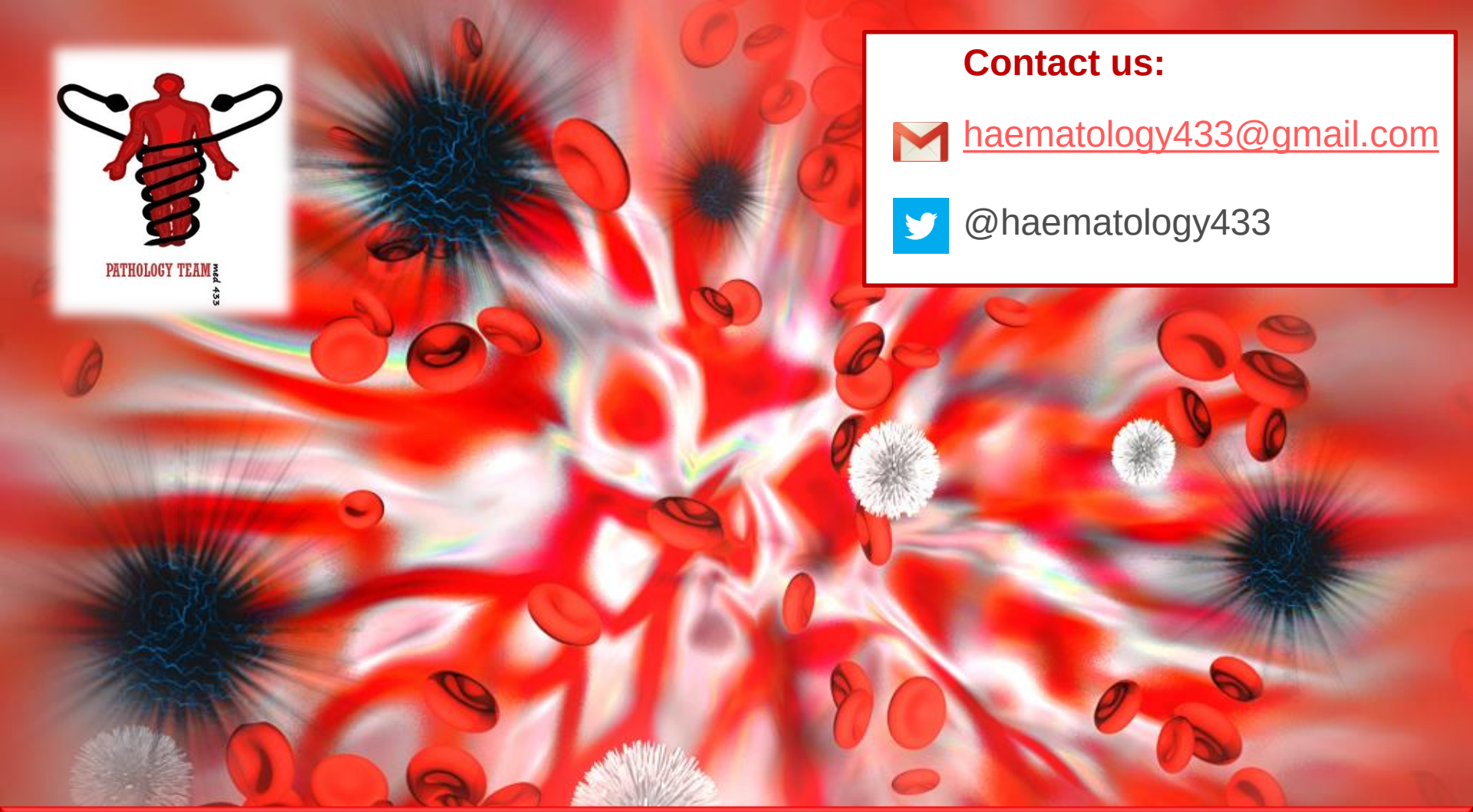

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Final review summaries & MCQs From L5 to L12

SummaryL5:Approach to bleeding disorders

- **Normal Haemostasis :**
- The cessation(stop) of bleeding following trauma results from :
  -constriction of blood vessels →platelets aggregation → formation of fibrin clot
- Bleeding due to:

1. **platelet defects (in number or function) or blood vessel wall defects called mucocutaneous bleeding**

Patient presents with : superficial bleeding into the skin (purpura) and from epithelial surfaces of organs.

2. clotting defects (coagulation defects) called musculoskeletal bleeding.

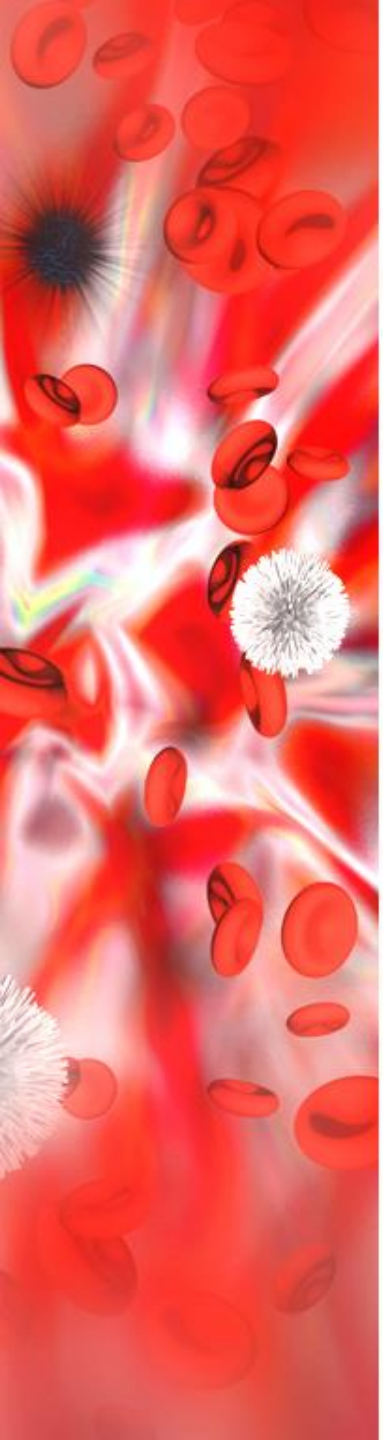
presents with bleeding into deep tissue and muscles (*haematomas*) and joints (*haemarthrosis*)

- Storage areas in platelets: Deans body - α - granule - lysosome
- Glycoproteins in platelet membrane:

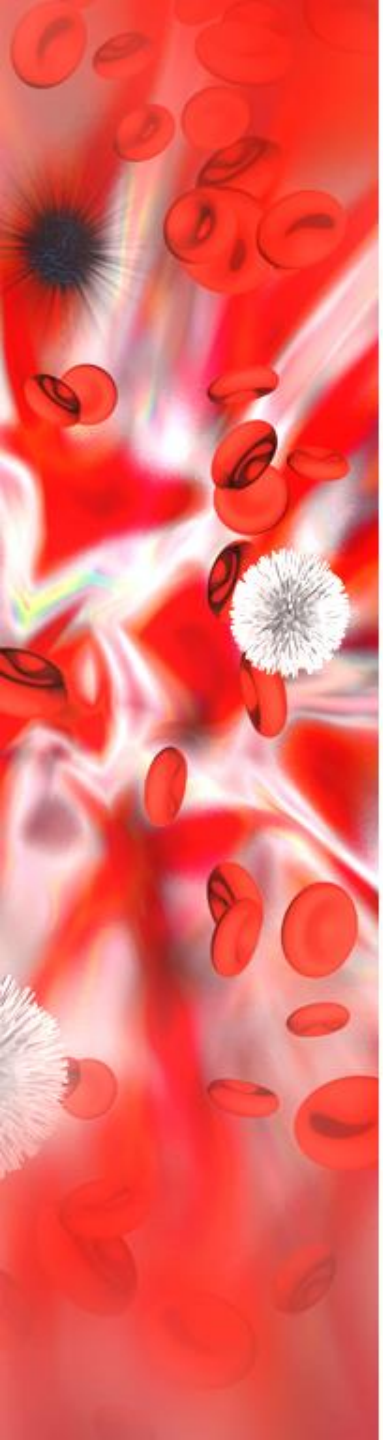
Without Glycoprotein the platelets can not adhere to subendothelial microfibrils:

Types : Gp Ia , Gp Ib and Gp IIb

- Prostacyclin inhibits platelets aggregation
- thromboxane A2 stimulates platelets aggregation



- **Adhesion**
  - Direct — by GP Ia receptor
  - indirect — by GP Ib & GP IIb, needs vW factor
- **Hereditary Platelet Disorders :**
  - Membrane abnormalities
    - -Bernard - Soluier syndrome (deficiency in glycoprotein Ib-IX-V)
    - -Glanzmann Thrombasthenia (glycoprotein IIb/IIIa abnormality)
  - Intracellular abnormalities
  - Storage-pool (dense body) deficiency
  - α- granule deficiency
    - Gray platelet syndrome
  - dense bodies and α granules
  - Defects of thromboxane synthesis
  - Miscellaneous
    - May-Hegglin anomaly
- **acquired platelet dysfunction: (Causes)**
  - Uremia , Myeloproliferative disorders , leukemia ,Drugs and Scurvy …etc
- **Thrombocytopenia (decreased platelets count):**
  - Caused by any disease affects the bone marrow or the immune system



- **Laboratory features of immune thrombocytopenia :**

#Large platelets # Reduced intravascular platelet survival.

#Increased number and size of megakaryocytes.

#Elevated levels of platelet-associated IgG.

- **Thrombotic thrombocytopenic purpura (TTP) – Hemolyticuremic syndrome (HUS) :**

Clinical Features:
- Fever.
- Thrombocytopenic purpura.
- Hemolytic anemia.
- Neurological symptoms.
- Renal dysfunction.
- genetic predisposition

Causes:
- Infections
- Hypersensitivity.
- Oral contraceptive.
- Autoimmune diseases
- Chemotherapy.

- **Blood count film :**
  - **Low platelet count :** decrease production or increase destruction
  - **Normal platelet count :** abnormal function

SummaryL6: Acute leukemia I

Acute leukaemia : is a fatal neoplastic condition .
Accumulation of abnormal blasts (Immature precursors of WBC).

• Genetic alteration leads to : Block of differentiation ,Enhanced proliferation & Decreased apoptosis .

• There are 3 classes :

Acute Myeloid Leukemia(AML) .

Acute Lymphoid Leukemia(ALL) .

Acute Leukemia of Ambiguous Lineage .

