ヒト生物学III 試験問題（平成19年度） 2007.7.30.実施

I. ( )に適当な言葉を英語で答えよ。

The number of glands that produces steroid hormone is limited to the (1), the ovaries, and testes. Steroid hormone do not bind to plasma membrane receptors, and instead they are able to enter the cell. Once inside, steroid hormones bind to receptors, usually in the (2). The hormone-receptor complex binds with (3) and activates (4) of certain (5) genes. Translation of mRNA transcripts results in enzymes and other proteins that can carry out a response to the hormonal signal.

II. The following sentences should be completed by filling ( ) with appropriate terms. (in English)

Male reproductive system

Sperm are produced in the (1), mature in the (2), and pass from the vas deferens to the (3) at the time of orgasm. In the (1), (4) tubules produce sperm, and interstitial Leydig cells produce (5).

Female reproductive system

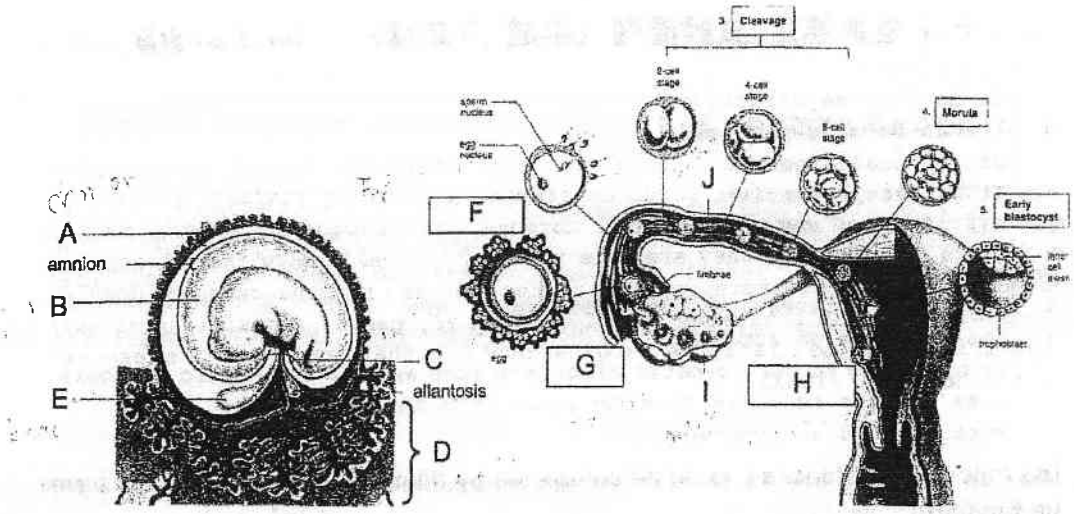
In the non-pregnant females, the ovarian and uterine cycles are under hormonal control of the (6), (7), and ovaries. During the follicular phase, (8) released by the (7) promotes the maturation of a follicle in the ovary. The ovarian follicle produces increasing levels of (9), which causes the (10) to thicken during the proliferative phase of the uterine cycle. After ovulation and during the luteal phase of the ovarian cycle, (11) produced from the (7) promotes the development of the (12), which produces progesterone that causes the (10) to become secretory. Decrease of these hormones causes the breakdown of the (10), and then (13) occurs.
If fertilization and (14) occur, the placenta produces (15) which maintains the (11).

III. 下記の病原微生物の英語名を full spell で記せ。

A 破傷風菌　B 赤痢菌　C チフス菌　D 肺炎レンサ球菌　E 炭疽菌

IV. These figures show the extraembryonic membranes of the human embryo and pre-embryonic development. Using the alphabetized list of terms, label the extraembrionic membranes (A - E) of the embryo, stages of development (F - H) and tissues (I and J) in the figures and translate them into Japanese.

~~Amniotic fluid~~, Chorion, ~~Fertilization~~, ~~Implantation~~, ~~Ovary~~, Oviduct, Ovulation, ~~Placenta~~, ~~Umbilical cord~~, ~~Yolk sac~~



V. Answer the following questions.

1. Which of the following is involved in controlling gene expression?
   a. the occurrence of transcription
   b. activity of the polypeptide product
   c. life expectancy of the mRNA molecule in the cell
   d. All of these are involved.

