

Anemia



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Anemia is a laboratory diagnosis

	<u>Men</u>	<u>Women</u>
Hemoglobin (g/dL)	14-17.4	12.3-15.3
Hematocrit (%)	42-50%	36-44%
RBC Count ($10^6/\text{mm}^3$)	4.5-5.9	4.1-5.1
Reticulocytes	$1.6 \pm 0.5\%$	$1.4 \pm 0.5\%$
WBC (cells/mm^3)	$\sim 4,000-11,000$	
MCV (fL)	80-96	
MCH (pg/RBC)	30.4 ± 2.8	
MCHC (g/dL of RBC)	34.4 ± 1.1	
RDW (%)	11.7-14.5%	

Risk factors

- Diet low in meat and egg
- Malnutrition
- Vegetarians
- Low weight
- Chronic disease
- Obesity
- Menorrhagia

Presentation/history

- Mild anemia:
 - few or no symptoms; may be discovered accidentally on lab test
- May complain of:
 - Fatigue, decr. exercise tolerance, SOB, palpitations, lightheadedness on arising
 - Sore tongue (glossitis), cracking mouth corners (angular cheilitis), peripheral paresthesias (numb toes, etc.), pica, pagophagia, RLS

Presentation/history

- Symptomology is poorly related to absolute lab values
 - Patients with gradual onset may be asymptomatic with quite low Hb/HCT
 - Acute onset can cause symptoms with relatively less anemia
- Mild anemia may be “normal” or “OK” for a menstruating woman, but you should always seek a cause in a man or a postmenopausal woman (or child)

Anemia: Special Populations

- Higher Hb/HCT:
 - Patients living at high altitudes
 - Smokers and patients living in air pollution areas
 - Endurance athletes have increased HCT
- Lower Hb/HCT:
 - African-Americans have 0.5 to 1 g/dl lower Hb than do Caucasians
 - Elderly (slowed erythropoiesis)
 - Pregnant women (hemodilution)

Differential diagnosis

Consider:

- Anemia
- Hypothyroidism
- Depression
- Cardiac (congestive heart failure, aortic stenosis)
- Pulmonary causes of SOB/DOE
- Chronic fatigue syndrome, others

Physical examination

- Pallor (may be jaundiced– think hemolytic)
- Tachycardia
- Glossitis
- Angular cheilosis
- Decreased vibratory sense/ joint position sense (B12 deficiency, w/ or w/o hematologic changes)
- Ataxia

Labs

- For all: CBC, reticulocyte count, $\pm$ peripheral smear
- For some:
 - B12, folate, hemoglobin electrophoresis
 - Bone marrow aspirate to assess possible defective hematopoiesis
 - Other labs to assess other differential diagnoses (e.g. thyroid function tests, etc.)

Fe^{++} deficiency anemia

- Most commonly due to chronic bleeding and erythropoiesis limited by iron stores that have been depleted
- Iron balance is very close in menstruating women, so Fe^{++} deficiency is not uncommon with no other source of bleeding

Labs

- Iron and ferritin will be low
- TIBC (total iron binding capacity) will be high, since iron stores are not saturating their binding sites on transferrin
- Reduced RBC counts (definition of anemia)
- Microcytosis & hypochromia are hallmarks, but early Fe^{++} may be normocytic ($\pm$ hypochromic)
- Usually, MCH and MCHC will both be low (whereas in macrocytic anemia, the MCH may be normal while the MCHC is low, because of the larger cell size)

Labs

- Most practitioners would agree that if a patient has microcytic hypochromic anemia with a low reticulocyte count, it would be reasonable to use a trial of FeSO_4 to diagnose
- 5-10 days after initiating therapy, a robust rise in reticulocytes confirms the diagnosis

Treatment

- Iron, oral in most cases, parenteral in cases of malabsorption
- The amount of elemental iron in different formulations
 - If intolerant of FeSO_4 (cheapest), reduce the dose, rather than switching form
 - 150-200 elemental iron daily
- Follow up the cause of the iron deficiency!

Oral Iron

- Are EC formulations preferred ?
- Administration
- Interactions
- Heme Iron VS. non-Heme Iron
- Who should receive parenteral Iron?

Folate deficiency

- Folate intake is usually dietary, and may be deficient with low fresh fruit & vegetable intake
- Folate supplementation of bread prevents neural tube defects in pregnancy

B12 deficiency

- Less common, usually caused by absorption problems, rather than dietary deficiency
- B12 needs Intrinsic Factor for protection from degradation in gut
 - Produced by parietal cells of stomach, protects through gut for uptake at terminal ileum
 - Pernicious anemia from immune attack of IF production
 - EtOH-related gastritis can affect IF production, and liver disease may also contribute to macrocytosis

Treatment— supplementation

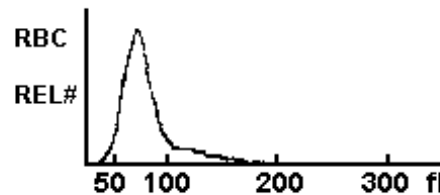
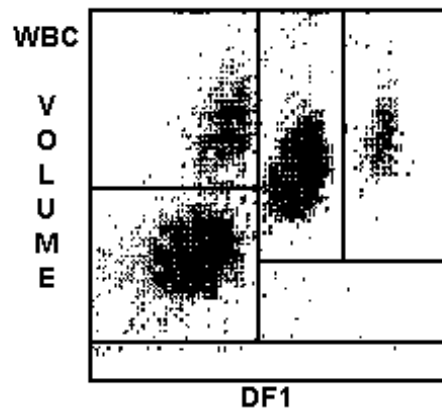
- Do NOT correct folate levels unless B12 is OK
 - Correction of folate deficiency will correct hematologic abnormalities without correcting neurological abnormalities
 - Check B12 and correct first
- B12 usually 1000 mg I.M. q month
 - B12 stores take a long time to deplete; missed doses are not usually a problem
 - Oral supplementation is gaining support; usually effective in pernicious anemia (1-2 mg PO QD)
- Reticulocyte count should respond in 1 wk

Anemia

Case Study #1

A 72 year old male has the CBC findings shown.

Peripheral RBCs are hypochromic & microcytic.



WBC	5.5	
	%	#
NE	54.7	3.0
LY	34.1	1.9
MO	7.5	0.4
EO	3.0	0.2
BA	0.7	0.0
RBC	4.28	L
HGB	9.7	L
HCT	29.9	L
MCV	69.7	L
MCH	22.6	L
MCHC	32.4	L
RDW	18.4	H
PLT	331	
MPV	8.8	

Thanks for your attention

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