

The IRON Story

Part of a patient education series provided by The American Association of Kidney Patients



National Kidney Foundation Kidney Disease Outcomes Quality Initiative

The National Kidney Foundation (NKF), in 1997, printed a special guide for the care of end-stage renal disease patients. This guide is for your physician and was written by a group of physicians (kidney doctors), nurses, and other people who know a lot about kidney disease. Before they wrote the guide, they reviewed all the evidence

and studies that were written on each topic. They also reviewed how the best doctors were taking care of their patients across the country.

This guide was called the

NKF – Dialysis Outcomes Quality Initiative (NKF-DOQI™).

The four topics that were included in the guide were:

1. Getting enough dialysis to stay healthy for patients on Hemodialysis (Adequacy of Hemodialysis).
2. Getting enough dialysis to stay healthy for Peritoneal Dialysis patients (Adequacy of Peritoneal Dialysis).
3. The best ways to provide you with a blood access for dialysis (fistula, graft, or catheter) and how to care for that access (Vascular Access).
4. The best ways to use an ESA (erythropoietin stimulating agent) and iron to keep your blood count high and prevent anemia (Anemia Management).

The NKF-DOQI™ guide helped make patient care better. Because of this, the NKF decided to update their original guides and to print new guides for other special problems of patients with kidney disease. They changed the name from the NKF Dialysis Outcomes Quality Initiative (NKF-DOQI™) to the **NKF-Kidney Disease Outcomes Quality Initiative (NKF-KDOQI™).**

This pamphlet you are about to read tells only one small story. It explains the importance of:

How iron prevents anemia in patients with kidney disease (like you).

What is Anemia?

When your doctor tells you that your blood count is low, it means you do not have enough red blood cells (RBCs) in your blood. Red blood cells are responsible for delivering oxygen throughout the body. Anemia is a sign of disease, and not a disease itself. This is very common

in chronic kidney disease. Anemia can also be caused by hemodialysis alone. There is always some blood that remains in the dialyzer and blood lines after each treatment. When you lose blood, you are losing RBCs, and when you lose RBCs, you lose hemoglobin and iron.

Possible Symptoms of anemia

- Often, no symptoms
- Paleness
- Feeling tired
- Unusual shortness of breath
- Fast heartbeat
- Colder hands and feet than usual
- Headaches

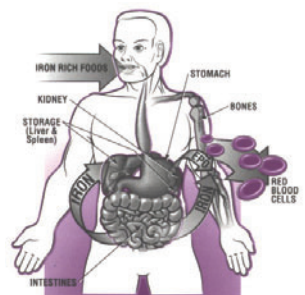


Anemia, over a long period of time, can cause you to have problems with your heart. If you already have heart problems, it can make those problems worse.

The Kidneys, Iron and Anemia.

The healthy kidney produces a hormone called erythropoietin (commonly known as EPO). A hormone is a chemical substance that acts as a messenger delivering material from one part of the body to another. RBCs are formed in the bone marrow with the help of this hormone. The bone marrow is also supplied with a small amount of iron, which helps to build healthy new RBCs.

Then the RBCs carry oxygen to all parts of the body. Every living human cell needs oxygen to live. Muscles are made up of millions of cells. An important muscle is the heart. This is why heart conditions can develop or worsen if there are not enough RBCs to deliver oxygen to the cells of the heart. Oxygen is the fuel for cell survival.



What happens when the kidneys don't work properly?

There are two common causes of anemia in chronic kidney disease patients:

1. Too few red blood cells. This is because the kidney is no longer making the hormone erythropoietin.
2. Too little iron.

