

<b>Title</b>	A Review of Anemia
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<b>Contact Hour</b>	1

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## Purpose

The goal of the course is to refresh the nurse's knowledge of the major anemias, their prevention, diagnosis and treatment.

## Objectives

1. Name three major categories of anemia
  2. Suggest ways to diagnose various anemias
  3. Be familiar with the preferred treatments for the most common anemias.
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## Overview

Anemia is defined as the state of having too few red blood cells as evaluated by the hemoglobin. This results in the inability of the blood to carry oxygen to body cells and tissue. There are three categories of anemia:

- a. Microcytic: anemias with smaller than normal red blood cells  
Example: iron deficiency anemia
- b. Normocytic: anemias with normal sized red blood cells  
Example: acute blood loss
- c. Macrocytic: anemias with larger than normal sized red blood cells  
Example: pernicious anemia

A very common complaint the doctor will hear over and over during the course of his/her career is, "I'm so tired all the time," or "I think I have tired blood," or "low blood," as the case may be. A patient without knowing it has described her illness better than the literature ever could. Any patient presenting to a health care provider with these complaints should have the hemoglobin checked even if everything else seems to check out normally. It is said that iron deficiency anemia is the most common dietary deficiency in the world, so the possibility that the patient is anemic should always be considered. Since there are so many different kinds of anemia and so many different causes, it is imperative to do further blood studies if the hemoglobin is found to be lower than normal. The plan of treatment will be dependent upon the results of the blood studies.

## Microcytic Anemia:

By far the most common example of a microcytic anemia is iron deficiency anemia or IDA. It can and does affect men, women and children of all races and ethnic groups, but has a decided preference for women of childbearing age, the elderly and young children. The cause can be insufficient dietary intake of iron, excess bleeding from menstruation, intestinal bleeding or

acute blood loss. The age and sex of the patient can often point to the cause of the deficiency. For example, young children are likely to have low iron reserves because of insufficient intake of red meat and green, leafy vegetables. Women of childbearing age may have excess blood loss from heavy menstrual periods, or be anemic due to increased blood volume during pregnancy or excessive bleeding during childbirth. In the elderly, the cause is usually the result of bleeding somewhere in the body, and the first place to look is the intestinal tract. In countries such as the US where the populace eats red meat, iron deficiency is rather uncommon in healthy men and postmenopausal women unless they are vegetarian. It is possible, though, that elderly folks who do not eat properly either because of poor appetite or inadequate income to purchase good food, could be anemic without having bleeding anywhere in the body.

The symptoms of IDA can be vague. The patient may complain of the insidious onset of weakness and fatigue, feeling lightheaded, tiring easily, shortness of breath, palpitations and sweating. Such symptoms could be ascribed to numerous other illnesses, so a careful history and physical should be done as well as hematocrit and hemoglobin. The examiner may notice that the patient is somewhat pale with pale mucous membrane. The stool should always be checked for occult blood even though the patient denies having tarry or black stools or frank intestinal bleeding. There may not be any abnormal findings on the clinical exam.

If the hematocrit and/or hemoglobin are abnormal, a CBC (complete blood count) with differential is warranted. The result will either confirm IDA or lead the clinician to order more lab studies to rule out more sinister ailments.

If the patient is found to have IDA, the treatment is iron replacement therapy. Though dietary changes should be made that would include eating more red meat, organ meat, green/leafy vegetables, raisins, etc., this treatment alone is likely to take a very long time and be highly variable depending upon the compliance of the patient and socio-economic factors. The result is more reliable if 325 mg. of ferrous sulfate is given three times daily (adult dose) with meals. Follow-up lab studies should be done at four weeks and again at three months. The iron replacement therapy should continue for several months after the blood picture has returned to normal.

Iron replacement can cause some predictable side effects such as constipation or diarrhea, nausea, and abdominal pain. The side effects are sometimes unpleasant enough to cause the patient to be non-compliant. Taking the iron supplement with food can minimize the side effects. It is also a good idea to drink orange juice with the iron pill since iron is more readily absorbed when vitamin C is present in the stomach. Patients should be warned that their stools can be black from the iron.

### **Normocytic anemia:**

This grouping of anemias is so large and so diverse that most of the illnesses should be dealt with on an individual basis. Therefore, this article will only touch on the grouping.

Normocytic anemia can be caused by acute blood loss such as would result from severe trauma or a GI bleed, certain chronic diseases such as liver or kidney failure and hormonal deficiencies. Rarely, bone marrow failure (aplastic anemia) will cause an anemia with rapid progression and a grim prognosis.

