

Physiology of Puberty

PUBERTY

- ◉ The stage of physical maturation in which an individual becomes physiologically capable of sexual reproduction.
- ◉ Triggered by increased secretion of Luteinizing Hormone(LH).
- ◉ Results from changes in the hypothalamus that allow increased secretion of GnRH to stimulate secretion of LH

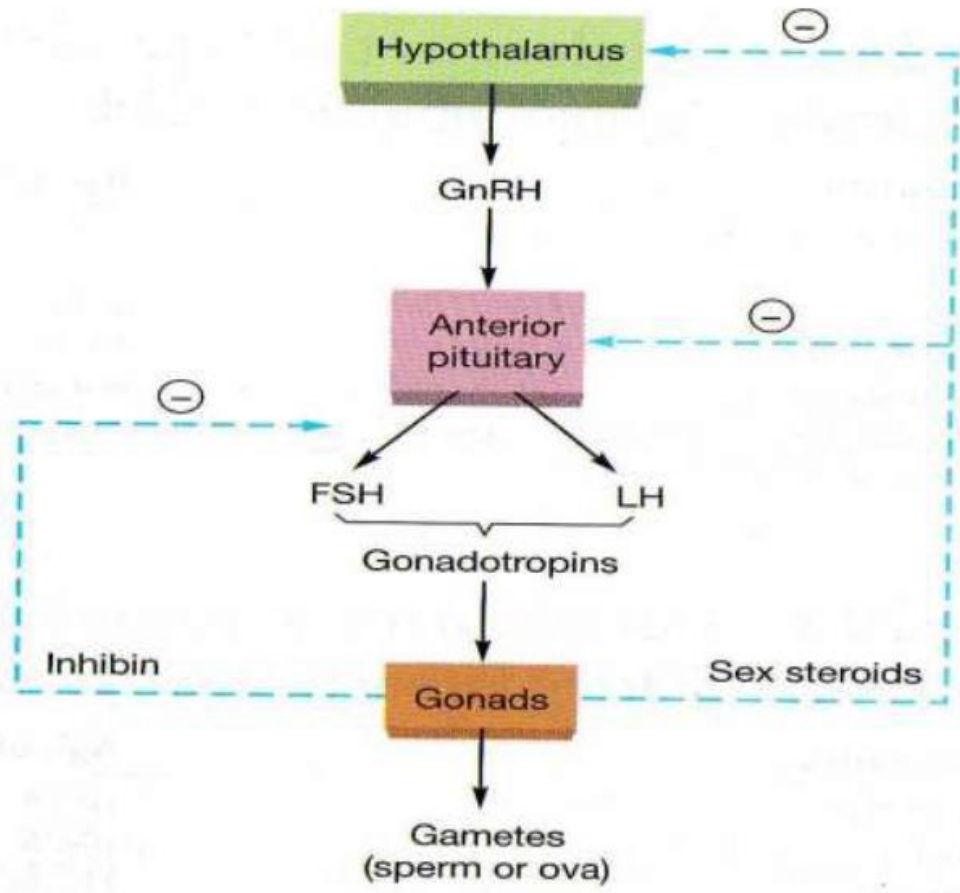
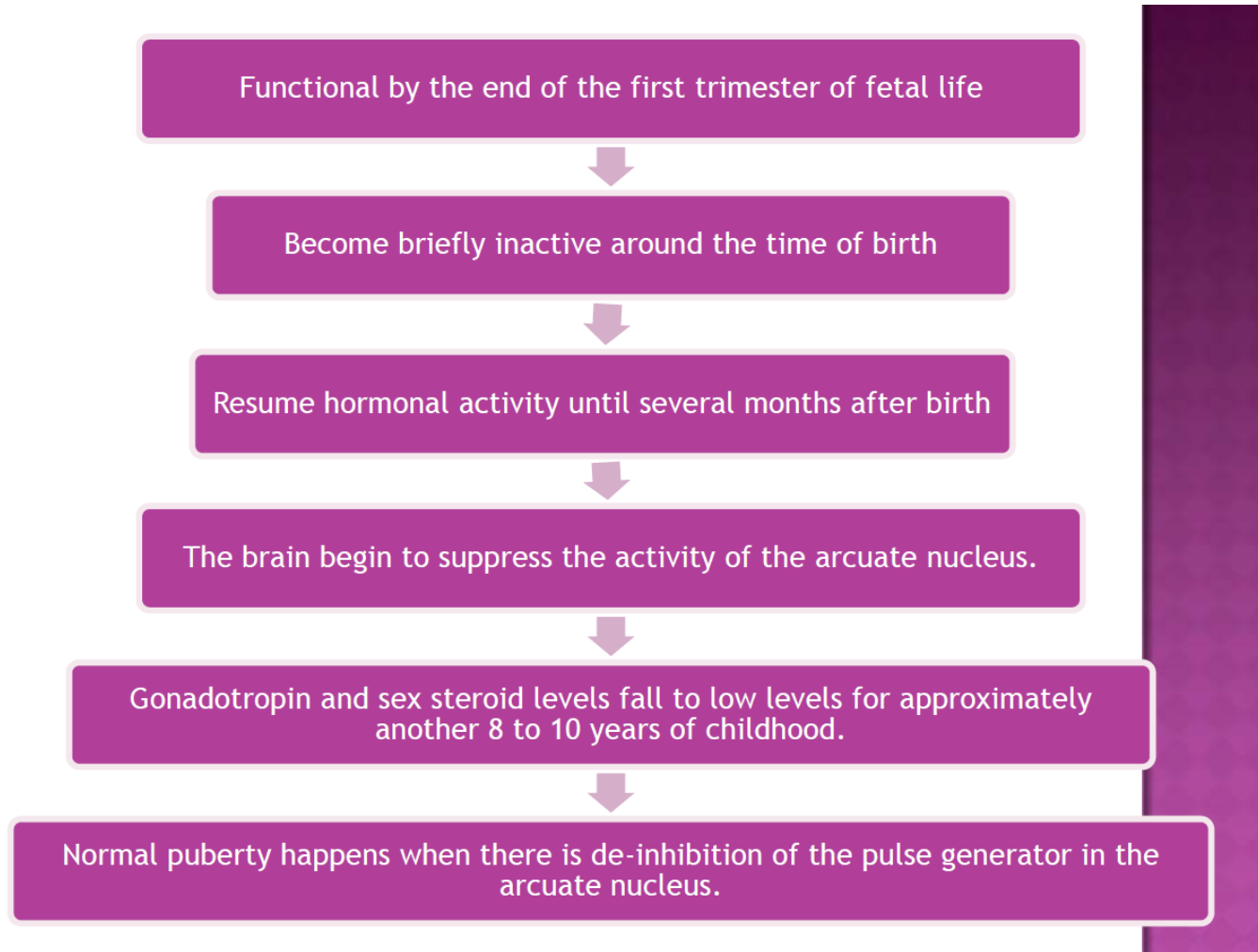


