Great news for patients!

August 2008—University of California Los Angeles (UCLA) and Intrinsc Lifesciences announce that they have developed the first blood test to measure hepcidin, a key hormone that regulates iron. This new test will help clinicians in the diagnosis and management of iron disorders affecting millions of people worldwide.

Discovered in 2000, hepcidin, a hormone produced by the liver, regulates the absorption of dietary iron and its distribution in the body. Hepcidin works with another protein named ferroportin. Ferroportin allows iron to leave the cell but hepcidin causes the destruction of ferroportin and iron retention in the cell. When a person has iron deficiency hepcidin production is lowered so that more iron can be absorbed. When a person experiences inflammation due to infection or disease, hepcidin production is increased and the availability of iron in serum is lowered. The lowering of iron suppresses growth of infectious microbes.

Unfortunately however, in humans and in mice with HFE-related hemochromatosis (classic type I) and most other types of hereditary hemochromatosis, hepcidin synthesis is severely depressed despite iron overload. These patients continue to load iron, strongly suggesting that the HFE gene mutation and other hemochromatosis mutations impair hepcidin production, and thereby cause iron overload.

Changes in hepcidin levels are often the cause of iron disorders. Therefore, diagnostic measurements of hepcidin concentrations should be more informative about the cause of iron-related disease. Read more about this new test in: Blood First Edition Paper, prepublished online August 8, 2008; DOI 10.1182/blood-2008-02-139915 “Immunoassay for Human Serum Hepcidin” Authors: Ganz, Olbina, Girelli, Nemeth and Westerman.

Antioxidants: Why your choice could do more damage than good!

Personalized Medicine: Using your DNA to predict disease risk.

Talk on the "LIST" iron avidity, liver biopsy, keeping good records and problems with phlebotomies.

In the next issue: Iron-Out-of-Balance™ and Metabolic Syndrome, Misunderstood: Coping with Siguamis Attributed to Hemochromatosis; Infection: a harmful invader’s need for iron; Update on Minority Health.

If we have your email address, we will send you a reminder that nanograms is available. Printed copies will be mailed to IDI MEMBERS. Join today and get your printed copy of nanograms.
Dear IDI Member,

We are delighted that Chris Kieffer, one of the founding directors has agreed to come out of retirement to help us. Presently, she is overseeing one of IDI’s educational programs and reports that she is ecstatic about the progress of the program and the potential to reach so many healthcare providers. Comments about our 2008 Physician Hemochromatosis Reference Chart continue to be positive. We are pleasantly surprised by the number of physicians who are willing to talk with us about iron. Jim Hines’s experience with Dr. Shepro exemplifies the kind of patient-physician relationship we love to see. (Jim’s experience is detailed on July Awareness pages 4-5).

Among our accomplishments this quarter we report the completion of our Minority Health Statewide Plan. We especially thank our friends at the Arthritis Foundation for guidance and suggestions on structure and content. Our 2008 update of our website is nearing completion and we thank Dr. Kulkarni and Sara at CDC for helpful comments. The Guide to Anemia book second edition is on its way to the publisher. I personally want to thank Dr. Robert Means of our board and Dr. Suki Bagal, medical director of NORD for reading portions of the manuscript. We had so much help with this book, it would take an entire page to thank everyone—which is exactly what we did in the acknowledgement page! The Hemochromatosis Cookbook is now available and getting good reviews from patients—some of whom are helping with the second edition of Guide to Hemochromatosis book scheduled for release in Fall 2009.

We represented you at an NHLBI council meeting in Bethesda, MD and in Washington DC where we met with policy makers. We submitted a complaint to the FDA about the blood center variance process and are hopeful that our suggestions will be adopted.

The retirement of Dr. Francis Collins took us all by surprise, but I have no doubt he will not want for things to do! I met Dr. Collins in 1999 and liked him immediately. He was soft-spoken but jovial, sincere, kind, and listened intently—looking me in the eye (although he towered over me considerably) and he wore a constant wide smile making all of us feel like we were old friends. We have corresponded over the years on health related issues, but it was not until 2006 when I read an article in Guideposts that I understood the attraction many of us have to this man. He is a scientist who believes in God. In the article, one of my favorite comments he makes is “…that faith and science belong together, not in conflict. God is not afraid of scientific truth. How could he be? He invented it.” I highly recommend his book *The Language of God*. My favorite story in the book was about his experience with the Eku farmer. In a recent interview with Charlie Rose (that I was fortunate to see— I’m usually not up that late!), Dr. Collins, sporting his double-helix tie—talked about personalized medicine—a DNA directed approach to wellness. Whatever his endeavors, we wish Dr. Collins all the best and hope that our paths will continue to cross now and then.

Thank you so much for your continued support of IDI. Please consider making a year-end donation so that we can continue our mission! And please take time to vote!

Take care,
Cheryl Garrison, executive director
Hemochromatosis patients in the Seattle Washington are delighted that the Puget Sound Blood Center now has its FDA variance to use hemochromatosis blood for transfusional purposes. July 2008 was the center’s first month to examine data associated with the program and overall, the response from HHC donors exceeded expectations! The center collected a total of 117 units from hemochromatosis patients during July.

IDI Scientific & Medical Advisory Board Member and Seattle-based hemochromatosis expert Dr. Kris Kowdley, knows the potential of hemochromatosis patients to bolster the blood supply. “Encouragement from experts like Dr. Kowdley and hemochromatosis patients no doubt helped to persuade blood center administrators to implement this program.” Comments Chris Kieffer, one of the founding directors of IDI. “Two questions HHC patients ask of IDI Patient Services,” comments Peggy Clark, IDI Patient Services Coordinator, “are the name of a doctor and treatment center. We are delighted that IDI can include PSBC to our list of resources for patients.” Concludes Clark.

IDI was one of the organizations present at the 1999 Blood Safety and Available Council meeting in Bethesda, MD. Together with the voices of patients and other organizations the FDA was persuaded to investigate HHC blood as a major source of safe blood to replenish the country’s dwindling blood supply. IDI continues to work on this important issue. In August of 2008 Gerry Koenig, member of IDI’s board of directors submitted a comment to the FDA asking that the application process be simplified for blood centers. “We have been disappointed in the drop in rate of blood center applications. In 2001 17 centers were granted a variance; in subsequent years, the trend continued to be encouraging but in 2004 we saw a sharp decline in FDA variances granted.” Remarks Mr. Koenig. “This concerned us.” Adds IDI executive director, Cheryl Garrison. “In 2005, we began to call centers to find out why they halted application efforts; most reported their delay was a cost to benefit issue.”

