DOWNLOAD PDF IRON TOXICITY IN HUMANS

Chapter 1 : Toxicity, mechanism and health effects of some heavy metals

Acute Iron Toxicity -- Late Symptoms. People who survive the first stage of acute iron toxicity may appear to improve for a while. This latent period is the second stage and can happen within 6 to 48 hours of an iron overdose.

Importance of iron regulation[edit] Structure of Heme b ; "Fe" is the chemical symbol of iron, "II" indicates its oxidation state. Iron is an essential bioelement for most forms of life, from bacteria to mammals. Its importance lies in its ability to mediate electron transfer. In the ferrous state, iron acts as an electron donor , while in the ferric state it acts as an acceptor. Thus, iron plays a vital role in the catalysis of enzymatic reactions that involve electron transfer reduction and oxidation, redox. Proteins can contain iron as part of different cofactors , such as iron-sulfur clusters Fe-S and heme groups, both of which are assembled in mitochondria. Cellular respiration Human cells require iron in order to obtain energy as ATP from a multi-step process known as cellular respiration, more specifically from oxidative phosphorylation at the mitochondrial cristae. Iron is present in the iron-sulfur clusters and heme groups of the electron transport chain proteins that generate a proton gradient that allows ATP synthase to synthesize ATP chemiosmosis. Heme groups are part of hemoglobin , a protein found in red blood cells that serves to transport oxygen from the lungs to the tissues. Heme groups are also present in myoglobin to store and diffuse oxygen in muscle cells. Hemoglobin and myoglobin The human body needs iron for oxygen transport. Oxygen O2 is required for the functioning and survival of nearly all cell types. Oxygen is transported from the lungs to the rest of the body bound to the heme group of hemoglobin in erythrocytes. In muscles cells, iron binds myoglobin , which regulates its release. Toxicity[edit] Iron is also potentially toxic. Its ability to donate and accept electrons means that it can catalyze the conversion of hydrogen peroxide into free radicals. Free radicals can cause damage to a wide variety of cellular structures, and ultimately kill the cell. Also, there are virtually no truly free iron ions in the cell, since they readily form complexes with organic molecules. However, some of the intracellular iron is bound to low-affinity complexes, and is termed labile iron or "free" iron. Iron in such complexes can cause damage as described above. This binding allows cells to benefit from iron while also limiting its ability to do harm. In mammalian cells, intracellular labile iron concentrations are typically smaller than 1 micromolar, less than 5 percent of total cellular iron. Most bacteria that cause human disease require iron to live and to multiply. In response to a systemic bacterial infection, the immune system initiates a process known as iron withholding. If bacteria are to survive, then they must obtain iron from their environment. Disease-causing bacteria do this in many ways, including releasing iron-binding molecules called siderophores and then reabsorbing them to recover iron, or scavenging iron from hemoglobin and transferrin. The harder they have to work to get iron, the greater a metabolic price they must pay. That means that iron-deprived bacteria reproduce more slowly. So our control of iron levels appears to be an important defense against most bacterial infections; there are some exceptions however. TB causing bacterium can reside within macrophages which are an iron rich environment and Borrelia burgdorferi utilises manganese in place of iron. People with increased amounts of iron, like people with hemochromatosis, are more susceptible to some bacterial infection. Since the liver produces hepcidin in response to inflammatory cytokines , hepcidin levels can increase as the result of non-bacterial sources of inflammation, like viral infection, cancer, auto-immune diseases or other chronic diseases. When this occurs, the sequestration of iron appears to be the major cause of the syndrome of anemia of chronic disease , in which not enough iron is available to produce enough hemoglobin-containing red blood cells. In iron deficiency, the bone marrow produces fewer blood cells, and as the deficiency gets worse, the cells become smaller. The reserves of iron in industrialized countries tend to be lower in children and women of child-bearing age than in men and in the elderly. Iron deficiency first affects the storage iron in the body, and depletion of these stores is thought to be relatively non-symptomatic, although some vague and non-specific symptoms have been associated with it. Since iron is primarily required for hemoglobin, iron deficiency anemia is the primary clinical manifestation of iron deficiency. Iron-deficient people will suffer or die from organ damage well before cells run out of the iron needed for intracellular processes like electron transport. Macrophages of the reticuloendothelial system store iron as part of the process of breaking down

and processing hemoglobin from engulfed red blood cells. Iron is also stored as a pigment called hemosiderin which is an ill-defined deposit of protein and iron, created by macrophages where excess iron is present, either locally or systemically for example among people with iron overload due to frequent blood cell destruction and transfusions. If the systemic iron overload is corrected, over time the hemosiderin is slowly resorbed by macrophages. Mechanisms of iron regulation[edit] Human iron homeostasis is regulated at two different levels. Systemic iron levels are balanced by the controlled absorption of dietary iron by enterocytes , the cells that line the interior of the intestines , and the uncontrolled loss of iron from epithelial sloughing, sweat, injuries and blood loss. In addition, systemic iron is continuously recycled. Cellular iron levels are controlled differently by different cell types due to the expression of particular iron regulatory and transport proteins. Dietary iron uptake[edit] The absorption of dietary iron is a variable and dynamic process. The efficiency with which iron is absorbed varies depending on the source. Generally the best-absorbed forms of iron come from animal products. Heme iron in animals is from blood and heme-containing proteins in meat and mitochondria, whereas in plants, heme iron is present in mitochondria in all cells that use oxygen for respiration. Like most mineral nutrients, the majority of the iron absorbed from digested food or supplements is absorbed in the duodenum by enterocytes of the duodenal lining. These cells have special molecules that allow them to move iron into the body. It the iron is bound to Heme it is instead transported across the apical membrane by Heme carrier protein 1 HCP1. In contrast, ferroportin is post-translationally repressed by hepcidin , a amino acid peptide hormone. The body regulates iron levels by regulating each of these steps. For instance, enterocytes synthesize more Dcytb, DMT1 and ferroportin in response to iron deficiency anemia. The body also absorbs less iron during times of inflammation , in order to deprive bacteria of iron. Recent discoveries demonstrate that hepcidin regulation of ferroportin is responsible for the syndrome of anemia of chronic disease. Iron recycling and loss[edit] Most of the iron in the body is hoarded and recycled by the reticuloendothelial system, which breaks down aged red blood cells. In contrast to iron uptake and recycling, there is no physiologic regulatory mechanism for excreting iron. People lose a small but steady amount by gastrointestinal blood loss, sweating and by shedding cells of the skin and the mucosal lining of the gastrointestinal tract. TFR1 has a fold higher affinity for transferrin-bound iron than TFR2 and thus is the main player in this process. Iron from this pool can be taken up by mitochondria via mitoferrin to synthesize Fe-S clusters and heme groups. The latter two are especially important since systemic iron levels depend upon them. There is only one known iron exporter, ferroportin.

