Male primary sex organs------Testes

Accessory sex organs------ Penis with scrotum.

Prostate

Seminal vesicle

Urethra

Epididymis

Vas deference

Ejaculatory duct

Bulbo urethral gland

**Hormones of male**: Testosterone

Inhibin

Gonadotropin-releasing hormone

Luteinizing hormone

Follicular stimulating hormone

**Secondary sex characteristics of male**

|  |  |
| --- | --- |
| **Traits** | **Secondary sex characteristics of male** |
| 1. External genitalia | * Penis increases in length & width * Scrotum becomes pigmented & rugose. |
| 2. Internal genitalia | * Development of internal genitalia. |
| 3. Voice | * Voice becomes deeper. |
| 4. Hair growth | * Bear appears. * Pubic hair grow with male pattern * Hair appears in the axillas, on the chest, and around the anus. * General body hair increases. |
| 5. Mental | * Interest in opposite sex develops |
| 6. Body conformation | * Shoulders broaden. * Muscles enlarge. |
| 7.Skin | * Sebaceous gland secretion increases |

**Function of testosterone:**

**In male fetus:**

1. It is responsible for the sex differentiation.
2. Causes the development of external & internal genitalia.
3. Cause the descent of the testes.

**In adult male:**

1. Causes enlargement of penis, scrotum & testes after puberty.
2. Development of secondary sexual characteristics.
3. It is essential for spermatogenesis.
4. Increase size and strength of bones.
5. Increase basal metabolic rate (BMR)
6. Increase RBC count.

**In female:**

* Increase in libido.
* Enlargement of clitoris

Growth of hair on the face.

**Semen**

**Definition:** It is the fluid that is ejaculated at the time of orgasm, and contain sperms and the secretions of the seminal vesicles,prostate, Cowper’s glands and probably the urethral glands.

**Average volume:** 2-4ml/ ejaculation. The volume of the semen and the sperm count decreases rapidly with repeated ejaculation.

**Composition of human semen:**

1. Color: White , opalescent
2. Volume : 2-4 ml/ ejaculation.
3. Specific gravity: 1.028
4. pH: 7.35-7.50
5. Sperm count: Average about 100 million/ml, with fewer than 20% abnormal forms.
6. Mortility more than 60% progressively mortile.

7. Other components: Fructose, Ascorbic acid ,Zinc Phosphate, Acid phospatase, Bicarbonate, etc.

**Female Reproductive system**

**Female reproductive organs:** The female reproductive organs are classified in to two group:

1. Primary sex organs: Ovary
2. Accessory sex organs
3. External geni talia (valve)
4. Vagina
5. Uterus
6. Uterus
7. Bartholins gland.

**Hormones of female** ---- Gonadotropin-releasing hormone

Luteinizing hormone

Follicular stimulating hormone

Estrogen

Progesterone

**Secondary sexual character of female**

1. Onset of menstruation.
2. Enlargement of breast.
3. Change in voice .
4. Maturation of female sex organs.
5. Appearance of pubic and axillary hair.
6. Enlargement of pelvis in all diameter ( Gynaecoid pelvis)

**Menstrual cycle**

The monthly rhythmic change in the rates of secretion of female hormones and corresponding changes in overies and sexual organs as well is known as menstrual cycle. May be regard as periodic prepararation for fertilization and pregnancy.

Stages of menstrual cycle: Menstrual cycle has three phase-

1. Proliferative or estrogenic phase-- Duration is 8-10 days. Changes occurs in this phages--

Thickness of endometrium becomes 3-4 mm.

Proliferation of epithelium.

Growth of blood vessels.

Enlargement of tubular glands.

1. Secretory or progesteronal phase-- Duration is 9-10 days. Changes occurs in this phages—

Further proliferation of stromal tissue.

Thickness of endometrium becomes 5-6 mm.

Blood vessels become highly tortuous.

Secretion of epithelial glands.

