When breastfeeding is *not* contraindicated

Jack Newman, MD, FRCPC

Formula = Breastmilk?

Jack Newman, MD, FRCPC

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A *crucial* question

- Is infant formula really very near to, or almost like breastmilk?
  - If it is, it is difficult to explain any health risks to artificial feeding
  - But is it really very near to or almost the same as breastmilk?
  - No!
  - Even now, formula is only superficially similar to breastmilk
  - *There is no question about this!*

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Is formula almost like breastmilk?

- How can it possibly be?
  - We don’t really know what is in breastmilk
  - There is no such thing as a *standard* breastmilk
  - Even the formula companies admit that not all babies need exactly the same stuff
  - And, of course, will use this notion to market their formulas (special formulas for special babies)
  - While, at the same time convincing us that formula is *virtually the same as* breastmilk
  - But *different* and better than the formulas of their competitors, which are also virtually the same as breastmilk

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Quote from: *Travels in Hyperreality* by Umberto Eco

- ...the American imagination demands the real thing and, to attain it, must fabricate the absolute fake;

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Breastmilk varies

- From woman to woman
- Depending on the baby's gestational age
- With the mother's diet
- With the time of day
- With the length of time after birth
- During a single feeding
- With which breast is offered first
- With the time of the mother's menstrual cycle
- With the number of previous pregnancies
- Depending on how the milk is obtained
**Diurnal variation of breastmilk**

- **Nitrogen**
- **Fat**
- **Lactose**

**Variation in fat content during a single feeding**

**Variation in lysozyme over 18 months**

**But...**

**One sample is not enough**


**Number of consecutive sampling days required for each woman to obtain a stable estimate**

<table>
<thead>
<tr>
<th>Element</th>
<th>95%</th>
<th>90%</th>
<th>80%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iron</td>
<td>11</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>Zinc</td>
<td>3</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Copper</td>
<td>10</td>
<td>5</td>
<td>2</td>
</tr>
</tbody>
</table>
What is an adequate sample?

- We don’t know this either
  - Many old studies (upon which we still rely) used “dripped milk”
  - Is pumped milk the same as that which the baby gets when he’s on the breast?

The formula fed baby needs more and more with increasing age and weight

- We now know that the breastfed baby is getting less than we previously thought, much less than the formula fed baby
- The exclusively breastfed, well gaining 5 month old is getting only, at most, 10-15% more milk than the exclusively breastfed, well gaining 1 month old, even though the 5 month old is twice as heavy

Really? Is that possible?

- See: Kent, J.C., Mitoulas, L.R., Cox, D.B., Owens, R.A. and Hartmann, P.E. Breast volume and milk production during extended lactation in women Experimental Physiology 1999;84:435-447
  - During this period of exclusive breast-feeding, 24 h milk production from each breast remained relatively constant (453.6 ± 20.1 g, nb = 48), and storage capacity was 209.9 ± 11.0 ml (nb = 46)
  - They compared milk production by the mother between 1 and 6 months of age

Colostrum is a wonderful fluid

- More Na, K, Cl, protein, fat-soluble vitamins
- More minerals
- Rich in immunoglobulins, especially SIgA
- Rich in cells (100,000-5,000,000 leukocytes per ml)
- Higher percentage of fat is docosahexaenoic, arachidonic and linolenic acids

In addition, colostrum...

- Facilitates establishment of L. bifidus flora in GI tract
- Facilitates expulsion of meconium
- Is the best “treatment” for preventing hypoglycaemia and hyperbilirubinaemia
So why leave out all the other important ingredients?

A double standard?
- There is a lot of blah blah blah about what's missing in breastmilk
  - But we don't talk much about what's missing in formula
  - Maybe because it would take all day

What's missing in breastmilk?
1. Iron?
   - No, there is just the right amount of iron in breastmilk
   - Together with the stores the baby gets at birth, probably there is enough to keep the baby iron sufficient for up to 6 to 9 months
2. Vitamin D?
   - The breastmilk does not need to supply vitamin D

Getting free vitamin D (Toronto in February)

What’s missing from formula?
- What about colostrum?
- Where do I buy Similostrum?
- Enfalostrum?
- Good Startostrum?
Which formula is closest to which colostrum?