Chapter 2 : Heavy Metal Poisoning - NORD (National Organization for Rare Disorders)

Iron toxicity: The body normally absorbs less iron if its stores are full, but some individuals are poorly defended against iron toxicity. Once considered rare, iron overload has emerged as an important disorder of iron metabolism.

Download as PDF Avoid alcohol: Adding booze to pre-existing fatty liver will accelerate liver deterioration. Since alcohol requires a healthy liver to be properly metabolized, I recommend zero tolerance for drinks. Be Diligent About Supplements: Some supplements, such as vitamin C, probiotics, and N-acetylcysteine can have a positive affect on the liver. Others, such as ron, niacin, and vitamin A, can cause stress on the liver if it is already unhealthy. For more information on which supplements are helpful and which should be approached with more caution, see the full text of this article below. Avoid exotic-sounding bodybuilding ingredients and shoddily manufactured herbal products: The recent banning of certain sports supplements that contain significant amounts of anabolic steroids underscores the risk to unwary consumers. Regular aerobic exercise helps optimize liver function. It may do so by curbing insulin resistance, a key promoter of fatty deposits in the liver. For more liver-saving tips, read the full text below. Iron â€" roles in the body: Iron is an essential nutrient that is vital to the processes by which cells generate energy. Iron also can be damaging when it accumulates in the body. In fact, iron is a problem nutrient for millions of people. The principle that too little or too much of a nutrient is harmful seems particularly apropos for iron. Iron has a knack of switching back and forth between two ionic states. In the reduced state, iron has lost two electrons and therefore has a net positive charge of two. Iron in the reduced state is known as ferrous iron. In the oxidized state, iron has lost a third electron, has a net positive charge of three and is known as ferric iron. Because iron can exist in different ionic states, iron can serve as a co-factor to enzymes involved in oxidation-reduction reactions. In every cell, iron works with several of the electron-transport chain proteins that perform the final steps of the energy yielding pathways. If you recall from my previous article on this website, ATP is adenosine triphosphate, the cellular energy currency of the body. A direct precursor to this substance is nicotinamide adenine dinucleotide NADH. In both, iron helps accept, carry and then release oxygen. Iron also is found in many enzymes that oxidize compound reactions so widespread in metabolism that they occur in all cells. Enzymes involved in the making of amino acids, hormones and neurotransmitters require iron. Iron absorption and metabolism: The body conserves iron zealously and has devised many special provisions for its handling. Two special proteins in the intestinal mucosal cells help the body absorb iron from food. One protein called mucosal ferritin receives iron from the GI tract and stores it in the mucosal cells. When the body needs iron, mucosal ferritin releases some iron to another protein, called mucosal transferrin. Mucosal transferrin transfers the iron to a carrier in the blood called blood transferrin, which transports iron into the rest of the body. Intestinal mucosal cells are replaced approximately every three days. When the cells are shed from the intestinal mucosa and excreted in the feces, they carry some iron out with them. The iron holding capacity of these cells provides a buffer against short-term changes in iron need or supply. Iron in food reaches the intestinal cells during digestion where some is stored in intestinal cells in ferritin. Some iron is lost during the shedding of intestinal cells. If the body needs iron, it is packaged into transferrin, a transport protein, and carried in the blood. Iron containing hemoglobin in red blood cells carries oxygen. The liver and spleen dismantles red blood cells and packages iron into transferrin, and the cycle begins again. Some losses of iron occur via sweat, skin, bleeding, urine and the shedding intestinal cells. Heme and non-heme iron: How much iron is absorbed depends in part on its source. Iron occurs in two forms in foods, heme and non-heme. Heme iron is found only in foods derived from the flesh of animals, such as meats, poultry and fish. Non-heme iron is found in both plant and animal foods. Heme iron is so well absorbed that it contributes significant iron to the body. It is absorbed at a relatively constant rate of about 23 percent. The rates of absorption of non-heme iron are lower, ranging from 2 percent to 20 percent, and are strongly influenced by dietary factors and body iron stores. People with severe iron deficiencies absorb heme and non-heme iron more efficiently and are more sensitive to dietary enhancing factors than people with better iron status. MFP and vitamin C Meat, fish and poultry contain not only the highly bioavailable heme iron, but also MFP factor that promotes the absorption of non-heme iron from other

