

Etege Menen Girls' Boarding School
Biology Department
Grade 10

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Contents

3.3. *ENDOCRINE SYSTEM*

3.4. *REPRODUCTIVE HEALTH*

Endocrine system

□ There are two different systems that have a role in co- ordination and control of the body.

❖ Nervous system

➤ It use electrochemical coordination

❖ Endocrine /hormonal/

➤ It is chemical /hormonal/ coordination

THE ENDOCRINE GLAND

❖ Glands are structures that produce hormone and other useful substance.

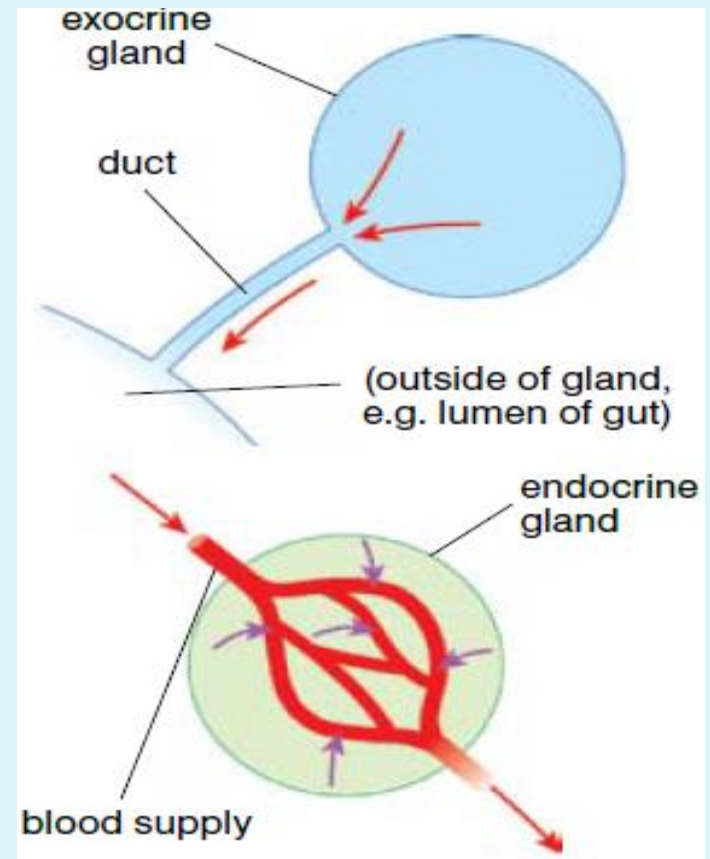
❖ There are two types of glands

EXOCRINE GLAND

❖ Release its secretion in to its ducts

❖ Some example of exocrine gland

- Salivary gland
- Sweat gland
- Mammary gland
- Pancreatic gland
- Intestinal gland



ENDOCRINE GLAND (ductless gland)

- ❖ Gland without duct
- ❖ Transport their secretion through **blood vessels**
- ❖ Produce a chemical called **hormones**
- ❖ **Hormones** are chemical messengers which carry information from one part of the body to another.
- ❖ Hormones exert their influence on certain body parts called **target organs**
- ❖ **Hormones are able to find target cells using** specific receptors on the target cell
- ❖ Hormones have a long-term effect on the body such as **growth, development, metabolism and reproduction**
- ❖ Some examples of endocrine glands;

PITUTARY GLAND

- ❖ **Found in the brain**

- ❖ Control the activity of other endocrine glands. Thus, it is called **master gland** or an **endocrine orchestra**

Pituitary gland secret the following hormone

- ❖ **Growth hormone** regulate the development of bone and muscle
 - Low secretion **dwarfism (very short)**
 - High secretion **gigantism (Very tall)**
- ❖ **Thyroid stimulating hormone (TSH)** stimulate thyroid gland to produce thyroxin hormone

PITUTARY...

- ❖ **Gonadotrophic hormone(GTH)**
 - **Follicular stimulating hormone(FSH)** stimulate the development of egg in ovary
 - **Luteinizing hormone(LH)** stimulate the production of progesterone in female and testosterone in male
- ❖ **Antidiuretic hormone** stimulate reabsorption of water by kidney tubules
- ❖ **Oxytocin hormone** initiate uterus contraction to cause birth

THYROID GLAND

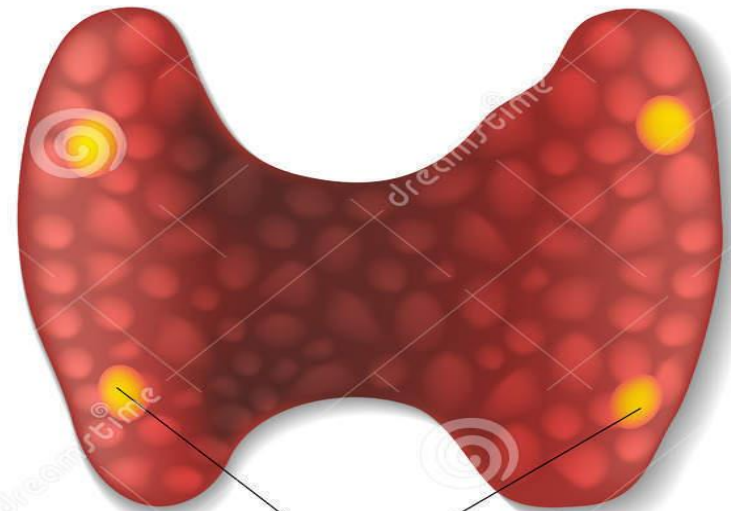
- ❖ Found in neck region in front of wide pipe
- ❖ Secret iodine contain hormone called **thyroxin**
- ❖ It involve in regulation of:
 - rate of metabolism
 - stimulate the conception of oxygen by most cell
 - development of brain in children

