Breast Feeding:

Who can or should breast feed?

How many mothers actually breast feed?

Some difficulties and contraindications

A report written for MAM Babyartikel GesmbH

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Summary

There can be no doubt that breast milk is the best diet for babies. Breast-feeding on demand remains the ideal form of feeding for healthy babies who are born at term.

At least 97% of women are capable of breast-feeding. However some data are presented to show that in reality a minority of mothers exclusively breastfeed and few continue even with partial breastfeeding after four months.

Although the reasons for not commencing or continuing with breast-feeding are complex, there are a number of contraindications that may either preclude breast-feeding or have a significant effect on the course of natural feeding. Some of these contraindications, including galactosaemia, medical and additive drug taking, the effect of mother’s diet and environmental agents, infectious diseases, HIV infection and mastitis are explored in a series of appendices.

Although mothers need to take note and be cautious about some of these contraindications, it is clear that only retroviral infections such as HIV and HTLV are considered to be absolute contraindications to breast-feeding in developed countries.

The appendices also contain a note regarding feeding from breasts that have had silicone implants.

A comprehensive list of references is provided for further reading.
Breast Feeding: Who can or should breast feed? How many mothers actually breast feed? Some difficulties and contraindications

Who can or should breast-feed?

There can be no doubt that breast milk is the best diet for babies. Breast-feeding on demand remains the ideal form of feeding for healthy babies who are born at term.

All health organisations such as the American Academy of Pediatrics recognise breastfeeding as the preferred method of feeding infants and achieving optimal infant and child health, growth, and development. AAP recommends exclusive breastfeeding for approximately the first 6 months after birth and the gradual introduction of iron-enriched foods in the second half of the infant’s first year to complement the breastmilk diet (AAP 1997b).

Some breastfeeding is recommended for at least 12 months and thereafter for as long as mutually desired.

According to the World Health Organisation at least 97% of women are capable of breast-feeding. However in reality, a minority of mothers exclusively breastfeed and few continue even with partial breastfeeding after four months.

How many Mothers breast-feed?

The WHO Global Data Bank on Breastfeeding presently covers 94 countries and 65% of the world’s infant population (<12 months). Based on the latest data, it is estimated that only 35% of these infants are exclusively breastfed between 0-4 months of age (WHO 2003).

Breast feeding rates (predominantly or partial) are either comparatively low at birth or fall off markedly with time in many countries, as seen in Table 1:

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1 “Exclusive” breastfeeding is defined as no other food or drink, not even water, except breast milk for at least 4 and if possible 6 months of life, but allows the infant to receive drops and syrups (vitamins, minerals and medicines). “Predominant” breastfeeding means that the infant’s predominant source of nourishment has been breast milk. However, the infant may also have received water and water-based drinks (sweetened and flavoured water, teas, infusions, etc), fruit juice, or oral rehydration therapy (ORS) solution.
Table 1. Percentage Rates of Breast Feeding

<table>
<thead>
<tr>
<th>Country</th>
<th>Rate at Birth</th>
<th>3 months</th>
<th>6 months</th>
<th>9 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belgium</td>
<td>60</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Canada</td>
<td>80</td>
<td>24</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Croatia</td>
<td>75</td>
<td>40</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Czech Republic</td>
<td>92</td>
<td>73</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>Denmark</td>
<td>98</td>
<td>60</td>
<td></td>
<td></td>
</tr>
<tr>
<td>France</td>
<td>50</td>
<td>15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ireland</td>
<td>31</td>
<td>15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Italy</td>
<td>62</td>
<td>46</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lithuania</td>
<td>82</td>
<td>40</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Luxembourg</td>
<td>80</td>
<td>38</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Netherlands</td>
<td>68</td>
<td></td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>Norway</td>
<td>98</td>
<td>75</td>
<td>50</td>
<td>40</td>
</tr>
<tr>
<td>Poland</td>
<td>93</td>
<td>27</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Sweden</td>
<td>98</td>
<td>70</td>
<td>53</td>
<td></td>
</tr>
<tr>
<td>United Kingdom</td>
<td>69</td>
<td>28</td>
<td>21</td>
<td>13</td>
</tr>
<tr>
<td>USA</td>
<td>69</td>
<td></td>
<td>32</td>
<td></td>
</tr>
</tbody>
</table>


Breast Feeding rates in the United Kingdom are shown in the graph below (Hamlyn et alia 2002):
The shape of the graph is not untypical of many found in the Developed World, in that a relatively high proportion of mothers give up any form of breast feeding within 1 or 2 weeks after returning home from hospital. Ironically, many women give up breastfeeding when they return to work because the thoughts of expressing their milk at work and the usage of pumps and storage at work seem overwhelming (McAlpine 1998, cited by Netshandama 2002).