Figure 20.9 Interactions between the hypothalamus, anterior pituitary, and gonads. Sex steroids secreted by the gonads have a negative feedback effect on the secretion of GnRH (gonadotropin-releasing hormone) and on the secretion of gonadotropins. The gonads may also secrete a polypeptide hormone called inhibin that functions in the negative feedback control of FSH secretion.

The Reproductive System



GnRH surge is triggered by a few factors:

- ■ Nutrition
- ■ Leptin level
- ■ Genetics
- ■ Physical activity
- ■ Drugs

ONSET OF PUBERTY

- ◉ Girls: 10-14 years old
- ◉ Boys: 12-16 years old

FIRST SIGNS

- ◉ Biological: Pulsatile LH especially during sleep
- ◉ Girls: Breast development
- ◉ Boys : Increase in the size of the testicles

PHASES OF PUBERTY

a) Adrenarche

- Stage of maturation of the cortex of adrenal glands
- ↑ adrenal androgens secretion

b) Gonadarche

- Earliest gonadal changes
- Ovaries and testes begin to grow
- ↑ production of sex hormones

c) Thelarche

- First stage of secondary breast development
- Usually noticed as a firm, tender lump directly under the center of the nipple (papilla & areolla)
- Referred as breast bud (Tanner stage 2)

d) Pubarche

- First appearance of the pubic hair
- Results from ↑ levels androgens from adrenal glands or testes

e) Menarche

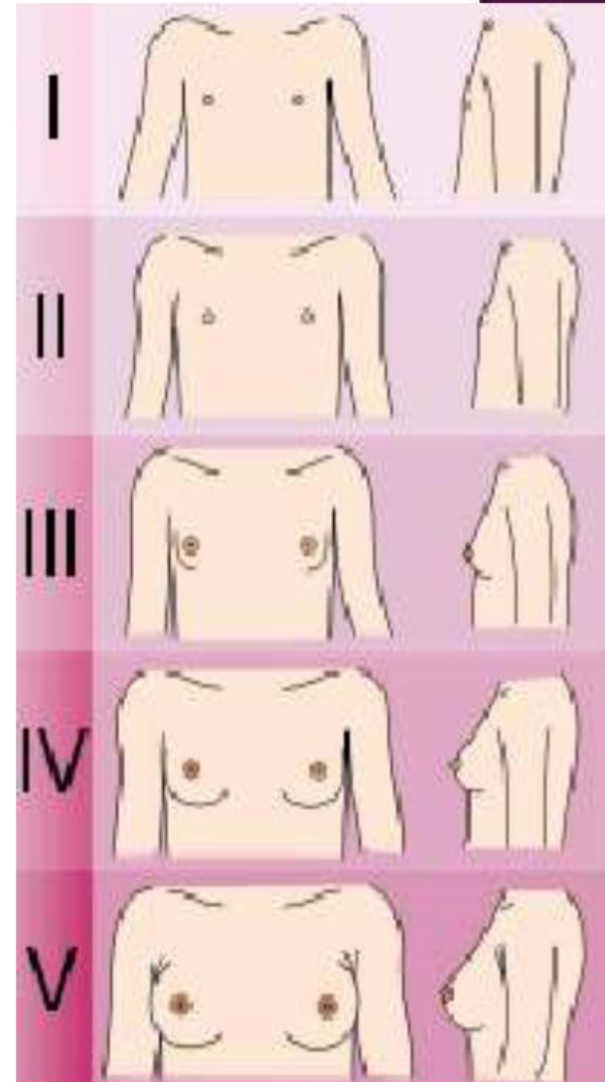
- First menstrual bleeding in females
- Possibility of fertility

TANNER STAGES

- ◉ Develop as a way to classify the time, course, and progress of changes that occur during puberty.
- ◉ Based upon attainment of secondary sex characteristics, which include genital development in males, breast development in females, and pubic hair development in both genders.

