CancerCare Manitoba

Blood Day for Primary Care

you should

How I work up undifferentiated anemia

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UPCON
Uniting Primary Care and Oncology

University of Manitoba

Disclosures

DONALD S. HOUSTON

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5. No dinners

Disclosures

RYAN ZARYCHANSKI

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Objectives

1. Direct the investigation of anemia with reference to a practical algorithm that starts from the full set of data in the complete blood count
2. Employ appropriate additional testing including blood film, reticulocyte count, iron studies, and ancillary biochemical tests in the further characterization of anemia
3. Communicate effectively to make optimal use of the consultant hematologist

A case

- A 17 year old woman is referred for anemia (note at age 17, consult goes to adult service)

Form 121

Health Sciences Centre

TO CONSULT ☑ Pediatric Hematology

TO TAKE OVER ☐

FOR INFORMATION ☐

USE THIS AREA WHEN REFERRING TO AMBULATORY CARE

FROM ..... AREA/CLINIC ..... CENTRE

TO ..... CLINIC-APPT. DATE .....

PATIENT'S PHONE NUMBER .....

DATE Dec 4/14

WARD

FULL NAME [redacted]

YEAR OF BIRTH

HOSPITAL NUMBER

PHYSICIAN

Doctor and/or Service Peds Hematology Date 5/12/14

Your opinion is sought regarding: Chronic anemia ? Cause

Evidence of GI Cause

Signed Dr. [redacted]

CONSULTANT'S REPORT Date .....

To Doctor: HSC chart req Hour .....

Dec 4/14

9/14

A case

- No additional data provided with referral
- Looked up in e-Chart blood work from 6 mo. earlier:
- **WBC 5.6**
- **Hb 91**
- **MCV 66.6fL, MCHC 282g/L, MCH 18.8pg**
- **RDW 18.5%**
- **Platelets 338**

A case

What investigation is most appropriate in work-up of this patient at this time?

1. Serum iron and TIBC
2. Reticulocyte count
3. LDH, haptoglobin, direct & total bilirubin
4. Serum ferritin
5. Hemoglobin electrophoresis

A case

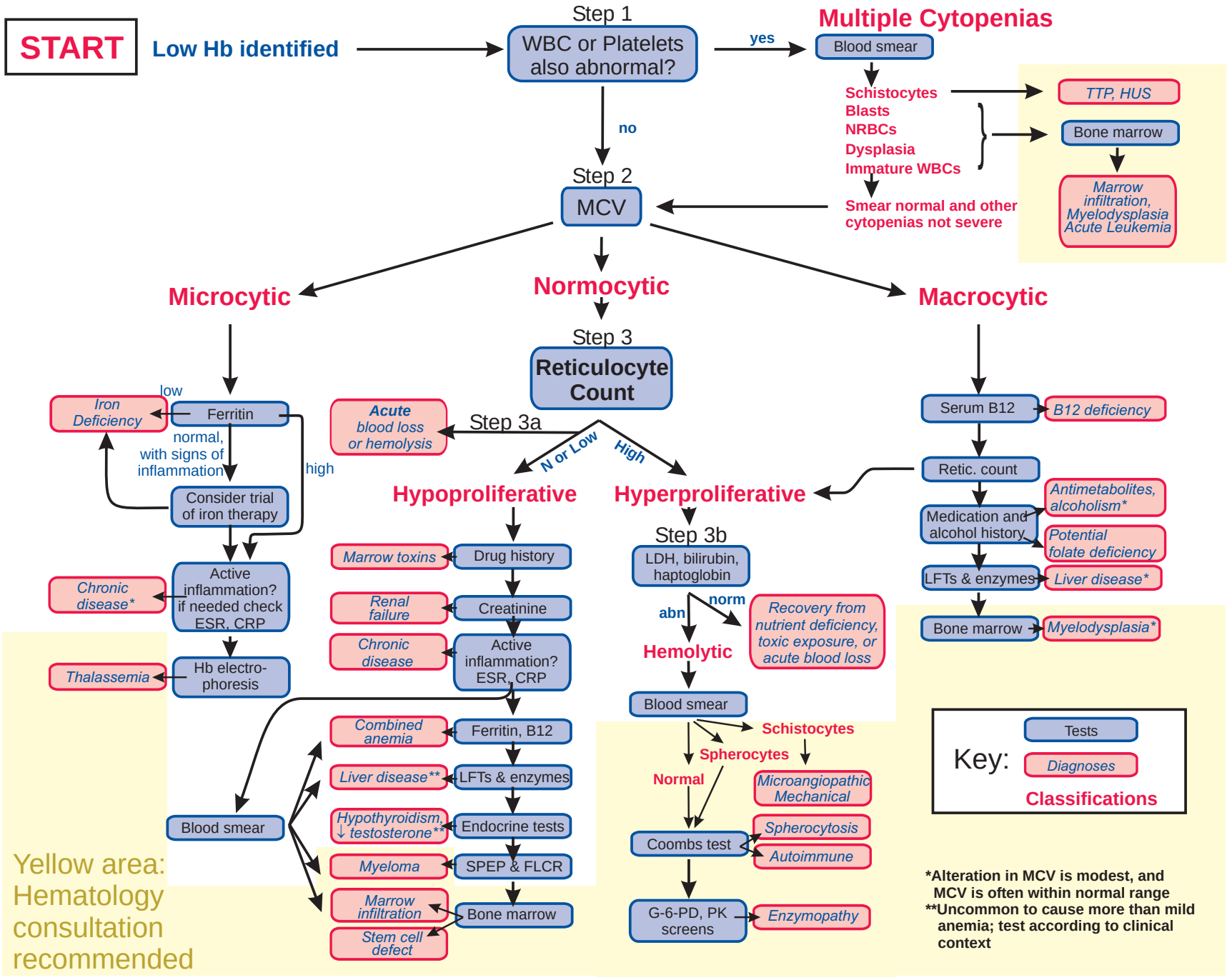
- Result: serum ferritin 3ug/L

General Points

- Anemia is very common
- Anemia is often more important as an objective indicator of illness than a problem for the patient in itself
- Every case of anemia warrants thought; investigation should be undertaken if the cause of anemia is not apparent
- Most cases can be sorted out by generalists

First: Four Practical Rules

1. If your laboratory doesn't automatically supply them, always order WBC and differential, red cell indices, and platelet count, when you order a hemoglobin (i.e. complete blood count, or CBC)
2. Look at prior CBC results, if available.
   - Trends are as informative as point values
3. If the abnormality is minor / unexpected: repeat it before embarking on extensive investigation
4. In formulating an investigation plan and establishing a diagnosis, take account of everything you know about the patient



