Continuing Education Questions

FALL 2008

To receive **2.0** contact hours of **intermediate** level P.A.C.E.® credit for the **Focus: Anemia in Selected Populations** questions, insert your answers in the appropriate spots on the continuing education registration form that follows, then mail a photocopy of the form as directed.

LEARNING OBJECTIVES

1. Recognize infant and toddler populations vulnerable to developing iron deficiency.
2. Describe characteristic laboratory findings evaluating infant erythropoiesis.
3. Identify variations in iron requirements from birth to age three years.
4. Describe specific laboratory tests and expected results to detect iron deficiency anemia.
5. Distinguish the sensitivity and specificity of the specific tests to detect iron deficiency anemia.
6. Recognize laboratory tests that detect iron deficiency before frank anemia develops.
7. Describe the main limitations of the reticulocyte hemoglobin content assay.
8. State the World Health Organization criteria for defining anemia and discuss issues related to this definition.
9. Compare the prevalence of anemia in a variety of subgroups in persons over age 65.
10. Discuss the physical, cognitive, and economic impact of anemia in the elderly.
11. Characterize the major causes of anemia in the geriatric population.
12. Explain laboratory tests and results useful in identifying the cause of anemia in the elderly.
13. Compare and contrast hemoglobinopathies and thalassemias.
14. Describe the most common type of mutation found in the majority of hemoglobinopathies and α-thalassemias.
15. List the five categories of mutations common in β-thalassemia.
16. Discuss why compound heterozygotes involving HbS and either a β-chain hemoglobinopathy or β^+-thalassemia are less severe than sickle cell disease but more severe than sickle cell trait.
17. Discuss why an α-thalassemia mutation occurring in a HbSS patient lessens the severity of the existing sickle cell disease.
18. List two compound heterozygotes that mimic other hemoglobinopathy and/or thalassemia conditions.

CONTINUING EDUCATION QUESTIONS OCCURANCE AND DETECTION OF IRON-DEFICIENCY ANEMIA IN INFANTS AND TODDLERS

1. Which of the following populations of infants and toddlers is most vulnerable to developing iron deficiency?
   a. Infants breastfed without any cow's milk until age two
   b. Toddlers who drink ≤8 oz./day of cow's milk
   c. Infants born at 30 weeks gestation
   d. Infants with birth weight of >8 lbs

2. Which feature below is a typical laboratory finding in a full-term newborn?
   a. Adult amount of polychromasia
   b. Relative reticulocyte count of five percent
   c. Mean corpuscular volume of 90 fL
   d. Erythrocyte life span of 120-130 days

3. The recommended daily iron intake for a child three years old is:
   a. 6 mg.
   b. 8 mg.
   c. 10 mg.
   d. 16 mg.

4. In an infant or one-year-old child, what hemoglobin level (in g/L) is suggestive of iron deficiency anemia?
   a. <185
   b. <160
   c. <126
   d. <110

5. Which laboratory test of those below has the best specificity and sensitivity for iron deficiency?
   a. Total iron binding capacity
   b. Serum ferritin level
   c. Percent transferrin saturation
   d. Bone marrow iron

6. Of the laboratory tests below, which one is the earliest indicator of iron deficiency?
   a. FEP
   b. ZPP
   c. CHr
   d. TIBC

7. Which of the following is a limitation of the CHr laboratory test?
   a. Falsely increased in cases of infant and toddler infection
   b. Available as a test on only a few hematology analyzers
   c. Diagnostic power is limited in patients with MCV<80
   d. Is not the equivalent of Sysmex XE-2100's Ret He test

ANEMIA IN AN AGING POPULATION

8. What are the World Health Organization criteria for defining anemia?
   a. Hemoglobin less than 140 g/L for men and less than 130 g/L for women
   b. Hemoglobin less than 130 g/L for men and less than 120 g/L for women
   c. Hemoglobin less than 120 g/L for men and less than 110 g/L for women
   d. Hemoglobin less than 120 g/L for both sexes

9. Which statement best describes the use of WHO reference intervals for defining anemia in the elderly?
   a. Using the WHO definition of anemia always overestimates the number of elderly with anemia.
   b. Using the WHO definition of anemia underestimates the number of elderly women with anemia.
   c. The WHO criteria are controversial and there is evidence to both support and reject their use.
   d. The WHO criteria are clearly inappropriate for defining anemia in the elderly and should only be used for younger patients.

10. Which statement best characterizes the prevalence of anemia in the elderly?
    a. Anemia is more common in elderly blacks than in elderly whites.
    b. Anemia is more common in elderly females than in elderly males.
    c. Anemia is very rare in elderly persons according to the majority of studies.
    d. The prevalence of anemia decreases with increasing age.

11. What was the prevalence of anemia in persons ≥65 found to be in the NHANES III study?
    a. 11% in men and 10% in women
    b. 5% in men and 4% in women
    c. 7% in men and 17% in women
    d. 44% in men and 48% in women

12. What percentage of nursing home patients were found to be anemic in one study?
    a. 4%
    b. 10%
    c. 15%
    d. 44%

13. Which condition has **not** been shown to be associated with anemia in elderly persons?
    a. Increased risk of falls
    b. Cognitive impairment
    c. Mobility problems
    d. Increased risk of developing cancer

14. Which statement best summarizes the impact of anemia on the elderly?
    a. Anemia is associated with increased morbidity and mortality for all persons ≥65.
    b. Anemia has no effect independent of other diseases which afflict the elderly.
    c. Anemia is associated with increased mortality only in the frail elderly over age 85.
    d. Anemia is associated with increased morbidity and mortality only in persons who are living in institutions such as nursing homes.