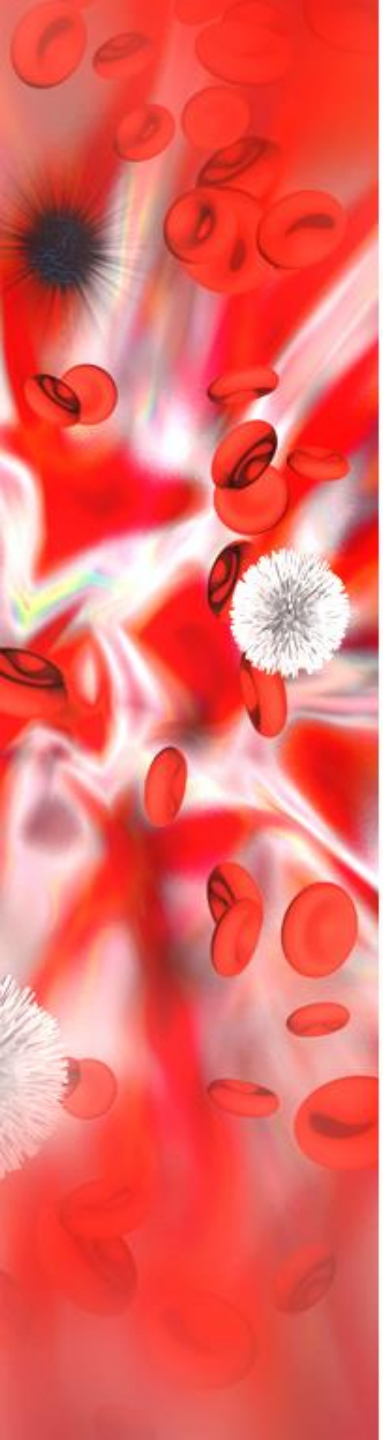
• AML mainly in adult , while ALL mainly in children

•Blast count : should be >20% out of the total cells

• . Blast morphology :

Myeloblast: Are larger and has Auer rods .

Lymphoblast: is smaller and have agranular cytoplasm



•Stem Cell Markers: (CD34& TDT).

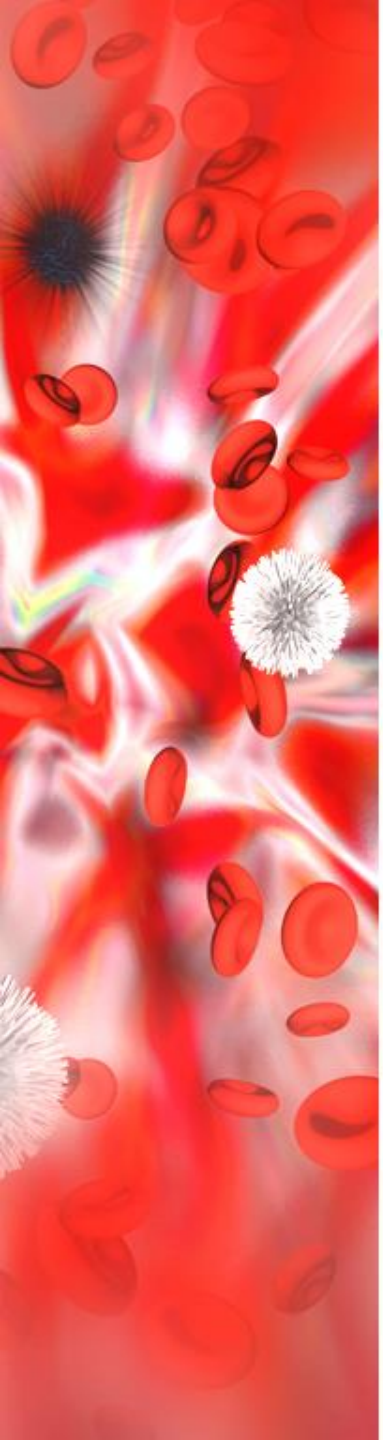
•Main lineage markers are:

- Myeloid: MPO - CD13 - CD33 - CD14 - CD41 - CD64 - CD235a
- B-Lymphoid: CD10 - CD19 - CD22 - CD79a
- T-Lymphoid: CD3 - CD4 -CD5 - CD7 - CD8

Myeloblast - Monoblast – Megakaryoblast – Erythroblast

Acute Myeloid Leukemia :

Subtype	Feature	Genetics in WHO	NOTES
M0	Minimal differentiation of myeloid stem cell		Only MPO is detected
M1	Without differentiation		
M2	**With maturation**	T(8;21)	
M3	Promyelocytic	T(15;17)	DIC+ Auer rods + heavy granulation
M4	Granulocytic & Monocytic	T or Inv(16;16)	Gum hyperatrophy
M5	Monocytic M5b+Monoblastic M5a	T(9;11)	
M6	Erythrocytic(dark erythroid precursor)	+ve CD235a	No mature RBcs
M7	Megakaryoblast "platelets"	+ve CD41	Thrombocytopenia
M8	Basophilic		



WHO Classification: (Based on Genetics)
AML with recurrent genetic abnormalities has a good prognosis.
Myelodysplasia related AML OR Therapy related AML : poor prognosis .
.

Clinical Features:

Pancytopenia : Decrease HB , PLATELETS . Functional WBCS
Hepatosplenomegally .
Lymphadenopathy (rare) .
Leucostasis : Increased blood viscosity .

Myeloid sarcoma - Gum hypertrophy - CNS disease (M4-M5)
DIC: Widespread activation of coagulation system (M3)

Prognosis:
is good with: t(8;21), inv(16;16) or t(15;17)
Less than 60 yrs.

Chemotherapy Treatment: all have the same protocol except M3:
target "ATRA"

SummaryL7 : Acute leukemia II

❖ **Acute lymphoid leukemia: is a proliferation of malignant lymphoid blasts in bone marrow and blood.**

 # More in children and prognosis better than AML .

❖ **Most important clinical feature :**

1- Pancytopenia
2- Organ infiltration specially lymphadenopathy
3- in case of T cell ALL you fiend Mediastinal mass .

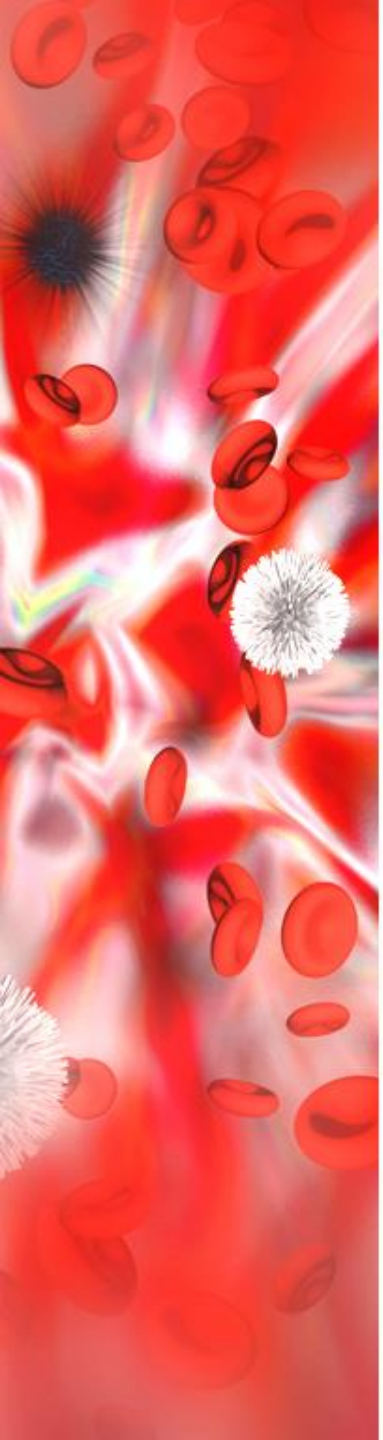
❖ **Regarding FAB subtypes it's classified into 3 subtypes :-**

1- L1 (Homogenous + small cell).
2- L2 (Heterogeneous + variable cell size with more cytoplasm)
3- L3(Burkitt's) (Homogenous + small VACULATED cell + t(8,14)c-myc mutation)

❖ **Regarding WHO subtypes two types :**

1- B-cell ALL (80% + better prognosis + young age + less WBC + CD19 marker + gene involvement t(9,22)- t(4.11)- t(12.21) .

2- T-cell ALL (20% + worse prognosis + CNC , Mediastinal mass + old age + CD3 marker + more WBC .



❖ To differentiate between B-ALL and T-ALL subtypes :

1- (Regarding B-ALL/ If CD34 +TDT **positive** it's precursor B-cell If also CD10 positive now it called Common B-cell (good prognosis) .
/ But If surface immunoglobulin positive it's Mature B-cell)

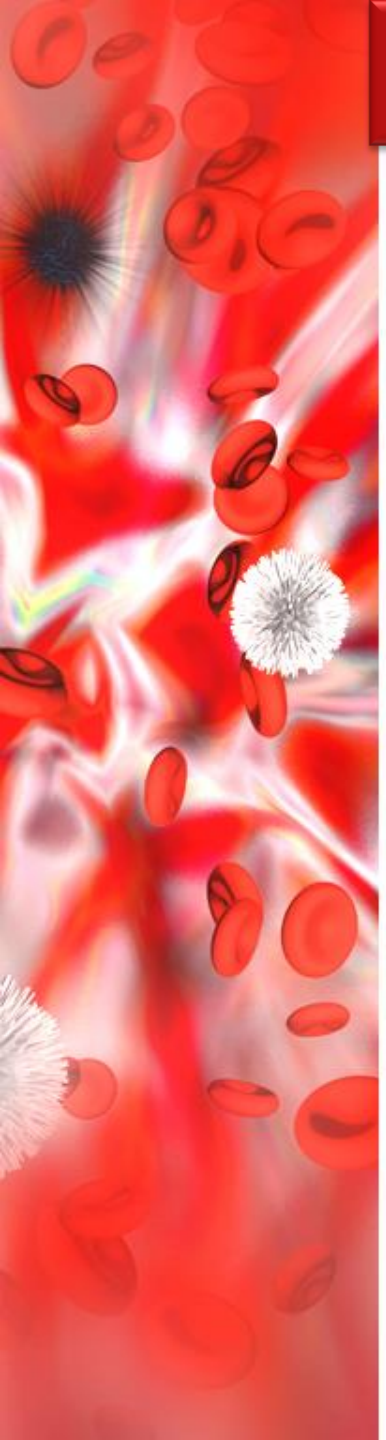
2- (Regarding T-ALL / if CD3 still in cytoplasm (cCD3 positive) it's precursor T-cell .

/ But if CD3 goes to cell surface (sCD3 positive) it's Mature T-cell
OR test for CD4+CD8 if both +ve or both –ve it's precursor
But if Only one +ve it's Mature).

❖ Better prognosis in **Female** , age from (2-10y) and **Hyperdiplidy** t(12,21).

❖ Bad prognosis in Male , **CNS involvement** , Hypodiploidy t(9,22) .

❖TREATMENT with 1- Chemotherapy . 2- Stem Cell Transplantation .