By 4 months, less than 30% of mothers are breastfeeding, and after 6 months only about 20%

There are many reasons for these low breast feeding rates, including – choice of the mother, social pressures, and a variety of contraindications. The latter factors are discussed below.

**When is breast-feeding difficult or contraindicated?**

Although breast milk is ideal for most infants, there are some *contraindications* which preclude breast-feeding. These include:

- Galactosaemia (Appendix I)
- Congenital absence of the gut enzyme lactase (Appendix II)
- A number of drugs taken by the mother during the lactation period (Appendix III)
- Use of addictive drugs by the mother – including tobacco (Appendix IV)
- Food and environmental agents (Appendix V)
- Infectious Diseases - Tuberculosis, Measles, Human T-Cell Lymphotropic Virus, Cytomegalovirus (Appendix VI)
- HIV infection (Appendix VII)
- Mastitis (Appendix VIII)

This list is not exhaustive, and under certain conditions the mother’s health advisor may not recommend cessation of breast-feeding if one or other of the above contraindications is present. However, all the above may effect breast-feeding itself or the outcome of breast-feeding on the well being of the child.

It should be remembered that the composition and quality of the mother’s milk is a reflection in part of her own diet and of her life style. Thus, any chemicals hazardous or not, may enter her milk, to be subsequently ingested by her baby.

As indicated some of these contraindications are reviewed in the Appendices, together with a note regarding feeding from breasts that have had silicone implants (Appendix IX).
Appendix I

Galactosaemia (high blood level of galactose)

Galactosaemia, which means a high blood level of galactose, is caused by a carbohydrate metabolism disorder.

Carbohydrates such as glucose, sucrose and fructose are sugars. Some of them - sucrose and galactose, for example - must be processed (metabolised) by enzymes in the body before they can be used as a source of energy. If the enzymes needed to process them are missing, these sugars can accumulate causing problems, some of which may be severe.

Galactosaemia is usually caused by the lack of galactose 1-phosphate uridyl transferase (Segal and Berry 1995), one of the enzymes necessary for metabolising galactose. This disorder is present from birth. About 1 out of 40,000 to 70,000 babies is born without this enzyme.

The newborn seems normal at first, but within a few days or weeks, he loses his appetite, vomits, becomes jaundiced, and stops growing normally. The liver becomes enlarged, excess amounts of protein and amino acids appear in the urine, tissues swell, and the body retains water. Early diagnosis is essential (Walter et alia 1999), although neonatal screening is not routine in the United Kingdom for example. If treatment is delayed, affected children remain short and become mentally retarded.

If there is any suspicion of the diagnosis (either biochemical or clinical) galactose must be excluded from the diet including via breast milk and cow’s milk formulae (Table A1 lists galactose free formulae). Supportive care should be provided as required, dependent on the severity of liver, renal, and central nervous system disease. Antibiotics, intravenous fluids, plasma, and vitamin K are often necessary. Continue a galactose free formula after confirming the diagnosis.

Table A1. Some Milk substitutes suitable for infants with galactosaemia (prescribable in the UK)

<table>
<thead>
<tr>
<th>Formula</th>
<th>Manufacturer</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infasoy</td>
<td>Cow &amp; Gate</td>
<td>Lactose free soya preparation</td>
</tr>
<tr>
<td>Wysoy</td>
<td>SMA Nutrition</td>
<td>Lactose free soya preparation</td>
</tr>
<tr>
<td>Prosobee</td>
<td>Mead Johnson</td>
<td>Lactose free soya preparation</td>
</tr>
<tr>
<td>Farleys Soya Formula</td>
<td>Farleys</td>
<td>Lactose free soya preparation</td>
</tr>
<tr>
<td>Isomil</td>
<td>Ross Products Division</td>
<td>Lactose free soya preparation</td>
</tr>
<tr>
<td>MCT Pepdite 0-2</td>
<td>SHS</td>
<td>For infants with severe liver disease MCT containing preparation, lactose free</td>
</tr>
</tbody>
</table>
Patients should be followed up throughout childhood and adult life. A recommended scheme for outpatient review is: every three months to 1 year of age; every four months to 2 years; every six months to 14 years; and annually thereafter. More frequent monitoring for girls in late childhood and adolescence is necessary to monitor pubertal development.
Appendix II

**Congenital absence of enzymes, such as lactase**

The ability of breast-feeding infants to utilise lactose, the major carbohydrate in breast-milk, is dependent on the presence of the enzyme lactase.

