IRON DEFICIENCY ANEMIA (IDA)

Created by Students in the Entry to Practice Doctor of Pharmacy Program at the University of British Columbia

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We sincerely thank all community members and healthcare providers in Fort St. John who generously shared their experiences, insights, and feedback.

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NOTE: The following information was created by UBC pharmacy students. Only general information is provided on this topic and is subject to change. Please consult with your pharmacist or health care provider for any client-specific questions.

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IMPORTANCE OF IRON

Iron is an essential trace mineral present in all tissues. It plays many roles, including:

- hemoglobin synthesis (making red blood cells)
- cellular metabolism (DNA synthesis, generation of energy)
- oxygen transport from the lungs to tissues
- oxygen use and storage in muscles

Overall, a reduced supply of iron in developing red blood cells results in an insufficient supply of iron to all tissues in the body.

Behind the Counter Iron Supplement Products*

GENERIC	BRAND	DOSAGE FORM & STRENGTH	PHARMACARE COVERAGE
ferrous sulfate (contains 20% iron)	Enfamil Fer-In-Sol®	Drops: 75 mg/ml Syrup: 150 mg/5 ml	Full
	Ferodan®	Syrup: 150 mg/5 ml Drops: 75 mg/ml	Full
	Pediafer™	Oral solution: 30 mg/5 ml	Full
	Ferrous sulfate	Tablets: 300 mg	Full
ferrous fumarate (contains 33% iron)	Palafer®	Capsules, tablets: 300 mg Suspension: 20 mg/ml	Partial
	Ferrous fumarate	Suspension: 60 mg/ml	No
ferrous gluconate (contains 11.6% iron)	Ferrous gluconate	Tablets: 300 mg	Full
heme iron polypeptide	Proferrin®	Tablets: 11mg elemental iron	No
polysaccharide-iron complex	Feramax®	Capsules: 150 mg elemental iron Powder: 15 mg elemental iron per dose (¼ teaspoon)	No

Prescription Iron Supplement Products

GENERIC	BRAND	DOSAGE FORM & STRENGTH	PHARMACARE COVERAGE
ferric derisomaltose (iron isomaltoside)	Monoferric®	Injection solution: 100 mg/ml	Requires Special Authority**
iron sucrose	Venofer®	Injection	Requires Special Authority**
iron sodium ferric gluconate	Ferrlecit®	Injection	No

Requires Special Authority** - Additional documentation required by your physician for partial/full coverage

DAILY IRON INTAKE

- Men >19 years old: 8mg iron/day
- Non-pregnant, non-lactating women 19-50 years old: 18 mg/day
- Women ≥ 51 years old: 8 mg/day
- **Note:** The iron requirement may be almost twice as much in female adults who eat a purely vegetarian diet, due to poorer absorption of non-heme iron.

Vegan Iron Supplement Products***

GENERIC	BRAND	SUITABILITY	COST
ferric pyrophosphate microencaps	Ferosom® Forte	Adults looking for a gentle iron. Contains Vitamin C to enhance iron absorption.	$
iron pyrophosphate	allKiDz® Vegan Iron Liquid with No Added Sugars	Toddlers and children looking to increase their iron intake and avoid gut-related side effects	$
ferric pyrophosphate	Herbaland Vegan Iron Gummies with Folate, B12 and B6	Adults or children looking to avoid gut-related side effects. Those who cannot or prefer not to swallow pills. Anyone looking to improve their B vitamins intake simultaneously to Iron	$
iron bisglycinate	Now® Vegan Iron Bisglycinate Capsules	Adults looking to avoid gut-related side effects and is on a budget looking for a very affordable product	$ (least expensive)
ferrous bisglycinate chelate	Naturelo® Vegan Iron Capsules with Vitamin C	Adults looking for a gentle iron and is gut-sensitive to iron supplements	$
polysaccharide-iron complex	Feramax®	Adults	$$

$: 0.19 - 0.46 CAD per unit
$$: 0.86 CAD per unit

*"Behind the counter" indicates products that are accessed with the assistance of a pharmacist or pharmacy employee. Please see Appendix 1 & 2 for more information about these products.

***These products may need to be ordered. Contact your local pharmacy to check on availability. Consult with your pharmacist for product selection.