SummaryL8: Chronic leukemia

	Chronic myeloid leukemia (CML)
Type of cells	Proliferation of granulocytes (mature cells)
Clinical presentation	Massive splenomegaly
Gene	BCR-ABL1 positive
Chromosome	Philadelphia (Ph) positive
Mutation	t(9,22)
Treatment	1st line :Imantinib (Trade name:Gleevec) 2nd line : If no response (stem cell transplantation)

Main Differential Diagnosis

Diagnosis	CML	CMML
Gene (BCR-ABL1)	Positive	Negative
Type of cells	Granulocytosis	neutrophils + Monocytosis

Diagnosis	CML	Leukomoid reaction
Gene(BCR-ABL1)	Positive	Negative
NAP score	Low	High

	Myelodysplastic syndrome (MDS)
Peripheral	Cytopenia
morphology	dysplasia
Genetic abnormalities	-5,-7
Treatment	Supportive,Chemotherapy

Chronic Myeloid Leukemia (CML) Phases

Chronic phase

- Leukocytosis (12-1000×10⁹/L)
- Mainly neutrophils & myelocytes
- Blasts ≤10% ,Basophils≤ 20%
- Stable course (years)

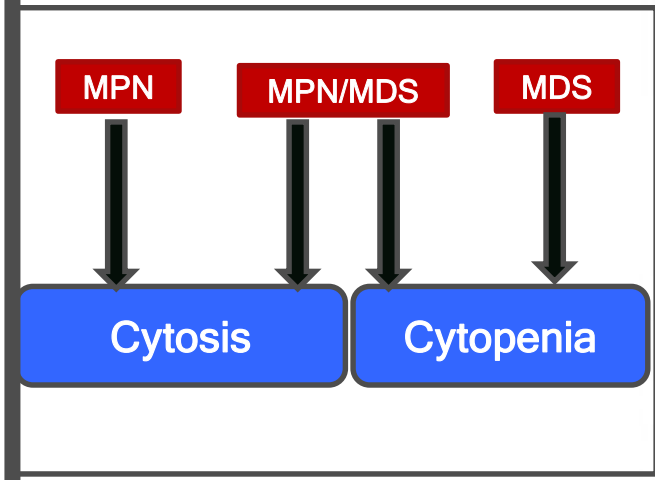
Accelerated phase

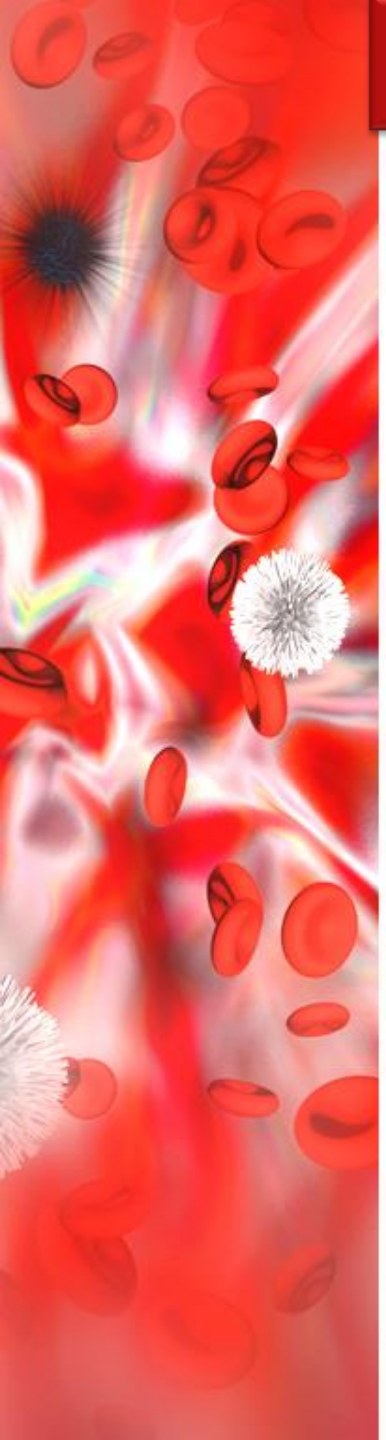
- Increasing counts
- 10-19% blasts (basophils ≥20%)
- Unstable course (months)

Blastic phase

- ≥20% blasts = Acute Leukemia
- 80% AML & 20% ALL WHY ?
- (coarse: Weeks)

MPN vs. MDS vs. MPN/MDS





SummaryL9: Myeloproliferative Neoplasms

Polycythemia: raised Hb or packed cell volume (PCV)

Polycythemia classified to:

Relativ polycythemia	2nd polycythemia	Polycythemia vera
↓ Plasma volume	↑ RBCs due to high EPO	↑ RBCs due to malignancy

Polycythemia vera:

↓erythropoietin, **JAK2 mutation (95%),** Hypercellular bone marrow

↑ blood viscosity, thrombosis & hepatosplenomegaly

Investigation: ***CBC**=↑ RBCs and Hb … ***Blood smear**= normocytic normochromic RBCs … ***Bone marrow** = hypercellular (erythroid precursors)

Treatment: Venesection, Aspirin ±Hydroxyuria

Complication: 10% AL and 20% Myelofibrosis

Essential Thrombocythemia (ET):

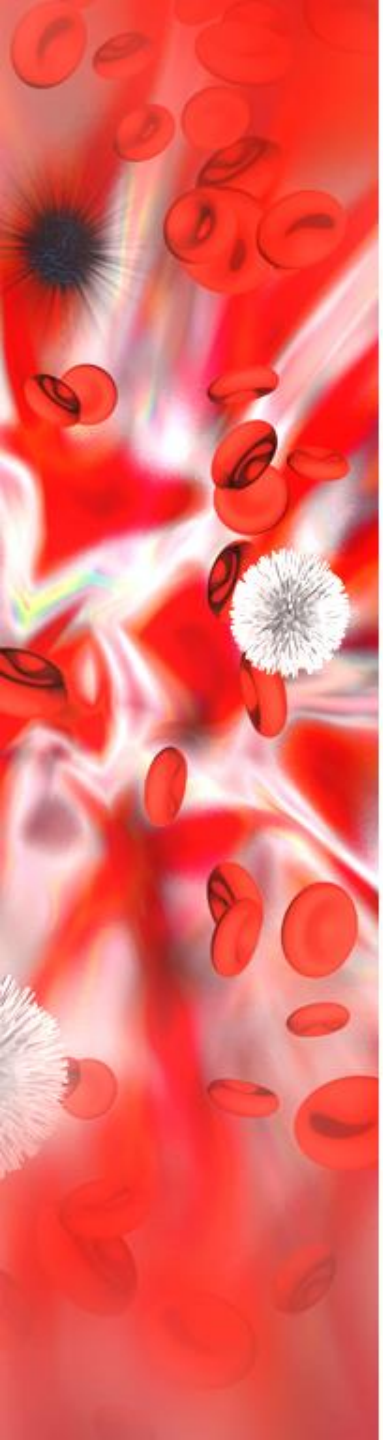
Sustained thrombocytosis (≥45O×10⁹).

Hypercellular BM

JAK2 mutation (60%)

Clinical Presentation: Asymptomatic, thrombosis, bleeding, hepatosplenomegaly

Treatment: Aspirin ±Hydroxyuria



Primary Myelofibrosis (PMF):

Proliferation of megakaryocytes & granulocytes

Deposit of fibrous C.T (fibrotic bone marrow)

Extramedullary haematopoiesis (case splenomegaly)

JAK2 mutation (50%)

Leukoerythroblastic blood picture

Risk of AML transformation

Stages of PMF:

Prefibrotic stage	Fibrotic stage	AML transformation
7-10 years survival	3-7 years survival	≤1 year survival

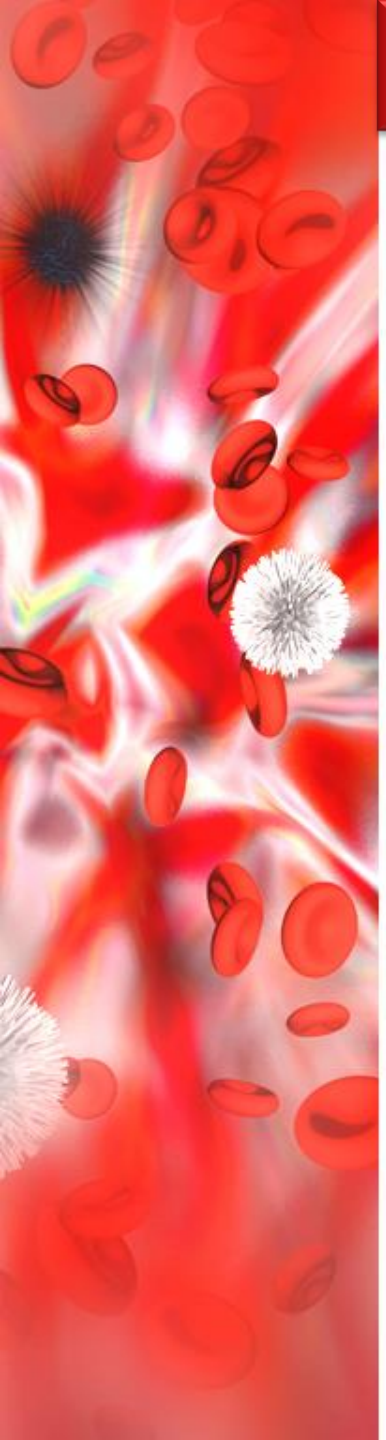
JAK2 mutation:

Point mutation (at codon 617 in JH2)

Leads to loss of auto inhibitory control over JAK2.

#The mutated JAK2 is in a constitutively active state

Lead to increase proliferation and decrease apoptosis



SummaryL10: Approach To Haemolysis And Haemoglobinopathies

-Premature destruction of RBCs.

