

NORMAL PUBERTY

NORMAL PUBERTAL DEVELOPMENT

WHAT IS PUBERTY?

The transitional period of development during which an individual matures from childhood to sexual & reproductive maturity

Maturation of the 1^{ry} sexual chct ?

Hypothalamic Pituitary Ovarian Axis

Development of 2^{ry} sexual chct ?

- Sexual hair

- Breasts

- Genitalia

Dramatic growth spurt

Psychological changes □ mental & emotional maturity

NORMAL PUBERTAL DEVELOPMENT

➤ WHAT IS THE AGE OF ONSET OF PUBERTY?

-Females -----8-13

-Males -----9-14

➤ WHAT IS THE USUAL SEQUENCE OF SOMATIC CHANGES OF PUBERTY?

1-Beast development (mean 10.6 Y)

2-Pubic & axillary hair (11.2)

3-Maximal growth velocity (12)

onset of growth spurt (9.6)

4-Menarche (12.7)

➤ The average age of menarche has \square over the last 3-4 decades (secular trend) attributed to improved nutrition general health & life style

NORMAL PUBERTAL DEVELOPMENT

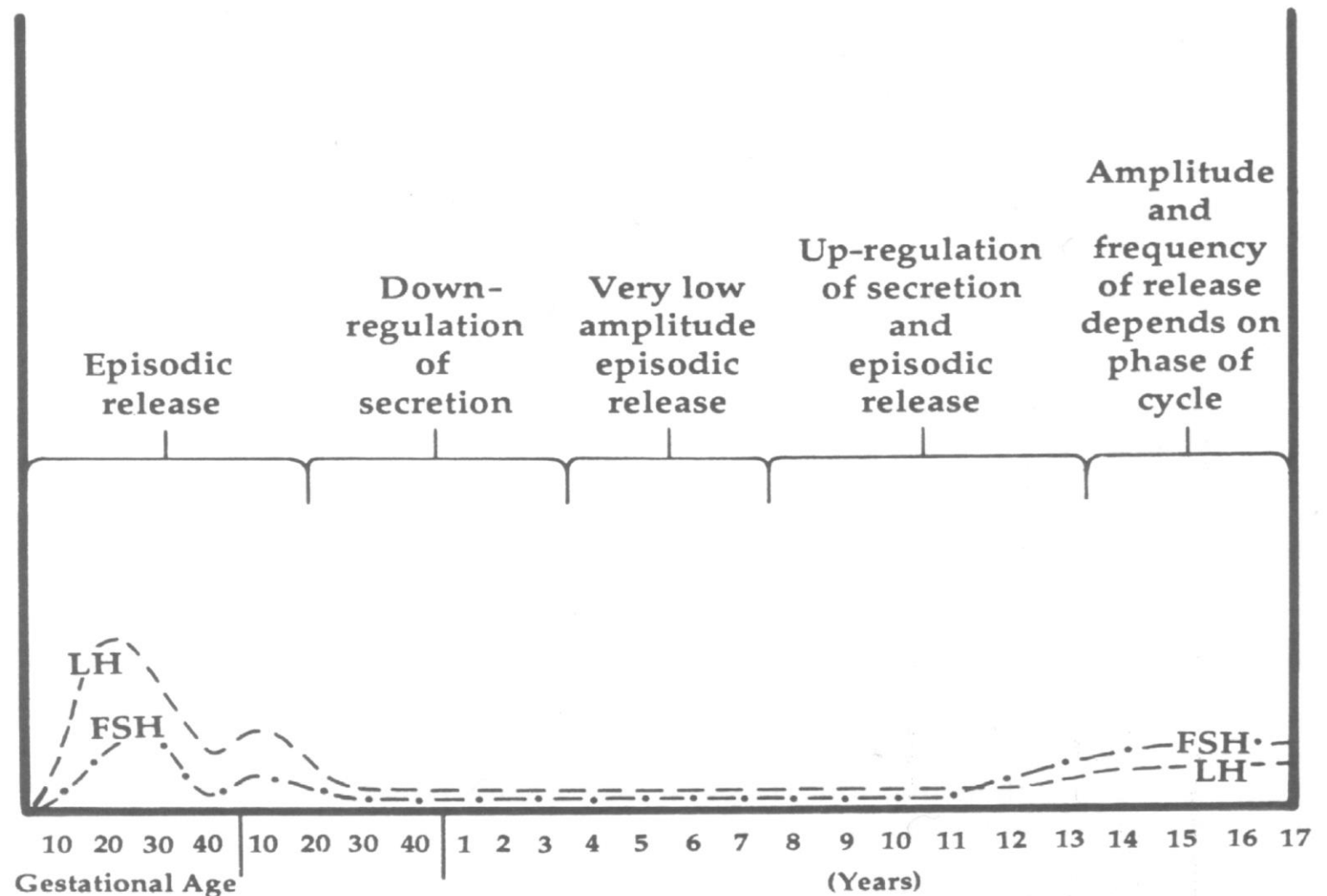
- WHAT IS THE INTERVAL BETWEEN ONSET OF BREAST DEVELOPMENT & MENARCHE?

