Haematology Labs

Greenlane Summer GP Symposium 2019

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Recap 2018

- Diagnostic approach for microcytic hypochromic anaemia
  - Pitfalls of using ferritin alone
  - Interpretation of iron study and thalassaemia/haemoglobinopathy screen
- Importance to repeat CBC + iron study to ensure resolution
  - Can unmask concurrent thalassaemia/haemoglobinopathy
- Interpretation of serum free light chain and protein electrophoresis
- Clinical detail on request form is appreciated (mandatory if blood film request)
  - Correlation
  - Focus the pathologist

Revision 1

		Ref. Range
Haemoglobin	66	(115 – 155)
RBC	3.98	(3.60 – 5.60)
HCT	0.25	(0.35 – 0.46)
MCV	62	(80 – 99)
MCH	16.6	(27.0 – 33.0)
Platelets	523	(150 – 400)
WBC	5.2	(4.0 – 11.0)
Neutrophils	2.74	(1.90 – 7.50)
Lymphocytes	1.66	(1.00 – 4.00)
Monocytes	0.55	(0.20 – 1.00)
Eosinophils	0.17	(<0.51)
Basophils	0.05	(0.00 – 0.20)

- Possible diagnosis
  - Iron deficiency anaemia
    - Thrombocytosis
  - Anaemia of chronic disease
  - Thalassaemia/haemoglobinopathy

Revision 2

		Ref. Range
Haemoglobin	137	(115 – 155)
RBC	6.14	(3.60 – 5.60)
HCT	0.44	(0.35 – 0.46)
MCV	72	(80 – 99)
MCH	22.3	(27.0 – 33.0)
Platelets	360	(150 – 400)
WBC	15.0	(4.0 – 11.0)
Neutrophils	10.7	(1.90 – 7.50)
Lymphocytes	3.2	(1.00 – 4.00)
Monocytes	0.8	(0.20 – 1.00)
Eosinophils	0.5	(<0.51)
Basophils	0.0	(0.00 – 0.20)

- Thalassaemia/ haemoglobinopathy

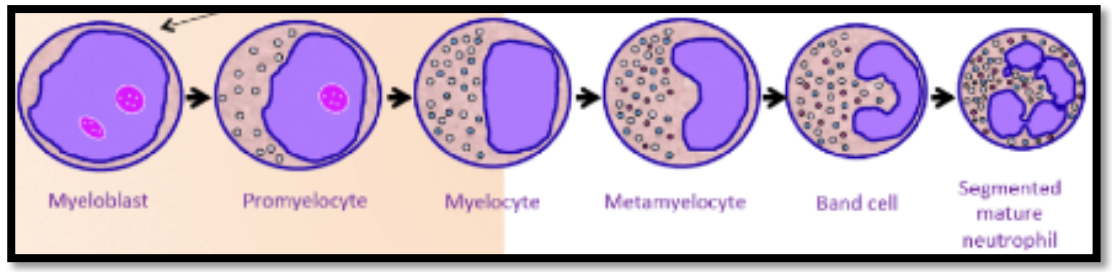
Case 1: WBC Interpretation

- 60yr old Fijian Indian
- Presented with influzena (H1N1) and suffered myocarditis on weekend
  - Treated with abx discharged on Monday
- PMHx
  - HTN
  - Dyslipidaemia
- Social Hx
  - Current smoker (40pk yr)
  - High ETOH

		Ref. Range
Haemoglobin	157	(130 – 175)
RBC	5.25	(4.3 – 6.0)
HCT	0.47	(0.4 – 0.52)
MCV	90	(80 – 99)
MCH	29.9	(27.0 – 33.0)
Platelets	103	(150 – 400)
WBC	36.5	(4.0 – 11.0)
Neutrophils	24.8	(1.90 – 7.50)
Lymphocytes	1.8	(1.00 – 4.00)
Monocytes	2.6	(0.20 – 1.00)
Eosinophils	0.0	(<0.51)
Basophils	0.7	(0.00 – 0.20)
Immature Granulocyte	6.6	(<0.06)