Notes about the Algorithm

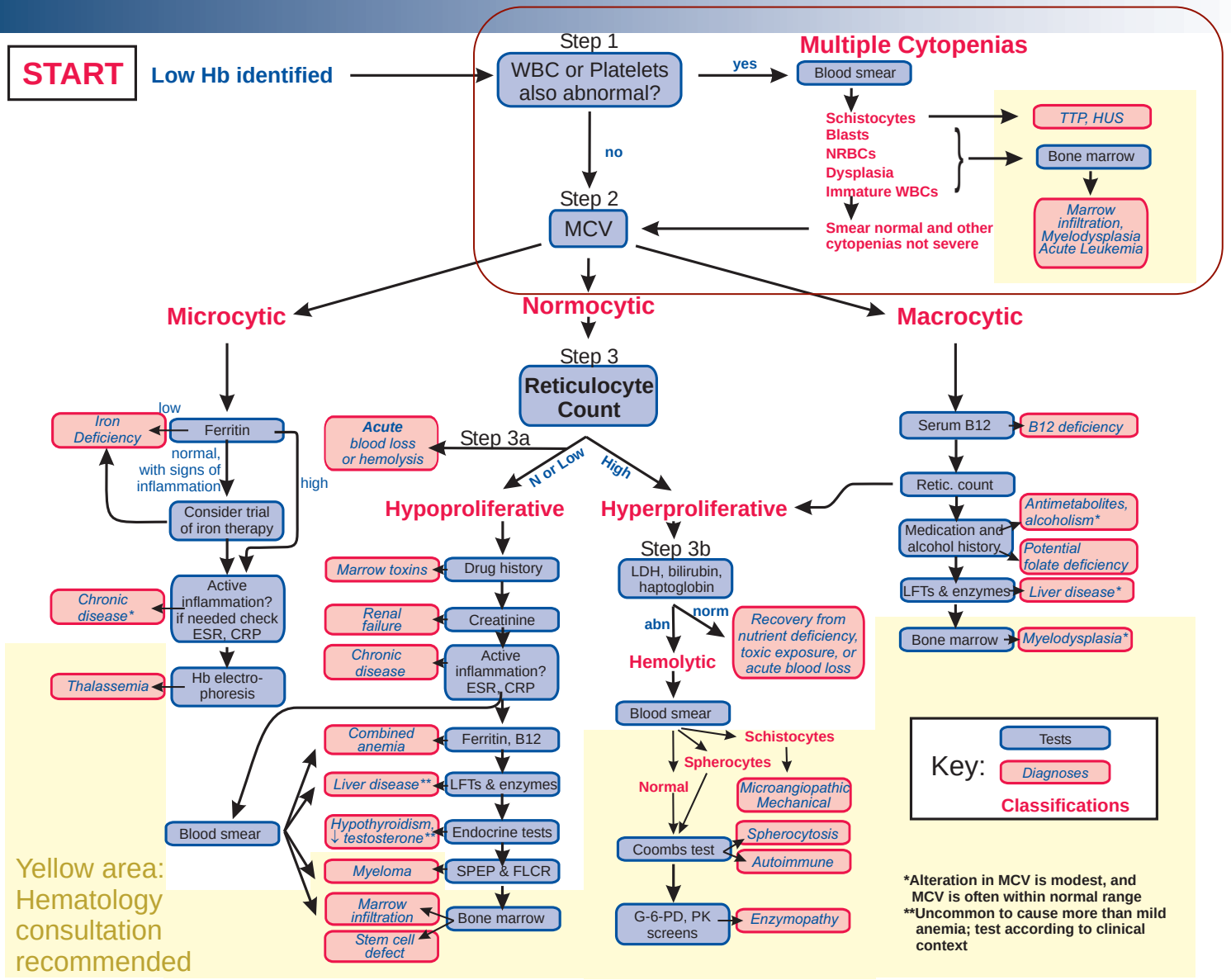
- It starts with data provided for free by the automated analyzer (WBC and platelet count, and MCV)
- Disclaimer: No algorithm can address every possible patient; in particular it is common for patients to have more than one process contributing to their anemia
- Make use of all the data available to you!

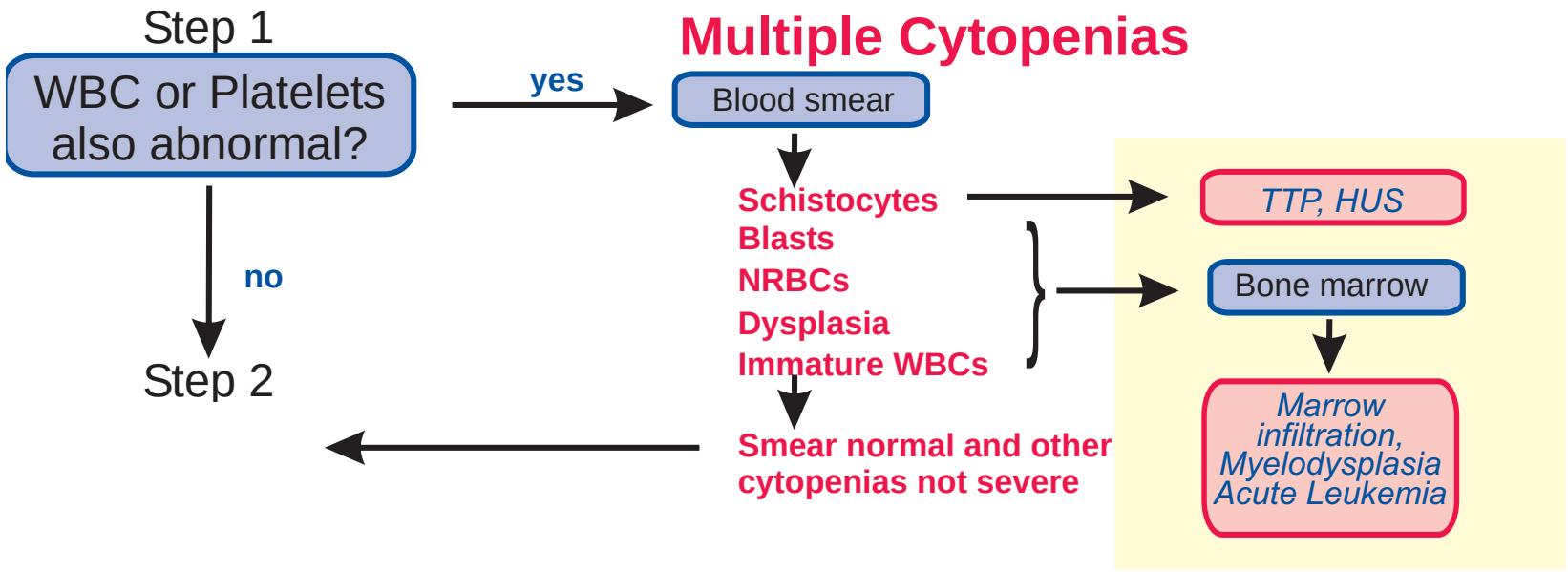
Notes about the Algorithm

- Yellow area indicates when referral to Hematologist is warranted

- *Note about blood smears: if the automated hematology analyzer flags a significant abnormality, a blood smear will likely be done even if you haven't requested it. Look for the result*

