



THE UNIVERSITY OF  
WESTERN AUSTRALIA

*SCHOOL OF ANATOMY & HUMAN BIOLOGY*

2ND SEMESTER EXAMINATIONS 2007

**DISCIPLINE – ANATOMY & HUMAN BIOLOGY**

**HUMAN REPRODUCTIVE BIOLOGY (ANHB2216)**

FAMILY NAME: \_\_\_\_\_ STUDENT ID: \_\_\_\_\_

GIVEN NAMES: \_\_\_\_\_ SIGNATURE: \_\_\_\_\_

This Paper Contains: 9 Pages  
25 Multiple Choice Questions  
10 Short Answer Questions  
3 Essay Questions  
Time allowed: 2 hours 10 minutes

**INSTRUCTIONS**

1. Check that you have **THREE** items.
  - (a) This question paper.
  - (b) A booklet to answer the short answer questions and essay.
  - (c) A sheet for MCQ answers.
2. Write your personal details on **ALL** of the 3 items.
3. **ALL** the items listed above must be handed in at the end of the examination.
4. This exam is in **THREE** sections.
  - A. Multiple choice questions (questions 1 –25). Answer **ALL** questions. These should take about 40 minutes to complete and are worth 1/3 of the paper.
  - B. Short answer questions (questions 26-35). Answer **SIX** questions. These should take about 40 minutes to complete and are worth 1/3 of the paper.
  - C. Essay questions (questions 36-38). Answer **ONE** question. This should take about 40 minutes to complete and is worth 1/3 of the paper.
5. **Carefully read the instructions at the beginning of each section.**
6. This paper contributes 40% to your semester grade.

**PLEASE NOTE**

*Examination candidates may only bring authorised materials into the examination room. If a supervisor finds, during the examination, that you have unauthorised material, in whatever form, in the vicinity of your desk or on your person, whether in the examination room or the toilets or en route to/from the toilets, the matter will be reported to the head of school and disciplinary action will normally be taken against you. This action may result in your being deprived of any credit for this examination or even, in some cases, for the whole unit. This will apply regardless of whether the material has been used at the time it is found.*

*Therefore, any candidate who has brought any unauthorised material whatsoever into the examination room should declare it to the supervisor immediately. Candidates who are uncertain whether any material is authorised should ask the supervisor for clarification.*



**PART A**

Answer **ALL** of the questions (1-25) in this section.

It is recommended that you spend about **40 minutes** on this section.

Choose the best alternative (A, B, C, D or E) and mark your answers clearly on the answer sheet provided. Note: use only a soft lead pencil to write on the answer sheet. Make corrections with an eraser. Do not use white-out or other correcting fluid.

- 1 Which of the following is **NOT** a peptide or protein hormone?
  - A Follicle stimulating hormone (FSH)
  - B Prolactin
  - C \*Prostaglandin
  - D Oxytocin
  - E Gonadotrophin releasing hormone (GnRH)
  
- 2 Which statements about endocrinology are **CORRECT**?
  - a. A hormone agonist is a molecule that can bind to the receptor but lacks the ability to activate it
  - b. The abortifacient RU-486 is a progesterone agonist
  - c. Tamoxifen is an estrogen antagonist used in breast cancer treatment
  - d. Ethinylestradiol is an estrogen agonist used in hormonal contraceptives
  - A All are correct
  - B a and b only are correct
  - C a and c only are correct
  - D b and c only are correct
  - E \*c and d only are correct
  
- 3 Which statement about the hormonal control of spermatogenesis is **INCORRECT**?
  - A FSH stimulates the development of androgen receptors in Sertoli cells
  - B Androgens stimulates the development of FSH receptors on sertoli cells
  - C Both FSH and Testosterone is necessary for spermatogenesis
  - D \*Leydig cells secrete inhibin
  - E Testosterone is converted to the more potent 5alpha-dihydrotestosterone by enzymes in the Sertoli cells
  
