Physical examination of musculosceletal system in children

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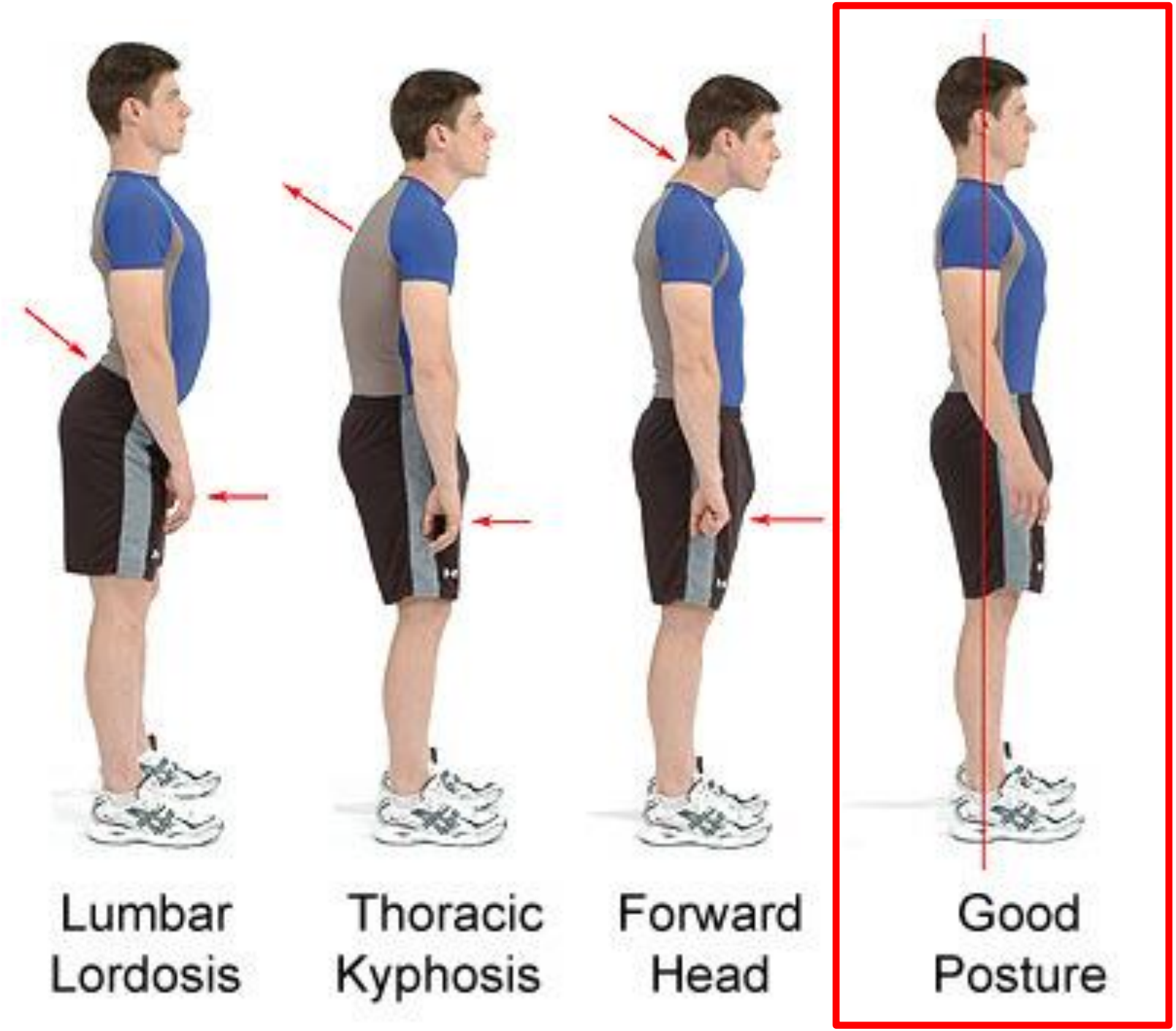
Sceletal system

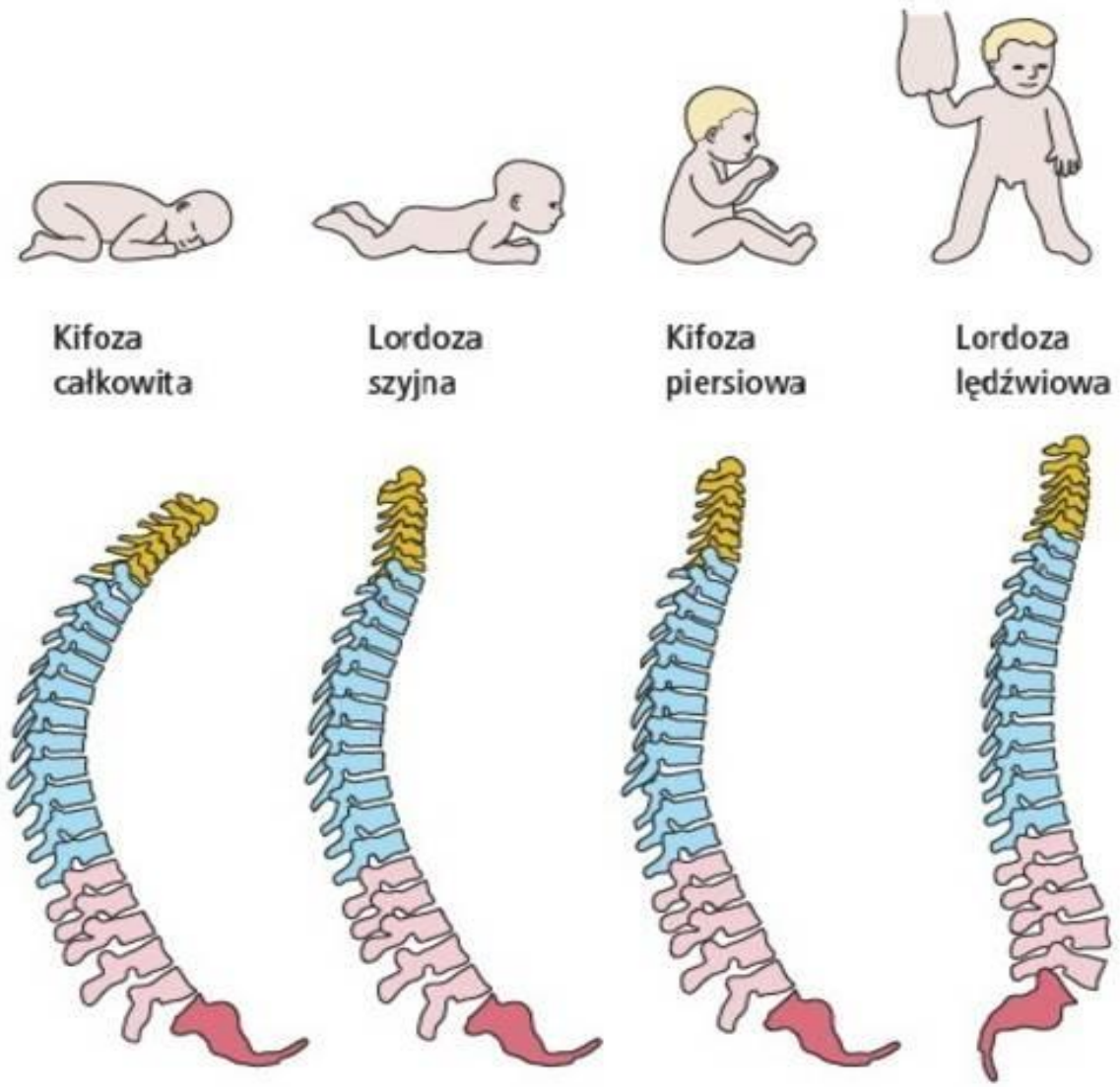
Inspection/ Watching

1. **Posture:**

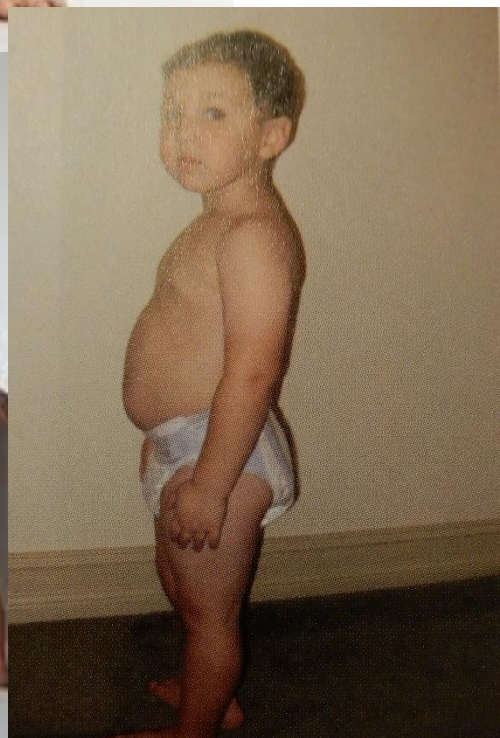
- Position of the head
- Position of the shoulders
- Position of the pelvis
- Shape of the chest
- Physiological curves of the spine (normal ranges for age!)
- Skoliosis?
- Position of kness and feet
- Proportion of the body parts


Lumbar Lordosis
Thoracic Kyphosis
Forward Head
Good Posture

Physiological curves of the spine -SAGGITAL PLANE



Is this posture normal in children?