DIETARY CONSIDERATIONS

- **Heme iron:** Most easily absorbed and is present in foods such as:
  - Meat, poultry, and fish
- **Non-heme iron:** Not as easily absorbed and is present in foods such as:
  - Eggs, beans, whole grains, dark green vegetables and nuts
- Iron absorption is further enhanced by **vitamin C–rich** foods, such as:
  - Red, yellow and green peppers, broccoli, kiwi fruit, and oranges
- **Note:** In Canada, iron must be added to certain food products like white flour and meat substitutes. Check the ingredient list to see if iron has been added to a packaged food.

DRUG INTERACTIONS

The following example medications can reduce the absorption of iron, leading to reduced efficacy.

Space these medications by at least 4 hours between taking iron supplements:

- Calcium-containing products (antacids, dairy products, calcium supplements)
- Proton-pump inhibitors (pantoprazole, omeprazole, esomeprazole)
- Thyroid medications (levothyroxine)
- Antibiotics (tetracycline, ciprofloxacin)
- Anti-Parkinson medications (levodopa, entacapone, methyldopa)
- Phosphate binders

IDA

A depletion of the body's iron stores, characterized by low iron levels, low hemoglobin (a protein that carries oxygen from the lungs to the rest of the body), and low mean corpuscular volume (MCV - a measure of the average size of red blood cells)

CAUSES OF IDA

- Most commonly caused by menstrual blood loss in females (losses from 12-30mg/month) and gastrointestinal blood loss (e.g. peptic ulcers, hemorrhoids, gastric irritation, etc.) in males
- Increased need for iron, such as during pregnancy
- Inadequate iron consumption through food
- Decreased absorption - may be seen in patients with Celiac disease or a history of gastric bypass surgery
- Iron loss from bleeding or injury

IRON CONSIDERATIONS

Taking iron supplements can have side effects such as nausea, diarrhea, constipation, and dark stools. In such cases, you can try the following but speak to your pharmacist or physician as well.

- Take iron with meals (however, can decrease iron absorption) or before bed.
- Use lower doses or take iron every other day
- Switch to another product with lower iron content
- Liquid formulations of iron can stain your teeth. To avoid this, try using a straw or brushing your teeth after taking the supplement

POPULATIONS AT RISK FOR IDA*

*Barton et al. 2020

- Higher in Hispanics and Blacks compared to Whites and Asians populations
- Higher in women (any race/ethnicity group) 25-54 y/o compared to those >55 years old
- Higher in women of reproductive age

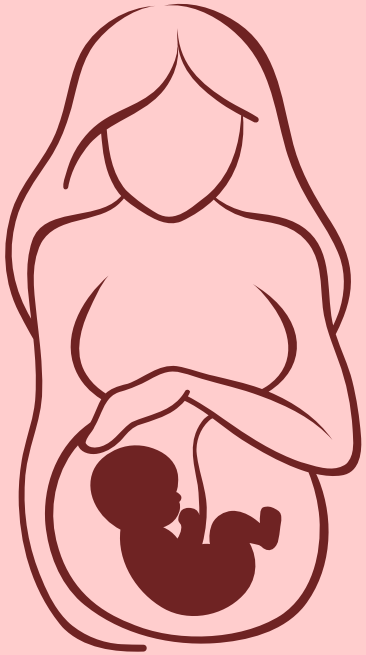
SYMPTOMS OF IDA

- Tiredness
- Shortness of breath during activity
- Craving ice, dirt, or other non-food items
- Headache
- Cold intolerance
- Pale and/or dry skin
- Hair loss
- Brittle nails

WHEN WILL IRON START WORKING

It usually takes around 3-10 days for oral iron supplements to start working (this time can be shortened if an injectable iron is used). However, you need to take iron for an additional 3-6 months after your deficiency is corrected to help replenish the stores of iron in your body. Lab work may be required to confirm iron levels.

IDA IN PREGNANCY



A healthy woman needs 27mg of iron from food everyday during pregnancy, and around 10mg of iron during lactation

IMPORTANCE OF IRON

Iron is a crucial mineral to prevent negative outcomes for the pregnant mother and fetus/infant. Correcting moderate/severe (Hgb <100 g/L) anemia before delivery is warranted to avoid complications.

