

Adolescence

Adolescence is a transitional phase of life when an individual is no longer a child but is not yet an adult. According to the WHO definition, an adolescent is a person between the age 10-19. The legislation then defines adolescence as the period from the end of primary school to the end of vocational training (approximately 14-19 years).

General characteristics

This period is critical and risky. **Immune changes** are mainly in cellular immunity, when there is a physiological involution of the immune system (nodes, RES). Common somatic adaptation difficulties:

- orthopedic in rapid growth;
- **vegetative dystonia**: hypotension, change of pulse during lying / verticalization by 20 pulses, redness, cold hands, ECG syndrome of early depolarization over the middle precordium (oblique elevation of ST).

Grow:

- up to 10 years: 4-6 cm / year;
- at puberty: girls 9-11 cm / year (maximum at 13 years), boys 10-12 cm / year (maximum at 15 years). When a 15-year-old patient comes to the surgery, we are interested in Tanner, height and weight. We observe the menarchal metacarpus, which is the ossification of the 4th metacarpus in girls, preceded by menarche. If puberty is delayed, we look for a family history, comparing bone age. **The most common chronic diseases** in adolescence: orthopedic disorders, sensory (eye) defects, skin diseases (acne), immune and allergic diseases, obesity.

Mental development:

- in the emotional sphere - emotional instability, emotions often negative, suggestiveness;
- in the intellectual sphere - development of intellectual abilities and creative thinking (culminating in 25 years);
- in the social sphere - the influence of peers is growing (crisis of the given authority), emancipation from the family.

Psychosocial issues:

- tasks - to create an identity, a system of values; future career; relationships with the opposite sex.

Biological issues

Rapid body growth places great demands on nutrient requirements (especially the micronutrient component is often not covered by food). Zinc, I, Fe, Mg, Ca, Se, vitamins C, A, B2 are common. New hormonal conditions are given by the growth and maturation of the gonads. The immune system is changing. Lifestyle changes are also common.

The beginning of pubertal development

Iron

Puberty is a hormonally conditioned process of physiological maturation and growth rate.

By adolescence we mean the process of psychosocial maturation. According to arbitrary criteria, it is terminated when the individual is able to reproduce (in women the first ovulation, in men the onset of spermatogenesis).

Major physical changes in puberty:

- development of secondary sexual characteristics;
- complete maturation and induction of adult adrenal function, ovaries or testes;
- achieving adult skeletal, muscle, adipose tissue development.

Pubertal development (including growth) is ensured by 2 main axes:

- axis hypothalamus - growth hormone - IGF-I (in puberty, the secretion of GTH and IGF is the largest in all human life);
- axis hypothalamus - pituitary - gonads.

Adrenarche - activation of the adrenal glands, zona reticularis grows, enzymes are activated and androgen production begins. It contributes to body odor, hair development and growth stimulation. Adrenarche begins before gonadarche.

Gonadarché - initiated by the activation of the axis in the hypothalamus; FSH and LH begin to be produced (initially only in night pulses).

Puberty in boys

Tanner's scale for boys Throughout puberty, muscle grows and the skeleton is modeled, the shoulders expand. Pubertal growth rate usually begins at 12.5 years, the peak is at 14 years, when the growth rate is around 7-12 centimeters per year. Girls start two years earlier, so girls are on average taller than boys of the same age during this period.

Hormones stop bone growth - growth stops in boys between the ages of 17 and 18.

Growth of the testicles and penis

Puberty in boys is an interplay of hormones such as androgens, growth hormone (with IGF) and testosterone (from Leydig cells). The first sign of adolescence is **activation and enlargement of the testicles** (usually before the age of 10). Before puberty, their volume reaches up to 3 ml, at the beginning of puberty they grow to 4 ml and more. Furthermore, the scrotal bag darkens and thins. Penis enlargement follows and pubic hair appears.

The testes gradually increase approximately tenfold (to 15-25 ml). We measure their volume with a **Prader orchidometer** (beads - the size of the bead is palpated with a testicle). The penis lengthens more than twice - from 6.2 cm to 13.2 (range is 7.5-15.5 cm).

In the third phase of puberty, the voice mutates due to **laryngeal growth**. The activity of the sebaceous and sweat glands also increases and typical acne develops. 70% of boys have mild gynecomastia.

Secondary sexual characteristics are evaluated according to the **Tanner scale**:

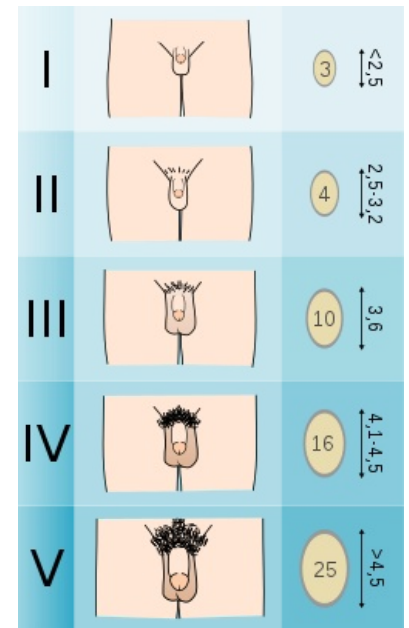
G1 - preadolescent tests;

G2 - enlarging testes and scrotum;

G3 - penis enlargement (mainly in length);

G4 - penis enlargement (mainly in width), development of glans penis;

G5 - genitals of adult size and shape.



