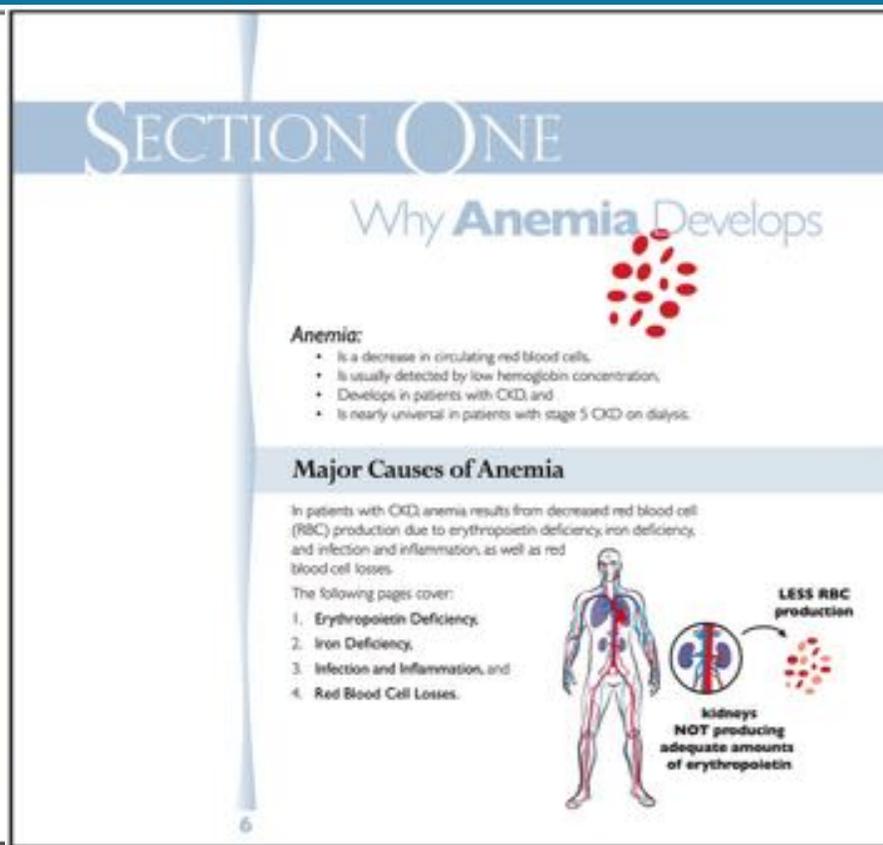
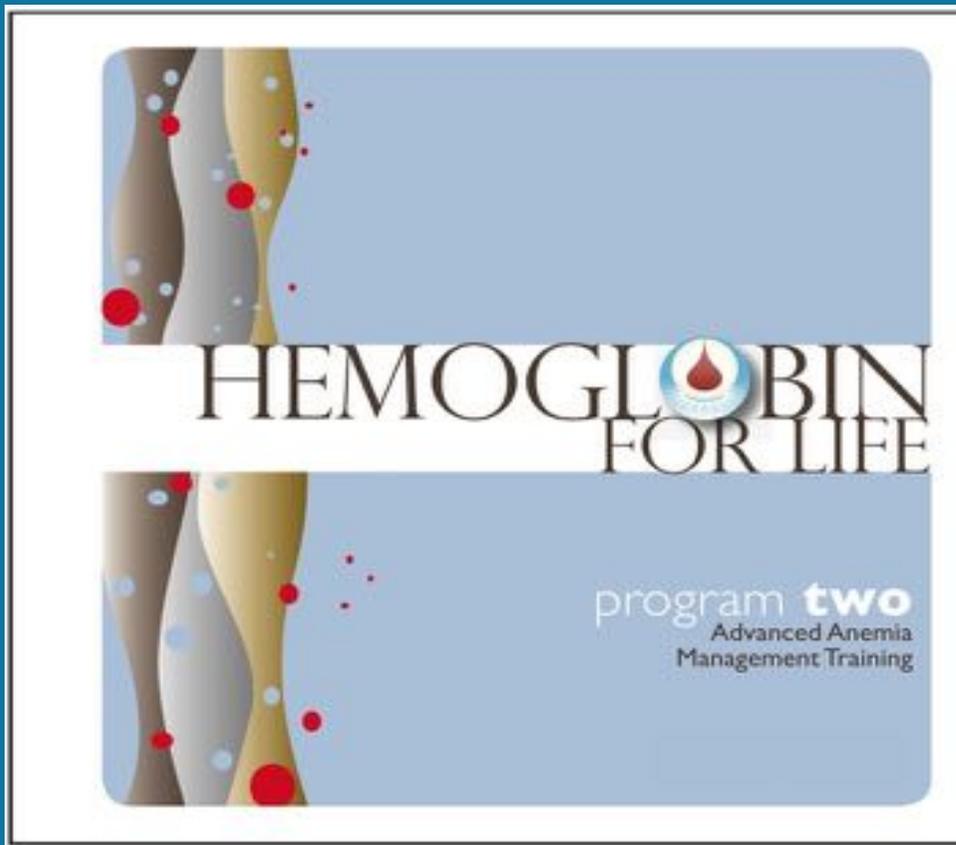


