



Ts'ewulhtun Health Centre & H'ulh-etun Health Society

# Best Practices Iron Initiative

Promoting iron health during pregnancy  
and beyond

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# Objectives

Review, discuss and share information on:

- ❑ Prevalence of iron deficiency and anemia [IDA]
  - ❑ Role of iron in health
  - ❑ Impact of iron deficiency and IDA; especially in pregnancy and young children
  - ❑ Current interventions & recommendations
  - ❑ Communication strategies to consider
  - ❑ Overview of resources
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# Why focus on iron deficiency?

- **High rates of iron deficiency anemia [IDA] in Aboriginal population**

- “profound anemia we find most often in our First Nations clients”  
*Dr. M. Watt, local family physician, 2010*
  - ~ prevalence of anemia in Aboriginal populations ranges from 14 - 50% [significant variation amongst communities]...  
*Christofides et al, 2005*
  - Aboriginal infants and children have iron deficiency prevalence rates much higher (11-50%) than reported in non-Aboriginal children (3-7%)  
*Cited in Verrall et al, 2005*
  - Ts’ewulhtun/McGill Study- assessed dietary iron intake of 3-11 month old infants; one third of the infants (7-11 mths) did not meet the recommendations for daily iron intake
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# Why is iron important?

It affects growth, development and performance of all

- Essential at every stage of life
    - Makes red blood cells
    - Carries oxygen (via hemoglobin) to all parts of the body
    - Contributes to normal energy metabolism
    - Associated with neurodevelopment and synthesis/uptake of neurotransmitters
    - Increased demands: pregnancy, growth and infection
  - Supports
    - Healthy pregnancy and delivery
    - Healthy growth & development, especially healthy brain and motor skill development in infants
    - Healthy immune system
    - Learning ability
    - Work capacity
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**A nine month old baby  
needs more *iron* than an  
adult man!**

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# How much?

Recommended Dietary Allowance (RDA) for Iron (Daily)		
Age (years)	Male (mg)	Female (mg)
Infants (7 - 12 months)	11 ←	11 ←
1-3	7	7
4-8	10	10
9-13	8	8
14-18	11	15
19-49	8 ←	18
Over 50	8	8
Pregnancy	/	27
Breast-feeding under 19	/	10
Breast-feeding 19-50	/	9

□ See HealthLink BC Nutrition Series 68c *Iron and Your Health*

# Who's at risk?

- Women

- Significant needs during ages 14-50 years
- Recent study found majority of Canadian women (ages 19-50) do not consume the recommended amount of iron (18 mg/day)

- Pregnant Women

- Most common nutritional deficiency during pregnancy
- Increased requirements during pregnancy (27 mg/day)
- Screening at first prenatal visit



## Who's at risk? (con't)

- Premature babies
- Infants (0 - 24 months)
- Toddlers/Young children
- Teens/Adolescents
- Vegetarians
- Low income families
- People with chronic diseases
- Regular blood donors
- Certain post-operative patients
- Endurance athletes