“With inputs about program successes from already established centers and persistence of hemochromatosis patients, we saw an uptick in applications approved.” Continues Garrison.

“We must continue to help make the process easier and make these blood centers aware of the tremendous influence we have on the donor community to deliver blood. Blood centers that encourage physicians to use IDI physician reference materials report better outcomes.” Continues Koenig.

The Iron Disorders Institute and National Institutes of Health recommend a pre-treatment cut-point of 12.5g/dL hemoglobin or 38% spun hematocrit. Physicians who write orders according to this recommendation accomplish two things: reduce the risk of over-bleeding a hemochromatosis patient and generate more usable blood, since blood taken from patients whose hemoglobin’s are below this cut-point cannot be used.

Herbert Bonkovsky, M.D. Chair, IDI Scientific & Medical Advisory Board and Board of Directors Member points out that “Some exceptions to the pre-treatment hemoglobin do apply and should be addressed on a case-by-case situation by the attending clinician.”

*based on the FDA standard for the lower level for hemoglobin, which is 12.5 g/dL or 38% hematocrit for both men and women.

Is there a blood center in your area that does not take hemochromatosis blood? Encourage them to call IDI to learn how they can increase their blood supply with an endless resource of donors.

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Cherished & Remembered, Forever...

IN MEMORY OF **Art Callahan**
From all your friends at Iron Disorders Institute

IN MEMORY OF **Eileen Comstock**, our grandmother who will never be forgotten. Thanks for giving me the courage to fight the same battle as you did against Hemochromatosis.
Love, Jessy and Ryan Reagor

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**OUR MISSION**

“Iron Disorders Institute exists so that people with iron disorders receive early, accurate diagnosis, appropriate treatment and are equipped to live in good health.”

IN MEMORY OF **James E. (Jimmy) Nash** who passed away in Columbia, SC; July 12, 2007. He died of complications related to consequences of hemochromatosis. Jimmy was only 57. Hundreds mourned his passing and miss him still. His only son Jay is taking steps to prevent hemochromatosis-related disease by getting his iron levels checked periodically and reading IDI educational materials.

If you would like for us to honor the memory of someone who is suffering or who has lost the battle with a deadly iron disorder, or you would like to make a prayer list request, call us toll free 888-565-4766 or email Peggy Clark: pclark@irondisorders.org.
JULY is National Hemochromatosis Awareness and Screening Month!

Over three decades ago Margit Krikker, M.D. founded The Hemochromatosis Foundation in Albany, NY. She secured July as the month dedicated to screening patients for hemochromatosis in the USA. Her message was aimed at fellow doctors. Thanks to her efforts, hemochromatosis (HHC) is among the daily, weekly and monthly national health observances on the National Health Observances Calendar (healthfinder.gov). Hemochromatosis is an inherited disorder; people with this condition absorb extra iron from the diet. The body has no efficient way to excrete iron, so over time, excesses build in vital organs of the liver, heart, pancreas, pituitary and joints. Iron burdened organs eventually fail to function and disease or premature death occurs. Excess iron levels can be reduced with blood donation (phlebotomy). Simple tests can define body iron levels. Is your iron elevated? Find out by requesting an iron panel: fasting serum iron, TIBC and serum ferritin. If your iron is elevated, you may want to get a DNA test, but knowing your iron levels is most important! Contact IDI to see what you can do to raise awareness in your community: ckieffer@irondisorders.org or Call 888-565-4766

The Norwood City Health Department (NCHD), Norwood Ohio created public awareness bulletins at their local town hall and the local library. They distributed IDI brochures at these locations and also to local healthcare providers. NCHD representatives learned about hemochromatosis at the Regional Hemochromatosis Patient Conference, Columbus OH, April 2008, and they volunteered to help get the word out.

“The Iron Disorders Institute is a valuable resource and we appreciate being provided with these materials.”—Karen Regan

Sigalle Reiss, MPH, RS is on left, and Karen Regan, RN, BSN on right.

The IDEAL Doctor-Patient Relationship...

Years ago, we asked our friends at CDC what kind of doctor should we suggest to hemochromatosis patients? The response from epidemiologist Dr. Sharon McDonnell was this: “Find one who will listen.” Hemochromatosis patient Jim Hines tells of a 2008 experience, when after relocating, he needed to find a physician in his area. “My visit with hematologist Dr. David S. Shepro was mutually rewarding. He accepted the ‘Chart’ and newsletter with gusto. He listened to what I had to say and agreed that a fasting serum iron blood test is essential to obtaining accurate iron measurements and that bleeding me until I was anemic was not a good approach. He also showed the two documents to several nurses and aides, who guessed by my T-shirt (IRON USA 2004) that my medical reason for being there was iron-related. After Dr. Shepro briefly described hemochromatosis to the nurses, he showed them the Charts and Newsletter, which gave me the opportunity to point out that they all could earn CMEs for hemochromatosis through the CDC website. In parting I asked if Dr. Shepro would like his name added to our physician registry; his response was “Of Course!”. For those of you who live in or near Worcester, MA, here’s is doctor who’s willing to listen!

David S. Shepro, M.D.; Commonwealth Hematology-Oncology, P.C. 299 Lincoln Street, Suite 100; Worcester, MA 01605 Tel. 508.754.2273 Fax 508.754.1735

P.S. Another hematologist Jim visited was unimpressed with Jim’s 30 years as a hemochromatosis patient and level of knowledge about therapy. This doctor tossed the IDI Physician Hemochromatosis Reference charts to the side and informed Jim that he would “bleed him until he got anemic.” Jim let his feet do the “talking”, walked out and later found Dr. Shepro.

What doctors are saying about IDI’s Reference Charts

After interviewing or surveying hundreds of healthcare providers about the Iron Disorders Institute Physician Reference Charts, IDI has garnered a near perfect score of 99.5%. One Pennsylvania family practice physician comments about the hemochromatosis reference chart:

“I find this chart to be succinct yet comprehensive, with easily understood diagnosis and treatment guidelines. Family Physicians will find this to be a great asset. In my practice three families have been diagnosed as a result of this literature.”

—Pamela H. Rutkowski, M.D.; AAFM Board Certified

Roz Fusco gives countless hours to the cause. In her work as a Florida alternative healthcare professional she shares IDI Physician Reference Charts with doctors in the area. She estimates that she has reached more than 200 healthcare professionals. Roz comments that doctors love the convenience of the IDI diagnosis algorithm and treatment guidelines. Roz’s interest is in women’s health and she makes every effort to reach OB-GYN doctors in her area.