Tanner's scale for boys

Puberty in girls

The aspect is most noticeable in the development of breasts and pubic hair and redistribution of body fat. The first external manifestation is breast growth (the so-called stage of the breast bud). It is the first manifestation of the action of estrogens on peripheral tissues, beginning between 8 and 13 years.

Growth rate is also quite an initial symptom (signs as early as 10 years).

Pubic hair usually does not appear until after the breast bud, around the age of 11, but in a third of girls it is preceded by it.

Breast growth is initially due to the lengthening and thickening of the glands due to estrogens. After ovulation, the corpus luteum produces progesterone, which causes the formation of lobes and further enlarges the breasts.

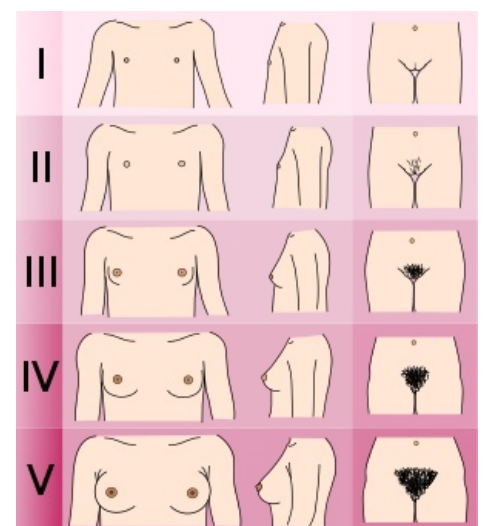
Menarchy in girls in our conditions begins on average at 13 years (2 years after the onset of breast development). The breasts are well developed at that time (M4) and the hair is advanced (P3 - P4).

The first two years after menarche are 50-90% of anovulatory cycles. The pelvis continues to grow, the amount of subcutaneous fat increases. After menarche, the girl will grow an average of 7.5 cm (2.5-17.5 cm). Girls' growth usually ends at the age of 15.

Tanner scale:

- Breast rating: M1 - preadolescent mamma puetilis; M2 - bud stage; M3 - yard enlargement and elevation; M4 - nipple and areola protrude above breast level; M5 - mature stage.

Evaluation of pubic hair (also applies to boys): P1 - preadolescent, no hair; P2 - slight growth of long, weakly



Tanner's scale for girls

pigmented fluff, straight or slightly wavy, mainly at the root of the penis or along the labia; P3 - darker, coarser and more wavy hair, spreading sparsely across the symphysis; P4 - hair type of adult type, but the area of hair is smaller than in adulthood; P5 - adult hair.

Personality development in adolescence

According to Piaget, at the age of 12 the **ability of so-called formal operations arises**, when the child begins to think in the abstract, fully understands the relationship between cause and effect, egocentrism recedes into the background and the adolescent perceives the opinion of another person. However, few adolescents reach this state, most of them are rigid and egocentric, they do not know the future consequences of current action, they often respond in one word, they do not know how to discuss the problem.

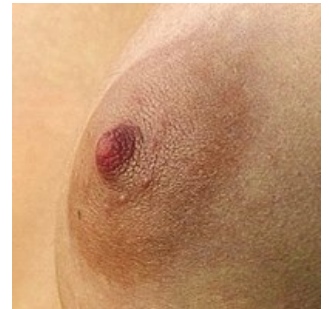
Abstract thinking follows and the **process of introspection** begins, when they think about their own thinking and tend to be proud of them, they tend to overlook others (especially adults).

In the next phase, the adolescent begins to think about morality, **the importance of norms of behavior increases**.

If the adolescent is not successful in school, he is looking for another environment where he could be recognized (often different parties).

At the end of adolescence - **adult norms of behavior** - they create their own moral principles, judge the good and the bad, the rigidity of thinking is replaced by flexibility, control of their own actions.

Certain individuals will never reach psychosocial maturity.



Nipple and areola of a 19 year old girl

Links

related articles

- Newborn • Infant • Toddler • Preschooler • Schoolboy
- Puberty • Praycox pubertas • Tarda pubertas

Source

BENEŠ, Jiří. Study materials [online]. © 2007. [feeling. 2009]. <<http://www.jirben.wz.cz/>>.

literature

- HRODEK, O and J VAVŘINEC, et al. Pediatrics. 1st edition. Prague: Galén, 2002. 767 pp. ISBN 80-7262-178-5.
- ŠAŠINKA, M, et al. Pediatrics, vol. I and II. 1st edition. Košice: Satus, 1998. ISBN 80-967963-0-5.
- LEBL, J, K. PROVAZNÍK and L. HEJCMANOVÁ, et al. Preclinical pediatrics. 1st edition. Prague: Galén, 2003. 248 pp. ISBN 80-7262-207-2.