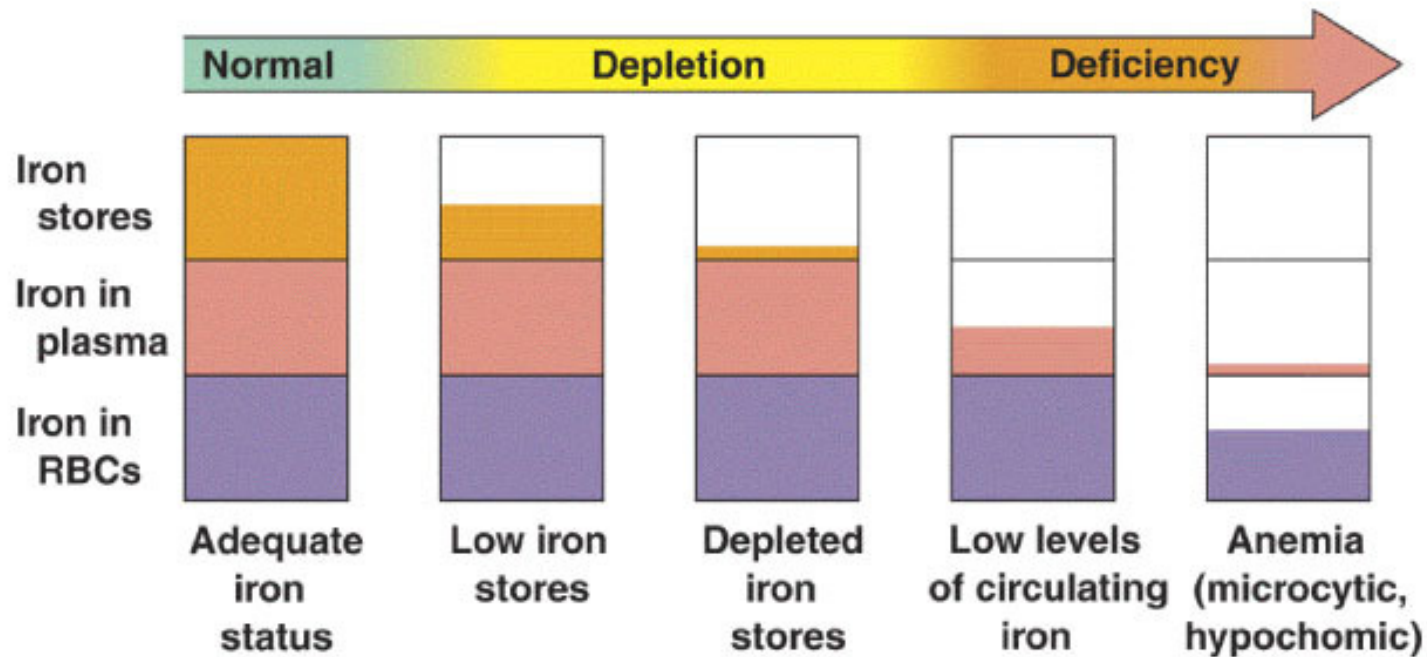
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# What is iron-deficiency and anemia (IDA)?

- **IDA** is identified by checking **hemoglobin** levels in the blood\*
  - **Iron depletion or changes in iron status** (check serum **ferritin**) can be gradual no symptoms to overt symptoms:
    - Tired and weak (fatigue)
    - Feeling short of breath (i.e. climbing stairs or working out)
    - Pale skin
    - Rapid/fast heart beat [tachycardia]
    - Irritable/depressed
    - Decreased appetite
    - Dizzy or light-headed/ headaches/poor concentration
    - Increased infections
  - **Untreated:**
    - decreases exercise or work performance
    - poor pregnancy outcomes
    - developmental delays in infants
    - impaired ability to fight infection
  - Symptoms can be difficult to notice in infants; “good baby”
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# Stages of Iron Deficiency

- Iron status occurs on a continuum



- Iron status or stores are monitored by checking serum ferritin
- **IDA** is identified by checking **hemoglobin (Hb)** levels in the blood\*

# Stages of Iron Deficiency

<p><b>Stage 1: Iron depletion</b></p> <p>Iron stores marginally depleted; no functional changes</p>	<ul style="list-style-type: none"> <li>■ <b>Hb</b>- normal</li> <li>■ <b>Serum Ferritin</b>- Adults &lt; 15 <math>\mu\text{g/L}</math> Children &lt;12 <math>\mu\text{g/L}</math></li> </ul>
<p><b>Stage 2: Iron deficiency</b></p> <p>Iron stores exhausted; RBC production limited.</p> <p>Mental/cognitive impairments, reduced physical activity/capacity and immunity.</p>	<ul style="list-style-type: none"> <li>■ <b>Hb</b>- normal</li> <li>■ Transferrin Saturation- low (&lt;12%)</li> <li>■ Total Iron Binding Capacity (TIBC)- elevated</li> <li>■ <b>Serum Ferritin</b>- &lt;12 <math>\mu\text{g/L}</math></li> </ul>
<p><b>Stage 3: Iron deficiency anemia</b></p> <p>Physiological function impaired; hemoglobin synthesis and RBC production altered- hypochromic and microcytic!</p> <ul style="list-style-type: none"> <li>□ HCT and MCV - low</li> </ul>	<p><b>Hb <u>below</u> normal:</b> male &lt;130 g/L female &lt;120 g/L pregnancy &lt;110 g/L*</p> <ul style="list-style-type: none"> <li>■ IDA can be categorized as: <ul style="list-style-type: none"> <li>□ Mild Hb- 95-110 g/L</li> <li>□ Moderate Hb 80-95 g/L</li> <li>□ Severe Hb &lt;80 g/L</li> </ul> </li> </ul>