2. Which one or more of the following does not characterize the process of transcription?
   a. RNA is made with one strand of the DNA.
   b. In making RNA, the base uracil of RNA pairs with the base adenine of DNA.
   c. The enzyme RNA polymerase synthesizes RNA.
   d. RNA is made in the cytoplasm.

3. Which of the following is not a clone?
   a. colony of identical bacteria cells
   b. identical quintuplets
   c. a forest of identical trees
   d. eggs produced by oogenesis
   e. copies of a gene through PCR

4. Which of the following is not a proper association with regard to genetic engineering?
   a. plasmid as a vector ----- bacteria
   b. protoplast as a vector ----- plant
   c. RNA retrovirus as a vector ----- human stem cells
   d. All of these are correct.

5. Because of the Human Genome Project, we know the
   a. sequence of the base pairs of our DNA
   b. sequence of genes along the human chromosomes
   c. mutations that lead to genetic disorders
   d. All of these are correct.
   e. Only a and c are correct.

<裏面に続く>

V. (つづき)

6. Which of the following is a benefit to having insulin produced by biotechnology?
   a. It is just as effective.
   b. It can be mass-produced.
   c. It is nonallergenic.
   d. It is less expensive.
   e. All of these are correct.

7. Gene therapy
   a. is still an investigative procedure.
   b. has met with no success.
   c. is only used to cure genetic disorders such as SCID and cystic fibrosis.
   d. uses viruses to carry foreign genes into human cells.
   e. Both a and d are correct.

8. What is PCR, and how is it carried out to produce multiple copies of a DNA segment? (in English)

PCRは 少量のDNAを増幅する…
1. 高温で denature 2. RNAプライマー…
3. DNAポリメラーゼで複製.

VI. 括弧内に適当な語句（英語）を記入せよ。

1) Ordinarily, cells with damaged DNA undergo ( ). ~~apoptosis~~ apoptosis
2) Chromosomes in human cells end with special repetitive DNA sequences called ( ). telomere
3) Chemical signals between cells tell them whether they should be dividing or not dividing. These chemicals are called ( ). growth factors
4) Malignancy is present when cancer cells are found in nearby lymph nodes. When these cells begin new tumors far from the primary tumor, ( ) has occurred. metastasize
5) In normal cells, ( ) code for sufficient cyclin to keep the cell cycle going normally. proto-oncogene
6) ( ) code for proteins that inhibit cyclin, and promote p53 and apoptosis. tumor-suppressor gene
7) ( ) is the formation of new blood vessels. angiogenesis
8) The low ( ) content in a tumor may turn on genes coding for angiogenic growth factors. oxygen
9) Cancer cells have the ability to ( ) surrounding tissues. infiltrate 浸潤
10) ( ) means that a single cell undergoes a mutation that causes it to begin to divide repeatedly. initiation

VII. 説明文を表す語句を英語と日本語で書きなさい。

1. Members of a pair that synapse during prophase I and are aligned together at the equator during metaphase I homologous chromosome
2. Repeating sequence of events in human cells consisting of interphase, when growth and DNA synthesis occur, and a mitotic stage, when cell division occurs cell cycle
3. Nonfunctioning daughter cell that has little cytoplasm and is formed during oogenesis polar body
4. Half the diploid number; the number of chromosomes in the gametes haploid
5. Alternative forms of a gene that occur at the same locus on homologous chromosomes allele

6. Particular site where a gene is found on a chromosome
7. Alleles of an individual for a particular trait or traits such as BB or Aa or BBAa
8. Allele that exerts its phenotypic effect in the heterozygote; it masks the expression of the recessive allele
9. Duplicated chromosome arranged by pairs according to their size, shape, and general appearance
10. Removal of cells from a portion of the placenta for karyotyping of the fetus
11. Both the husband and wife have normal vision. The wife gives birth to a color-blind daughter. Is it more likely the father had normal vision or was color-blind? What does this lead you to deduce about the girl's parentage? （この質問には授業で指摘した点を踏まえて答えなさい。日本語で良い。）

以上

H.19

II (1)testes (2)epididymides (3)penis (4)seminiferous (5)testrosterone (6)hypothalamus (7)anterior pituitary (8) (9)estrogen(10)endometrium (11)corpus luteum (12) (13)menstruation (14)implantation (15)HCG

III A clostridium tetani B dyseutery bacillus C salmonella typhi D Streptococcus pueumoniae E bacillus authracis

Ch14

(1) Adrenal cortex
(2) Nucleus
(3) DNA
(4) Transcription
(5) Structural (自信なし)

