Final review for ANSC 229/300

www.geocities.com/uconnyanglab/ansc229.html

Folliculogenesis/oogenesis/embryogenesis

- Definition of these three processes
- terms/timing/important events in these three processes
- relationship between these three processes (I.e. what stage follicle contains what stage oocyte)

Telomere, telomerase

- What is telomere? What is telomerase?function of telomerase
- end replication problem (DNA polymerase cannot fully replicate the template strand…….)
- clone animal age problem. Answers to this problem

Micromanipulation of embryos

- Mosaic and chimera
- how to clone an animal
- how to produce transgenic animal
- capacity of single blastomere to develop

ES cell

- Definition
- how to derive ES cell line?
- How to maintain ES cell line
- how to confirm ES cell?

Cell culture

- How to passage cell
- factors influence cell growth (PH, temp, nutrietion…….)
- confluency
- autoclave
- incubator

Gene terapy

- Definition
- Principle
- ex vivo - in vivo
- three types of virues
- advantages and disadvantages

Transgenic/clone identification

- Microsatellite/minisatellite
- how to identify cloned animals?
- PCR and southern blotting
- advantages and disadvantages
- polymorphism

xenotransplantation

- Hyperacute rejection,Acute vascular rejection,Acute cellular rejection
- why choose pigs?
- What modifications need to be done with pigs (CD59/H-transferase)

Functional genomics

- Principle
- techniques used for gene-expression analysis
- QTL
- polyphormism
- DNA chips

Gene cloning and sequencing

- Genetic map/physical map
- DNA sequencing
- polymorphism and DNA markers
- gene cloning
- cDNA library

Embryo transfer and superovulation

- Definitions
- Applications of embryo transfer
- Procedure of embryo transfer
  - superovulation of donor
  - oocytes collection from the donor
  - sychonization of the recipient
  - in vitro fertilization and in vitro culture
  - transfer embryo at BL stage

ET, Superovulation, OPU, embryo cryopreservation

- Major hormones used in superovulation
- Timing (the cattle example) of superovulation
- hormone profile during superovulation
- slow freezing vs. vitrification
- liquid nitrogen
- definition and principle of OPU

Human IVF

- Major ART procedures (ICSI, GIFT, IVF……)
- Major causes of infertility
- human embryo development
  - day 0, day 1, day2, day 3, day 4, day 5
- relate human ET and embryo freezing to the talk by Dr. Taneja
- ethical concerns

sexing

- Principle (why use sperm and embryo?)
- difference between x-sperm and y-sperm and the applications
- major techniques in sperm sexing and embryo exing, respectively
- flow-cytometry cell sorter for sperm sexing (principle, procedure, advantages, disadvantages)
- H-Y antibody for embryo (principle, procedure, advantages, disadvantages)
- PCR for embryo(principle, procedure, advantages, disadvantages)

Transgenic fish

- Advantages and disadvantages of using fish as the model
- unique technique used in fish TG (electroporation! Not used in mammals)
- Madaka (small size, short cycle, good model)
- functions of GH in fish
- effects of GH on fish
- how to identify transgenic fish (PCR, southern blotting)
- alternative gene transfer method in finfish or shellfish

Transgenic plant

- Major systems as bioreactor (bacteria, yeast, animal, plant)
- advantages and disadvantages of each system
- two major method used in plant transgenic research (particle gun and agrobacterium mediated)
- how to express human proteins in plant? How to modify a human gene in order to express it in plant? (promoter, coding region, 3’ UTR)

Field Trips

- Time course of drug development (Pfizer trip)
- advantages/disadvantages of using mice/sheep/goat/cow as transgenic animals to produce pharmaceutical proteins
- advantages/disadvantages of using cloning technique to produce transgenic animal
- milk specific promoter (I.e. bovine alpha-casein promoter)

X Chromsome Inactivation

- Definition
- timing of inactivation
- maintenance of XCI
- counting mechanism for XCI

Maternal zygotic transition

- Definition
- MZT in cattle (the graph)
- how to study MZT (the table)

Genetic imprinting

- Definition
- IGF II /H19
- evidence for genetic imprinting (pronuclear swap, certain disease……..)
- imprinting mechanisms
- difference of imprinting and X chromosome inactivation

Fertilization

- Fertilization process
- Acrosome reaction
- ZP1/ZP2/ZP3 proteins