The sugars lactose, sucrose, and maltose are broken down by the enzymes lactase, sucrase, and maltase, which are located in the lining of the small intestine. Normally, the enzymes break these sugars into simpler sugars, such as glucose, which are then absorbed into the blood through the intestinal wall.

If the necessary enzyme is lacking, the sugars remain in the small intestine, and they cannot be absorbed. The resulting high concentration of sugar draws fluid into the small intestine, causing diarrhea and subsequent loss in weight. The unabsorbed sugar is then fermented by bacteria in the large intestine, producing acidic stool and flatulence.

However, reduction of breast milk intake is not advised in Third World situations as the nutritional and immunological benefits of breast milk may continue to outweigh any disadvantages (Northrop-Clewes et alia 1997).
Appendix III

A number of drugs taken by the mother during the lactation period

This, in the Western World is a very common reason for either not initiating breast-feeding or ceasing breast-feeding prematurely. Very often the cessation is at the advice of the mother’s physician. Such advice may not always be warranted. The American Academy of Pediatrics (AAP) issued a policy statement in 2001 that detailed data concerning the excretion of drugs into human milk (AAP 2001).

Cytotoxic drugs such as Cytoxan, Dauomycin, Methotrexate, Cyclosporine, may interfere with cellular metabolism of the nursing infant (Wiernik and Duncan 1971; Amato and Niblett 1977; Flechner et alia 1985; Nyberg et alia 1998; Egan et alia 1985; Johns et alia 1972).

The use of Olanzapine in the treatment of postpartum psychosis has been limited by sparse data on its transfer into breast milk and on the effects of exposure to the drug on a suckling infant. Recent research has suggested from a small-scale study that only a small amount of Olanzapine transfers from mother to baby during breast-feeding (Gardiner et alia 2003). However, these authors recommend that breast-fed infants are monitored closely and the decision to breast-feed be made after individual risk-benefit analysis. In any event it is recommended that mothers taking the medication should avoid breast-feeding in the five hours post dose.

Treatment or testing the mother with radioactive compounds, such as copper 64 (McArdle and Danks 1991) and iodine 131 (Karjalainen ET ALIA 1971; Bland et alia 1969; Nurnberger and Lipscomb 1952) requires a temporary cessation of breast-feeding. The radioactivity can be detected in the breast milk for a few hours in the case of indium 111 (Butt and Szaz 1986) to up to 2 weeks if gallium 67 (Tobin and Schneider 1976) has been used.

A whole range of anti-anxiety (for example Diazepam and Lorazepam), antidepressants (Amoxapine, Trazodone) and antipsychotics (Chlorpromazine and Haloperidol) are listed as possibly being of concern because, particularly with antipsychotics, they appear in human milk and could alter short-term and long-term central nervous system functions (AAP 1982).

Relatively common drugs, many of which may be purchased over the counter, without prescription have been associated with significant effects on some nursing infants and should be given or taken by mothers with extreme caution. The blood concentration in the infant may be of clinical importance. These include:

*Acebutolol* – causes hypotension, bradycardia, tachypnea (Boutroy et alia 1986).

*Bromocriptine* – suppresses lactation; may be hazardous to the mother (Kulski et alia 1978; Katz et alia 1985).

Lithium – One-third to one-half therapeutic blood concentration in infants (Schou and Amdisen 1973; Tunnessen and Hertz 1972; Sykes et alia 1976).


Two other “drugs” commonly taken in the home, namely alcohol and caffeine (via coffee) can, if imbibed in large amounts, cause problems for the infant.

With large amounts of alcohol, the infant suffers drowsiness, diaphoresis (heavy perspiration), deep sleep, weakness, decrease in linear growth, and abnormal weight gain. A maternal ingestion of 1 g/kg daily decreases the milk ejection reflex (Bisdom 1937; Binkiewicz et alia 1978; Cobo 1973; Kesaniemi 1974; Little et alia 1989).