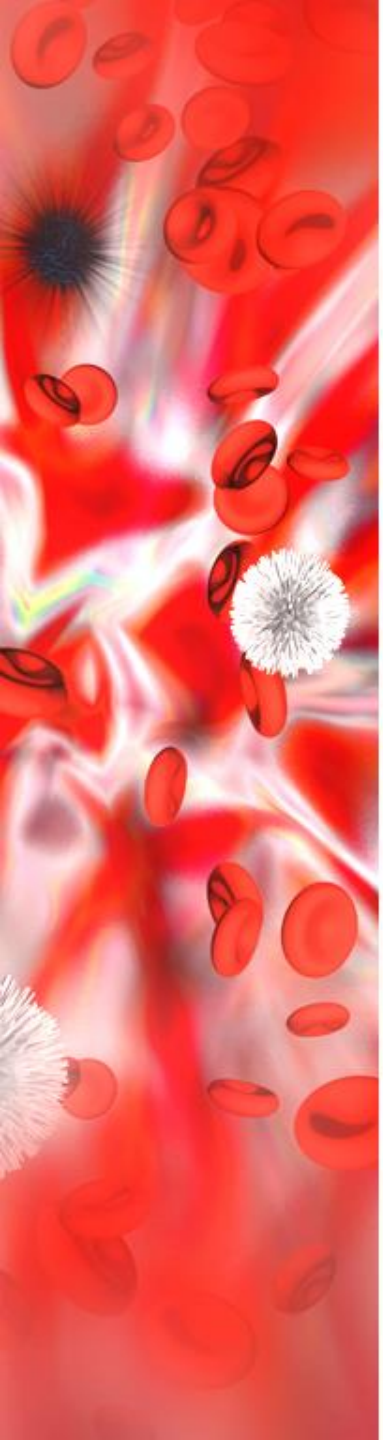
Clinical feature of Hemolysis :

Pallor, lethargy , Jaundice , Splenomegaly
Gall stones (Pigment – bilirubin) and Dark urine (urobilinogen)

TYPES	intra-corpuscular	extracorpuscular
Definition	the process of breakdown of red cells directly in the circulation as in Congenital Anaemia	excessive removal of red cells by cells of RE system in the spleen and liver. in acquired Anaemia
laboratory features	Haemoglobinaemia Haemoglobinuria Haemosiderinuria	↑ Serum unconjugated bilirubin ↑Urine urobilinogen ↑Faecal stercobilinogen ↑ LDH Absent Serum Heptoglobins

- **Hemolytic Anemia could be:**

Congenital	Acquired
• Hemoglobin Defect (Eg: Sickle cell) • Thalassaemias • Emzymopathies (G6DP or PK deficiency) • Membranopathies Eg. Hereditary spherocytosis, Elliptocytosis, Acanthocytosis.	• **Red cells fragmentation Syndrome (Seen In Patient With Cardiac Valves)** **infection (**Malaria, clostridia) • Paroxysmal nocturnal Haemoglobinuria. • Autoimmune Haemolytic Anaemias.



- Hb C: α2 β2 6 GLU→ LYS.
- Sickle Cell Anemia "HbS": α2 β2 6-GLU →VAL
- Sickle cell clinical manifestations:
  - Foot and leg syndrome
  - Leg Ulcer
  - Short middle finger
  - Hair on head (seen on X-RAY)

- Laboratory Diagnosis:
  - Low Hb
  - BLOOD FILM: irreversible SICKLE CELLS, TARGET CELLS and normocytic normochromic.
  - Sickle Solubility Test: +ve
  - Hb electrophoresis:
    HbS level <45% = TRAIT
    HbS level >45% = DISEASED
-

Indications for blood Transfusion:
  - Severe painful crisis associated with severe hemolysis.
  - Pregnancy.

- Patients with Sickle cell anemia have high risk of Salmonella "infections in general".

SummaryL11: Lymphoproliferative disorders

- Causes:

1- Viral infections: infectious mononucleosis

2- Bacterial infections: pertussis,

3- Chronic lymphocytic leukemia (CLL)

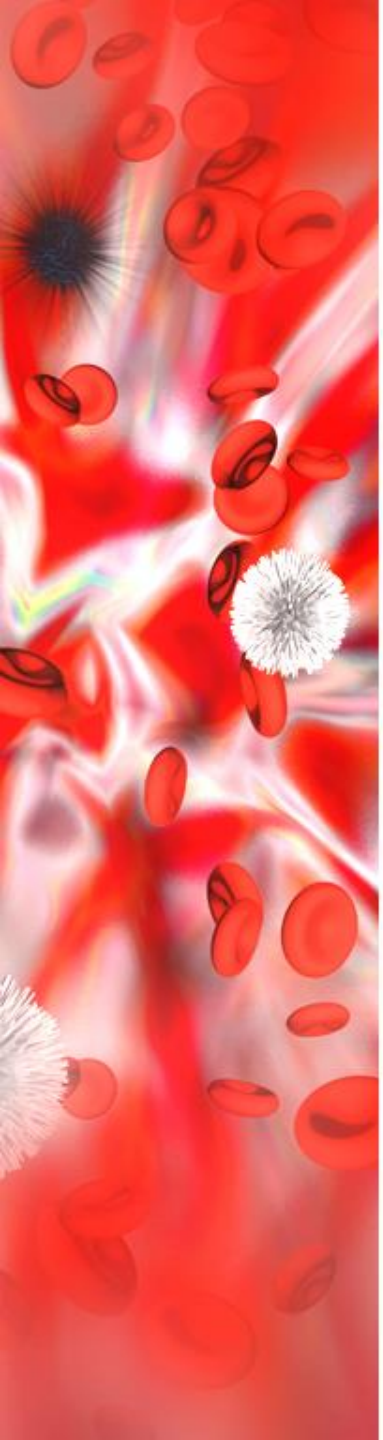
4- Other lymphomas: Mantle cell lymphoma ,Hodgkin lymphoma

- Infectious Mononucleosis :
- caused by Epstein-Barr virus and characterized by **fever, swollen lymph nodes (painful), Sore throat**. Transmitted through saliva.
- Implicated in the development of Burkitt's lymphoma and Hodgkin's disease
- Serology Tests :

A.Virus specific antibodies: IgM, IgG **B.** Heterophile Antibodies

Antibodies produced due to infection and react to antigen in animal RBCs

- Paul-Bunnell test\ Sheep RBCs
- Monospot test\ Horse RBCs



- Chronic Lymphocytic Leukemia (CLL)
- Malignant conditions characterized by an increased number of small, mature appearing lymphocytes in the blood (>5,000) and bone marrow (± spleen and lymph node). seen in the elderly
- Charactersitics: Small matureappearing lymphocytes,Condensed ("soccer ball") nuclear chromatin & Numerous "smudge cells

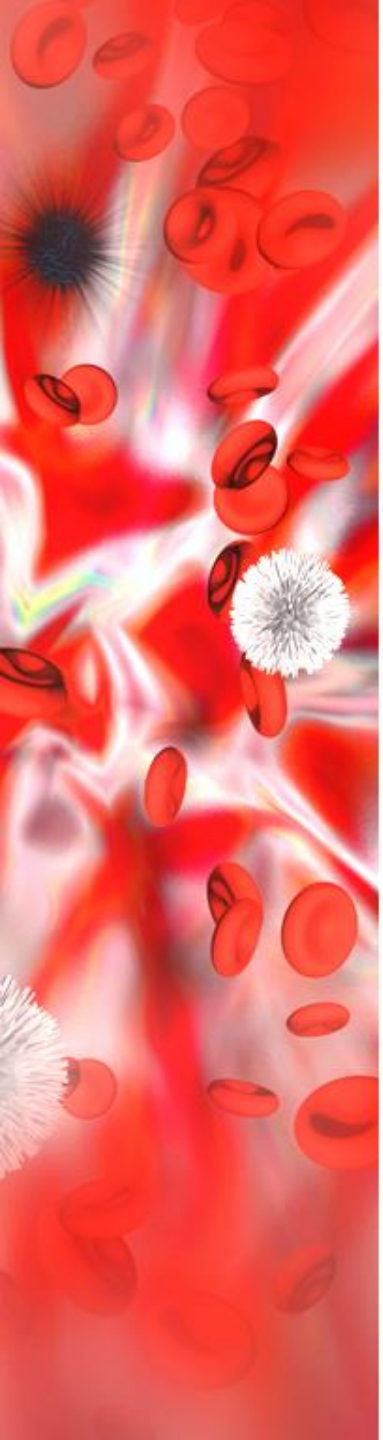
- Burkitt's lymphoma
- High-grade non-Hodgkin's B-cell lymphoma which is rapidly growing and highly aggressive with extremely short doubling time (24 hrs)
- Types:

1-**Endemic**: associated with chronic malaria and EBV. It affects the jaw, other facial bone and breast.

2-**Sporadic**:affects GIT.

3-**Immunodeficiency-associated**: associated with HIV infection or the use of immunosuppressive drugs

- Morphology: Diffuse infiltration with "starry sky"
- Genetics of BL:
  - Highly associated with t(8;14)
  - Translocation of the c-MYC proto-oncogene at chromosome 8 to immunoglobulin gene at chromosome 14
  - Burkitt's lymphoma is the fastest growing tumor in humans.



- Follicular lymphoma
- malignant proliferation of germinal center B cells centrocyte which has at least a partially follicular pattern. Due to overexpression o f Bcl2 caused by t(14;18) .
- Diagnosis: Positive for **CD10,CD20 and Bcl2**. Negative for **CD5** (in most cases)
- Management: Transformation to aggressive lymphoma (DLBCL) can occur

- Multiple Myeloma
- Malignant B neoplasm characterized by a **triad** of abnormalities:
- Accumulation of plasma cells in the bone marrow
- Lytic Bone lesions
- Production of a monoclonal immunoglobulin (Ig) or Ig fragments

- Hodgkin lymphoma
- Indolent malignant lymphoma characterized by :
- 1- presence of few large binucleated cells (Reed-Sternberg) surrounded by reactive cells (lymphocytes, plasma cells ,eosinophils)
- 2- Involving cervical lymph nodes in young adults (most often)
- Diagnosis : **CD 30 , CD15**

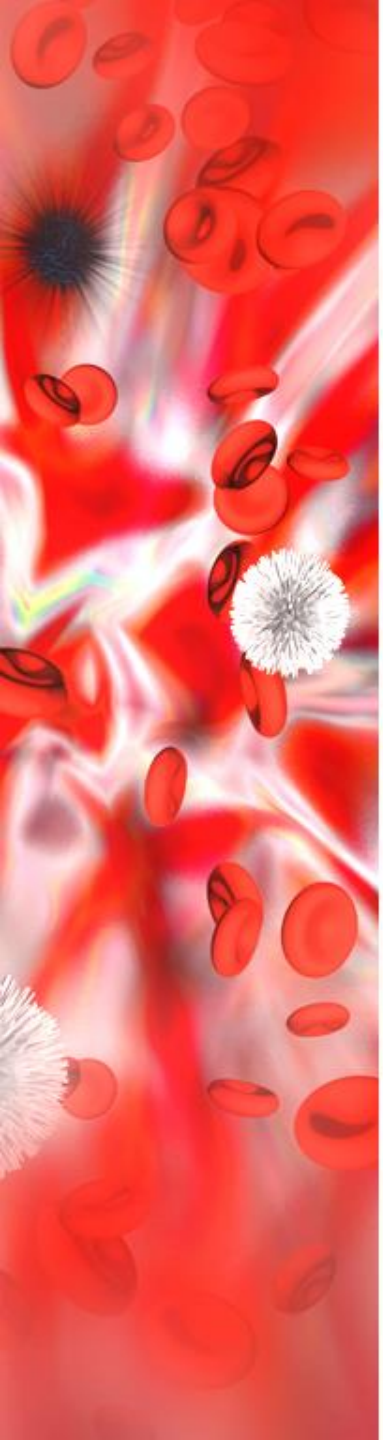
SummaryL12: Bleeding disorders

- coagulation process: has 2 pathways (intrinsic & extrinsic)
- The two pathways will meat at the COMMON FINAL PATHWAY
- Tissue Factor : is the main stimulus for coagulation cascade.