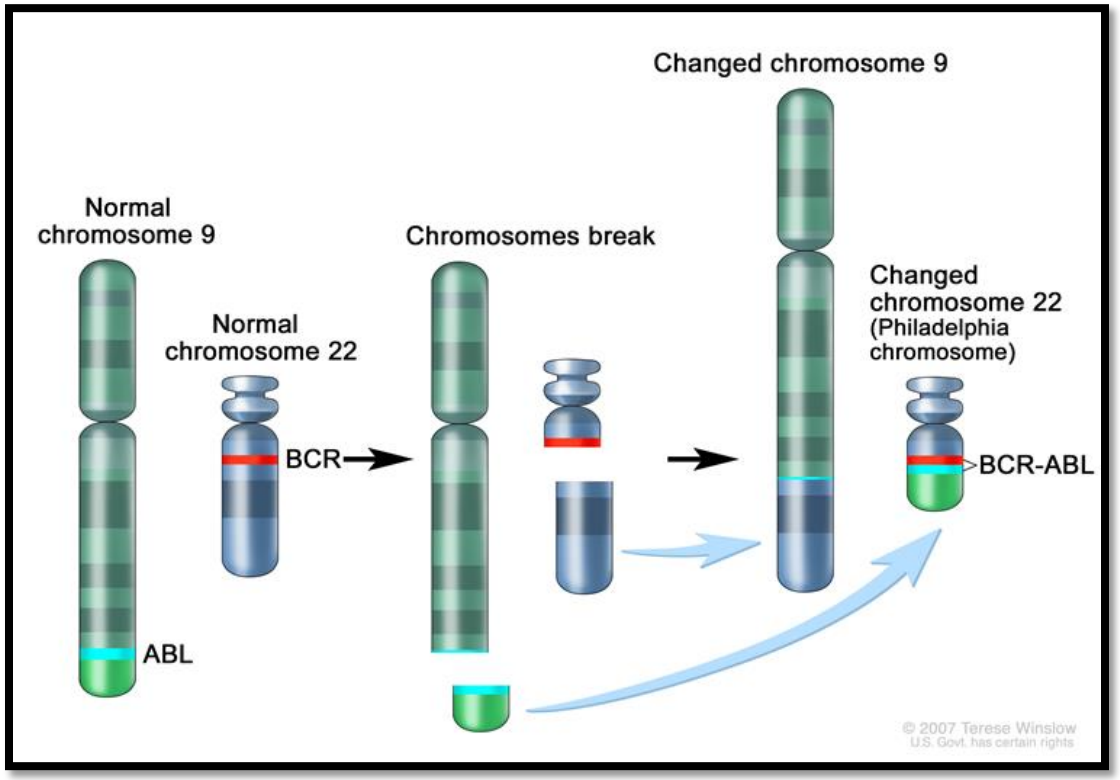
1 Month Later

		Ref. Range
Haemoglobin	151	(130 – 175)
RBC	4.97	(4.3 – 6.0)
HCT	0.46	(0.4 – 0.52)
MCV	93	(80 – 99)
MCH	30.4	(27.0 – 33.0)
Platelets	176	(150 – 400)
WBC	52.0	(4.0 – 11.0)
Myelocytes	7.8	
Metamyelocytes	0.5	
Neutrophils	30.2	(1.90 – 7.50)
Lymphocytes	7.3	(1.00 – 4.00)
Monocytes	3.1	(0.20 – 1.00)
Eosinophils	1.0	(<0.51)
Basophils	2.1	(0.00 – 0.20)



- Blood Film:
  - Leucocytosis with left shift down to promyelocyte stage
  - Twin peak
    - The granulocyte stages are mature neutrophils and myelocytes
  - Basophilia
    - ≥3% of circulating WBC need to exclude CML

Chronic Myeloid Leukaemia



- Readily treatable with tyrosine kinase inhibitor (TKI)
- For minority it could be curable
- Compliance is the most important predictor for response/survival

Take home message

- Concurrent diseases can occur
  - Important to monitor for resolution
    - Recommendation for white cell changes (2 to 6 weeks depend on suspicion)
- Persistent basophilia is almost always sinister
- We all makes mistake

