cytoplasmatic sperm injection and Embryo biopsy for PGD).

Language of instruction

The course is given in English

Grading scale

Pass (G) /Fail (U)

Compulsory components & forms of assessment

Compulsory components

The laboratory demonstrations are obligatory. The student should compensate for absence at a laboratory demonstration by presenting a literature report in agreement with the course leader.

Forms of assessment

Individual written exam on the last day of the course.

Course literature

Recommended literature:
In vitro fertilization (3rd edition)
Elder and Dale, Cambridge University Press, 2010
Textbook of Assisted Reproductive Techniques: Laboratory and Clinical Perspectives, 3rd edition
Gardner DK, Weissman A, Howles CM, Shoham Z, editors.
2009, Informa Healthcare UK Ltd
Human Embryology, William J. Larsen, Third Edition, Churchill Livinstone, 2001
Infertility; Julius Hreinsson, Lars Hamberger, Thorir Hardarson, Studentlitteratur, 2005
Manipulating the mouse embryos ""Laboratory manual"" third edition Andras Nagy, Marina Gertsenstein, Kristina Vintersten, Richard Behringer, 2003
IVF LAB --Laboratory aspects of in-vitro fertilization-- Editor: M. Bras, J.W. Lens, M. H. Piederiet, P.M. Rijinders, M. Verveld, G.H. Zeilmaker, 1996