foods eaten with them. Vitamin C , which also enhances non-heme iron absorption from foods eaten in the same meal, is the most potent promoter of non-heme iron absorption. Vitamin C captures iron and keeps it in the ferrous form, ready for absorption. Other factors that enhance non-heme iron absorption include citric acid and lactic acid from foods, as well as HCl from the stomach. Some dietary factors bind with non-heme iron, inhibiting absorption. These include the phytates and fibers in whole grain cereals and nuts, the calcium and phosphorus in milk and supplements, the EDTA in food additives, and tannic acid. Tannic acid is present in tea, coffee, nuts, and some fruits and vegetables. Recent studies reveal that soy may inhibit iron absorption. If absorption cannot compensate for losses or low dietary intakes, and body stores are used up, then iron deficiency sets in. Bleeding from any site incurs iron losses. Active bleeding ulcers, menstruation and injury result in iron losses. Women are especially prone to iron deficiency during their reproductive years because of repeated blood losses during menstruation. Pregnancy places iron demands on women as well because iron is needed to support the added blood volume, the growth of the fetus and blood loss during childbirth. Infants and young children receive little iron from their high milk diets, yet extra iron is needed to support their rapid growth. The rapid growth of adolescence, especially for males, and the menstrual losses of teen females demand extra iron that a typical teen diet may not provide. Assessment of iron deficiency: Iron deficiency develops in stages. In the first stage of iron deficiency, iron stores diminish. Measures of serum ferritin reflect iron stores and are most voluble in assessing iron status. The second stage of iron deficiency is characterized by a decrease in iron being transported within the body. Serum iron falls, and the iron carrying protein transferrin increases an adaptation that enhances iron absorption. Together, these two measures can determine the severity of iron deficiency; the more transferrin and the less iron in the blood, the more advanced the deficiency. The third stage of iron deficiency occurs when the supply of transport iron diminishes to the point that it limits hemoglobin production. Now the hemoglobin precursor, erythrocyte protoporphyrin, begins to accumulate as hemoglobin and hematocrit values decline. Iron deficiency and anemia: Iron deficiency and anemia are not the same. People may be iron deficient without being anemic. The term iron deficiency refers to depleted body iron stores without regard to the degree of depletion or to the presence of anemia. The term anemia refers to the severe depletion of iron stores that results in a low hemoglobin concentration. The red blood cells in a person with iron deficiency anemia are pale and small. The result is fatigue, weakness, headaches, apathy, pallor and poor resistance to cold temperatures. Since hemoglobin is the bright red pigment of the blood, the skin of a fair person who is anemic may become noticeably pale. In a dark skinned person, the eye lining, normally pink, will be very pale. Overview of iron deficiency symptoms: Blue sclera sclera is a tough fibrous tissue that covers the white of the eye, blue sclera has an abnormal degree of blueness. Reduced resistance to infection. Reduced work productivity, reduced physical fitness, weakness, fatigue, impaired cognitive function, reduced learning ability, increased distractibility, impaired reactivity and coordination. Itching, pale nail beds and palm creases, concave nails, hair loss, impaired wound healing. Reduced resistance to cold, inability to regulate body temperature, pica clay eating and ice eating. The body normally absorbs less iron if its stores are full, but some individuals are poorly defended against iron toxicity. Once considered rare, iron overload has emerged as an important disorder of iron metabolism. Iron overload is known as hemochromatosis and usually is caused by a gene that enhances iron absorption. Other causes of iron overload include repeated blood transfusions, massive doses of dietary iron and rare metabolic disorders. Additionally, long-term overconsumption of iron may cause hemosiderosis, a condition characterized by large deposits of the iron storage protein hemosiderin in the liver and other tissues. Iron overload is most often diagnosed when tissue damage occurs, especially in iron-storing organs such as the liver. Infections are likely to develop because bacteria thrive on iron-rich blood. Ironically, some of the signs of iron overload are analogous to those of iron deficiency:

Chapter 3 : Human iron metabolism - Wikipedia

iron toxicity, iron overdose: Iron poisoning is an iron overload caused by a large excess of iron intake and usually refers to an acute overload rather than a gradual.

Factors that enhance iron absorption are: When excess dietary iron is absorbed, the body produces more ferritin. Ferritin is greatly abundant in the heart and liver, therefore there is a large amount in these organs, and iron rushes to these organs for storage. The body can only produce so much of these proteins, however, so excess iron builds up in these organs and causes tissue destruction. Iron Overload is characterized by increased levels of ferritin the iron storage protein , haemosiderin another storage protein , and iron catalyzed lipid peroxidation. There are many reasons why certain people absorb more iron than others: Not everyone takes in the same amount of iron. When alcohol and food are consumed together, the alcohol facilitate the absorption of iron. Many people develop alcoholic cirrhosis disease of the liver , and, hence , lose their ability to control iron uptake. Dietary patterns such as drinking orange juice with a meal, increases iron absorption. Diseases that Can Cause Iron Toxicity Iron toxicity is not always due to an increase in dietary iron. There are many diseases that can lead to a problem in iron absorption and in turn iron toxicity. With acute iron poisoning, much of the damage to the gastrointestinal tract and liver may be a result of a high localized iron concentration and free radical production, leading to heptatoxicity via lipid peroxidation and the destruction of the hepatic mitochondria. Therefore, the patient needs rapid removal of iron from the gut to prevent tissue damage. The iron accumulating disease is Hemochromatosis. This is an iron storage disease the results from the inability of the intestine to keep out unneeded iron. Instead, iron accumulates in the liver causing siderosis the accumulation of storage iron in tissues and damage to the storage organs. This is a very common problem, 1 out of every 15 people have a form of this disease. There are two types of this disease: Heredity or Primary Hemochromatosis Acquired or Secondary Hemochromatosis Hereditary Hemochromatosis is a hereditary disease where the intestines lack the normal ability to keep out the available but unneeded dietary iron. Patients suffering from this disease take in the iron, but have problems excreting it. The excess is therefore placed into storage. It has been shown numerous times, that with an increased uptake from the diet of mg of iron, more than required, per day, in a period of years, g of iron will be accumulated in the body. This accumulation especially occurs in the liver and heart, and will eventually lead to necroses and cardiopathy. This condition can be spotted at an early stage by determination of serum ferritin concentration and liver biopsy. This condition can be treated and cured if caught before the tissue damage begins. Acquired Hemochromatosis is an intestinal abnormality occurring with acquired diseases. Some of the diseases this may happen with are: Anemia and Ineffective Erythropoiesis These diseases may result when a patient receives blood transfusions, but receives them for too long and the iron begins to build up. Liver Disease if a patient has a liver disease, he will not be able to control the iron uptake from the liver and the iron will begin to accumulate. Therefore, many people are given supplements that they do not need and the iron in their body increases. Problems Resulting From Iron Toxicity There are many problems that may result from iron toxicity, these include: In addition to these, the patient may experience vascular congestion of the gastrointestinal tract, liver, kidneys, heart, brain, spleen, adrenals, and thymus. As a result of iron storage disease, the liver becomes cirrhotic. Hepatoma, the primar cancer of the liver, has become the most common cause of death among patients with hemochromatosis. Also, when siderosis becomes severe in young people, myocardial disease is a common cause of death. Impotence may occur in young men, and amenorrhea may occur in young women. Both of these sexual related problems are due to iron loading in the anterior pituitary. Children are at Risk as Well The lethal dose of iron for a 2 year old child is 3 g, and 1 g leads to severe poisoning. Accidental iron poisoning occurs in children consuming iron tablets in the form of ferrous sulfate, over a period of a few hours. The ingested iron enters the stomach where the pH is low. The ferrous sulfate will remain in a soluble form, leading to irritation of the gastric mucosa. When the ferrous sulfate leaves the stomach, the pH is changed again by the pancreatic bicarbonate in the duodenum. This leads to the formation of insoluble iron complexes, causing further mucosal damage. There was a study conducted from , reported in Pediatrics. This