With caffeinated beverages, moderate intakes (2-3 cups per day) have little effect. Above this level, the infant suffers irritability and pro sleeping patterns. The caffeine in the human milk and in the infant’s body is excreted slowly, so the effects may continue for some time (Berlin 1981; Tyrala and Dodson 1979; Hildebrandt and Gundert-Remy 1983; Berlin et alia 1984; Rye 1985a, 1985b).

In conclusion, it may therefore be speculated that a wide-range of drugs, freely available and present in many homes may effect both the infant and also the progress of breast-feeding. Therefore it is surprising that many studies on the initiation of breast-feeding, early weaning, and the effect of pacifiers on breast-feeding, do not include in their protocol a factorial for drug taking. It is therefore recommended that in any study on, for example pacifiers and breast-feeding, questions are included relating to the mother’s diet, medicine and drug taking habits.
Appendix IV

Use of addictive drugs by the mother

Amphetamine, cocaine, heroin, marijuana and phencyclidine have all been cited as causing adverse effects on the infant during breast-feeding:

Amphetamine – Causes irritability and a poor sleeping pattern (Steiner et alia 1984). The drug concentrates in human milk.

Cocaine - Can intoxicate the child causing irritability, vomiting, diarrhea, tremors and seizures (Chasnoff et alia 1987). England et alia (2003) found that 94% of Colombian women with at least one contraindication to breastfeeding had a history of cocaine use and/or HIV infection.

Heroin - Tremors, restlessness, vomiting, and poor feeding (Cobrinik et alia 1959).

Marijuana – There is only 1 report in the literature; no effect mentioned; very long half-life for some components (Perez-Reyes and Wall 1982).

Phencyclidine - Potent hallucinogen (Kaufman et alia 1983).

The AAP Committee on Drugs strongly recommends that nursing mothers should not ingest drugs of abuse, because they are hazardous to the nursing infant and to the health of the mother (AAP 2001).

Tobacco smoking

In their 1994 edition of an Official statement, the AAP Committee on Drugs (AAP 1994) defined nicotine (tobacco smoking) a “Drug of Abuse-Contraindicated During Breast-feeding.” The reasons were well documented decreases in milk production and weight gain in the infant of the smoking mother and exposure of the infant to environmental tobacco smoke as demonstrated by the presence of nicotine and its primary metabolite, cotinine, in human milk (Bisdom 1937; Hopkinson et alia 1992; Labrecque et alia 1989; Luck and Nau 1984,1985, 1987; Schulte-Hobein et alia 1992; Schwartz-Bichenbach et alia 1987). There is controversy regarding the effects of nicotine on infant size at 1 year of age (Little et alia 1994; Boshuizen et alia 1998).

There are hundreds of compounds in tobacco smoke; however, nicotine and its metabolite cotinine are most often used as markers of tobacco exposure. Nicotine is not necessarily the only component that might cause an increase in respiratory illnesses (including otitis media) in the nursing infant attributable to both transmammary secretion of compounds and environmental exposure. Nicotine is present in human milk in concentrations between 1.5 and 3.0 times the simultaneous maternal plasma concentration, (Steldinger et alia 1988) and elimination half-life is similar, 60 to 90 minutes in both milk and plasma (Luck and Nau 1984). There is no evidence to document whether this amount of nicotine presents a health risk to the nursing infant.
However, the AAP in their more recent statement (AAP 2001) recognised that there are some women who are unable to stop smoking cigarettes regardless of the warnings from both Governmental agencies and from their own physicians.

The AAP were also concerned that some nursing smokers may cease breast-feedings because of the aforementioned warnings. However there is a study which reported that, among women who continue to smoke throughout breast-feeding, the incidence of acute respiratory illness is decreased among their infants, compared with infants of smoking mothers who are bottle fed (Woodward et alia 1990). It may be that breastfeeding and smoking is less detrimental to the child than bottle feeding and smoking. Clearly this study requires confirmation. The AAP Committee on Drugs has therefore removed nicotine (and thus smoking) from their contraindicated classifications.

The AAP also note that so-called “secondary” smoking, have not been studied sufficiently for the Committee on Drugs to make a recommendation.