1. Menstrual Phase –also called bleeding phage.It occurs when fertilization does not takes place. Duration 5-7 days.

Menstration

The cyclic discharge of blood, unfertilized ovum and certain other substances from uterus through vagina in the female reproductive life at an average interval of 28 days is called menstruation. Average duration of menstruation is 4-7 days.

1. Composition of menstrual blood:
2. Blood 30-70ml.
3. Stratum compactum and spongiosum of endometrium.
4. Mucous
5. Unfertilized ovum.
6. Leucocytes
7. Fibrinolysin
8. Some chemical substance like glycogen.
9. Nature of menstrual Blood:
10. It is liquid, pale, reddish brown in colour
11. Its smell is fishy like.
12. Its is non clotting due to absence of clotting factor and presence of fibrinolysin which acts as anticoagulant.

**Puberty:** Means the onset of reproductive life. In female it is charactersed by the onset of menstruation and in male by the gametogenic function.

**Menarche:** Means the onset of menstruation. It is at about 12 to 14 years.

**Menopause:** Means the cessation of menstruation. It is at at between the ages of 45 to 55 years.

**Amenorrhea:** It means the absence of menstruation.

Cause:

1. Before puberty
2. After menopause
3. During pregnancy
4. Some time during lactation.

**Dymenorrhoea:** It means painful or difficult menstruation

**Reproductive Period:** It is the life of female between menarche and menopause.

**Danger Period:** Form 9 to 17th days of menstruation or roughly the middle week of menstruation. Because in this time there is chance of fertilized, if ovum comes in contact with mature sperm.

**Ovulation** : It is the process of expulsion of an ovum from the ovary on spontaneous ruptures of mature graafian follicle. It’s usually occurs on the 14th days before the onset of the first day of the next menstruation.

Phages of ovarian cycle :

i) Follicular phages – in this phase follicular development & ovulation takes place. Ovulation takes place at about the 14th day of the cycle.

ii) Luteal phages—in this phage various changes in corpus luteum occurs. If pregnancy does not occur,corpus luteum degenerates. If pregnancy occur,corpus luteum continues to grow.

**Spermatogenesis -**--The process of formation & maturation of spermatozoa.

**Blood**

**Definition:** Blood is a specialized fluid connective tissue composed of liquid intercellular substance (plasma) and Formed elements (RBC,WBC,Platrlet)Which circulate in the a close system of blood vessels.

**Composition:**

Whole blood

Fluid Portion (plasma)(55%)

Fomed elements(45%)

Solid(8 – 9%)

Water (91 – 92 %)

* Red blood cell or erythrocyte
* White blood cell or leukocyte
* Platelet or thrombocyte

Organic substances(7.1 – 8.1%)

Inorgainic substances (0.9%0)

(Na+ ,K+ ,Ca2+ ,Mg2+ ,Fe2+ ,C1-,

I-,GCO3-,SO42- ,P,Cu,F-)

Gases ( 02, CO2 ,N2)

* Proteins(7%): albumin,globumin,fibrinogen,prothrombin.
* Non-protein nitrogenous substances: Urea, uric acid,xanthine,

Hypoxanthine,creatinine,creatine,ammonia, amino acids.

* Carbohydrates: Glucose,sucrose
* Lipids:Phospholipids.cholesterol,neutral fat etc.
* Colouring matters: Bilirubin,carotene,xanthophyllin.
* Others: Hormones, vitamins, enzymes(amylase,protease,lipase,phosphatase).