Breastmilk varies with the length of time after birth; consider this email

- I had a call today from a woman whose sister who is a drug user delivered a baby today. The baby remains in hospital and is being treated for drug withdrawal. The mother has abandoned the infant and the baby will be cared for by an aunt. My question is this: the caregiver wants to breastfeed this newborn as she is still nursing her own 11 month old. Is her milk appropriate for this infant or should the baby be supplemented at breast as well?

So, should this baby be supplemented with formula?

- Why?
  - In what way does formula become more appropriate for supplementing colostrum than the milk of a mother who is breastfeeding an 11 month old?
  - There we go again, believing formula is a good copy of breastmilk
  - What age was the calf whose mother provided the milk to make the formula?

Table 1. Biochemically active substances in human milk.

<table>
<thead>
<tr>
<th>Hormone</th>
<th>Colostrum</th>
<th>Mature milk</th>
<th>IL-1α/γ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Somatotropin</td>
<td>TSH</td>
<td>IL-1α/γ</td>
<td></td>
</tr>
<tr>
<td>THF</td>
<td>IL-4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dopamine</td>
<td>IL-6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Growth hormone</td>
<td>IL-8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NPY</td>
<td>IL-6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TSH</td>
<td>Other cytokines</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FSH</td>
<td>TNF-α</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Progesterone</td>
<td>TNF-α</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thyroxine</td>
<td>TGF-α</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thyroid</td>
<td>RANTES</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calcitonin</td>
<td>GROα</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PARATHYROID</td>
<td>CCK</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adrenal</td>
<td>Prostaglandins</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insulin</td>
<td>Cyclosporine A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Epinephrine</td>
<td>Cytokines regulating factors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GABA</td>
<td>GM-CSF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Glucagon</td>
<td>IL-13</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Somatostatin</td>
<td>M-CSF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Growth factors</td>
<td>Interleukin 6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IGF</td>
<td>Interleukin 13</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EGF</td>
<td>Interleukin 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NGF</td>
<td>Interleukin 8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HGF</td>
<td>Interleukin 10</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

White cells?
Table 2. Cellular composition of human breast milk

<table>
<thead>
<tr>
<th>Cell type</th>
<th>Percentage*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cell number/mL</td>
<td>10^9 to 10^10 (colostrum), 0.6 x 10^9 (mature milk)</td>
</tr>
<tr>
<td>Polymorphonuclear cells</td>
<td>Approximately 85%</td>
</tr>
<tr>
<td>Macrophages</td>
<td>Approximately 15%</td>
</tr>
<tr>
<td>Lymphocytes</td>
<td>4% (1-15)</td>
</tr>
<tr>
<td>T lymphocytes</td>
<td>80% of lymphocytes (80-85)</td>
</tr>
<tr>
<td>CD4+ T</td>
<td>40% of lymphocytes (10-85)</td>
</tr>
<tr>
<td>CD8+ T</td>
<td>35% of lymphocytes (11-70)</td>
</tr>
<tr>
<td>HLA DR+</td>
<td>80% of T lymphocytes (56-94)</td>
</tr>
<tr>
<td>CD45RO+</td>
<td>&gt;95% of T lymphocytes</td>
</tr>
<tr>
<td>CD103+</td>
<td>70% of T lymphocytes (81-93)</td>
</tr>
<tr>
<td>CD45RA+</td>
<td>65% of T lymphocytes (82-85)</td>
</tr>
<tr>
<td>γδ T lymphocytes</td>
<td>11% of lymphocytes (1-26)</td>
</tr>
<tr>
<td>B lymphocytes</td>
<td>&lt;2% of lymphocytes</td>
</tr>
<tr>
<td>Natural killer cells</td>
<td>3-4% of lymphocytes</td>
</tr>
<tr>
<td>Eosinophils</td>
<td>&lt;3%</td>
</tr>
<tr>
<td>Epithelial cells (fragments)</td>
<td>Present in mature milk.</td>
</tr>
</tbody>
</table>

*Percentages represent the means (range of the results of several different studies).""
If the mother has autoimmune disease, can she pass on illness to the baby in through antibodies in her milk?

