



Νοσοκομείο Παιδών
"Η Αγία Σοφία"

CLINICAL SYMPTOMS OF CANCER IN CHILDREN AND ADOLESCENTS

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«children are NOT young adults»



neonates



infants



children



adolescents



Differences among age groups

Clinical symptoms differ between age groups (neonates/infants – children – adolescents) due to:

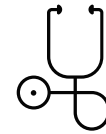
- Different anatomy (e.g. open anterior fontanel in infants)
- Different way of manifestation / expression of the symptoms (e.g. infants cannot express pain, parents notice restlessness, irritability, sleep disorders, etc.)
- Different epidemiology of cancer (eg fibrosarcoma more common in infants, Hodgkin lymphoma more common in teenagers)



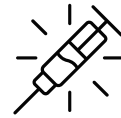
Don't forget...



Medical History



Clinical examination



Paraclinical examinations

REGIONAL RED FLAGS FOR CHILDHOOD CANCER

EYES:

Leukocoria (white glow to pupil), visual disturbance, new squint



PALPABLE MASS:

Of any location - soft tissue, bony or lymphadenopathy

ABDOMEN:

Distension, organomegaly, refractory constipation, nausea

SYSTEMIC:

Recurrent viral illnesses, weight loss, night sweats

BRAIN:

Headaches, early morning vomiting, change in behaviour, abnormal movements, new unsteadiness

PALLOR,

increased bleeding, bruising, exhaustion

GENITOURINARY:

Haematuria or difficulty voiding

BONE:

Back pain, new limp or persistent pain of any location



DON'T FORGET:

CONCERN **A**NOREXIA **N**O. OF ATTENDANCES (3) **C**OMPLEXION **E**XHAUSTION **R**ECURRENT PYREXIA

Early diagnosis saves lives, please listen to the concerns of the caregiver

QUIZ: 1



A 5 years old boy presents to the hospital with:

- Intermittent fever (max 37.8) for the last 20 days
- Fatigue
- Bone pain, especially in the pelvis and legs
- Multiple bruises



QUIZ: 1

CLINICAL EXAMINATION

- Pallor of skin and mucous membranes
- Petechiae and ecchymosis
- Multiple palpable cervical lymph nodes
- Hepatosplenomegaly
- Cardiac murmur 2-3/6



QUIZ: 1

CLINICAL EXAMINATION

- Pallor of skin and mucous membranes
- Petechiae and ecchymosis
- Multiple palpable cervical lymph nodes
- Hepatosplenomegaly
- Cardiac murmur 2-3/6

Next step?

- a) Abdominal CT
- b) ECG
- c) Blood test
- d) Cervical Us



QUIZ: 1

Blood test

- Hemoglobin 8.3 g/dL
- White blood cells $1.5 \times 10^3/\text{mL}$
- Platelets $44 \times 10^9/\text{L}$



QUIZ: 1

Blood test

- Hemoglobin 8.3 g/dL
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Possible Diagnosis?

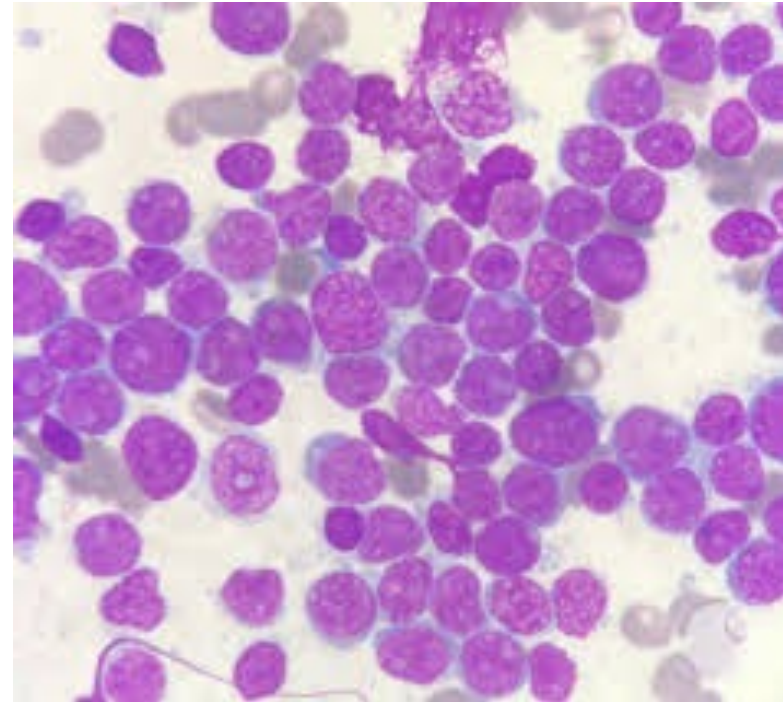
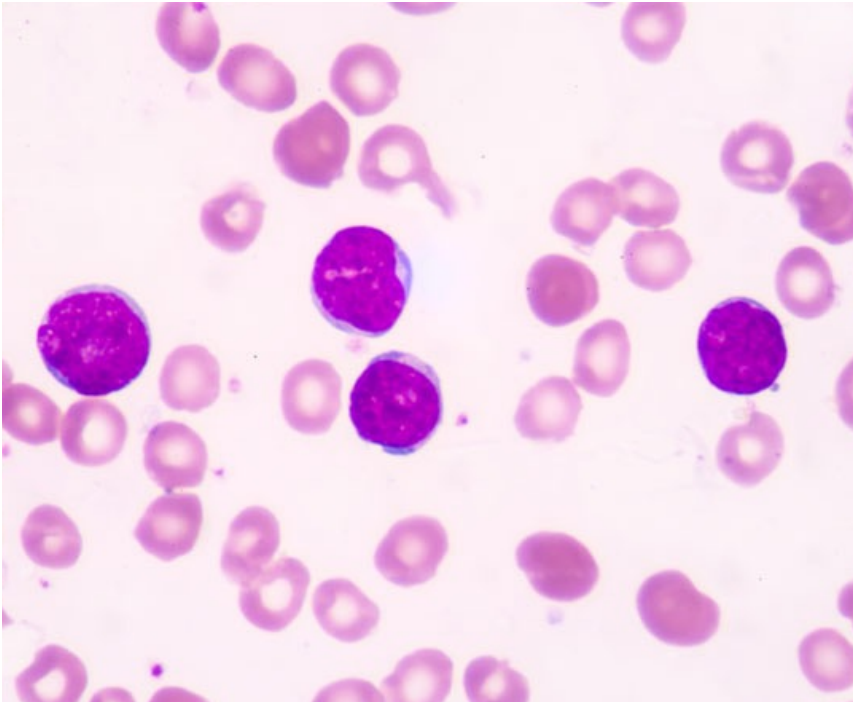
- Immune Thrombocytopenic Purpura
- Acute Lymphoblastic leukemia
- Viral Infection
- Hemolytic Anemia





