I have no disclosures of financial or other conflicting interests to make.

Objectives

1. Define the term *functional foods*
2. List at least 3 nutrients essential for good milk production
3. Name 2 foods that have research support for their galactogogue properties

Can what we eat make a difference?

Background
Nutrients
Cultural Foods
Placental Extract
Lactogenic Drinks
Wisdom from the dairy?
Fats
Malunggay

The Assumptions:

Today’s mother is so well-nourished that we don’t have anything to worry about

Good nutrition is good for breastfeeding but it isn’t *that* important

Nutrition: a historical approach

Most traditional societies view foods as part of their health strategy
Women have always had traditional foods for reproduction, and especially for milk production
Experience based- little research
Foods vs Herbs:

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“It is well known that diet has a profound effect on lactation and that the satisfactory secretion of milk is only possible in the presence of certain known dietary factors in adequate quantities.”
– Folley, 1938

“Insufficiency of food must produce insufficiency of milk.”
– Routh, 1879, p.57

Foods that have a potentially positive effect on health... are generally considered to offer additional benefits that may reduce the risk of disease or promote optimal health...
– MayoClinic.com

Foods

Wisdom of the ages...

Wisdom: Trouble shooting problems

Governing Rationales
Poor diet affects gut health → immune system → infections/mastitis → decreased production
Poor diet affects gut health → nutrient uptake → inadequate substrates → decreased production

Nutrients associated with good milk production and composition

Proteins

Essential building blocks


Edozie, J Nutr 1976. “...supplement was fed to lactating women to raise the protein content of their energy adequate diet from 25 or 50m to 100mg/d... Amount of milk secreted... increased significantly.”

Donnen, Trop Med & Int’l Health, 1997. Results in a situation where protein rather than energy deficiency occurs show that supplementation during lactation is...unlikely to increase breast-milk output.

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Iron
Anemia is a risk factor for low supply
Henly et al, Birth, 1995. “study results suggest that anemia is associated with the development of insufficient milk....”
Toppere et al, Indian J of Ped, 1994. “low PRL, low serum iron and ferritin levels.... Were associated w/significantly increased risk of deficient lactation”
Mathur et al, Indian Pedr, 1992. “out of 4 cases of complete lactational failure, 1 had severe anemia w/hypoproteinemia...”
O’Connor, British J Nutr, 1988. Impact of maternal iron deficiency on quality and quantity of milk ingested by neonatal rats. Lower fat content of milk needed more milk to compensate

Iodine
Essential for proper thyroid function
-Thyroid directly affects pituitary, prolactin, oxytocin

Good Fats/Omega-3s
Affect fat composition

Nutrition: Can fats be manipulated?
Dairy Research: inducing milk fat depression
➢ Diets high in simple carbs and low roughage/fiber (including chopped)
➢ Diets high in PUFAs (polyunsaturated fatty acids)
➢ TFAs (Trans fatty acids) >pattern of trans isomers, was related to low roughage
➢ Biohydrogenation theory- certain conditions result in fatty acids that inhibit milk fat synthesis (Griinari 2001) -Trans-10, cis-12 CLA (conjugated linoleic acid)

Fats: human research
Mixed results of CLA supplementation on milk fat content
BUT
Reg margarine vs low TFA margarine vs butter
➢ TFAs matter for lean women
➢ Obese women pull from fat stores
Manipulation of mat’l diet for infant... Hatherly 1994

B-Complex
Part of building blocks of milk synthesis
Sure, B. Dietary requirements for fertility and lactation, J of Nutr, 1941. Rat study: “Lactation factor...may properly be described as associated with B complex.”

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Lactogenic Foods for Milk Production

Calcium


Calcium/Magnesium

- When supply seems to dip around time of period
- May be related to lower calcium levels
- 1500mgCa/750mgMg daily
- Start mid-cycle, continue through period

Patricia Gima IBCLC

Zinc

“Zinc deficiency during lactation rapidly reduced maternal blood plasma zinc concentration and caused an impairment in milk production which was specifically due to the lack of zinc rather than to inanition.”


