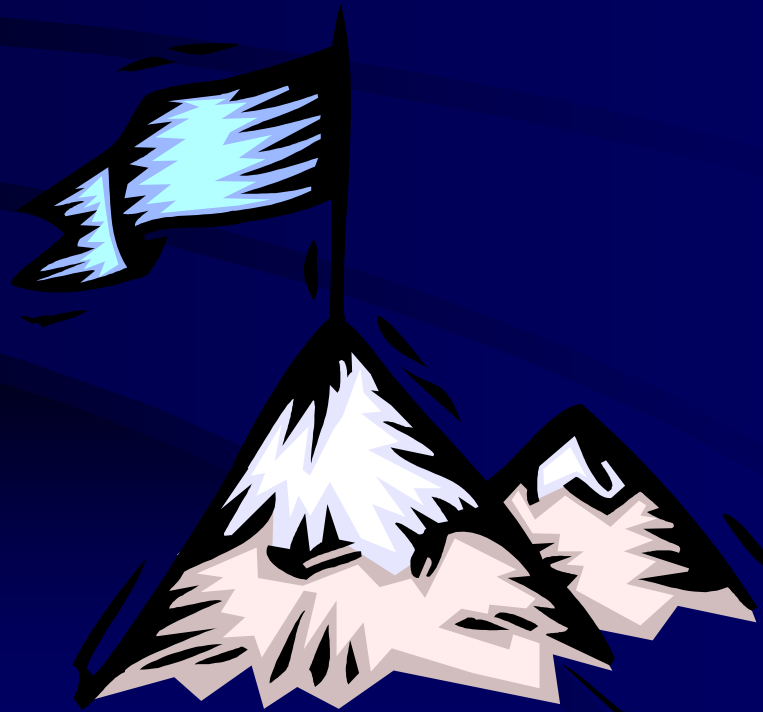


# Flags in Automated Cell Counters



# Case 1

Dr A Vazifdar

# Case 1

- 25 yrs female
- History: Weakness and fatigue since 6 months
- O/E: Pallor++  
Mild hepatosplenomegaly  
No LN

WBC 8.8

NE % 70.6

LY % 15.2 L

MO % 7.9

EO % 5.7

BA % 0.6

NE # 6.2 H

LY # 1.3

MO # 0.7

EO # 0.5 H

BA # 0.1

NRBC % 0.0

NRBC # 0.0

RBC 2.95 L

HGB 5.7 cL

HCT 17.7 cL

MCV 60.0 cL

MCH 19.1 aL

MCHC 31.9 L

RDW 21.9 aH

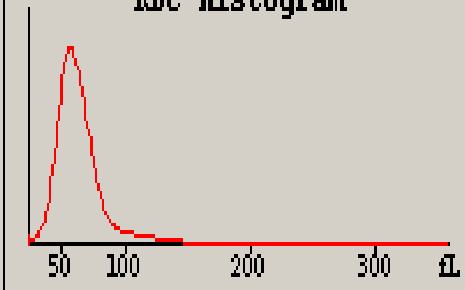
PLT 525 H

MPV 7.3

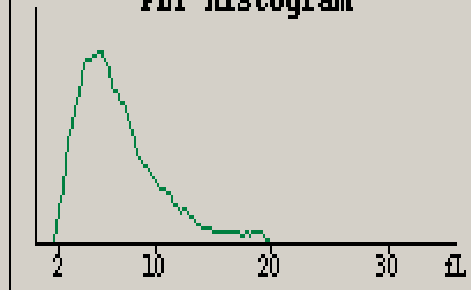
Suspect / Definitive

- Anemia
- Anisocytosis
- Hypochromia
- Microcytosis

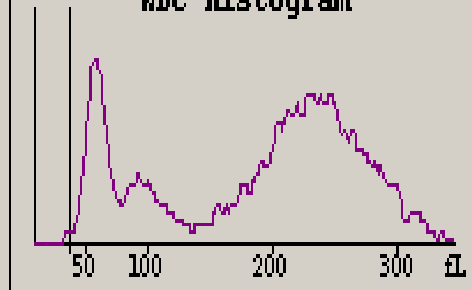
RBC Histogram



PLT Histogram



WBC Histogram



# Findings

**Left shift of curve: Microcytosis**

**D/D:**

- Iron Deficiency Anemia,
- $\beta$  thalassemia trait,
- Anemia of chronic diseases