# 1. We can learn only 3 to 5 new things at a time.



# 2. Real life use between sessions deepens learning.

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# ENGAGES MULTIPLE LEARNING STYLES:

**ABS Hemoglobin (Hgb)**

**ABOUT HEMOGLOBIN**

- Iron-containing protein in erythrocyte
- Binds with oxygen and transports it and carbon dioxide through the body
  - Is a direct measurement of oxygen-carrying capacity
- Indication of patient's level of anemia
  - A change in Hgb indicates a change in the patient status. A patient assessment should be completed prior to making adjustments to ESA and/or iron dose.

**ACTIONS**

- Assess patient for infection, inflammation, malnutrition, blood loss, and volume status.
- Evaluate ESA dose.
- Check iron parameters and supplementation.

**ABOUT HGB LABS**

**↑ May Be Caused By:**

- Dehydration
- Blood transfusion

**↓ May Be Caused By:**

- Chronic illness
- Infection/inflammation
- Malnutrition
- Vitamin deficiency
- Dialysis (blood loss, inadequate dialysis)
- Blood loss
- Iron deficiency
- Other acute or chronic conditions/comorbidities
- Extra volume

**HEMOGLOBIN FOR LIFE**

**NORMAL IRON RECYCLING**

## Training includes:

- Workbook
- "Safety-Coated" Flash Cards
- Short, animated videos
- Games, including one online

**Great Job!**

You really know your stuff—that much is clear!

Congratulations, you have successfully completed your Advanced Anemia Management training!

To allow you to print your Contract Hours Certificate, a separate window will open when you click [here](#) below.

After printing, close your certificate window and return to this window to exit the training.

- It is important to print and keep your certificate as proof of successful completion of the training and Contract Hours earned.
- You will not be able to access your certificate again.

NOTE: The California Board of Registered Nursing requires that you keep your certificate for several years as noted on the certificate itself.

**SCORE BOARD**

**POINTS: 1600**

**CHAMPION**

[Next](#)

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# CONTENT+DESIGN ARE APPROACHABLE:

- Clear labels make the page scannable
- Content is simplified, so it's easy to read
- Core content is clearly separate from other information so participants:
  - Know what they must learn
  - Are not overwhelmed, distracted or confused

The infographic is presented as a vertical scroll with three distinct sections, each featuring a small green leaf icon. The first section discusses the production of erythropoietin in the bone marrow. The second section explains the mechanism of action of two types of erythropoietin: Bureo-Forming Unit Erythropoietin (B-FU-E) and Cofuro-Forming Unit Erythropoietin (C-FU-E), noting that they undergo cell death without erythropoietin. The third section states that hemoglobin is 95% of the protein in red blood cells. To the right of the scroll, there are two main sections: '1. Erythropoietin Deficiency' and '2. Iron Deficiency'. The Erythropoietin section is divided into 'normal physiology' and 'in patients with CKD', with a list of three points for each. The Iron Deficiency section also includes 'normal physiology' and 'in patients with CKD', with a list of two points for each. At the bottom right, there is a cluster of purple circles of varying sizes, with a line pointing to them from the label 'Erythroblasts'.