Cellular elements of human blood with their values:

|  |  |
| --- | --- |
| Cellular elements | Normal values in traditional units |
| RBC | In adult male:4.9- 5.5 million/mm3  In adult female:4.4- 5.0 million/mm3 |
| WBC | 4000- 11,000/ mm3 |
| Platelet | 200,000- 500,000 / mm3 |

Functions of blood

1. Respiration: Transport of O2 form the lungs to the tissues & of CO2 form the tissues to the lungs.
2. Nutrition: Transport of a absorbed food materials.
3. Excretion: Transport of metabolic waste products to the kidneys, lungs , skin & intestines for removal form the body.
4. Maintenance of normal acid- base balance in the body.
5. Regulation of water balance through the effects of blood on the exchange of water between the circulating blood and tissue fluid.
6. Regulation of body temperature by the distribution of body heat
7. Transport of hormones and regulation of metabolism.
8. Transport of metabolites
9. Define against infection by the white blood cells and circulating antibodies.
10. Coagulation
11. Storage: blood serves as the ready made source for water & certain electrolytes such as glucose, Na+ ,K+ etc which are constantly needed by tissue cells.

Difference between plasma and serum

|  |  |
| --- | --- |
| **Plasma** | **Serum** |
| 1.Non-cellular fluid portion of the blood | 1.If the blood is allowed to clot and the clot is removed, the remaining fluid is called serum. |
| 2.Contains all the blood clotting factors | 2.It does not contain fibrinogen, factors II, V and  VII. platelet |
| 3.Serotonin count is low | 3.Serotonin count is high due to breakdown of platelet |
| 4.Plasma can clot because it has all the blood  clotting factors | 4.Serum cannot clot due to lack of some of the clotting  factors |

**Origin of plasma proteins:**

1. **In adult,**

|  |  |  |
| --- | --- | --- |
| **Plasma proteins** | | **Site of origin** |
| 1.Albumin | | Liver |
| 2.Fibrinogen | | Liver |
| 3.Prothrombin | | Liver |
| 4.Globulin | ά &β | Liver |
|  | Γ(antibody) | Plasma cells |

**List the plasma proteins with their normal values**

Plasma proteins

1. Albumin
2. Globumin
3. Fibrinogen
4. Proteins,coagulation factorsII,VII,IX,X
5. ά 1 – Antiprotease
6. ά – Fetoprotein
7. ά2- Macroglobumin
8. Antithrombin-III
9. Cerulosplasmin
10. C-reactive protein
11. Haptoglobin
12. Hemopexin
13. Transferrin
14. Apolipoprotein B
15. Angiotensinogen
16. Antithrimbin C,protein C
17. Insulinlike growth factors I
18. Steroid hormone- binding globulin
19. Thyroxine-binding globumin
20. Transthyretin(thyroid-binding prealbumin
21. Orosomucoid

**Total plasma proteion concentration** is 6.4- 8.3g/dl.

|  |  |
| --- | --- |
| **Major plasma proteions** | **Normal values (gdl)** |
| 1. Albumin | 4.8 |
| 1. Globumin | 2.3 |
| 1. Fibrinogen | 0.3 |
| 1. Prothrombin | 0.1 |

Functions of plasma proteins:

|  |  |
| --- | --- |
| 1. Albumin | 1. Maintains 80% of the total colloidal osmotic pressure of blood. 2. Maintains viscosity of blood. 3. Acts as a buffer & maintains acid-base balance. 4. Acts as a carrier of lipid, bilirubin, hormone &drugs. 5. Acts as a protein reservoir |
| 1. Globumin | 1. Maintains 20% of the total colloidal osmotic pressure of blood. 2. Maintains viscosity of blood. 3. Ά1- globumin transport lipid &steroids 4. Ά2- globumin transport Cu as ceruloplasmain. 5. β- globumin transports Fe as transferring. 6. γ – globumin acts as antibody. |
| 1. Fibrinogen | 1. Essential for blood coagulation 2. Increases ESR 3. Helps to maintain viscosity of blood |
| 1. Prothrombin | 1. Essential for blood coagulation |

**Hemopoisesis: synthesis of blood cells**

1. **Pluripotent hematopoietc stem cells,**
2. **Multipoteal progenitor cells**
3. **Committed progenitor cells**
4. **Maturing**