Lunch Review Session: Anemias and Sickle Cell Disease

Drs. Kato, Gordeuk, Malkovska, and Siegel
A 65-year-old Caucasian woman with a history of hypothyroidism and diabetes mellitus type II, presents with fatigue, shortness of breath and mild paresthesias in both feet. Labs: Hb 8.5 g/dL, MCV 112 fL, WBC 2,800/µl, absolute neutrophil count 1,200/µl, platelet count 132,000/µl, retic 0.2%. Blood smear shows macro-ovalocytes and hypersegmented neutrophils. Serum B12 190 pg/mL (N 200-950), red cell folate 220 ng/mL (N 280-903).

Select the set of tests that are most likely to confirm the diagnosis of pernicious anemia:

A. Plasma methylmalonic acid level (MMA), anti-intrinsic factor antibodies and gastrin levels
B. Homocystein levels, anti-thyroglobulin and anti-parietal cell antibodies
C. Bone marrow aspirate and biopsy and antiparietal cell antibodies
D. Plasma MMA, homocystein and anti-parietal cell antibodies
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D. Plasma MMA, homocystein and anti-parietal cell antibodies
ANSWER #1

A. Plasma methylmalonic acid level (MMA), anti-intrinsic factor antibodies and gastrin levels
B. Homocysteine levels, anti-thyroglobulin and anti-parietal cell antibodies
C. Bone marrow aspirate and biopsy and antiparietal cell antibodies
D. Plasma MMA, homocysteine and anti-parietal cell antibodies
A healthy African immigrant woman with sickle cell trait brings her 19 and 21 year old sons by the same father to you for evaluation of their sickle cell status. Neither has ever had a blood transfusion. You find on hemoglobin HPLC testing that the younger has a report of ASFA\textsubscript{2} and the older SAFA\textsubscript{2}. You suspect:

A. Both sons have sickle cell trait
B. One son has sickle cell trait and the other has sickle cell anemia with alpha-thalassemia
C. One son has sickle cell trait and the other has sickle-beta-thalassemia
D. Lab error in reporting S and A out of order in the older son
E. The father of the sons has sickle cell trait
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D. Lab error in reporting S and A out of order in the older son
E. The father of the sons has sickle cell trait
QUESTION #3

- In a patient with homozygous HFEC282Y hemochromatosis and total body iron stores of 10 grams, most of the body’s total amount of iron is present in:

  A. Macrophages of the bone marrow, spleen and liver.
  B. Enzyme systems of the body.
  C. Red blood cells in the form of hemoglobin.
  D. Parenchymal cells of the liver, heart, pancreas and other organs.
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Bar chart showing:
- A: 71%
- B: 0%
- C: 7%
- D: 22%
A. Macrophages of the bone marrow, spleen and liver.
B. Enzyme systems of the body.
C. Red blood cells in the form of hemoglobin.
D. Parenchymal cells of the liver, heart, pancreas and other organs
Hydroxyurea therapy has been shown to improve the following EXCEPT:

A. Priapism
B. Red cell transfusion
C. Acute chest syndrome
D. Vaso-occlusive pain crisis
E. Mortality
QUESTION #5

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E. Mortality
The patient is treated with intramuscular injections of cyanocobalamin 1000 µg for 3 doses and then once a month. After 1 month of therapy her Hb is 10.8 g/dL. After 2 months her Hb is 10.6 g/dL, MCV 78 fl, retic 1.2%. Her ferritin at diagnosis was 40 ng/ml (N 25 -200). The most likely cause of her suboptimal response to cyanocobalamin therapy is

A. Folate deficiency
B. Hypothyroidism
C. Iron deficiency
D. Alcohol use
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QUESTION #7

- The treatment of choice in a patient with homozygous HFEC282Y hemochromatosis, normal CBC and liver biopsy showing increased portal fibrosis and grade 4 of 4 hepatocellular iron is:

  A. Interferon alpha
  B. Daily infusions of desferrioxamine
  C. The phlebotomy of 500 ml of blood every 2 weeks until the serum ferritin concentration is less than 20 ng/ml
  D. The phlebotomy of 500 ml of blood two times a week until the serum ferritin concentration is less than 50 ng/ml.
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A 38 year old woman with sickle cell anemia (HbSS) is transferred to the ICU in apparent congestive heart failure with peripheral edema, pulmonary edema and echocardiography showing left ventricular dilation with abnormally low ejection fraction. She has never been on scheduled regular transfusions, but she reports that she is hospitalized for pain crisis approximately ten times a year and that she is transfused two units of red cells each time since her teens. Appropriate considerations include:

A. High output cardiac failure
B. Left ventricular diastolic dysfunction
C. Pulmonary arterial hypertension
D. Check the serum ferritin level
E. Stat EKG and serum troponin levels
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ANSWER #8

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B. Left ventricular diastolic dysfunction
C. Pulmonary arterial hypertension
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QUESTION #9

Which of the following statements best characterizes the hemolysis associated with G6PD deficiency?