- HAEMOPHILIA :
- A due to Factor VIII Deficiency
  B due to Factor IX Deficiency (Christmas Disease)
  C due to Factor XI Deficiency

- Von Willebrand Disease : Von Willebrand Factor is important for 2 reasons (platelet-collagen adhesion and carrier for factor VIII).
- Clinical features :
- 1- muscle bleeding. 2- Hemarthoses .
- If the coagulation factor activity <1% will lead to Severe disease, joint deformity and crippling , and spontaneous bleeding episodes.
  if it 1%-5% will lead to Moderate disease ,Post-traumatic bleeding
  & if it 5%-20% will lead to Mild disease , Post-traumatic bleeding

- We do Coagulation Profile to diagnose HAEMOPHILIA if:
- PT is prolonged : problem with the Extrinsic pathway.
- APTT is prolonged : problem with the Intrinsic pathway.
- Both are prolonged : problem with the common pathway.



How to differentiate between haemophilia A&B and VW disease?

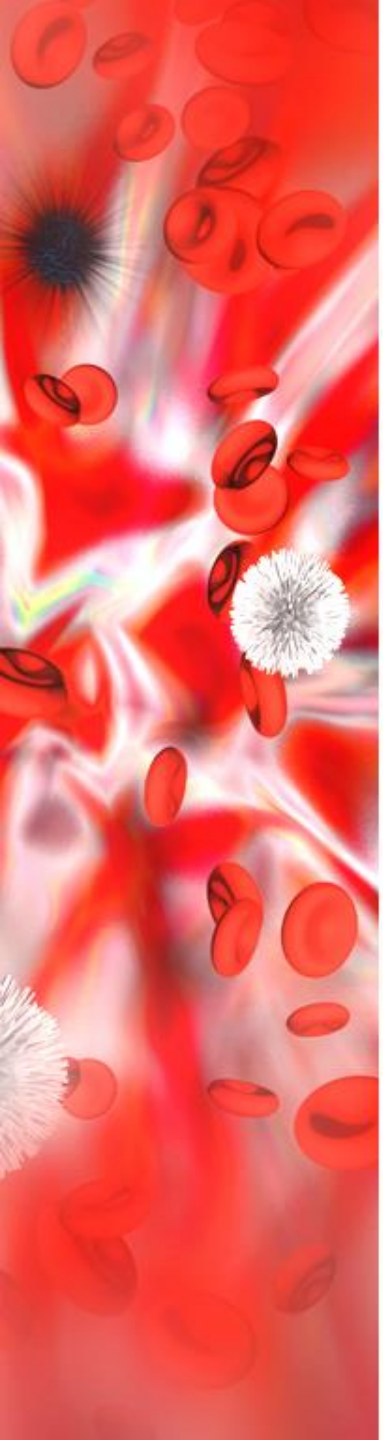
Haemophilia A & B are similar except in the affected factor. But VW disease has totally different characteristics.

	Haemophilia A or B	VW disease
Inheretance	Sex-linked	Dominant
Site of hemorrage	Muscle - joints	Mucous membranes – skin cuts
Bleeding time	Normal	Prolonged (because VW factor has a role in the aggregation)
PT	Normal	Normal
PTT	Prolonged	Prolonged or normal
Affected factor	A: factor VIII , B: factor IX	Factor VIII (because VW is carrier for factor VIII)
VW factor	Normal	Decreased or has abnormal function
Platelet aggregation test	Normal	Abnormal

Von-Willebrand disease:

o Classification:

- Type1: Quantitative partial deficiency.
- Type2: Functional abnormality.
- Type3: complete deficiency



-Disseminated Intravascular Coagulation (DIC):

❖ **Causes:**

• **Infections:** malaria

• **Malignancies:**mucin-secreting adenocarcinoma , Acute promyelocytic leukaemia (AML-M3)

•**Obstetric complications**: Amniotic fluid embolism abortion

• **Hypersensitivity reactions:** Anaphylaxis (Drug induced), Incompatible blood transfusion

•**Widespread tissue damage** Following surger

•In case of DIC the patient will have (low platelet count , prolonged PT, APPT and TT and high FDP's)

Q1: Which of the following is clinical distinction associated with platelets defects:

a. Haematomas bleeding
b. Mucocutaneous bleeding
c. Haemarthrosis bleeding
d. Musculoskeletal bleeding

Q2: Which of the following is NOT hereditary vascular disorder:

a. Senile purpura
b. Homocystinuria
c. Ehlers-Danlos syndrome

Q4: Which of the following is the normal range of platelet count:

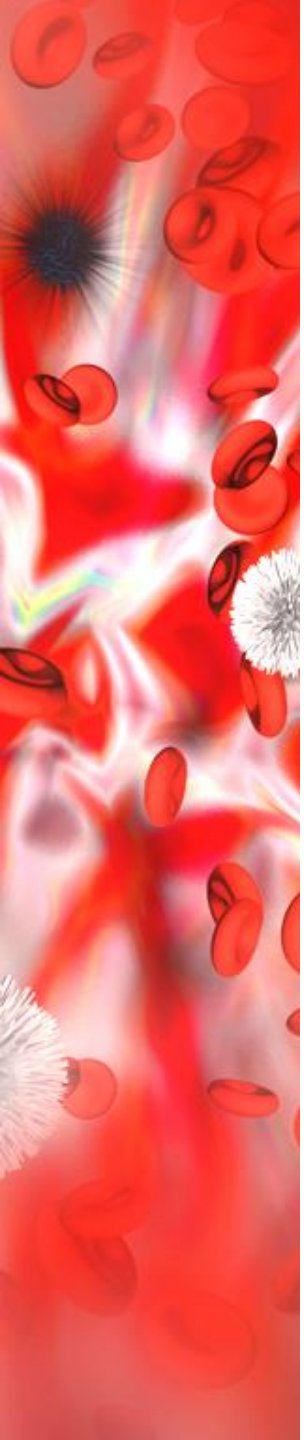
a. 350-500x10^9L
b. 200-300x10^9/L
c. 150-400x10^9/L
d. 500-750x10^9/L

Q5: All of the following are contents of dense granule except:

a. ADP
b. Ca^{2+}
c. Fibrinogen
d. Serotonin

Key answers : 1-b 2-a 4-c 5-c

MCQs L5



Q6: Which of the following platelet adhesion receptors bind directly to collagen:

a. GP IIb
b. GP Ia
c. GP IIIa
d. GP Ib

Q7: Which of the following disorders is α-granule deficiency:

a. Thrombasthenia
b. Platelet factor-3 deficiency
c. Thromboxane synthetase deficiency
d. Gray platelet syndrome

Q8: Thrombasthenia doesn't respond to all GP except:

a. Ristocetin
b. ADP
c. Collagen
d. Arachidonic acid

Q9: Bernard-Soluier syndrome respond to all GP except:

a. Ristocetin
b. ADP
c. Collagen
d. Arachidonic acid

Key answers : 6-b 7-d 8-a 9-a

Q10: Which of the following is NOT used in the treatment of immune thrombocytopenia :

a. IV immunoglobulins
b. Corticosteriods
c. Platelet transfusion
d. Splenectomy

Q11: Patient presents with superficial bleeding into the skin. This type of bleeding called :

a. musculoskeletal
b. internal
c. Mucocutaneous
d. external

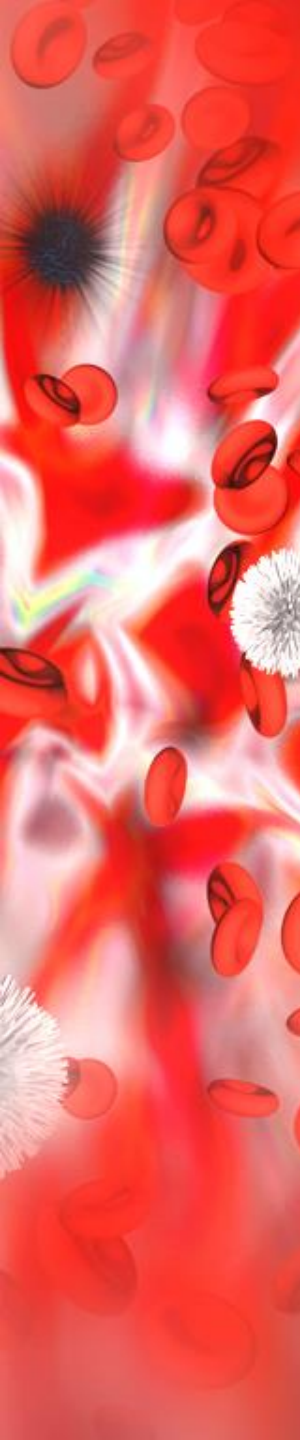
Q12: Which one of the following results from deficiency in glycoprotein Ib:

a. Bernard – Soluier syndrome
b. Glanzmann Thrombasthenia
c. May-Hegglin anomaly
d. Gray platelet syndrome

Q13: Patiens with Hemolyticuremic syndrome (HUS) may present with :

a. Decrease blood urea level
b. Thrombocytosis
c. Renal failure
d. Iron deficiency anemia

Key answers : 10-c 11-c 12-a 13-c



Q14: One of the laboratory findings in immune thrombocytopenia :

a. Decrease megakaryocytes number
b. Increase intravascular platelets survival
c. Increase megakaryocytes size
d. No large platelets

Q15: Which one of the following does prostacyclin do :

a. Inhibits ATP to cAMP conversion
b. Stimulates platelets aggregation
c. Increases Ca++ in platelets
d. Inhibits platelets aggregation

Q16: Which one of the following is a storage area in platelets :

a. α – granule
b. Deans body
c. endoplasmic reticulum
d,. A & B

Q17: musculoskeletal bleeding is due to :

a. Clotting factors defects
b. Blood vessel wall defects
c. Bone marrow defects
d. Platelet defects

Key answers : 14-c 15-d 16-d 17-a

Q1: which one of the following is true about the pathogenesis of Acute Leukemia :

a. Block differentiation & increase apoptosis
b. Enhanced differentiation & decrease apoptosis
c. Enchaced the differentiation & apoptosis
d. Block differentiation & decrease apoptosis

Q2: in acute myeloid leukemia the blast count should be :

a. 5 % of total cells .
b. >20 % of total cells .
c. <20 % of total cells .
d. 10-15 % of total cells .