THYROID AND PARATHYROID

Thyroid gland
(front view)



Thyroid gland
(back view)



**Parathyroid
glands**

Too much thyroxin

- ❖ Metabolic rate will rise
- ❖ Heart beat and blood pressure rises
- ❖ People with this condition may have
 - 1) Loss of weight (Thin body)
 - 2) Irritable or restlessness
 - 3) Heavy sweat

Low level of thyroxin

- ❑ Metabolic rate decrease
- ❑ People with low thyroxin;
 1. People feel tired
 2. Lack of energy
 3. Weight gain
 4. Miscarriage in pregnant women
 5. Reduce mental and physical development in children known as **cretinism**
- ❑ The deficiency of thyroxin in adult human results thyroid gland enlarges. This condition is known as **goiter**
- ❑ **Goiter prevented** by including **more iodine in our diet**

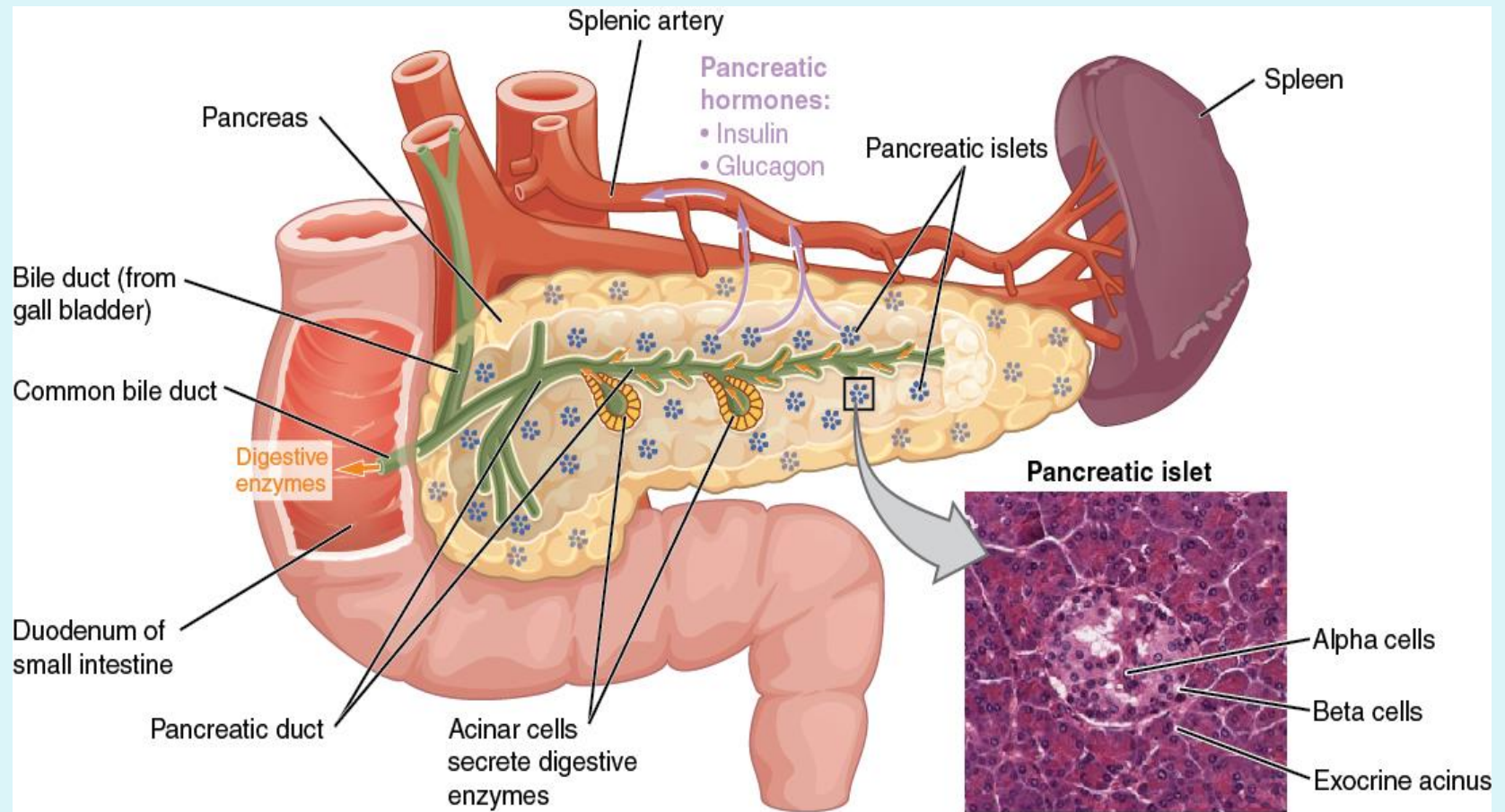
3. PARATHYROID GLAND

- ❑ Four tiny structure found at the back of thyroid gland
- ❑ Produce a hormone called **parathyroid hormone (Parathormon)**
- ❑ Parathyroid hormone **control the amount of calcium ion in body fluids**
- ❑ Calcium ion necessary for bone formation .
- ❑ **Parathyroid hormone increase calcium ion in body fluid using:**
 - the release of calcium ion from bone
 - Absorption of calcium ion from food in small intestine
 - Re-absorption of calcium ion from kidney tubules

4. PANCREASE

- ❑ Pancreases is **both endocrine** and **exocrine** gland
- ❑ Pancreatic exocrine gland (acinar cells) secret digestive enzymes.
- ❑ Pancreases also contain endocrine gland called '**islets of Langerhans**'
- ❑ Pancreatic islets secretes two hormone known as **insulin** and **glucagon**
- ❑ Insulin and Glucagon control blood glucose level in the body
- ❑ **Insulin and glucagon** are **antagonistic hormones** because they have opposite effect on glucose level.