1. The predominant immunoglobulin in human milk is secretory IgA, but there is no evidence that secretory IgA is a pathogenic antibody in autoimmune disease
2. In any case, secretory IgA is not absorbed via the gastrointestinal tract
3. There is no evidence that IgG in human milk is absorbed into the circulation of the infant
4. IgM also excluded from the infant's circulatory system

Formula contains the same amount of protein as breastmilk

- Breastmilk contains 8 to 15 g/L of protein
- This is somewhat less than most formulas (most contain 15 g/L or more)
- But:
  - Up to 60-65% (about 5 g/L) of the protein in breastmilk is lactoferrin, which is not absorbed from the gut!
  - About 0.5 g/L of the protein is immunoglobulin, which is also not absorbed from the gut!
- Formula contains way too much protein
What about S100B protein?

- S100B is an acidic calcium-binding protein of the EF-hand family, characterized by the most common calcium binding motif of a helix-loop-helix structure
- Whatever that means
- It may be important to brain development
- Present in much higher concentrations in breastmilk than in formula (and higher in mature breastmilk than in colostrum)

Yogurt closest to breastmilk?

So what’s this all about?

Stem cells in breastmilk

- See:

Is it good or bad?

- If this is formula, it’s neither good nor bad
- If it’s breastmilk, it’s probably good, but why?
  - Breastmilk is full of immune factors (and not just immunoglobulins)
  - The immune factors line the babies upper respiratory tract and upper gut, likely protecting the baby against infection
  - So if the baby aspirates breastmilk?
  - formula=breastmilk?
That's nice, but does it make a difference to the baby?

- You bet it does!
- The studies are all there, it's just that so many people prefer not to believe them because they don't like to believe them
  - As soon as one study comes out doubting the results of many studies, we hear "You see? Formula is just as good!"
  - Studies showing risks of formula are never as well done as studies showing no risk...

A Perfect Example

- Many did not believe that the long chained polyunsaturated fatty acids in breastmilk could make babies "smarter"
- Maybe they don't
- But when the formula came out with their new formula, I have heard pediatricians have said "Now formula is just as good as breastmilk"
- Long chained PUFA's make babies smarter only when they are in formula?
- Check out Mead Johnson's website for the "breastmilk formula--Enfamil": Grossly unethical marketing!

In fact...

- No evidence that simply adding DHA and ARA to formula gives the benefit it's supposed to
  - These PUFA's need to be added in correct proportions, and they are not absorbed from formula in the same way as they are from breastmilk
  - Studies do not support any benefit when added to formula

Oh, and one more thing formula is missing...

- Breastfeeding!
- How could I forget that?
- Because in the mind of the average person in an industrialized society...
  - Bottle feeding=Breastfeeding
How breastfeeding helps prevent adult heart disease
- Ravelli AC et al. Infant feeding and adult glucose tolerance, lipid profile, blood pressure, and obesity Arch Dis Child 2000;82:248-52

How breastfeeding helps to prevent adult cardiac disease

Formula: a heavy metal cocktail
- Too much aluminum
- Cow milk formula 100x
- Soy formula up to 2000x
- Too much manganese
- Too much lead
- Too much cadmium
- Too much iron

Too much...
Recalls of infant formulas

- 1978
  - Enfamil contaminated with *E. coli*

- 1979
  - SMA recalled (improper homogenization)
  - Neomulsoy and CHO free caused hypochloremic alkalosis

- 1980
  - Soyalac contained too much Vitamin D
  - Enfamil recalled (sour, green, curdled)