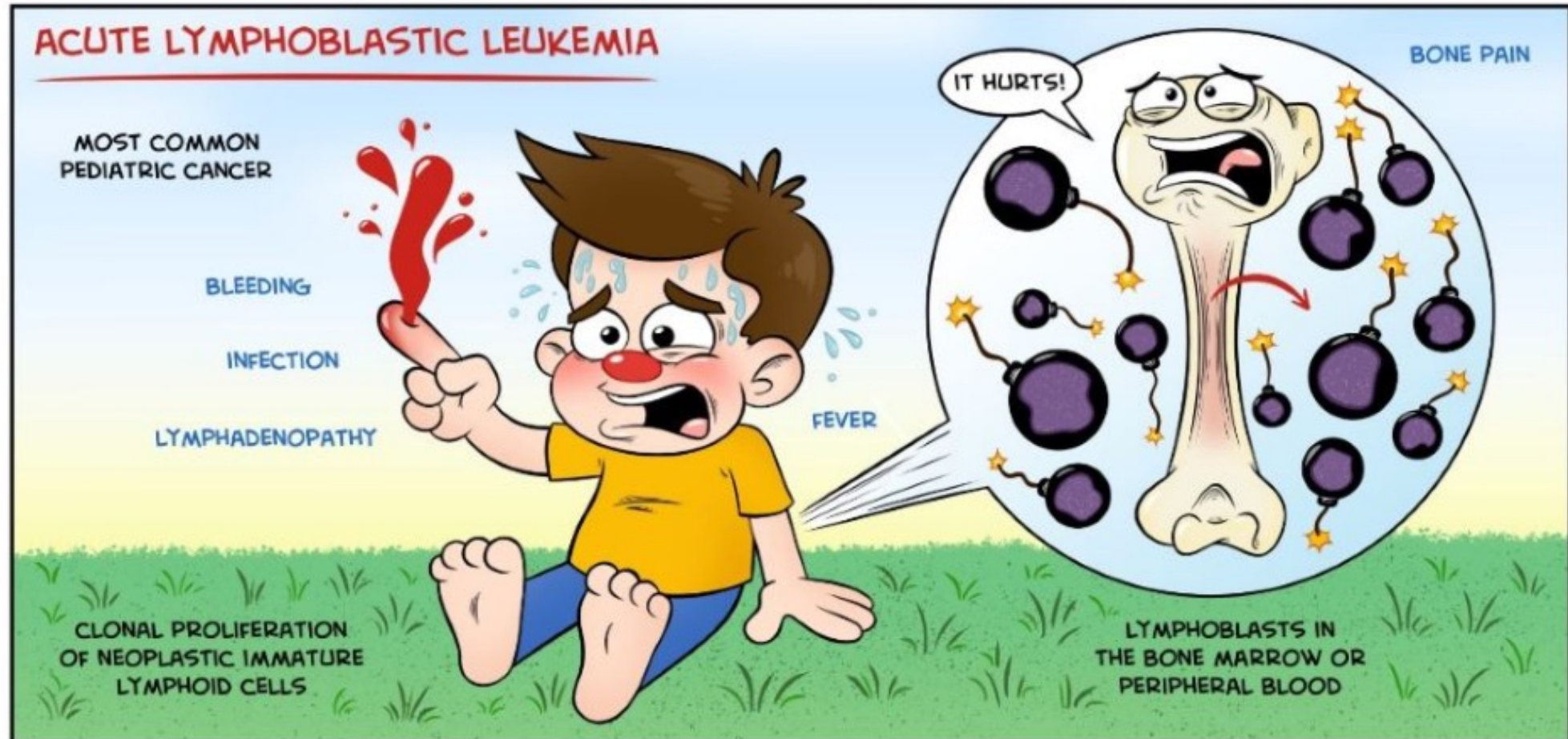
QUIZ 1: Acute Lymphoblastic leukemia

Bone marrow aspiration



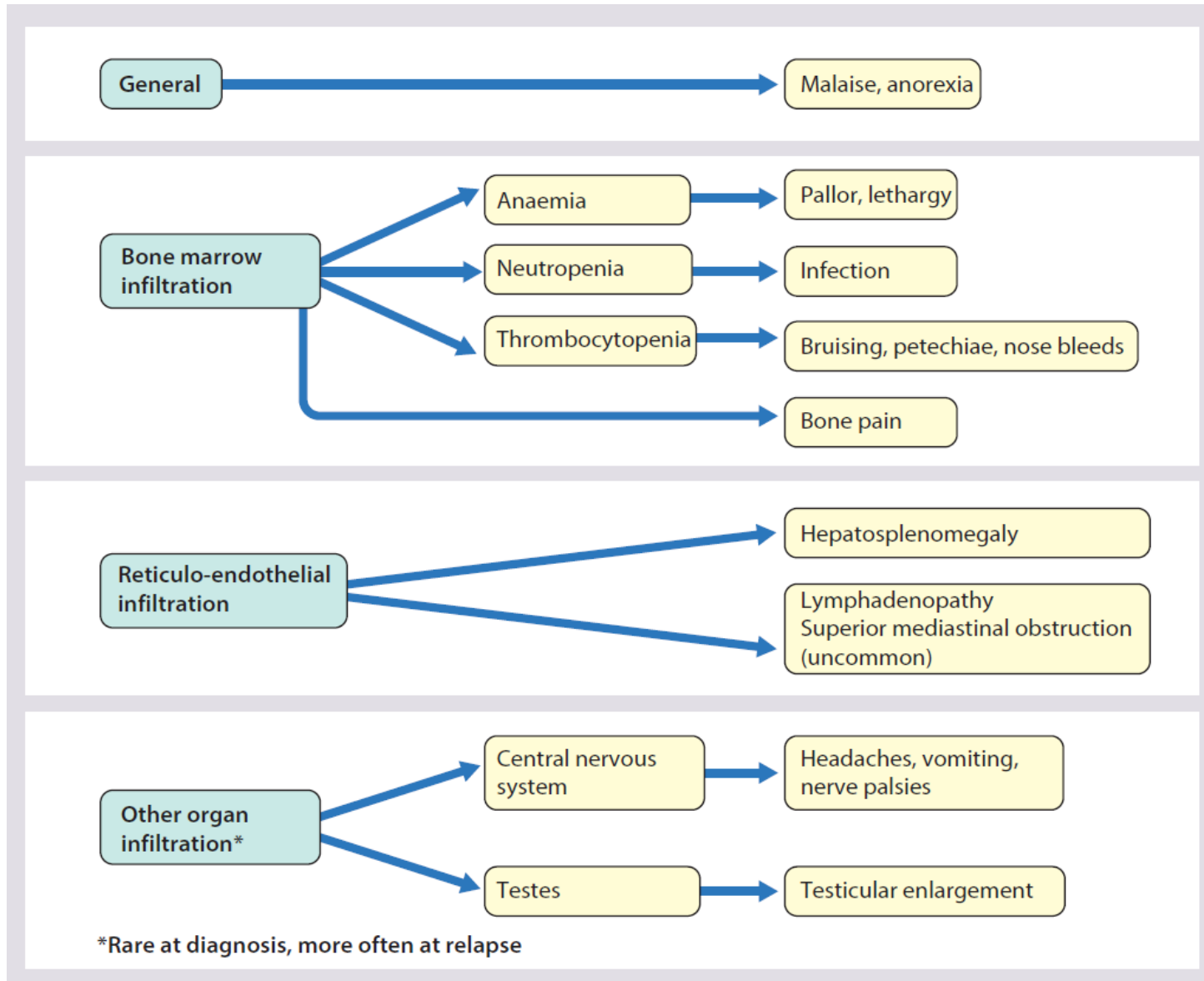


Acute Lymphoblastic Leukemia: Signs and Symptoms





Acute Lymphoblastic Leukemia: Signs and Symptoms



QUIZ: 2



6 years old girl presents with:

- Headache
- Morning vomiting

The parents say that she has just started school and perhaps she doesn't want to go.



QUIZ: 2

Clinical examination

- Torticollis
- Unsteadiness
- Neurological examination: ataxic gait, dysdiadochokinesia
- Ophthalmological: papilledema
- BP: 145/95mmHg, pulse 52/min

Next step?

- a) ECG
- b) Blood tests
- c) Orthopedic consultation
- d) Brain CT/MRI
- e) Psychological consultation