It is well documented that smoking (particularly maternal smoking) significantly increases the risk of Sudden Infant Death Syndrome (SIDS) but this also true of babies who are both breast and formula fed.
Appendix V

Food and environmental agents

As has been mentioned the quality of human milk is partly a reflection of both the mother’s diet and lifestyle. The environment may also effect the composition of her milk. Some of the common factors are:

Chocolate (theobromine) – If excess amounts are consumed (450 g per day) by the mother the baby may suffer irritability or increased bowel activity (Berlin 1981; Resman et alia 1977).

Polychlorinated biphenyls (PCB’s) and polybrominated biphenyls – lack of endurance, hypotonia (a condition in which the muscles offer reduced resistance to passive movement), sullen, expressionless facies (Miller 1977; Rogan et alia 1980, Wickizer et alia 1981).

Lead – possible neurotoxicity (Rabinowitz et alia 1985; Sternowsky and Wessolowski 1985; Namihira et alia 1993; Baum and Shannon 1996).

Mercury, methylmercury – May effect neurodevelopment (Koos and Longo 1976; Amin-Żaki et alia 1974; Pitkin et alia 1976).

Tetrachloroethylene cleaning fluid – Obstructive jaundice, dark urine (Bagnell and Ellenberg 1977).

Even if the mother has a completely vegetarian diet, this may cause signs of B_{12} deficiency in her baby (Higginbottom et alia 1978).
Appendix VI

Infectious Diseases

General

Maternal infectious disease is not a contraindication to breastfeeding in most cases (Beudry et alia 1995). For common infections, infants have already been exposed by maternal contact during the prodromal period, and to interrupt breastfeeding at a time that antibodies and other anti-inflammatory and immunomodulating substances are being provided by breastfeeding is counter-productive (Lawrence 1999).

These factors protect infants against infection and diminish the severity of the symptoms even if illness occurs in an infant. The common cold is one of the best examples of an illness during which it is best to continue to breastfeed.

Maternal infections of the genitourinary or gastrointestinal tract do not pose a risk to infants except in the rare circumstances when septicaemia occurs and bacteria might reach the milk. Even in this event, continued breastfeeding while the mother receives appropriate antibiotic therapy that is compatible with breastfeeding is considered to be the safest course for the infant (Pisacane et alia 1994).

If the infecting organism is especially virulent or contagious (e.g., an invasive group A streptococcal infection causing severe disease in the mother), breastfeeding should continue after a temporary suspension during the first 24 hours of maternal therapy (Lawrence 1999). Prophylactic or empiric therapy for the infant, against the same organism, may be indicated.

Tuberculosis

Breastfeeding is not contraindicated in women with previously positive tuberculosis (TB) skin tests and no evidence of the disease (Lawrence 1999).

However in women in whom active TB is suspected infants cannot be in contact with the mother after delivery regardless of the mode of feeding. Respiratory contact puts these infants in jeopardy (AAP 1997a). The breast milk, however, does not contain tubercle bacilli (Keller et alia 1987).

Mothers with TB, therefore, may pump their milk to be bottle-fed to their infants by an assistant. As soon as therapy for the mother has been initiated ands she is considered non-contagious, she may breast-feed her infant directly.

However differentiation between TB infection and active disease is important in considering the risk to newborn infants (Starke 1997). Where medical care and diagnostic ability is unavailable or poor, many mothers appear to chose not to breast-feed (Kapil et alia 1990).
Measles

For mothers with measles, a short period of isolation (72 hours after the onset of the rash) from the infant is advisable. Expressed breast milk can be given after receiving immunoglobulin (Lawrence 1999).

Subsequent return to direct breastfeeding carries not significant risk (Hummel et alia 2000). In fact there is some suggestion that a small amount of measles antibodies may be passed through breast milk (Adu and Adeniji 1995).

Human T-Cell Lymphotropic Virus (HTLV-I and HTLV-2)

The two types (HTLV-1 and HTLV-2) are closely related but distinct retroviruses. HTLV’s are associated with adult T cell leukaemia or lymphomas and other conditions such as tropical spastic paraparesis and polymyositis.

The prevalence of HTLV-1 is increasing in various parts of the world and is epidemic in parts of the West Indies, sub-Saharan Africa, Brazil and south-western Japan. Transmission occurs most often by sexual contact, contact with blood or blood products, human milk, and infrequently by transplacental transmission and casual or household contact (AAP 1997a, Ureta-Vidal et alia 1999).