**ACTION:**

**RBC indices**

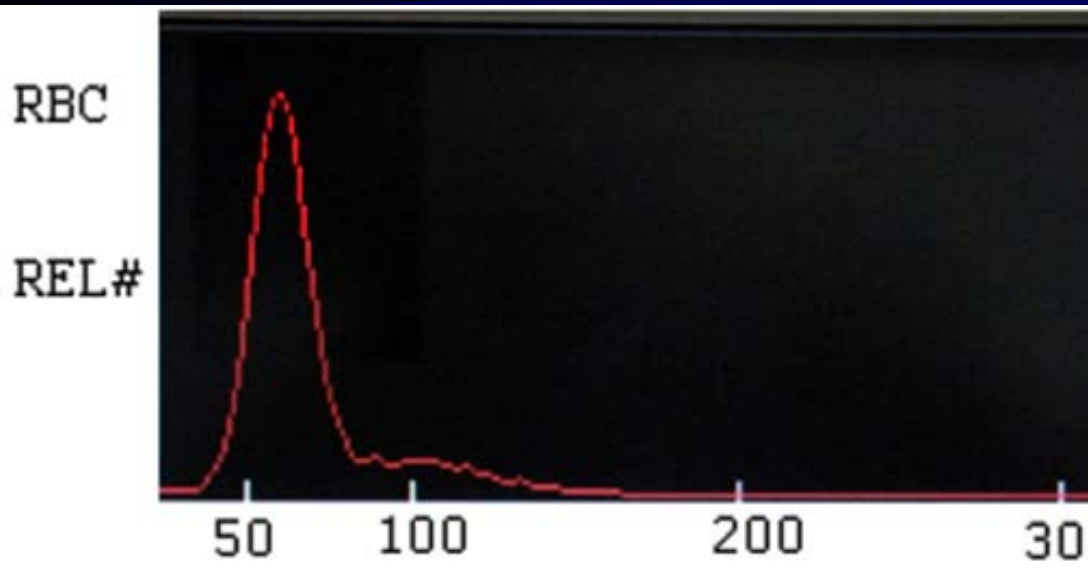
$$\begin{aligned} \text{Mentzer's index} &= \text{MCV} / \text{RBC count} \\ &= 20.33 \end{aligned}$$



- Conclusion:
  - **s/o Iron Deficiency Anemia**
  - Advise Iron studies

7/F

PLT 287, WBC 7.3



Reagent	Sensor	OFF
RBC	5.03	
HGB	9.4	L
HCT	30.8	L
MCV	61.2	L
MCH	18.7	L
MCHC	30.6	L
RDW	14.0	H

Flag: Anemia, microcytosis

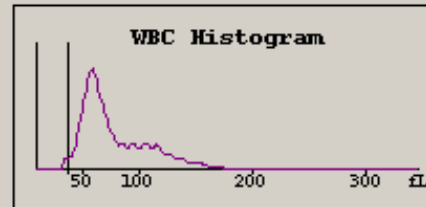
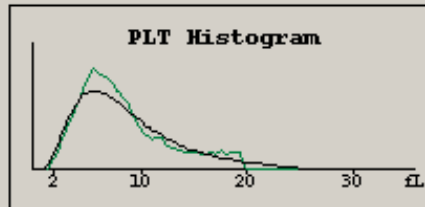
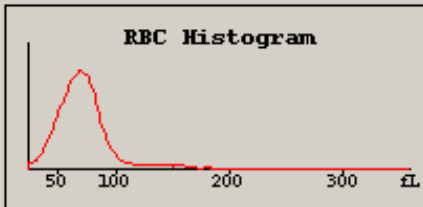
Mentzer's index= 10.55

Hb Electrophoresis:  
↑ Hb A2= 7.5

Heterozygous beta thalassemia.

# 2.5/F

Parameters | Demographics | **CBC Data** | Diff Data | Retic Data



Suspect / Definitive

Anisocytosis  
**Dimorphic Reds**  
**Giant Platelets**  
 H&H Check Failed  
 Hypochromia  
 Microcytosis

	<b>Uncorrected</b>				
WBC	9.7	9.5	9.9	9.8	9.7
RBC	5.09	5.03	5.13	5.11	
MCV	67.4 aL	67.8	67.5	66.9	
RDW	26.7 aH	26.3	27.2	26.6	
PLT	510 H	518	508	505	
MPV	8.7	9.2	8.6	8.4	

<b>HGB Voltages</b>	
Blank	8.469
Read	5.031

Navigation: All

Patient ID 2JF02627423

	Sample ID	Cass / Pos	Date	Time	Asp Mode	Status	Instrument	Listname	Elap
CBC(+Diff,+Retic)	-----	000503	11/06/2010	9:44:54	Auto	No Read	Instrument 1	37M6B507	
Retic Only									

Parameters Demographics CBC Data Diff Data Retic Data

WBC 9.7

NE % 54.0

NE # 5.2

LY % 42.8

LY # 4.2 H

MO % 1.4 L

MO # 0.1 L

EO % 1.8

EO # 0.2

BA % 0.0 L

BA # 0.0

NRBC % 8.2 RcH

NRBC # 0.8 RcH

RBC 5.09

HGB 10.4 L

HCT 34.3 L

MCV 67.4 aL

MCH 20.3 aL

MCHC 30.2 aL

RDW 26.7 aH

PLT 510 H

MPV 8.7

Suspect / Definitive

Anisocytosis  
Dimorphic Reds  
Giant Platelets  
H&H Check Failed  
Hypochromia  
Microcytosis

MI=13.24

- HPLC:
  - HbA<sub>2</sub>= 3.7
  - HbF= 0.7
- Beta Thalassemia trait with Iron deficiency anemia