Posture of the child- anatomy

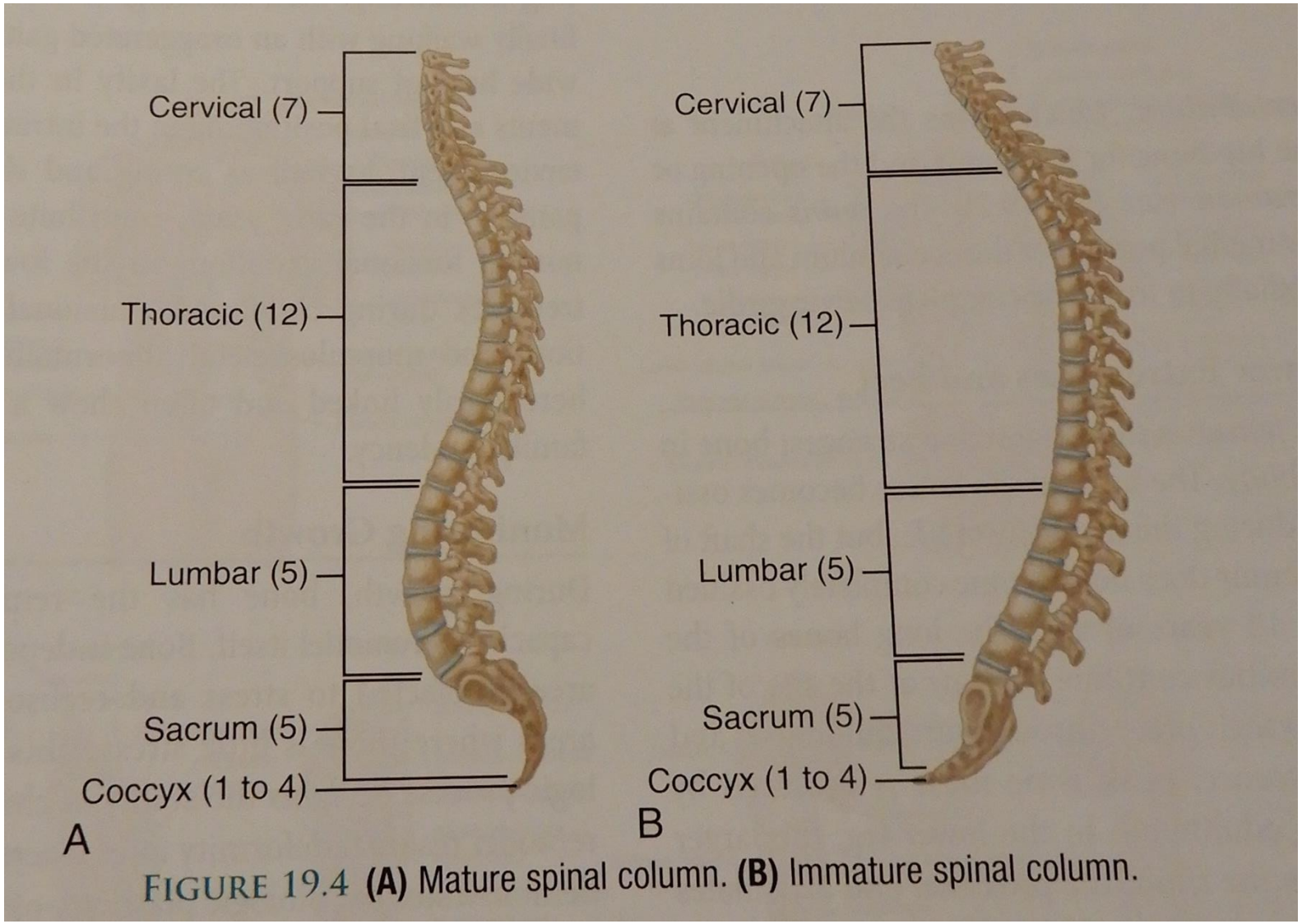
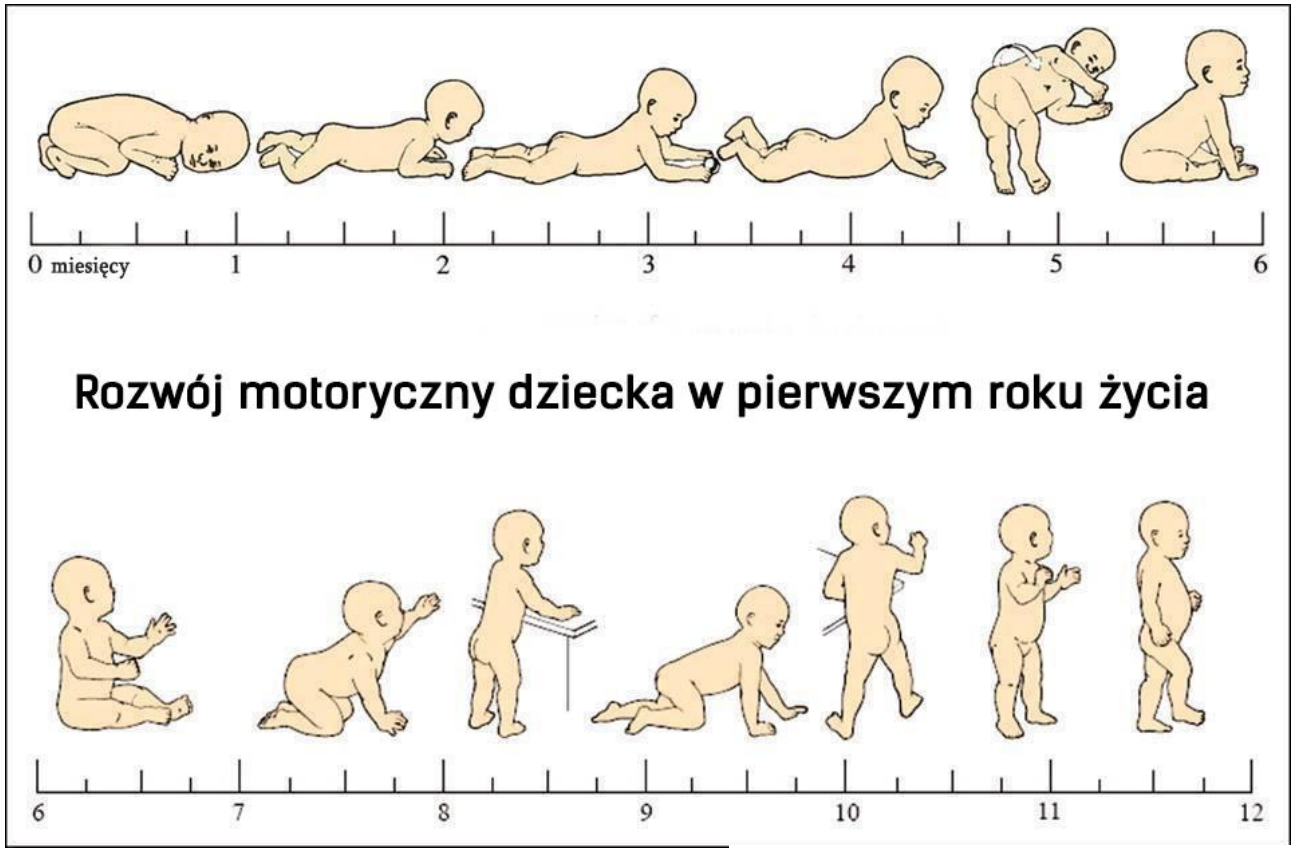
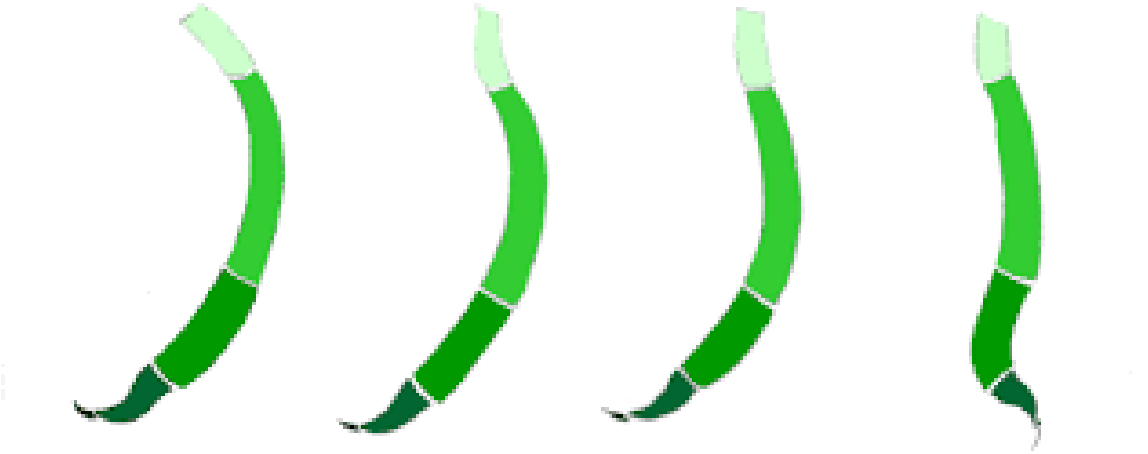


FIGURE 19.4 **(A)** Mature spinal column. **(B)** Immature spinal column.