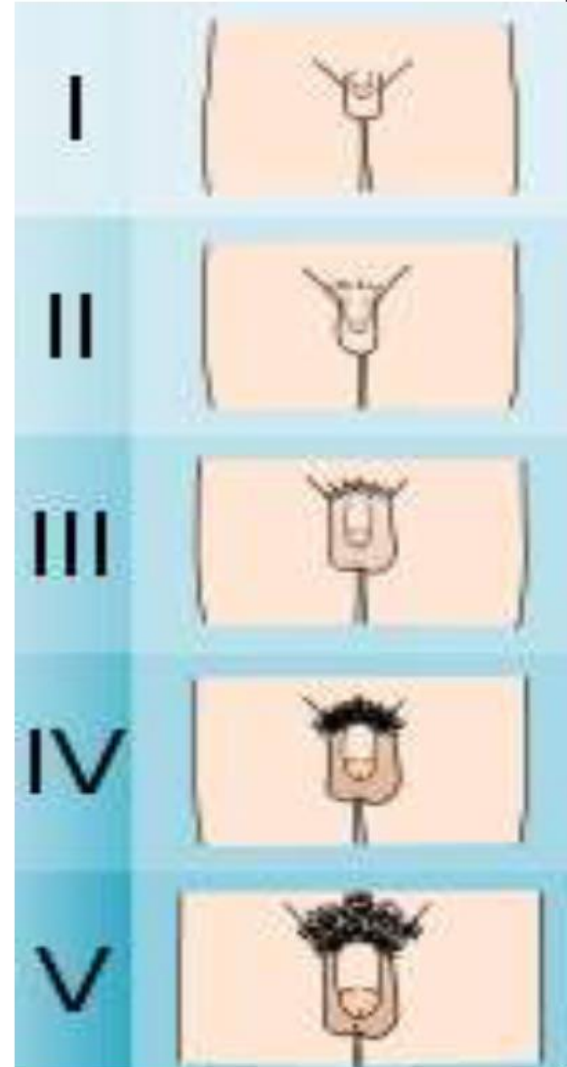
FEMALE: BREAST

Tanner Stages	Breast
1	Preadolescent. Elevation of the papilla only
2	-A small mound is formed by the elevation of the breast and papilla - Areolar diameter enlarges
3	Further enlargement of breast and areola.
4	Projection of the areola and papilla to form a secondary mound above the level of the breast
5	-Mature breast - Areola recessed to the general contour of the breast.



MALE: GENITALIA

Tanner Stages	Genitalia
1	-The penis , testes and scrotum are of childhood size
2	-Enlargement of scrotum and testes - Scrotal skin reddens
3	-Further growth of the testes and scrotum. -Enlargement of penis, mainly in length
4	-Further growth of the testes and scrotum. -Enlargement of penis, mainly in breadth
5	Adult genitalia



GROWTH

- Growth spurt / Peak height velocity
 - Female:
 - Happens in earlier stages of puberty
 - Average age: 12.1
 - Male:
 - Happens in later stages of puberty
 - Average age: 14.1
 - Boys have greater velocity at the maximum pubertal growth rate

OTHER CHANGES IN MALE

- ◉ Body and Facial hair
- ◉ Voice change
 - Same time as growth of penis
- ◉ Musculature and body shape
 - Heavier bones, nearly twice skeletal muscle
 - Muscle develops mainly during the later stages of puberty
- ◉ Body odor, sweat glands, sebaceous glands and acne
 - About the same time as facial and axillary hair growth

OTHER CHANGES IN FEMALE

- ◉ Vagina
 - Becomes thicker and duller pink in color
- ◉ Uterus, ovaries and follicles in the ovaries
 - Increase in size
- ◉ Menstrual and fertility
- ◉ Body shape and fat distribution
 - Pelvis and hip widen
 - More fat distributed to breasts, hips, buttocks, thighs, upper arm and pubis.
- ◉ Body odor and acne

HORMONAL CHANGES

- Increase in:
 - Testosterone
 - Estrogen
 - Prolactin
 - Growth Hormone
 - Insulin

- Puberty is the bridge between being a kid and becoming an adult. As you cross this bridge, your body and your feelings change a lot. You also may feel differently about your family, friends and classmates, and view the things that they do in whole new ways. You may feel like changing what you do with them, the way you dress and the things you talk about. These differences are called "social" and "behavioral" changes.