2.3 +_1 years

- WHAT IS THE TIME FROM ONSET TO COMPLETION OF PUBERTY?

Average	4.2 Y
Range	1.5-6 Y

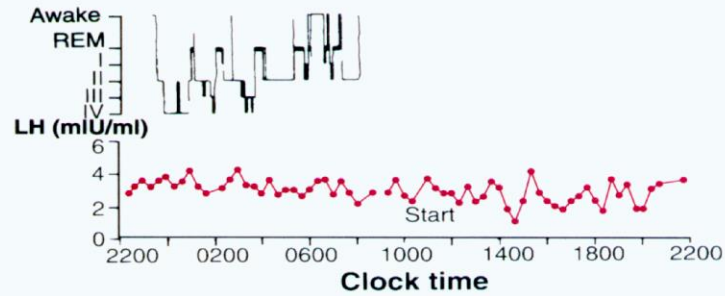
LEVELS OF LH & FSH DURING FETAL LIFE, INFANCY CHILDHOOD & PUBERTY



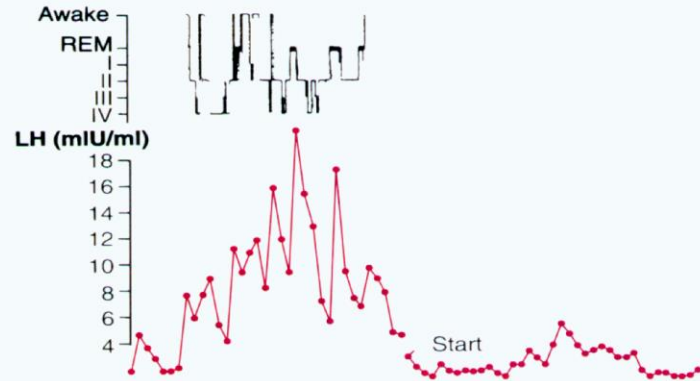
Age

PLASMA LH CONC MEASURED EVERY 20 MIN FOR 24 HRS

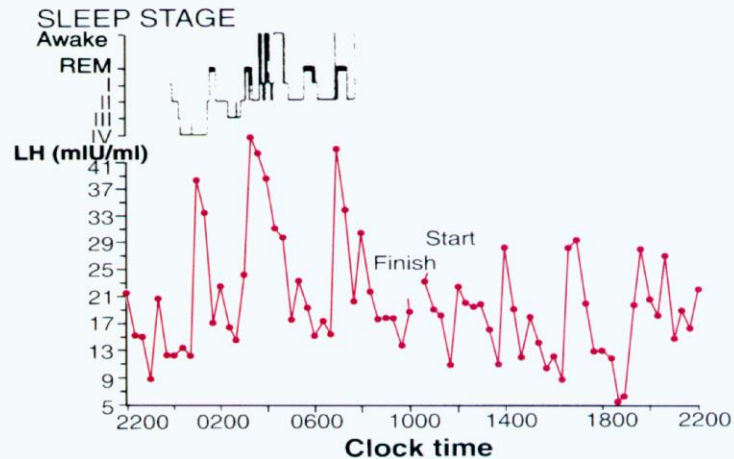
1-PREPUBERTAL



2-EARLY PUBERTAL



3-LATE PUBERTAL



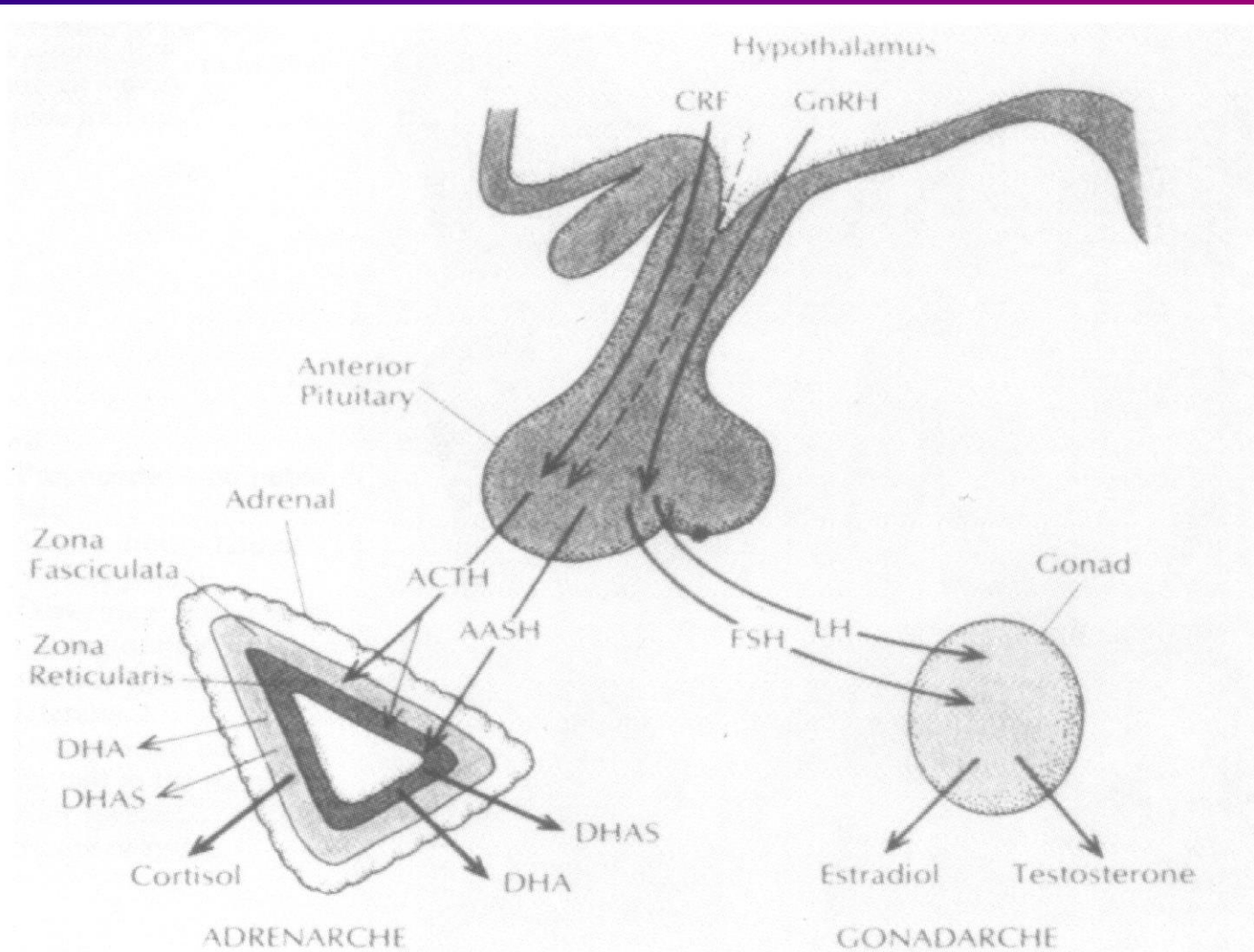
ADRENARCHE

- The maturational □ in adrenal androgen secretion
- DHEA , DHEAS, AND
 - development of pubic & axillary hair
 - adult type body odor
 - acne
 - oily skin & hair
- Adrenal androgens □□ bone age & linear growth
- Premature adrenarche □ □ adult height

GONADARCHE

- The onset of pubertal gonadal activity due to reactivation of HPO axis □ □□ gonadotropin pulses □ sustained follicular development □ ↑↑ estrogen production □ proliferation of the endometrium until □ it outgrows the estrogen capacity to maintain it or □ the follicle undergo atresia □ □ estrogen □ **MENARCHE**
- Anovulatory cycles occur during the first 6-18 M—4Y
- Ovulatory menstrual cycles requires further maturation of the HPO axis □ development of the +ve feedback mechanism

ADRENARCHE & GONADARCHE CONTROLLED BY DIFFERENT MECHANISMS



Pubertal development involves two temporally associated processes: adrenarche and gonadarche. The