PANCREAS



INSULINE

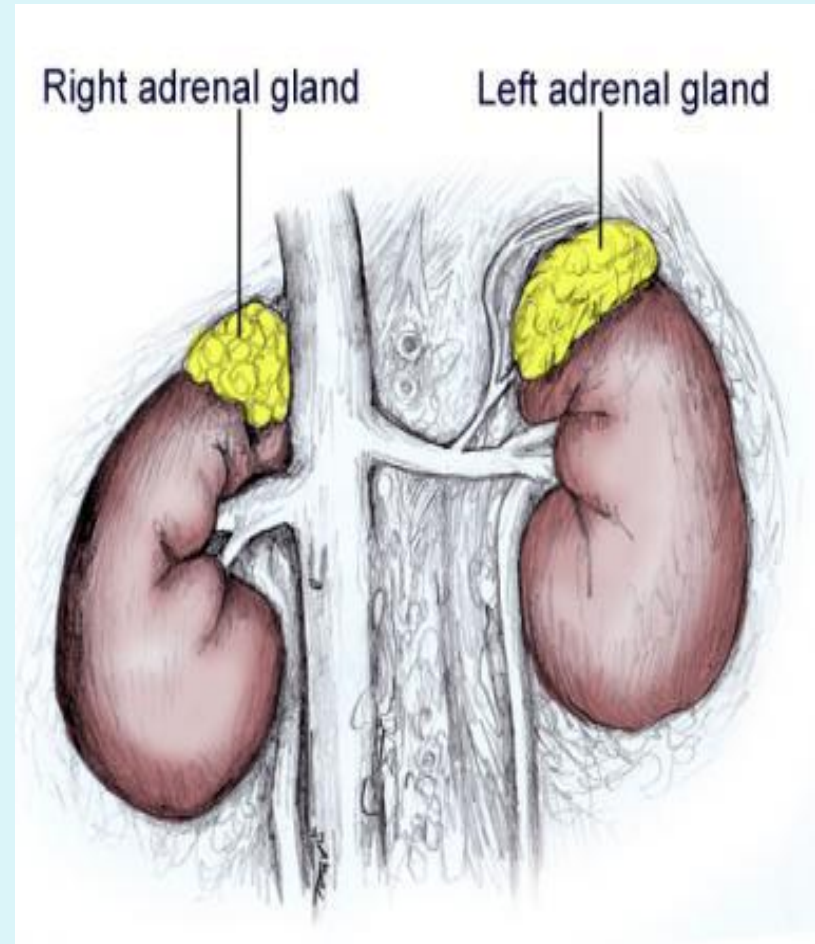
- ❑ **Secretes** when blood glucose level **rises above the ideal range.**
- ❑ **Decrease blood glucose level by;**
 - Glucose is removed by cellular respiration
 - Increase the take up of glucose by cells
 - Glucose is converted into glycogen in liver and muscle cell (**glucose** → **glycogen**)
 - Glucose converted to fat for storage

GLUCAGON

- ❑ **Secretes** when blood glucose level **falls below the ideal range.**
- ❑ **Increase blood glucose level by;**
 - Stimulate the conversion of glycogen into glucose
 - Stimulate the formation of glucose from amino acid and fat
- ❖ The deficiency of insulin and glucagon cause the disease called **diabetes**
- Type 1 diabetes :** appeared in children, It is inherited ,can not be avoid
- Type 2 diabetes:** appeared in person life, can be linked , being obese

5. ADRENAL GLAND

- ❖ Found on the top of kidney
- ❖ Adrenal gland have two separate and independent parts
 - **Adrenal cortex (outer layer)**
 - **Adrenal medulla (Inner layer)**



Adrenal medulla

- ❖ Produce a hormone called **adrenalin** (fight and flight hormone)
- ❖ Secret under **stress, emergency, excited, frightened** situation
- ❖ Important for preparing the body for action
- ❖ The main change produce by adrenalin
 - Increase heart rate
 - Increase breathing rate
 - Pupil dilates
 - Body hair stand

Adrenal cortex

- ❖ Secret complex steroid hormone called **corticoids**
- ❖ Control certain phase carbohydrate, fat and protein metabolism
- ❖ Another hormone release by adrenal cortex is **aldosterone**
- ❖ This hormone **promotes the re-absorption of sodium and chloride ion in the kidney tubules**, Therefore affect water and salt balance in the blood

6. The Gonads /Sex gland/

- ❑ **Testes** produce male sex hormone **testosterone**
- ❑ Control male secondary sexual characteristics such as:
 - ❖ The whole body growth spurt
 - ❖ Testes began to produce sperm
 - ❖ Pubic, body and facial hair
 - ❖ Voice deepens
 - ❖ Body become more muscular

