

Child growth and development

- We describe **physical development** (height, proportionality, maturity of the system...) and neurological development (gross motor, fine motor, cognitive development, speech).

Length/height

- up to two years we talk about length, from two years about height
- from 3 years to puberty, the child should grow 5-7 cm per year

Mass

- average birth weight (PH): 3500 g (then 10% weight loss); doubling of PH - in the 4th-5th months; tripling of PH - in 1 year (approx. 10.5 kg);
- toddlers, preschoolers and school children should have 2kg annual gain.

age	height/height	weight	head circumference
at birth	50 cm	3,5 kg (PH)	34 cm
6 months			43 cm
1 year	75 cm	10,5 kg (3×PH)	47 cm
2 years	87 cm (½ dospělé výšky)	13 kg (4×PH)	
3 years	96 cm		50 cm
3,5 years	100 cm		
5 years	110 cm	20 kg	
10 years	140 cm	30 kg	53 cm
18 years	167,3 cm (girl), 180,2 cm (boy) ^[1]		56 cm

Proportionality of growth

- **Head/trunk ratio:** newborn 1/4, adult 1/8.
- **proportion of muscle mass:** 22% at 3 months, 35% at 3 years, 40% adult male
- Power consumption:
 - infant: 40% energy for growth (110 kcal/kg per day);
 - toddler: 3% energy for growth (60-90 kcal/kg per day).

Periodization of child growth

- The human growth pattern is referred to as „**sandwich**“ pattern, because between the period of rapid postnatal growth and the pubertal spurt there is a period of quiet growth (childhood; 2 to 11 years of life), unlike in other biological species.
- **ICP growth model according to Karlberg:**
 - component I (infancy), infantile component of growth - from the 2nd half of intrauterine development to the 3rd to 4th year of life; mainly IGF-I is applied;
 - component C (childhood), the children's component of growth - begins before the end of the 1st year of life and lasts until the end of physical growth; dominant influence of growth hormone and persistent action of IGF-I;
 - component P (puberty), pubertal component of growth - phase of additional growth induced by puberty; it accelerates until the age of the highest growth rate, it slows down until the end of growth; influence of sex hormones. ^[2]
- Humans grow relatively slowly (compared to other mammals) - in most mammals, a period of rapid postnatal growth is followed by a pubertal spurt and sexual maturity. In addition, a person has a period of quiet growth between these periods - childhood (specificity of a person).

Brain development

- Replication of neurons completed before birth, but their organization continues long after birth.
- White brain matter and synapses increase.
- Gray matter develops relatively late - it grows from the 30th week of gestation and ends in the 1st year, therefore it is relatively sensitive to damage in late gestation and perinatally.
- Myelination begins in the 4th month of gestation in the spinal cord, in the last trimester and in the brain;
 - at birth, myelination of autonomic nerves, cranial nerves (except optic and olfactory) is complete
 - the cortex and connections to the thalamus and BG are incompletely myelinated (here, myelination ends

within 2 years).

Speech development

- the first stage is nonverbal
- from 2 months, communication begins to be vocalized – mutual vocal play;
- 6-10 months - the child begins to better control the oral muscles, begins to babble and repeat syllables without a specific meaning;
- at 12 months begins to have a need to use specific words to refer to objects and activities;
- at 18 months can speak about 20-50 words;
- attention – speech development can be delayed by frequent otitis media with conductive hearing impairment;
- understanding develops faster than expressive ability;
 - the child understands the first words already at 9 months;
 - can understand 20-100 words at 13 months;
- at the end of the 2nd year, the child begins to put words into sentences.

Assessment of body growth

- The basic tool for assessment is **the percentile chart** of body height;
 - the basis for compiling percentile graphs is national reference studies;
 - we thus evaluate the degree of difference from the norm;
 - 94% of the population lies between the 3rd and 97th percentiles;
 - medium height – between 25-75 percentile (50% of the population);
 - great height – above 75th percentile;
 - very high height – over 97th percentile..
- The assessment includes **an assessment of the child's genetic growth potential** ; dítěte;
 - we draw on the right edge of the percentile graph;
 - for boys – the body height of the father (point O), the body height of the mother increased by 13 cm (point M);
 - for girls – mother's body height (point M), father's height minus 13 cm (point O);
 - the middle between these values is the average expected adult height, with a range of 8.5 cm;
- With repeated measurements, we can calculate **the growth rate in cm/year**;
 - it changes depending on age and gender - we evaluate it from the percentile chart.
 - children from the age of two are correctly measure with **a stadiometr** attached to the wall - on the stadiometer scale there is a moving head that touches the vertex of the head (or have a giraffe there);
 - children under two years old are measured using the so-called **body meter** („trough“) – we determine length.

Development of teeth

- Milk teeth
 - eruption – on the mandible 5–7 month, on the maxilla 6–8 Moon;
 - exfoliation – mandible 6.–7. year, maxilla 7–8 year;
 - eruption of all milk teeth should be within 3 years of life;
 - we indicate a dental examination when not a single tooth has erupted within 13 months.
- Permanent dentition
 - lower incisor – 6.–7. year (mandibula), 7.–8. year (maxilla);
 - second molar – 12.–13. year (mandibula).

Links

Related articles

- Child age distribuion
- Child psychomotorical development
- Child growth disorders

External links

- Růstové grafy (Státní zdravotní ústav) (<http://www.szu.cz/publikace/data/rustove-grafy>)

Sources

- BENEŠ, Jiří. *study material* [online]. ©2007. [cit. 2009]. <<http://www.jirben.wz.cz/>>.

Literature

- LEBL, Jan – PROVAZNÍK, Kamil – HEJCMANOVÁ, Ludmila. *Preklinická pediatrie*. 2. edition. Galén, 2007. ISBN 978-80-7262-438-6.

- 1.
- 2.