IDI volunteer Patrick McKeever shares a humorous moment. Hemochromatosis (The Rusting Disease) comes to mind for Patrick with this over-the-counter product RUST AID.

Thanks! American Society of Hematology for adding July Hemochromatosis Awareness to your printed calendar! We encourage healthcare providers to attend the ASH Annual Meeting and Exposition December 6–9, 2008. This year in San Francisco, CA. ASH Advance Registration closes November 6th. Get details at hematology.org

Jaylynn Gray, Communications Specialist, USI Midwest (Integrated Insurance and Financial Services) featured a full page handout about hemochromatosis which was circulated to more than 600 of their clients!
Hemochromatosis on Discovery Channel for second year…

Discovery Channel Mystery ER will feature hemochromatosis in their 2008 episode “Ironic Condition”. In this segment, a local South Carolinian’s story was selected. Airtime is this October. In 2007 Discovery Channel Mystery Diagnosis featured IDI Board Member Aran Gordon’s Story. After the show airs, IDI will receive a DVD copy of the show for assisting the producers with this segment. Check the Discovery Health website for schedule updates OR check with us!

Chris Kieffer, one of the founding directors of Iron Disorders Institute started one of the most successful July Awareness programs in the nation. Crisp Regional Hospital, in Chris’s hometown of Cordele, GA established iron disorders (hemochromatosis) as the July Test of Month. For a modest $25.00, Crisp Regional will check TS% and serum ferritin. No prescription is needed.

John Carter, M.D. pathologist and head of laboratory services at Lexington Medical Center, Columbia, SC provides a similar service to the community except that he does not limit screening of iron disorders to the month of July; his program is year-round.

Jane Nelson never misses an opportunity to raise awareness about hemochromatosis. Her degree in Systems Engineering from Georgia Tech and Masters in business admin Northeastern University (Boston) took a turn when Jane developed an intense interest in nutrition and now iron metabolism. She shares IDI iron educational materials at professional conferences with physicians, patients, colleagues, and environmentalists.

For HHC awareness Jane will give an interview with a local Georgia Talk Radio station WRBN 104.1FM. She will emphasized hemochromatosis as a condition that is prevalent but still remains undiagnosed in many people at risk. As owner of The Rootcellar, an alternative health center in Clayton GA, Jane hands out IDI educational brochures to her customers. Jane’s husband who has hemochromatosis attributes his excellent physical health to Jane’s enthusiasm to learn about controlling iron levels with diet and the sciences of iron metabolism. If you are in her neighborhood stop in for a visit with Jane! The Rootcellar, 35 E. Savannah St., Clayton, GA 30525 706-782-9676 email is rootcellar@alltel.net or visit the website www.rootcellar.biz

Francis Collins, M.D., recently retired director of the National Human Genome Institute holds up a copy of Iron Disorders Institute’s Guide to Hemochromatosis (GTH) book. Geared for patients and family members there are now 10,000 copies in circulation, prompting a second edition which is due out in Fall 2009.

Photo: IDI Archives 2001

Peggy Queen, Michigan supporter is pictured here with her two beautiful daughters Jennie and Tina. They exemplify the positive potential of family-based detection. Generally, one hemochromatosis diagnosis leads to at least one more. In some cases multiple diagnoses can occur. After being diagnosed with hemochromatosis, Peggy made certain that her two daughters were immediately made aware of the iron tests and importance of early detection and treatment. Jennie and Tina both are being pro-active with regards to hemochromatosis by requesting the iron panel each year at their annual physical. Besides informing family members, Peggy is influential in her community writing letters to the media, distributing IDI literature and talking with co-workers and friends about hemochromatosis. Her message: “Most affected people DO NOT KNOW they are accumulating dangerous amounts of iron!”

“Pumping Iron is the CURE” by health reporter Dennis Thompson was made available to health related sites on the Internet bringing awareness to hemochromatosis. The article is cited nearly 4,000 times on a web search. We estimate that 800 or more sites actually promoted the article; many provided links back to IDI. Featured in the article are comments made by IDI board of director member Gerry Koenig and IDI Medical & Scientific Advisory Board Member Gene Weinberg, Ph.D.
The health hazards of tobacco smoking are clearly and abundantly documented. It is common knowledge that inhaled smoke from tobacco is a known cause of lung cancer. What some may not know is that tobacco is loaded with iron and iron is a booster for cancer cells and other lung diseases such as COPD, asthma, pneumonia or tuberculosis. Harmful pathogens like cancer cells or the bacteria that cause pneumonia or tuberculosis need iron to thrive just like any other living thing. When you smoke you can overwhelm the body’s defense system of macrophages, white blood cells contained in our body that are the scavengers of harmful debris such as excess or unnatural sources of iron. To make matters worse, the tar and gas phases of cigarette smoke contain chemicals that promote the release of stored iron from the macrophages.

Inhaled iron is an unnatural source of this element. In contrast, the iron we get from food is the way nature intended us to get this nutrient. However, people with hereditary hemochromatosis can accumulate dangerous levels of iron from their diet. Interestingly people with hemochromatosis are somewhat protected from lung diseases such as tuberculosis. But anyone who smokes can accumulate excessive amounts of iron in their lungs.

The body has several intricate mechanisms for balancing iron in the body. The Iron Withholding Defense System (IWDS) described by Gene Weinberg, Ph.D., is an elegant system that withholds iron from harmful invaders. When this system is activated, a person experiences a mild drop in hemoglobin, which can be mistaken for iron deficiency anemia (IDA). But once the harmful invader is gone, the hemoglobin will return to normal. Where did the iron go in the meantime? The IWDS placed it in a containment molecule called ferritin!

Environments where a person can inhale cancer-causing levels of iron are wide-spread. Besides smokers or second-hand smokers, people at risk for toxic levels of iron in the lungs are workers who remove iron-silicate asbestos (the magnesium-silicate is not known to be harmful), people who work in coal mines, iron smelters, or who travel daily by subway or who work in subway systems.

In a 2004 report of an ongoing pilot study of New York City airborne metal exposure, particulates were collected from a surface street location and from an underground subway station. Airborne concentrations of three metals iron, manganese, and chromium were observed to be more than 100 times greater in the subway environment than in home indoor or outdoor settings in NYC.