# Case 2

Dr K. Galani

## Case 2

- 30 yrs female, operated case of Giant cell tumor
- Came for follow up

WBC 5.7

NE % 46.1

LY % 48.5 H

MO % 4.9 L

EO % 0.2 L

BA % 0.3

NE # 2.6

LY # 2.8

MO # 0.3

EO # 0.0 L

BA # 0.0

NRBC % 0.0

NRBC # 0.0

RBC 1.53 L

HGB 6.6 cL

HCT 19.3 aL

MCV 125.6 cH

MCH 43.0 aH

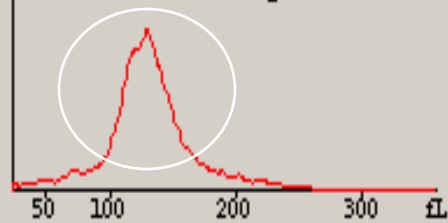
MCHC 34.3

RDW 17.4 H

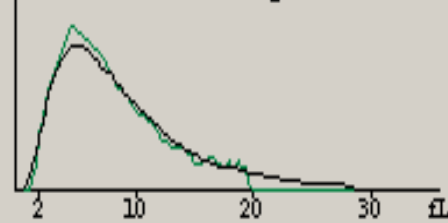
PLT 97 L

MPV 9.6

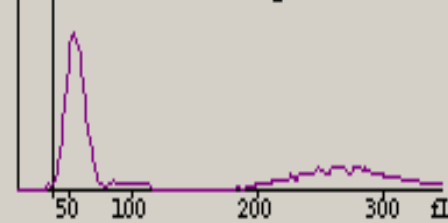
RBC Histogram



PLT Histogram

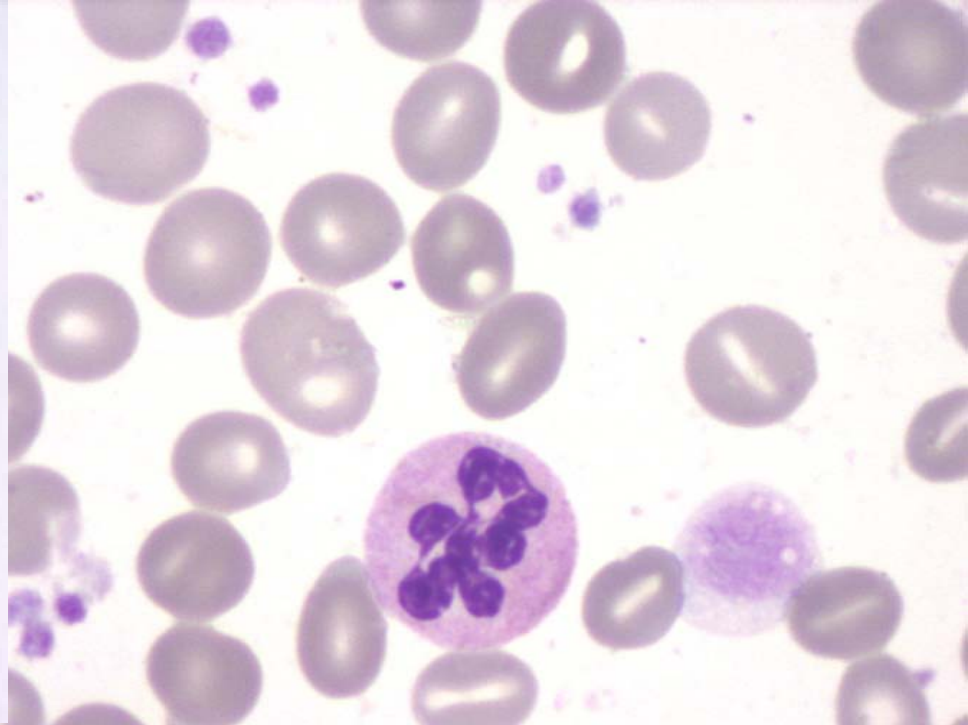
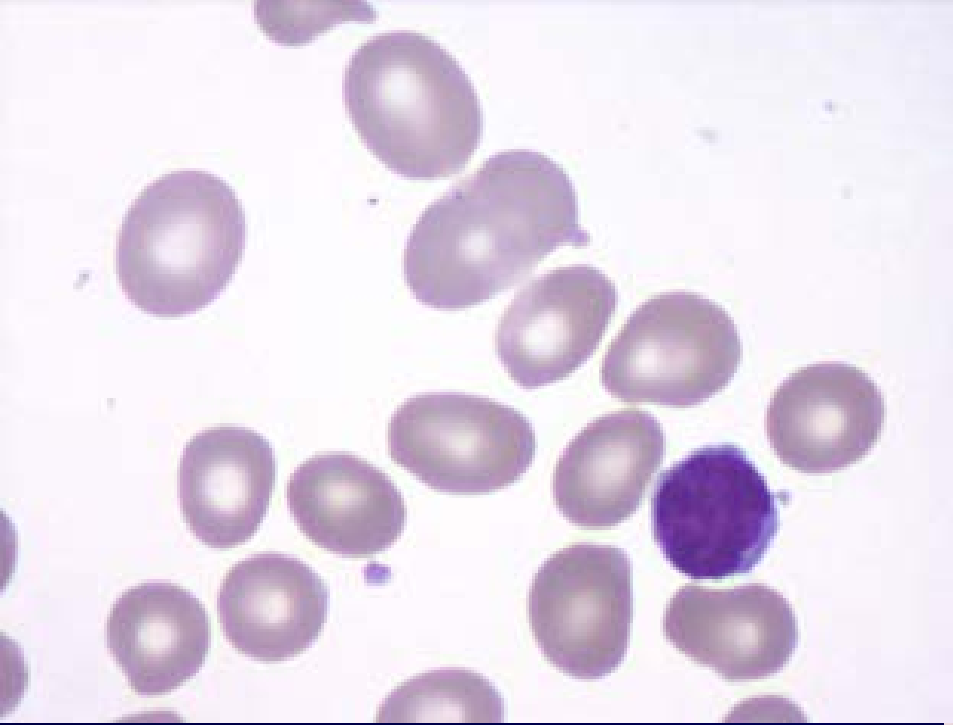