Anemia Algorithm

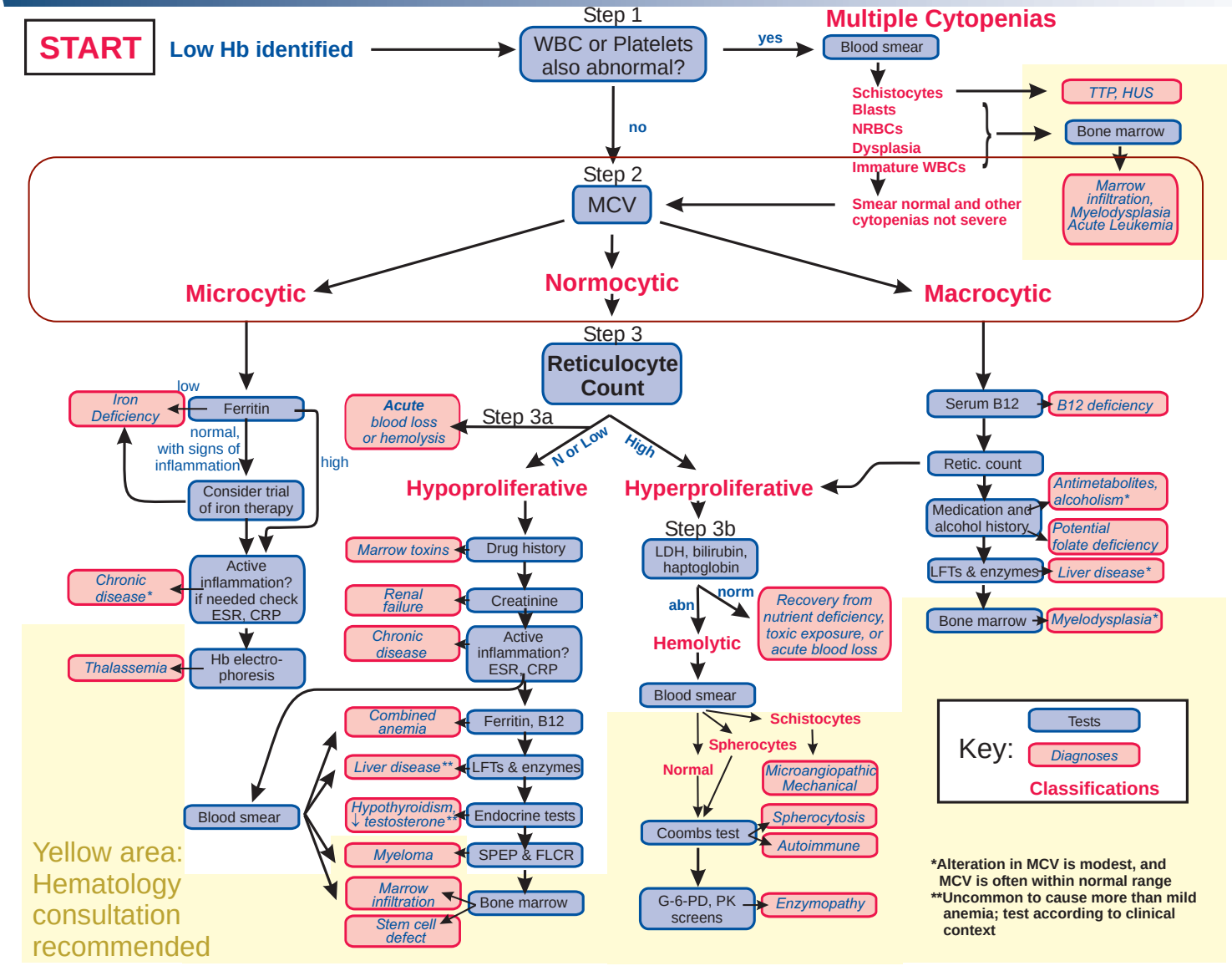


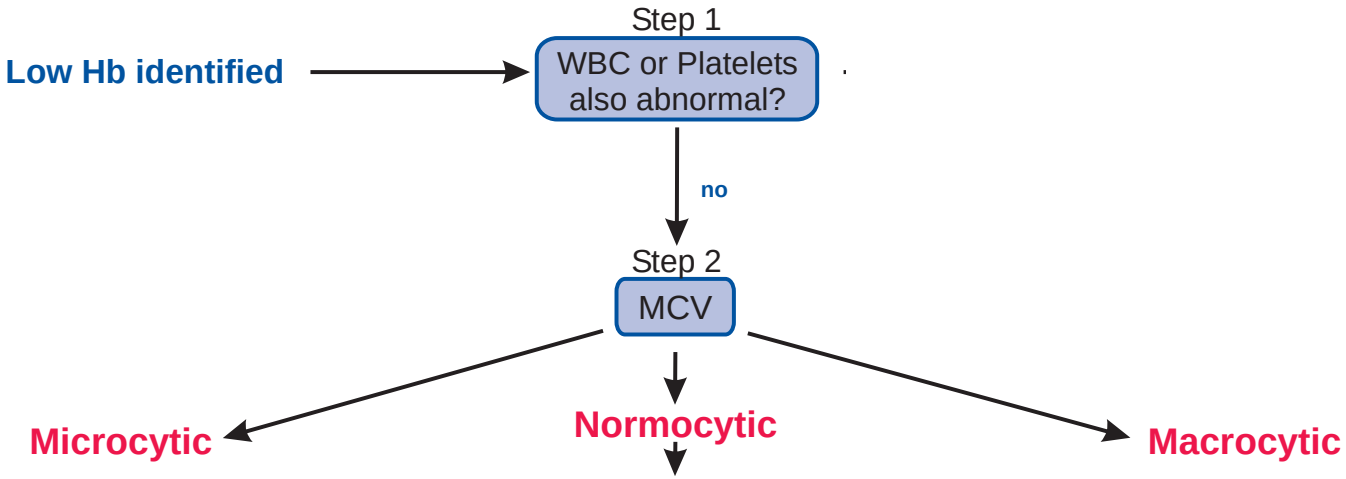


Refer to Dr. Moltzan's algorithm on pancytopenia

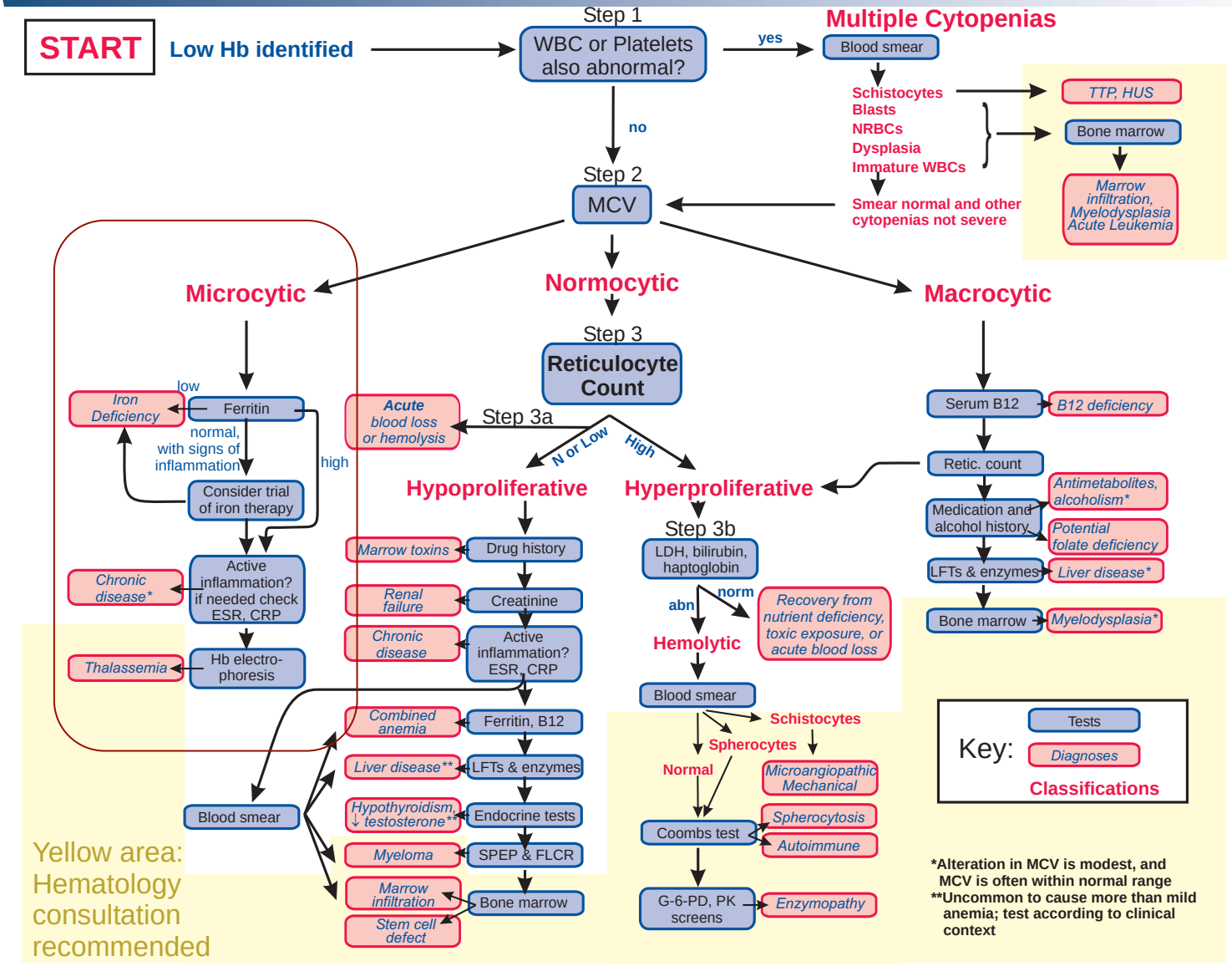
Schistocytes in conjunction with thrombocytopenia: TTP/HUS or DIC – Emergent referral
Blasts – Urgent referral