It is obvious that the treatment for acute blood loss is to stop the bleeding as rapidly as possible and replace it as necessary to sustain life. Follow-up with iron therapy to replenish the iron reserve would be helpful after the emergency is resolved.

Of importance in the normocytic anemia group are the anemias caused by chronic diseases

such as low-grade infection or inflammation, renal insufficiency, chronic liver disease, alcoholism, endocrine disorders and malnutrition. All illnesses in these groups can interfere with the production of red blood cells (RBC) or with their survival. Diagnosis is dependent upon ruling out other forms of anemia and detecting the chronic disease process that is causing the anemia. Successful treatment is highly dependant upon the detection of the underlying disease process and the ability to treat it. Malignancy somewhere in the body should always be considered when other illness has been ruled out.

A large category of anemias in the normocytic grouping is the hemolytic anemias. This category includes idiopathic autoimmune hemolysis, secondary immune hemolysis, drug-induced hemolysis, microangiopathy hemolytic anemia and drug-induced hemolysis. This grouping also includes chronic lymphocytic leukemia, non-Hodgkin's lymphoma, Hodgkin's disease and multiple myeloma. Because of the wide variety of illnesses represented, the accuracy of diagnosis would require an extensive work-up that would include, among other tests, a bone-marrow aspiration. Treatment and prognosis are disease specific.

Though it is rare, aplastic anemia is thought to be brought on by exposure to certain toxins or chemicals such as benzene, excessive radiation and even chloramphenocol. Avoidance of contact with these substances is highly recommended. Chloramphenocol should never be used except when no other antibiotic will work.

### **Macrocytic anemias:**

Included in this group of anemias that is characterized by larger than normal RBCs are vitamin B12 deficiency and folic acid deficiency.

Pernicious anemia is found mainly in women of Northern European origin, although it is sometimes found in other races and ethnic groups. Though the victim is deficient in vitamin B12, it usually is because the intrinsic factor is missing. The intrinsic factor is a substance made in the human stomach that is responsible for the absorption of the vitamin, and thus the production of RBCs. When it is missing, B12 cannot be absorbed and an anemia results that is called pernicious anemia.

The symptoms of pernicious anemia are somewhat vague and the onset is likely to be insidious with the patient not being able to say exactly when she began feeling badly or exactly what is bothering her. She may complain of weakness, unusual fatigue, sometimes a sore tongue and sometimes paresthesias. She may have lost a significant amount of weight over the past several weeks or months without even trying. Some patients will report constipation, others will report frequent stools and still others may complain of diarrhea. Because of the very gradual onset of the illness, the resulting anemia is often quite well tolerated.

On the clinical exam a sore, red tongue may be noted. The heart rate may be abnormally rapid because it is compensating for the loss of hemoglobin. There may even be signs of early congestive heart failure without a prior history as the heart works harder to oxygenate the vital organs. On the neurological exam, the patient may be found to be clumsy or unsteady.

The clinician will order a CBC with morphology and find that the patient is suffering from a macrocytic anemia. Since the nervous system as well as the cardiovascular system is often adversely affected by the anemia, it is prudent to start B12 injections immediately. The anemia is incurable. That is, once the body stops the production of the intrinsic factor, it never resumes that function. Therefore, it will be necessary to inject the patient with B12 at least once a month for the remainder of her life.

Crohn's disease, certain medications, chemo-therapeutic agents, gastric surgery, and a host of

other GI illnesses can cause loss of the intrinsic factor or mal-absorption of vitamin B12.

Folic acid deficiency anemia is similar to pernicious anemia in that it causes similar changes in the hemoglobin as does B12 deficiency. The major difference is that folic acid deficiency is not due to the lack of intrinsic factor. It is almost always caused by long-term dietary deficiencies. Fresh fruits and vegetables are the best sources of folic acid. When a person doesn't eat many fresh fruits or vegetables or when the food is over-cooked as might be the case in an institution or simply the habit of the cook or for ethnic or religious reasons, the anemia is more prevalent. It is seen in the elderly, in people who have had a portion of the stomach removed and in pregnant women for whom the daily requirement is increased. All pregnant women should be given a multiple vitamin containing at least the minimum daily requirement of folic acid since a deficiency can cause brain and spinal cord problems in the unborn child.

## **Special category anemias**

No discussion of anemia would be complete without touching upon a couple of the more common inherited or genetically transmitted anemias.

### **Sickle cell anemia**

This anemia comes about as the result of a genetic defect that causes some of the RBCs to be normal and others to be shaped like a sickle. Since the round shape of the RBC facilitates the transport of oxygen to the cells and carbon dioxide away from the cells, it is logical that the sickle shape has impaired transport capabilities thus producing the many symptoms that plague the victim all his life.