- 4 Which statement about sex determination is **INCORRECT**?
  - A Mullerian (para-mesonephric) ducts give rise to the uterus and uterine tubes
  - B \*The primordial germ cells originate from the amniotic membrane of the developing embryo
  - C Primordial germ cells differentiate to form oogonia and spermatogonia
  - D In the absence of the SRY gene ovaries develop
  - E The labia majora and scrotum are homologous structures

- 5 During an experiment into the hormonal control of puberty the researcher transplanted the testes of an immature male animal into that of an adult male animal of the same species. The transplanted testes were observed to grow in size and spermatogenesis was initiated. Which of the following statements **best** explains this observation?
- A The adult animal needed testosterone so the Leydig cells became active
  - B The adult animal had higher body weight so the testes grew to match
  - C Leptin levels were higher in the adult animal and directly stimulated spermatogenesis
  - D \*The mature anterior pituitary of the adult animal produced gonadotrophins which stimulated testicular function
  - E Growth hormone in the adult male stimulated testicular function
- 6 Which of the following statements about ovarian function is **INCORRECT**?
- A \*Differentiation of oogonia into oocytes commences at puberty
  - B Mitotic division of oogonia commences during fetal life
  - C Secondary oocytes have a haploid chromosome number
  - D Continued development of secondary (antral) follicles is dependent on stimulation by gonadotrophins
  - E A primary follicle surrounds a primary oocyte
- 7 Which statements about sperm transport and fertilization are **CORRECT**?
- a. ZP3 binds to the inner acrosomal membrane
  - b. The acrosome releases hyaluronidase which digests a pathway through the cumulus oophorus
  - c. Acrosin permits passage of the sperm through the zona pellucida
  - d. Freshly ejaculated sperm are immediately capable of fertilization in vitro
- A a and b only are correct
  - B a and c only are correct
  - C \*b and c only are correct
  - D c and d only are correct
  - E all are correct
- 8 Which statement is **INCORRECT**? The window of implantation.....
- A is the time that the uterus is responsive to signals from the blastocyst
  - B \*typically lasts about 2 weeks in humans
  - C is characterised by the appearance of pinopodes on the uterine endometrium
  - D is characterised by the loss of the glycocalyx on the uterine epithelial cells
  - E requires an estrogen signal on a progesterone primed uterus

- 9 Which of the following hormones is produced by conversion of DHEAS within the placenta?
- A Progesterone
  - B hCG
  - C \*Estriol
  - D Corticotrophin-releasing hormone (CRH)
  - E Human chorionic somatomammotrophin (hCS)
- 10 Which statement about fetal growth is **INCORRECT**?
- A An infant born at term and weighing less than 2500g is considered low birth weight
  - B Growth hormone has little influence on fetal growth
  - C Insulin-like growth factors are important for pre- and post-natal growth
  - D Thyroxine is important for growth of the fetal nervous system
  - E \*The fetus' genetic potential for growth is paternally constrained
- 11 Which statement is **INCORRECT**?
- A \*The first trimester screening test is useful to screen for spina bifida
  - B The cause of congenital anomalies is not known in about 50% of cases
  - C About 4 – 6% of babies born in WA have a congenital anomaly
  - D The 2<sup>nd</sup> trimester maternal serum screening test (triple test) accurately detects Down Syndrome in about 60-70% of cases
  - E Preimplantation genetic diagnosis requires IVF technology to generate embryos for testing
- 12 Which statement about maternal physiology is **INCORRECT**? During pregnancy.....
- A maternal cardiac output is increased
  - B \*maternal arterial PCO<sub>2</sub> is increased
  - C maternal oxygen consumption is increased
  - D maternal reabsorption of water is increased
  - E maternal tidal volume is increased
- 13 Which statement about human labour is **INCORRECT**?
- A Prostaglandins are produced by the decidua and fetal membranes
  - B Prostaglandins induce cervical ripening
  - C Full dilation of the cervix marks the end of the first stage of labour
  - D \*The Fergusson reflex involves neural stimulation of pituitary CRH release
  - E Abdominal muscles aid in expelling the baby during the second stage of labour