Recalls (continued)

- 1981
  - Enfamil recalled (excess solvents)

- 1982
  - SMA, Nursoy recalled (lack Vitamin B6)
  - SMA recalled (contained black material)
  - SMA had bad odor and fat separated

Recalls (continued)

- 1983
  - Soyalac recalled (problem with Vitamin A stability)
  - Naturlac recalled (absence thiamine, copper, Vitamin B6)
  - Similac, Isomil found to contain carcinogens (trichloroethylene and parchorethylene)

Recalls (continued)

- 1984
  - Neo-Ag-U (Taiwanese) deficient in calcium
  - De-lact Infant found to contain calcium calceinate (believed dangerous for infants)
  - Enfamil contains *Enterobacter cloacae*
Recalls (continued)

- 1985
  - Kama-Mil recalled (deficient folic acid, zinc and Vitamin D)
  - Nutra-Milk recalled (nutrient deficiencies)
  - Gerber meat-based formula recalled (excess Vitamin D)
  - Carnation evaporated milk in Australia mislabeled

- 1986
  - Soylac recalled (progressive degradation of Vitamin A)

- 1993
  - Soylac and Enfamil recalled in Canada (bacterial contamination)
  - Labeling error on Similac

FDABALERTS
PUBLIC REGARDING RECALL OF POWDERED INFANT FORMULA

AN IMPORTANT MESSAGE FROM NESTLÉ CANADA

Dear Parents,

By now you may have heard about the recall of some of our infant formula products. At Nestlé we hold ourselves to high international standards of quality to ensure your continued trust and confidence in our brands and our company. As President and CEO of Nestlé Canada, I made this decision as a responsible manager.

We apologize for the worry and inconvenience this has undoubtedly caused. The extensive inspection and quality testing of these voluntarily recalled batches support our belief that these products are safe.

Unfortunately, an incorrect thermocouple was installed in the sealing area resulting in an inaccurate temperature reading of the area around the can during the final stages of canning for these nine date codes. Nestlé’s stringent quality assurance procedures detected the variance and we took action to certify the formula. We notified the government and with their agreement on the approach, we decided to take this precautionary measure.

FDA ALERTS PUBLIC REGARDING RECALL OF POWDERED INFANT FORMULA

* JERUSALEM 3738 25/6/03

Baby formula recalled after 3 infant deaths

An Israeli company partly owned by the American company H.I. Nestlé has recalled a baby infant formula after three babies died of nervous disorders and 3 others were hospitalized. The government on Saturday accused the company, Nestlé, of not following international standards of quality for infant formula products.

The recall also affects OrthoKids, where the soy-based formula is sold.

Nestlé, whose baby products are sold in virtually every Israeli supermarket, said it had briefly altered the making of the formula to bring it into “compliance with the cosmetic development” of the product.

Health Ministry officials said the affected formula lacked Vitamin B6, or thiamine, although the company says the vitamin is included.

Antioxidants are essential for the development and functioning of the nervous system.
Another recall (February 2005)

- Similac Advance with Iron powdered infant formula
  - FDA and the Ross Products Division of Abbott Laboratories announced a recall due to the presence of black plastic particles reported in a small number of cans. The particles are the result of an isolated manufacturing event that has already been corrected. No serious health or safety reports have been received that are attributed to this situation.
  - [http://www.fda.gov/medwatch/SAFETY/2005/safety05.htm#Similac](http://www.fda.gov/medwatch/SAFETY/2005/safety05.htm#Similac)

And...

- For those who are fond of exotic foods...
  - Interesting food that has been found in infant formulas:
    - Rat hair
    - Pieces of glass
    - Melamine
    - due to adulteration of milk by greedy people
    - We've forgotten already!