Pregnancy Outcomes of IDA

- Need for blood transfusion
- Heavy bleeding after delivery
- Infection
- Depression
- C-section (surgical delivery)

Fetus/Infant Outcomes of IDA in pregnant mother

- Low birth weight
- Preterm delivery
- Poor overall physical condition
- Iron deficiency at birth

IRON INFUSION

Oral iron is usually the first choice, but iron infusion might be more efficient in correcting IDA in the following scenarios (except in 1st trimester):

- Advanced gestational age (>35 years old)
- Symptomatic IDA
- Malabsorption syndromes (e.g. active inflammatory bowel disease, or gastric-bypass surgery)
- Side effects of oral iron are intolerable
- Oral iron did not improve IDA (don't worry too much if your ferritin did not increase after oral therapy as it takes time for it to go up)
- When the physician believes the benefit of iron infusion outweighs the risk of side effects and the added financial cost of infusions.

SCREENING

BC Ministry of Health and Perinatal Services BC recommend screening of IDA in everyone who is:

- preconception, in their 1st trimester
- breastfeeding
- has symptoms of IDA

Discuss with your doctor if your ferritin is below 100 ug/L, and start a supplement when it's below 30 ug/L. Once you have started supplementing iron, continue for 3-6 months after delivery or when ferritin returns to normal.

DIAGNOSIS

	Hemoglobin (Hgb) concentration (g/L)	
Pregancy Trimesters	Moderate anemia	Severe anemia
1st*	70-99	<70
2nd**	70-94	<70
3rd*	70-99	<70

*Normal Hgb: 110 g/L **Normal Hgb: 105 g/L

Ferritin* (ug/L)**	**Status**
<30	Deficiency
30-50	Depletion
>100	Normal

***Ferritin is the preferred test in pregnancy

IDA IN PRE-OPERATIVE PATIENTS

WHO SHOULD BE TREATED

- Ferritin <30 ug/L, OR
- Ferritin <30 - 100 ug/L, Transferrin Saturation (TSAT) <20%, and with inflammation including autoimmune disease, inflammatory bowel disease, infections, chronic kidney disease, cancer, and heart failure.

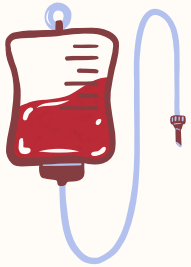
SPECIAL CONSIDERATIONS

For patients whose surgery is not urgent, it is recommended to start oral iron at least 6 weeks before the surgery.

Iron infusions can be considered when:

- The patient cannot tolerate the side effects of oral iron
- Oral iron did not correct anemia
- The surgery is urgent

***Iron infusions are generally administered at special clinics or in hospital by trained staff**



COMPLICATIONS OF IDA

Correcting IDA before surgery can prevent possible complications, such as:

- Difficulty thinking and recalling memory
- Weakened immune system
- Increased risk of death after surgery
- Increased risk of requiring a blood transfusion
- Slower healing or recovery time
- Extended hospital stay

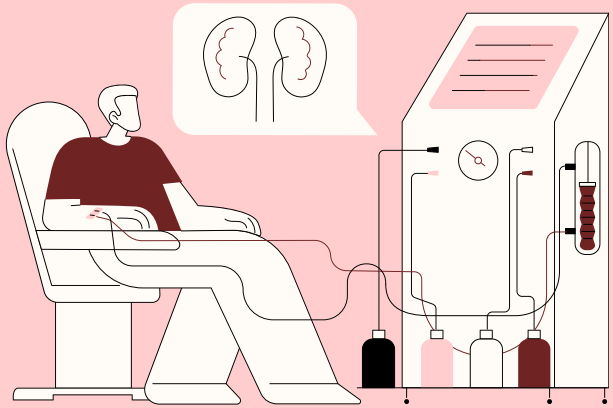
BENEFIT OF IRON SUPPLEMENTS

Treating IDA beforehand can lead to better health outcomes in patients awaiting surgeries.

- Giving iron infusions to patients with IDA can lower the need for blood transfusion*
- Iron infusions usually allow patients to get out of the hospital sooner*

*Froessler et al., 2016

IDA IN DIALYSIS PATIENTS

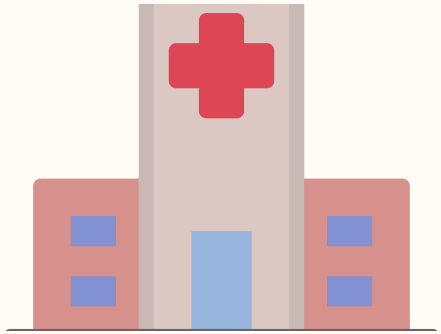


Resource for healthcare providers

COMPLICATIONS

Anemia of chronic kidney disease (CKD), if left untreated, can lead to serious health consequences such as:

- Cardiovascular events
- Increased mortality
- Increased hospitalization
- Decreased quality of life



TREATMENT ALGORITHIM

To access the BC Renal anemia protocols, please click the hyperlinks below*:

- CKD Non-Dialysis Anemia Management Protocol
- Peritoneal Dialysis Anemia Management Protocol
- Hemodialysis Anemia Management Protocol

***See Appendix 3 for URL access**

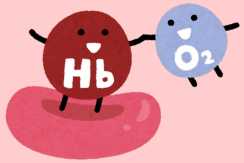
DIAGNOSIS*

Age of the patient with CKD	Hemoglobin concentration (g/L)
>15 years old	<130 in males <120 in females
12 - 5 years old	<120
5 - 12 years old	<115
0.5 - 5 years old	<110

*Based on the KDIGO Clinical Practice Guideline for Anemia in Chronic Kidney Disease

TREATMENT TARGETS

Hemoglobin concentration
95 - 115 g/L



TSAT
22 - 49%

GENERAL IDA FAQ

Q: How is IDA treated?
A: Treatment depends on the cause and severity and can include eating an iron-rich diet, taking iron supplements (oral or IV) and treating the underlying cause.

Q: When should I take my iron supplement?
A: For best absorption, iron should be taken on an empty stomach, 1 hour before or 2 hours after a meal, taken with vitamin C, and avoided with milk, tea, coffee and calcium supplements.

Q: Why should I take my supplements with Vitamin C?
A: Vitamin C helps increase iron absorption by creating an acidic environment, which prevents oxidation of iron.

Q: Will I always have to take iron?
A: Not necessarily. Once iron levels are restored, supplementation may be stopped. However, your doctor may recommend ongoing monitoring and blood work if the risk is high.

IDA IN PREGNANCY FAQ

Q: Why does anemia happen in pregnancy?
A: Your body needs more iron to support the growing baby and increased blood volume. If you are not getting enough iron through food or supplementation, then iron stores drop, leading to anemia.

Q: What are the risks of anemia during pregnancy?
A: It can increase the risk of preterm birth, low birth weight, fatigue, postpartum depression and complications during delivery.

Q: Is iron safe for my baby?
A: YES! Treating anemia ensures the baby gets enough oxygen and nutrients to grow well.

Q: Will I need to continue iron supplements after delivery?
A: Possibly. Blood loss during delivery can worsen anemia. Healthcare providers should check levels after birth and recommend treatment based on lab results.

PREOPERATIVE IDA FAQ

Q: What happens if I do not treat my iron deficiency before surgery?
A: Your body may not carry enough oxygen to recover well, and this may cause you to feel more tired after surgery, heal more slowly, or need a blood transfusion during the procedure. Treating sooner will give your body the strength to recover.

Q: Can I skip iron if my surgery is soon?
A: Even short-term treatment can help. Intravenous (IV) iron works quickly and can raise levels within 1-2 weeks. Talk to your health care provider to see what is most suitable for you.

Q: Can I eat more iron-rich foods instead of taking supplements?
A: Eating iron-rich food is helpful, but it is not enough to raise your levels quickly before surgery. Supplementation or IV iron is often needed.

Q: Can I stop taking iron if I feel better?
A: No, keep taking it until your doctor or pharmacist says it's okay to stop.

IDA IN DIALYSIS PATIENTS FAQ

Q: Why do people with kidney disease get anemia?
A: The kidneys make a hormone (erythropoietin) that helps the body make red blood cells. When kidneys are damaged, there is a decrease in this hormone.

Q: Will I always need iron?
A: Many dialysis patients need regular iron infusions, especially if taking in conjunction with erythropoiesis-stimulating agent (ESA) injections. ESA is an injectable medication that stimulates red blood cell production in the kidneys.

Q: Why do I need IV iron instead of pills?
A: In CKD, your body does not absorb iron well from food or some pills. IV iron may work faster and be more effective.

Q: How often do I get iron on dialysis?
A: You might need small maintenance doses weekly or larger doses depending on your bloodwork and laboratory values.

Q: What if my hemoglobin is still low after getting iron?
A: You may need a higher dose of ESA, or another cause of anemia may need to be investigated.