Immature WBCs: more than 2% promyelocytes or myelocytes
Dysplasia: hypogranular neutrophils or platelets, Pelger-Huet

Anemia Algorithm

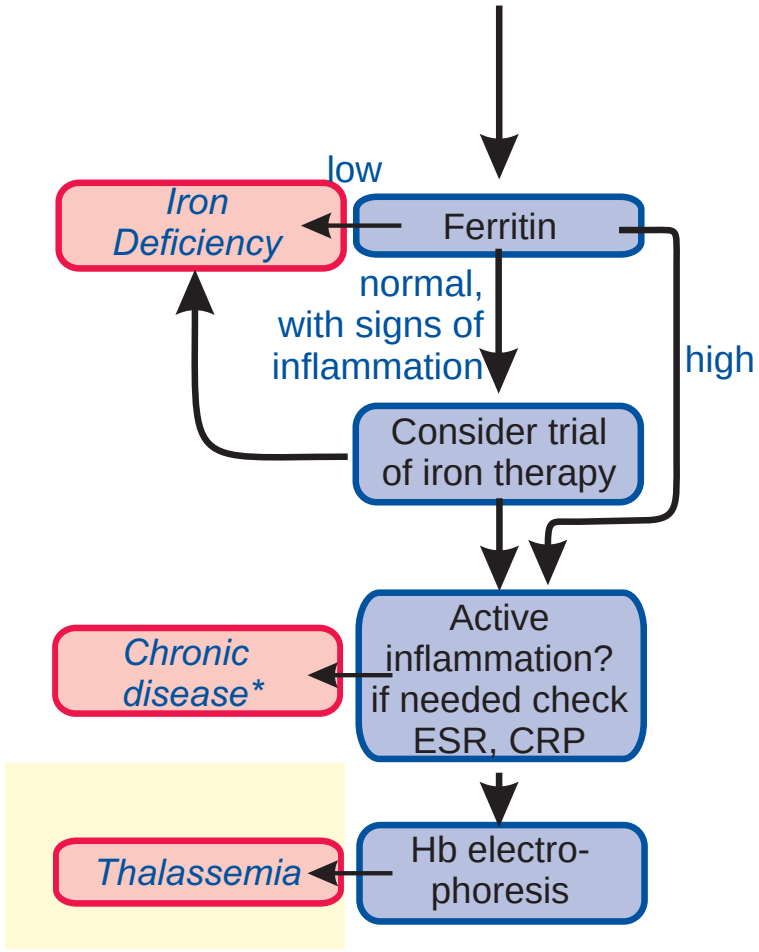



Low Hb identified
Step 1
WBC or Platelets also abnormal?
no
Step 2
MCV
Microcytic
Normocytic
Macrocytic