Gene Weinberg, Ph.D., professor emeritus, Indiana University adds, “In a similar study conducted in Stockholm cultures of human lung cells exposed to airborne particles were monitored for oxidative stress and DNA damage. Lead investigator on the study, H.L.Karlsson reports that ‘…all particles tested caused DNA damage and those from the subway caused more damage than the other particles likely due to redox-active iron.’ The air particulates collected from the subway station were four times more likely to cause oxidative stress in the cells and were eight times more damaging to lung cell DNA.

Moreover, the particle concentration per unit of air in the subway location was 5-10 times denser than that of the street location. Thus the actual increase in toxicity of the underground air was estimated to be 40-80 times that of the surface air.” Weinberg concludes, “It will be of considerable interest to compare the rate of lung cancer and of pulmonary infections in subway workers with persons of similar age and smoking habits who are employed above ground. Even before such epidemiological data are acquired, subway workers should be advised to stop smoking and to consider wearing protective masks on their jobs.”

Parents should take additional precautions to protect their children against environmental exposure to inhaled iron. Smokers should never smoke in a closed car or in the same room with a child.

To read more about second-hand dangers of smoking and ways to stop smoking: visit www.cdc.gov/tobacco

Things to think about!
Would you give your child a pack of cigarettes or cigar to smoke? You may as well, if you smoke with a child in a closed area such as a car or room. According to the US Centers for Disease Control and Prevention, American Cancer Society and The American Lung Association, “non-smokers exposed to second-hand smoke absorb toxic chemicals just like smokers do.”

Concentrations of many cancer-causing and toxic chemicals are potentially higher in secondhand smoke than in the smoke inhaled by smokers.

Inhaled iron interferes with our lung macrophages’ defense against cancer and infection.

References:
Dreyfus J., “Lung Carcinoma Among Siblings who Have Inhaled Dust Containing Iron Oxides during Their Youth.” Clinical Medicine (1936) 30: 256-260

California Support Group Launches Book

SANTA CRUZ, CALIF – The US Center for Disease Control and Prevention calls Hereditary Hemochromatosis (HHC) the most common genetic disorders in the U.S., affecting one in 200 people. Untreated HHC can become fatal.

Because so little is known about this iron overload disorder, a local support group, The Ironic Family, recently completed a booklet about their experiences with the disorder “Hemochromatosis Adventures” A Serious Saga of the Ironic Elephant on the Shifting Sands of Monterey Bay.

to help bring attention to the symptoms and effects of hemochromatosis. Led by Mardi Brick, founder and coordinator of The Ironic Family, ten members of the group personally wrote a description about how they first discovered their excess iron, their symptoms and other personal insights to help others learn about this metabolic malfunction.

The book is available for a small fee of $6.00 to cover handling and mailing. Any proceeds remaining will be applied to hemochromatosis awareness activities in California.

The Monterey Bay Ironic Family Support Group meets every other month on the first Saturday. If you live in the area and are interested in attending, contact Mardi Brick directly 831-459-9459.

To read more about second-hand dangers of smoking and ways to stop smoking: visit www.cdc.gov/tobacco
Arthur L. Callahan, 75 of Memphis, TN passed away on March 2nd, 2008. Art was committed to advancing patient knowledge through education and personal example that iron in excess can be a seriously debilitating health issue. The excess iron community will sorely miss Art as he was an ardent Iron Disorder Institute supporter and an early IDI member, if not a “plank owner.” Art was dedicated to his family, IDI’s mission of raising iron awareness and service to his country.

Art first became known to the iron community in 1999, when, he deciphered the secret of IDI mascot’s name from the clues in 3 previous issues of idInsight. He was awarded the coveted Iron T-shirt that he so proudly and often wore. “It was tough, but I finally put the clues together: CR Hume Ferret sounds like ‘Serum Ferritin’.”

Many IDI members and friends will fondly recall Art sharing his personal encounters with airport detectors illustrating how excess iron can seriously affect travel plans when the Guide to Hemochromatosis was published in 2001 (Page 16.) In that same year, his airport detector episodes also appeared in IDI’s Cooking with Less Iron (Page 236.)

In idInsight (Spring/Summer, 2002, page 12), Art once again displayed his commitment to educate the iron community by relating his personal battle with glucose-6-phosphate dehydrogenase (G6PD) deficiency. In his story, Art introduced iron patients to the problems associated with an iron loading anemia and hemolysis, a condition where red blood cells are prematurely destroyed consequently increasing iron stores. In addition, he explained how, with assistance from his wife, Judy of 54 of years, they managed his ferritin level by increasing iron stores. In addition, he explained how, with assistance from his wife, Judy of 54 of years, they managed his ferritin level by using an infusion pump to administer deferoxamine when therapeutic phlebotomies were no longer feasible.

During his personal story it became obvious to the reader that Art’s commitment to his family’s education about G6PD deficiency and genetics was intense: an example to be followed by anyone potentially afflicted with a genetic disorder. His story also indicated how genetics was intense: an example to be followed by anyone potential.

Renewed interest in anemia that can also load iron prompted a reprint of Art’s G6PD deficiency experience in idInsight (July/August, 2006, page 5.) When informed of the increased interest in his story, Art’s optimistic response was, “It’s great to hear I can be recycled.”

According to his wife, Judy, “Art was a vocal advocate for diet as an extremely important way to manage both iron intake and foods that may trigger G6PD deficiency.”

Art retired from the U.S. Navy in 1979 before being diagnosed with G6PD deficiency; however, he continued to demonstrate the leadership qualities indicative of a Master Chief Petty Officer. He set an example by willingly educating his fellow patients and his family never wavered in his quest to share knowledge. It is only fitting that Art be honored with the Fleet Reserve Association’s time honored tradition, The Two Bell Ceremony, which speaks volumes about Art Callahan.

The Two Bell Ceremony

Background

In days past, “two bells” marked the end of the routine day aboard ship. It was time for “Tattoo” and soon “Taps” would sound throughout the ship. Certainly this is a most appropriate time to honor departed Shipmates.

If you are familiar with one of the greatest stories of the sea, you will recall that “The Ancient Mariner” found safe passage by listening to the sound of the marking buoy. The bobbing marking buoy sounds much like the tolling of a bell for a funeral dirge; solemn, reverent and mournful.

Since the beginning of recorded time, men of the sea have been guided by the sounding of the ship’s bell. In the Fleet Reserve Association’s “Two Bell Ceremony”, the tolling of the bell and the spoken word is combined in a dramatic testimony to an individual’s humility, dignity, reverence and honor.

Note: While reading The Two Bell Ceremony, pause at the ship’s bell icon and imagine the tolling of the bell. The tone of the bell should be sharp and clear in your mind. Let the sound slowly fade from your mind before continuing to read on.