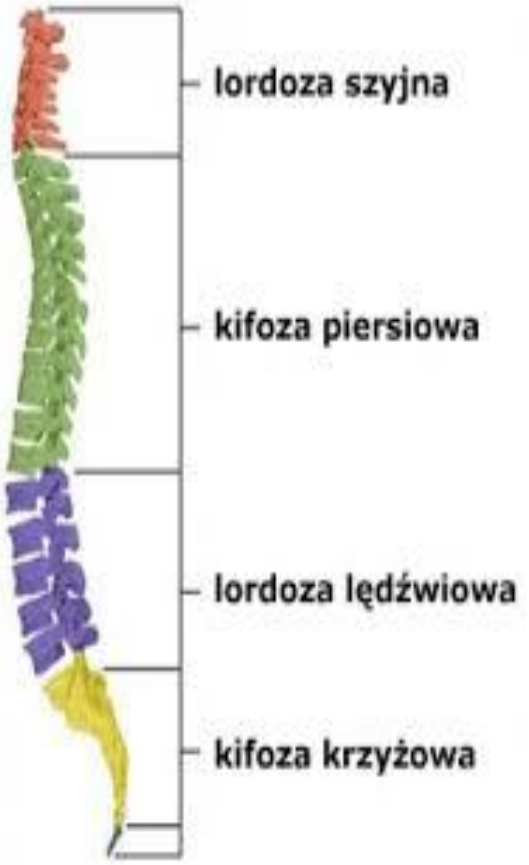


Rozwój motoryczny dziecka w pierwszym roku życia



Physiological curves of the spine SUMMARY

- **Cervical lordosis** – begins to form when a head in kept upright , formed- 6/7 years of age
- **Thoracic kyphosis**– formed 6/7 years of age
- **Lumbar lordois**– begins to form whith the chils's first steps, formed- teenagers
- **Sacral kyphosis**



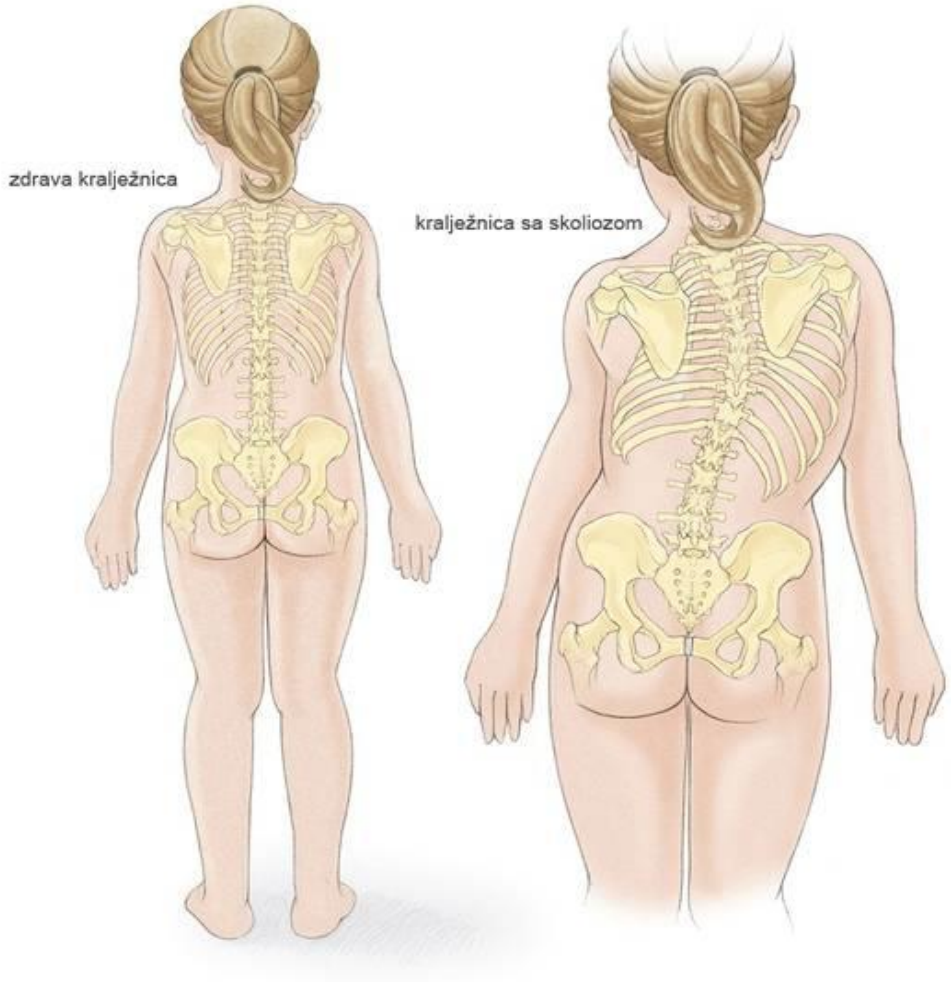
Pathological kyphosis

Scheuermann's disease

- is considered to be a form of juvenile osteochondrosis of the spine
- is found mostly in teenagers
- uneven growth of vertebrae results in the signature "wedging" shape of the vertebrae, causing kyphosis

Examination of the spine

TRANSVERSE PLANE

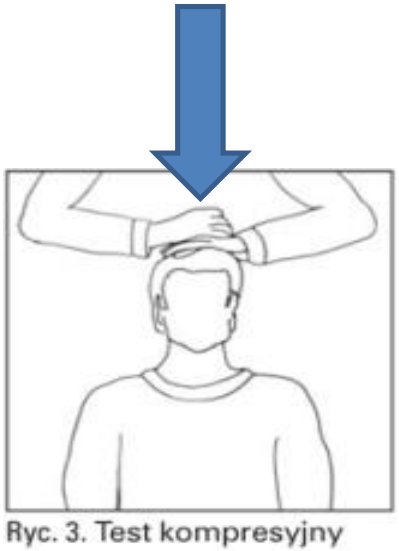


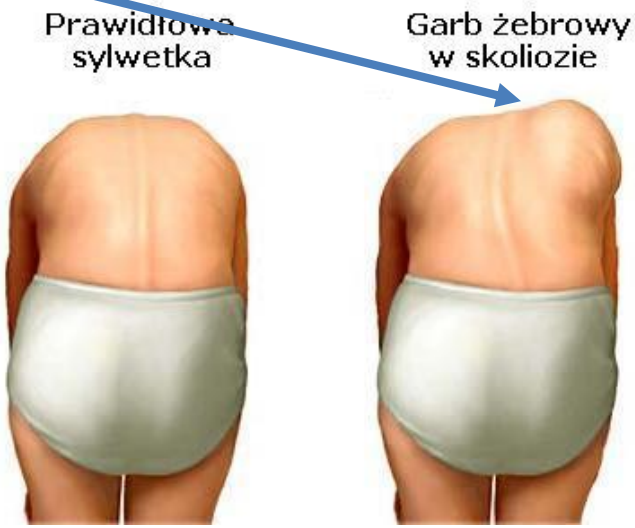
Inspection of the spine

Looking

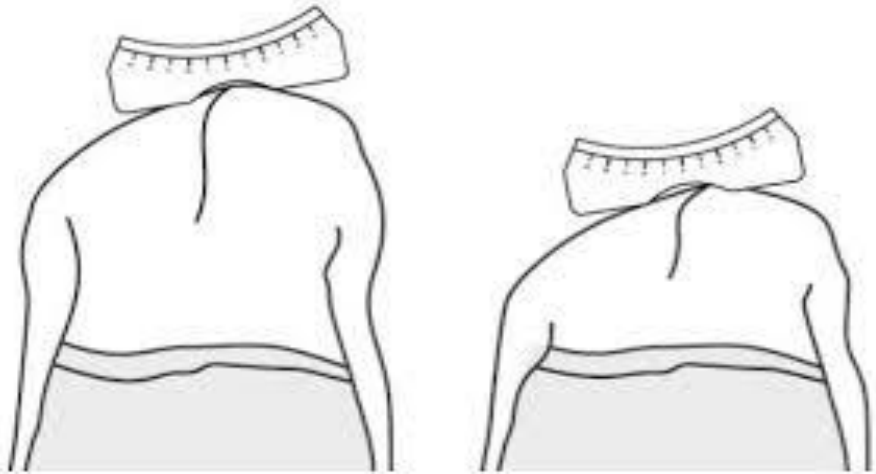
- Shape
  - ❖ Physiological curves
  - ❖ Scoliosis
  - ❖ Adam's test
- Movements (active & passive)

- Palpation
- Percussion
- Axial compression (pain?)