Provide iron, vitamins, fiber

Nutrition: More Wisdom from the dairy

Roughage

- Manipulated for milk volume, cream content

Galactogogue property found in polysaccharide* in barley plant, appears to increase prolactin

Koltzekko 2000; Farnsworth

Barley *Hordeum vulgare*

*Nguyen, US patent 4948785, 3/14/90. Plant polysaccharide fractions inducing prolactin in mammals

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Lactogenic Foods for Milk Production

Quinoa

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Amount</th>
<th>DV (%)</th>
<th>Nutrient Density</th>
<th>World’s Healthiest Foods Rating</th>
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<tbody>
<tr>
<td>Magnesium</td>
<td>1.37 mg</td>
<td>18.1</td>
<td>47</td>
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</tr>
<tr>
<td>Phosphorus</td>
<td>5.52 mg</td>
<td>1.95</td>
<td>24</td>
<td>good</td>
</tr>
<tr>
<td>Iron</td>
<td>1.14 mg</td>
<td>2.34</td>
<td>good</td>
<td></td>
</tr>
<tr>
<td>Fiber</td>
<td>5.2 g</td>
<td>12.7</td>
<td>very good</td>
<td></td>
</tr>
<tr>
<td>Protein</td>
<td>7.37 g</td>
<td>19.4</td>
<td>good</td>
<td></td>
</tr>
</tbody>
</table>

“Special soaked grain preparations of high mineral content—particularly millet and quinoa—were fed to lactating women to increase milk supply.” -Fallon, 1999

Oats

- High in iron, fiber
- Listed as a galactogogue in botanical surveys

Properties:
- Antidepressant
- Antianxiety
- Diuretic
- Thyroid/pituitary supportive

Abu-Rabia, 2005: Herbs as a Food and Medicine Source in Palestine

Acharya 2010: Traditional Knowledge on medicinal plants used for the treatment of livestock diseases in Sarkikhola VDC, Kaski, Nepal

Cultural Favorite Foods

Quaker Oats

Oats/Oatmeal (proteins, vitamins, minerals and trace elements)

Sesame seed, Tahini

Calcium

Cultural Favorites


Lentils

High in fiber, protein, iron, B-1, folate, magnesium

Green papaya (B) Carica papaya

Traditional use across Asia, frequently in soups
Vitamins & minerals including C, A, B, & E
Must be hard, unripe, then cooked
Or can be taken as supplement
Caution for women taking warfarin or allergic to latex

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Seaweed soup
Colocasia amboinicus Lour (Bataknese traditional soup)

Chicken soup
(calcium)

Coleus amboinicus Lour

Torbangun soup
Tinola soup
Chicken, green papaya, malunggay leaves

Cultural Foods

Torbangun research

Three groups of 25 each (Moloco reference)
Moloco+B-12 (placental extr 15mg, B-12 20μg) 1 TID
Torbangun soup- 150g leaves/day of soup
Fenugreek capsules – 1 600mg cap TID
30 day supplement started day 2, 60 day tracking

Reported results:
- Fenugreek group ↑ 20%
- Moloco group up ↑ 10%
- Torbangun ↑ 65%

Damanik, 2006

Beer: Myth or Fact?


Hops (B) Humulus lupulus

Properties
Diuretic
Estrogenic & Bust-enhancement
Considered sedating
Lactogenic ability tested, not proven; does not stimulate prolactin
Caution: do not use too much or for too long; contraindicated w/depression

Brewers Yeast Saccharomyces cerevisiae

One-celled fungus used to make beer
Good source of many B-Vitamins, but not B-12.
May help with fatigue, depression, irritability
Rat lactation studies in 30's & 40's
Some recent dairy studies show increase in milk yield, milk fat

"Proposed complex method of hypogalactia treatment does not exclude possibility of simultaneous use of the such products as walnuts (when there is no allergy to them), brewer yeast, etc that are commonly used for the stimulation of lactation....." Zeits 1990