Human biology p269 `the action of steroid hormones 抜粋です。

訳 ステロイドホルモンを産出する内分泌腺は、副腎皮質と卵巣 精巣に限られる。ステロイドホルモンは、細胞膜上の受容体に結合するのではなく、(脂溶性なので) 細胞内に入ることが出来る。細胞膜に入ると、ステロイドホルモンは通常核内で受容体と結合する。ホルモンと受容体の結合体は、DNA に結合し、特定の構造遺伝子を活性化する。転写mRNA の翻訳によて、そのホルモン信号に応じた特定の酵素やタンパク質が多量に産出される。

1 染色体 chromosomes
2 細胞分裂周期 cell cycle
3 極体 polar body
4 一倍体 haploid
5 対立遺伝子 allele
6 パフ puff
7 遺伝子型 genotype
8 優性対立遺伝子 dominant allele

9 姉妹遺伝子　　sister chromatid

10 出生前診断　　prenatal diagnosis

11 過去問といっしょ

(1)問題文訳

V.以下の質問に答えなさい

1. 以下のもののうち、遺伝子発現の調節に関係しているのは？
   a. a 転写が起きること
   b. ポリペプチド産生活性
   c. 細胞における mRNA 分子の平均寿命
   d. これらはすべて正しい

2. 次のうち、どれが転写の過程を正しく述べていないか？
   a. DNA の鎖から 1 本取り去ったものである
   b. RNA を作る過程において、RNA のウラシル塩基は DNA のアデニン塩基と対になる
   c. RNA ポリメラーゼは RNA を合成する
   d. RNA は細胞質において作られる

3. 次のうち、クローンでないのはどれか？
   a. 同じ細菌細胞のコロニー
   b. 一卵性五卵児
   c. 同じ木からなる森
   d. 卵子形成でできた複数の卵
   e. PCR を使った遺伝子のコピー

4.次のうち、遺伝子工学に関連して、適切な組み合わせでないものはどれか？

a.ベクターとしてのプラスミド　　細菌

b.ベクターとしてのプロトプラスト　　植物

c.ベクターとしての RNA レトロウイルス　　ヒト幹細胞

d.これら全ては正しい

ヒト生物学III 試験問題（平成17年度） 2005. 9. 5. 実施

I. （ ）に適当な言葉を英語で答えよ。

(1) is the most important of the mineralocorticoids. The (1) primarily targets the kidney, where it promotes renal absorption of (2) and renal excretion of (3).
When the blood sodium level and therefore the blood pressure are low, the kidneys secrete (4). (4) is an enzyme that converts the plasma protein angiotensinogen to (5), which is changed to angiotensin II by a converting enzyme found in lung capillaries.
The secretion of mineralocorticoids is controlled not only by the (6) system but also by ACTH-adrenal cortex system.

A low blood calcium level stimulates the release of (7). (7) promotes the activity of osteoclasts ((7) primarily activates osteoblasts, and secondarily activates the osteoclasts) and the release of calcium from bones.
(7) also promotes the reabsorption of calcium by the kidneys, where it activates (8). (8), in turn, stimulates the absorption of calcium from the intestine. These effects bring the blood calcium level back to the normal range so that the (9) no longer secrete (10). This inhibition induced by increasing calcium level is called as (11) regulation.

(注) osteoclasts：破骨細胞 osteoblasts：骨芽細胞

II. The following sentences should be completed by filling ( ) with appropriate terms. (English)

Male reproductive system

Spermatogenesis occurs in the seminiferous tubules of the (1), and sperm mature and are stored in the (2). Sperm are also stored in the vas deferentia, and enter to the (3) at the time of orgasm.
The external genital of males are the (4), which is the organ of sexual intercourse, and the scrotum which contains the (1). Testosterone is produced by (5) cells of the (1).

Female reproductive system

In the non-pregnant females, the ovarian and uterine cycles are under hormonal control of the hormone (6), (7), and ovaries. During the first half of the ovarian cycle, (8) produced from the (7) causes maturation of a follicle that secretes (9). After ovulation and during the second half of the cycle, (10) produced from the (7) converts the follicle into the (11), which produces progesterone. (9) and progesterone regulate the uterine cycle; (9) causes the (12) to rebuild, and progesterone causes the (12) for secretory changes. Then, decrease of these hormones causes the breakdown of the (12), as (13) occurs.
If fertilization and (14) occur, the placenta produces (15) which maintains the (11) of the ovary.