“The toll of the ship’s bell reminds us of the reverence we owe to our departed shipmates and to those who guard the honor of our country. Upon the sea, under the sea, in the air, and on foreign soil. Let it be a reminder of the faith they confide in us; Let us who gather here not forget our obligations, and in silence, breathe a prayer for our absent shipmates. (Pause and slowly count to 5)

Each in his own words, and each in his own way, bow your heads and let us pray offering a silent prayer for our departed shipmate who is now serving on the staff of the Supreme Commander. This moment of reverence we dedicate to the memory of Art Callahan. (Pause and slowly count to 30 to allow for the moment of prayers.)

Strike two bells sharply to conclude the ceremony.

Source: Section 2703, Rituals and Standing Rules; Fleet Reserve Association.

1. Latin for “Let there be light,” is the motto of and appears on the seals of nine educational institutions. It is also an ancient biblical reference that announced the coming of light into the world, and with it knowledge, the power of perception and the hope for wisdom.

2. A “plank owner” is an individual who was a member of the crew of a ship when that ship was placed in commission. Originally, this term applied only to crew members that were present at the ship’s first commissioning. Today, however, plank owner is often applied to members of newly commissioned units, new military bases and recommissioning crews as well.

Third Quarter 2008
My Iron Story: Jim Koster

My experience with iron disorders has been three-fold: as a high school athlete with an iron disorder; as a college coach counseling student-athletes with iron disorders; and then, again personally, as an older person in my fifties. This mysterious and anxiety-ridden path of mine is yet another testament to the great value and need for the Iron Disorders Institute.

It was my junior track season in high school when I fell from being one of the top distance runners in the Philadelphia area to one of the slowest runners on the team. Everyone was completely mystified that I could set multiple records in cross country in the previous autumn and again in March on the track, yet in April become about the slowest runner on the team.

Believe me, I was running just as hard, probably with more effort than I had ever run, but I had absolutely no power in my stride. I just could not keep up. I would keep losing ground, like running in a dream in which you just can’t get your body going. I fell from being a runner who my teammates and coaches depended and looked highly upon to one who was letting the team down.

They called me a head case. My leg was not wrapped up, no limp, no sign of any mechanical physical problem. My running used to help my teammates gain confidence in our team and themselves. Now my running inspired puzzlement in everybody and sent negative signals to the psyche of everyone else! It was like I was playing a dirty trick on the team. Bewilderment was my state of mind. My joy of running had turned into poison. At the end of the season, I simply stopped running.

Years later, I would read an obscure article about some Finnish Olympic runners taking iron supplements in order to replenish the iron excreted during their training. It mentioned the debilitating effects on a distance runner’s oxygen transfer ability if too much iron was lost due to strenuous training and how their racing performances would suffer. A light bulb went off in my head! The article described the same physical symptoms I suffered back in high school! Could this be what happened to me back then? Had it been a simple case of a mineral deficiency that so affected me physically, and then emotionally and mentally?

Another few years found me coaching cross country and track at the collegiate level. When my athletes started to train at higher mileage levels (over 70 miles a week), I started to notice that one or two succumbed to the same malady as I had in high school. They would be one of the top runners and then all of a sudden their performance dropped drastically. There was no gradual decline in performance. It was a sudden drop off, with them exhibiting significant lack of aerobic power. I also noticed it now and then with runners on other college teams. All of a sudden one of the top runners on another team went from a front-pack racer to a mid-pack racer or even further back among the finishers.

As a concerned coach, I pushed the college medical staff for blood tests on my afflicted athletes and upon completion, we were told through the college trainers that the nurses and doctors said all the results were normal, especially since the hemoglobin levels were in normal range for all the runners tested. When I mentioned that my own research revealed that the serum ferritin test would give us a much better picture of the iron condition in the athletes, I was met with dismissive responses from trainers, nurses, and doctors alike.

But, I could not in good conscience ask a symptomatic runner to continue with the exhausting training required in distance running training at the collegiate level if I thought there could be a health issue, so I encouraged the runner’s family to pursue the serum ferritin test on their own with their family doctor.

They were told now by their own doctor that the test was not needed. When they continued requesting the test, they were told that their insurance would not cover it. Finally the family insisted on the test and said that they would simply pay for it themselves. The serum ferritin test was accomplished and the family was told that the iron storage level was fine.

This became the typical scenario of every one of my runners’ families who pursued the serum ferritin test. And, each time they were told that the serum ferritin level was fine. I let go of the idea that iron deficiencies were an important malady to be on the alert for in distance runners. The reason for the disintegration of a very good runner now and then remained a mystery.

But, then by chance, a parent had requested a hard copy of a serum ferritin test and called me with the actual numerical result. I was astonished at the result she cited to me, 9 ng/ml! She went on to say that the results sheet stated the normal range was 8 - 320 ng/ml. Now I was flabbergasted! How could that be the normal range?! The nurse had told her that the results were fine from this serum ferritin test, but how could a 9ng/ml reading be considered within normal range?! How could the normal range be 8 - 320 ng/ml?!

This was going to be another chapter in the typical scenario of a family getting that serum ferritin test done. But now, I would always add that they needed to get the exact numerical result. It turned out after speaking directly with the testing labs about this particular test, that the printed ‘normal’ range for the serum ferritin test was many times just citing the range of all test results for that physician’s population of patients. The lowest result for any of the physician’s patients would be the low end of this ‘normal’ range and the highest result would thereby be the high end of this ‘normal’ range. Theoretically, no matter how low your result was, it could never be out of this range because it simply would become the new low end of this ‘normal’ range! No wonder all the results were fine!

Eventually, we had great success in bringing afflicted athletes back to their top form again with proper serum ferritin testing and a doctor’s oversight. We learned that distance runners can lose significant iron in several ways due to their training. Also, we ensured that the athletes were all educated as to the deadly nature of iron overload and the dangers of supplementation without a doctor’s guidance.

Years went by, and I was no longer coaching in my mid-fifties when I started suffering with unusual fatigue and mental distress. As a positive optimist person all my life, I was unprepared for this sudden change into despondency and negative thinking. Couple this with extreme fatigue and being unable to sleep for more than three hours each night, I finally realized after 9 months like this that I needed a complete physical. The normal blood test was included but something told me to specifically request that a serum ferritin test be added to the blood work.