QUIZ 2: Brain Tumor : medulloblastoma

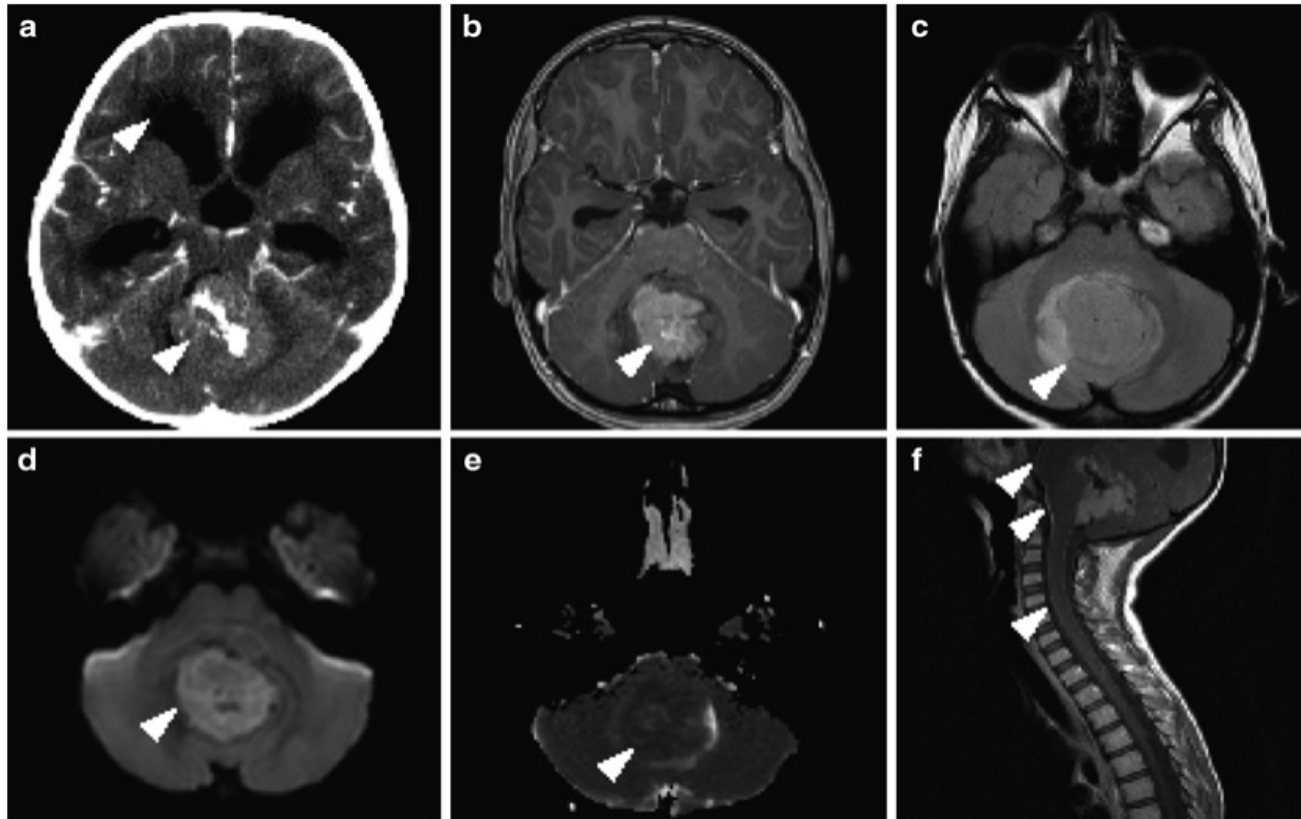


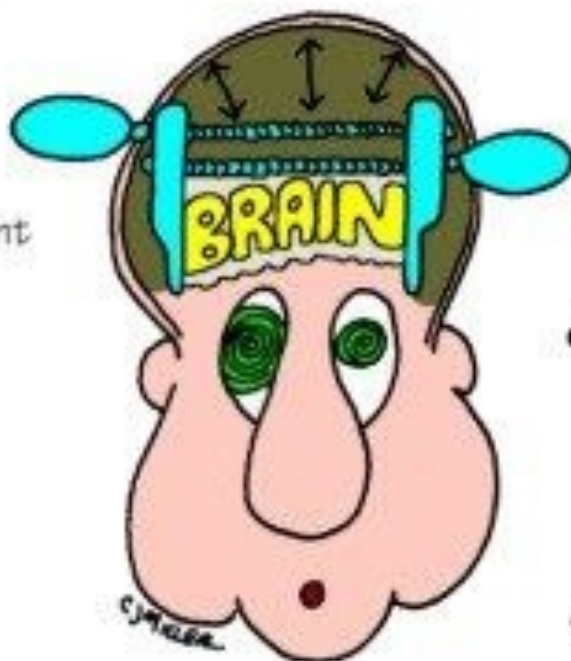
Fig. 12.1 CT and MR imaging of medulloblastoma. (a) Axial contrast-enhanced CT showing a hyperdense mass compressing the 4th ventricle (*white arrow*). Note the hydrocephalus with accompanying trans-ependymal flow (*white arrow*). (b) Axial T1 gadolinium-enhanced MRI and (c) axial FLAIR showing an enhancing mass in the midline cerebellum. (d) Axial T1 and (e) accompanying

axial diffusion coefficient map showing restricted diffusion. (f) Sagittal T1 gadolinium-enhanced MRI through the midline spine showing laminar leptomeningeal enhancement along the dorsal and ventral aspects of the spinal cord and ventral brainstem indicative of metastatic dissemination (*arrows*)



INCREASED INTRACRANIAL PRESSURE

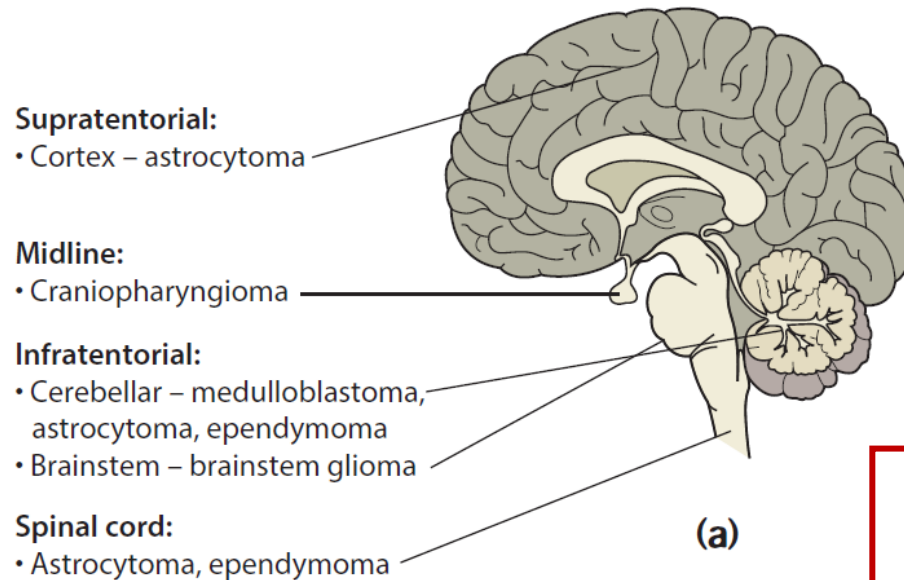
- Changes in LOC
- Eyes
 - Papilledema
 - Pupillary Changes
 - Impaired Eye Movement
- Posturing
 - Decerebrate
 - Decorticate
 - Flaccid
- Decreased Motor Function
 - Change in Motor Ability
 - Posturing