study reported that 53 children younger than 6 died as a direct result of unintentional ingestion. Iron supplements caused the death of 16 of these children. Iron supplements, causing The reason for this high percentage involves many factors, including: The ready availability of prenatal vitamins and iron supplements in homes with young children. The similar appearance of iron supplements to candy. The unrestricted over the counter marketing of high strength iron. These problems could be eliminated by increasing parental education, repackaging and reformulating iron supplements, and making the warning labels more clear. Treatment for Iron Toxicity The following are treatments for iron toxicity: Removal of the patients blood, one unit at a time. This is the cheapest, safest, and most efficient way to reduce siderosis. This not an efficient way to cure the problem, but patients with iron storage disease should avoid heavily iron enriched foods, vitamins supplemented with iron, and therapeutic iron. Deferoxamine is the best and least dangerous. It is expensive and administered by painful intramuscular injections. These result in the excretion of mg of iron. This is very dangerous, however, because the dose and route of administration are limited by the hypotensive effect of the drug. References Chapman and Hall. Iron Nutritional and Physiological Significance. The British Nutrition Foundation. Iron and Your Health: Mineral Tolerance of Domestic Animals. The Norwegian Academy of Science and Letters. Iron and Human Diseases. Comparison of Pediatric Poisoning Hazards: An Analysis of 3. Iron in Central Nervous System Disorders.

Chapter 4 : Iron poisoning - Wikipedia

However, iron toxicity can significantly increase the levels of "free" iron in the body. Free iron is a pro-oxidant - the opposite of an antioxidant - and may cause damage to cells. Several.

Iron plays essential roles in energy metabolism, hormone synthesis, growth, development, brain function, immune activity, and cellular function. Excess iron intake can quickly become dangerous. Iron toxicity is an overdose caused by ingesting too much iron. It can be either gradual or acute. Acute iron poisoning is very dangerous and requires immediate action. What Is Iron Poisoning? It usually occurs when a person greatly exceeds the recommended dosage of iron pills. Excessive iron is corrosive to the digestive system , making the symptoms traumatic and hard to miss. The symptoms of iron poisoning come in several distinct stages. This stage occurs in the first six hours after ingestion. Initial symptoms of iron poisoning include abdominal pain, nausea, drowsiness, diarrhea , and bloody vomiting. Continuous vomiting may cause dehydration. In more extreme cases the patient may lose consciousness or lapse into a coma. The second stage typically lasts a day or two. In this stage, symptoms seem to improve. Many people assume this means that the danger has passed, but this is still a very dangerous time. The initial symptoms appear to ease because the iron has moved from the digestive system. However, it is now in the bloodstream, where it can do even more damage. Over the course of the next few days, iron will circulate throughout the body, slowly damaging organs and tissues. This leads to seizures, shock, internal bleeding, severe liver damage, and dangerously low blood pressure, any of which could be fatal. Operated by the U. Department of Health and Human Services, this national helpline is available 24 hours a day, seven days a week, days a year. While anyone can suffer from acute iron overload, children are particularly vulnerable. The FDA requires that all iron supplements include the following warning directly on the label: Accidental overdose of iron-containing products is a leading cause of fatal poisoning in children under 6. Keep this product out of reach of children. In the case of accidental overdose, call a doctor or poison control center immediately. Keep all vitamins and supplements out of the reach and sight of children. Like child resistant containers, this is just one precaution, not a complete solution. Children can and will climb on anything. If possible, keep your supplements in a locked cabinet. Never put disposed-of medications in an open trash container where children can reach them. The symptoms of iron poisoning in dogs are very similar to that of humans â€" vomiting, bloody diarrhea, lethargy, and abdominal pain. Symptoms can progress to tremors, cardiac distress, liver damage, and severe shock. You can keep pets safe from iron poisoning by following the same precautions you would with children. Keep your supplements well out of the reach of your furry family members. Some pets seem to regard the garbage can as a type of buffet, so be extra aware of what goes in the trash. Be sure to keep these items away from pets. What Is Gradual Iron Toxicity? Slow, chronic iron toxicity is usually referred to as iron overload disease, ferrotoxicity, or iron buildup. While not as immediately life-threatening as acute iron poisoning, it nonetheless carries its own severe health risks. While trace amounts of iron are lost through urination and excretion, you mostly lose iron only when you lose blood. This includes menstruation, which is one reason why women have higher iron needs than men. Excess iron damages your organs and tissues and increases oxidative stress throughout your body. Hemochromatosis is a hereditary condition that can exacerbate iron toxicity. Normally, a liver hormone called hepcidin regulates the absorption, use, and storage of iron in the body. In those with hemochromatosis, a genetic mutation disrupts hepcidin, causing the body to absorb iron indiscriminately, regardless of iron status. It can increase the risk of joint issues, diabetes, liver damage, coronary issues, and reproductive abnormalities. Hemochromatosis most heavily affects people of European descent; approximately one in 10 are potential carriers of the gene that causes this disorder. Most people who carry this gene are asymptomatic, but the condition is active in about four out of every Hemochromatosis is far less common in other ethnic groups. If you have hemochromatosis, avoid iron supplements and monitor your intake of Vitamin C. High-dose iron supplements can react poorly with many types of medication. Possible interactions can occur with thyroid replacement hormones, birth control, antibiotics, blood pressure medication, and prescriptions that treat ulcers and other stomach issues. Check with a healthcare professional before starting iron supplements if you take any kind of medication,