From the typical blood test, all seemed well except for low readings in my calcium and folate levels. My hemoglobin was within normal range. And then, the shocker in the serum ferritin result . . . 6 ng/ml. My doctor did understand the nature of this low reading and we both agreed that my physical and mental afflictions might well be attributed to the fact that I was not oxygenating my body properly. Continued on next page...
Antioxidants are naturally occurring in our body and readily available in most foods. The primary role of an antioxidant is to protect us from free radical (FR) damage also called oxidative stress. Free radicals do have beneficial properties such as killing harmful bacteria engulfed by macrophages (white blood cells that scavenge our cells for debris) but they are highly reactive. When in the presence of unbound iron, free radicals accumulate in excess triggering a chain reaction that damages cells. This type of destruction can also damage DNA and result in diseases such as spontaneous cancers, accelerate aging and influence the development of diseases of the cardio-vascular system, kidney, brain, pancreas, joints and liver. Some experts believe that oxidative stress rather than alcohol is more likely the cause of liver damage in heavy drinkers.

The destructive potential of free radicals is brought under control by antioxidants. FRs are missing an electron, which is what makes them highly reactive. An antioxidant donates or gives up the sought after electron to a free radical and renders it harmless so that oxygen molecules can function normally, unite with hydrogen to become water.

Some of the naturally occurring antioxidants in humans are in the form of enzymes or enzyme groups such as superoxide dismutases (SOD), catalase, and glutathione peroxidase. Additionally, although we can consume foods or supplements that contain antioxidants, not all antioxidants provide the same degree of protection from oxidative stress.

Food or supplement forms of antioxidants vary in bioavailability, also taken in supplemental form, an antioxidant can become a pro-oxidant and kick up the cycle of free radical activity. Alpha lipoic acid (ALA) for example was found to alter iron metabolism in such a way as to act as a pro-oxidant. For instance, the compound has been observed to dislodge iron from ferritin retention and to increase lipid peroxidation by ferrous ions. Nevertheless, in other systems, ALA has lowered the risk of iron-induced oxidative damage. Vitamin E, a powerful antioxidant was found to function similarly.

Every food contains some level of antioxidant: nuts, grains, oils, fruits, vegetables, chocolate, coffee, and tea. How do we determine which choices are best? Coffee and tea for example are high in antioxidants, but too much of these beverages can damage the liver because of the high tannin content. Plums are very high in antioxidants but not highly bioavailable to the body. Wild blueberries while both high in antioxidants and high in bioavailability must be consumed in large amounts-at least a half-cup to earn the distinction of the highest antioxidant content.

In 2007 the USDA published the Oxygen Radical Absorbance Capacity (ORAC) of 277 foods. This list resulted from studies conducted by Ronald Prior, an Agricultural Research Service (ARS) chemist. Prior who works at the Arkansas Children’s Nutrition Center in Little Rock, led a research team that investigated the antioxidant status of certain foods.

By measuring the plasma antioxidant capacity (AOC) of volunteers after eating certain foods these investigators confirmed that antioxidants are quite complex, with some being more bioavailable than others. An interesting footnote is that when volunteers were asked to consume a shake containing protein, carbohydrates and fat, with no antioxidants, their blood antioxidant levels dropped.

Taking antioxidants however, is not enough for people with elevated iron levels. Removing excess iron from the body with therapeutic phlebotomy, blood donation or iron chelation therapy is necessary to diminish the risk of disease for these individuals.

Important Terms
Free iron: iron that is unbound
Free radical: an atom or molecule with an unpaired electron in its outer orbit; highly reactive.
ROS: Reactive Oxygen Species also called oxygen radicals; examples include hydroxides, peroxy radicals, and superoxides
Antioxidant: a molecule that gives up (donates) one electron rendering a free radical harmless
Oxidative Stress (OS): excessive strain on cells that change their intended function; one outcome of OS is cell death
Bioavailability: the extent to which a nutrient is available to the body

Key Resources:
http://www.ars.usda.gov/is/contacts.htm#top
http://www.ars.usda.gov/fs/pr/2007/07/06/12.htm
http://www.nutrition.org/

For a complete bibliography contact publications@irondisorders.org
Wikipedia describes "personalized medicine" as the concept that information gathered about a patient’s genotype could be used to fashion medical care to that individual’s specific needs. This notion follows the logic that such information could be used to help select medications, prescribe appropriate dosage, select a tailored therapeutic regimen, or initiate the most appropriate preventive protocol. Similar to traditional clinical medicine, this genetically-adapted approach provides foundational information that your physician can review in the context of your family and personal medically histories, diet and lifestyle habits, imaging and other standard laboratory tests.

This approach to individualized treatment evolved on the heels of the combined efforts of the federal government and private industry through parallel undertakings that culminated with the announcement of the "near" completion of the Human Genome Project in 2003. The sequencing of the last chromosome was published in May of 2006. Interestingly, the private industry company, Celera Genomics, and its founder, genetics pioneer Dr. J. Craig Venter announced at the completion of the project that the first full sequencing yielded Dr. Venter’s personal genetic profile, information that had been kept secret during the project.

The Human Genome Project provided a blueprint that ties together the common building blocks of human life. Continuing research has proved that all humans share essentially all the same “building blocks,” but as in architectural blueprints, the differences reside in the finishing detail, in humans that means the proteins and enzymes produced from the genetic structure. Relatively slight differences in one or more genes can lead to significant variance in their function and utility. As research defining these differences continues, we are learning that these seemingly insignificant variations provide the distinctive traits that make each of us different from all others. Many of these differences are shared by our relatives and ancestors, while some of them can be rare, or even unique.

Experts studying the human genome have traced many of these genetic variances to predispositions for conditions and diseases through what is referred to as genome-wide association studies. In the practice of personalized medicine, the variations, also called mutations, or polymorphisms, are first identified from a sample of a person’s DNA. The next step is to compare that person’s specific genetic profile to the medical histories of others having the same genetic variations. Experts can then determine if the differences are associated with elevated risks of certain conditions or diseases.

Then, the differences can be quantified and weighed through sophisticated analyses to unveil the presence of one or more health risks that can be associated with the individual’s specific profile. Equipped with that information, a physician can prescribe the best preventive or remedial procedures to be followed.

During the past year, three companies have emerged as leaders in the field of personalized medicine. Two of them are California companies, 23andMe and Navigenics; the third, deCODEme, is an Icelandic company. Each company provides their customers kits to gather either saliva or buccal (cheek tissue) samples, which customers then ship back to the respective lab for genetic sequencing and evaluation. The advertised prices range from $399 for 23andMe, to $985 from deCODEme and $2,500 for Navigenics.