PHYSICAL EVENTS OF PUBERTY

1-Maturation of the genital organs

Uterus , Ovaries, Vagina, External genitalia

2-Breast development

3-Pubic hair development

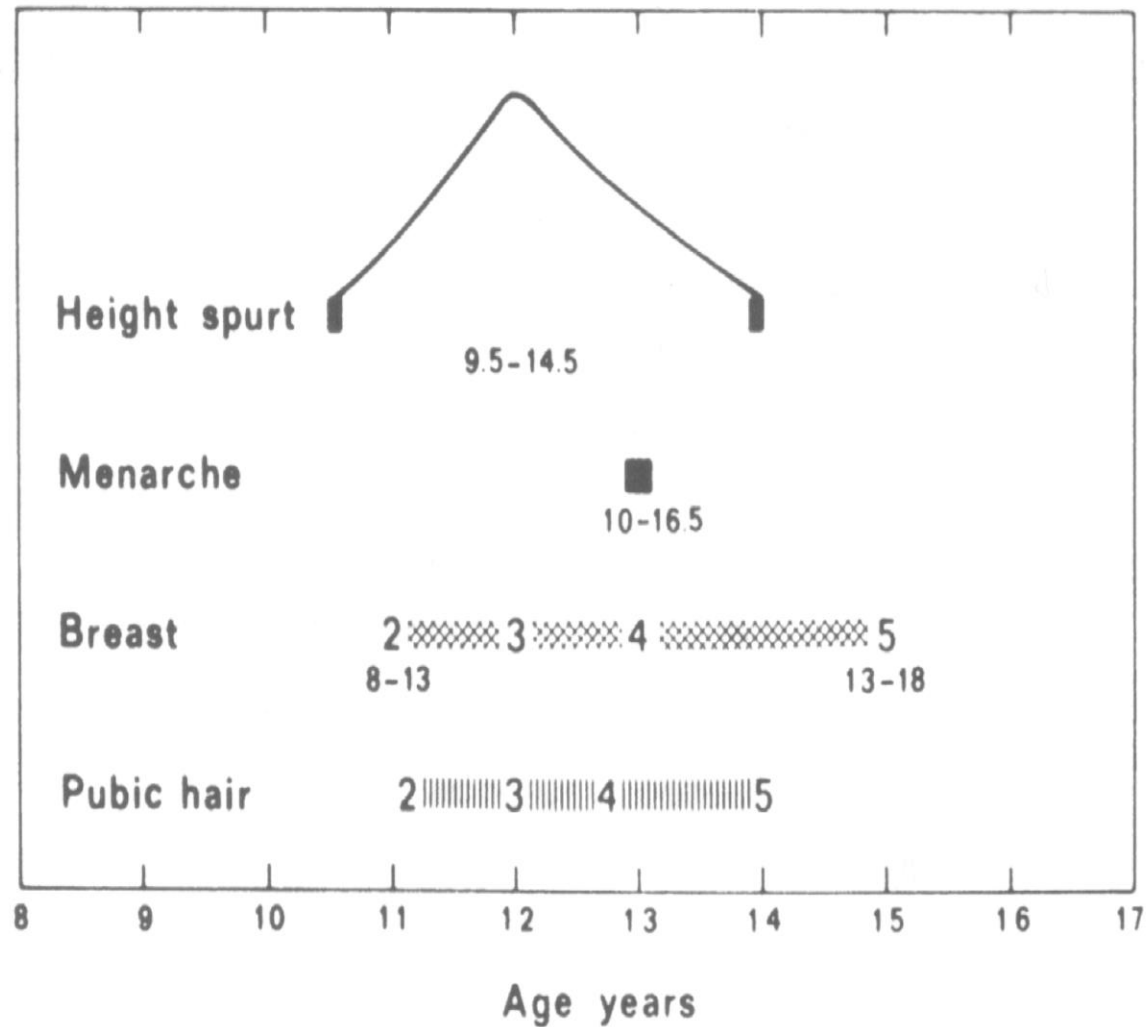
4-Growth spurt □ Dependent on mainly on estrogen & growth hormone

Estrogen has □ direct anabolic effect

□ □ growth hormone & □ insulin like growth factors

- The onset of growth spurt antedates thelarche & pubarche
- □ Ht --onset of growth spurt --cessation of growth □ 25 cm
- Girls who start the growth spurt early □ shorter adult Ht
- Peak Height Velocity 8.1 cm/year (pre- puberty 3-6 cm/y)