- human chorionic gonadotropin

III. 下記の病原微生物名を英訳せよ (full spell)。

1. 肺炎レンサ球菌 2. 破傷風菌 3. 大腸菌 4. 淋菌 5. 赤痢菌

IV. Answer the following questions.

The diagram is a human embryo at 35+ days. Using the alphabetized list of terms, label the alphabets (a to i) in the diagram and translate them into Japanese.

a	Allantois 尿膜
b	Amnion 羊膜
c	Amniotic cavity 羊膜腔
d	Chorion 絨毛膜
e	Chorionic villi 絨毛膜絨毛
f	Digestive tract 消化管
g	Embryo 胚子
h	Umbilical cord 臍帯
i	Yolk sac 卵黄嚢



V. Answer the following questions.

1. **Which of the following is involved in controlling gene expression?**
   a. the occurrence of transcription
   b. activity of the polypeptide product
   c. life expectancy of the mRNA molecule in the cell
   d. All of these are involved.

2. **Which one or more of the following does not characterize the process of transcription?**
   a. RNA is made with one strand of the DNA.
   b. In making RNA, the base uracil of RNA pairs with the base adenine of DNA.
   c. The enzyme RNA polymerase synthesizes RNA.
   d. RNA is made in the cytoplasm.

3. **Which of the following is not a clone?**
   a. colony of identical bacteria cells
   b. identical quintuplets
   c. a forest of identical trees
   d. eggs produced by oogenesis
   e. copies of a gene through PCR

裏面につづく

V. (つづき)

18

4. Which of the following is not a proper association with regard to genetic engineering?

a. plasmid as a vector ----- bacteria
b. protoplast as a vector ----- plant
c. RNA retrovirus as a vector ----- human stem cells
d. All of these are correct.

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5. Because of the Human Genome Project, we know the

a. sequence of the base pairs of our DNA.
b. sequence of genes along the human chromosomes.
c. mutations that lead to genetic disorders.
d. All of these are correct.
e. Only a and c are correct.

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6. Which of the following is a benefit to having insulin produced by biotechnology?

a. It is just as effective.
b. It can be mass-produced.
c. It is nonallergenic.
d. It is less expensive.
e. All of these are correct.

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7. Gene therapy

a. is still an investigative procedure.
b. has met with no success.
c. is only used to cure genetic disorders such as SCID and cystic fibrosis.
d. uses viruses to carry foreign genes into human cells.
e. Both a and d are correct.

☆ **8. What is PCR, and how is it carried out to produce multiple copies of a DNA segment?** (English)

23 がん

VI. Fill in the following blanks. (English)

When a mutation occurs or DNA damaged by a (1), p53 is instrumental in stopping the cell (2) and activating repair enzymes. If repair is impossible, the p53 protein usually promotes (3).

Cancer cells have abnormal characteristics:

a. Are genetically unstable and prone to (4).
b. Are not differentiated and do not adhere to other cells within a (5).
c. Do not need external stimulatory (6) signals to divide and are insensitive to inhibitory (6) signals.
d. Do not undergo apoptosis when (7) of DNA is impossible.
e. Undergo the cell cycle for and unlimited number of times.
d. Induce and sustain (8) (new blood vessel growth).
e. Invade and (9) (i.e., spread to new locations where they start new tumors).

When (10) is combined with drinking alcohol, the risk of these cancers increases even more. Passive (10) is also dangerous and probably causes a few thousand deaths each year.

VII. 17・18 遺伝

1. 説明文が表す語句を英語と日本語で答えよ。

04

(1) type of nuclear division that occurs as part of sexual reproduction in which the daughter cells receive the haploid number of chromosomes in varied combinations meiosis 減数分裂
(2) body cell excluding those that undergo meiosis and become a sperm or egg somatic cell 体細胞
(3) one of two types of reproductive cells that join in fertilization to form a zygote gamete 配偶子
(4) failure of homologous chromosomes to separate during meiosis non-disjunction 染色体不分離
(5) exchange of corresponding segments of genetic material between nonsister chromatids of homologous chromosomes during meiosis crossing-over 乗換え
(6) arrangement of all the chromosomes within a cell by pairs in a fixed order karyotype 核型
(7) alternative form of a gene located at the same position on a pair of homologous chromosome allele 対立遺伝子
(8) stage in mitosis during which chromosomes are at the equator of the mitotic spindle metaphase 中期
(9) a quantitatively variable phenotype dependent on the interaction of numerous genes polygenic inheritance 多因子遺伝
(10) any chromosome other than the sex chromosomes autosomal chromosomes 常染色体

2. 次の質問について、授業で指摘した点を踏まえて答えよ。

04

Both the husband and wife have normal vision. The wife gives birth to a color-blind daughter. What can you deduce about the girl's parentage?