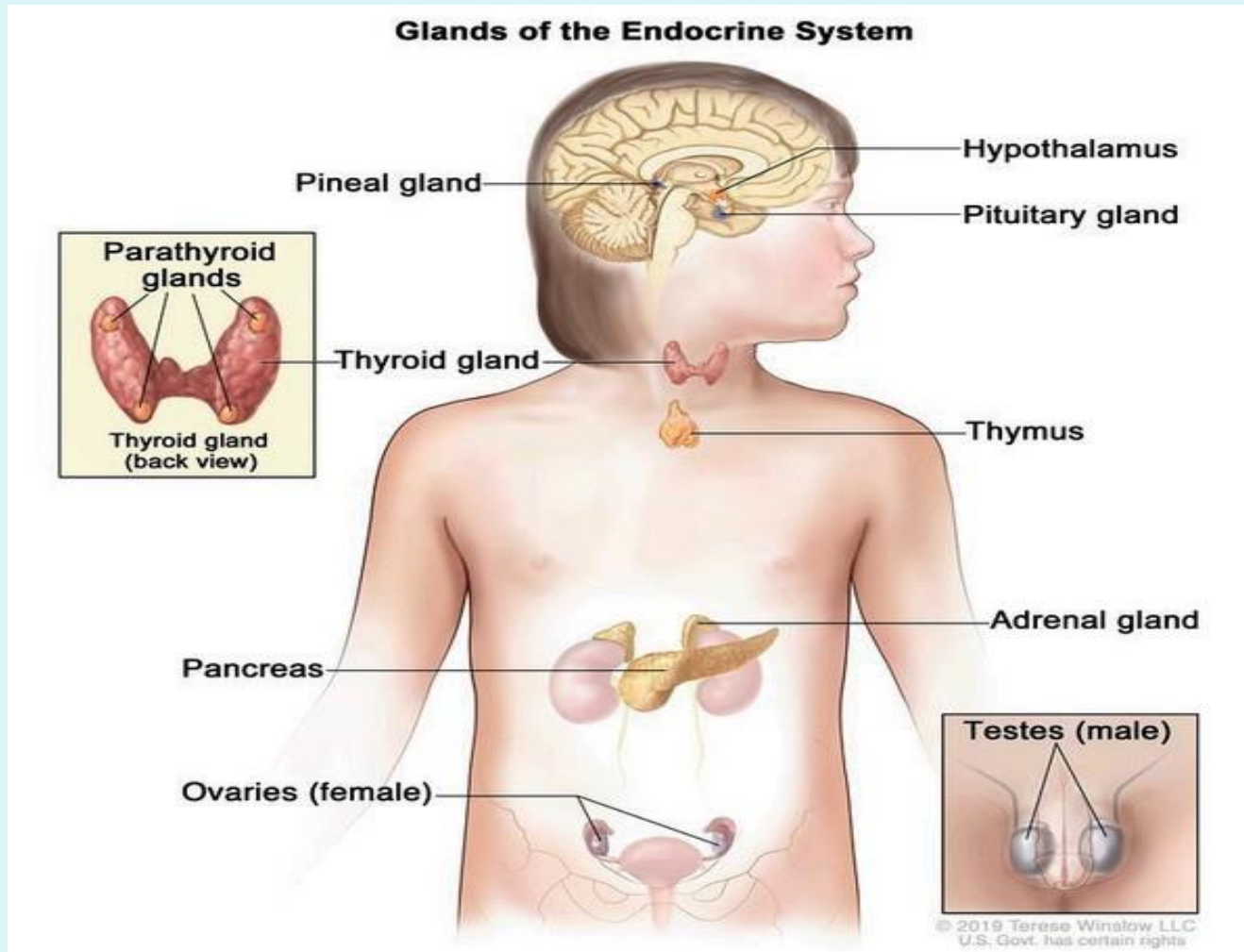
B. Ovaries

- ❑ Produce female sex hormone called **progesterone** and **Oestrogen**
- ❑ **Oestrogen** cause the development of female secondary sexual characteristics such as;
 - The whole body under goes growth spurt
 - Brest develop
 - External genital enlarges
 - Widening of hip
 - Ovaries began to produce egg
 - Menstruation begins
 - Pubic hair grows
 - Voice become thinner