- Headache
- Seizures
 - Impaired Sensory & Motor Function
- Changes in Vital Signs:
 - Cushing's Triad:
 - ↑ Systolic B/P
 - ↓ Pulse
 - Altered Resp Pattern
- Vomiting
- Changes in Speech
- Infants:
 - Bulging Fontanel
 - Cranial Suture Separation
 - ↑ Head Circumference
 - High Pitched Cry



Brain Tumors : Signs and Symptoms



 **Headache and behaviour changes- is there raised intercranial pressure?**

↑ICP



1. High BP
2. Low pulses
3. Altered resp pattern

Clinical presentation

All ages

Persistent or recurrent vomiting
Problems with balance, coordination or walking
Behavioural change
Abnormal eye movements
Seizures (without fever)
Abnormal head position–wry neck, head tilt or persistent stiff neck

Child/Adolescent

Persistent or recurrent headache
Blurred or double vision
Lethargy
Deteriorating school performance
Delayed or arrested puberty, slow growth

Infants

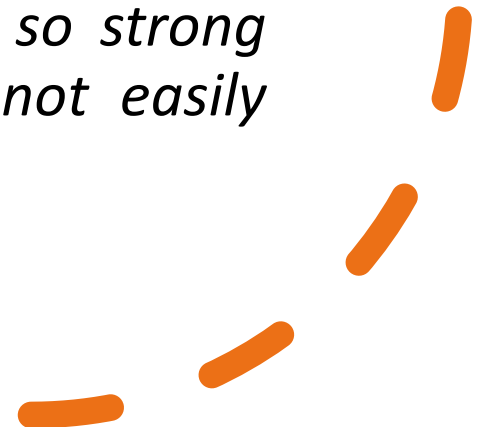
Developmental delay/regression
Progressive increase in head circumference, separation of sutures, bulging fontanelle
Lethargy



QUIZ: 3

A 14-year-old boy complained of pain in the left lower extremity for almost 2 months.

The parents describe that the child often complained of lower extremity pain attributed to vigorous exercise. Although sports activities were discontinued, the pain gradually worsened. The pain is mainly located on the left tibia, so strong that it may wake the child up and is not easily relieved with painkillers.



QUIZ: 3

Clinical examination

- Pain at the left tibia with swelling and erythema



Next step?

- a) Blood tests
- b) Psychological consultation
- c) Orthopedic consultation
- d) Xray of the left tibia





QUIZ 3: Ewing Sarcoma

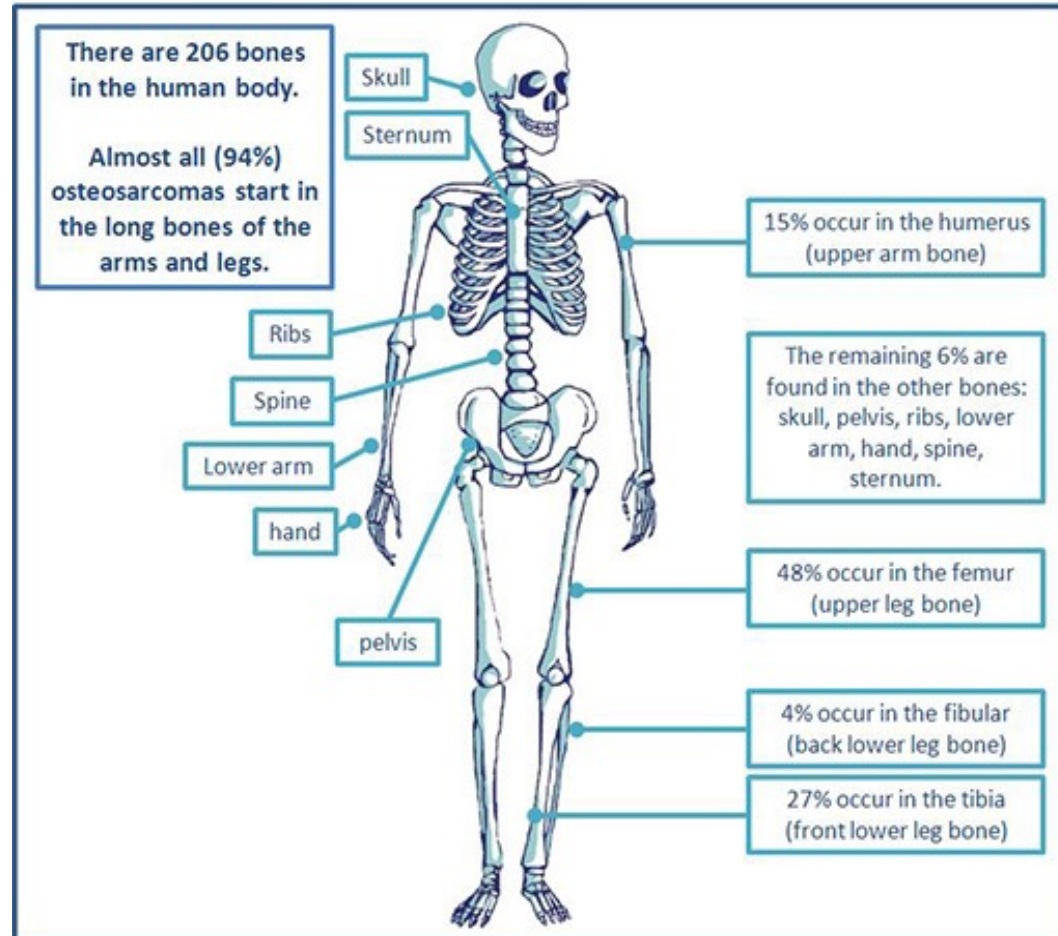


Radiology:

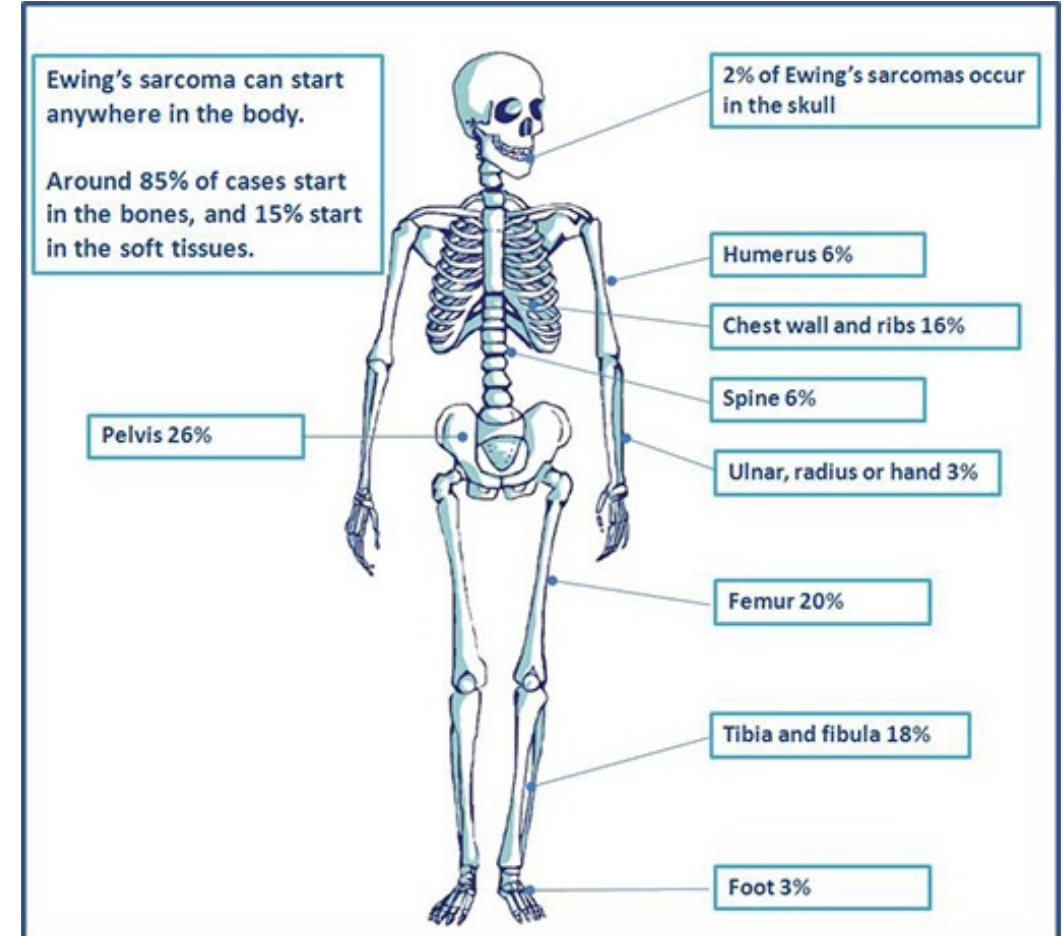
- Osteolysis
- Detachment of the periosteum from the bone (Codman triangle)
- Diaphyseal location



Bone Sarcomas: Osteosarcoma vs Ewing Sarcoma



Osteosarcoma



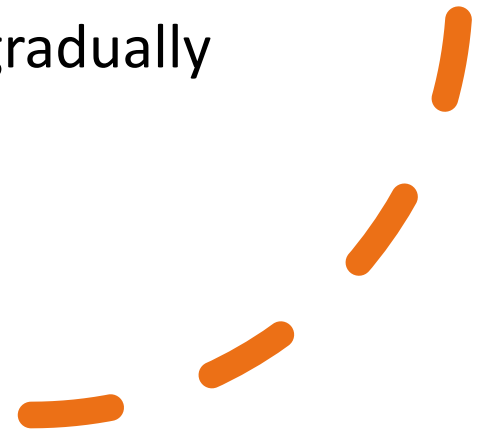
Ewing Sarcoma

QUIZ: 4



An 11-month-old infant, with a nonsignificant medical history and good growth, is referred to the hospital by a private ophthalmologist.

The child was evaluated a week ago due to swelling of the Left upper eyelid. It was initially treated as a bee sting, but it gradually worsened.



QUIZ: 4



Clinical Examination

- Pallor
- Firm fixed, irregularly shaped midline abdominal mass
- Periorbital ecchymosis (Raccoon eyes)