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# Iron Indices in Pregnancy

- **75% of anemia in pregnancy is IDA**
  - In 1<sup>st</sup> trimester associated with preterm and LBW baby
- **Pregnancy values for Hb**
  - 1<sup>st</sup> trimester: <110 g/L (6.8 mmol/L)
  - 2<sup>nd</sup> trimester: <105 g/L (6.5 mmol/L)\*
  - 3<sup>rd</sup> trimester: <110 g/L

\*Lowest Hb concentration at 24-32 weeks but rises toward term; accounts for normal hemodilution/blood volume expansion

- **Serum Ferritin - “banked” iron stores; HB can be normal until stores are depleted**
    - < 15  $\mu\text{g/mL}$  = body iron depletion
    - 15-30  $\mu\text{g/mL}$  = small iron reserves (210-240 mg)
    - > 70  $\mu\text{g/mL}$  = ample iron reserves ( $\geq 500$  mg)
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# Treating IDA...depends on what's causing it!

- **Inadequate intake of iron in the diet**
  - **Increased demand (i.e. growth spurts; pregnancy)**
  - **Increased losses (i.e. menstruation or gradual loss of blood from the intestinal tract)**
  - **Impaired absorption or lower RBCs production**
    - Presence of inhibitors of iron uptake, including drug interference (i.e. antacids)
    - Injury to the upper small intestine (duodenum/jejunum)
    - Bone marrow is not producing enough RBCs:
      - Anemia related to chronic illness such as arthritis or kidney disease
      - Chemotherapy
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## Most common cause of IDA is not getting enough iron in the diet

- **Most at risk: infants, toddlers, teens** [females and males], **pregnant women, low income families**
  - Promote and support exclusive breastfeeding to 6 months
  - Introduction of iron-fortified or iron-rich complementary solid foods, starting at 6 months
  - Feed 4-5 meals per day
  - Encourage diversification of the diet to enhance iron intake; include traditional foods where feasible
    - **Promote enhancers/limit inhibitors**
  - During pregnancy, diet not enough to replenish depleted or low iron stores
    - **Need prescribed iron supplement or introduce need for IV iron**
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# Choosing Dietary Sources of Iron

- Bioavailability of iron impacts absorption

- There are two types of iron:

- Heme:**

- Found in meat, poultry and fish
      - Provides 1/3 of total daily iron that the body absorbs
      - Average~15-35% absorption; not affected by dietary factors