Ryc. 3. Test kompresyjny

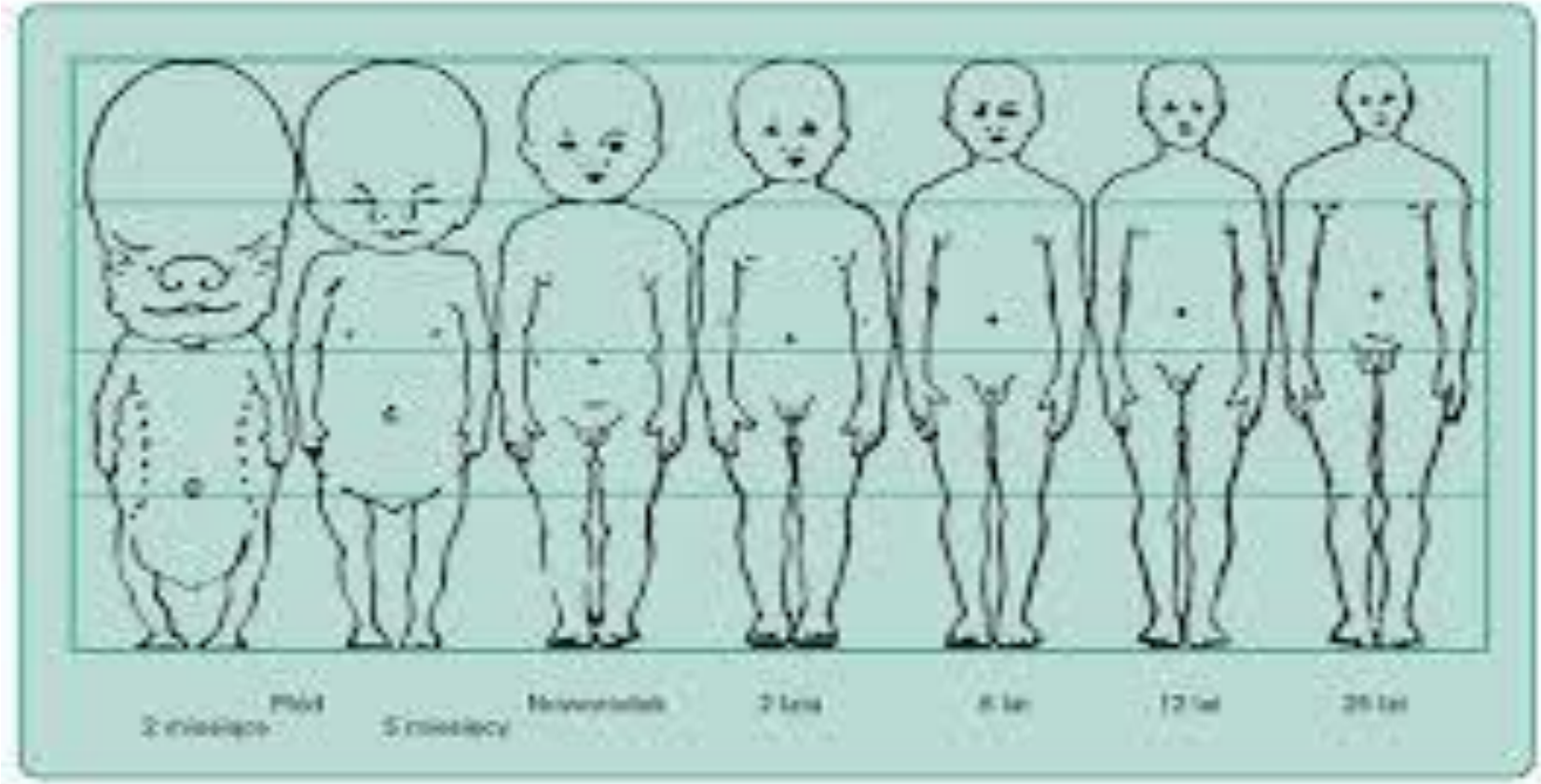


Scoliosis



Proportions

Proportion of the body parts

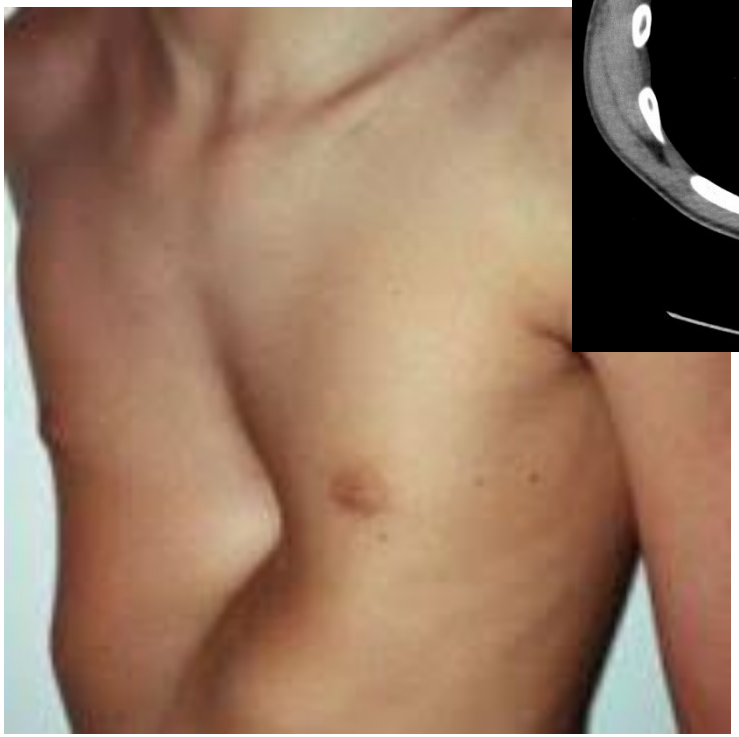


Achondroplasia in children

- is the most common form of **short stature** (dwarfism)- 70 %
- is linked to a mutation in the fibroblast growth factor receptor-3
- autosomal dominant
- **a long and narrow trunk, shortening of the proximal segments of limbs, large head, mid-face hypoplasia and joint hyperextension**

Chest

Chest



Pectus excavatum

- structural deformity of the anterior thoracic wall in which the sternum and rib cage are shaped abnormally
- caved-in or sunken appearance of the chest
- can either be present at birth or develop after puberty

Chest

Pectus cariantum (also called pigeon chest)

malformation of the chest characterized by a protrusion of the sternum and ribs

Extremities

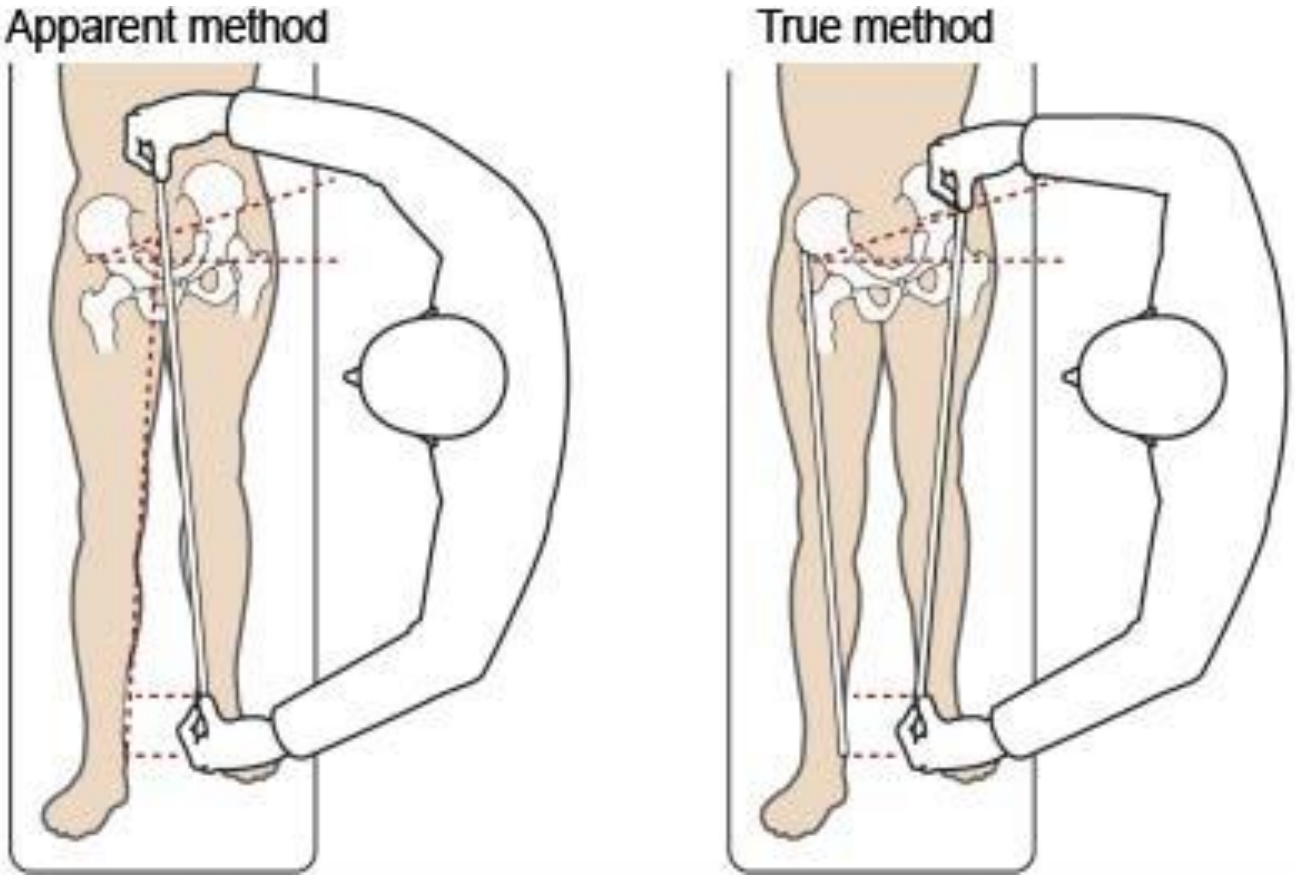
Extremities/ Limbs

Looking

- symmetry
- shape
- length
- proportion

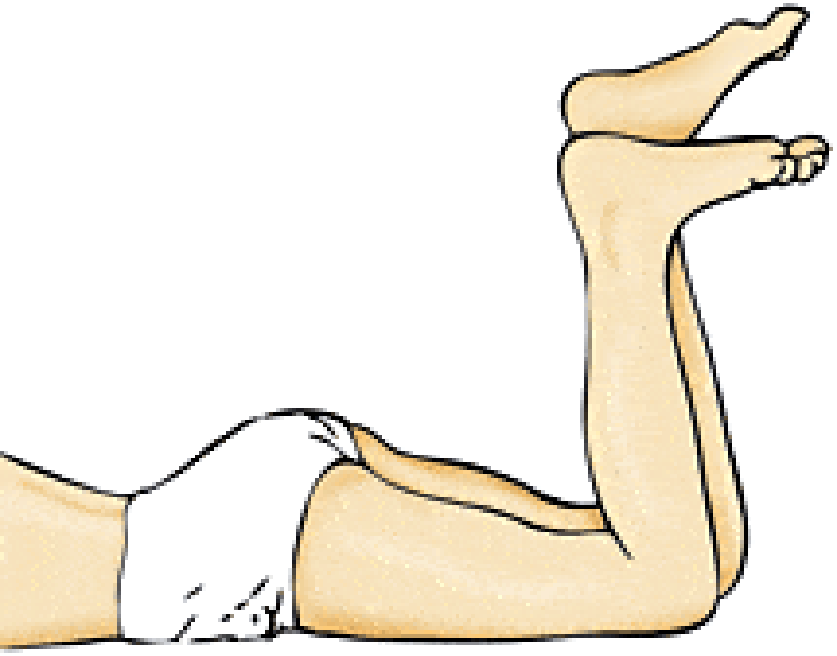
Palpation

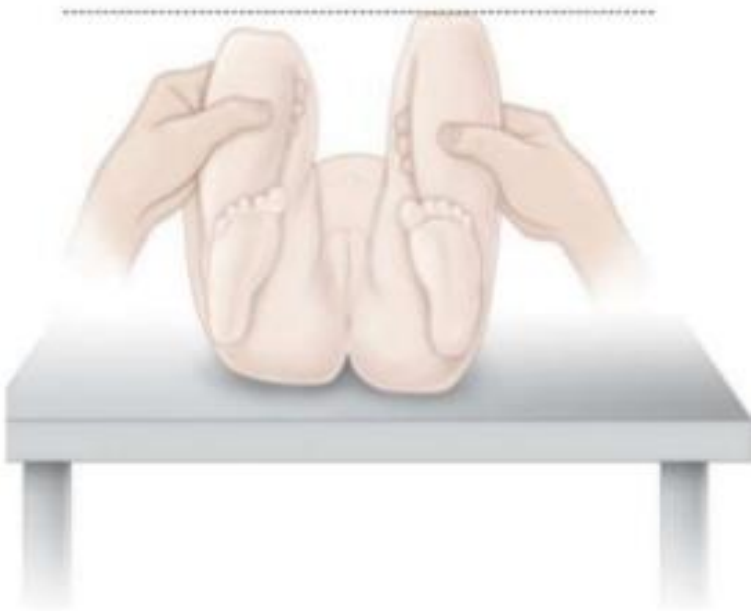
- Funtion
- pain



Length of the lower extremities is measured from **superior anterior iliac spine** do **medial malleous**