Q3: which one of the following is a marker for Megakaryoblast:

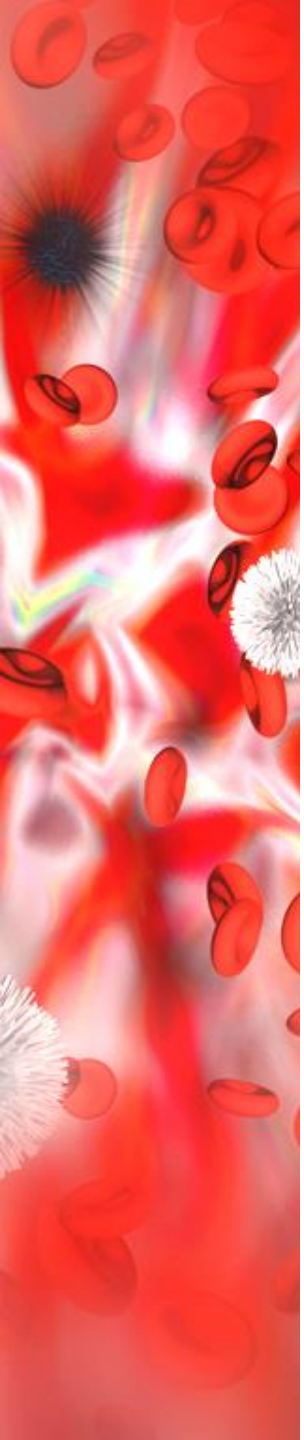
a. CD64 .
b. CD3 .
c. CD235a .
d. CD41 .

Q4: one of these features can be seen in subtype M3 :

a. Granulocyte.
b. Monocyte .
c. +ve CD235a.
d. Promyelocyte.

Key answers : 1-d 2-b 3-d 4-d

MCQs L6



Q5: in which of the following subtype we will see two types of cells :

a. M1
b. M4
c. M5
d. M3

Q6: subtype M3 is associated with which of the following gene translocation :

a. T(15;17)
b. T(8;21)
c. T(9;11)
d. T(16;16)

Q7: Gum Hypertrophy are more common with :

a. M1 & M3
b. M4 & M5
c. M6 & M2
d. M3 & M4

Q8: which one of the following is a marker for Erythroblast :

a. CD13 , CD33
b. CD41
c. CD235a
d. CD3

Key answers : 5-b 6-a 7-b 8-c

Q9: Auer rods is a characteristic feature for:

a. Myeloblasts.
b. Erythroblasts.
c. Lymphoblsts.
d. Monoblasts.

Q10: Disseminated Intravascular Coagulation (DIC) is usually accompany which subtype of acute myeloid leukemia:

a. M2 (with maturation) leukemia.
b. M3 (promyelocytic) leukemia.
c. M4 (granulocytic) leukemia.
d. M5 (monocytic) leukemia.

Q11: markers of T-lymphblastic, B-lymphocytic, myeloblastic leukemia, respectively:

a. CD19, CD13, CD4.
b. CD3, CD19, MPO.
c. CD79a, CD33, MPO.
d. CD3, CD19, CD10.

Q12: the main feature of acute leukemia is:

a. Abnormal blasts in circulation.
b. Increased mature WBC's.
c. indolent.
d. Cytosis.

Key answers : 9- a 10-b 11- b 12-a

Q13: Translocation or inversion of (16;16) chromosome, can give which subtype of AML:

a. M1.
b. M2.
c. M3.
d. M4.

Q14: Clinical feature of AL:

a. Pancytopenia.
b. Hypercellular bone marrow.
c. Associated with t(9;22).
d. All above.

Q15: All AML subtypes treated by chemotherapy at the same protocol except one, treated by ATRA or arsenic:

a. M3.
b. M4.
c. M5.
d. M6.

Key answers : 13- d 14- a 15- a

Q1:Which one is more common ?

a. T-cell ALL
b. B-cell ALL
c. T-cell lymphoma
d. Precursor T-cell

Q2: In case of chromosomes are more than 50 it' ?

a. Homogenous
b. Hypodiploidy
c. Heterogeneous
d. Hyperdiploidy

Q3:The most important clinical feature in children with T-cell ALL?

a. Mediastinal massL
b. Testicles involvement
c. Vomiting
d. CNS involvment

Q4: If test for CD34 ,TDT and CD10 positive so the case is ?

a. T-cell ALL
b. B-cell ALL with bad prognosis
c. common B-cell with good prognosis
d. Burkett's

Key answers : 1-b 2-d 3- a 4-c

MCQs L7

Q5: If You test for CD4 and CD8 and only CD4 is positive so it is?

a. Mature T-cell or T-cell lymphoma
b. Burkitt's
c. Precursor B-Cell ALL
d. Precursor T-cell

Q6:Which one of these cases has Bad prognosis?

a. B-cell ALL
b. Age of patient 15 years old
c. Female
d. Hyperdiploidy

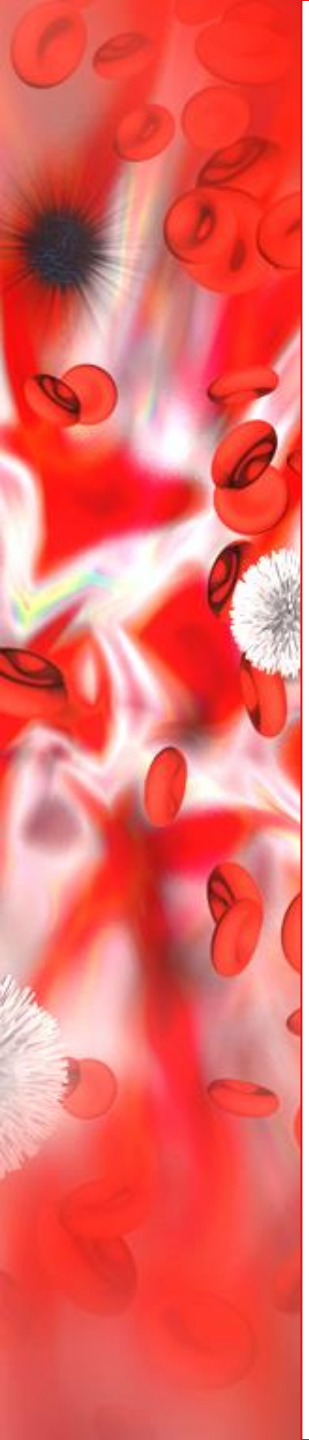
Q7:If the cell morphology is Homogenous + small cell + vacuolated cytoplasm so the most likely subtype is ?

a. L2
b. L3 (Burkett's)
c. T-cell lymphoma
d. Precursor T-cell

Q8 :Regarding L3 (Burkitt's) which one is true ?

a. represents immature lymphoid neoplasm so, it is a type of lymphoma
b. Type of ALL
c. Represents mature lymphoid neoplasm so, it is a type of lymphoma
d. Represents mature lymphoid neoplasm so, it is a type of ALL

Key answers : 5-a 6- b 7-b 8-c



Key answers : 9-e 10-c 11-a 12-c

Q9: Which of the following is clinical presentation of a child with acute lymphoblastic leukaemia:

a. A 6-month history of fatigue and repeated upper respiratory tract infection
b. Poor appetite and abdominal pain resulting from swollen spleen
c. Swollen gums in the mouth
d. Recent history of bruising and tiredness
e. A & D

Q10: Which of the following is NOT TRUE about acute lymphoblastic leukaemia:

a. It has a better prognosis in females than males
b. It may be associated with the Philadelphia chromosome
c. It causes meningeal leukaemia in 50% of cases
d. It has a high cure rate in children

Q11: Hyperdiploidy of more than 50 chromosomes is seen in:

a. acute lymphoblastic leukaemia
b. Chronic myelogenous leukaemia
c. Chronic lymphocytic leukaemia
d. Acute myelogenous leukaemia

Q12: Which of the following is NOT main lineage marker:

a. MPO
b. CD19
c. CD33
d. CD3

Q13: Which of the following is seen in Burkitt's lymphoma:

a. t(15:17)
b. t(8:14)
c. t(9:22)
d. t(11:14)

Q14: Which of the following is a stem cell marker:

a. MPC
b. CD4
c. CD19
d. CD34

Key answers : 13-b 14-d

Q1: Which ONE of these is TRUE concerning the translocation that leads to the Philadelphia chromosome?

a. It leads to increased expression of the *c-ABL* gene as it brings a strong gene promoter close to the *c-ABL* gene.
b. It is present in around 60% of cases of CML.
c. It is detected on a karyotype as the t(8;21) translocation.
d. It leads to generation of a BCR-ABL fusion protein.

Q2: Which ONE of these clinical features is commonly seen in patients who present with chronic myeloid leukaemia?

a. Swollen cervical lymph nodes.
b. Enlarged spleen.
c. Bone marrow failure with reduced peripheral blood cell count.
d. Swelling of the gums.

Q3-what genetic change defines chronic myelogenous leukemia?

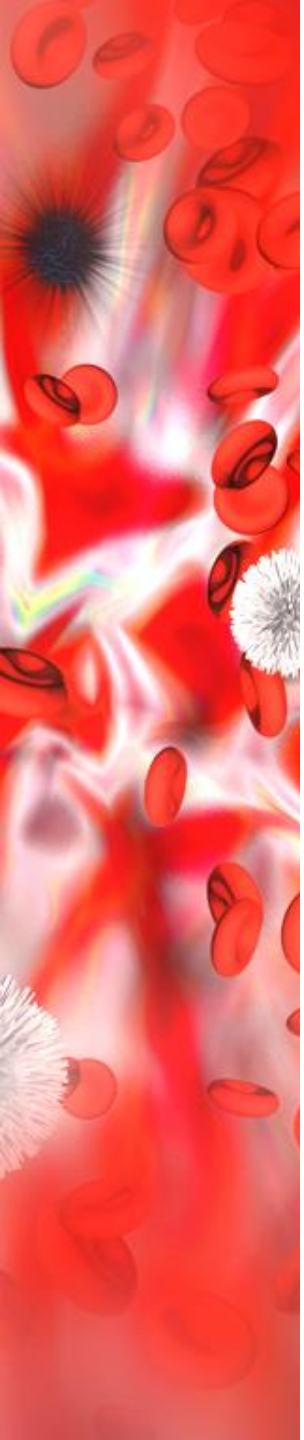
a. PH, t(9;22) BCR-ABL
b. t(8; 14)
c. t(14; 18) BCL-2
d. t(15-17).

Q4-main chromosomal abnormalities in MDS?

a. -6, -5
b. -5, -7
c. -6, -7
d. -5, -6

Key answers : 1-D 2-B 3-A 4-B

MCQs L8



Q5-chronic leukemia occur mainly in?

a. Infants
b. Children
c. Adults
d. Eldrly .