Progesterone

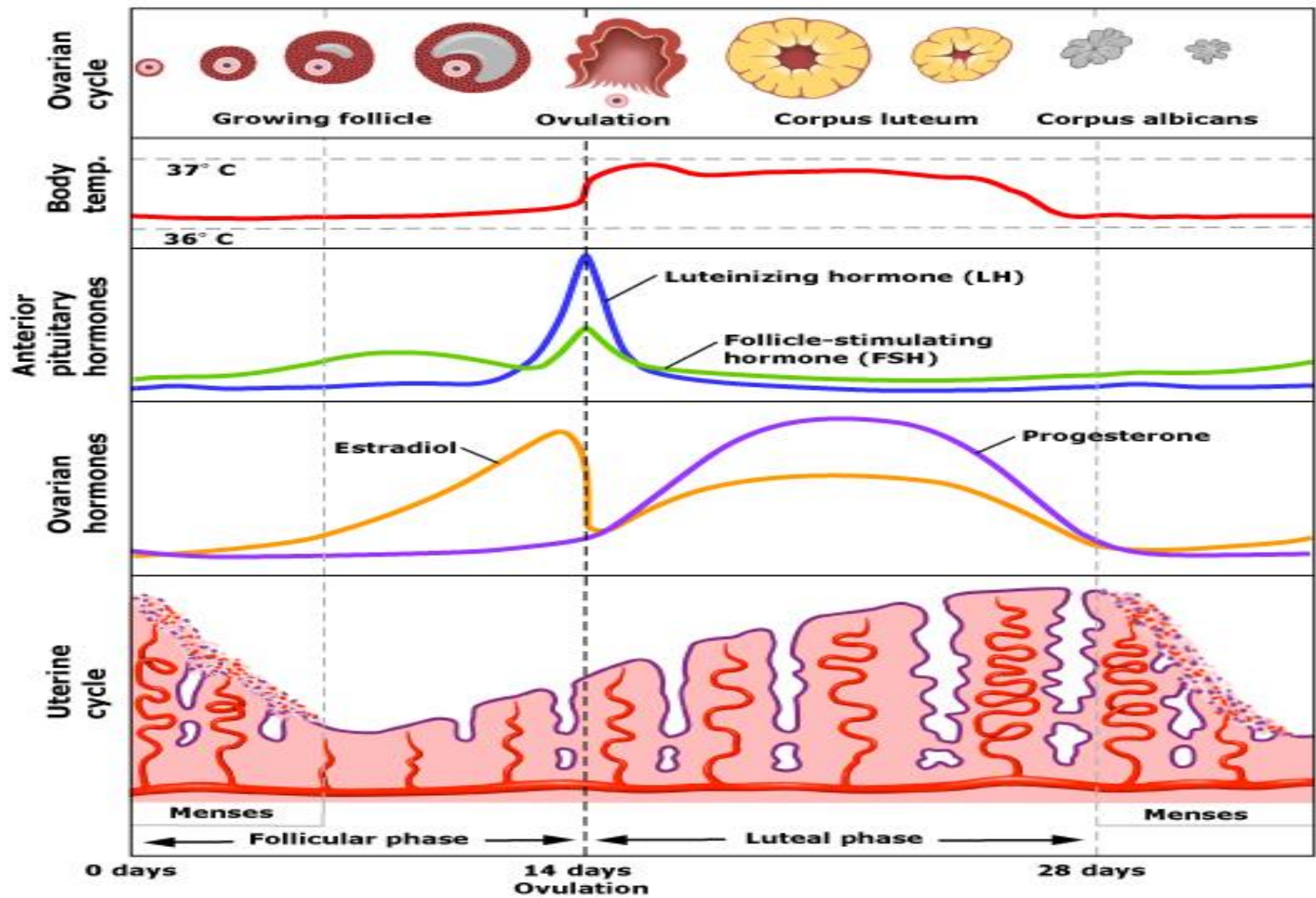
- ❑ Preparing uterus for the implantation of a fertilized ovum.
- ❑ Stops the development of additional egg while the women is pregnant
- ❑ Prevent menstruation during pregnancy
- ❑ **So it helps to maintain pregnancy**

Endocrine system



Menstrual cycle

- ❑ **Menstruation**; monthly discharge of blood and cell shed from endometrium
- ❑ Menstruation starts during **puberty** and stops permanently at **menopause**.
- ❑ **Menstrual cycle** is a sequence of events which takes place approximately every four weeks
- ❑ Menstrual cycle occur between two coordinated events
 1. **Ovary**
 - Development of follicle and burst releasing the mature egg into the fallopian tube. This condition is called **ovulation**
 2. **Uterus**
 - Uterine wall prepare to receive zygote (fertilized egg)
 - Thicken of uterine lining and ready for the fertilized egg to implant



Estrogen

The developing follicle produces Estrogen. The level rises just before ovulation.