Pathological- if diameters > 1 cm



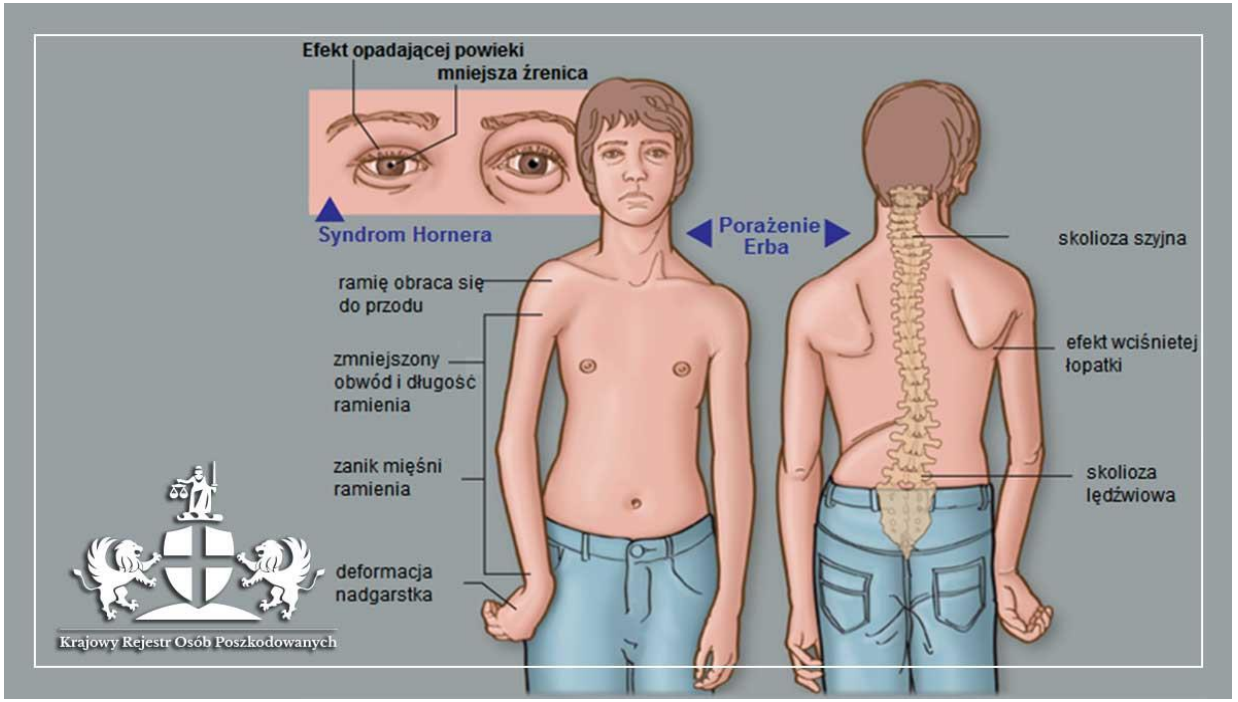


Causes of the shorter limbs:

- **Congenital malformation** of the limbs (abnormalities of the bones or/ and joints)
- **Diseases of epiphysis** of the bone
- **Hip dysplasia**
- **Hip dyslocation**
- **Inflammatory** (after osteitis)
- **Injuries** (bad bone union, damage of growth cartlilage)

Erb’s palsy

Mechanical damage of brachial plexus



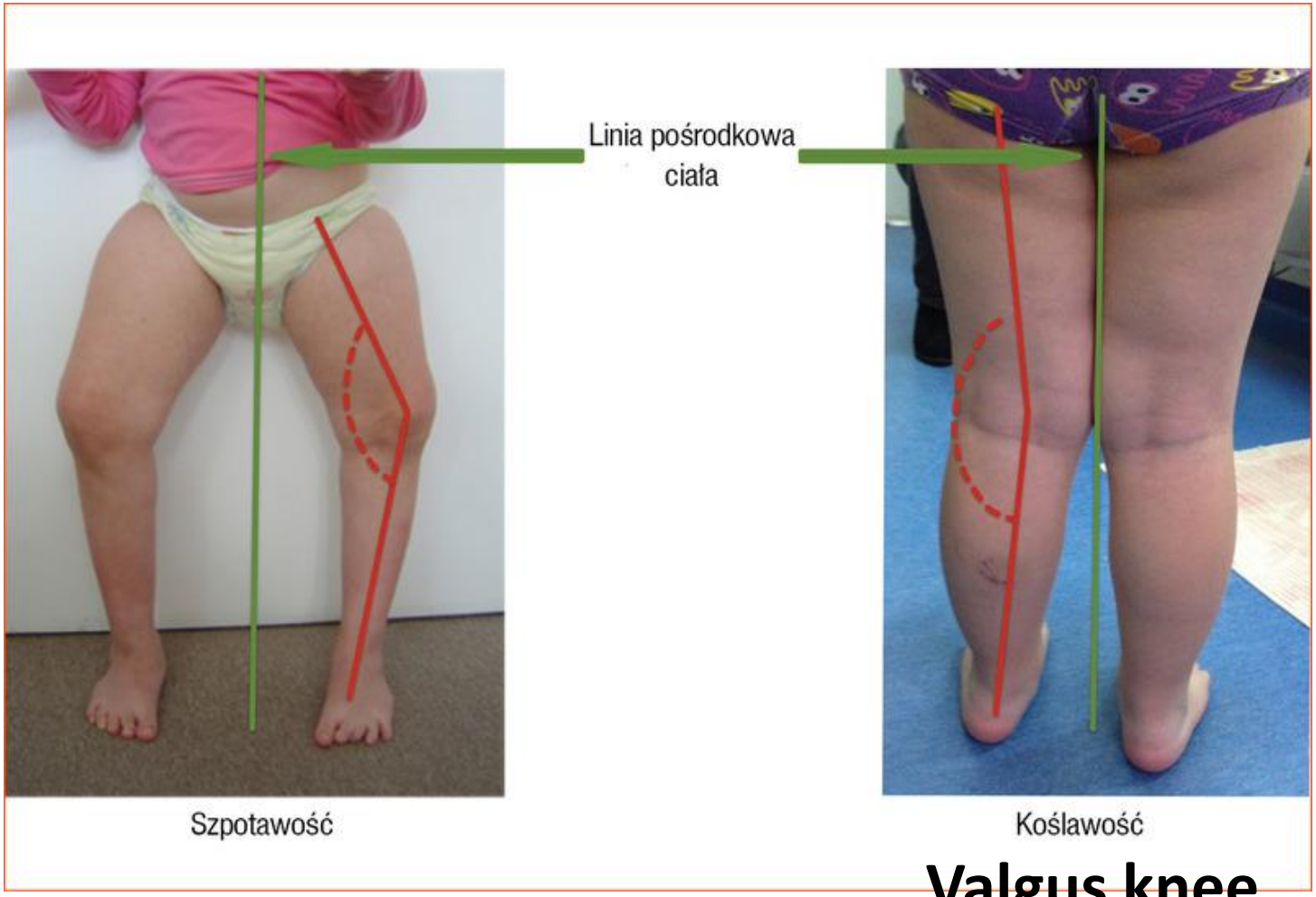
- paralysis of the arm caused by **perinatal injury** to the upper group of the arm's **main nerves**,
- specifically the severing of the **upper trunk C5–C6 nerves (brachial plexus)**
- the most commonly involved nerves are **the suprascapular nerve, musculocutaneous nerve, and the axillary nerve**
- include **loss of sensation in the arm and paralysis and atrophy of the deltoid, biceps, and brachialis muscles**
- **Characteristic position: the arm hangs by the side and is rotated medially; the forearm is extended and pronated, the arm cannot be raised from the side; all power of flexion of the elbow is lost, as is also supination of the forearm**

Erb’s palsy


Zablokowany bark dziecka o kość łonową.
W celu wydobycia dziecka lekarz pociąga za głowę. Jeżeli użyje zbyt dużej siły może dojść do rozciągnięcia i pęknięcia nerwów splotu ramiennego.