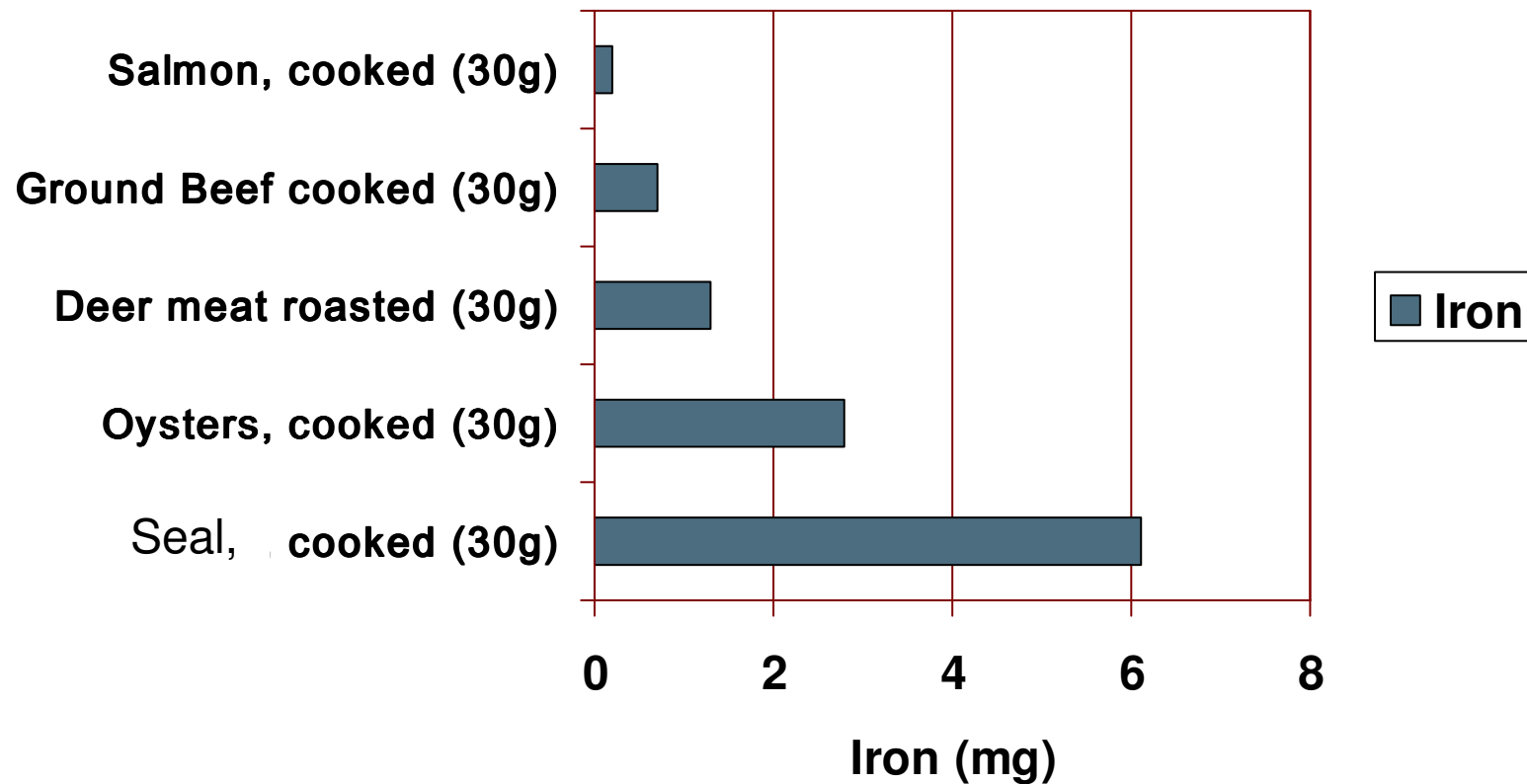
- Non-Heme:**

- Majority of the dietary iron we eat: eggs and plant-based foods such as legumes, vegetables, fruits, grains (i.e. bread and pasta) and iron-fortified cereal products, nuts and seeds
      - Only 3-10% absorption; affected by enhancing or inhibitory dietary factors
      - Including Vitamin C-rich fruit/vegetables with meals can double or triple iron absorption; reduces ferric ( $\text{Fe}^{3+}$ ) to ferrous( $\text{Fe}^{2+}$ )