progesterone

The empty follicle makes progesterone to thicken the endometrium

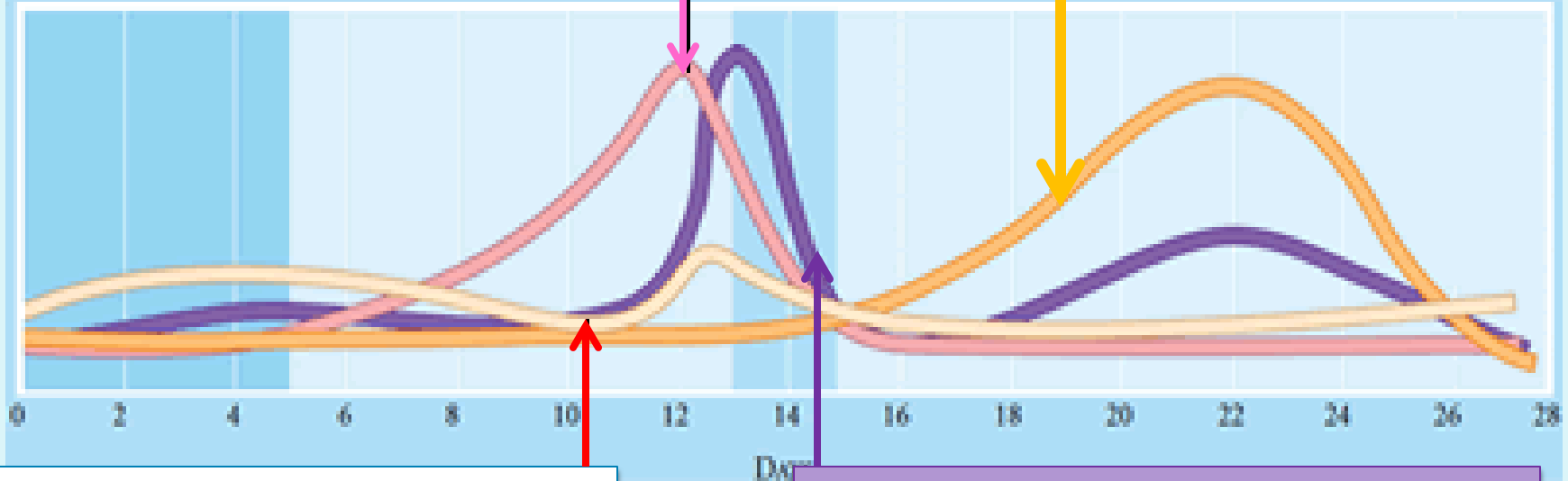
CHANGES DURING THE MENSTRUAL CYCLE

MINSTRUATION

PRE-OVULATION

OVULATION

POST-OVULATION



FSH

FSH hormone causes an egg follicle to start developing in the ovary

LH

LH triggers ovulation on about day 14 of the menstrual cycle

3.4. REPRODUCTIVE HEALTH

- ❑ **Reproduction:** is a biological process by which new individual organisms /offspring/ are produced from their parents
- ❑ The process of releasing egg from ovary to fallopian tube is called **ovulation**
- ❑ **Fertilization (conception for human)** a single sperm combine with ovum /egg/ to form zygote. It takes place in **oviduct fallopian tube** Fertilized egg (ovum) is called **zygote**

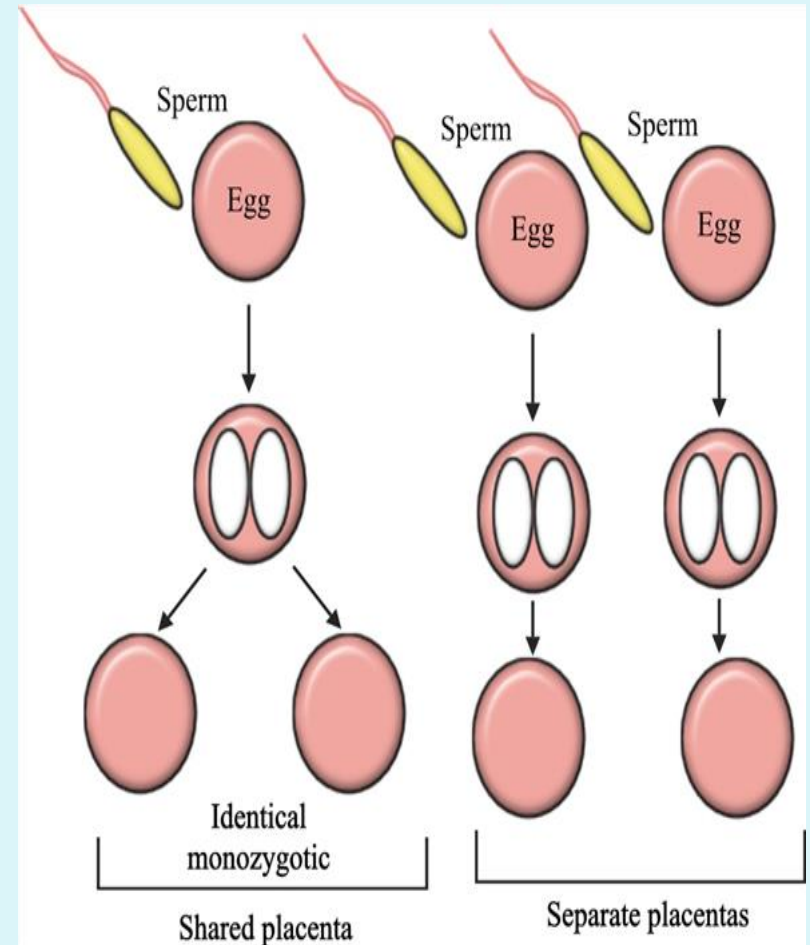
Twins

Identical / monozygotic/ twins

- ❑ One egg fertilized by one sperm but the fertilized ovum splits completely in to two.

Fraternal /non-identical twins/

- ❑ Sometimes **two ripe ova** will be released during the same **monthly cycle** fertilize by two separate sperm



Contraception

- ❑ **Contraception** is a method of avoiding pregnancy or controlling fertility
- ❑ Different contraceptive method are based on different techniques these are:
 - **Preventing conception/** fertilization/
 - **Preventing ovulation/**release of egg from ovary/
 - **Preventing implantation**
- ❑ **Major contraceptive method used by people are;**

1. NATURAL METHOD

- ❑ Natural birth control method without using hormonal or physical material

1.1. Rhythm or calendar method

- ❑ Contraception based on understanding menstrual cycle and predict ovulation time
- ❑ **Advantage**
 - there is no side effect
- ❑ **Disadvantage**
 - It is not easy to pinpoint ovulation
 - Depend on full cooperation of both partners
- ❑ **Effectiveness** 10 pregnancy per 100 women years

1.2 Breast feeding

- ❑ Breastfeeding a baby also helps to space a family.
- ❑ Woman does not ovulate while she is fully breast feeding a baby.

Calendar method

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1 Safe	2	3	4 Period Starts	5	6	7
8	9	10	11 Unsafe	12	13	14
15	16	17	18	19	20	21
22	23 Safe	24	25	26	27	28
29	30	1	2 Period Starts	3	4	5

2. PHYSICAL or BARRIER METHOD

- ❑ Physical barriers prevent pregnancy by preventing the meeting of the ovum and the spermatozoa.