Anemia Algorithm



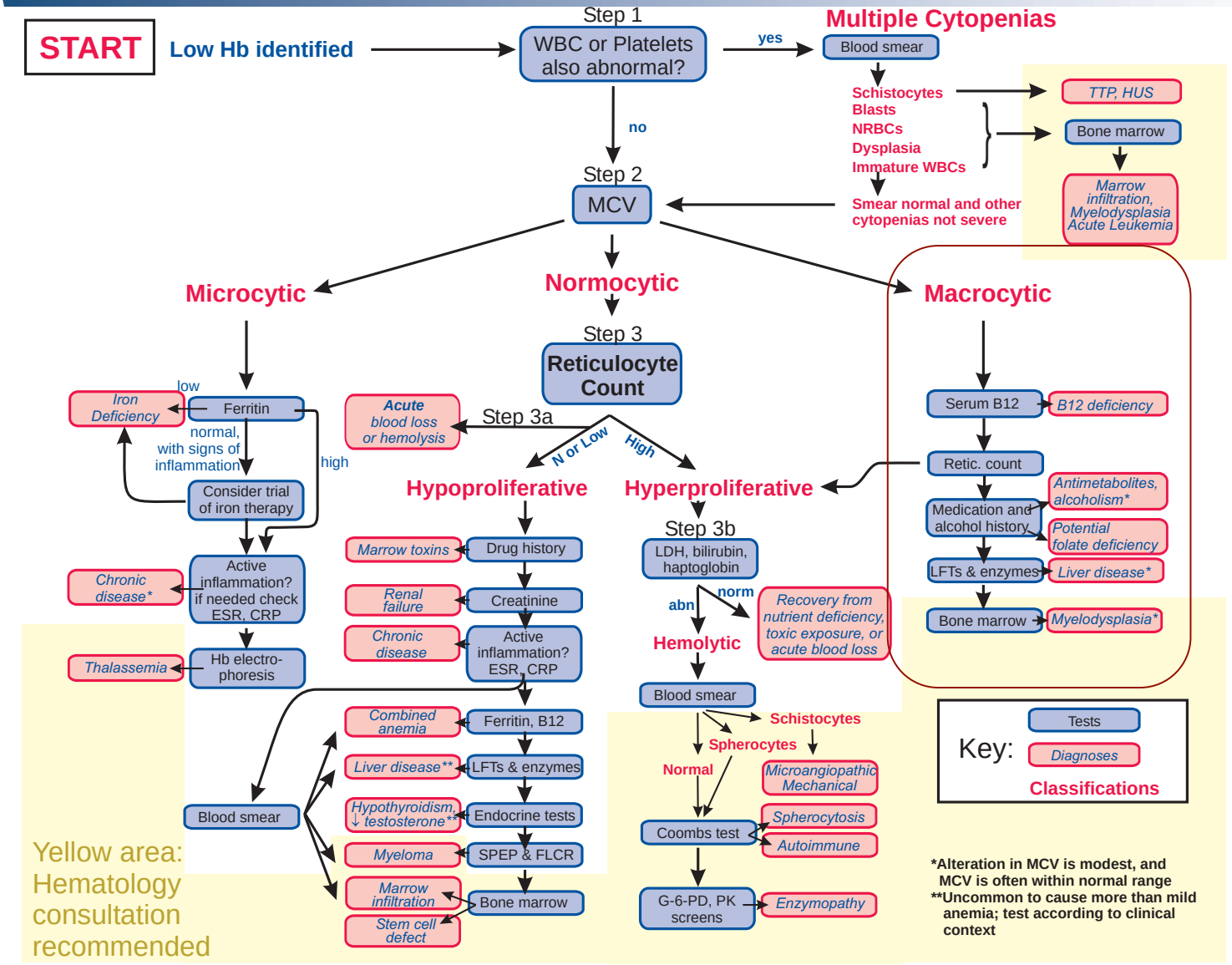
Microcytic



If iron deficiency is established or likely, evaluate for source of bleeding

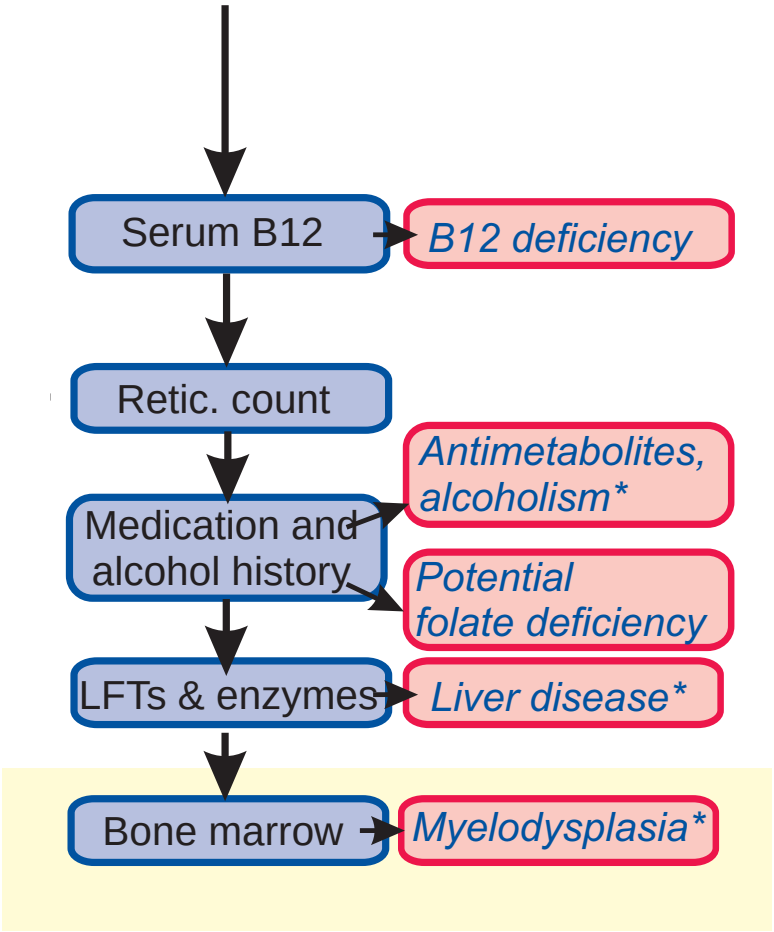
Refer to Iron Deficiency algorithm

Anemia Algorithm

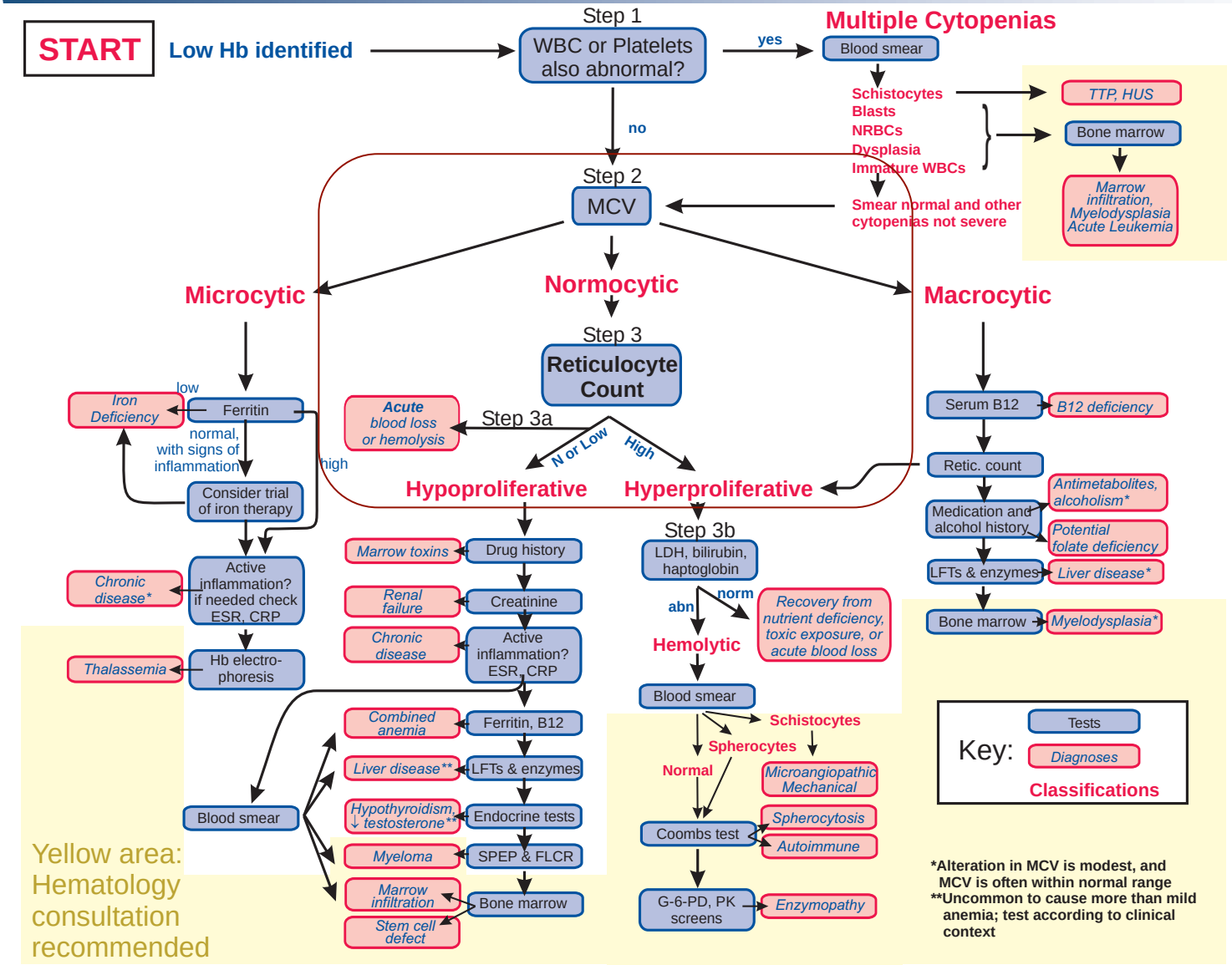


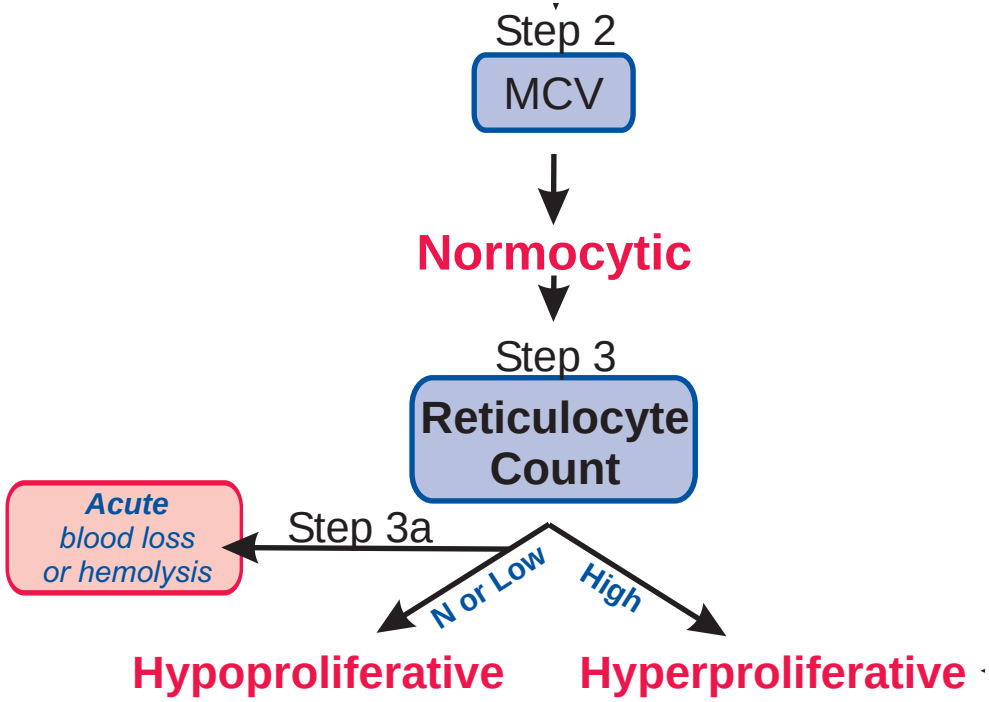
Anemia Algorithm

Macrocytic



Anemia Algorithm

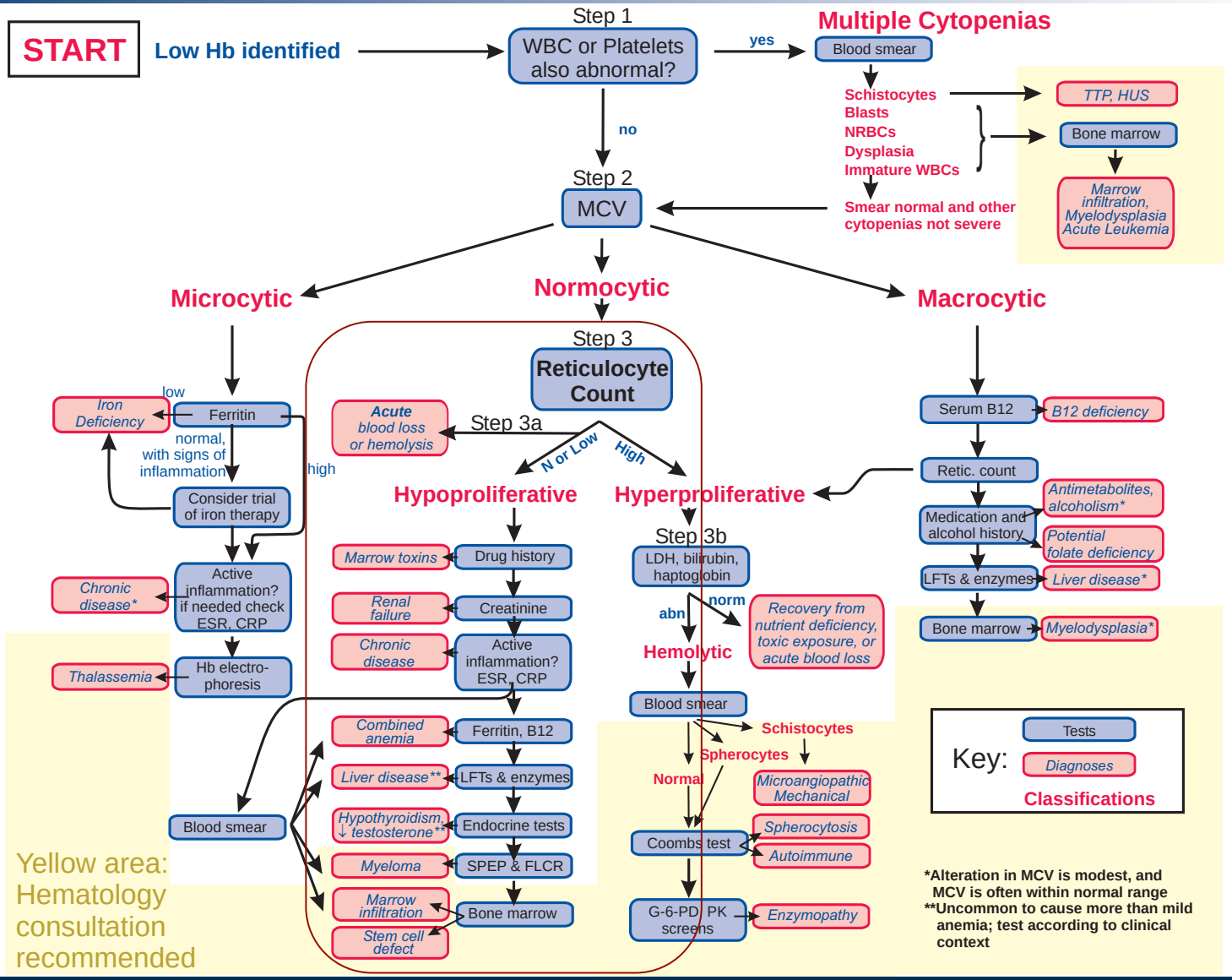


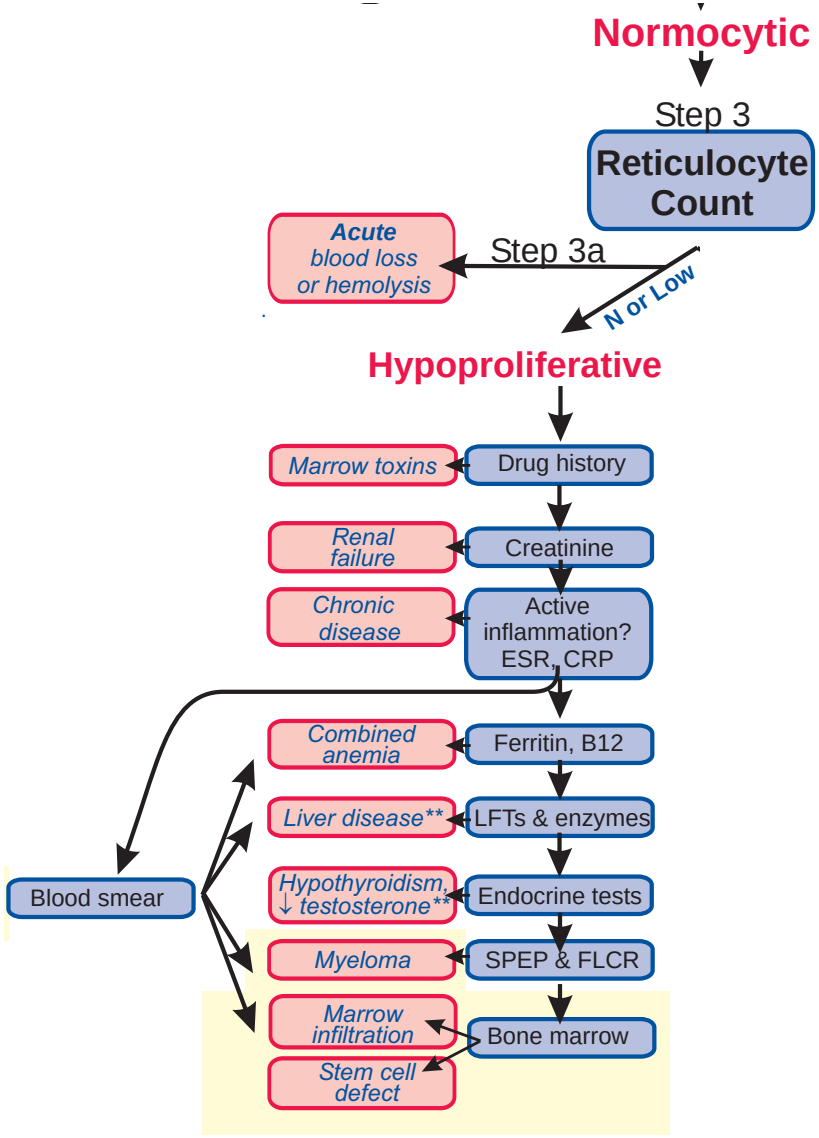

Step 2
MCV