Refer to HealthLinks BC Nutrition Series File #68d Iron in Foods

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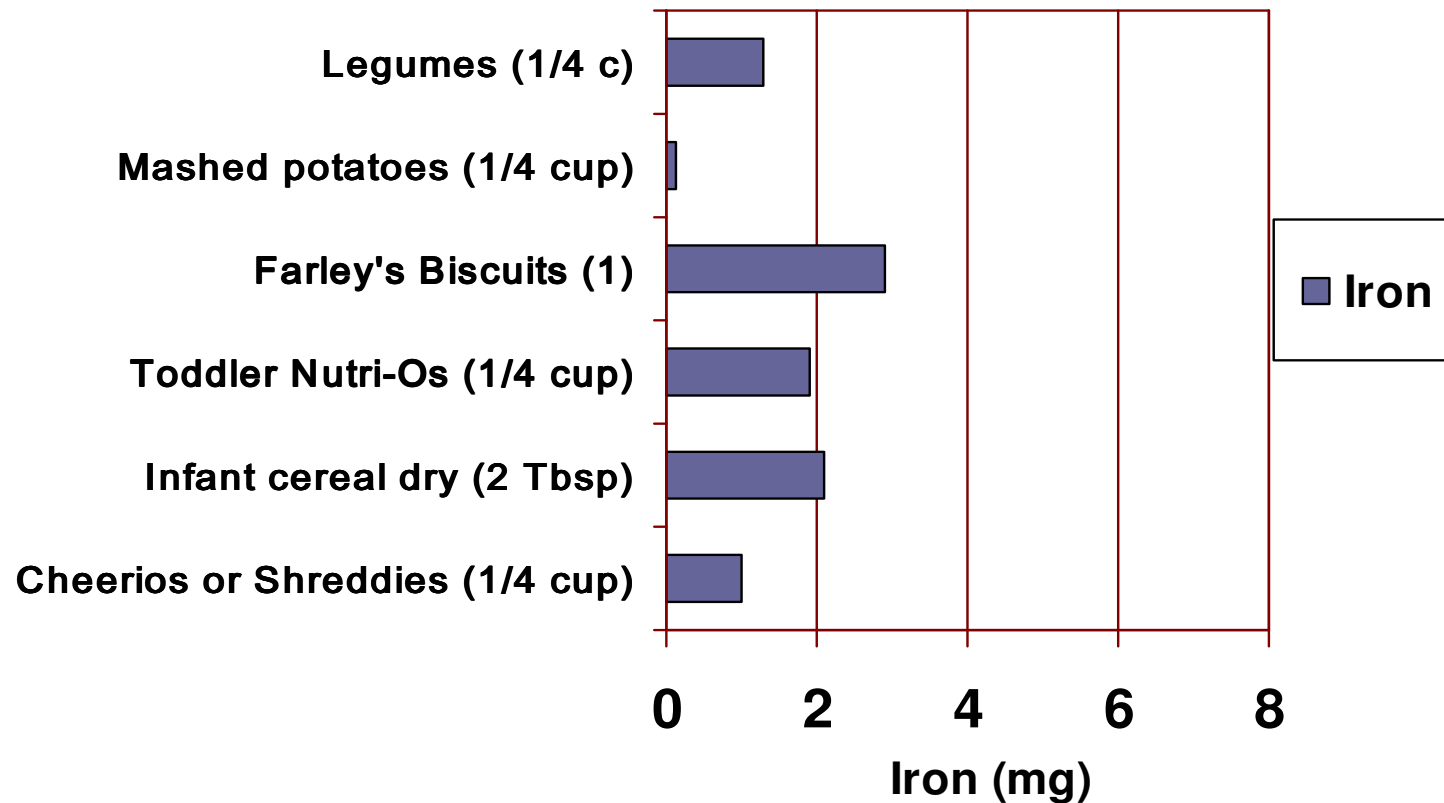
## Examples of animal sources of iron



Sources: CPNP, Health Canada IDA Campaign, 2004 (modified)



# Examples of plant food sources of iron



Sources: CPNP, Health Canada IDA Campaign, 2004



# Starting with iron-rich complementary foods at 6 months

- Suggested iron-rich first foods to popular first foods offered to infants; initially use semi-solid texture

HEME IRON SOURCES	Suggested Iron-rich First Foods	Popular First Foods
	Beef, Lamb, Pork	Infrequently offered at this time
	Game (caribou, bison, deer)	
	Poultry: chicken, turkey	
	Fish	
NON- HEME IRON SOURCES	Iron fortified single grain infant cereal	Iron fortified <u>single</u> grain infant cereal
	Cooked legumes-beans, peas, lentils	Vegetables (squash, peas, green beans)
	Soybeans	Fruit (low in iron; high in Vit C)
	Tofu	
	Cooked egg	