WBC Histogram

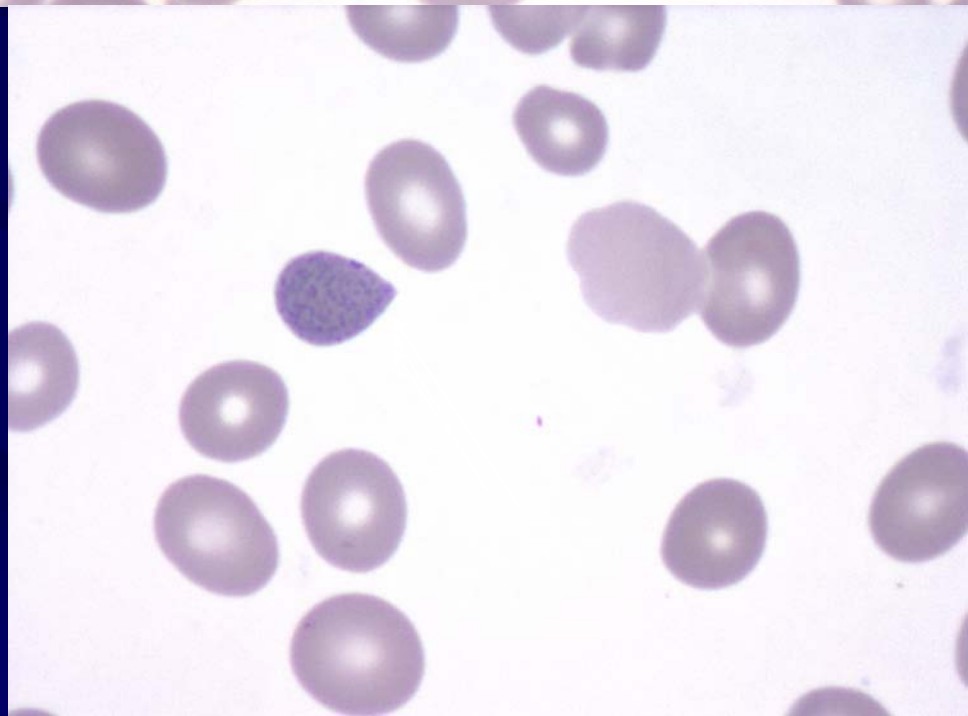


Suspect / Definitive

Anemia  
Macrocytosis



Peripheral smear showing  
macroovalocytes,  
hypersegmented neutrophil  
& basophilic stippling



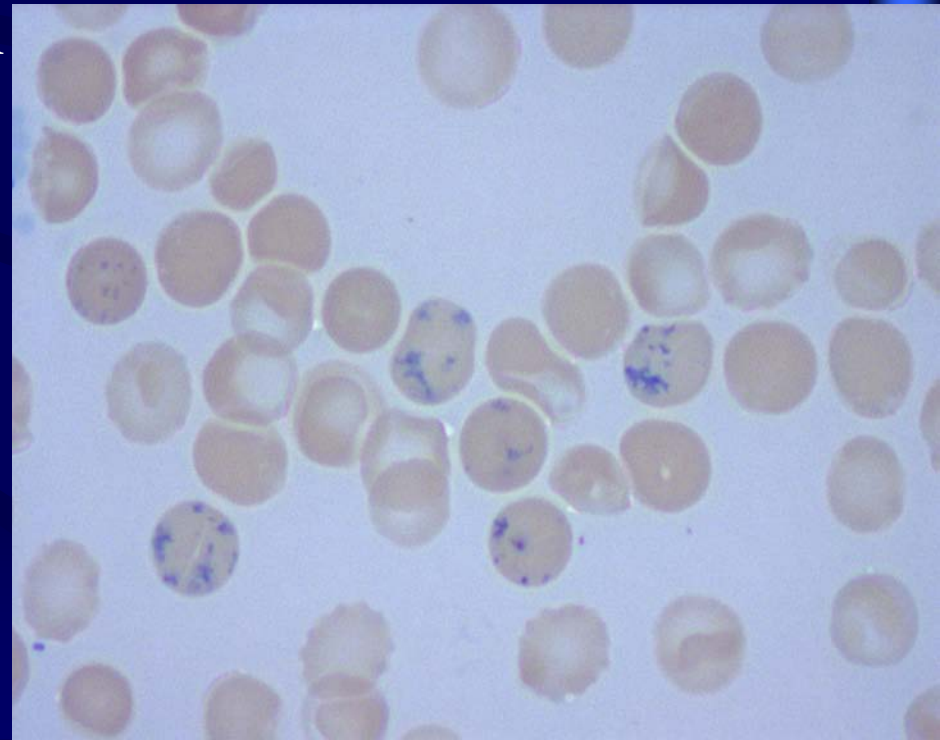
# Diagnosis: Megaloblastic Anemia

- Reduction of total RBC count
- Low Hb
- High MCV
- High MCH
- Increased RDW
- RBC Histogram showing right shift
- Thrombocytopenia

Diagnosis may be confirmed by the serum B12/FA levels, presence of megaloblasts and giant metamyelocytes in bone marrow