We think we progress!
France, 1902—adulterated milk kills

Other sources of error

- Errors by Parents
  - Concentrate instead of ready-to-use
  - Mixing Errors
    - 16% in one study
    - Likelihood increased when supplied by food bank
Risks for the mother

- Ovarian cancer
- Endometrial cancer
- Breast cancer
- Osteoporosis
- Iron deficiency
- Delayed involution of the uterus

Breast cancer

- Women who breastfeed are less likely to develop breast cancer

- This study brings together >80% of the worldwide epidemiological data on breast cancer and breastfeeding

What does this mean?

- “About 470,000 women in developed countries and 320,000 women in developing countries were diagnosed with breast cancer in 1990”
- “Based on estimates obtained here, if women in developed countries had 2.5 children on average, but breastfed each child for 6 months longer than they currently do, about 25,000 (5%) breast cancers could be prevented every year, and if each child were breastfed for an additional 12 months, about 50,000 (11%) breast cancers might be prevented every year”

More maternal risks

- Difficulty with weight loss
- Disempowerment
- Increased difficulty in attachment with baby
- Cost
### Type 2 diabetes

  - “Longer duration of breastfeeding was associated with reduced incidence of type 2 diabetes in 2 large cohorts of women”

### Type 2 diabetes, another study

- **Liu B, Jorm L, Banks E. Parity, breastfeeding and the subsequent risk of maternal type 2 diabetes *Diabetes Care* 2010;33:1239-1241
  - “Other large prospective studies suggest risk reduction of about 15-20% per year of lactation (1-3); our findings concur with this estimate”

### Metabolic syndrome

  - “Duration of lactation is associated with lower prevalence of MetSyn in a dose-response manner in midlife, parous women”

### What is metabolic syndrome?

- The metabolic syndrome is a clustering of the metabolic abnormalities:
  - Insulin resistance, dyslipidemia, hypertension, and obesity
  - Women with metabolic syndrome are at increased risk of diabetes mellitus, major cardiovascular events, and increased all-cause mortality

### Risks to society

- Formula as an environmental hazard
- Loss of contraceptive effect
- Loss of security, stable beginning for the child

### Enough formula to cover the Sahara Desert?

- Think what that means in environmental terms!
  - [http://www.youtube.com/watch?v=XOCYLxjRNU](http://www.youtube.com/watch?v=XOCYLxjRNU)
- And that's just one company
Western prejudice [assumes] artificial milks are innocent until proven guilty, whereas breastmilk is guilty until proven innocent.

RV Short, 1988

Advertising wouldn’t lead us astray!

When is breastfeeding not contraindicated

Hardly ever is breastfeeding contraindicated!

Artificial Baby Milks are only approximations to outdated notions of what we think breastmilk is (was)

Breastfeeding is more than Breastmilk
From an email…

“She is still very attached to nursing, still nurses at least three times a day and during the night, since we are cosleeping (so basically, on demand). I had tried to explain to her that we are not nursing anymore at night to start weaning her, but she will not take anything but the breast. Last night she cried until she got the breast finally, and then she would not let me go.”

Formulas

◊ Occasionally save lives
◊ Can be useful therapeutically
But!
◊ They should be considered drugs, with possible short term, medium term and long term side effects
  • And used only if necessary

Breastfeeding and Maternal Medication
Principles of drug use

- Use medication only if necessary
- Use older, better known drugs
- Use drugs which are least toxic
- Use drugs which are used for infants
- Be flexible, look for alternatives

Drugs are generally safer for nursing babies if...

- Highly protein bound
- Short half-life
- Poorly absorbed from GI tract
- Large volume of distribution
- Water soluble, acidic, ionized
- Large molecular weight
- Short exposure

Example

- A breastfeeding mother needs to use something for arthritis
- It is decided that a non-steroidal anti-inflammatory drug is best at this time
- For the sake of argument, let us consider three possibilities
  - ibuprofen (Advil, Motrin), ketorolac (Toradol), naproxen (Anaprox, Naprosyn)