以上

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1-H18.

Human Genetics 学籍番号 _____ 氏名 _____

説明文を表す語句を（　　）内に英語と日本語で書きなさい

1. 説明文 : type of nuclear division in which daughter cells receive the exact chromosomal and genetic makeup of the parent cell; occurs during growth and repair.

英語：（ mitosis ） 日本語：（ 体細胞分裂 ）

2. 説明文: body cell excluding those that undergo meiosis and become a sperm or egg

英語：（ somatic cell ） 日本語：（ 体細胞 ）

3. 説明文: haploid sex cell; the egg or a sperm, which join in fertilization to form a zygote

英語：（ gamete ） 日本語：（ 配偶子 ）

4. 説明文 : failure of homologous chromosomes or daughter chromosomes to separate during meiosis I and meiosis II, respectively

英語：（ nondisjunction ） 日本語：（ 不分離 ）

5. 説明文 : exchange of segments between nonsister chromatids of a tetrad during meiosis

英語：（ crossing-over ） 日本語：（ 乗換え ）

6. 説明文 : duplicated chromosomes arranged by pairs according to their size, shape, and general appearance

英語：（ ~~Sister chromatids~~ Sister chromatids ） 日本語：（ 姉妹染色分体 ）

7. 説明文 : alternative form of a gene located at the same position on a pair of homologous chromosome

英語：（ allele ） 日本語：（ 対立遺伝子 ）

8. 説明文 : mitotic phase during which daughter chromosomes move toward the poles of the spindle

英語：（ Anaphase ） 日本語：（ 後期 ）

9. 説明文 : inheritance pattern in which a trait is controlled by several allelic pairs; each dominant allele contributes to the phenotype in an additive and like manner

英語：（ (mutiple allele inheritance) ） 日本語：（ 複対立遺伝子 ）

10. 説明文 : any chromosome other than the sex chromosomes

英語：（ (Autosomal chromosome) ） 日本語：（ 常染色体 ）

11. A child has neurofibromatosis. The mother appears normal. What is the genotype of the father?
この質問について授業で指摘した点を踏まえ答えなさい。（裏に書いても結構です。）

neurofibromatosis とは神経線維腫症のことで、これは常染色体優性遺伝である。ここで、母親は普通であるから、この遺伝子を含んでいない。つまり、父親がこの病気にかかっていなければならない。(常染色体優性遺伝なので、対立遺伝子のどちらかでもこの病気に関する遺伝子があれば発病する)。ここで、この病気を発症する遺伝子をA、そうでない遺伝子をaとすると、父親は Aa または AA でなければならない。

No. _____ Name _____

1 Which of the following is involved in controlling gene expression? (1 x 7 = 7) P.387 8

a. the occurrence of transcription
b. activity of the polypeptide product
c. life expectancy of the mRNA molecule in the cell
d. All of these are involved.

2 Which one or more of the following does not characterize the process of transcription? P.387 10

a. RNA is made with one strand of the DNA.
b. In making RNA, the base uracil of RNA pairs with the base adenine of DNA.
c. The enzyme RNA polymerase synthesizes RNA.
d. RNA is made in the cytoplasm.

3 Which of the following is not a clone? P.388 13

a. colony of identical bacteria cells
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c. a forest of identical trees
d. eggs produced by oogenesis
e. copies of a gene through PCR

4 Which of the following is not a proper association with regard to genetic engineering?

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6 Which of the following is a benefit to having insulin produced by biotechnology? P.388 18

a. It is just as effective.
b. It can be mass-produced.
c. It is nonallergenic.
d. It is less expensive.
e. All of these are correct.

7 Gene therapy

a. is still an investigative procedure.
b. has met with no success.
c. is only used to cure genetic disorders such as SCID and cystic fibrosis.
d. uses viruses to carry foreign genes into human cells.
e. Both a and d are correct.

8 What is PCR, and how is it carried out to produce multiple copies of a DNA segment? (3 x 1 = 3)