Test Prep #4
04/23/2020

What's order of embryonic development?

- ootid (before syngamy)-> zygote (after syngamy)-> 2 called embryo / blastomere -> (4-8 cell) -> morula -> early blastocyst -> hatching blastocyst -> hatched blastocyst

What has to happen for an embryo to continue growth?

- hatching out of the ZP

What are the 4 steps that must be achieved before the embryo can attach to the uterus?

1. Development within confines of Zona Pellucida
2. Hatching of blastocyst from Zona Pellucida
3. Maternal recognition of pregnancy
4. Formation of extraembryonic membrane

Match the following term to the correct definition:

D Yolk sac B Amnion A Allantois D Chorion

a. Carries blood vessels of placenta, reservoir for nutrients and wastes
b. Protects fetus from injury, provides lubrication for parturition, reservoir for urine and wastes
c. Attaches to the uterus → absorbs nutrients and allows maternal-fetal gas exchange
d. Early nutrient supply for early embryo

How does maternal recognition happen in a mare?

- The embryo must migrate between the horns of the uterus 13x during days 12-17
- Presence of conceptus prevents luteolysis so it reduces endometrial production of PGF2a

What is MOET?

- Multiple Ovulation and Embryo Transfer
- Ovulation with large # of oocytes is induced (super ovulation) and fertilized oocytes are collected and transferred to many recipient dams with the same stage of the cycle as donor

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Match the following terms to the correct species and description:

C Diffuse A Zonary D Discoid B Cotyledonary

a. Placentas have a band-like zone of chorionic villi ; cats and dogs
b. Numerous, discrete button-like structures ; ruminants
c. Uniform distribution of chorionic villi ; mare and sows
d. Placenta form a regionalized disc ; rodent and primates

Implantation can happen a few different ways. What species does the conceptus "bury" itself into the uterine endometrium?
Rodents and humans

What makes up a placentome?
Caruncle and cotyledon

What are some hormones produced by the placenta?
Placental P4, Estrogen, Placental lactogen, placental relaxin, eCG, hCG

Name the different types of placenta in order of least intimate to most intimate.

Epitheliochorial, Endoheliochorical, Hemochorial

What triggers the on-set of parturition?

- The fetus or fetal stress which stimulates for the release of ACTH from the fetus' anterior pituitary

What removes the "progesterone block" and increases reproductive tract secretions?
Fetal corticoids

What are the stages of the parturition process?
Stage 1- myometrial contractions (dilation of cervix occurs, hips sink in, etc.)
Stage 2- expulsion of fetus (entry of fetus in birth canal, OT release, etc.)
Stage 3- expulsion of fetal membranes

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Longer than ____ hours is considered dystocia

a. 24
b. 5
c. 2
d. 12

What are causes of dystocia?

a. Excessive size of fetus (primary cause)
b. Failure to proper fetal rotation (secondary cause)
c. Multiple births (tertiary cause)
d. None of the above
e. All of the above

When inducing cattle, you can use what?

- Dexamethasome (parturition in 48hrs)
- Prostaglandins (used in cases of mummification and inducing abortion)

You do not want to induce cattle before _____ of gestation.

a. 5-18 days
b. 7-14 days
c. 7 weeks
d. 14 weeks
e. None of the above

When inducing sheep, you can use what?

- Dexamethasome (parturition in 24-72hrs)
- Lutalyse (abortions before day 50)

It is best to induce sheep _____ within parturition.

a. 12 days
b. Like 2 weeks
c. 5-7 days
d. Never, the CL is important until she is ready naturally.

When inducing goats, you can use what?

- Lutalyse (only 5-7 days prior parturition)

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When inducing sows, you can use what?

- PGF2a (Lutalyse) parturition in 29-48hrs
- Close synchrony (lutalyse at 8AM followed by OT 24hrs later) (parturition will occur 32hrs from start)

Only induce sows _____ day 111 of gestation.

a. Before
b. After
c. Neither, it must happen naturally.

When inducing mares, you can use what?

-Oxytocin (parturition happens in less than an hour)

Only induce mares day ___ of gestation

a. 285
b. 320
c. 45
d. None

If you induce a mare, what must be there before?