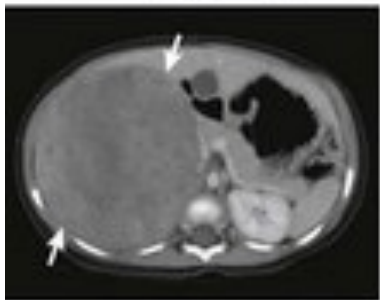




QUIZ 4: Neuroblastoma

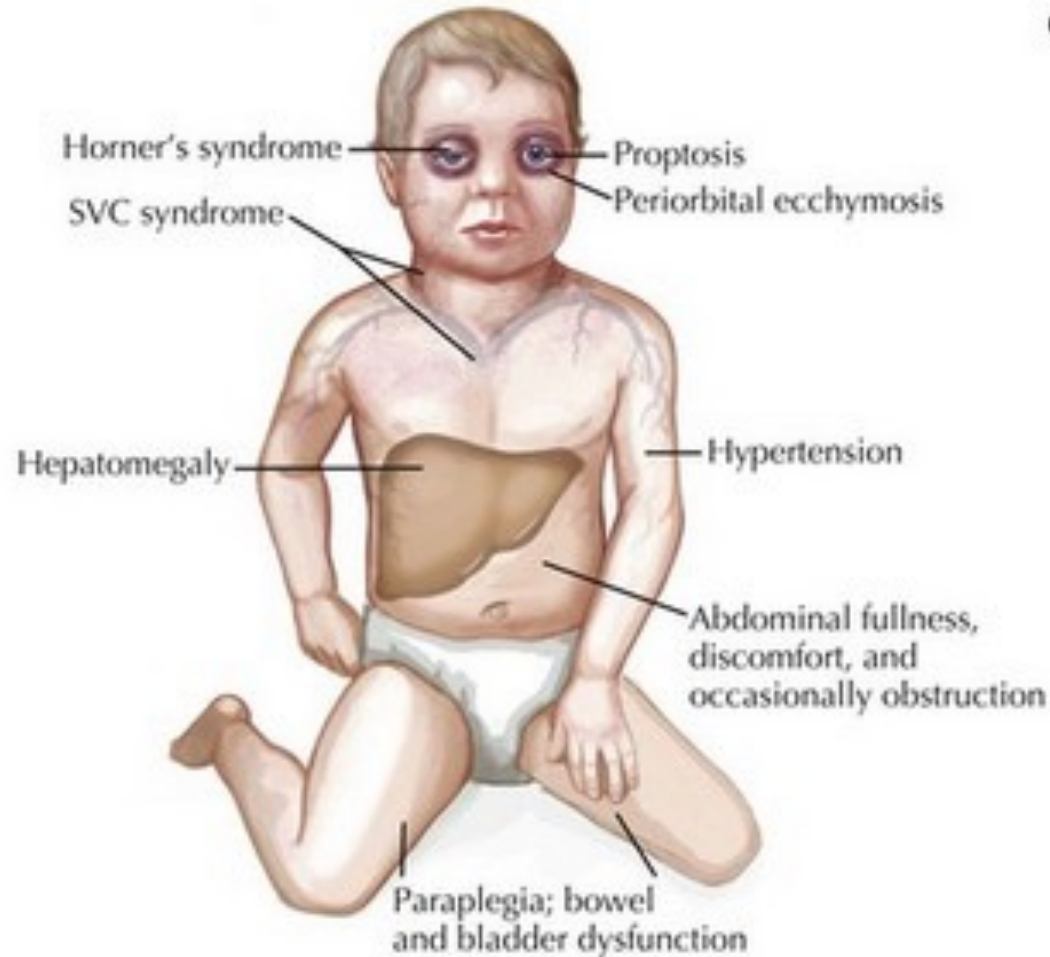


MR image, paraspinal tumor

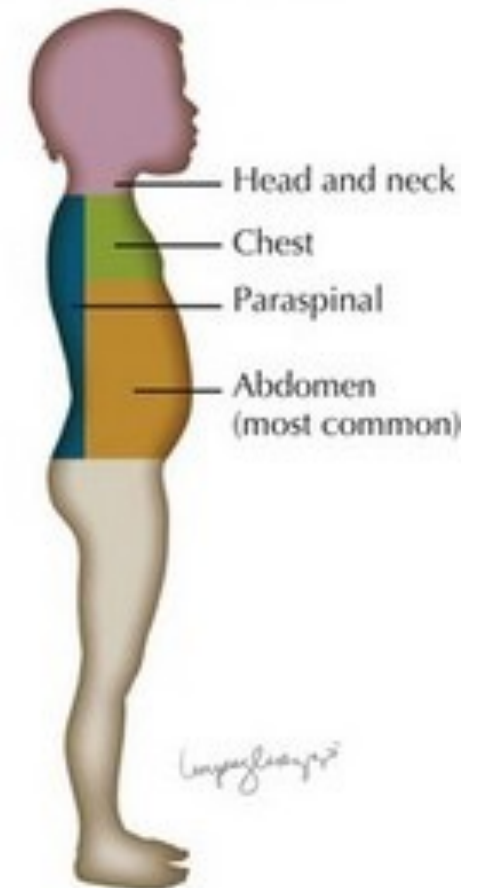


CT, abdominal tumor

Radiology images courtesy of Lisa States,
MD Children's Hospital of Philadelphia



Common sites of primary tumor



QUIZ: 5

- A 5-year-old girl presented to the hospital with lower back pain after falling downstairs at home (2 steps)
- Clinical examination: small ecchymosis in the Lumbar spine
- Radiological examination: L5 vertebral fracture
- She remains hospitalized for immobilization in the orthopedic department and repeats x-rays in one month



Multiple vertebral fractures





Patients from our unit



Skin Manifestations of leukemia



Patients from our unit



Dermatofibrosarcoma
protuberans



LCH



NF1 - MPNST

QUIZ: 6

A 12-month-old boy is referred to the hospital by the pediatrician, due to a rapid increase in the head circumference >97th