Q6-Which of the following is true about Myelodysplastic Syndromes?

a. Cytosis
b. BCR-ABL1 - positive .
c. Massive splenomegaly.
d. Enhanced apoptosis.

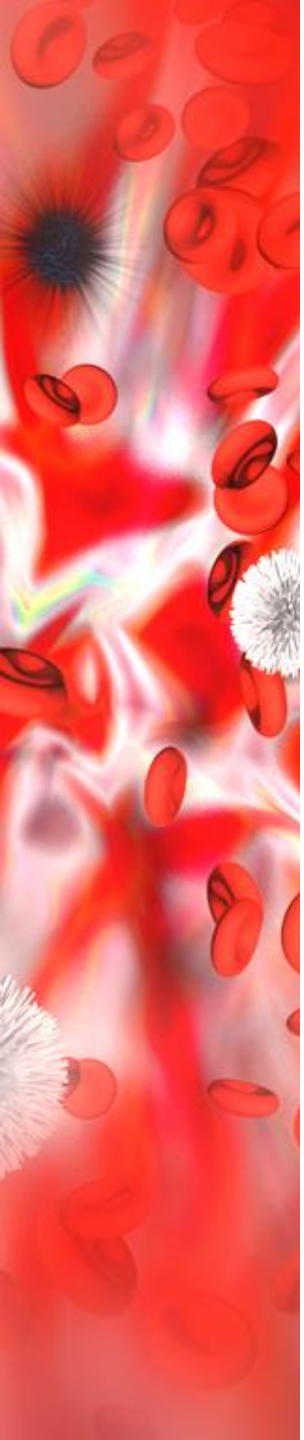
Q7- All of the following are features of chronic phase of CML Except :

a. Mainly neutrophils & myelocytes.
b. Basophils ≥20%
c. Blasts ≤10% .
d. Stable course (years).

Q8: Chronic leukemia composed mainly of:

a. Mature cells
b. Blast cells
c. a&b
d. Non above

Key answers : 5-C 6-D 7-B 8-A



KEY ANSWERS : 9-B 10-A 11-C 12-a

Q9: Myeloproliferative neoplasm is malignant proliferation of myeloid cells mainly:

a. RBCs
b. granulocytes
c. monocytes
d. lymphocyte

Q10: MPN progress to acute leukemia mainly:

a. AML
b. ALL
c. Leukemoid reaction
d. CMML

Q11: Chronic leukemia associated with BCR-ABL fusion gene located in Philadelphia chromosome:

a. AML
b. ALL
c. CML
d. CMML

Q12: High NAP score with negative BCR-ABL indicate:

a. Leukemoid reaction
b. CMML
c. CML
d. AML

Q13: Which phase of CML represent leukocytosis with blast 10%-19% :

a. chronic
b. accelerated
c. blastic

Q14: Cytopenia with dysplasia and enhanced apoptosis are features of:

a. AML
b. CML
c. CMML
d. MDS

Q15: CMML characterized by proliferation of:

a. monocyte
b. neutrophil
c. lymphocyte
d. A and b

Key answers : 13-b 14-d 15-d

Q1: Which one of these MPNs is associated with BCR-ABL1 positive?

A- PV

B- CML

C- PMF

Q2: Which one of these features is not associated with MPNs ?

A- High uric acid

B- Cytosis

C- Osteoporosis

Q3: Polycythemia vera is associated with:

A- Decreas plasma volume

B- Increas EPO

C- Increase RBCs

Q4: We could see hyper cellular erythroid precursors in

A- Bone marrow

B- Blood smear

C- CBC

Key answers : 1-B 2-C 3-C 4-A

MCQs L9

Key answers : 5-B 6-C 7-B 8-A

Q5: PMF characterized by proliferation of:

A- RBCs
B- Megakaryocytes
C- lymph nodes

Q6: Which one is the best stage of PMF?

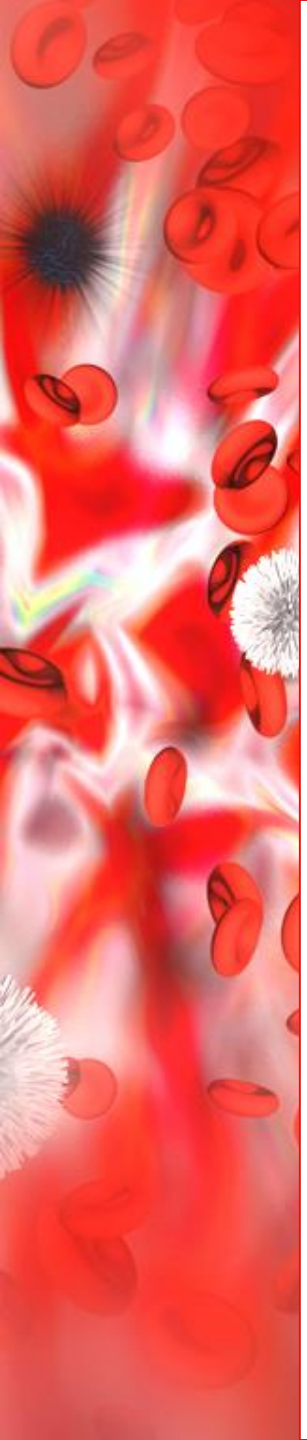
A- Fibrotic stage
B- AML transformation
C- Prefibrotic stage

Q7: Why is ET patient could suffer from bleeding?

A- Increase number of platelets
B- Platelets are non-functional
C- Positive JAK2 mutation

Q8: JAK2 mutation will not cause:

A- Negative feed back
B- Loss of auto inhibitory control
C- Increase proliferation and decrease apoptosis



Key answers : 9-b 10-c 11- a 12- b

Q9: A patient with COPD presented with polycythemia. What is the cause?

a. Decrease in plasma volume
b. Increase in erythropoietin
c. Malignant proliferation
d. Decrease in erythropoietin

Q10: A male presents with headache, dizziness, thrombosis and splenomegaly. Upon investigation, his hemoglobin count was 20g/dl and his serum erythropoietin was low. What is the diagnosis?

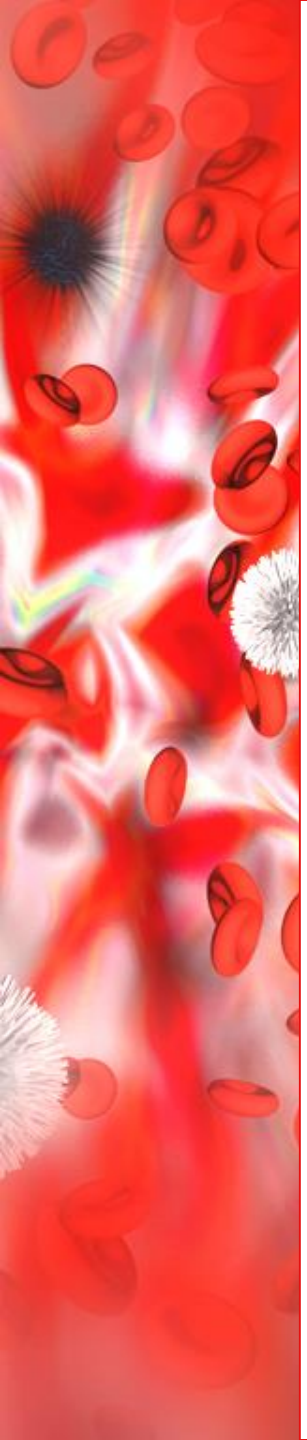
a. Relative polycythemia
b. Secondary polycythemia
c. Polycythemia vera
d. Combined polycythemia

Q11: Polycythemia is caused by:

a. Erythropoietin
b. Hemosiderin
c. Serum iron
d. Serum folic acid

Q12: Point mutation at which codon leads to the loss of auto-inhibitory control of JAK2?

a. 616 in JH3
b. 617 in JH2
c. 618 in JH3
d. 619 in JH2



Key answers : 13-d 14- a 15- b 16- d

Q13: A patient presents with anemia, massive splenomegaly and upon investigation his bone marrow was found to be fibrotic. What is the diagnosis?

a. Polycythemia vera
b. Secondary polycythemia
c. Essential thrombocytopenia
d. Primary myelofibrosis

Q14: All of the following are the causes of secondary polycythemia except:

a. Dehydration
b. Renal disease
c. Parathyroid adenoma
d. High altitude

Q15: Which of the following is a characteristic of the fibrotic stage of primary myelofibrosis?

a. AML transformation
b. Extramedullary hematopoiesis
c. Leukocytosis
d. Thrombocytosis

Q16: Massive splenomegaly is an indicator of which of the following?

a. Chronic myeloid leukemia
b. Myelofibrosis
c. Acute leukemia
d. a&b

Q1: One of the most important features that indicates an increase in red cell breakdawn is :

a. Normal serum haptoglobines
b. Increase Lactate dehydrogenase (LDH)
c. Decrease faecal stercobilinogen
d. Decrease in serum bilirubin

Q2: Patient with a mechanical heart valve replacement presented to the hematologic clinic with jaundice and splenomegaly. Laboratory findings revealed haemoglbinuria and haemosiderinuria , he is expected to have :

a. red cell fragmentation syndrome
b. Thalassemia
c. Iron deficiency anemia
d. Leukemia

Q3: defect in the glutamic acid in B globin cause :

a. Thalassemia
b. Sickle cell anemia
c. Leukemia
d. Lymphoma

Key answers : 1- B 2- A 3-B

MCQs L10

Q4: If one parent was a carrier of an abnormal allele (HbS) 50 % of their children's will be :

a. carriers
b. homozygous sickle cell disease
c. Healthy
d. Heterozygous sickle cell disease

Q5: Patient presented to hematologic clinic with severe joints pain , hepatosplenomegaly and leg ulceration. He is expected to have:

a. Iron deficiency anemia
b. Leukemia
c. Sickle cell disease
d. Thalssemia

Q6: One of the most important Confirmation test for the sickle cell disease is:

a. Hb electrophoresis
b. PCR
c. CT scan
d. Biopsy

Key answers : 4-A 5-C 6-A

Key answers : 7-B 8-A 9-B

Q7: Which ONE of the following is a feature of an extravascular haemolytic anaemia?

a. Raised serum conjugated bilirubin
b. Gall stones
c. Low reticulocytes count
d. Hypocellular Bone marrow

Team 432

Q8: Which one of the following is a cause of congenital hemolytic anemia?

a. Pyruvate kinase deficiency
b. ABO incompatibility
c. Malaria
d. Red cell fragmentation syndrome

Team 432

Q9: Homozygous sickle cell disease (Hb ss) can usually be differentiated from sickle cell trait (Hb AS) by:

a. Sickle cell test.
b. Haemoglobin electrophoresis.
c. Osmatic fragility test.
d. Reticulocyte count.