vitamins, or supplements. Heme iron comes from animal sources, while nonheme comes from plants. Heme iron is absorbed by the body more quickly, so it is often mistakenly thought that vegans and vegetarians are more at risk for iron deficiency. Research, however, has found that those who follow a plant-based diet are no more likely to suffer from iron deficiency anemia than anybody else. Nonheme iron is associated with significantly lower rates of metabolic syndrome, heart disease, diabetes, stroke, and cancer than its meat-based counterpart. The cancer risk also increases significantly. Nonheme iron is often found in foods that contain potent antioxidants, like vitamin C. These antioxidants inhibit oxidation and terminate the chain reactions that produce free radicals. Find the Right Balance Iron is a double-edged sword. Ultimately, like many things in health and life, iron is all about finding the right balance. Try getting your iron from food sources instead of pills; this reduces the risk of overdose drastically. Food, particularly plant-based food, is the safest way to incorporate iron into your diet. Fortunately, there are plenty of excellent, plant-based, iron-rich foods. Supplementation may be beneficial in some cases, such as iron deficiency anemia or during pregnancy. If you do supplement with iron, I advise caution. Some people approach supplements with the assumption that "if some is good, then more must be better. Consult your trusted health care advisor before taking an iron supplement, and take only as directed. Never give iron supplements to a child unless under the supervision of a health care professional. A healthy adult should only need between 18 and 27 mg of iron each day. Pregnant women should aim for somewhere between 27 and 45 mg total. If you choose supplementation, be sure to do your research. Avoid elemental iron supplements. I recommend a nonheme supplement with no more than 18 mg of iron per serving. Have you had an experience with iron toxicity? How do you make sure you have the right iron balance? Let us know in the comments! References 8 " Dietary Supplement Fact Sheet: Department of Health and Human Services, 11 Feb. Oregon State University, May Department of Health and Human Services, Mar. Information and statements made are for education purposes and are not intended to replace the advice of your doctor. Global Healing Center does not dispense medical advice, prescribe, or diagnose illness. The views and nutritional advice expressed by Global Healing Center are not intended to be a substitute for conventional medical service. If you have a severe medical condition or health concern, see your physician. View Comments 2 Jeff Pearce Sr. As a side, we keep activated charcoal in the house in case of accidental poison of any sort. As always GHC, fantastic information. David Emrich Stopped taking levothyroxine for two months after liquid iodine, and ginseng potentiated thyroid supplements I was taking. Routine physical blood work showed iron deficiency anemia, and increased creatine levels. Went back on levothyroxine, but provider insisted on mg iron supplement as well. Wound up in er. Two days later, back again.

Chapter 5 : The Effect of Excess Iron in Plants | Home Guides | SF Gate

Iron toxicity can be classified as corrosive or cellular. Ingested iron can have an extremely corrosive effect on the gastrointestinal (GI) mucosa, which can manifest as nausea, vomiting, abdominal pain, hematemesis, and diarrhea; patients may become hypovolemic because of significant fluid and blood loss.

Zinc Poisoning General Discussion Heavy metal poisoning is the accumulation of heavy metals, in toxic amounts, in the soft tissues of the body. Symptoms and physical findings associated with heavy metal poisoning vary according to the metal accumulated. Many of the heavy metals, such as zinc, copper, chromium, iron and manganese, are essential to body function in very small amounts. But, if these metals accumulate in the body in concentrations sufficient to cause poisoning, then serious damage may occur. The heavy metals most commonly associated with poisoning of humans are lead, mercury, arsenic and cadmium. Heavy metal poisoning may occur as a result of industrial exposure, air or water pollution, foods, medicines, improperly coated food containers, or the ingestion of lead-based paints. Some specific examples are: The gas from arsenic also has some industrial uses. Overexposure may cause headaches, drowsiness, confusion, seizures, and life-threatening complications. Neurological symptoms include brain damage encephalopathy , nerve disease of the extremities peripheral neuropathy , pericapillary hemorrhages within the white matter, and loss or deficiency of the fatty coverings myelin around these nerve fibers demyelination. Gastrointestinal symptoms include a flu-like illness gastroenteritis that is characterized by vomiting; abdominal pain; fever; and diarrhea, which, in some cases, may be bloody. Other symptoms include breakdown of the hemoglobin of red blood cells hemolysis , a low level of iron in the red blood cells anemia , and low blood pressure hypotension. Some individuals may experience a garlic-like odor that may be detectable on the breath. In cases of chronic poisoning, weakness, muscle aches, chills, and fever may develop. The onset of symptoms in chronic arsenic poisoning is about two to eight weeks after exposure. Other symptoms include inflammation of sensory and motor nerves polyneuritis and the mucose membrane lining the throat. Inorganic arsenic accumulates in the liver, spleen, kidneys, lungs, and gastrointestinal tract. It then passes through these sites but leaves a residue in tissues such as skin, hair, and nails. Symptoms of acute inorganic arsenic poisoning include severe burning of the mouth and throat, abdominal pain, nausea, vomiting, diarrhea, low blood pressure hypotension , and muscle spasms. Individuals with severe inorganic arsenic poisoning may experience heart problems cardiomyopathy ; accumulation of acid in the tubes of the kidneys renal tubular acidosis ; breakdown of the hemoglobin of red blood cells hemolysis ; irregular heart rhythms ventricular arrhythmias ; coma; seizures; bleeding within the intestines intestinal hemorrhage ; and yellowing of the skin, mucous membranes, and whites of the eyes jaundice. The onset of symptoms may be delayed for two to four hours after exposure. Overexposure may cause fatigue, headaches, nausea, vomiting, abdominal cramps, diarrhea, and fever. In addition, progressive loss of lung function emphysema , abnormal buildup of fluid within the lungs pulmonary edema , and breathlessness dyspnea may also be present. Exposure to too much chromium may cause lung and respiratory tract cancer as well as kidney diseases. In addition, overexposure to chromium may also cause gastrointestinal symptoms, such as diarrhea and vomiting, often with blood. Lesions on the kidneys, liver, and muscular layer of the heart myocardium may also develop. Lead is stored in the bone but may affect any organ system. The effects of lead poisoning varies depending on the age of the individual and the amount of exposure. In children, symptoms vary depending upon the degree of exposure to lead. Some affected individuals may not have any noticeable symptoms. Symptoms usually develop over a three to six week time period. Lead overexposure may cause children to be less playful, clumsier, irritable, and sluggish lethargic. In some cases, symptoms include headaches, vomiting, abdominal pain, lack of appetite anorexia , constipation, slurred speech dysarthria , changes in kidney function, unusually high amounts of protein in the blood hyperproteinemia , and unusually pale skin pallor resulting from a low level of iron in the red blood cells anemia. Some affected children experience learning or behavioral problems such as mental retardation and selective deficits in language, cognitive function, balance, behavior, and school performance. In some cases, symptoms may be life-threatening. In adults, overexposure to lead may cause high blood pressure and