# Absorbing iron from dietary sources

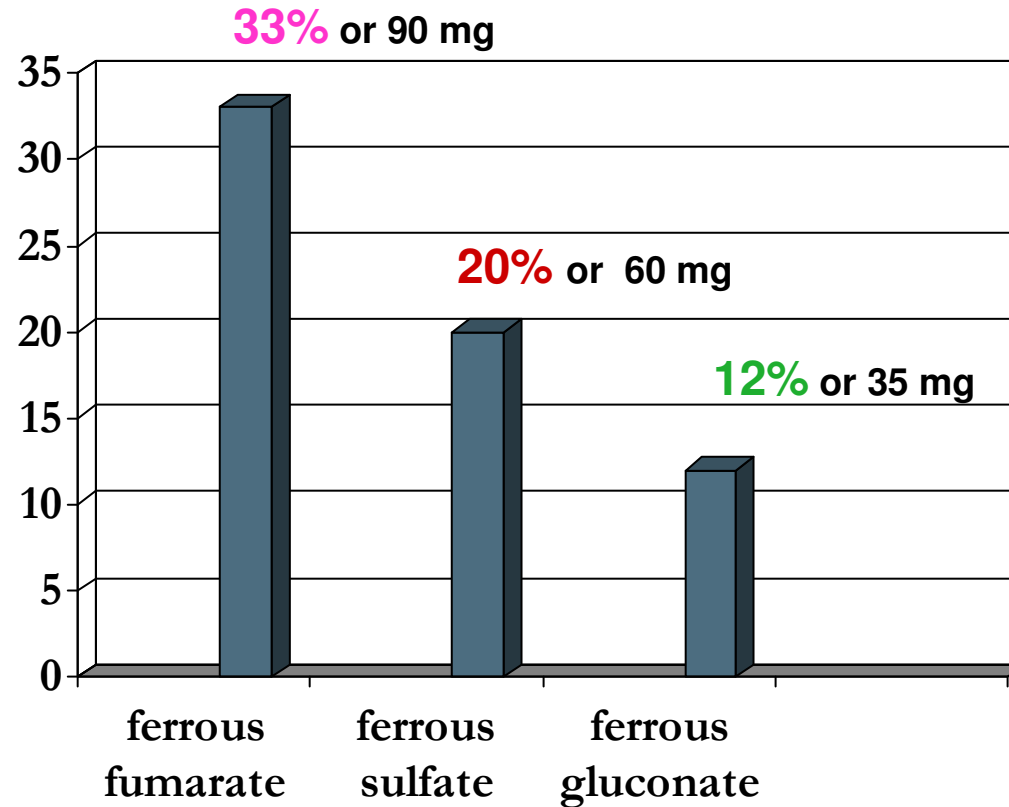
- Improving **non-heme** iron absorption:

Enhancers	Inhibitors
<b>Vitamin C- rich foods</b> 	<b>Polyphenols</b> <ul style="list-style-type: none"><li>coffee, tea (tannins), herbal teas, cocoa-containing beverages taken within 1 hour of meals</li></ul>
<b>Meat, poultry or fish</b> [MFP factor] 	<b>Phytates</b> <ul style="list-style-type: none"><li>legumes (dried peas, beans, lentils), grains, rice, soybeans</li></ul>
	<b>Oxalates</b> <ul style="list-style-type: none"><li>spinach, chard, beet greens, rhubarb, sweet potato</li></ul>
	<b>Calcium</b> intake at levels >300 mg

- Our bodies will typically absorb ~18% of iron from a mixed iron diet (heme and non-heme) with Vitamin C-rich foods

# Iron Supplements

Percent Elemental Iron in Iron supplements [300 mg tablets]