Case 2

- 60 year old woman
- Normally fit and well
- No significant PMHx
- Medication:
  - Nil regular medication
  - NKDA
- Social:
  - Retired widow
  - Non smoker

	18/3/11	Ref. Range
Haemoglobin	134	(115 – 155)
RBC	4.90	(3.60 – 5.60)
HCT	0.43	(0.35 – 0.46)
MCV	87	(80 – 99)
MCH	27.3	(27.0 – 33.0)
Platelets	433	(150 – 400)
WBC	8.0	(4.0 – 11.0)
Neutrophils	5.24	(1.90 – 7.50)
Lymphocytes	1.80	(1.00 – 4.00)
Monocytes	0.78	(0.20 – 1.00)
Eosinophils	0.15	(<0.51)
Basophils	0.02	(0.00 – 0.20)

Causes of Thrombocytosis

- Reactive
  - Increased bone marrow activity
    - Acute bleeding/haemolysis
    - Iron deficiency
  - Infection
  - Splenectomy
    - 30% of platelet is sequestrated in spleen
  - Inflammation
    - Autoimmune
    - Malignancy
    - Trauma/Surgery
    - Smoking
- Primary
  - Myeloproliferative neoplasm

Clinical relevance of thrombocytosis in primary care: a prospective cohort study of cancer incidence using English electronic medical records and cancer registry data

Sarah ER Bailey, Obioha C Ukoumunne, Elizabeth A Shephard and Willie Hamilton

Br J Gen Pract 2017; 67 (659): e405-e413. **DOI:** https://doi.org/10.3399/bjgp17X691109

- Prospective Registry Data
- Associated
  - Lung
  - Colorectal
  - Urogenital
- Annual Risk of Cancer

	Elevated %/NNT	Persistent (within 6m)	4-12m	13-24m	Baseline
Male	11.6%/(13)	18.1%/(7.1)	3.9%	2.7%	4.1%
Female	6.2%/(25)	10.1%/(12.7)	2.4%	1.8%	2.2%

- Few comment
  - Lack of multivariate analysis is frustrating
  - Clear evidence of chronic inflammation causes cancer
    - Chicken or Egg
- What to do?
  - Debatable but similar to unprovoked VTE
  - Routine CXR
  - Rest symptom guided??