- Udder enlargement with presence of colostrum
- Relaxion of perineal region
- Cervical relaxation (1-2 fingers can fit in cervix)

Reasons to induce mares:

- Demonstration
- Prolonged gestation

What events occur just before parturition?

Pelvic ligaments soften, cervix softens and begins stringing, swelling of vulva, udder swelling, fetus moves into proper position

What contractions continue after parturition? Why?

- Strong myometrial contractions ; to expel fetal membranes, compress uterine vasculature, reduce overall size of uterus

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In most species, what stimulates oxytocin secretion?

- Postpartum suckling

What are some events that occur during uterine repair at the caruncular sites?

- Early necrotic changes in septal mass of caruncle (first 48 hrs)
- Vasoconstriction of caruncle blood vessels (day 2)
- Sloughing of necrotic material (by day 5 postpartum)
- Small blood vessels protrude from surface of caruncles (Day 10 - 15)
- Sloughing is complete (by day 15 postpartum)

What promotes leukocytes in the uterus after parturition (due to there being normal postpartum events to eliminate bacteria)?

- Estradiol (E2)

What are factors that influence the involution process?

- Age
- Season of year
- Nutrition
- Periparturient abnormalities
- Delayed return to cyclicity increase involution

Explain Mammary Gland Development in each stage -

Embryonic: Mammary ridges → mammary buds → canalization

Postnatal – Puberty: Isometric growth rate → no noticeable enlargement when compared to rest of body

Post-Pubertal: allometric growth rate → faster than normal body growth (estrogen stimulates ducts to branch and increase in diameter) (prolactin and growth hormone initiates more rapid duct response)

Post-Pubertal – Pregnancy: progesterone → alveolar development
E2, prolactin, and GH → continued duct development

Pregnancy: continued duct and alveolar development
~90% of cellular mass of mammary gland at parturition

In ruminants/swine/horses the epitheliochorial placenta is a barrier to _____ to the fetus.

a. Toxins
b. Hormones
c. Nerves
d. Immunoglobulins

In humans, the placental type allows for immunoglobins to pass giving the offspring _____ immunity.

a. Passive
b. Active
c. Partial active
d. Partial Passive
e. None of the above

Milk naturally contains what?

- Hormones and growth factors

Reproductive toxicology is… the study of the occurrence of adverse effects on the male or female reproductive system that may result from exposure to chemical or physical agents

Why should you care if there is reproductive toxicology?

- There is approximately 2 million couples are infertile, birth defects, etc.

What are the principles of teratology? (the study of defects induced during development between conception and birth)

- Timing of exposure (developmental stage)
- Susceptibility based on genetic makeup
- 4 manifestations
    - Death
    - Malformation
    - Growth retardation
    - Functional defect
- Dose-dependent

What are the critical periods?

- Gametogenesis/fertilization
- Pre embryonic- pre-implantation/gastrulation (1-2 weeks) ; Primary adverse outcome: death, some malformations of anterior neural plate
- Embryonic- organogenesis (3-8 weeks) ; Primary adverse outcome: malformation

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Why is the embryo vulnerable?

- Low differentiation
- Lack/decrease of detoxifying systems
- Tight regulation of temporal and spatial cellular numbers and signaling

What sedative was prescribed to ease nausea? What did it cause?

- Thaliomide ; missing/abnormal limbs, heart and kidney problems, cleft palate, spinal cord defects, digestive disorders

Cigarette use in pregnancy can lead to

a. Low birth weight / Obesity
b. Ectopic pregnancy / SIDS
c. Type II diabetes
d. All of the above
e. None of the above

What is the BPA (Bisphenol A prenatal exposure) mechanism of actions?

- Nuclear E2 receptors
- Non-classical membrane-bound form of E2 receptors
- Alters aromatase

What was given to women to prevent miscarriage?

- Diethylstilbestrol (DES)

What are the conclusions of Reproductive Toxicology?

- Reproductive and developmental toxins can elicit numerous effects
- Binding of estrogenic chemical vs. endogenous hormones
- Multigenerational
- Effect of mixtures, metabolites
- More research is needed..