Knees

Knees

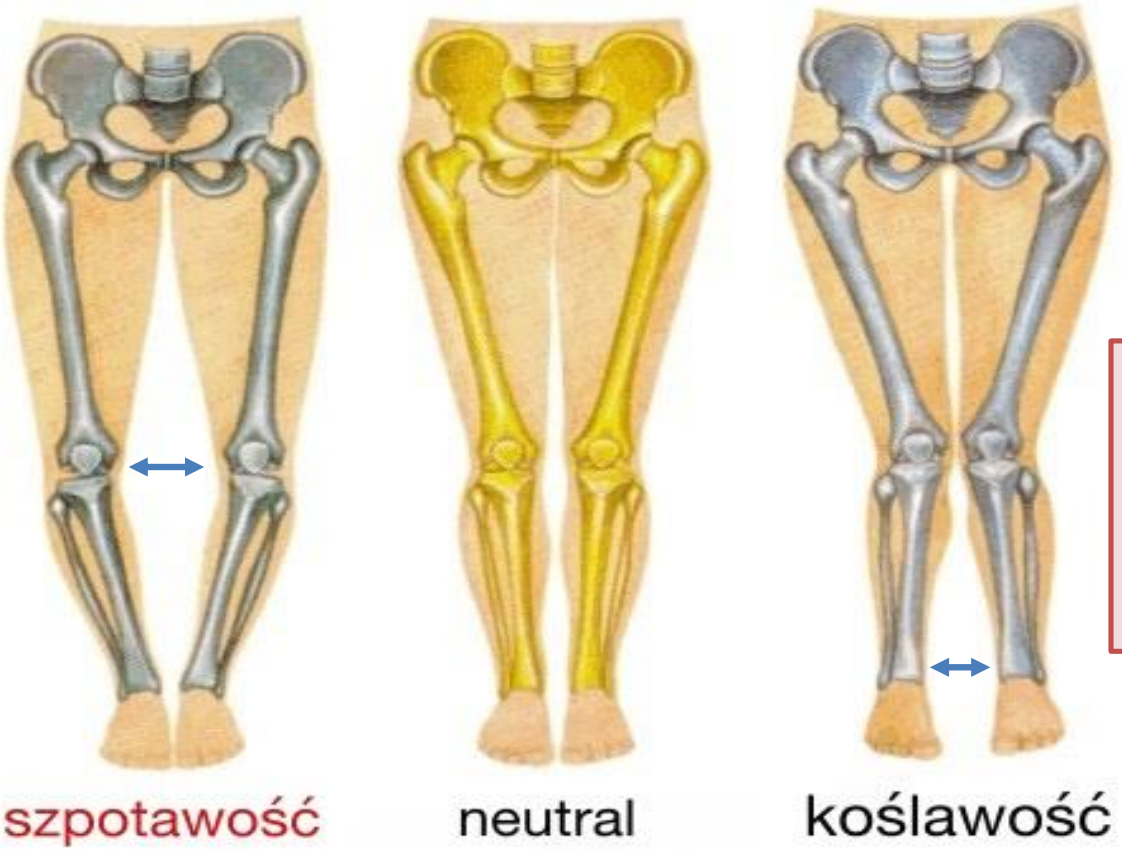


Varum knee (lat. Genu varum)
(also called **bow-leggedness)**

Valgus knee
„knock-knee”
(lat.genu valgum)

Knees

Diameter between knees <= **6 cm (when feet together)**



Diameter of medial malleous <= 8 cm when knees together)

May be physiology in children who stand and walk very quickly (**<u>should resolve up 18-20 months of age</u>**)

- **is normal < 2years ,**
- **should resolve definitely < 7 years**

Physiotherapy

Orthopedic surgeon reffral

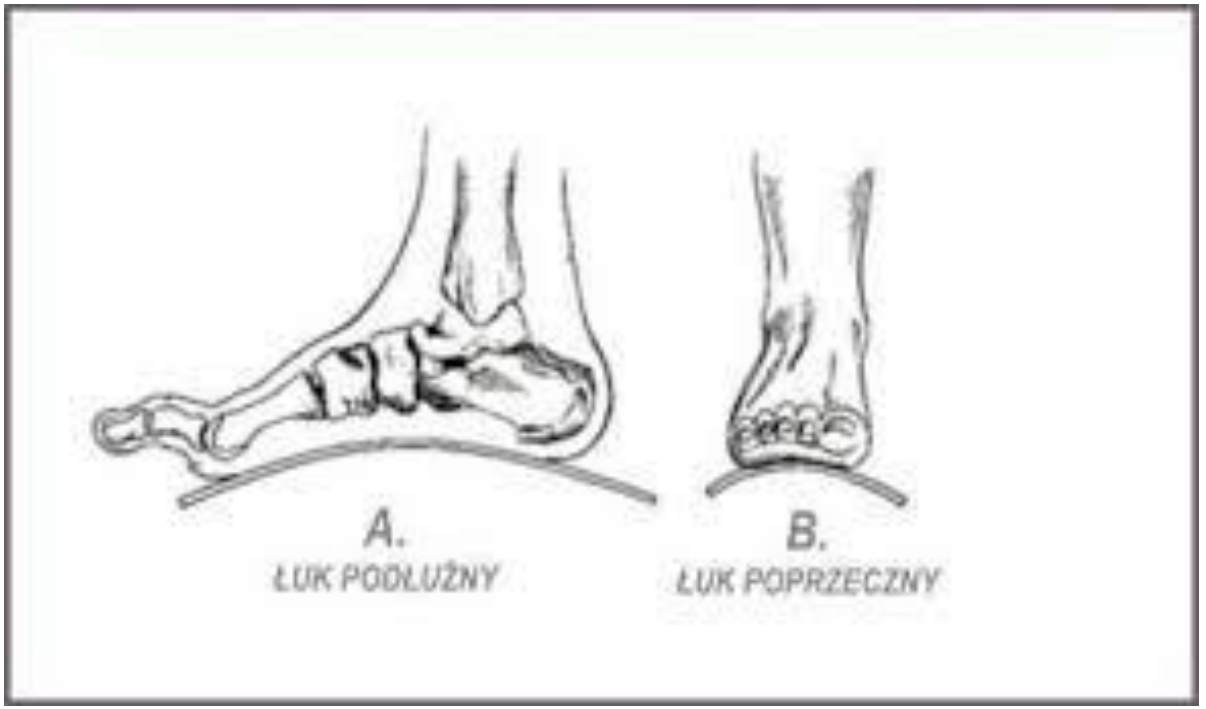
Indications for orthopedic counselling:

Genu varum	Genu valgus
- Serious deformity (> 2 SD) - Assymetry - Genu varum > 2 years old - additional abnormalities	-Serious deformity -Assymetry -Diameter between maedal malleous > 8 cm -Genu valgus > 7 years - additional abnormalities

Feet

Feet examination

- Shape
- Arch (longitudinal/ transverse arch)
- Position
- Function



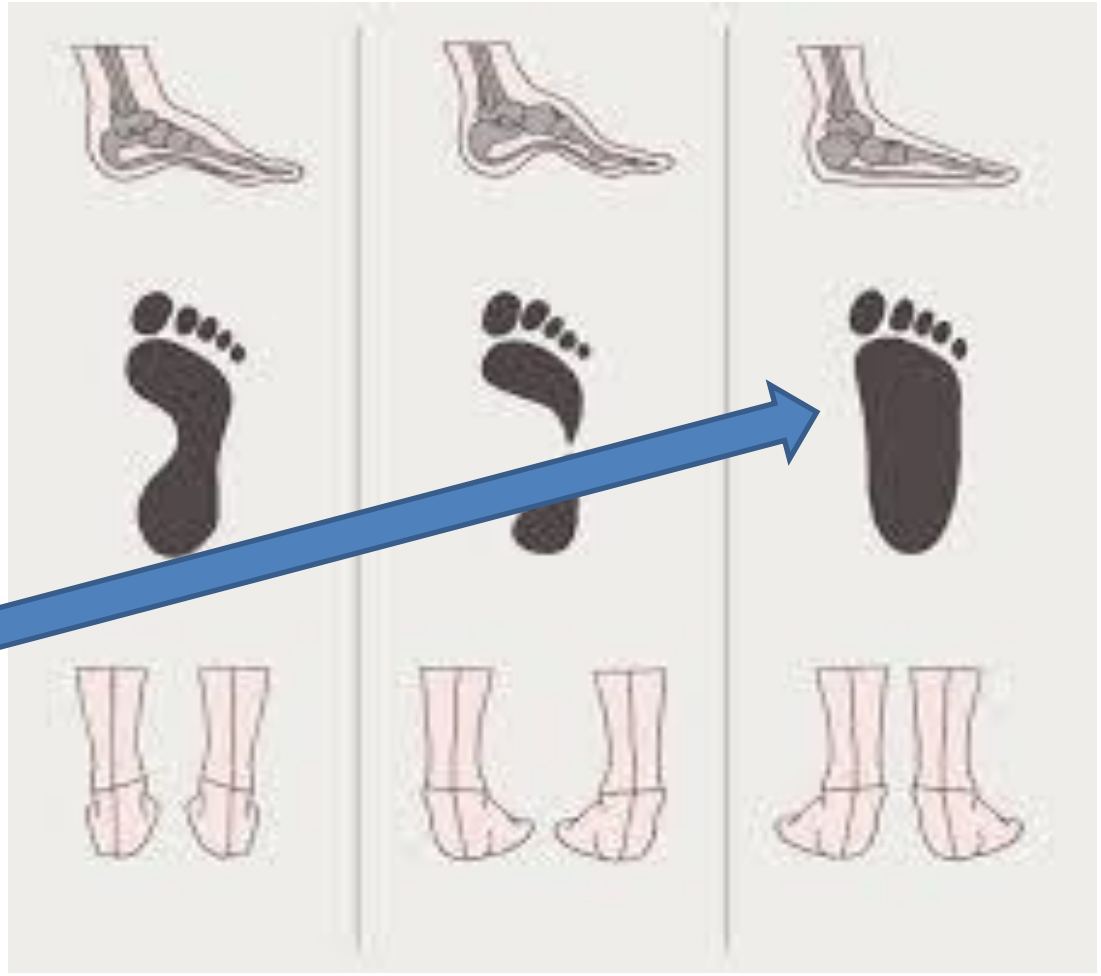
Foot of the newborn

Feet

Club feet
- inwardand & downward rotation

Flat feet (plano-valgus)
-arches of the foot collapse
-entire sole of the foot coming into complete or near-complete contact with the ground

Feet



Flat feet (plano-valgus foot)

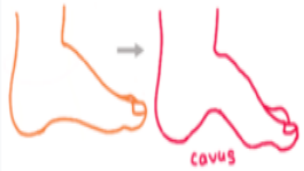
- normal up 3 years !