AGES OF GIRLS AT VARIOUS STAGES OF PUBERTAL DEVELOPMENT



TANNER STAGING OF BREAST DEVELOPMENT

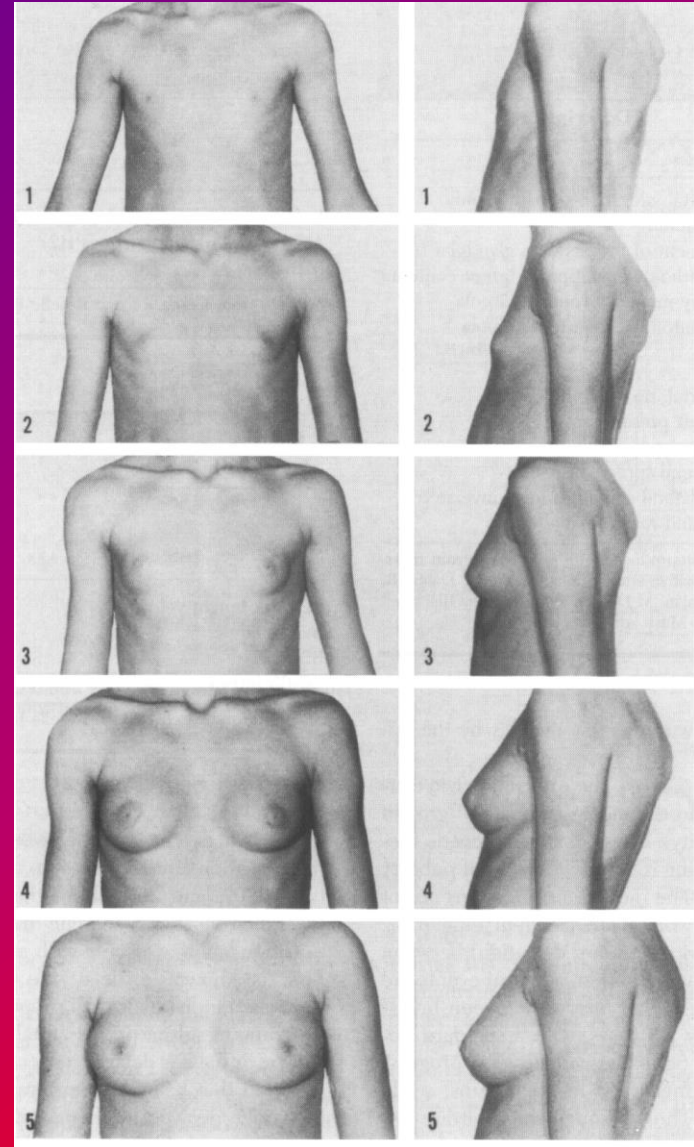
Stage 1 : Prepubertal

Stage 2 : Breast bud

Stage 3 : Enlargement of breast &
areola

Stage 4 : Areola & nipple form
a mound atop breast
tissue

Stage 5 : Adult configuration
areola & breast having
smooth contour



TANNER STAGING OF PUBIC HAIR DEVELOPMENT

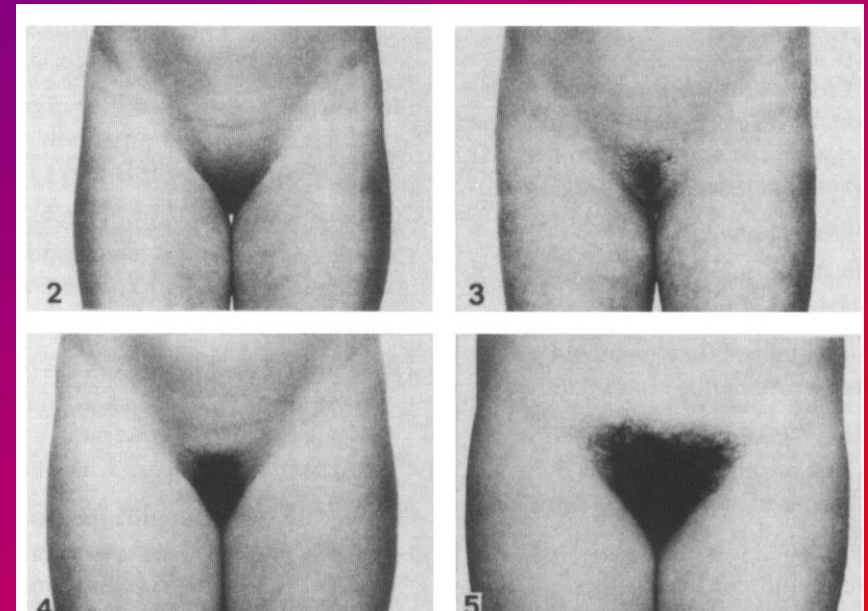
Stage 1 : No pubic hair

Stage 2 : Sparse downy hair on
the medial aspect of the
labia majora

Stage 3 : Darkening, coarsening
& curling of hair which
extends upwards &
laterally

Stage 4 : Hair of adult consistency
limited to the mons

Stage 5 : Hair spreads to medial
aspect of thighs



GROWTH RATE VERSUS AGE IN GIRLS