Normocytic
Step 3
Reticulocyte Count
Acute
blood loss
or hemolysis
Step 3a
N or Low
High
Hypoproliferative
Hyperproliferative

Notes about the Reticulocyte Count

- Retics should increase physiologically in response to anemia, but to do so requires:
  - Normal renal function (to produce erythropoietin)
  - Time (7 – 10 days from drop in hemoglobin)
  - Normal marrow function
- High reticulocyte can indicate
  - Compensation for hemolysis
  - Recovery from blood loss, nutritional anemia or marrow suppression

Anemia Algorithm

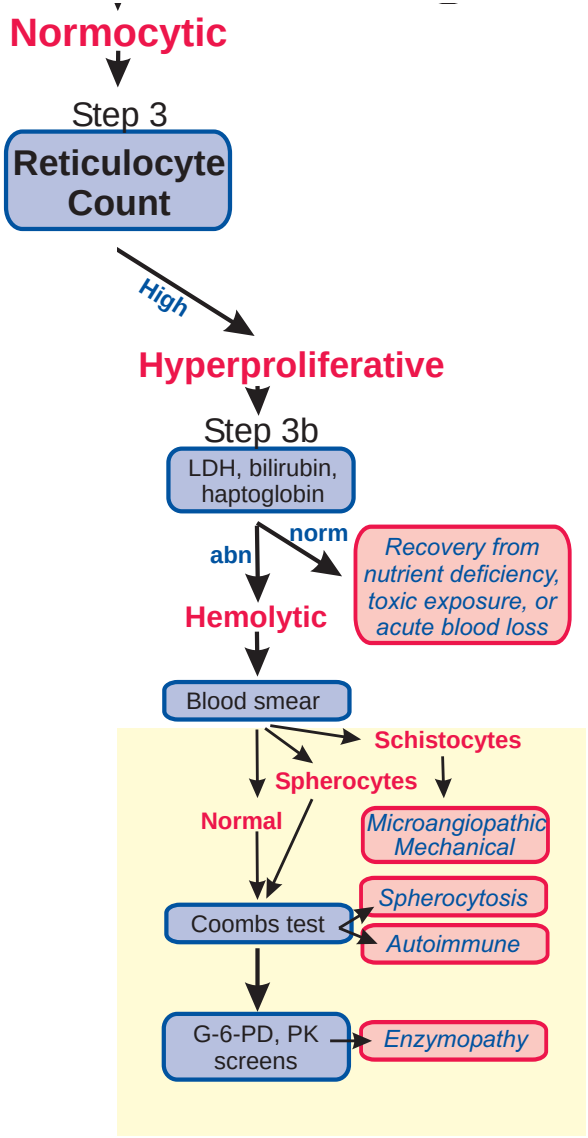



Normocytic
Step 3
Reticulocyte Count
Acute blood loss or hemolysis
Step 3a
N or Low
Hypoproliferative
Marrow toxins
Drug history
Renal failure
Creatinine
Chronic disease
Active inflammation? ESR, CRP
Combined anemia
Ferritin, B12
Liver disease**
LFTs & enzymes
Blood smear
Hypothyroidism, ↓ testosterone**
Endocrine tests
Myeloma
SPEP & FLCR
Marrow infiltration
Bone marrow
Stem cell defect