The evidence for transmission of the virus from infected mother to her child via breast milk is highly convincing as is its prevention by bottle-feeding (Ando et alia 1989b). Indeed, the longer the duration of breast-feeding the higher the risk for infection (Takahashi et alia 1991, Hino 1989). The latter author also reported that 22% of children of HTLV-I carrier mothers were themselves carriers, in contrast to approximately 1% of the young age population of the same area, and more than 95% of mothers of carrier children were themselves carriers. Tsuji et alia (1990) reported a transmission rate of 39% from breast milk, but none from bottle fed children of HTLV-1 carriers.

These Japanese findings have been reproduced in the USA for both HTLV-1 (Kaplan et alia 1992), and HTLV-2 (Lal et alia 1993), in Jamaica (Wiktor et alia 1993), in the UK where seroprevalence of these viruses is approximately 1 in 20,000 (Kepple 1996), in Taiwan (Hu et alia 1998), and in Brazil (Bittencourt 1998) where it is known that in Salvador, Bahia, 1 in 130 of pregnant women of low socio-economic class are HTLV-I carriers.

HTLV-2 is clearly also becoming a significant health problem in a number of isolated tribal communities, such as the Indians in Northern Argentina (Biglione et alia 1999) and in Brazil (Ishak et alia 2001).

Accordingly, maternal HTLV-1 infection is a contraindication to breastfeeding whenever and wherever a safe alternative supply of infant nutrition is available - such as formula milk (Ruff 1994, Lawrence 1999).

In Japan it has been reported that freezing of expressed breast milk and subsequent provision to infants via a bottle is a promising way of transmission prevention,
presumably because the virus is inactivated by freezing (Ando et alia 1986, Ando et alia 1989a). However this finding has not been duplicated elsewhere and is not included in the guidelines of the Centers for Disease Control and Prevention (CDC 1993) who have confirmed that seropositive patients should be advised not to breastfeed. This is echoed by similar advice in the UK and Japan, for example.

Goldfarb (1993) when discussing HLTV-1, HIV and CMV (see below) questioned the use of expressed breast milk as it can be contaminated with bacteria or can contain viruses shed by the donor mother. Use of expressed breast milk should be carefully controlled, with strict attention to infection control issues in obtaining, storing, and processing the milk. Physicians should be aware of the risks of transmission of viral pathogens with fresh breast milk. Pombo-de-Oliveira et alia (2002) has also shown that mothers who provide surrogate breast-milk appear to be an important source of HTLV-I transmission in Brazil.

In Nagasaki Prefecture, Japan (population: 1.5 million) the health authorities took the unique and controversial decision to “ban” breastfeeding by HTLV-I carriers. This has resulted in blocking approximately 80% of mother-to-child transmission of HTLV-I (Hino et alia 1997). There is also some evidence that “short-term breastfeeding for example, less than 6 months, may reduce the risk of HTLV-I transmission (Takezaki et alia 1997, Wiktor et alia 1997).

Bittencourt et alia 2002 has shown that bottle-fed children of HTLV-I seropositive mothers were infection free which indicates that transmission by transplacental route may be very infrequent.

_Cytomegalovirus (CMV)_

Cytomegalovirus infection is caused by a virus of the herpes group which causes enlargement of the cells which it invades. In infants the infection causes liver enlargement, jaundice and blood disorders, deafness, and is sometimes fatal.

CMV infection can be acquired before birth or at any age after birth. One in every 50 to 500 newborns is infected with cytomegalovirus before birth. The virus is thought to cross through the placenta from the mother. If the mother becomes infected during the first half of pregnancy, infection of the fetus tends to be more severe.

After delivery, a newborn may become infected with cytomegalovirus by being exposed to infected breast milk or to contaminated blood received in a transfusion. However, most full-term infants with infected mothers do not develop symptoms, and infants who are breast-fed are protected by antibodies they receive in the milk. Stagno et alia (1980) considered that in full-term, healthy infants, acquisition of CMV by human milk does not result in significant clinical disease and termed this occurrence _natural vaccination_. It is therefore considered safe for CMV-positive mothers (with pre-existing infection and antibodies) to breastfeed their full term infants (Lawrence and Lawrence 2001).