A. It is more severe in females than in males
B. It is more severe in affected African-Americans than in affected persons of Mediterranean ancestry
C. It causes the appearance of Heinz bodies on Wright staining of peripheral smear.
D. It is most often precipitated by infections
E. The best time to perform the diagnostic test is during a hemolytic crisis.
QUESTION #9

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Bar chart showing the percentage of respondents for each option:
- A: 4%
- B: 13%
- C: 43%
- D: 34%
- E: 4%
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QUESTION #10

Which of the following is typically found in the anemia of inflammation?

A. Diminished serum ferritin concentration
B. Diminished bone marrow macrophage iron stores
C. Diminished free erythrocyte protoporphyrin concentration
D. Diminished transferrin saturation
Question #10

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A 37-year-old caucasian woman with a history of bariatric surgery 3 years ago presents with fatigue, paresthesiae of hands and feet and intermittent diarrhea. She is taking Vitron C and vitamin B supplements. Physical exam reveals unsteady gait, brisk tendon reflexes and sensory ataxia. Labs: Hb 10.2 g/dL, MCV 83, WBC 3.0 k/µL, ANC 0.9 k/µL, platelets 255 k/µL. Bone marrow aspirate shows 50% cellularity with granulocytic hypoplasia, M:E ratio 1:2, vacuolated proerythroblasts and myelocytes and 10% ringed sideroblasts. The most likely diagnosis is:

A. Combined iron and B12 deficiency
B. Copper deficiency
C. Protein-calorie malnutrition
D. Myelodysplastic syndrome
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QUESTION #12

Important health maintenance items in sickle cell disease include:

A. Pneumococcal 23-valent vaccine
B. Influenza vaccine
C. Retinal examination for retinopathy
D. Urinalysis
E. All of the above
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QUESTION #13

Which of the following statements about hereditary spherocytosis (HS) is incorrect?

A. HS is most commonly associated with autosomal-dominant inheritance

B. The RBCs in HS have increased osmotic fragility

C. Splenectomy will improve the anemia but not the spherocytosis

D. Splenectomy will lead to disappearance of the spherocytosis with no improvement in the anemia.
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Iron overload due to mutations of the genes for HFE, TfR2, or hemojuvelin and iron overload due to anemias characterized by ineffective erythropoiesis share what common pathway for developing iron overload?

A. Excessive levels of transferrin circulating in the blood plasma.
B. Excessive activity of hephaestin in the basolateral membrane of enterocytes.
C. Excessive activity of cytochrome b5 reductase in the luminal brush border of enterocytes.
D. Abnormally reduced concentrations and activity of hepcidin.
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QUESTION #15

Which of the following would not be expected in a patient who had a splenectomy for hereditary spherocytosis 6 months ago?

A. Elevated platelet count
B. Elevated reticulocyte count and decreased serum haptoglobin concentration
C. Predominance of microspherocytic red blood cells on peripheral blood smear
D. Increased osmotic fragility of red blood cells.
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QUESTION #16

The patient’s labs show: MMA 1.2 µmol/L (N <=0.40), homocysteine 38 µmol/L (N<=15), both anti-intrinsic factor and antiparietal cell antibodies are positive and gastrin levels are high. She is diagnosed with pernicious anemia. The following statement about her disease is correct:

A. Macrocytosis or anemia always precedes the development of neurological complications of B12 deficiency.
B. B12 deficiency can be differentiated from folate deficiency by peripheral blood and marrow morphology.
C. Patients with pernicious anemia can respond to high doses of oral cobalamin (1000 µg daily).
D. Red cell folate is a better discriminator of B12 versus folate deficiency than serum folate.
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QUESTION #17

Which of the following statements about hereditary elliptocytosis is incorrect?

