

## Adolescence and Puberty

- Human beings can reproduce only after a certain age because their reproductive system becomes active after a certain age.
- The hormonal changes are responsible for transforming a child into an adult.
- The period of life, when the body undergoes several changes which leads to reproductive maturity, is called adolescence.
- Adolescence begins at the age of 10 -11 and ends at the age of 18 or 19 years.
- As this period covers the 'teens' (13 to 18 or 19 years) adolescents are also called teenagers. The period of adolescence may vary from person to person.
- The child undergoes several changes during adolescence. These changes imply the onset of puberty.

## Changes at Puberty

### Increase in Height

- The most important change during puberty is the sudden increase in height.
- During this time the bones of the arms and the legs elongate and make a person tall.
- Girls and boys both grow to their maximum height by the age of 18 years.
- The rate of growth varies from person to person

### Change in body shape and appearance

- With the onset of puberty, boys develop broader shoulders and girls develop wider waist.
- Changes occurring during adolescence are different in boys and girls.

### Voice change

- At puberty the voice box or larynx begins to grow, boys develop larger voice boxes which is visible as a protruding part of the throat called Adam's apple.
- In girls the voice box is hardly visible because of its small size.
- In boys, sometimes the muscles of the growing voice box grow out of control and the voice becomes hoarse. However, this state remains for a few days or weeks after which the voice becomes normal.

### Increased activity of sweat and sebaceous gland

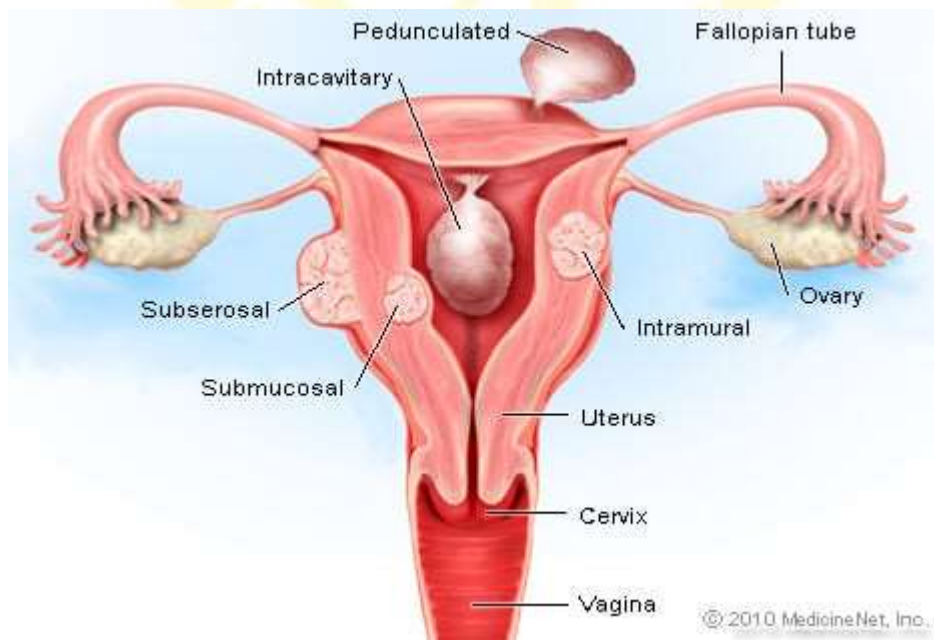
- The activity of sweat and sebaceous glands increases during puberty. As a result, young people can get pimples and acne on the skin mainly facial area.

## Development of Sex organs

- At the age of puberty, male sex organs such as testes and penis develop completely.
- In girls, the ovaries become enlarge and eggs begins to mature.

## Secondary Sexual Characteristics

- The characteristics that distinguish a male from a female but are not directly involved in reproduction are called Secondary Sexual Characteristics.
- These are controlled by hormones.
- The Secondary Sexual Characteristics in males are:
  1. Boys develop hair on their chest and under the arms.
  2. Facial hair begins to grow like beard and moustaches.
  3. Adam's apple develops in throat.
  4. A heavy voice or low-pitched voice.
- The Secondary Sexual Characteristics in Females are:
  1. Development of breasts take place.
  2. Hair growth begins under the arms and in pubic region.



## Role of Hormones in initiating Reproductive functions

- Changes that take place during adolescence are controlled by hormones.
- Hormones are chemical substances secreted from the endocrine glands.
- The male hormone called testosterone is released by the testes.

- The female hormone called estrogen is produced by the ovaries. This hormone is responsible for the development of the breasts.
- The production of the male and female hormones is controlled by another hormone secreted by pituitary gland.
- The endocrine glands release hormones in the bloodstream so that it reaches the particular body part called the target site.
- These stimulate the ovaries and the testes to secrete the sex hormones.

## Reproductive Phase of Life in Humans

- At adolescence, girls become capable of reproduction.
- The reproductive age begins at 10- 12 years and continues till the age of 45- 50 years.
- At the age of puberty, the ova begins to mature. One ovum matures and is released by one of the ovaries in every 28- 30 days cycle.
- During this period, the walls of the uterus becomes thick to receive the egg. In case it gets fertilised and begins to develop, it results in pregnancy.
- If it is not fertilised, the released egg and the thickened lining of the uterus along with blood vessels is shed off. This causes bleeding in women which is called menstruation cycle.
- Menstruation occurs once in every 28- 30 days. The first cycle begins at the age of puberty and is called Menarche. This cycle stops at the age of 45- 50 years and is termed as Menopause.
- The menstrual cycle occurs in following steps:
  1. Maturation of eggs.
  2. Release of matured egg.
  3. Thickening of the wall of uterus.
  4. If pregnancy does not occur, the thickened walls of uterus breakdown.
  5. Fertilised egg gets embedded in the uterine wall for further development, if pregnancy occurs.