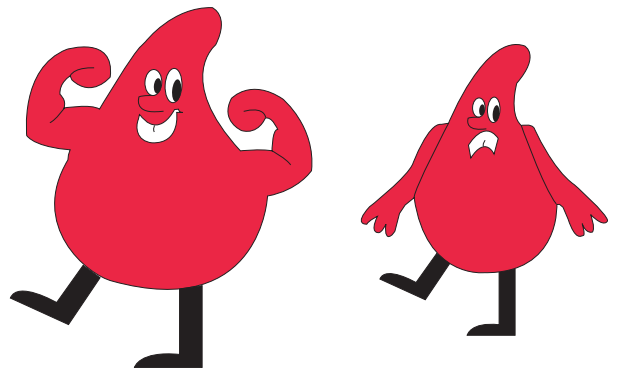
Too little iron may be caused by the following:

- Diet restrictions
- The body is not able to absorb enough iron
- Some blood is lost during hemodialysis. It's almost impossible to return all your blood after hemodialysis. Some blood remains in the dialyzer and tubing
- Other blood loss: GI (gastrointestinal) bleeding, catheter lines, bleeding from the access site after hemodialysis, surgery, clotted dialyzers and blood lines
- Erythropoietic stimulating agents (ESA) such as EPO speeds up the making of RBCs and quickly uses a lot of the iron in your body to make RBCs

How your doctor knows when to give you iron.

The blood tests that are taken each month will give your doctor a picture of how healthy your red blood cells are. It will show if they are receiving enough iron. (These tests may be taken less often if your red blood count remains good.)

There are blood tests that show how your red blood cells are doing and there are blood tests that show where the iron is in your body and how it is being used.



Your most important red blood cell test is:

1. **Hemoglobin:** This is the part of the red blood cell which contains iron and carries oxygen.
2. **Hematocrit:** a percentage of red blood cells (RBCs) within a sample of blood.

The two iron blood tests you should know about are:

1. **Ferritin:** This is a protein that reflects stored iron. Think of ferritin as gas in the tank. You need to have enough gas to keep a car running. This is why it is important to measure and track these values regularly. Remember, when you lose blood you lose iron and RBCs. Losing iron is like losing gas from your car.



When you have a serious infection, it is possible that your body will hold onto the iron in storage. In this case, your ferritin levels will be high but you don't have enough iron in your red blood cells. The infection should be treated before continuing your iron therapy.

2. **Transferrin Saturation (TSAT):** Transferrin is a protein that takes the iron from the storage protein (ferritin), or the iron that you're being treated with, and brings it to the bone marrow where it may be used to build healthy red blood cells. This lab value is a percentage. Think of it as the tube that brings the gas to the engine. It's the transportation vehicle for iron. A TSAT of <20% means that you do not have enough iron for your RBCs.

Other:

Reticulocyte Hemoglobin Content (CHr): This test measures the amount of iron in the youngest red blood cells, known as reticulocytes. This lets you see iron status earlier in the newest RBCs and is a more sensitive test when you have an infection or inflammation. During infection or inflammation, your ferritin levels can be higher even if you do not have enough iron. The CHr level is not affected in this way, and can help show if you need iron therapy. This new test has been added to the NKF-KDOQI guidelines for 2006.

National Kidney Foundation (NKF) KDOQI Guidelines

Lab Values	HemoDialysis Dependent CKD	Non-Dependent Dialysis CKD & Peritoneal Dialysis
Hemoglobin*	>11 g/dL	>11 g/dL
Ferritin	200 - 500 ng/mL	100 - 500 ng/mL
Transferrin Saturation	>20%	>20%
CHr	>29 pg/cell	None Recommended

* Based on recent recommendations the target range is between 11.0 g/dL to 12.0 g/dL. Each patient should discuss how best to treat their anemia with their doctor and such treatment should be based on their individual healthcare needs.