damage to the reproductive organs. In addition, affected individuals may experience low levels of iron in the red blood cells anemia , peripheral neuropathy, and, in some cases, brain damage encephalopathy. Lead is excreted in urine and feces. However, it may also appear in hair, nails, sweat, saliva, and breast milk. Symptoms associated with overexposure to manganese may include damage to the central nervous system and pneumonia. Additional symptoms and physical findings include weakness, fatigue, confusion, hallucinations, odd or awkward manner of walking gait , muscle spasms dystonia , rigidity of the trunk, stiffness, awkwardness of the limbs, tremors of the hands, and psychiatric abnormalities. Symptoms of mercury poisoning include fatigue, depression, sluggishness letheragy , irritability, and headaches. There may be behavioral and neurological changes associated with overexposure to mercury poisoning, such as excitability and quick-tempered behavior, lack of concentration, and loss of memory. Shock and permanent brain damage may also be result from mercury poisoning. Some affected individuals experience mental confusion. A progressive cerebellar syndrome with impaired ability to coordinate voluntary movements ataxia of the arms may also be present. Abnormal involuntary movements of the body such as uncontrolled jerky movements combined with slow, writhing movements choreoathetosis are common. Changes in mood, behavior, and consciousness may also occur. In some cases of chronic exposure to inorganic mercury a personality disorder known as erethism or mad hatter syndrome may occur. This syndrome was described in workers with occupational exposure to mercury in the felt-hat industry. Many affected individual experience sensory impairments such as visual problems e. Some individuals may experience skin changes such as painful swelling and pink coloration of the fingers and toes acrodynia ; persistent redness or inflammation of the skin erythema ; extreme sensitivity hyperesthesia of the affected areas; and tingling and sensory disturbances. Mercury is mainly excreted through the urine and feces. In addition, non-inflammatory degenerative disease of the sensorimotor nerves sensorimotor polyneuropathy may advance to progressive deterioration atrophy. In some cases, respiratory paralysis may also occur. Some individuals may experience eye symptoms including wasting away atrophy of the optic nerve optic atrophy , inflammation of the optic nerve retrobulbar neuritis , and impaired functioning of the muscles of the eyes ophthalmoplegia. Common symptoms of poisoning from these metals may include gastrointestinal, renal, and neurological symptoms, such as headaches, irritability, psychosis, stupor, coma, and convulsions. Antimony is used for hardening lead, and in the manufacture of batteries and cables. It may possibly cause lung disease and skin cancer, especially in those who smoke. Copper is used in the manufacture of electrical wires. It may cause a flu-like reaction called metal fume disease and disturbances in the blood. Lithium is used to make glasses and pharmaceuticals. Lithium may cause diseases of the stomach, intestinal tract, central nervous system, and kidneys. Overexposure to silver may cause a gray discoloration of the skin, hair and internal organs. Additional symptoms may include nausea, vomiting, and diarrhea. Overexposure to gold as in treatment of rheumatoid arthritis may cause skin rashes; bone marrow depression; stomach and intestinal bleeding; headaches; vomiting; focal or generalized continuous fine vibrating muscle movements myokymia ; and yellowing of the skin, mucous membranes, and whites of the eyes jaundice. Some cases of overexposure to nickel have been associated an increased risk of lung cancer. Overexposure to selenium may cause irritation of the respiratory system, gastrointestinal tract, and eyes; inflammation of the liver; loss of hair alopecia ; loss of skin color depigmentation ; and peripheral nerve damage. Overexposure to tin may damage the nervous system and cause psychomotor disturbances including tremor, convulsions, hallucinations, and psychotic behavior. Aluminum containers used in the manufacture and processing of some foods, cosmetics and medicines, and also for water purification. Overexposure to aluminum may cause brain damage encephalopathy. Causes Heavy metal poisoning is a result of the toxic accumulation of certain metals. Ingestion of herbicides, insecticides, pesticides, fungicides, or rodenticides containing arsenic may cause arsenic poisoning. Occupational exposure to arsenic in the manufacture of paints, enamels, glass, and metals may cause arsenic poisoning. Other forms of occupational exposure include galvanizing, soldering, etching, lead plating, smelting, and wood preserving. Arsenic is also found in contaminated water, seafood, and algae. Cadmium poisoning may be caused by ingestion of food e. Occupational exposure to cadmium in metal plating, battery, and plastics industries may also occur. Lead poisoning may be caused by exposure e. Occupational exposure to lead in painting, smelting, firearms

instruction, automotive repair, brass or cooper foundries, printing, battery manufacturing, mining, brass foundry, gasoline, glass, and bridge, tunnel and elevated highway construction may also occur. Another cause of lead poisoning is through the contamination of water from lead pipes. Additional causes of lead poisoning include calcium products, progressive hair dyes, kajal, surma, kohl, and foreign digestive remedies. Manganese poisoning may be caused by chronic inhalation and ingestion of manganese particles. Occupational exposure to manganese in mining and separating manganese ore may also occur. Mercury poisoning may be caused by exposure to large amounts of mercury in the manufacturing of thermometers, mirrors, incandescent lights, x-ray machines, and vacuum pumps. Another cause of mercury poisoning is contaminated water and fish. Children often are exposed to mercury through paint, calomel, teething powder, and mercuric fungicide used in washing diapers. Additional causes of mercury poisoning is exposure to mercury in thermometers, dental amalgams, and some batteries. Phosphorus poisoning may be caused by insecticides such as tetraethylpyrophosphate. Thallium poisoning may be caused by ingestion of rodenticides containing thallium. Thallium in pesticides, insecticides, metal alloys, and fireworks can be absorbed through skin as well as through ingestion and inhalation. Affected Populations Heavy metal poisoning can affect males and females in equal numbers, depending on exposure. Outbreaks of this type of poisoning have occurred in the United States during the past several years from imported plates and cookware that were not properly coated to prevent heavy metals from contaminating food. In the United States, lead poisoning most often affects children between one and three years old. Lead poisoning affects adults less often than children. In the last 20 years, statistics show the number of children with potentially harmful blood lead levels has dropped 85 percent. Mercury poisoning is unusual in children. There have been large outbreaks in Australia and France of bismuth poisoning. Related Disorders Symptoms of the following disorders can be similar to those of heavy metal poisoning.