14 Which statement about lactation is **INCORRECT**?

- A \*The protein content of human breast milk is much higher than that of cows' milk
- B The lactose content of human breast milk is much higher than that of cows' milk
- C Prolactin acts on alveolar cells to promote milk synthesis
- D Oxytocin acts on myoepithelial cells to induce expulsion of milk from the alveoli
- E Estrogen promotes development of the lactiferous ducts during pregnancy

15 Which statement about sexually transmitted infections is **INCORRECT**?

- A Gonorrhoea and chlamydia can be readily cured with antibiotics if detected early
- B Genital herpes can be successfully treated but not cured with anti-viral drugs
- C In W.A. the most common sexually transmitted infection is the Human Papilloma Virus (genital warts virus)
- D Gonorrhoea is asymptomatic in females in about 80% of cases
- E \*The use of a barrier methods of contraception (such as the male or female condom) eliminates the risk of contracting genital herpes

16 Which statement about the endocrinology of menopause is **CORRECT**?

The menopausal transition is characterised by....

- A \*a decreased number of ovarian follicles, decreased estrogen, decreased inhibin and increased FSH.
- B a decreased number of ovarian follicles, decreased estrogen, increased inhibin and increased FSH.
- C an increased number of ovarian follicles, increased estrogen, increased inhibin and decreased FSH
- D a decreased number of ovarian follicles, decreased estrogen, decreased inhibin and decreased FSH
- E an increased number of ovarian follicles, decreased estrogen, increased inhibin and increased FSH.

17 Which statement about population growth is **INCORRECT**?

- A Fertility rate required to replace the population is 2.1
- B The world population is currently ~6.5 billion
- C Age specific fertility rate is the number of children born per 1000 women within a specific age cohort
- D \*Australia's total fertility rate is currently about 2.4
- E Total fertility rate (TFR) is the number of children delivered by a woman during her fertile years

18 Which statement about fertility is **INCORRECT**?

- A In a population of individuals not using contraception, the probability of conceiving in any one month is about 20-25%
- B Women over 35 years are more likely to experience fertility problems than younger women
- C Vasectomy may result in autoimmunity to spermatozoa
- D \*Smoking reduces female but not male fertility
- E Older male age ( $\geq 40$  years) is associated with increased DNA damage in sperm

19 Which statement about infertility treatment is **INCORRECT**?

- A \*The treatment of choice for women with blocked uterine tubes is tubal surgery to remove the blockage
- B Timed intercourse involves tracking female hormones to predict when ovulation will occur
- C One of the risks of assisted reproductive technology (ART) is ovarian hyperstimulation syndrome
- D The use of assisted reproductive technology (ART) is associated with a higher rate of multiple births (eg twins)
- E Assisted hatching involves partially removing some of the zona and is believed to help implantation

20 Which statements are **CORRECT**? The combined oral contraceptive pill works by.....

- a. Causing the cervical mucous to thicken
  - b. Blocking the uterine tubes
  - c. Irritating the lining of the uterus so it is inhospitable for embryonic and fetal development
  - d. Inhibiting the release of FSH and LH
- 
- A a and b only are correct
  - B b and c only are correct
  - C \*a and d only are correct
  - D c and d only are correct
  - E all are correct

21 Which statement about reproductive cancers is **INCORRECT**?

- A A single mutation is usually not capable of causing cancer
- B \*Exposure to the Human Papilloma Virus (HPV) is implicated in the risk of breast cancer
- C Low apoptosis is linked to tumour development
- D Reproductive cancers make up about 20% of carcinomas
- E Early menarche is associated with an increased of risk of breast cancer