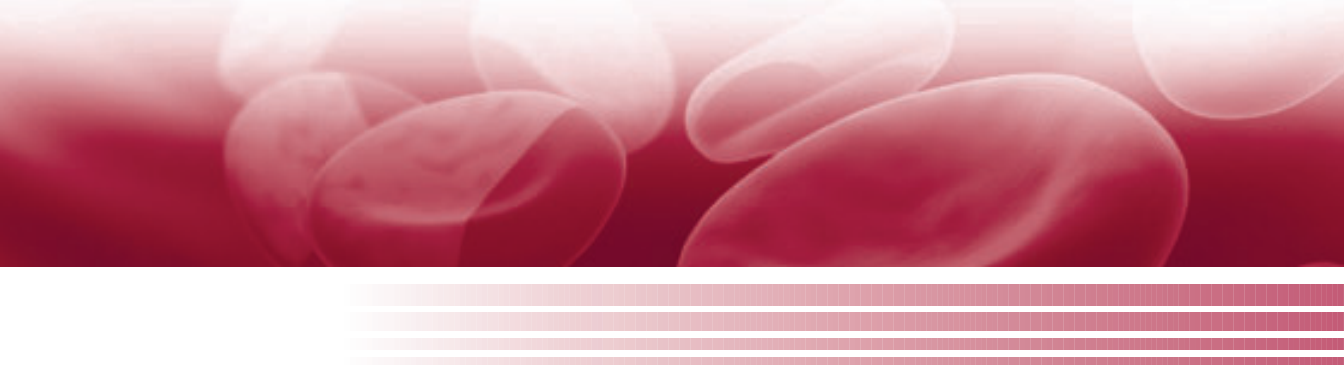
What can be done to prevent or control anemia?

Reading this booklet is one of the first steps to preventing and controlling anemia. It's very important to find the reason for a low iron level. Talk to your doctor or nurse if you think you might have anemia. A blood test will probably be done to diagnose anemia. GI

bleeding many times is undetected. If you develop dark tarry stools, report it immediately to your doctor or nurse. Other tests may be needed to find out what's causing the anemia. Early and controlled treatment can reduce some of the symptoms of anemia.

Taking an erythropoietin stimulating agent (ESA). Since as a patient with chronic kidney disease you may not be making enough erythropoietin, you will receive a man-made form of erythropoietin. An ESA may be given during your hemodialysis treatment through the blood lines or by an intravenous (IV) injection. It may also be given by a very small injection under your skin. This is a subcutaneous or S.C. injection.

Taking Iron. Taking iron by mouth (oral iron) may be enough if you are not receiving an ESA. However, some patients with chronic kidney disease and almost all patients on hemodialysis who are taking an ESA will need to receive injectable iron. Oral iron is not fast enough to replace the iron that's needed once the ESA begins to make new red blood cells.



Stored iron will be used when needed but eventually will need to be replaced for future use. Without enough iron, an ESA cannot completely correct anemia.

What type of iron may my doctor prescribe?

If you are on an ESA and you are not getting enough iron, your doctor may treat you with intravenous (IV) iron. You will receive intravenous iron during your hemodialysis treatment or when you come to your doctor's office or clinic visit.

There are two ways of receiving iron if diet alone is not enough. Your doctor may prescribe oral iron (pills that you may buy without a prescription). Oral iron is usually given three times a day between meals. How and when you take oral iron is very important:

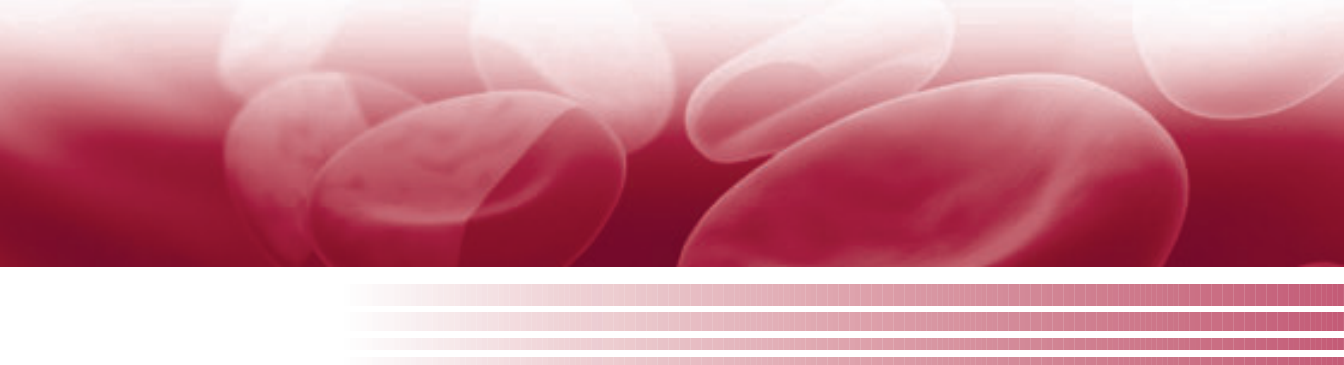
- Take iron one hour before or two hours after a meal
- Do not take with antacids
- Do not take phosphate binders at the same time
- Avoid alcohol