# Treatment

- B12/FA therapeutic trial
- Reticulocyte count on day 8 (7-10 days)



# Causes of Macrocytic anemia

- Deficiency of Vit B12 or Folic acid and/or both
  - Myelodysplastic syndrome
  - Hyperthyroidism
  - Hemolysis
  - Liver disease
  - Alcoholism
  - Aplastic anemia
- } Normal RDW

# Case 3

Mr. N. Deshpande

## Case 3

- 72 year old male, a case of carcinoma buccal mucosa
- Hemogram revealed thrombocytopenia (54,000/cmm)

WBC 6.8

NE % 49.0

NE # 3.3

LY % 34.4

LY # 2.3

MO % 8.8

MO # 0.6

EO % 7.5 H

EO # 0.5 H

BA % 0.3 L

BA # 0.0

NRBC % 0.0

NRBC # 0.0

RBC 4.51

HGB 15.0

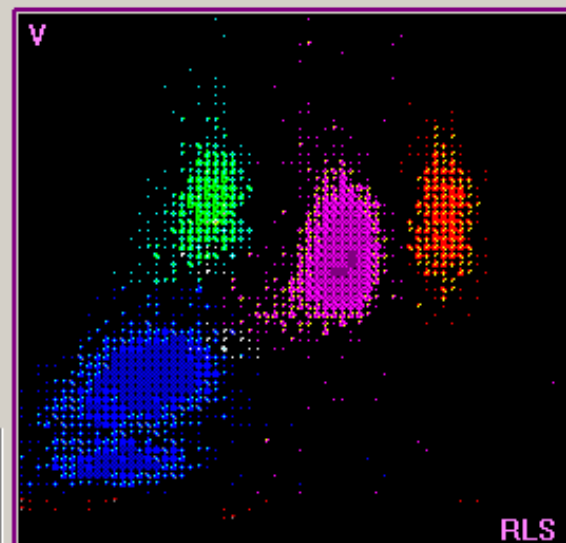
HCT 44.0

MCV 97.6 H

MCH 33.2

MCHC 34.0

RDW 13.6



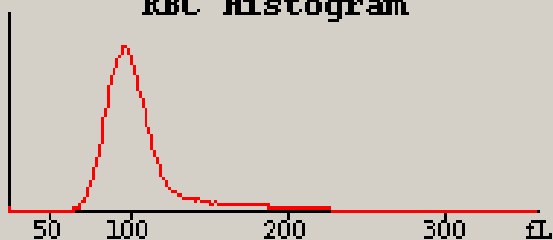
Suspect / Definitive

**Giant Platelets**  
**Thrombocytopenia**

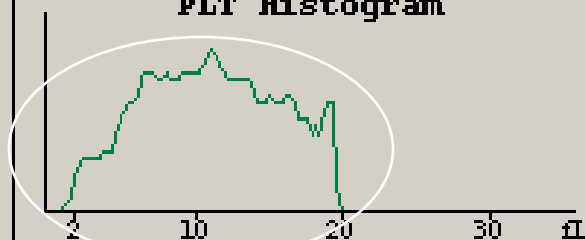
PLT 54 aL

MPV 11.6 H

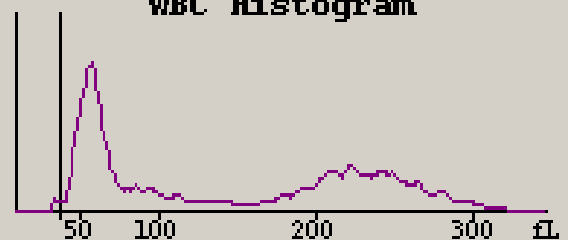
RBC Histogram



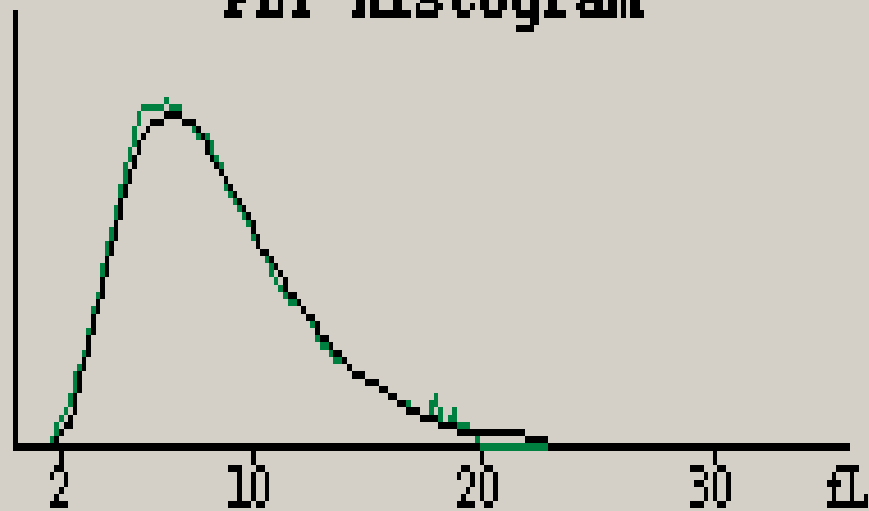
PLT Histogram



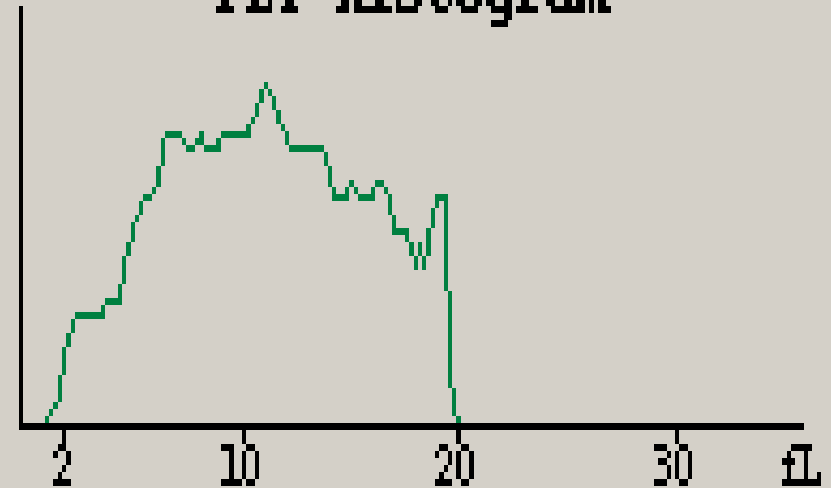
WBC Histogram



PLT Histogram



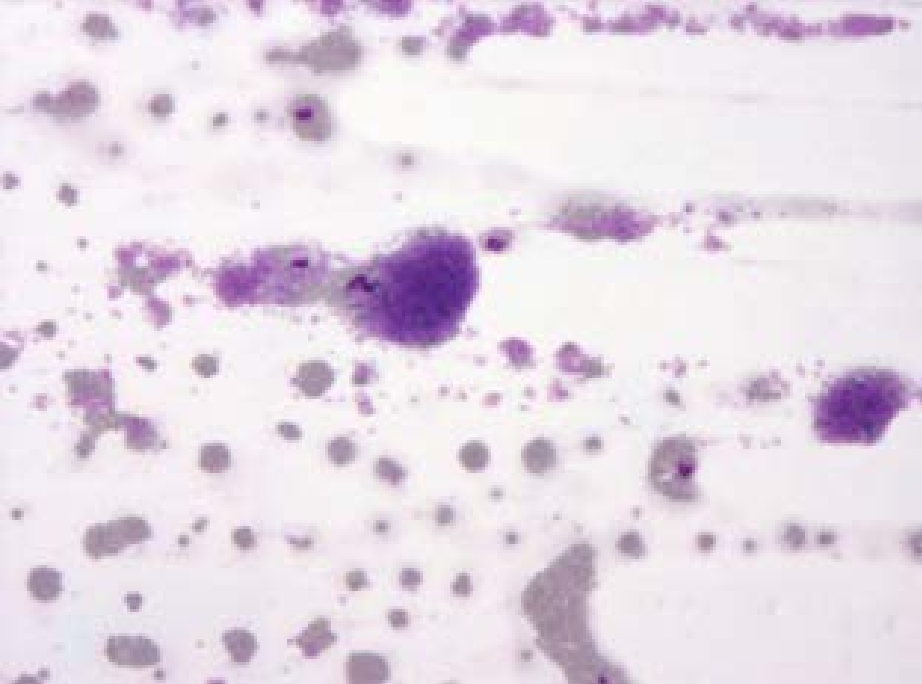
PLT Histogram



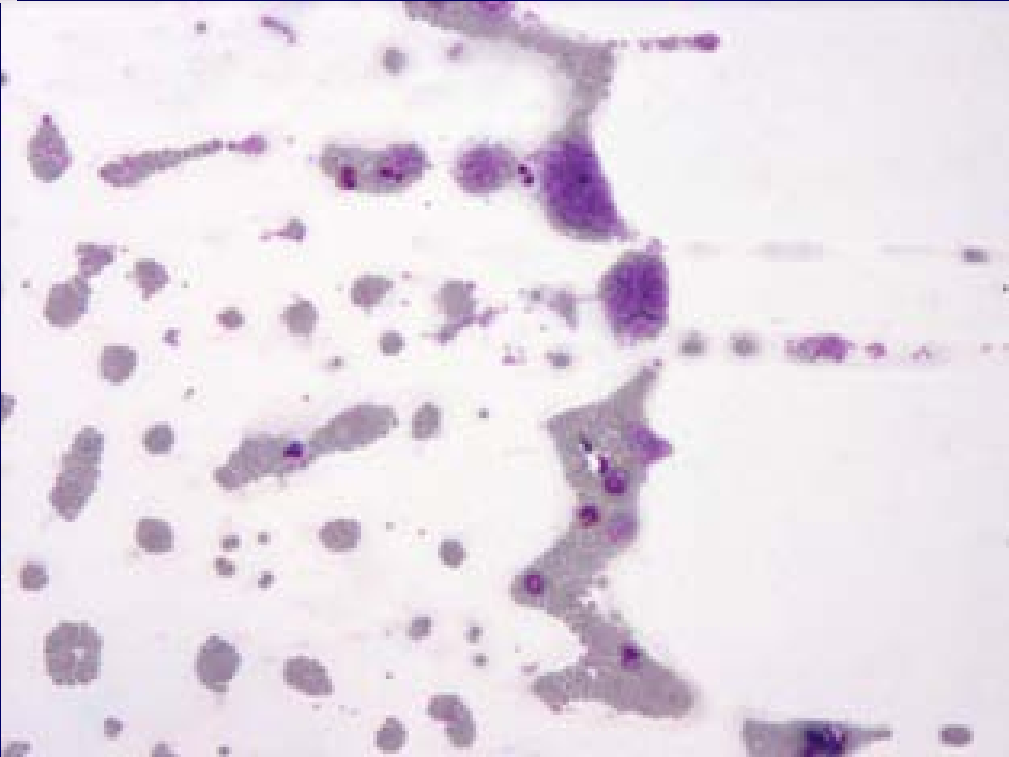
Based on platelet histogram findings, a peripheral smear examination was done