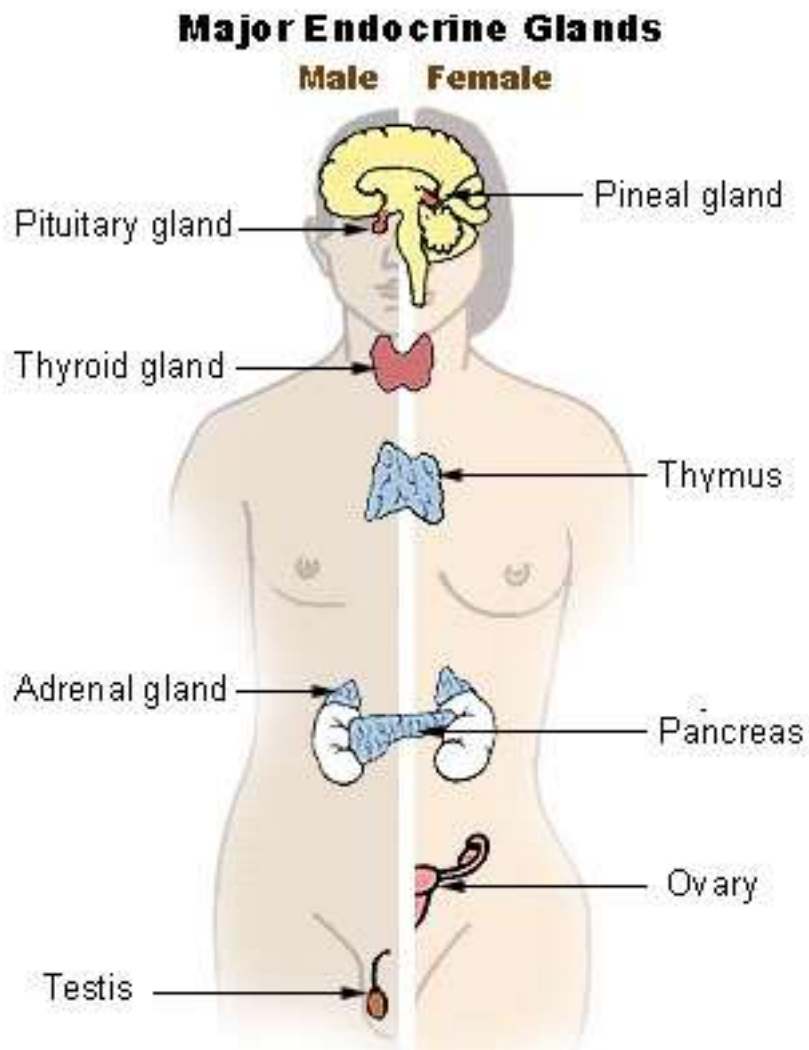
## Determining the sex of the baby

- The sex of the baby is determined by the chromosomes.
- Chromosomes are present in the nucleus of every cell of the human body.
- Human beings have 23 pairs of chromosomes. Out of these, one pair of chromosomes is called the sex chromosome.
- The pair of chromosomes that determines the sex of the baby is called the sex chromosomes, named X and Y.
- A female has two X chromosomes while a male has one X and one Y chromosomes.
- The gametes that is sperm and egg has only one pair of chromosomes.
- In females all the gamete contain X chromosome while in males, half of the gametes or sperms have X chromosomes and half of the sperms have Y chromosomes.

- When a sperm containing X chromosome fertilises the egg, the zygote will contain 2 X chromosome and will develop into a girl.
- On the other hand, when a sperm containing Y chromosome fertilises the egg, the zygote will contain X and Y chromosome and will develop into a boy.

## Other Hormones

- Pituitary gland which is an endocrine gland controls the release of other hormones such as thyroid, adrenals, the ovaries and testicles.
- The thyroid gland secretes the hormone Thyroxine. The deficiency of this hormone causes the disease Goitre in human beings.
- Pancreas is responsible for secreting the hormone Insulin.
- The adrenal glands secrete the hormone Adrenaline which is responsible to maintain the correct salt balance in the blood.
- Pituitary also secretes growth hormones which are responsible for normal growth of a person.



## Hormones involved in Metamorphosis

- The change of a larva to adult is known as Metamorphosis.
- Metamorphosis is controlled by insect hormones. In frog, metamorphosis is taken control by thyroxine hormone which is secreted by the gland Thyroid.
- Thyroxine can only be produced in the presence of Iodine in the water.
- If iodine is not present in the sufficient amount, the tadpole cannot become adults.

## Reproductive Health: Nutritional needs and physical exercises

- Adolescence is a stage involving rapid growth and development. Therefor, proper balanced diet is required.
- The balanced diet includes adequate amounts of proteins, carbohydrates, fats, minerals and vitamins.
- The meal should contain leafy vegetables, fruits, pulses, milk, iron rich food in a balanced amount.
- Physical exercises like walking, running and playing keeps the body fit and healthy.

## Personal Hygiene

- At adolescence, it is necessary to maintain personal hygiene since the body undergoes big transformations including hormone secretion.