If you begin to get constipated, have nausea, or a feeling of fullness, consult your doctor. You may take stool softeners to help avoid constipation, and let your doctor know if you begin to have this problem. If you are not able to obtain a good blood count with oral iron, your doctor may prescribe intravenous iron. This is the iron injected into your bloodstream.

An ESA and iron work together to help your body make healthy new red blood cells. Your doctor will decide how to give you these drugs based on the procedures in your dialysis unit and the suggestions from the NKF-KDOQI™ guidelines.

The Food and Drug Administration (FDA) has approved three types of intravenous iron injectable products for use in the United States. These are iron sucrose, iron dextran, and iron gluconate.* All of these will help to increase the amount of iron you have in your body. There are some differences among them, however.

*Iron gluconate: also known as sodium ferric gluconate in sucrose injection.



These differences have to do with the approved uses, how quickly they work, whether or not a test dose is required, the types of side effects you may see, and the size of your dose. Your doctor will decide which is best for you. Like many other treatments, IV iron may be partially covered through your medical insurance.

A person can experience an allergic reaction to intravenous iron just as they do to other medications. It is important for you to notify your doctor or a member of the dialysis staff immediately if you experience:

- Flushing
- Difficulty breathing
- Itching
- Rash
- Any unusual symptoms during or just after the drug was given

If you have had an allergic reaction to intravenous iron in the past, you need to discuss with your doctor whether a different type of intravenous iron may be better for you.

Conclusion

We hope this booklet has helped you understand the importance of iron in your body to help correct the problem of anemia. If you still have questions about iron or anemia, talk to your doctor. We salute you for taking the time to learn about your health, and hope you will continue to take steps to be an active participant in your care.



Glossary

- Anemia:** A decrease in the amount of red blood cells that are needed to carry enough oxygen to meet the body's needs.
- CHr:** Reticulocyte Hemoglobin Content. This lab value measures the iron status of a young red blood cell usually 24 hours before it becomes a mature red blood cell.
- CKD:** Chronic Kidney Disease (reduced kidney function).
- EPO:** (Erythropoietin). A hormone produced by the kidney. It stimulates the bone marrow to produce red blood cells.
- ESA:** Erythropoietin stimulating agent. Drugs that replace the hormone erythropoietin when the kidneys fail to produce it.



Glossary (cont.)

- Ferritin:** A form of storage iron.
- Hematocrit:** Measures the amount of red blood cells within a specific amount of blood.
- Hemoglobin:** The part of the red blood cells that carries oxygen from the lungs to the tissues.
- RBC:** Red blood cell.
- Transferrin:** A protein in the blood that carries iron.
- Transferrin Saturation:**
(TSAT) measures the amount of iron that is immediately available to produce RBCs.

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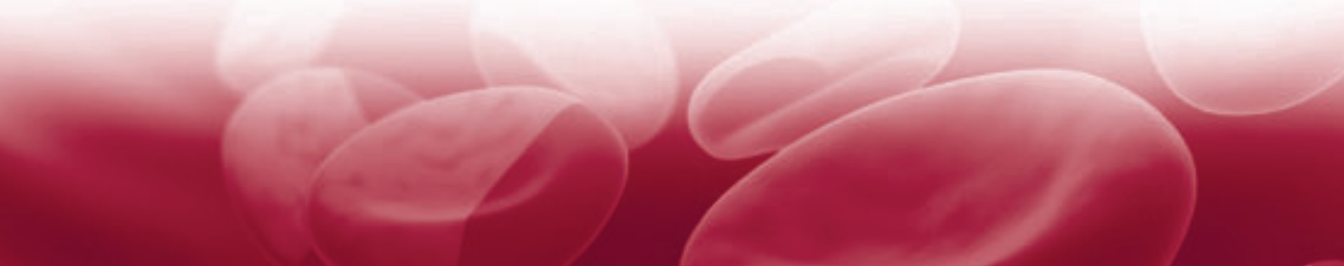