2.1 Condoms-prevent conception

Advantage

- ❑ No side effect
- ❑ Protect against sexually transmitted disease

Disadvantage

- ❑ Sheath may tear or damage during sexual intercourse

Effectiveness; 2.5 pregnancies per 100 woman years

2.2 The diaphragm or cap-**prevent** **conception**

- ❑ A thin rubber inserted into the vagina before intercourse to cover the cervix and **prevent the entry of sperm.**
- ❑ **Advantages:**
 - No side effects.
- ❑ **Disadvantages:**
 - May be incorrectly positioned or damaged and allow sperm pass.
- ❑ **Effectiveness:** 2.5 pregnancy per 100 woman of years

3. HORMONAL METHOD

- ❑ Use natural hormone **progesterone** and **estrogen** to prevent pregnancy by preventing ovulation
- ❑ **Rises of estrogen in the blood results in**
 - slowing down of the production of follicle stimulating hormone by pituitary gland. FSH is responsible for maturation of egg. If the egg is not mature there is no pregnancy
- ❑ **Rises of progesterone in the blood results in;**
 - Increase the mucus in the cervix and vagina to prevent the entrance of sperm cell

Hormonal pills

Mixed pill

- ❑ Consists estrogen and progesterone;

Mini pill (progesterone only pill)

- ❑ Does not contain estrogen, so does not inhibit ovulation

Advantages hormonal pills:

- ❑ Menstrual cycle regulation
- ❑ Does not interfere with sexual intercourse.

Disadvantages hormonal pills:

- ❑ It can cause raised blood pressure
- ❑ Increased tendency for the blood to clot.

Effectiveness

- ❑ 0.5 pregnancies per 100 woman years.

Hormonal implant

- ❑ Involves implanting small silicon capsule contains female hormone implanted under the arm of woman
- ❑ If a woman wants to become pregnant the implant can be removed

Advantage of implant

- ❑ Prevent pregnancy up to five years

Disadvantage (Side effect)

- ❑ Changes period
- ❑ Headaches
- ❑ Depression

Effectiveness:

- ❑ 0.5–1 pregnancy per 100 woman years.

Hormonal injection

☐ Hormonal injection

Prevent pregnancy up to three months

☐ Contain female hormone oestrogen and progesterone

The injection

1. Stops ovulation
2. Changes cervical mucus to prevent sperm getting through

Advantages: .

☐ Only need an injection every three months.

Disadvantages:

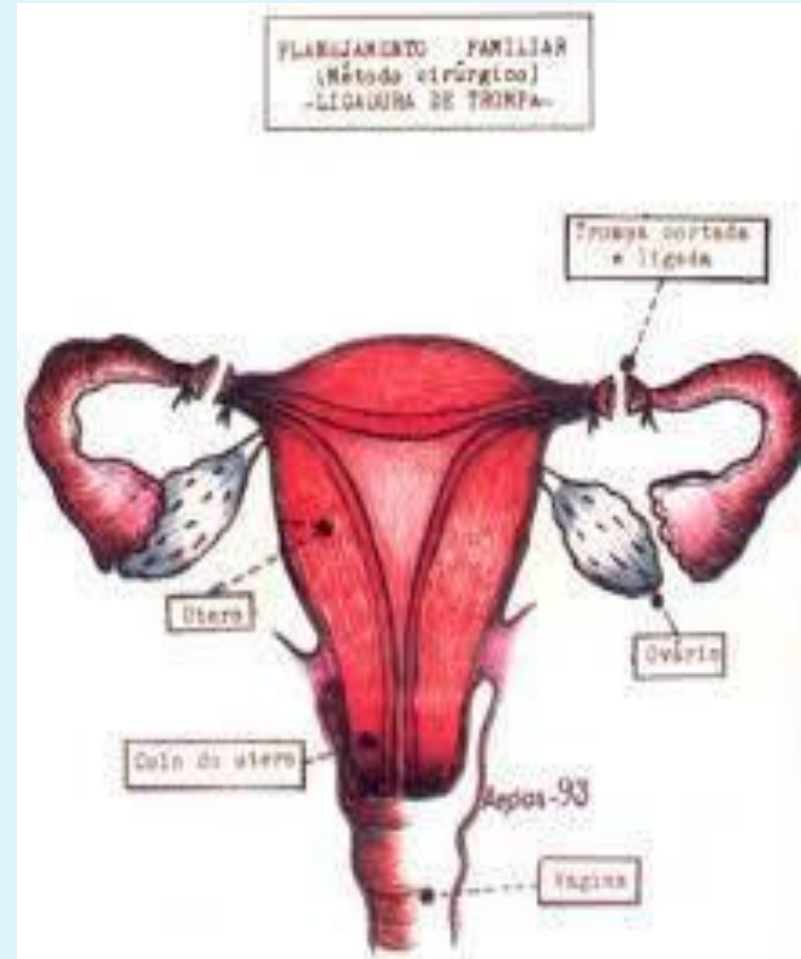
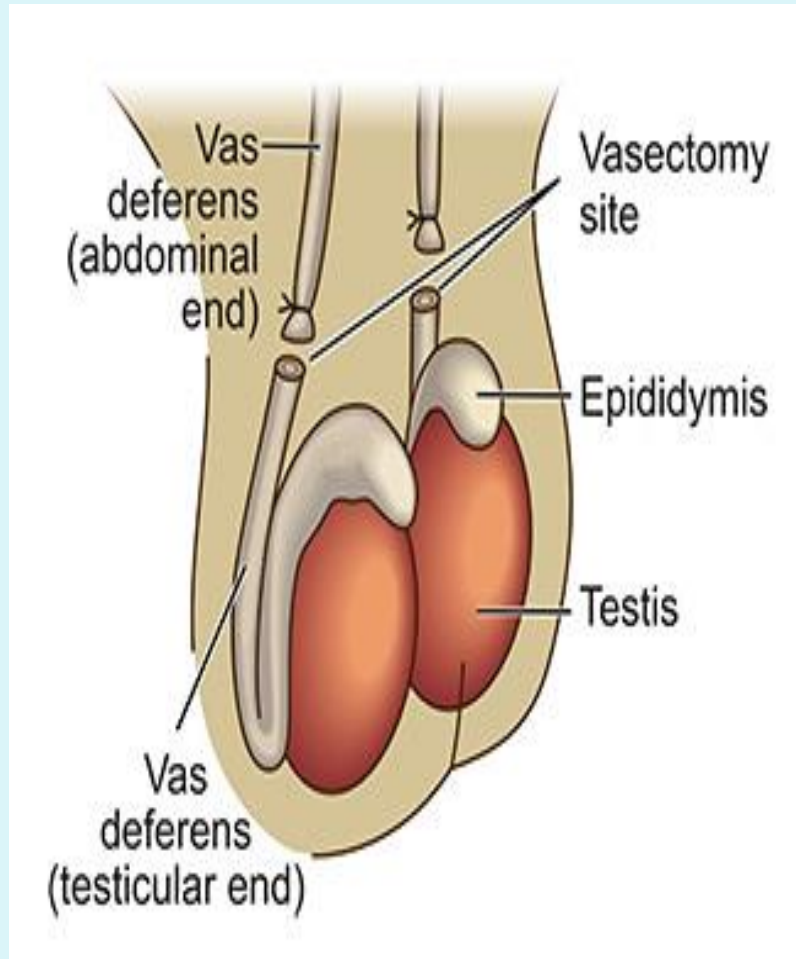
☐ Can't get pregnant for about 3 months.