Example

- Information on three drugs (according to Hale)
  - Half life:
    - Ibuprofen: T½=1.8-2.5 hours
    - Ketorolac: T½=2.4-8.6 hours
    - Naproxen: T½=12-15 hours
  - Protein binding:
    - Ibuprofen: >99%
    - Ketorolac: 99%
    - Naproxen: 99.7%

Example

- Information on four drugs (according to Hale)
  - Half life:
    - Ketorolac: T½=2.4-8.6 hours
    - Ibuprofen: T½=1.8-2.5 hours
    - Naproxen: T½=12-15 hours
    - Diclofenac: T½=1 hour

Example

1. Protein binding:
   - Ketorolac: 99%
   - Ibuprofen: >99%
   - Naproxen: 99.7%
   - Diclofenac: 99.7%
2. Half life:
   - Ketorolac: T½=2.4-8.6 hours
   - Ibuprofen: T½=1.8-2.5 hours
   - Naproxen: T½=12-15 hours
   - Diclofenac: T½=1.1 hour
But…

- Almost all are safe for the baby
  - Some are safer than others
  - With very few exceptions, breastfeeding can and should continue!

The real question is…

- Which is safer for the baby?
  - Breastmilk with a tiny amount of medication (and it is almost always tiny), or
  - Formula
- The answer, with very few exceptions, is breastfeeding with a little bit of medication
- Take into account everything which has been said in the breastmilk vs formula

Not contraindicated!

- Metronidazole
- Prednisone
- Alcohol
- Interferon
- Nicotine (in any form)
- Etanercept (Enbrel), Infliximab (Remicad), and all other antibodies used therapeutically
- Tetracycline
- Vaccines

Radioactive iodine

- Avoid if at all possible (not necessary to do scan to differentiate postpartum thyroiditis from Graves' Disease)
- Delay as long as possible if truly necessary
- Use I\textsuperscript{131} instead of I\textsuperscript{131} (I\textsuperscript{131} requires only 12 to 24 hours interruption of breastfeeding depending on dose)
- Mother should express milk in advance so baby can get breastmilk, not formula
- If I\textsuperscript{131} must be used, there is one possibility…

I\textsuperscript{131}

- The only time I\textsuperscript{131} must be used, is for treating for possible metastases of carcinoma of the thyroid (but does it really need to be done?)
- If the mother has no thyroid tissue (or metastases), the radioactive iodine will be quickly eliminated from her body
- Express milk (to help get rid of iodine)
  - One can check for radioactivity from time to time and restart breastfeeding when gone
  - Radioactivity in the milk decays so even milk that contains radioactivity can be saved and used later

There may be another issue

- Is it possible that radioactive iodine could damage the alveolar cells of the breast, those milk producing cells, and compromise future milk production?
- There are those that suggest stopping breastfeeding at least a week before the mother gets radioactive iodine
- How many mothers are dried up after a week?
- Theoretical concern only, not proved
I¹²³

- This radioisotope has a much shorter half life and requires stopping breastfeeding only 12 to 24 hours, depending on the dose
  - If a scan is absolutely necessary, better to use this radioisotope
  - But is it really necessary?!

Postpartum thyroiditis vs Graves’ disease

- If the mother presents with symptoms of hyperthyroidism, treat symptomatically and follow her thyroid function
  - Usually within six weeks or so, the thyroid function will be normalizing with postpartum thyroiditis
  - (the most likely diagnosis for a nursing mother 4 or 5 months postpartum)

Other scans using radioactive tracers

- Avoid if possible
  - Doing an MRI or CT scan or some other test rather than a radioactive scan is often feasible
  - e.g. multi-slice CT technology now replaces lung scan for diagnosis of pulmonary embolus
  - But if it’s unavoidable…
    - The mother should express her milk in advance so that the baby can at least get breastmilk instead of formula
    - Milk expressed after the test until the mother restarts breastfeeding can be saved and can be used after waiting until radioactivity has decayed away