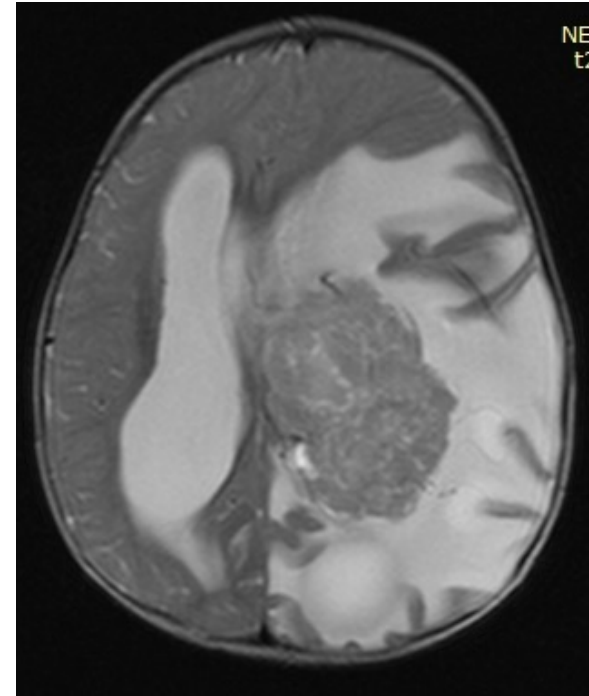
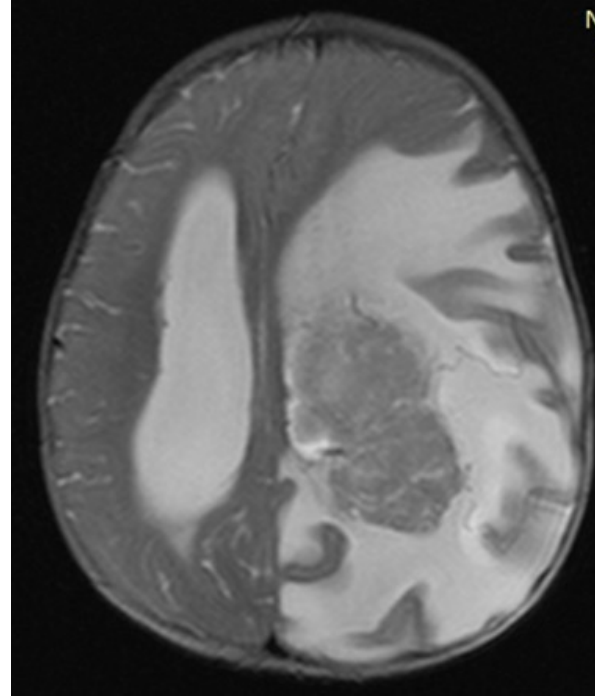
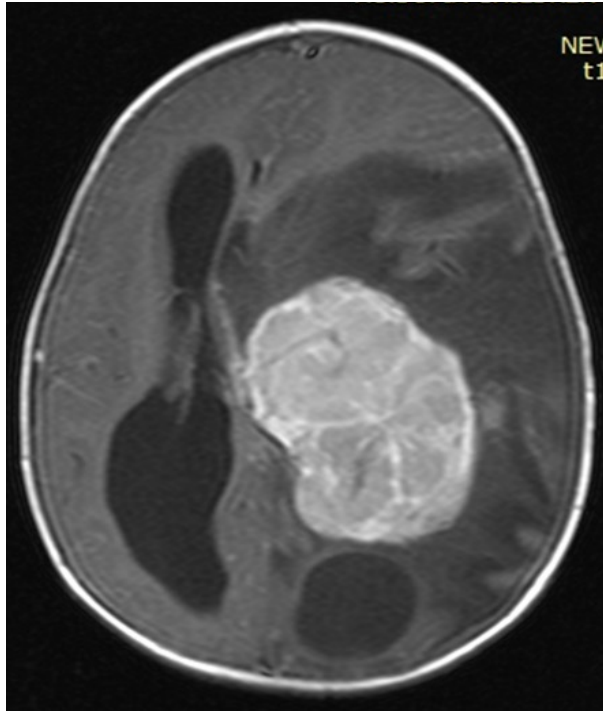
Clinical examination

Tense anterior fontanelle

Setting-sun sign (forced downward deviation of the eyes)



QUIZ 6: Choroid Plexus Carcinoma



QUIZ: 6

12 months after initial diagnosis, after chemotherapy and before XRT, the patient was admitted to the hospital due to:

- fever
- Eyelid swelling
- Gingivitis



QUIZ: 6

Blood test

WBC: 36000 (Blasts 70%)

Hb: 10.8g/dl,

Plt:20000

BM flow-cytometry : AML-M5



Concluding....

Brain tumours:

- Raised intracranial pressure
- Neurological signs – depends on anatomical position

Retinoblastoma:

- Screening if positive family history
- White pupillary reflex or squint

Lymphomas:

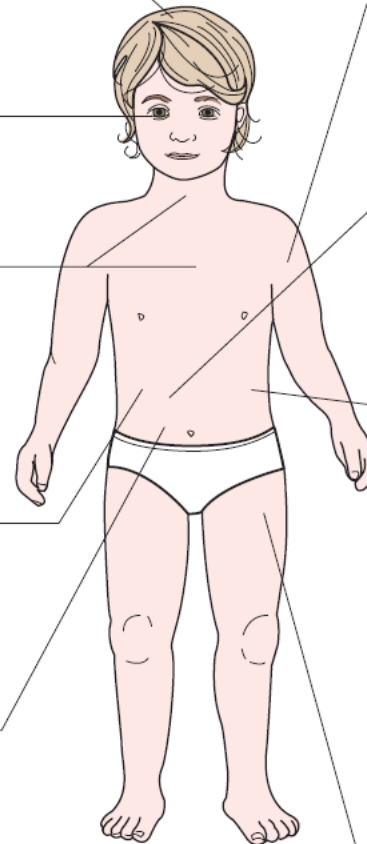
- Enlarged lymph nodes in the neck or abdomen
- Mediastinal mass – may cause superior vena caval obstruction.

Wilms tumour:

- Large abdominal mass in a well child
- Occasionally anorexia, abdominal pain, haematuria

Langerhans cell histiocytosis:

- Seborrhoeic rash
- Widespread soft tissue infiltration
- Bone pain, swelling or fracture
- Diabetes insipidus



Soft tissue sarcomas:

- Mass any site

Neuroblastoma:

- Abdominal mass
- Spinal cord compression
- Weight loss and malaise
- Pallor, bruising
- Bone pain

Acute lymphoblastic leukaemia (ALL):

- Malaise, anorexia
- Pallor, lethargy
- Infections
- Bruising, petichiae, nose bleeds
- Lymphadenopathy
- Hepatosplenomegaly
- Bone pain

Malignant bone tumours:

- Localised bone pain