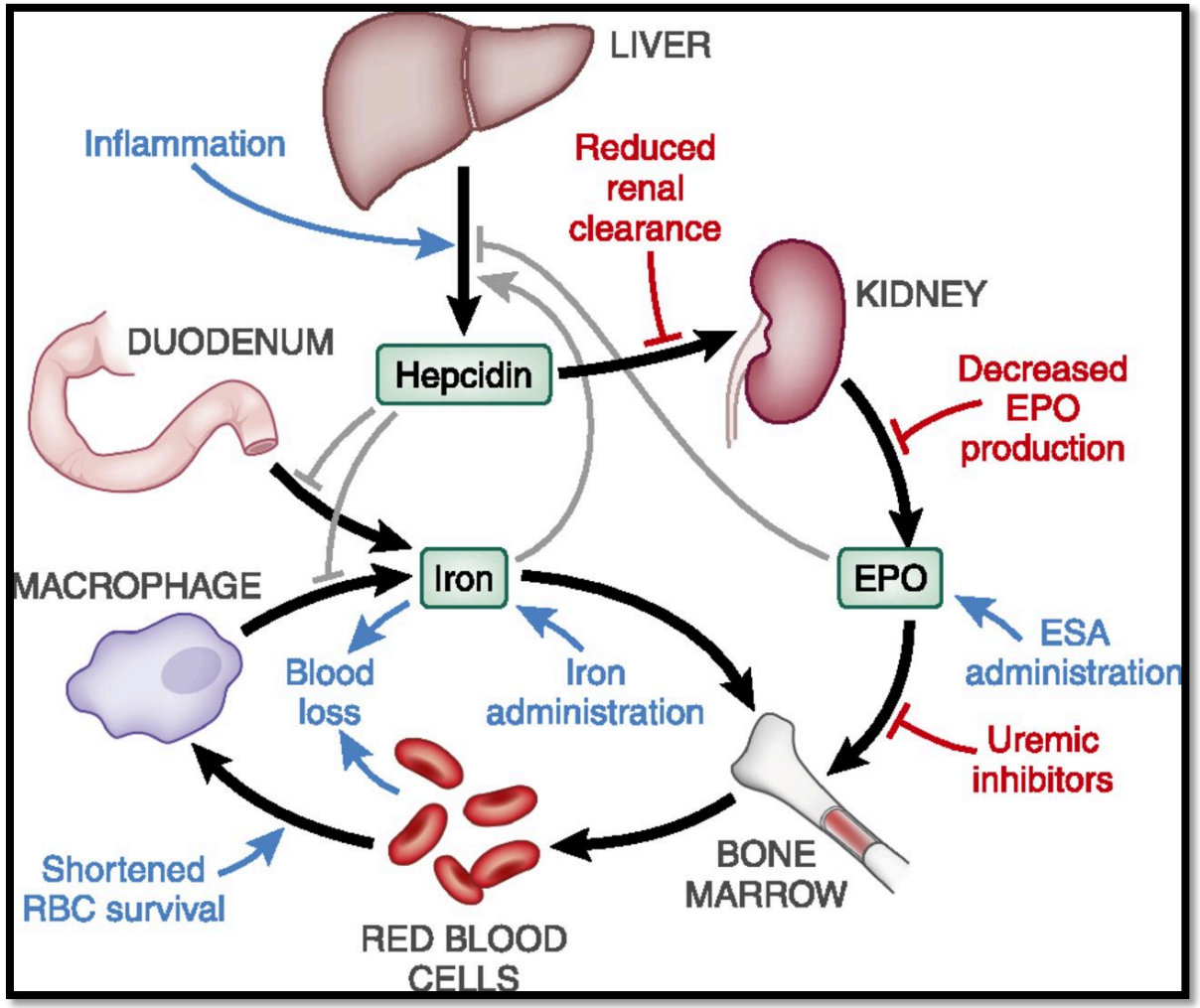
Results

	18/3/11	12/03/13	22/07/16	06/07/17	20/02/19	Ref. Range
Haemoglobin	134	139	136	128	140	(115 – 155)
RBC	4.90	5.11	5.59	5.08	6.26	(3.60 – 5.60)
HCT	0.43	0.43	0.43	0.41	0.46	(0.35 – 0.46)
MCV	87	84	78	80	74	(80 – 99)
MCH	27.3	27.2	24.3	25.2	22.4	(27.0 – 33.0)
Platelets	433	424	424	500	582	(150 – 400)
WBC	8.0	7.2	9.7	10.6	11.6	(4.0 – 11.0)
Neutrophils	5.24	4.63	7.21	8.00	9.9	(1.90 – 7.50)
Lymphocytes	1.80	1.70	1.58	1.35	1.0	(1.00 – 4.00)
Monocytes	0.78	0.7	0.53	0.85	0.2	(0.20 – 1.00)
Eosinophils	0.15	0.14	0.29	0.24	0.2	(<0.51)
Basophils	0.02	0.06	0.1	0.15	0.1	(0.00 – 0.20)

What is happening?
What to do next?
What you should not do?

Polycythaemia

- Diagnosis
  - Driver mutations
    - JAK2 V617F (90-95%)
    - JAK2 exon 12 (1-3%)
  - Serum erythropoietin
    - Should be low
    - Normal or high suggest other cause
- Manage the thrombosis risk factors (PV)
  - Venesection
  - Aspirin
  - Hydroxyurea > 60yr or with CVD RF
- Don't
  - Replace iron



Coagulation Testing

		Ref. Range
Haemoglobin	190	(130 – 175)
RBC	7.9	(4.3 – 6.0)
HCT	0.63	(0.4 – 0.52)
MCV	79	(80 – 99)
MCH	26	(27.0 – 33.0)
Platelets	420	(150 – 400)
WBC	8.9	(4.0 – 11.0)
Neutrophils	6.27	(1.90 – 7.50)
Lymphocytes	1.85	(1.00 – 4.00)
Monocytes	0.26	(0.20 – 1.00)
Eosinophils	0.3	(<0.51)
Basophils	0.22	(0.00 – 0.20)