Of course, the scope of services will depend in part on pricing and the sophistication of the technology employed, but it is important for the consumer to both utilize the genetic counseling services offered by these companies as well as consult with their personal physician to determine the implications of the findings, and the significance, if any, relative to their personal health profile. Also, these companies generally offer follow-up consultation based on their continued review of new and relevant, published scientific and medical findings.

As science evolves more information will become known. Although none of the above companies report on predispositions for all of the diseases and conditions listed below, the following list represents the combined total advertised on the respective web sites of these companies:

- abdominal aneurysm, Alzheimer's disease, asthma, atrial fibrillation, brain aneurysm, breast cancer, celiac disease, colorectal cancer, Crohn’s disease, exfoliation glaucoma, glaucoma, Graves’ disease, hemochromatosis, heart attack, intracranial aneurysm, lung cancer, lupus, macular degeneration, multiple sclerosis, obesity, osteoarthritis, peripheral arterial disease, prostate cancer, psoriasis, restless legs syndrome, rheumatoid arthritis, stomach cancer, type 1 and type 2 diabetes, and venous thromboembolism.

Only deCODEme reports hemochromatosis among the conditions it associates with genetic profiling. Several companies in the U.S. (including DNA Direct of California) will conduct specific testing for the main genetic variations commonly associated with hereditary hemochromatosis. The cost of this averages about $200.

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**What is your Iron Story?**

One way for new patients to learn about iron disorders is from other patient stories.

If you are interested in sharing your iron story in one of our issues of Nanograms newsletter, please contact our office.

1-888-565-IRON (4766) or email: Peggy Clark Pclark@irondisorders.org

**IF WE’VE HELPED YOU, PLEASE HELP US BY DONATING.**

**BECOME A VOLUNTEER AND A MEMBER**

**WITH YOUR MEMBERSHIP DUES YOU WILL RECEIVE YOUR HANDSOME IDI MEMBERSHIP PIN AND A PRINTED COPY OF NANOGRAMS.**

FOR DETAILS ABOUT MEMBERSHIP PLEASE CALL PEGGY CLARK, MEMBER SERVICES COORDINATOR 888-565-4766; EMAIL: pclark@irondisorders.org OR VISIT OUR WEBSITES: WWW.IRONDISORDERS.ORG AND WWW.HEMOCROMATOSIS.ORG
Join our CIRCLE of patients, family members, educators, students, and healthcare professionals on the EXCESS IRON online discussion list. One click on our website gets you on the list and in the CIRCLE. Here you can listen, share, ask questions and get help.

Recent LIST discussion topics have been about liver biopsy, keeping good records and iron avidity. IDI Patient Services reports information requests for these same topics along with the number one request for the name of a physician expert in Iron-Out-of-Balance™.

Liver Biopsy: some patients are still going through unnecessary liver biopsy to get the diagnosis of hereditary hemochromatosis (HHC). IDI’s advisory board recommends liver biopsy when initial serum ferritin is 1,000ng/mL or greater and for determining liver damage. Genetic testing or quantitative phlebotomy are less invasive and preferred ways to diagnose HHC. FerriScan® is a new alternative to liver biopsy but is not widely available in the US.

Keeping Good Records: IDI strongly urges every patient to ask their healthcare provider for copies of lab results. Keeping journals are also encouraged. Journals often help us remember important questions we want to ask at the next doctor visit. IDI’s Personal Health Profile is a great record-keeping form. It is available free online to anyone or in hardcopy FREE for members.

Iron Avidity: is a condition where the body has a lot of iron in transit (bound to transferrin) but the serum ferritin is low or low normal. It is a condition often seen in hemochromatosis patients especially if they have been overbled which causes the serum ferritin to go too far below normal. The mechanism of iron avidity is not fully known but is possibly due to genetics, hepcidin levels or the body’s natural reaction to repeated blood removal. IDI recommends that iron avid hemochromatosis patients discontinue phlebotomies until the body can adjust and iron levels are restored to normal. In rare cases IDI recommends iron replacement therapy for these individuals but generally we encourage first, diet changes that include more red meat.

Finding a Physician: This remains the number one request IDI gets from patients who report that different doctors use different lab ranges, different therapy approaches, offer limited or no diet information and often cannot explain the genetics simply enough or not at all. Once asked by of an epidemiologist* at CDC “What type of physician should we tell hemochromatosis patients to seek?” Thinking that the answer would be “doctor of internal medicine, a type of physician should we tell hemochromatosis patients to seek?” we were surprised with the answer: “Find a doctor who will listen.” This seems to hold true today.

*Epidemiologist: one who investigates the origin of disease

recipes for iron balance

BBQ Chili with Beans... for those who need more iron

- 1 pound lean ground beef
- 2 Tabs olive oil
- 1 cup cooked dark red kidney beans
- 1 pound can whole tomatoes
- 16 ounce can tomato sauce
- 1 med. onion finely chopped
- 1/2 cup catsup
- 1 Teas. sea salt, 5-10 shakes of red pepper flakes

In an iron skillet, sauté beef and chopped onion in oil. Tear tomatoes into smaller pieces; add to meat. Add all other ingredients; cover and simmer for 45 minutes. Uncover and simmer 15 minutes.

BBQ Chili with Beans... for those who need less iron

Follow the same recipe, except substitute ground turkey, chicken or pork, which are lower in heme iron for beef. Tips for greater reduction in iron absorption: drink tea with the meal; use white beans which are a bit lower in iron than kidney beans; and cook in glass (Pyrex; Corning Ware).

Steps for planning a meal to balance your iron intake

• Estimate the amount of heme (animal source) and non-heme (plant source) iron in your meal.
• Determine what substances to add or substitute to improve iron absorption--if you need more iron, or impair iron absorption--if you need less iron. See page 12 for substances that improve or impair iron absorption.
• Plan ahead! If you plan our menus in advance and use a shopping list, you will be less prone to impulsive eating and processed foods.

Get a FREE copy of the Iron Disorders Institute (IDI) MENU PLANNER FORM. You can also download this form from our website www.irondisorders.org

Or if you are a member, you can request we send you a printed copy. Call us toll free: 888-565-4766!

Some recipes are from our latest Hemochromatosis Cookbook and are modified for those who need more iron. If you have hemochromatosis, and you love to cook, you will want this book! Order online or by calling us toll free: 888-565-4766

I challenge all List Members to become volunteers and help us get the word out!

More than 1,000 people have signed onto this list in its years of existence. Hopefully, you have been helped by the exchanges on the List. It is a great venue and offers opportunities for people to share experiences.