Chapter 6 : CDC - NIOSH OSHA PEL Project Documentation: List by Chemical Name: IRON OXIDE (DUS

Iron toxicity means there is too much iron in the body. However, this is not as simple as it may appear. For example, I find that excess iron is in a biounavailable form, such as an oxide.

One of the more common metals to find its way into well water is iron. Iron oxides and salts found in nature may work their way into a well water supply with no obvious signs, depending on the concentration. Individuals who consume water contaminated with iron for a prolonged period may develop iron toxicity, a potentially deadly condition. Recognizing the symptoms can help catch the condition before it progresses to a more serious stage. Iron toxicity related to well water may cause headaches and dizziness, which are often accompanied by a fever. Gastrointestinal Symptoms Typically, the first symptoms of iron toxicity from well water are related to the gastrointestinal tract because iron has a corrosive effect on the lining of the stomach. Initial symptoms are usually abdominal pain and diarrhea and there may also be a metallic taste in the mouth. Nausea and vomiting are common as well and in some advanced cases individuals suffering from iron toxicity may have blood in their vomit or stool. The loss of fluids often leads to dehydration and in more extreme cases, shock. In severe instances of well water iron toxicity, liver enzymes may become elevated and liver failure may occur. As a result, jaundice can also be a symptom. Cardiovascular and Pulmonary Symptoms With continued exposure, individuals who contract iron toxicity from the ingestion of tainted well water may experience rapid breathing and fluid build-up in the lungs. The heart rate often increases as well, and blood pressure may begin to drop. The blood may also be unable to clot properly. In addition, an individual with iron toxicity often has a fast and weak pulse. Nervous System Symptoms Exposure to iron toxicity from well water may be accompanied by a headache, dizziness, fever and chills. Individuals often feel drowsy and may become unconscious. Irritability, confusion and lethargy are also common symptoms and seizures may occur. In extreme cases of iron toxicity, individuals may fall into a coma. Skin Symptoms Individuals who suffer from iron toxicity due to well water consumption may also demonstrate visible symptoms. Their skin, fingernails and lips often appear bluish due to low oxygen levels in the body. Flushing may also result, or the skin loses its color, giving it a pale appearance. In cases when iron toxicity progresses further along to affect the liver, the skin may take on a yellow cast known as jaundice.

Chapter 7 : Symptoms of Iron Toxicity | theinnatdunvilla.com

Iron poisoning is a potential cause of fatal poisoning in children younger than age 5. It first irritates the stomach and digestive tract, sometimes causing bleeding. Within hours, iron poisons the cells, interfering with their internal chemical reactions.

However, like many other nutrients, it is harmful in high amounts. In fact, iron is so toxic that its absorption from the digestive tract is tightly controlled. For the most part, this minimizes the harmful effects of excess iron. It is when these safety mechanisms fail that health issues arise. This article discusses the potentially harmful effects of consuming too much iron. Iron is an essential dietary mineral, mostly used by red blood cells. It is a crucial part of hemoglobin, a protein found in red blood cells. There are two types of dietary iron: This type of iron is only found in animal foods, mostly in red meat. It is absorbed more easily than non-heme iron. Most dietary iron is in the non-heme form. It is found in both animals and plants. Its absorption can be enhanced with organic acids, such as vitamin C, but is decreased by plant compounds like phytate. People who get little or no heme iron in their diet are at an increased risk of iron deficiency 1 , 2. Many people are iron deficient, especially women. Iron is an essential dietary mineral that plays an important role in transporting oxygen throughout the body. Iron deficiency is common among women. Regulation of Iron Stores There are two reasons why iron levels are tightly regulated within the body: Iron is an essential nutrient that plays a role in many basic body functions, so we must get a small amount. High levels of iron are potentially toxic, so we should avoid getting too much. The body regulates iron levels by adjusting the rate of iron absorption from the digestive tract. Its main function is to suppress the absorption of iron. Basically, this is how it works 4: Most of the time, this system works quite well. However, a few disorders that suppress hepcidin production can lead to iron overload. On the other hand, conditions that stimulate hepcidin formation may cause iron deficiency. Iron balance is also affected by the amount of iron in our diet. Over time, diets low in iron may cause a deficiency. Likewise, an overdose of iron supplements may cause severe iron poisoning. The rate of iron absorption from the digestive tract is tightly regulated by the hormone hepcidin. However, several iron overload disorders may disrupt this fragile balance. Iron Toxicity Iron toxicity can be either sudden or gradual. Many serious health problems may be caused by accidental overdoses, taking high-dose supplements for a long time, or chronic iron overload disorders. Under normal circumstances, very little free iron circulates in the bloodstream. It is safely bound to proteins, such as transferrin, which keep it from causing harm. However, iron toxicity can significantly increase the levels of "free" iron in the body. Free iron is a pro-oxidant - the opposite of an antioxidant - and may cause damage to cells. Several conditions may cause this to happen. Poisoning can occur when people, usually children, overdose on iron supplements 5 , 6. A genetic disorder characterized by excessive absorption of iron from food 7. A type of dietary iron overload caused by high levels of iron in food or drinks. It was first observed in Africa, where homemade beer was brewed in iron pots 8. Acute iron poisoning happens when people overdose on iron supplements. Similarly, repeated high-dose iron supplementation may cause serious problems. Make sure to follow the instructions on iron supplements, and never take more than your doctor recommends. Early symptoms of iron poisoning may include stomach pain, nausea and vomiting. Gradually, the excess iron accumulates in internal organs, causing potentially fatal damage to the brain and liver. The long-term ingestion of high-dose supplements may gradually cause symptoms similar to iron overload, which is discussed more below. Iron toxicity refers to the harmful effects of excess iron. It may occur when 1 people overdose on iron supplements, 2 take high-dose supplements for too long or 3 suffer from a chronic iron overload disorder. Iron Overload Iron overload refers to the gradual build up of too much iron in the body. For most people, iron overload is not a concern. However, it is a problem for those who are genetically predisposed to excessive absorption of iron from the digestive tract. The most common iron overload disorder is hereditary hemochromatosis. This leads to the build up of iron in tissues and organs 7 , Over time, untreated hemochromatosis increases the risk of arthritis, cancer, liver problems, diabetes and heart failure The body has no easy way to dispose of extra iron. The most effective way to get rid of excess iron is blood loss. Therefore, menstruating women are less likely to experience iron