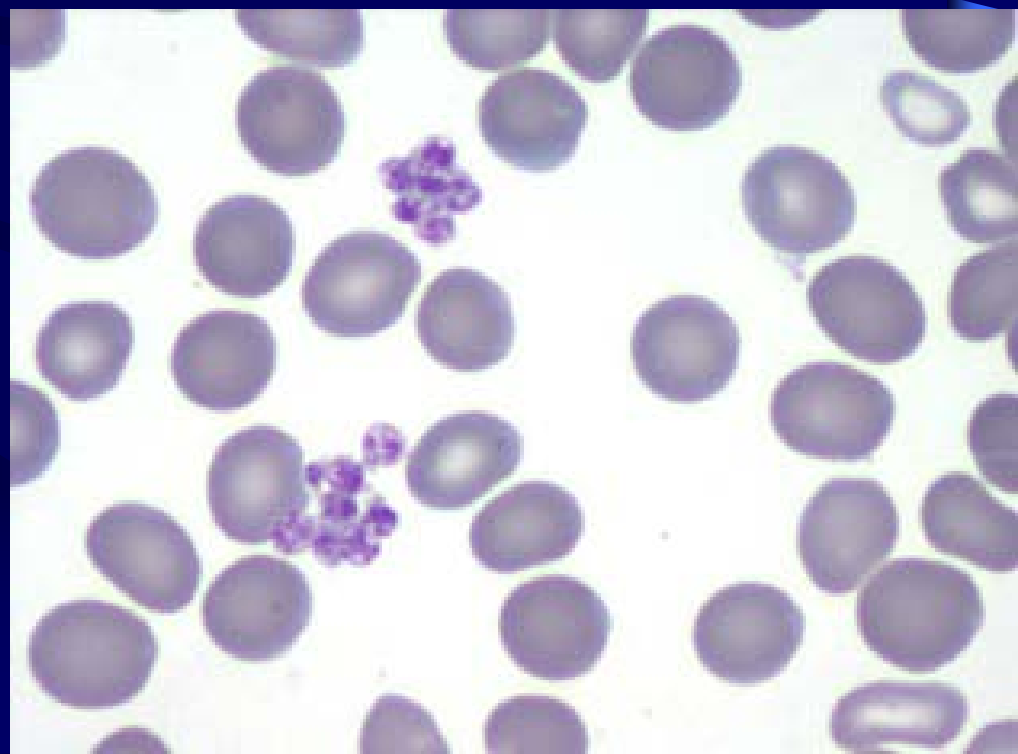
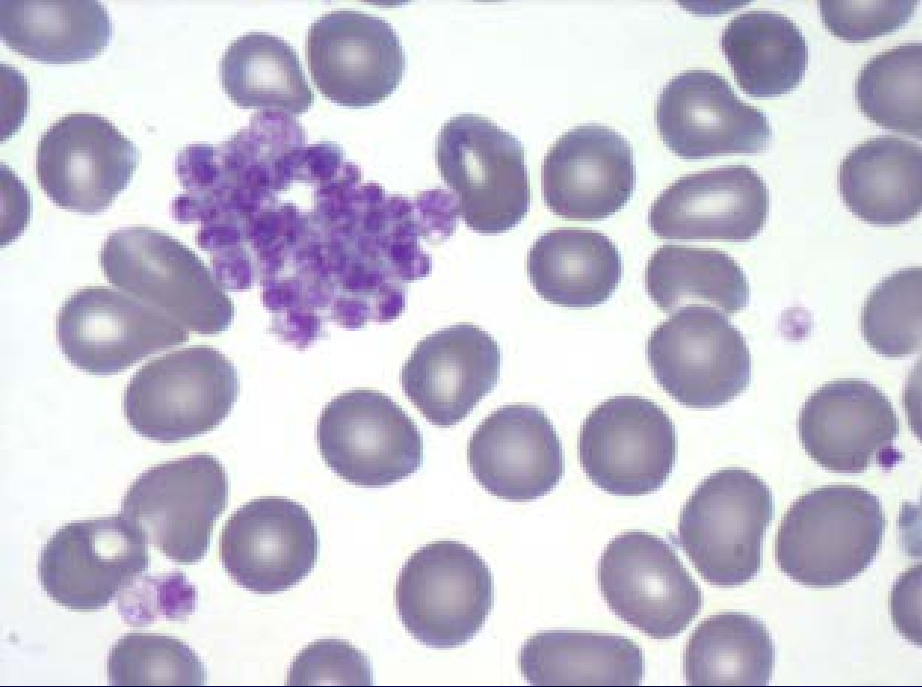
- Giant platelets were seen
- Platelet clumps seen

The sample contained adequate platelets, however we got spurious results on automated analyzer