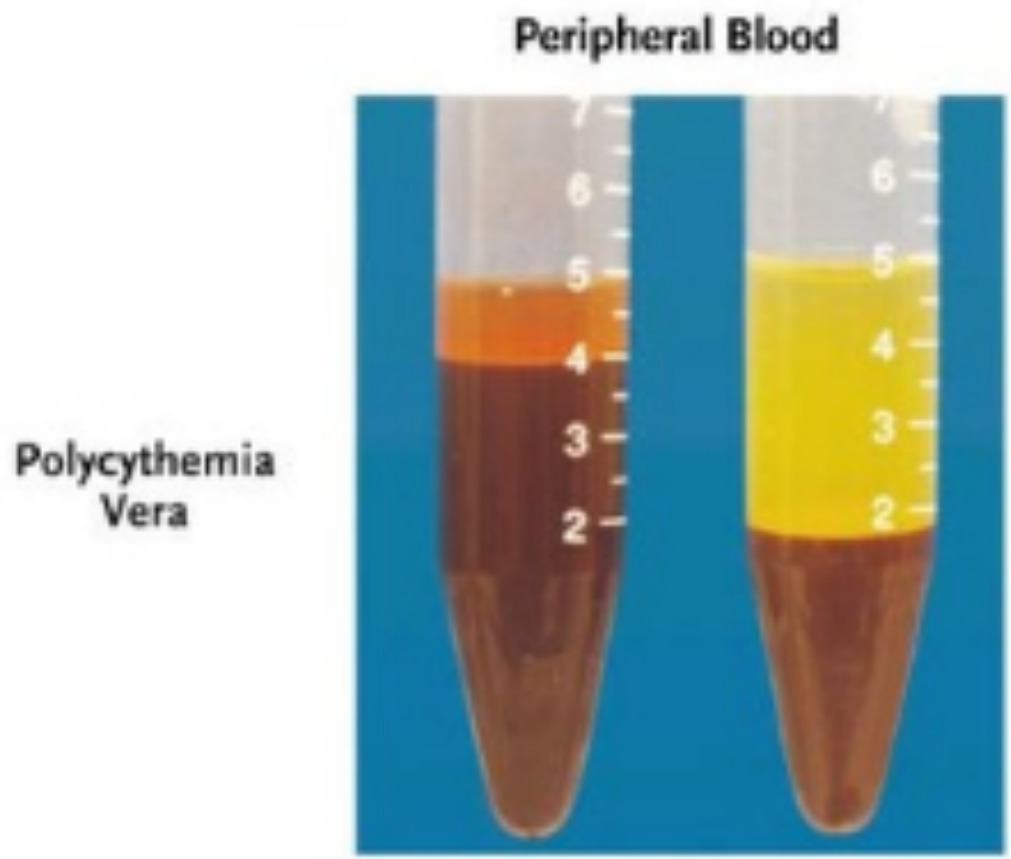
		Ref. Range
APTT	65	(25-40)
PR	1.8	(0.8-1.2)
Fibrinogen	3.6	(1.5-4.0)
Platelet	420	(150 – 400)

Interpretation?

What to do?

		Ref. Range
APTT 1+1	45	(25-40)
PR 1+1	1.3	(0.8-1.2)

- Coagulation Testing
  - Citrate tube
    - Inhibit coagulation process by removing calcium from plasma
  - Re-initiate coagulation process by adding calcium
  - In polycythaemic patient the plasma can be significantly reduced leading to excessive citrate
    - Prolonged coagulation
    - Act as an inhibitor



Take home message

- Access to previous results is extremely useful
  - Encourage patient not to op out of TestSafe
  - Disease can evolve over time
- What to do with mild thrombocytosis is controversial
- Polycythaemia can interfere with coagulation testing

Any suggestions for topics?