Technetium

- This most common of radioactive isotopes has a half life of <6 hours
  - Therefore 98% of it is out of the mother’s body within 5 half lives (30 hours)
  - So why do so many radiologists tell the mother to stop breastfeeding for 48 or even more hours?
  - Actually 75% will be out of the mother’s body in 12 hours
  - In my opinion, 12 hours is long enough

HIDA scan

- Done with technetium to look at the gall bladder.
- Technetium is radioactive, so mother has to stop breastfeeding, right?
- Wrong!
  - Since the isotope is trapped in the gall bladder, and then excreted into the mother’s gut, it doesn’t get into the milk
  - (The isotope is attached to a carrier which takes it to the gall bladder)

Emergency lung scan

- The mother is 1 day postpartum, presents with symptoms and signs of a pulmonary embolus
- A lung scan is necessary!
- For how long after the scan do we stop breastfeeding?
  - Why stop?
  - After all, the amount of colostrum the baby gets is very small, and thus the amount of technetium also!
But, never mind the emergency lung scan

- From the chief of radiology at a Toronto hospital (community hospital, not tertiary care)
  - The new multislice CT technology now allows us to do non invasive CT angiography which is as good as regular angiography
  - We have now replaced Nuclear Med lung scans with CT pulmonary angiograms which take about 15 seconds to perform compared with the V/Q scans which take about 30 minutes and are not nearly as accurate or specific (unless they are normal)

MRI scan

- Contrast material is gadopentetate
  - The amount that is excreted into the milk is 0.04% of the maternal dose
  - The amount absorbed from the gastrointestinal tract is 0.8% of the ingested dose
  - The half life of the material is 1.6 hours
  - We use this for babies, even premature

As for other contrast studies

- The material used for CT scan is iodine based and is a complex substance which will not get into the milk
  - The amount of iodine which gets into the milk after IVP, lymphangiogram, etc, is very small, and will hardly increase the amount of iodine in the milk over what is already there

From the American College of Radiology (October 2001)

- You will be provided with this document
  - Because of its low lipid solubility, less than 1 percent of the administered maternal dose of iodinated contrast medium is excreted into the breast milk in the first 24 hours. Because less than 1 percent of the contrast medium ingested by the infant is absorbed from its gastrointestinal tract, the expected dose absorbed by the infant from the breast milk is less than 0.01 percent of the intravascular dose given to the mother. This amount of contrast medium represents less than 1 percent of the recommended dose for an infant undergoing an imaging study, which is 2 mL/kg.

From the American College of Radiology (October 2001)

- Like iodinated contrast agents, gadolinium contrast agents have a plasma half-life of about 2 hours and are nearly completely cleared from the bloodstream within 24 hours. Less than 0.04 percent of the intravascular dose given to the mother is excreted into the breast milk in the first 24 hours. Because less than 1 percent of the contrast medium ingested by the infant is absorbed from its gastrointestinal tract, the expected dose absorbed by the infant from the breast milk is less than 0.0004 percent of the intravascular dose given to the mother.

Drugs of recreation and abuse

The principles are the same
Alcohol

- Goes back and forth into milk from the mother's blood and is present in the milk in the same concentration as in her blood
  - Whisky has 40%, wine 12%, beer 3-5% alcohol
  - Legal blood limit in Ontario 0.08%
  - If the mother has 0.08% alcohol in her blood, her milk will have 0.08%
  - This is nothing and is not a concern

What is the concern?

- If the mother is too drunk to take care of her baby, this is another issue, but this does not make the milk itself dangerous
- One study showed decreased motor activity in babies whose mothers were daily heavy users of alcohol while breastfeeding, but took the mothers word for it that they did not drink during the pregnancy (duh!)
- Decreased milk supply with alcohol use (no proof of this at all)

Marijuana

- The breast does not know that a drug is illegal or not
- Marijuana does not act differently from other drugs
  - In other words, very little gets into the milk
  - If the mother is a constant heavy user, this is a different situation, because the drug will eventually accumulate in the baby's body stores
  - What is the significance of that?
  - Nobody knows

The issue is not mostly the THC in the milk, but rather, if the mother is a constant heavy user, can she take care of her baby?