Feet

Club feet

- Always pathology
-Must be cured < 6/52 ! (Ponseti method)
-Otherwise remains deformed

Clubfoot- 4 components

	Cavus: the foot has a high arch, or a caved appearance.
	Adductus: the forefoot curves inwards toward the big toe.
	Varus: the heel is inverted, or turned in, forcing one to walk on the outside of the foot. This is a natural motion but in clubfoot the foot is fixed in this position.
	Equinus: the foot is pointed downward, forcing one to walk on tiptoe. This motion occurs naturally, but in clubfoot the foot is fixed in this position. This is because the Achilles tendon is tight and pulls the foot downwards.

Normal/ abnormal?

Flat foot

Physiology < 3 years of age

Flat foot

Clubfoot

Clubfoot

Clubfoot

Clubfoot

Equine foot

- the foot is **pointed downward, forcing one to walk on tiptoe**
- chromosomal abnormalities
- neuronal dysfunction
- miopathy

Examination of feet and extremities

Lumps?

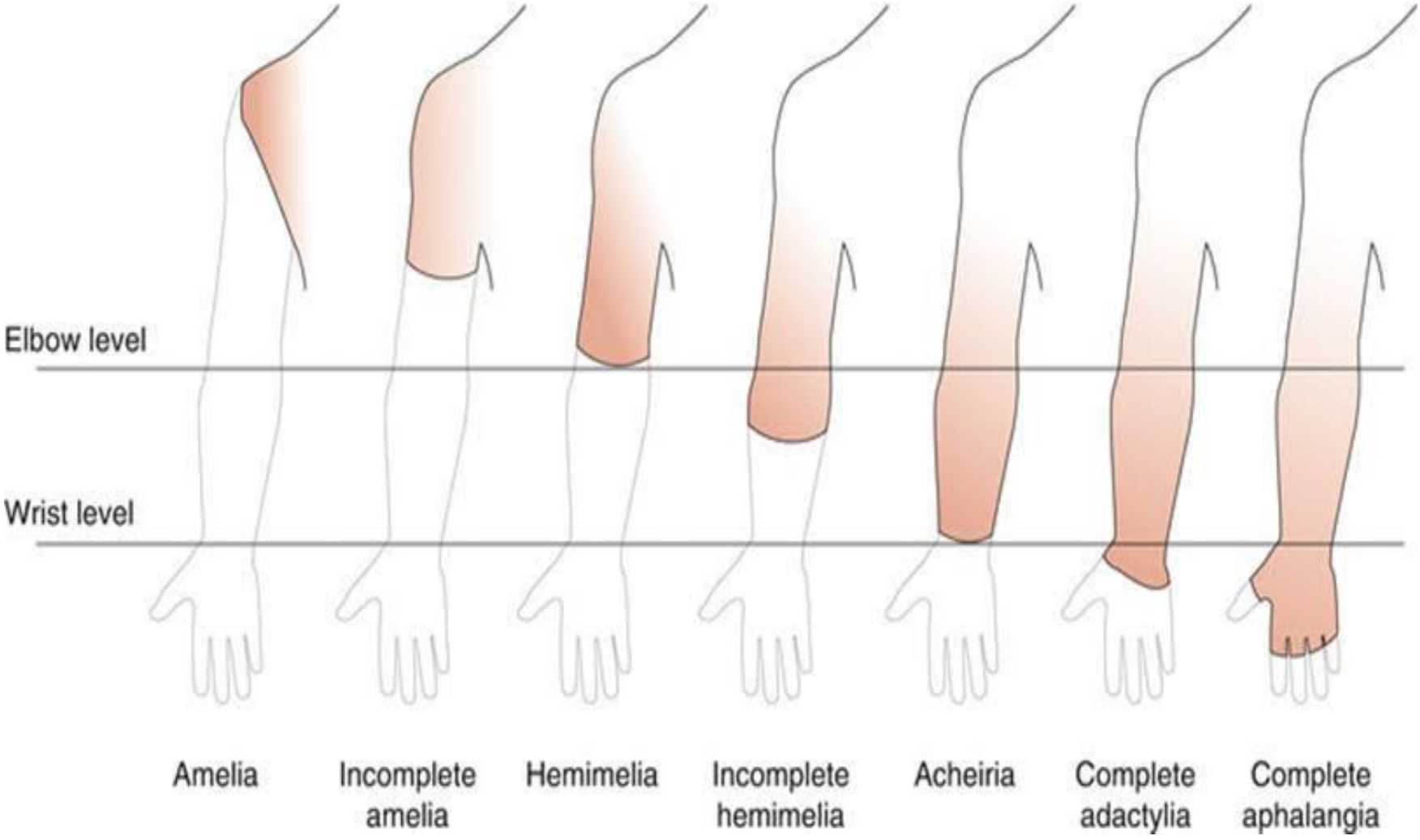
Pain? Tenderness?

Redness?

Soft? Hard?

Function

Congenital abnormalities of extremities


Elbow level
Wrist level
Amelia
Incomplete amelia
Hemimelia
Incomplete hemimelia
Acheiria
Complete adactylia
Complete aphalangia

Amelia

Fokomelia

Adaktylia

Congenital abnormalities of digits

Polidaktyly

Syndaktylia

Syndaktylia

Arachnodaktylia

Rickets= (lat.Rachitis)

Rickets= (lat.Rachitis)

-condition that results in weak or **soft bones** in children
- the most common cause of rickets is a vitamin D deficiency
-This can result from: por diet, dark skin, too little sun exposure, without vitamin D supplementation, celiac disease, other malabsorption syndromes and certain genetic conditions

Rickets- main symptoms

- soft, thinned skull bones –craniotabes
- Late closure of fontanelles
- Caput quadratum
- Late teetch

Rickets- main symptoms

- **rachitic rosary** can result as the thickening caused by nodules forming on the costochondral joins
- the deformity of a pigeon chest may result in the presence **of <u>Harrison's groove</u>**
- Abnormalieties of the **chest**
- Flat abdomen („frog”)

Rickets-
main symptoms

- thickened ankles and wrists
- bowed legs or knock knees
- kyphoscoliosis or lumbar lordosis
- pelvis deformities

Joints

Examination of joints

HISTORY

Character of pain/ dyscomfort

Number of joints involved- one? many?

Pain (generalised? Localised? Acute? Chronic? Severity?)

Movements restriction, morning stiffness, swelling

Other symptoms (apart from joints)- eyes? Skin? Guts? General? Fever?

Back pain?

Injury in the past?

Arthralgia- differentia diagnosisis	
inflammation	degeneration
Pain in the morning, resolving during the day, typical morning stiffness	Pain worsening during the movement

Examination of joints

LOOKING

Symmetry?

Shape of joints?

Deformity?

Swelling?

Redness of the skin?

Changes in surroundng soft tissue- subcutaneous nodules? Muscle athrophy?

Examination of joints

PALPATION

Hot skin?

Fluid in the joint?

(balloting of the patella in major knee efusion) →

push sharply against the femur, watch for fluid returning to the suprapatellar space

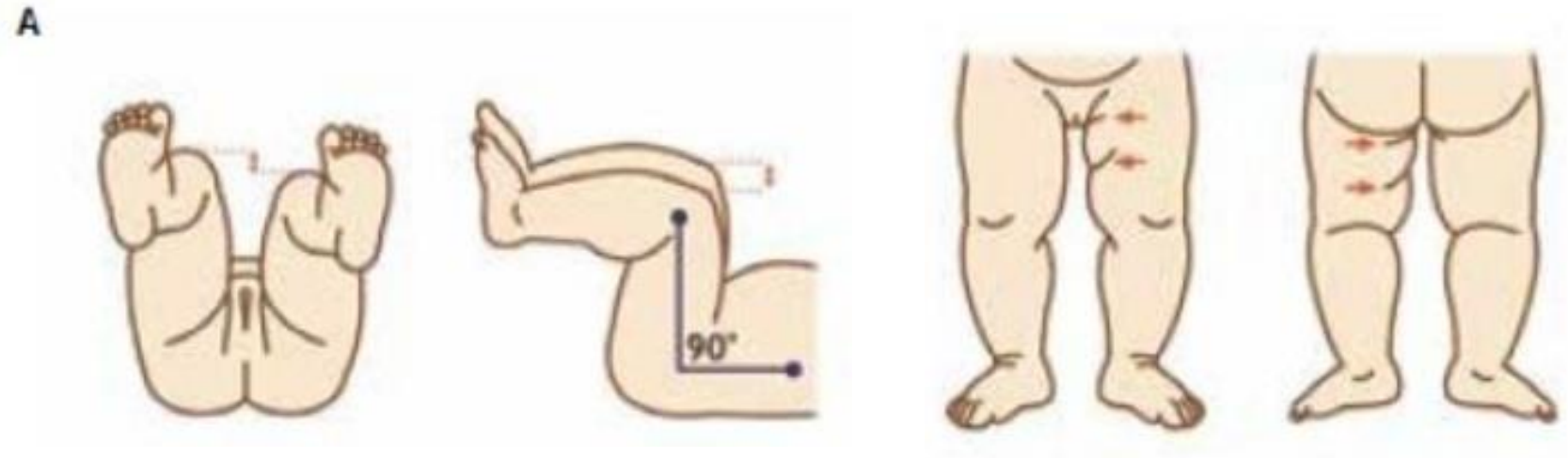
Decreased range of **passive** motion?

Decreased range of **active** motion?