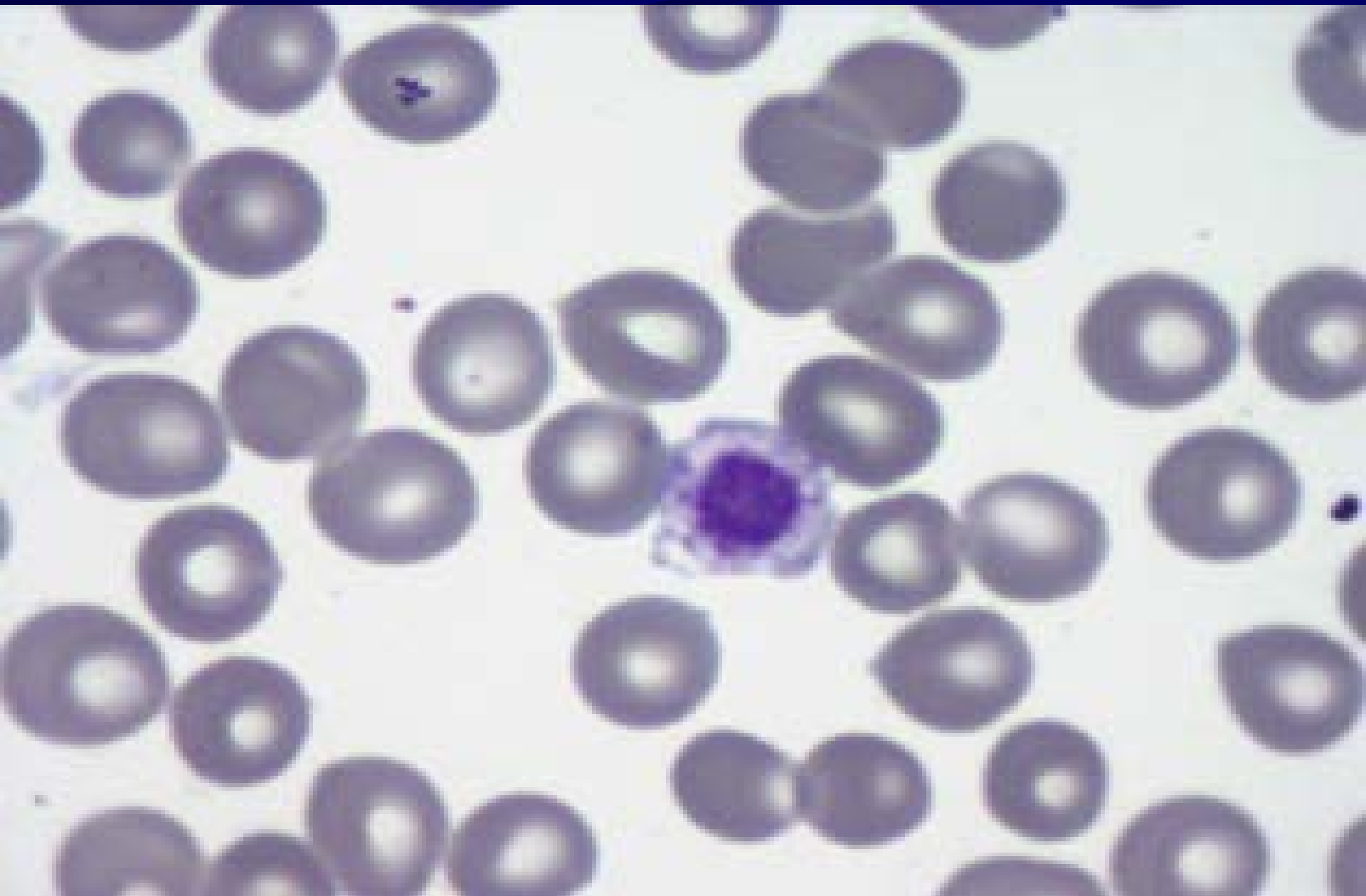


Peripheral smear showing many platelet clumps (10x).





Peripheral smear (100x)



Peripheral smear showing giant platelet

# Causes of Platelets Flag

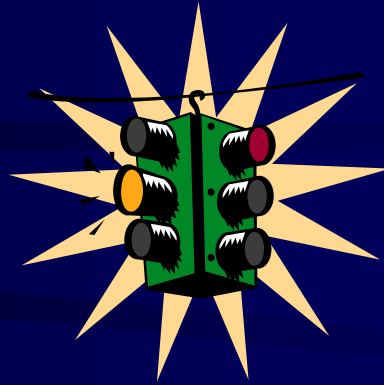
- Platelet clumps
  - Improper sample collection procedure especially inadequate mixing immediately after collection
  - EDTA induced platelet clumping
- Red cell fragments
- Giant platelets especially in patients from North Eastern parts of India

# Corrective action

- Check Peripheral smear for presence of giant platelets/ platelet clumps
  - If giant platelets seen then give a corrected manual count.
  - If platelet clumps are seen then repeat collection for rechecking the platelet count
- If neither of the above then recollect the sample for rechecking the platelet count
- Suspect EDTA induced platelet clumps, if repeat collection in vacutainer shows platelet clumps.
- Collect sample in citrate anti-coagulated tube if EDTA induced clumping is seen

## Different methods of platelet counting

- Neubauer chamber
- Peripheral blood smear examination
- Automated hematology analyzers



Thank You