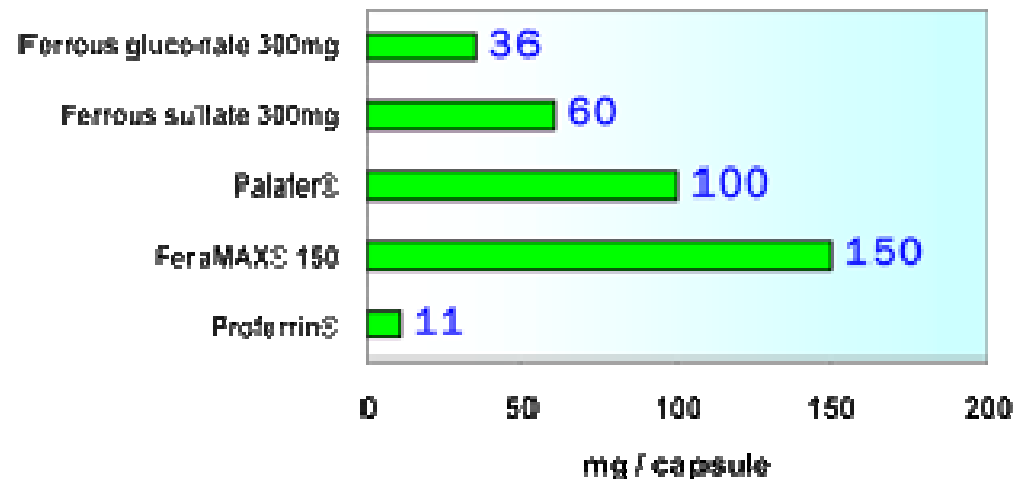


**NOTE:** Always keep iron supplements out of reach of children

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# Iron Supplements

Elemental Iron (mg) in Iron supplements [300 mg tablets]



**NOTE:** Always keep iron supplements out of reach of children

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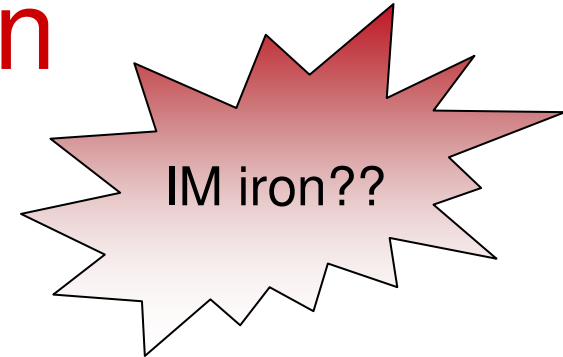
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# Communication Strategies

- Uptake of iron supplements
    - **Early Individual counseling:**
      - Promote the benefits of iron
      - Be upfront about possible side affects (SEs)
      - Encourage follow up with providers
      - Explain how to get supplements and their proper storage
    - **Follow up**
      - Within first 4 days ensure taking iron pills daily and discuss SEs
      - Again at one or two weeks, when they start to feel better
      - One month when supply may run out; emphasize need to take supplement for several months to replete iron stores [monitor serum ferritin]
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# Indications for I.V. Iron

- Alternative to transfusion for severe IDA
- Intolerance or non-compliance with oral iron
- Anemia of chronic disease/inflammation



- **Protocol**

- Iron sucrose infusion (200 mg per infusion)
- 3-5 infusions (at least 3 days apart)
- 2<sup>nd</sup> and 3<sup>rd</sup> trimester only when:
  - < 5 g/L increase in Hb after two weeks oral iron supplementation
  - Profound IDA: Hb <90 g/L beyond 14 weeks
  - IDA in third trimester: Hb <110 g/L
- **Hold** iron supplements during IV treatments
- **Re-start** iron supplements after last infusion to continue to maintain or replete iron
- **Benefits:** faster increase in Hb and repletion of body stores of iron.

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# Communication Strategies (con't)

- Promoting food based approaches with adults
    - Eating breakfast-
      - Ready to eat cereals are among the top contributors to iron, folate, Vit A, Vit C and zinc intakes
    - Eating fruit and vegetables high in Vitamin C
    - Delay drinking tea/coffee with meals
    - Strong support for Mom to breast-fed
    - Ensure follow up with parent/cargivers re: infant feeding practices
    - Promote homemade baby food and family meal preparation skills
  - Iron supplements ...after pregnancy (need to replete iron stores!)
  - IV iron protocol (need to re-start iron supplements after infusions complete)
  - Match iron health follow up with immunization schedule
  - Improve communication between providers, including follow up on intervention outcomes
  - OTHER...
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# Baby Vaccines