A. The disorder is autosomal dominant, although sporadic cases have been reported.
B. Most patients have severe hemolysis
C. Splenectomy relieves the anemia
D. Elliptic cells may be seen in thalassemia and iron deficiency
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D. Elliptic cells may be seen in thalassemia and iron deficiency
A 25-year-old woman presents with abdominal pain, nausea, constipation, and confusion. She has had several episodes of similar pain over the past 6 years. Most of these were mild compared with her current pain. Two years ago she was hospitalized with severe abdominal pain and had an appendectomy. In follow up, she was told that the appendix was normal. On examination, she is confused and uncooperative. She has decreased muscle strength in her arms and legs and shallow respirations. Her blood pressure is 145/90, and her pulse is 110. She has a low-grade temperature. There is no rash. Her chest and cardiac exams are unremarkable. She has decreased bowel sounds and diffuse abdominal tenderness. There is no hepatosplenomegaly. The complete blood cell count shows a mild leukocytosis with no anemia or thrombocytopenia. Her serum sodium is 125 mEq/dL.
QUESTION #18 (CONTINUED)

Which of the following is the most appropriate next step in the evaluation of this patient?

A. Rapid screen of urine for porphobilinogen
B. 24-hour stool collection for porphyrins
C. 24-hour urine collection for porphyrins
D. Plasma porphyrin determination
E. Measurement of red blood cell PBG deaminase
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E. Measurement of red blood cell PBG deaminase
Which one of the following patients with sideroblastic anemia is most likely to respond to oral pyridoxine:

A. A 25-year-old male with newly diagnosed hypochromic microcytic anemia and ferritin of 520. His maternal grandfather had life-long anemia.

B. A 67-year-old male with pancytopenia, hypogranular neutrophils and severe dyserythropoiesis and micromegakaryocytes in marrow aspirate.

C. A 3-month-old girl presenting with myopathy, lactic acidosis and anemia.

D. A 12-year old boy with macrocytic anemia, diabetes mellitus and deafness. Bone marrow shows megaloblastic erythropoiesis in addition to numerous ringed sideroblasts.
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QUESTION #20

All of the following are typical findings in the anemia of inflammation EXCEPT:

A. Shift of body iron into macrophage stores
B. Iron-limited erythropoiesis
C. Increased iron absorption
D. Slightly decreased erythrocyte survival
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8%  9%  79%  4%
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B. Iron-limited erythropoiesis
C. Increased iron absorption
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QUESTION #21

Which of the following hemolytic anemia can be classified as extra-corpuscular:

A. Elliptocytosis
B. PNH
C. Pyruvate kinase deficiency
D. Sickle cell anemia
E. Thrombotic thrombocytopenic purpura
QUESTION #21

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QUESTION #22

- A 73-year-old Indian woman with a history of chronic gastritis complains of bilateral shoulder and hip pains with morning stiffness, fatigue, weakness and anorexia for two months. Physical exam is significant for mucosal pallor and diminished range of movement in hips and shoulders. Labs: Hb 9.2 g/dL, RBC 3.4x10^6 /µL, MCV 78 fL, WBC 9,200/µl, platelet count 582,000/µl, retic 0.1%. Blood smear shows hypochromic red cells. ESR 105 mm/h, iron 15 µg/dL, TIBC 190 µg/dL, iron saturation 8%, ferritin 121 ng/mL.
What is the most likely cause of her anemia?

A. Anemia of chronic disease
B. Iron deficiency
C. Anemia of chronic disease with iron deficiency
D. Thalassemia trait
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Marrow fibrosis can occur in which of the following disorders?

A. HIV infection
B. Marrow tumor metastases
C. Hairy cell leukemia
D. Systemic lupus erythematosus
E. All of the above
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B. Marrow tumor metastases  
C. Hairy cell leukemia  
D. Systemic lupus erythematosus  
E. All of the above
QUESTION #24

All of the following may be found on the peripheral blood smear as a consequence of splenectomy except:

A. Erythrocytic Heinz bodies
B. Erythrocytic target forms
C. Erythrocytic Howell-Jolly bodies
D. Spherocytic red blood cells
QUESTION #24

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QUESTION #25

- Patient was diagnosed with polymyalgia rheumatic and started on oral prednisone. What is the best treatment for her symptomatic anemia?

A. Ferrous sulphate
B. Aranesp
C. Blood transfusion
D. No specific therapy
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A. Ferrous sulphate
B. Aranesp
C. Blood transfusion
D. No specific therapy
When starting a drug that carries a risk for G6PD mediated hemolysis, patients from which of the following geographical areas need not be screened for G6PD deficiency?

A. Russia
B. Southeast Asia
C. Brazil
D. Southern Europe
E. Sub-Saharan Africa
F. None of the above
LR1

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