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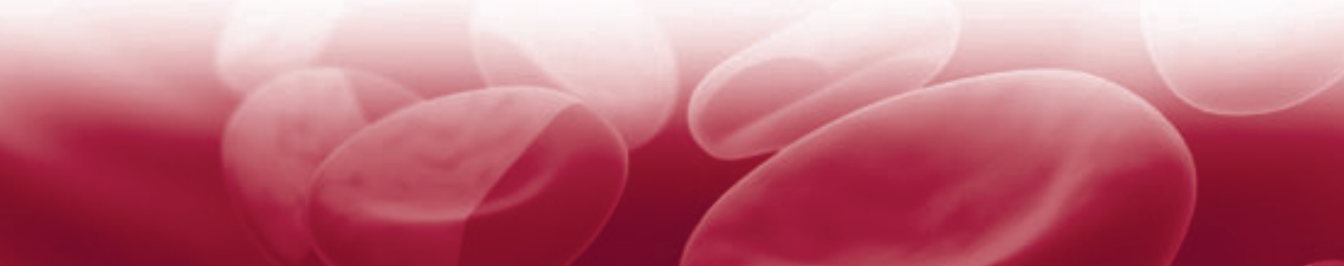


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Notes



Notes



Membership Benefits

Membership Form

Our membership categories are listed below. Please choose the category that is right for you and begin your AAKP membership today.

Membership Categories

- Patient/Family Member: \$25/annually
- Professional Member: \$45/annually
- Physician Member: \$100/annually
- Institutional Member: \$200/annually
- Life Member: \$1,000*

(a one-time donation)

* or four payments of \$250 every six months.

Payment Method

- Check Visa MasterCard
- American Express Discover

Account Number: _____

3 or 4-digit security code: _____

Expiration Date: _____

Signature: _____

Please complete the application below and return to:

*American Association of Kidney Patients
3505 E Frontage Rd
Ste 315
Tampa, FL 33607*

I am not interested in membership at this time, but please send me a complimentary package of information.

I am already a member of AAKP but would like to make a donation of \$_____.

Name _____

Address _____

City _____ State _____ ZIP _____

Phone _____

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Thank you for your support of the American Association of Kidney Patients.

As a member, you belong to a distinguished group of individuals who are dedicated to effecting positive changes in the lives of kidney patients nationwide.

- A membership welcome packet filled with your very own AAKP Member ID card and some of our most popular publications.
- Automatic subscriptions to AAKP's magazines: aakpRENALIFE (published six times a year) and Kidney Beginnings: The Magazine (published five times a year)
- Access to AAKP My Health™, a free online resource tool that allows patients to become more proactive in managing their healthcare by keeping a thorough record of their medical history.
- Free optional subscriptions to AAKP's five electronic newsletters.
- Automatic membership in the AAKP chapter in your local area (where available)
- Advanced updates of upcoming programs and events, such as our popular Annual Convention.
- Updates and information regarding public policy and affairs affecting kidney patients.
- Assurance that your voice is being represented by an organization that mirrors your interests and concerns by defending and protecting such resources as the Medicare ESRD program.

Our Mission

AAKP exists to serve the needs, interests and welfare of all kidney patients and their families. Its mission is to improve the lives of fellow kidney patients and their families by helping them deal with the physical, emotional and social impact of kidney disease.

Our Vision

To accomplish our goals, AAKP engages in a variety of educational and supportive programs designed to:

- assist patients both to learn more about their disease and to become active participants in planning and managing their treatment;
- improve patients understanding of and access to rehabilitation;
- work together for the improvement of public programs that help kidney patients meet their financial and personal needs
- reflect the view and concerns of patients and public policy makers and others in the renal community
- provide a lifeline for patients in need of emotional support and reassurance that only other patients can provide.

Becoming an AAKP member demonstrates your support and commitment to AAKP and the kidney patient population we serve.