Examination of hip
&
Congenital hip dysplasia

HIP examination

- Length of legs (shorter leg on the side of hip dysplasia)
- Space between thights ? (very wide in both-sided dysplasia)
- Symmetry of folds:
  - inguinal (deeper on the side of dysplasia),
  - bottom (higher on the side of dysplasia)

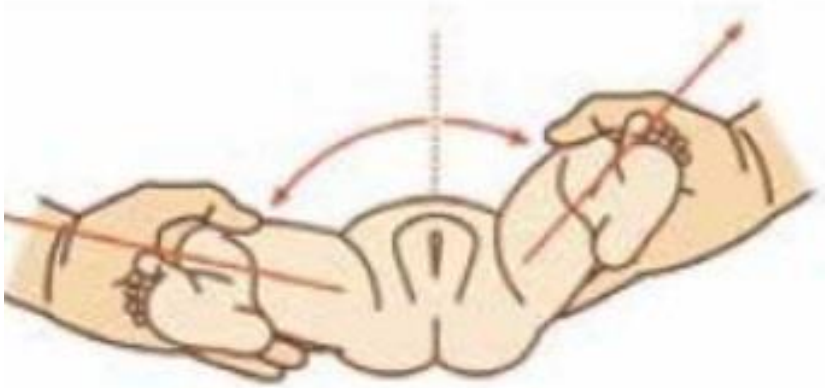


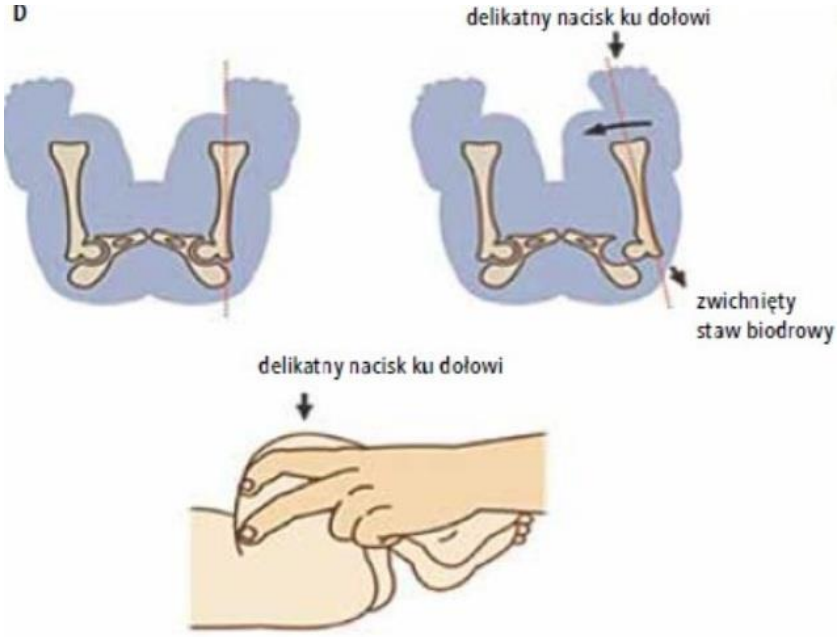
Hip movements

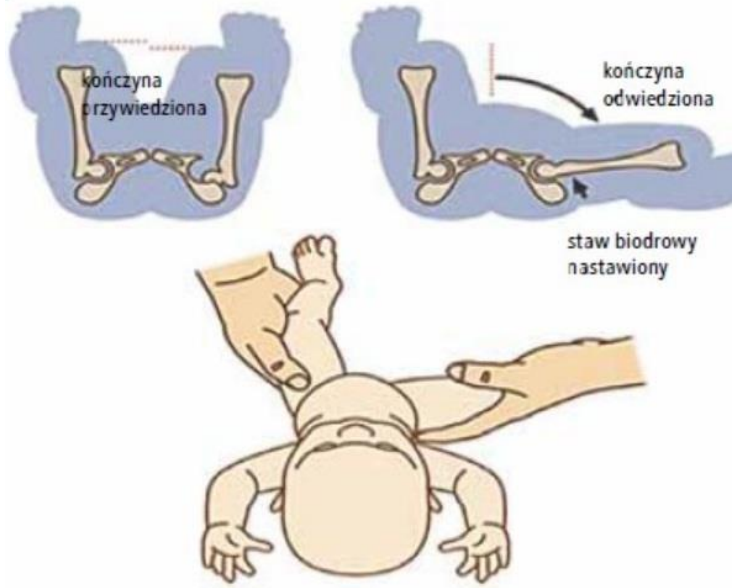
Physiology: 70- 80°

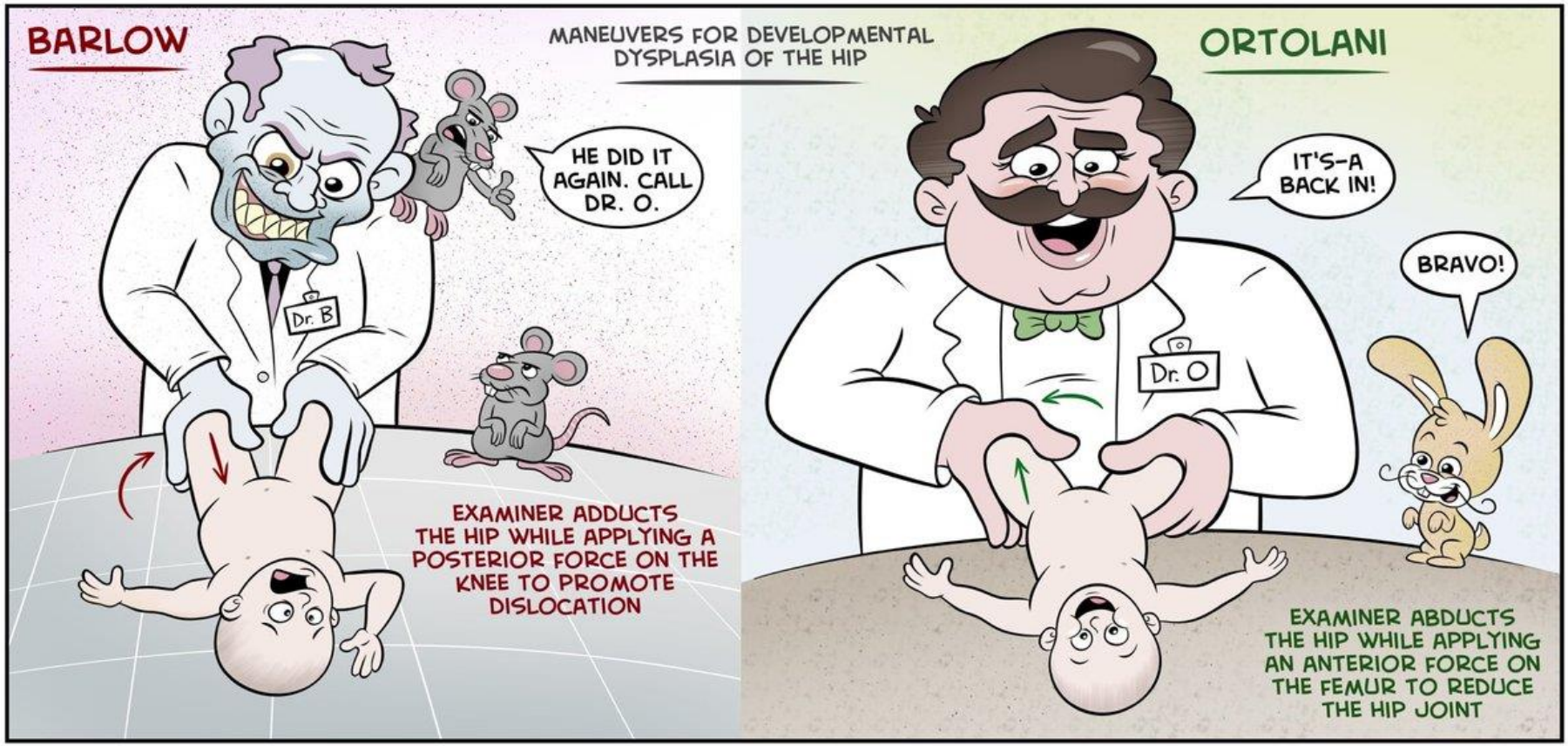
Pathology:

- <60°
- **Ortolani sign**
- **Barlow sign**









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Thank you for your attention!

***Palce pałeczkowate

Normal/ abnormal ?

Stopa piętowa

Zawsze patologia

**najczęściej jest związana z ciasnotą wewnątrzmaciczną- nie stanowi wady wrodzonej i poddaje się leczeniu rehabilitacyjnemu

Objawy zwichnięcia stawu biodrowego u dzieci w wieku poniemowlęcym

- Skrócenie kończyny dolnej
- Asymetria fałdów pośladkowych
- Ograniczenie odwodzenia po stronie zwichnięcia
- Bardziej uwypuklony zarys stawu po stronie zwichnięcia
- Skrzywienie kręgosłupa po stronie chorego biodra z pochyleniem miednicy po stronie przeciwnej
- Utykanie (zwichnięcie jednostronne)
- Chód kołyszący, kaczkowaty (zwichnięcie obustronne)
- Dodatni objaw Trendelenburga

  (pacjent stoi na jednej nodze, druga zgięta w stawie biodrowym i kolanowym, w razie zwichnięcia miednica bez podparcia opada)

Obserwacja chodu

Chód prawidłowy

- Dwunożny
- Naprzemienny
- Synchroniczny
- Harmonijny z zachowaniem faz (podporu, odbicia i wykroku)

Chód patologiczny

- Kaczkowaty (kołysanie się w biodrach)- zwichnięcie stawów biodrowych
- Brodzący (opadanie stopy)- porażenie nerwu strzałkowego, polineuropatia
- Koszący (niedowładna kończyna wyprostowana w stawie kolanowym wykonuje ruch koszący bez odrywania stopy od podłoża)
- Móżdżkowy (na szerokiej podstawie)- zaburzenia równowagi