For further questions regarding IDA, please contact your pharmacists or healthcare provider

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Appendix 1: Behind the Counter Iron Supplements

Generic	Brand	Dosage Form and Strength	PC Coverage	Plan W Coverage	Cost/count (CAD)	Suitability and Considerations	Dietary considerations
ferrous sulfate (contains 20% elemental iron)	Enfamil Fer-In-Sol®	Drops: 75mg/ml Syrup: 150mg/5ml	Full	No	$$ (per 250 mL)	Inexpensive and well-absorbed (best on an empty stomach), associated with gastrointestinal side-effects See the "Iron Considerations" section for symptom management	K
	Ferodan®	Syrup: 30mg/ml* Drops: 75mg/ml	Full	No, Yes*	$$ (per 250 mL)		
	Pediafer™	Oral solution: 15mg/ml*, 30mg/5ml	Full	No, Yes*	$$ (per 50 mL)		
	Ferrous sulfate	Tablet: 300 mg	Full	Yes	$		V
ferrous fumarate (contains 33% elemental iron)	Palafer®	Caps: 300mg Suspension: 60mg/5mL*	Partial	No, Yes*	$$ (per 100 mL)		Capsules contain gelatin
	Ferrous fumarate	Tabs: 300mg*	No	Yes*	$		
ferrous gluconate (contains 11.6% elemental iron	Ferrous gluconate	Tablet: 300 mg	Full	Yes	$		V
heme iron polypeptide	Proferrin®	Tabs: 11mg elemental iron	No	No		Can be taken with or with food	Contains animal products
polysaccharide-iron complex	Feramax®	Caps: 150mg elemental iron Powder: 15mg elemental iron per dose (¼ teaspoon)	No	No	$$		Capsules: K,H Powder: V

Abbreviations:
PC - Pharmacare **Plan W** - First Nations Health Benefits **V** - Vegetarian **Vg** - Vegan **K** - Kosher **H** - Halal

Appendix 1: Behind the Counter Iron Supplements (Continued)

Generic	Brand	Dosage Form and Strength	PC Coverage	Plan W Coverage	Cost/count (CAD)	Suitability	Dietary considerations
ferric pyrophosphate microencaps	Ferosom® Forte	Caps: 30 mg iron (elemental) + 70 mg Vitamin C	No	No	$	Adults who have not tolerated other iron products. Contains Vitamin C to enhance iron absorption.	Vg
iron pyrophosphate	allKiDz® Vegan Iron Liquid with No Added Sugars		No	No	$	Toddlers and children needing to increase their iron intake and avoid gut-related side effects	Vg
ferric pyrophosphate	Herbaland Vegan Iron Gummies with Folate, B12 and B6		No	No	$	Adults or children looking to avoid gut-related side effects. Those who cannot or prefer not to swallow pills. Anyone looking to improve their B vitamins intake simultaneously with Iron	Vg
iron bisglycinate	Now® Vegan Iron Bisglycinate Capsules		No	No	$ (Least expensive)	Adults looking to avoid gut-related side effects and a very affordable product	
ferrous bisglycinate chelate	Naturelo® Vegan Iron Capsules with Vitamin C		No	No	$	Adults who have not tolerated other iron supplements	Vg

Abbreviations:
PC - Pharmacare **Plan W** - First Nations Health Benefits **V** - Vegetarian **Vg** - Vegan **K** - Kosher **H** - Halal

Appendix 2: Prescription Iron Supplements

Generic	Brand	Dosage Form and Strength	Pharmacare Coverage
ferric derisomaltose (iron isomaltoside)	Monoferric®	Injection solution: 100 mg/ml	Requires Special Authority
iron sucrose	Venofer®	Injection	Requires Special Authority
iron sodium ferric gluconate	Ferrlecit®	Injection	No

Appendix 3: Clinical Guideline Weblinks for Healthcare Providers

CKD Non-Dialysis Anemia Management Protocol:

http://www.bcrenal.ca/resource-gallery/Documents/CKD_Non-Dialysis-Anemia_Management_Protocol.pdf

Peritoneal Dialysis Anemia Management Protocol:

http://www.bcrenal.ca/resource-gallery/Documents/Peritoneal_Dialysis_Anemia_Management_Protocol.pdf

Hemodialysis Anemia Management Protocol:

http://www.bcrenal.ca/resource-gallery/Documents/Hemodialysis_Anemia_Management_Protocol.pdf