Cultural Favorite Drinks

Green drinks- reputed to increase fat in milk. May include barley-grass, malt, alfalfa leaf, spirulina, kelp, oat-straw, etc.
- Chlorophyll supplements

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Cultural Favorite drinks

*Barley Water*

½ cup barley in 3 cups water overnight  
Or Boil 20 min  
Strain  
Pour 1 cup over 1 tsp fennel seeds &  
steep 30 min  
Can sweeten with cinnamon

*Barley Water*

Coffee substitutes

Common ingredient:  
*Barley*

Malunggay *moringa oleifera*  
also known as drumstick, horseradish tree, kelor

Properties: highly nutritive, estrogenic  
✓ Found in the Philippines, India, AF  
✓ Increases prolactin  
✓ Decreased T4→T3 conversion in rats, may not be good w/hypoT  
Tahiliani 2000


Goal: Increased milk in early postpartum to reduce early supplementation

RCT. Enrolled pg women >35wks; gave placebo placebo or Prolacta (malunggay leaves) 350mg Z T3 ni birth. No bfg first 2d - Pumped at 6th hr then q4hrs to 46th

Potential risks noted: some toxicity of root extract-hepatic; anti-fertility, oxytotic from roasted seeds


RCT trial: 40 mothers who delivered <37wks with baseline milk volume <100mL on day 2. *No dosage info or PRL results available in abstract*

<table>
<thead>
<tr>
<th></th>
<th>Milk volume day 7</th>
<th>Milk volume day 14</th>
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</thead>
<tbody>
<tr>
<td>Metoclopramide</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Domperidone (best)</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Malunggay</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Pumping only</td>
<td>4</td>
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Double-blind RCT, (BP>140/90) pg moms 28-40 wks gestation. Caps given after delivery then q12hrs for 4 months

30 hypertensive 15 placebo

15 Malunggay caps (Natalac)

Similar distribution of gestational age at birth in both groups, but more IUGR in M group

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**Lactogenic Foods for Milk Production**


Mothers delivering infants <37 wks
*No other maternal or fetal issues
37 Controls
31 Malunggay 250mg q12 hours starting on day 3
Pumped q4hrs

| Subjects: 82 full term moms for single-blind RCT |
| Dosage: 2 x 350mg (moringa or flour) daily day 3pp for 8 days |
| Method: Mothers used manual pump q4hrs for >5 minutes |
| *Did not say if babies nursed |

*Interesting comment: The state of the prolactin receptors number and degree of sensitivity to stimulation are said to be the controlling factor in the amount of breastmilk rather than the amount of serum prolactin. After age 35, these receptors become less sensitive to stimulation. Increased number of receptors is found among multiparous women.*

**Espinosa-Kuo, C. (2005). A randomized controlled trial on the use of Malunggay (Moringa oleifera) for augmentation of the volume of breastmilk among mothers of term infants.**

| Subjects: health exclusively bfg mothers |
| Design: Double blind RCT |
| Dosage: 250mg (Natalac or placebo) either once or twice daily |
| Outcome measurement: infant weight and length gain |
| Mothers used manual pump q4hrs for >5 minutes *Did not say if babies nursed |
| Results: In one month, average infant weight increase was 59% for one of capsule Natalac and 72% for 2 capsules daily. |

Interesting comment: Length and weight are valid outcome measurements until 6 months of age, after which genetic factors begin to exert their effect.

**Co & Co (2002). A comparative study on the efficacy of the different galactagogues among mothers with Lactational Insufficiency.**

| RCT trial: 40 mothers who delivered <37wks with baseline milk volume <100mL on day 2. No dosage info or PRL results available in abstract |

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Interesting mother reports...

Pig’s feet

Lactogenic spices

• FIRST line of defense for milk production is frequent & effective milk removal
• Lactogenic Foods support milk production in the context of good management
• Lactogenic Foods are NOT a substitute for good management
• Lactogenic foods can help increase milk supply for some women
• Lactogenic foods are low risk and nutritively beneficial

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