For Babies Born Dec. 1, 2008 & after



## Baby's Age

## Vaccines Baby will Receive

2 months

Infanrix-Hexa  
Pneumococcal Conjugate  
Meningococcal C Conjugate



4 months

Infanrix-Hexa  
Pneumococcal Conjugate

6 months

Infanrix-Hexa



12 months

Measles, Mumps, Rubella  
Meningococcal C Conjugate  
Varicella  
Pneumococcal Conjugate

18 months

Measles, Mumps, Rubella  
Dapt/IPV/Hib



Kindergarten

Dapt/IPV

**Ask about Iron and Vitamin D supplements!**

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# Opportunities to tackle IDA

- Enhance existing programs and create new awareness with community members and staff
- Opportunity to develop culturally sensitive resources with messages about promoting iron health
  - Share best practices within and with other communities
  - Emphasis on **primary prevention** with children; educate caregivers/staff about the difference they can make
  - Engage the family and community
  - A case for **screening**\* ....if anything, consistently follow up!
  - Improve integration & access to a full spectrum of services for members

\* Canadian Task Force on the Periodic Health Examination finds there is fair evidence to recommend that all high risk infants should be screened at nine months of age.

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# Resources

## ■ Websites:

- [www.healthlinkbc.ca](http://www.healthlinkbc.ca)

HealthLinkBC File #68c Iron and Your Health

HealthLinkBC File #68d Iron in Foods

- [www.beefinfo.org](http://www.beefinfo.org)

- [www.bcfoodsafety.ca](http://www.bcfoodsafety.ca)

- [www.dialadietitian.org](http://www.dialadietitian.org)

- [www.bcguidelines.ca/gpac/alphabetical.html](http://www.bcguidelines.ca/gpac/alphabetical.html)

2010 Guidelines for the investigation & management of ID for all ages

- [www.hc-sc.gc.ca/fn-an/alt\\_formats/hpfb-dgpsa/pdf/pubs/guide-prenatal-eng.pdf](http://www.hc-sc.gc.ca/fn-an/alt_formats/hpfb-dgpsa/pdf/pubs/guide-prenatal-eng.pdf)

2009 Prenatal Nutrition Guidelines for Health Professionals-concise summary document with key messages on iron for pregnant women

- [www.hc-sc.gc.ca/fn-an/nutrition/infant-nourisson/index-eng.php](http://www.hc-sc.gc.ca/fn-an/nutrition/infant-nourisson/index-eng.php)

Infant feeding guidelines for healthy term infants; watch this site for the latest recommendations.

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# Resources (con't)

## OTHERS:

- ❑ **First Nations Health Council** [Society] *Traditional Food Facts Sheets* and *Healthy Food Guidelines for First Nations communities*.  
[www.fnch.ca/index.php/community\\_engagement/document\\_tools/](http://www.fnch.ca/index.php/community_engagement/document_tools/)
  - ❑ **Better Together** this website contains recent research on “eating together= eating better”; resources and ideas focused on family, food and fun. [www.bettertogether.ca](http://www.bettertogether.ca)
  - ❑ **The Micronutrient Initiative** focuses on WHO food fortification, supplementation, advocacy, information, research and development.  
[www.micronutrient.org](http://www.micronutrient.org)
  - ❑ **The Manoff Group** provides global health and nutrition education/training materials, social marketing and communication strategies as well as other publications on reducing iron deficiency. [www.manoffgroup.com](http://www.manoffgroup.com)
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# Unlock the potential of children and families with Iron

**Iron** helps bring out the best in a child's development, learning and future!

**Childhood is a stage of rapid growth and development.**

**High iron** needs for:

- brain development
- better physical motor skills & energy to play
- emotional development and learning
- a healthy resistance to infections



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# Con't

- **Strive to prevent a problem.**
    - **Eating foods rich in *iron*, helps children explore, play, and learn more!**
      - ***Be on the look out for “Good Baby Syndrome”***

Babies or children with low iron or IDA can be quiet, sleepy, more hesitant and less curious
  - **From infants to elders, iron health is a family affair!**
    - **Individuals or families (with good *iron* health) thrive, with more energy to take part in programs and activities together!**
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**Iron** health is a family affair!



# Contact Information:

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