It takes approximately 3 weeks for the effect of erythropoietin on bone marrow to result in red blood cells

Bureo-Forming Unit Erythropoietin (B-FU-E) and Cofuro-Forming Unit Erythropoietin (C-FU-E) undergo cell death in the absence of erythropoietin

Hemoglobin is 95% of the protein in cells that mature into RBCs

## 1. Erythropoietin Deficiency

What causes this in patients with CKD?

**In normal physiology:**

1. Decreased oxygen delivery to the kidneys stimulates the production of erythropoietin.
2. Erythropoietin stimulates red blood cell production in the bone marrow.
3. B12, folate, and iron all play a necessary role in helping red blood cells to properly mature.

**In patients with CKD:**

1. As kidney function diminishes, the kidneys can no longer respond to decreased oxygen delivery and produce less erythropoietin.
2. Reduced erythropoietin results in diminished production of red blood cells in the bone marrow.
3. In the absence of erythropoietin, immature red blood cells in the bone marrow die.

## 2. Iron Deficiency

What causes this in patients with CKD?

Iron is a key factor in maintaining the production and development of healthy red blood cells. It is:

- An integral component of hemoglobin, and
- Vital to erythroblast formation.

Without iron:

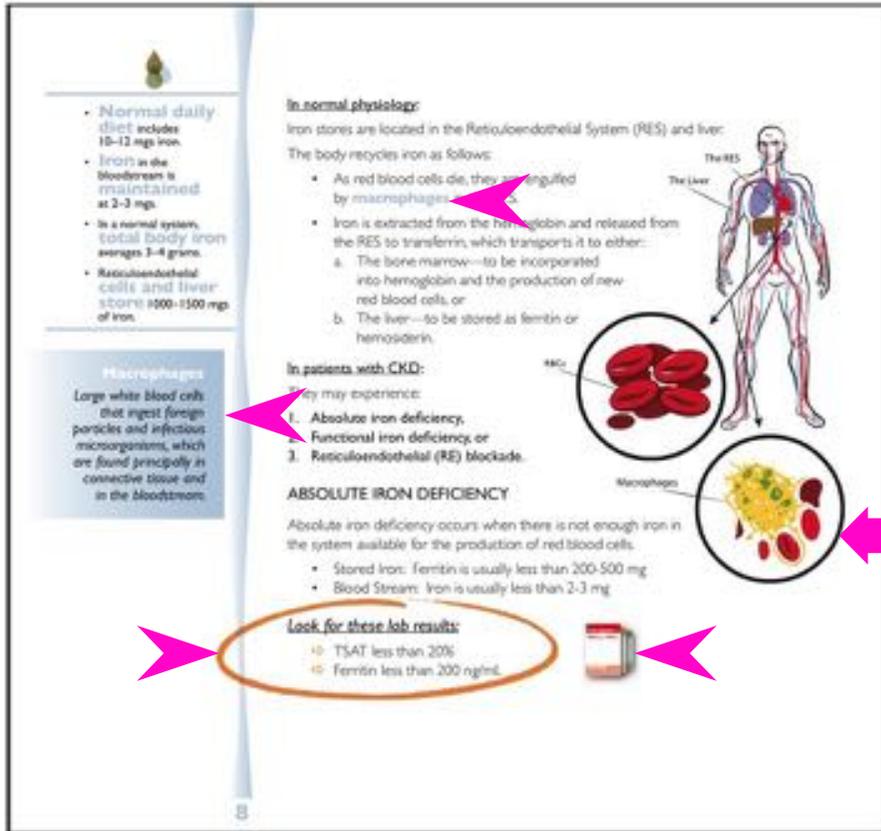
- Erythroblast production diminishes, which reduce the number available to mature into red blood cells.

Iron deficiency is often a direct result of blood losses that occur with dialysis treatments.