15. What causes of anemia in the elderly were identified in an analysis of data from the NHANES III study?
    a. One-half of cases were attributed to iron deficiency and one-half were due to folate deficiency.
    b. One-third of cases were attributed to anemia of chronic inflammation or renal disease, one-third of cases were attributed to nutritional deficiencies such as iron or cobalamin, and one-third of cases were unexplained.
    c. The majority of cases were due to acute or chronic blood loss.
    d. One-third of cases were due to cancer, one third due to inflammation, and one third due to blood loss.

16. What is the most common cause of cobalamin (vitamin B_{12}) deficiency in the elderly?
    a. Inadequate diet
    b. Alcohol abuse
    c. Lack of intrinsic factor
    d. Inability to split cobalamin from food

17. The following laboratory results were obtained for a 79-year-old male patient.

Test/Analyte	Result	Reference interval, SI units
Hemoglobin	110 g/L	130-160 g/L
Mean cell volume	83 fL	80-100 fL
Serum iron	10.2 µmol/L	11.6-31.3 µmol/L
Total iron binding capacity	52 µmol/L	54-64 µmol/L
Serum ferritin	230 µg/L	20-300 µg/L
Transferrin saturation	20%	20%-50%

    Based on these laboratory results, what is the most likely cause of anemia in this patient?
    a. Iron deficiency anemia
    b. Megaloblastic anemia
    c. Anemia of chronic disease
    d. No explanation based on results given

18. What additional test would you recommend be ordered to help determine the cause of anemia in the patient in the preceding case?
    a. Cobalamin
    b. Folate
    c. Transferrin receptor
    d. Bone marrow examination

PATHOPHYSIOLOGY OF COMPOUND HETEROZYGOTES INVOLVING HEMOGLOBINOPATHIES AND THALASSEMIAS

19. Which of the following statements is **FALSE** concerning a hemoglobinopathy?
    a. Hemoglobinopathies are usually caused by a point mutation.
    b. Hemoglobinopathies usually result in a quantitative reduction in hemoglobin synthesis.
    c. The mutations most common in hemoglobinopathies result in a functional change in the hemoglobin molecule.
    d. Sickle cell is the most severe of the hemoglobinopathies.

20. The most common mutation type found in α-thalassemia is:
    a. point mutation.
    b. promoter mutation.
    c. amino acid substitution.
    d. deletion.

21. A compound heterozygote HbS/β^0-thalassemia will produce symptoms that are:
    a. similar to HbSS in severity.
    b. severity intermediate between HbSS and HbAS.
    c. severity similar to HbAS.
    d. absent.

22. A compound heterozygote HbS/α-thalassemia will have fewer symptoms than most HbS/β^+-thalassemia compound heterozygotes because the:
    a. HbS/α-thalassemia patient will produce more HbF.
    b. α-thalassemia hemoglobin will interfere with the polymerization of the sickle hemoglobin.
    c. HbS/α-thalassemia patient will produce less HbS.
    d. HbS/β^+-thalassemia will produce more HbA.

23. Which of the following diagnoses can be confused with a compound heterozygote involving HbD^{Iran}/β^0-thalassemia using alkaline hemoglobin electrophoresis results?
    a. HbSS
    b. HbEE
    c. HbAS
    d. Hb Knossos

24. Anti-Lepore Hong Kong/β^0-thalassemia compound heterozygotes can be misdiagnosed with which diagnosis listed below?
    a. HbSC
    b. Hb Volga
    c. HbE/β^+-thalassemia
    d. Hb Paske/α-thalassemia

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A certificate of completion will be awarded to participants who achieve a passing grade of 70% or better. Participants should allow eight weeks for notification of scores and receipt of certificates.

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Answers
Circle correct answer.

1.	a	b	c	d	13.	a	b	c	d
2.	a	b	c	d	14.	a	b	c	d
3.	a	b	c	d	15.	a	b	c	d
4.	a	b	c	d	16.	a	b	c	d
5.	a	b	c	d	17.	a	b	c	d
6.	a	b	c	d	18.	a	b	c	d
7.	a	b	c	d	19.	a	b	c	d
8.	a	b	c	d	20.	a	b	c	d
9.	a	b	c	d	21.	a	b	c	d
10.	a	b	c	d	22.	a	b	c	d
11.	a	b	c	d	23.	a	b	c	d
12.	a	b	c	d	24.	a	b	c	d

Participant Information
Please circle the most appropriate answers.

1. Is this program used to meet your CE requirements for:
(a) state license (b) NCA (c) employment (d) other

2. Did these articles achieve their stated objectives?
(a) yes (b) no

3. How long did it take you to complete both the reading and the quiz? _____minutes

4. What subjects would you like to see addressed in future Focus articles?

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