overload. Likewise, those who donate blood frequently are at lower risk. If you are prone to iron overload, you can minimize the risk of health problems by: Reducing your intake of iron-rich foods, such as red meat. Avoiding taking vitamin C with foods that are rich in iron. Avoid using iron cookware. However, if you have not been diagnosed with iron overload, reducing your iron intake is generally not recommended. Iron overload is characterized by excessive amounts of iron in the body. The most common disorder is hereditary hemochromatosis, which may lead to many health problems. This is not a concern for most people. There is no doubt that iron overload may lead to cancer in both animals and humans 12 , It appears that regular blood donation or blood loss may reduce this risk Observational studies suggest that a high intake of heme iron may increase the risk of colon cancer 15 , Clinical trials in humans have shown that heme iron from supplements or red meat may increase the formation of cancer-causing N-nitroso compounds in the digestive tract 17 , The association of red meat and cancer is a hotly-debated topic. Although there are some plausible mechanisms explaining this link, most of the evidence is based on observational studies. Iron overload disorders have been linked with an increased risk of cancer. Studies also suggest that heme-iron may raise the risk of colon cancer. Both iron overload and iron deficiency appear to make people more susceptible to infection 19 , There are two reasons for this The immune system uses iron to kill harmful bacteria, so some amount of iron is needed to fight infections. Elevated levels of free iron stimulate the growth of bacteria and viruses, so too much iron can have the opposite effect and increase the risk of infections. Several studies indicate that iron supplementation may increase the frequency and severity of infections, although a few studies found no effects 22 , 23 , 24 , 25 , 26 , People with hereditary hemochromatosis are also more susceptible to infections For patients at a high risk of infection, iron supplementation should be a well-grounded decision. All potential risks should be taken into account. Iron overload and high-dose iron supplementation may increase the risk of infection in certain individuals. Take Home Message In short, iron can be dangerous in high quantities. However, unless you have an iron overload disorder, you generally do not need to worry about getting too much iron from your diet. Iron supplementation is another story. It benefits those who suffer from iron deficiency, but may cause harm in those who are not iron-deficient. Never take iron supplements unless recommended by your doctor.

Chapter 8 : Iron Toxicity: All You Need to Know About Iron Overdose

Helpful, trusted answers from doctors: Dr. Novick on iron toxicity in humans: Two such iron pills are not dangerous especially if you have an iron deficiency anemia. They could cause some gastric upset when taken without food however.

Symptoms may go away in a few hours, then return again after 1 day or later. This national hotline number will let you talk to experts in poisoning. They will give you further instructions. This is a free and confidential service. All local poison control centers in the United States use this national number. You should call if you have any questions about poisoning or poison prevention. It does NOT need to be an emergency. You can call for any reason, 24 hours a day, 7 days a week. What to Expect at the Emergency Room Take the container to the hospital with you, if possible. Symptoms will be treated. Tests that may done include: But, severe liver damage can occur 2 to 5 days after the overdose. Some people have died up to a week after an iron overdose. The more quickly the person receives treatment, the better the chance for survival. Iron overdose can be very severe in children. Children may sometimes eat large amounts of iron pills because they look like candy. Many manufacturers have changed their pills so they no longer look like candy. Nelson Textbook of Pediatrics. Iron and heavy metals. Concepts and Clinical Practice.

Chapter 9 : Plants Poisonous to Livestock - Cornell University Department of Animal Science

Iron poisoning occurs when a person, usually a child, swallows a large number of iron-containing pills, most often vitamins. Acute iron poisoning mainly involves children under age 6 who swallow.

She enjoys working with individuals and families, coaching and educating on health and wellness topics. Raw steak with a knife Photo Credit: Iron is naturally present in the food you eat -- it is found in some meats, plants and grains. It is also available in supplements. The recommended daily allowance is determined by gender and age. Women, especially those of childbearing age, require the most iron. However, the upper limit is 45 mg per day, according to "Visualizing Nutrition: Video of the Day Acute Iron Toxicity -- Early Symptoms There are 4 stages of acute iron toxicity, which is usually the result of an iron overdose. The first stage happens when iron is still present in the stomach and circulating in the blood. Symptoms include abdominal pain, nausea, vomiting and diarrhea. The lining of the intestine can become damaged, leading to blood in the vomit or stool. Irritability and lethargy may also occur. If the toxicity is severe, rapid heartbeat, low blood pressure and rapid breathing may develop. As the body loses fluid and blood, a person may go into shock, in which the heart is unable to pump a sufficient amount of blood throughout the body. According to the Merck Manual Professional Edition, if shock and coma develop within the first 6 hours after iron ingestion, there is a 10 percent chance of dying. Acute Iron Toxicity -- Late Symptoms People who survive the first stage of acute iron toxicity may appear to improve for a while. This latent period is the second stage and can happen within 6 to 48 hours of an iron overdose. Symptoms of the third stage of iron toxicity include low blood pressure, fever and seizures. Liver failure may occur, causing low blood sugar, excessive or prolonged bleeding and jaundice -- yellowish eyes and skin. It is rare for people with such severe iron toxicity to survive, but those who do enter the fourth stage. During this stage, the intestines may become blocked due to scarring, which prevents fluids and food from moving through the digestive tract. Chronic Iron Toxicity Chronic iron toxicity, also known as iron overload, has a variety of causes. Hereditary hemochromatosis is an inherited condition that leads to abnormally increased absorption of iron from food. Iron overload may also be caused by repeated blood transfusions to treat anemia, excessive iron therapy or liver disease due to chronic hepatitis C or alcoholism. As excessive iron accumulates in the body, it may result in liver or heart failure, as well as severe diabetes. Heart failure can cause swelling of the legs, shortness of breath, trouble exercising, fatigue, fast or irregular heartbeat and nausea. Diabetes symptoms include frequent urination, increased thirst and hunger, fatigue, blurry vision, numbness or tingling in the arms or legs and slow wound healing. When to Seek Medical Care Iron toxicity is a medical emergency. If you are taking an iron supplement and have unexplained symptoms that are similar to those of acute or chronic iron toxicity, seek medical care immediately.