☐ Change in periods and headaches.

Effectiveness:

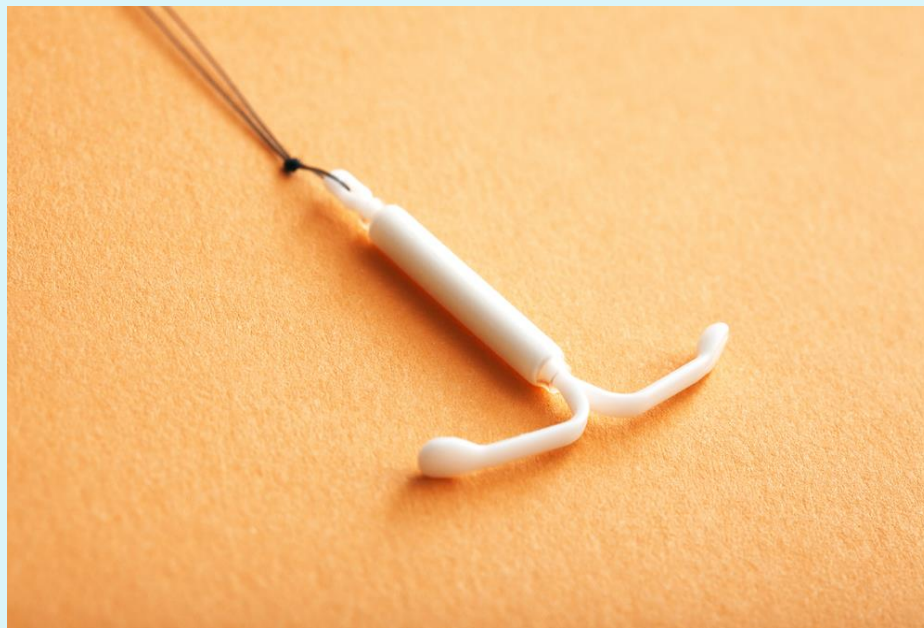
☐ **1 pregnancy per 100 woman years**

4. Sterilization /surgical contraception/ Vasectomy Tubectomy



INTRAUTERINE DEVICE (IUD)

- ☐ A device which is inserted by doctor in the uterus
- ☐ Does not prevent conception
- ☐ Prevent implantation of early embryo
- ☐ Prevent pregnancy up to twelve years



IUD....

Advantages:

- ☐ Once inserted, no further steps need to be taken.
- ☐ Relatively effective at preventing implantation.

Disadvantages:

- ☐ Can cause pain and heavy periods.
- ☐ Can cause uterine infections

Effectiveness:

- ☐ 2.5 pregnancies per 100 woman years.

Summary of contraception

Natural method

- Calendar
- Breast feeding

Barrier method

- Condom
- Diaphragm

Hormonal method

- Pill
- Implant
- Injection

Surgical

- Vasectomy
- Tubectomy

IUD

Lesson quizzes

Choose the correct answer from the given alternatives

- 1) In human menstrual cycle, which hormone is stimulate the release of egg from ovary?
 - A. Follicular stimulating hormone
 - B. Luteinizing hormone
 - C. Progesterone
 - D. Oestrogen
- 2) Which one of the following mechanisms does condom use to prevent pregnancy? by preventing
 - A. ovulation
 - B. implantation
 - C. conception
 - D. sexually transmitted disease
- 3) Which of the following contraceptive methods can be used by a human male?
 - A. Diaphragm
 - B. Vasectomy
 - C. Hormonal injection
 - D. Tubectomy

Answer 1. B , 2 .C. 3. B