Notes about the Ancillary Tests

- It is expedient to order multiple investigations together at the outset of this diagnostic path:
  - Creatinine
  - Liver enzymes
  - LDH
  - Direct and total bilirubin
  - Serum ferritin and B12
  - TSH
  - Blood smear

To distinguish whether an elevated retic count reflects hemolysis, or recovery from blood loss or marrow suppression, order LDH, bilirubin
direct / total, and haptoglobin



Take Home Messages

HOW I WORK UP ANEMIA

- Look at all the data from the CBC
- Most anemias also need a reticulocyte count
- Non-microcytic anemias need a blood smear
- Microcytic anemia: check ferritin first
- Other anemias: obtain a set of investigations including creatinine, liver enzymes, LDH, direct and total bilirubin, serum ferritin, serum B12, TSH

When to consider a referral to hematology

HOW I WORK UP ANEMIA

- Indication of bone marrow disorder
  - Pancytopenia
  - Blast cells on blood film
  - NRBCs and immature white cells
- Indication of hemolysis
  - Elevated retics, increased indirect bilirubin, increased LDH, decreased haptoglobin
- You're stumped

Another case

GRADUATE LEVEL

Dr. Don Houston
Cancer Care Manitoba
Ph: 787-2336
Fax: 786-0621

Thanks for seeing Scott, a very pleasant older gent who has anemia of unknown etiology. He originally was felt to be likely anemic because of a severe chronic gastritis and h.pylori infection. These have been treated and he is feeling good, but his hemoglobin has really not improved.

I have checked B12 and TSH, both seem normal enough not to be the culprit.

I have enclosed the rest of the bloodwork that was done originally.

His hemoglobin has fallen from 134 to 114 over the past year.

Your opinion and treatment as indicated would be much appreciated.
Thanks,

Another case

GRADUATE LEVEL

	Dec 3	Nov 14	Jul 18	A year ago
WBC	6.4		6.0	
Hb	114	119	115	134
MCV	95.1	93.5	95.2	
platelets	180		177	
PMNs Lymphs Monos Eos Basos	2.8 2.3 1.2* 0.1 0.0		2.8 1.9 1.0* 0.2 0.0	

Another case

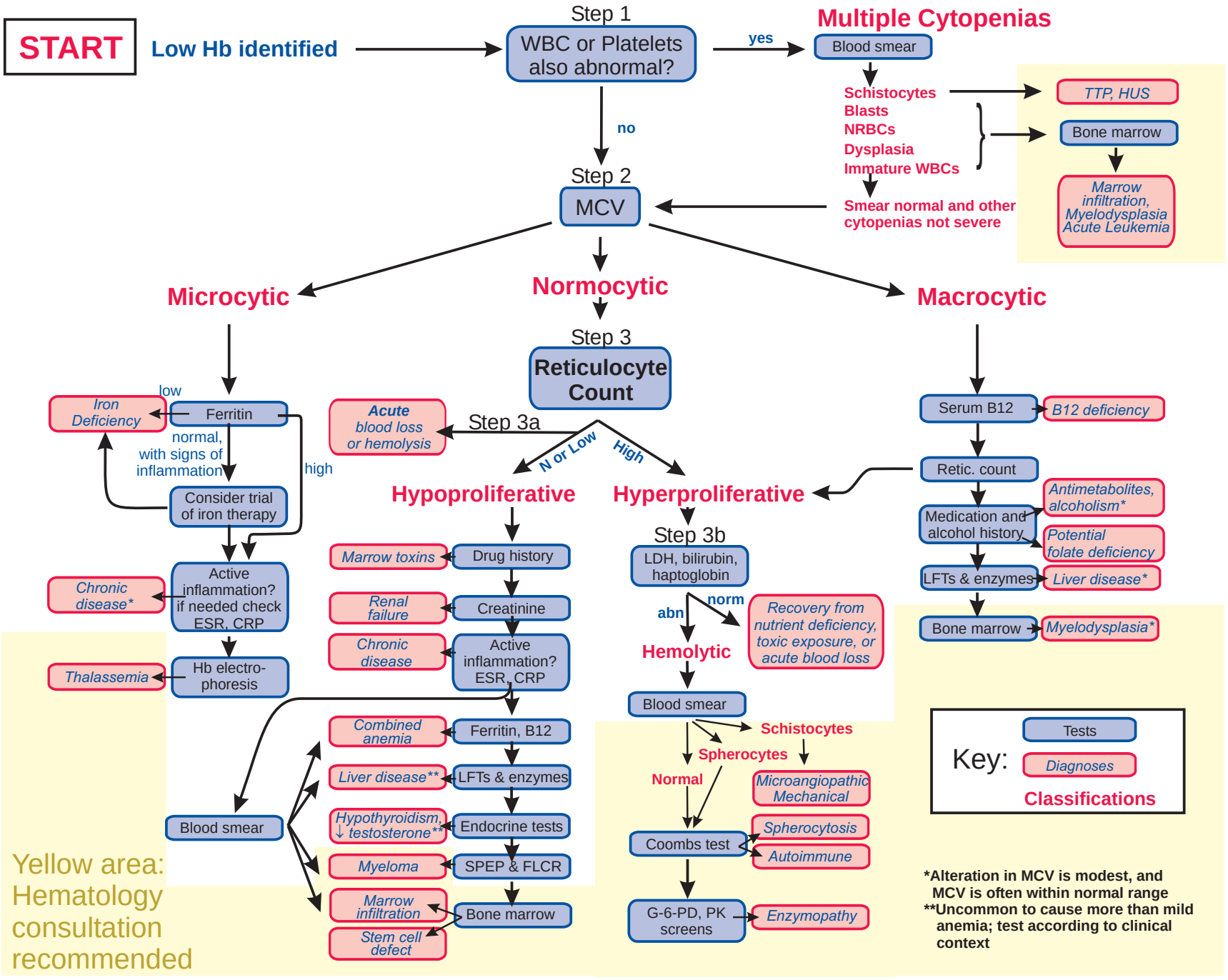
GRADUATE LEVEL

- Additional data provided:
  - Serum B12 (N), serum ferritin (538)
  - SPEP and UPEP (negative), total protein (60), albumin (39)
  - TSH (N)
  - ESR (35)
  - AST, ALT, alk phos, GGT (N)
  - LDH (153), total bilirubin (10.3)
  - Creatinine (84)

Another case

GRADUATE LEVEL

- Are there any other data you would like?
- What should be done next?



Questions?

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