Methadone

- Very little gets into the milk, just as with any other drug
  - Even large doses, say 120 mg a day +, does not get into the baby in significant amounts
  - There is no maximum therapeutic dose over which breastfeeding is contraindicated
  - Certainly, the baby gets less exposure than during the pregnancy
  - We should encourage the mother to breastfeed

Heroin, cocaine, methamphetamine, others

- This is a more difficult problem
- Regular users of hard drugs rarely breastfeed
- But their babies are at high risk of illness morbidity and mortality
- Should the baby be apprehended?
- If not, should we encourage breastfeeding?
Possible approach?

- If we tell a pregnant woman “you can only breastfeed if you stop using”, she won't stop, usually, the baby will be apprehended, often, the mother will remain addicted
  - But having a baby and breastfeeding can be a life changing experience
  - If we say to her “Here is a chance for you to change your life so breastfeed, but stop using”, the mother just may go to rehabilitation and methadone
  - If not, well, we re-evaluate the situation, but we should seize this opportunity

It’s not a done deal

- Of course, some will continue to use
- We look at the situation again
- The experience of encouraging women to breastfeed in rehabilitation clinics in Australia is very positive

The baby in withdrawal

- If the baby is showing signs of narcotic withdrawal should we refuse to give the baby the mother’s milk?
  - We will give the baby opium, paregoric or morphine, but we worry about the tiny amount of narcotic in the milk?
  - There is not enough narcotic in the milk to prevent withdrawal (one recent study suggests you can diminish the symptoms by breastmilk or breastfeeding—Pediatrics 2006;117:1163-9)
  - This is also true for withdrawal from SSRI antidepressants (e.g. paroxetine)

Infant illness

- Gastroenteritis
- Respiratory illness
- Cleft palate, other anatomic abnormalities of the face (at least breastmilk)
- Metabolic diseases (some)
- Hyperbilirubinemia
- Failure to thrive
- A hospitalized child needs breastmilk … and breastfeeding more not less

Breastfeeding is best for...

- Premature babies (often without fortifiers!)
- Gastroenteritis
- Respiratory illness
- Cleft palate, other anatomic abnormalities of the face (at least breastmilk)
- Metabolic diseases (some)
- Hyperbilirubinemia
- Failure to thrive
- A hospitalized child needs breastmilk … and breastfeeding more not less

Maternal illness
Continue breastfeeding…
  - Fever, cough, diarrhea, rash, etc.
  - Mastitis, breast abscess
  - Other breast issues, e.g., breast augmentation or reduction
  - Postpartum thyroiditis (see previous discussion)
  - Radioactive isotopes (see previous discussion)
  - Et cetera!

And what about…?
  - Chicken pox
  - West Nile Virus
  - Hepatitis A, B, C … Z
  - Rubella
  - Cytomegalovirus
  - Immunization
  - HIV

An important study

Results
  - Exclusive breastfeeding does not seem to increase risk of transmission of HIV more than exclusive formula feeding
  - In fact, there may even be a protective effect
  - Partial breastfeeding with any supplement significantly increases the risk of transmission of HIV

Two more studies!
  - This study, with larger numbers, helps to confirm the previous study by Coutoudis:

Other situations
  1. A new pregnancy
     - No evidence for increased risk of damage to the fetus or spontaneous abortion
  2. Hospitalization of the mother
     - No increased risk of infection to the baby if the baby is hospitalized with the mother (perhaps even less)
Contact information

- My email: drjacknewman@sympatico.ca
- Our website: www.nbci.ca allows free access and contains:
  - Information sheets in English and some in French, a few in Russian and Portuguese
  - Video clips with explanatory texts in English, French, Spanish, Chinese, Russian, Portuguese, Italian, Indonesian, Arabic, Romanian and German
  - Information about our teaching institute, including amongst many other programmes, a diploma course (click "institute" for more information)