Erythroblasts

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# CONTENT IS TIGHTLY INTEGRATED:



• Normal daily diet includes 10-12 mg iron.

• Iron in the bloodstream is maintained at 2-3 mg.

• In a normal system, total body iron averages 3-4 grams.

• Reticuloendothelial cells and liver store 1000-1500 mg of iron.

**Macrophages**  
Large white blood cells that ingest foreign particles and infectious microorganisms, which are found principally in connective tissue and in the bloodstream.

**In normal physiology:**  
Iron stores are located in the Reticuloendothelial System (RES) and liver:  
The body recycles iron as follows:

- As red blood cells die, they are engulfed by macrophages.
- Iron is extracted from the hemoglobin and released from the RES to transferrin, which transports it to either:
  - a. The bone marrow—to be incorporated into hemoglobin and the production of new red blood cells, or
  - b. The liver—to be stored as ferritin or hemosiderin.

**In patients with CKD:**  
They may experience:

1. Absolute iron deficiency,
2. Functional iron deficiency, or
3. Reticuloendothelial (RE) blockade.

**ABSOLUTE IRON DEFICIENCY**  
Absolute iron deficiency occurs when there is not enough iron in the system available for the production of red blood cells.

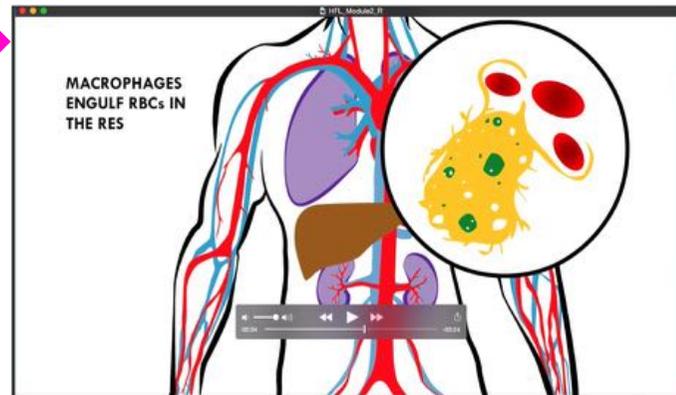
- Stored Iron: Ferritin is usually less than 200-500 mg
- Blood Stream: Iron is usually less than 2-3 mg

**Look for these lab results:**

- TSAT less than 20%
- Ferritin less than 200 ng/mL

8

- Workbook and video images are closely linked to reinforce important information
- Workbook uses visual and text cues when relevant Flash Cards are available
- Defined terms are in color, with definition in highlighted box of the same color



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# CASE STUDIES SIMULATE REAL LIFE

- Re-enforce learning-to-date
- Provide "real world" context
- Require understanding of material + critical thinking
- Illustrate how Flash Cards can be used on the job

## Test Your Knowledge: CASE STUDY A



Your patient's Hgb drops from 9.8 to 8.7. After increasing the ESA dosage as per algorithm, there is no change in Hgb, and then it begins to drop again.

**Additional Lab Results:**  
Ferritin = 767 ng/mL  
TSAT = 20%  
WBC = 15,000/mcL

- 1) What is the most likely cause of your patient's non-responsiveness to ESA?  
A. Absolute iron deficiency  
B. Functional iron deficiency  
C. Reticuloendothelial blockade
- 2) What would you do next?  
A. Increase ESA dose  
B. Administer a series of IV iron and monitor patient's Hgb response  
C. Increase ESA dose and administer a series of IV iron
- 3) The patient's Hgb did not increase with the iron administration. What may be the likely cause?  
 Functional iron deficiency       RE blockade



(Answers on page 34)

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PEOPLE ARE MORE LIKELY

TO SUCCESSFULLY COMPLETE TRAINING COURSES

WHEN DELIVERED IN SHORT SESSIONS

- + *They absorb & apply what they learn as they go, so they retain more information throughout.*

*How well do you* **EDUCATE | MOTIVATE | INSPIRE** *your audiences?*

# Easily Said & Done

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