Presently, I am directing a national education program for IDI and recruiting volunteers from all over the country to help us get our literature out to healthcare providers.

Chris Kieffer, a founding director
Iron Disorders Institute

Contact me ckeffer@irondisorders.org if you want to join others who are helping us spread the word!
C.R. Hume says, “Let us help you remain... 
IRON SMART!”

C.R. Hume is IDI’s mascot; he is a health-minded ferret, who helps raise awareness about the benefits of blood donation. His name is suggestive of “serum”. Together, his name and genre sound like serum ferritin.

ABOUT IRON
Iron is a mineral that we get from food. All living things must have iron to survive. Humans need about 1 milligram of iron a day to have enough energy to function. People lose about 1 milligram of iron per day in sweat, skin flakes or tears. Most people get enough iron from the diet, but some have Iron-Out-of-Balance™. This is any condition where iron levels in the body are not normal.

TESTS TO DETECT
Iron-Out-of-Balance™ is detected with blood tests. The most common tests include:

- serum iron
- total iron-binding capacity (TIBC)
- serum ferritin

Other tests or procedures are needed to determine the cause of Iron-Out-of-Balance™. Examples include complete blood count, retic count, B12 or folate, genetic testing, liver biopsy, and bone marrow aspiration. Our books are excellent resources for understanding iron disorders such as hemochromatosis, anemia of chronic disease, iron overload with anemia, and iron deficiency.

IN YOUR GENES?
Many iron disorders are inherited; that means it’s in your genes. If you are diagnosed with an inherited iron disorder, even if you are just a carrier, be sure to tell all your blood relatives: your parents, brothers and sisters, cousins, aunts and uncles. They need to know; if it is in their genes too, knowing might save their life!

IN YOUR GENES?
They need to know; if it is a carrier, be sure to tell all your blood relatives: your parents, brothers and sisters, cousins, aunts and uncles.

THERAPY TO CORRECT
People with normal hemoglobin and high body iron can have therapeutic phlebotomies. If they cannot tolerate the phlebotomies, they may be candidates for iron chelation therapy. This form of therapy is usually used with iron overload patients who are anemic. Iron chelators are pharmaceuticals that will specifically bind to iron.

TIPS TO MANAGE

SOME ITEMS THAT KEEP YOU FROM ABSORBING IRON:
- COFFEE
- TEA
- EGGS
- FIBER
- CHOCOLATE
- CALCIUM SUPPLEMENTS

SOME ITEMS THAT HELP YOU ABSORB IRON:
- BETA-CAROTENE
- SUGAR
- ACIDIC FOODS OR BEVERAGES
- ALCOHOL
- VITAMIN C SUPPLEMENTS

Important Ranges

Hemoglobin test determines the amount of iron in the blood that is carrying oxygen to vital organs. Hemoglobin will be within normal range unless you are iron deficient or have anemia of chronic disease.

Ferritin (serum) test determines stored or contained iron. Ferritin will be elevated if you have too much iron in your body or if you have inflammation. Ferritin will be low if you are iron deficient.

In treatment* serums are pharmaceuticals that will specifically bind to iron.

TS% is not a test but a calculation! Transferrin-iron saturation percentage (TS%) is calculated by dividing serum iron by TIBC and multiplying the quotient (results) by 100. This answer is expressed in percentage. Example: 210 serum iron ÷300 TIBC= 0.7 X 100= 70; which means that 70% of transferrin is saturated with iron. NORMAL TS% is 25-35.

THREE VIEWS OF IRON

IN USE: determined by measuring hemoglobin.
BEING TRANSPORTED: determined by measuring serum iron and TIBC (total iron-binding capacity)
Contained IN STORAGE: determined by measuring serum ferritin. YOU NEED ALL THREE VIEWS for a complete picture of your iron levels.

Important Ferritin Reference Ranges

<table>
<thead>
<tr>
<th>Reference Range</th>
<th>Adult Males</th>
<th>Adult Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal Range</td>
<td>up to 300ng/mL</td>
<td>up to 200ng/mL</td>
</tr>
<tr>
<td>In treatment</td>
<td>below 100ng/mL</td>
<td>below 100ng/mL</td>
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<tr>
<td>Ideal maintenance</td>
<td>25-75ng/mL</td>
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Hemoglobin

<table>
<thead>
<tr>
<th>Reference Range</th>
<th>Adult Males</th>
<th>Adult Females</th>
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</thead>
<tbody>
<tr>
<td>Normal Range</td>
<td>13.5-17.5 g/dL</td>
<td>12.0-16.0 g/dL</td>
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<tr>
<td>Adolescents</td>
<td>15-17.5 g/dL</td>
<td>12.0-16.0 g/dL</td>
</tr>
<tr>
<td>Juveniles</td>
<td>13-17.0 g/dL</td>
<td>12.0-15.0 g/dL</td>
</tr>
<tr>
<td>Infants &amp; Newborns</td>
<td>11-15.0 g/dL</td>
<td>11-15.0 g/dL</td>
</tr>
<tr>
<td>Adolescents</td>
<td>18-24.0 g/dL</td>
<td>15-20.0 g/dL</td>
</tr>
<tr>
<td>Juveniles</td>
<td>16-20.0 g/dL</td>
<td>15-18.0 g/dL</td>
</tr>
<tr>
<td>Infants &amp; Newborns</td>
<td>15-18.0 g/dL</td>
<td>14-16.0 g/dL</td>
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Ferritin

<table>
<thead>
<tr>
<th>Reference Range</th>
<th>Adult Males</th>
<th>Adult Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal Range</td>
<td>Male ages 10-19 23-70ng/mL</td>
<td>Infants 7-12 months 60-80ng/mL</td>
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<tr>
<td></td>
<td>Female ages 10-19 6-40ng/mL</td>
<td>Newborn 1-6 months 6-410ng/mL</td>
</tr>
<tr>
<td></td>
<td>Children ages 6-9 10-55ng/mL</td>
<td>Newborn 1-30 days 6-400ng/mL</td>
</tr>
<tr>
<td></td>
<td>Children ages 1-5 6-24ng/mL</td>
<td>*therapeutic phlebotomy for people without anemia</td>
</tr>
</tbody>
</table>

DYK?

Important Ranges

Hemoglobin test determines the amount of iron in the blood that is carrying oxygen to vital organs. Hemoglobin will be within normal range unless you are iron deficient or have anemia of chronic disease.

Ferritin (serum) test determines stored or contained iron. Ferritin will be elevated if you have too much iron in your body or if you have inflammation. Ferritin will be low if you are iron deficient.