Sickle cell anemia occurs when two parents each carry the recessive gene for the illness. Carriers seldom have any symptoms, but have the potential to pass the illness along to their progeny if the other parent also carries the damaged gene. The greatest incidence of sickle cell anemia is found in people of African descent although it is sometimes seen in Mediterranean people as well. In the US it is most prevalent by far in the African American population.

Some people who carry the illness are mildly unwell throughout their lives, while others have very serious crises on an ongoing basis. The RBCs in sickle cell are quite fragile and die easily. Without sufficient hemoglobin, the cells and thus the entire body are deprived of oxygen. As a result, fatigue is a common complaint. The malformed red cells break down and block small blood vessels thus setting up areas in different parts of the body that may become very painful. Joint pain, usually starting in the hands and feet, frequently may signal the beginning of a crisis. Jaundice occurs either because of liver damage or from the abnormally brisk breakdown of hemoglobin that can color the skin with iron pigment. Susceptibility to frequent infections is common since damage to the spleen renders it less effective in carrying out its function of fighting off infection. Growth can be stunted because of the scarcity of nutrients to the cells and tissues. Some people may suffer retinal damage from the clumping of the sickle cells in tiny blood vessels that supply the eye.

There is no cure for sickle cell anemia. There has been some success in treating the disease with bone marrow transplantation, but the procedure is risky and finding a donor is difficult. Before embarking upon this route of treatment, all the risks and rewards must be weighed and measured by the patient and his family with input from the health care team. For the most part, the aim of any treatment is to prevent sickle cell crisis. This would include the liberal use of antibiotics to prevent and treat infection, blood transfusions, pain relief, and the use of a hydroxyurea that is normally used to treat cancer. In some patients it reduces the frequency and severity of the sickle cell crises. It is an unfortunate fact of life that those born with sickle cell disease will likely endure a lifetime of suffering. These persons should be encouraged to

learn all they can about their illness, take folic acid supplements, eat a well-balanced diet, stay well hydrated, try to avoid stress and get moderate exercise. The more they know about their illness, the more likely they are to treat themselves well and avoid crises.

### **Thalassemia**

This anemia is one of the most common inherited disorders on the planet. It is found in people of Greek and Italian descent, but also in Native Americans and Asians. An abnormality in the synthesis of RBCs in the marrow can result in the early death of the RBCs that result in the anemia. Thalassemia major is seen in early childhood and can result in severe symptoms such as stunting of growth and jaundice. Thalassemia minor may not be obvious until much later in life and present as a mild anemia with microcytic RBCs. Most victims will have a family history of the anemia. Iron therapy is usually not recommended because it is possible to overload the patient with iron and complicate the illness and the blood picture. Usually, only minimal treatment is required.

### **Summary**

The three major types of anemia are microcytic, normocytic and macrocytic. These are terms that describe the size of the RBCs present within the blood. There are many types of anemias with many different causes and treatments. The treatment for any anemia is highly specific dependent upon the type of anemia. Some require the use of an iron supplements and others can be made worse by the use of iron. The person who suffers from anemia should be in the hands of a good clinician who can oversee the treatment not only of the anemia, but of the overall care of the patient. Where possible, prevention should be utilized as in eating a diet rich in green, leafy vegetables and some red meat. Overcooking of food should not be done since it destroys many nutrients. Highly trained and skilled professionals who are well versed in the care of the patients with whom they are dealing should deal with the more severe anemias. Treatment is aimed at bringing about the overall best health for the patient.

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### Course Exam

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1. The three major categories of anemia are microcytic, normocytic and macrocytic.  
 True  False
2. Iron deficiency anemia is classified as a nutritional deficiency.  
 True  False
3. The normocytic category includes a large number of anemias with larger than normal RBCs.  
 True  False
4. The workup for every anemia should start with a clinical examination and a CBC.  
 True  False
5. The onset of pernicious anemia is abrupt and usually occurs late in life.  
 True  False
6. Pernicious anemia is caused by the lack of intrinsic factor.  
 True  False
7. Pernicious anemia is treated with vitamin B12 injections for the remainder of a person's life.  
 True  False
8. Sickle cell anemia and thalassemia are both examples of inherited anemias.  
 True  False
9. Sickle cell anemia can be cured with blood transfusions and antibiotics.  
 True  False
10. Sickle cell anemia can adversely affect every organ in the body as well as joints and soft tissue.  
 True  False