Key answers : 10-A 11-D 12-A 13-D

Q10: a person was sickled patient Hb SS what is the possible state of his parents:

a. both of the parents are carriers
b. one of the parents is carrier and the other is normal
c. both parents are carriers of abnormal allele of different types (one Hb S and the other is Hb C)
d. All of the above

Q11: Which one of the following is a Clinical Manifestation in Sickle Anaemia :

a. Leg Ulceration
b. Hand-Foot Syndrome
c. Bones, Joints Pain, Abdominal Pain
d. All of the above

Q12: In sickle cell disease which DNA code Mutant ?

a. 6 GLU → VAL
b. 6 GLU → LYS
c. 121 GLU → LYS
d. 121 GLU →GLN

Q13: Which one of the following is an Indication for Blood Transfusion in Sickle Cell Anaemia ?

a. Hepatic & Splenic sequestration
b. Pregnancy
c. Aplastic crisis
d. All of the above

Q1: In multiple myeloma which one of the following is accumulated in the bone marrow?

a. Small B cells
b. Germinal cells
c. Plasma cells

Q2: To confirm follicular lymphoma which one of the following markers should be negative?

a. CD 20
b. CD10
c. CD15
d. CD5

Q3: In classical Hodgkin lymphoma which of the following is true :

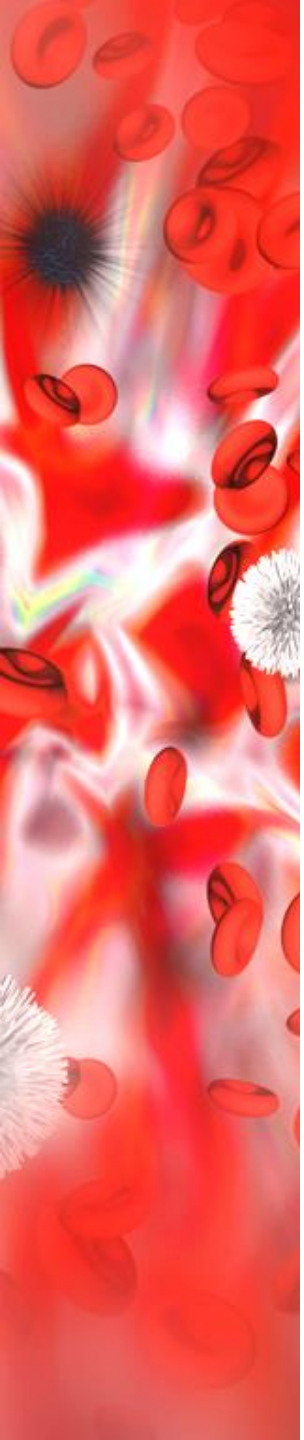
a. +CD30
b. +CD20
c. +CD15
d. Both a and c

Q4: Which one of the following immunoglobulins indicates the acute stage of IM ?

a. IgM
b. IgG
c. IgA
d. None

Key answers : 1- c 2- d 3- d 4- a

MCQs L11



Q5: a 20 year old patient present with fever, sore throat and swollen painful lymph node . His blood film showed lymphocytosis and Atypical lyphocytes , what is the most likely diagnosis ?

a. CLL
b. Infectious mononucleosis
c. Adenovirus infection
d. Mantle cell lymphoma

Q6: what is the etiology of the previous case?

a. Cytomegaly virus
b. Rubella virus
c. Brusella
d. EBV

Q7: EBV is associated with which one of the following lymphomas ?

a. CLL
b. Follicular lymphoma
c. Endemic Burkett's lymphoma
d. Sporadic BL

Q8: A 75 year old male present with lymphadenopathy and moderate splenomegaly . A blood film showed lymphocytosis (10000/ microliter) and smear cells (smudge cells) . What is the most likely diagnosis ?

a. Follicular lymphoma
b. Multiple myeloma
c. Infection
d. CLL

Key answers : 5-b 6-d 7-c 8-d

Q9: What is the fastest growing tumor ?

a. Lymphoma
b. Colon cancer
c. Burketts lymphoma
d. CLL

Q10: A translocation of a gene from Ch 14 to 18 found in follicular lymphoma patient believed to cause :

a. Over expression of BCL2
b. Mutation in C-MYC
c. Production of monoclonal IgG
d. All of the above.

Q11: A 56-year-old man came to hospital, the blood film shows proliferation mature B cell and condensed "soccer ball like" nuclear chromatin. What is likely diagnosis?

a. ALL
b. CLL
c. Burkitt's lymphoma
d. Multiple myeloma

Key answers : 9-c 10-a 11- B

Q12: A 6-year-old boy in Kenya develops swelling of the jaw. The mass responds rapidly to chemotherapy. What is the most likely diagnosis?

a. Burkitt's lymphoma
b. Follicular lymphoma
c. Mycosis fungoides
d. Lymphoblastic lymphoma

Q13: A patient presents with abdominal lymphadenopathy and peripheral blood lymphocytosis. The immunophenotype is surface immunoglopin + CD5+ and CD20+ and (CD10-). Cytogenetic analysis shows a t(11:14) translocation. What is the diagnosis?

a. Mantle cell lymphoma
b. MARGINA zone lymphoma
c. Follicular lymphoma
d. Small lymphocytic lymphoma

Q14: What is the mean feature of Hodgkin's Lymphoma?

Answer; Reed - Sternberg contain: CD 15+CD 30 positive

Key answers : 12- A 13- A

Q1: If we want to evaluate the intrinsic pathway, which screening test will be done?

a. Bleeding time
b. Aptt
c. Pt
d. Platelet function

Q2: The time of bleeding in haemophilia will be ?

a. Normal
b. Decreased
c. Increased

Q3: If patient come to the clinic and complaining from spontaneous bruising and muscle bleeding the most likely diagnosis?

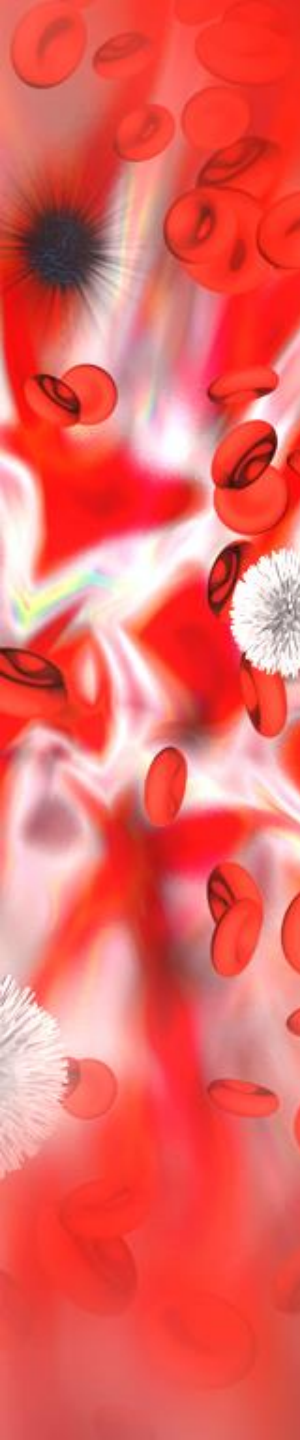
a. Haemophilia
b. Anemia
c. Leukemia
d. Thrmbocytopenia

Q4: Haemophilia A is due to deficiency of which of the following factors?

a. VIII
b. X
c. Iv
d. XI

Key answers : 1-b 2-a 3-a 4-a

MCQs
L12



Q5: A 4-year-old boy develops severe bleeding into the knee joint. Laboratory studies show that serum levels of factor IX are reduced, but levels of factor VIII are normal. What is the appropriate diagnosis?

a. Haemophilia A
b. Haemophilia B
c. Vw disease
d. Non

Q6: A 56 year old – male in KKUH with severe bleeding from his eyes and nose and areas of blocked circulations what is the most likely diagnosis ?

a. Vw disease
b. DIC
c. Haemophilia

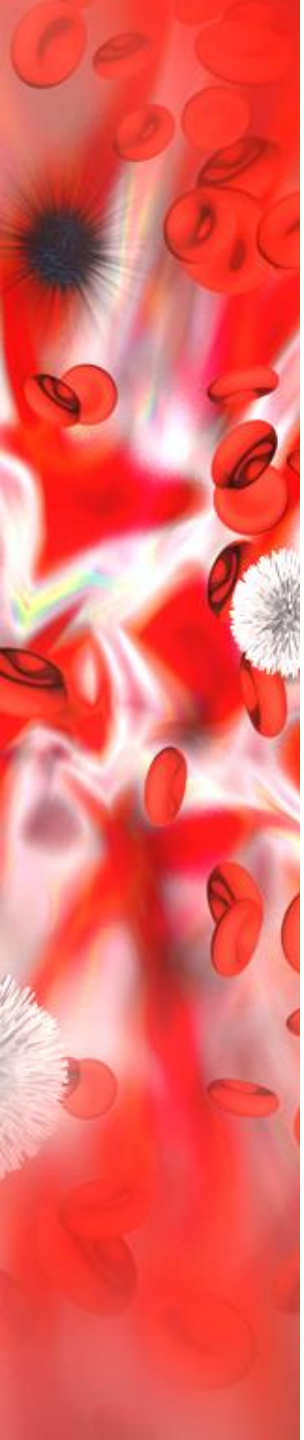
Q7: Vw patient will have platelet count ?

a. Increased
b. decreased
c. Normal

Q8: factor IX need …… to activate factor X?

a. Ca + Pl+ VII
b. Ca
c. Ca +Pl + VIII
d. Tissue factore

Key answers : 5-b 6-b 7-c 8-c



Q9: Patient have Hemophilia A , and the coagulation factor VIII less than 1 % (sever disease), the patient will present with :

a. Spontaneous bleeding
b. Post – traumatic bleeding
c. Joint deformity
d. Both a & c

Q10: If patient have prolong ATTP and prolong PT , the defect will be in :

a. Intrinsic pathway
b. Extrinsic pathway
c. Common pathway
d. No one

Q11: If PT is prolong and APPT normal ,the defect in :

a. intrinsic pathway
b. Factor XII
c. Factor VII
d. Factor IX

Q12: Which one of these can cause DIC :

a. Acute promyelocytic leukemia –M3
b. Widespread mucin-secreting adenocarcinoma
c. HIV
d. All of them

Key answers : 9- D 10-C 11-C 12-d

Q13: If patient have PT normal ,PTT abnormal, decrease in factor VIII and abnormal vWF ,he will have:

a. Hemophilia A
b. Hemophilia B
c. Von-willebrands disease
d. DIC

Q14: Von-willebrands disease type 3 is:

a. Complete quantitative deficiency
b. Partial quantitative deficiency
c. Qualitative deficiency
d. Functional abnormality

Key answers : 13-c 14-a

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Good Luck…