- 22 Which statement about female fertility during lactation is **INCORRECT**?
- A Menstrual cycles with deficient luteal phases are common in breast feeding women
  - B Lactational amenorrhoea can be considered adaptive from an evolutionary perspective
  - C The average duration of suckling each day is an important predictor of the duration of lactational amenorrhoea
  - D Most women will resume ovulatory cycles within 2 month of birth if they do not breast-feed their infant
  - E \*Suckling results in a regular pulsatile pattern of GnRH secretion which inhibits normal ovarian activity
- 23 Which statement about the effects of stress on reproduction is **INCORRECT**?
- A Stress may affect fertility by affecting reproductive behaviour such as the frequency of intercourse
  - B Reproductive function should not be suppressed if predicted future conditions are likely to be the same or worse than current conditions
  - C If energy intake is less than energy expenditure available energy is directed away from reproductive processes
  - D Glucocorticoids such as cortisol inhibit LH secretion
  - E \*Male reproductive system is more responsive to the effects of stress than female reproductive system
- 24 Which statement is **CORRECT**? As spermatozoon leave the seminiferous tubules they pass through, in order....
- A epididymis, rete testis, efferent ductules, ejaculatory duct, vas deferens, urethra
  - B \*rete testis, efferent ductules, epididymis, vas deferens, ejaculatory duct, urethra
  - C ejaculatory duct, rete testis, efferent ductules, epididymis, vas deferens, urethra
  - D efferent ductules, epididymis, vas deferens, ejaculatory duct, rete testis, urethra
  - E rete testis, efferent ductules, vas deferens, ejaculatory duct, epididymis, urethra
- 25 Which statement about the female reproductive system is **CORRECT**?
- A The uterus is lined by squamous epithelium
  - B The muscular layer of the uterine wall is termed the endometrium
  - C \*Simple columnar epithelium lines the internal os of the cervix
  - D After ovulation the oocyte is known as a corpus luteum
  - E The isthmus is the part of the uterine tube closest to the ovary

**PART B****SHORT-ANSWER QUESTIONS**

Answer **SIX** of the ten questions (questions 26-35) in this part.

It is recommended that you spend about **40 minutes** on this part.

Write **BRIEF NOTES** on **SIX** of the following. You may draw diagrams where appropriate to illustrate your answer. Write your answers in the booklet provided.

26. Is it true that estrogen is exclusively a female hormone and testosterone is exclusively a male hormone? Explain your answer.
27. Describe the changes in maternal cardiac physiology during pregnancy and their functional significance.
28. Briefly describe the role of androgens in sexual differentiation of the fetus.
29. The anatomical arrangement of the human placenta is achieved by 3-4 weeks of gestation but mature blood flow through the placenta is not established until 10-12 weeks. What are the consequences of this and how might it be adaptive?
30. Briefly explain the Haig hypothesis as it relates to fetal growth.
31. Describe the milk ejection (letdown) reflex.
32. Briefly explain the endocrinology of puberty.
33. Nuva Ring is a new form of hormonal contraception. Who uses it? How does it work? What advantages does it offer over existing hormonal forms of contraception?
34. Sexually transmitted infections can have serious consequences for other reproductive functions/processes. Discuss.
35. From listening to the Group Presentations write brief notes about **one** of the following (**do not** write on a topic related to your own group's presentation).
  - a. What are environmental estrogens? How may they affect female reproductive health?
  - b. Describe how nutrition may affect reproductive health
  - c. Which 3-letter word (or words) did the "Reproduction is a Three Letter Word" group choose? What was their main line(s) of argument?
  - d. Based on the arguments presented by the reproductive aging group, do you agree with the statement "It is Grandmother's hand that best rocks the cradle"? Given reasons for your answer.

**PART C****MAJOR ESSAY**

Answer **ONE** of the questions in this section (36 **OR** 37 **OR** 38).

It is recommended that you spend up to **40 minutes** on your answer. Write your answer in the booklet provided.

36. Discuss the various screening and diagnostic tests for monitoring fetal development and well-being, and the pro and cons of each. What does “false positive” mean and why is a low false positive rate for screening and diagnostic tests important?

**OR**

37. Describe the process of fertilization including the preparatory events that occur in the spermatozoa during transit through the male and female reproductive tract. Explain why a normal ejaculate contains many millions of spermatozoa. Describe how a male with as few as 6 spermatozoa can potentially father children using Assisted Reproductive Technology.

**OR**

38. Compare and contrast the age related decline in fertility in males and females. Include in your answer (a) the changes in gonadal function and reproductive hormone production (b) the impact of these changes on health and well-being.