However the potential for transmission of CMV to premature or otherwise immunodeficient infants by breast milk is an important concern. The lack of passively
acquired maternal antibodies against CMV is the most important significant deficit leading to severe disease in susceptible infants. Vochem et alia (1998) showed a 59% rate of transmission of CMV to premature infants receiving CMV-positive human milk and no transmission in infants receiving human milk without CMV. They also showed that infants who developed infection before 2 months of age suffered dramatically more severe disease than did infants infected later.

Therefore, CMV-seronegative (those without antibodies) or premature infants should not receive CMV-positive breast milk whether by donor or from their natural mother. Clearly the presence of CMV antibodies in mother’s milk is an important factor in the equation. It may therefore be of concern that a significant proportion of white women are lacking CMV antibodies (Walmus et alia 1988, White et alia 1988).

Although inactivation of CMV in human milk has been demonstrated by several methods such as freezing or brief high temperature treatment (May 1988), no prospective controlled trials exploring the efficacy of these techniques in preventing severe CMV infection in susceptible infants has been published.

As a postscript to this section, it is noted that in the early 1990’s a workshop was held in the USA to present and discuss current information on the epidemiology, diagnosis, treatment, and prevention of CMV disease in mothers and their infants (Demmler 1991).

It was concluded that in the United States each year, 30,000 to 40,000 infants are born congenitally infected with (CMV), and more than 9,000 of these children suffer permanent consequences. Congenital CMV disease is a significant public health problem that, to date, has been largely ignored. They also agreed that certain child-rearing practices, such as the common use of day-care centres and breast-feeding, have changed the epidemiology of CMV in the United States and that the next decade may bring an increase in congenital CMV disease in certain groups. Therefore, a national system for surveillance of congenital CMV disease was established; its goals are to characterise trends over time, to identify risk groups, and to lay the groundwork for evaluation of future intervention programs. In addition, the surveillance system will be used to educate the medical and lay communities about congenital CMV disease and to facilitate collaborative efforts in research.

These efforts are timely because clearly the CMV problem is deepening in intensity. Hamprecht and colleagues (2001) stated: “Breastfeeding as a source of postnatal cytomegalovirus infection in preterm infants has been underestimated and may be associated with a symptomatic infection.”
Appendix VII

Human Immunodeficiency Virus (HIV)

The one infectious disease, when it occurs in industrialised countries, that is a clear contraindication to breastfeeding is maternal HIV infection.

Current recommendations for developing nations from various agencies that proscribe against breastfeeding with HIV infection emphasise the relative risk for HIV transmission by human milk and its associated morbidity and mortality compared with the risk associated with not breastfeeding caused by malnutrition and other infectious disease (WHO 1998a, 1998b, 1998c, 2000). They recommend making specifically tailored policy decisions for local geographic and cultural regions considering the numerous issues involved in such a risk-benefit analysis.


These and other studies point out the many possible contributing factors to these variable rates, including strain of HIV, maternal illness, immune status and viral load, duration of breastfeeding (timing of transmission), primary infection of the mother during the breastfeeding period, exclusive breastfeeding versus mixed feeding, mastitis and the availability of or lack of antiretroviral therapy (Goldman 2000).

Overall, the various studies report transmission rates between 5% and 20% without controlling for the possible contributory factors and an increased risk of 29% (range 15-53%) when the mother acquires the HIV infection just before or during the breastfeeding period (Oxtoby 1988).

In countries in which sanitary, affordable replacement feeding alternatives are available and medical resources are sufficiently available to prevent significant infant morbidity and mortality from other infectious disease, HIV-infected women should be counselled strongly not to breastfeed (WHO 1998b). In the USA the AAP Committee on Pediatric Aids (AAP 1995) stated that women need to be aware of the risks of transmission of HIV during pregnancy and lactation. They encourage all women to know their HIV status and to seek early prenatal care and more specifically encourage them to receive adequate antiviral medication. They also recommend that these mothers be counselled not to breastfeed or provide their milk to any infant.


When children born to women living with HIV can be ensured uninterrupted access to nutritionally adequate breast milk substitutes that are safely
prepared and fed to them, they are at less risk of illness and death if they are not breastfed.

However, when these conditions are not fulfilled, in particular in an environment where infectious diseases and malnutrition are the primary causes of death during infancy, artificial feeding substantially increases children's risk of illness and death.

In most countries, policy must cover a range of socioeconomic conditions, and the aim should be to promote and protect breastfeeding for the majority of women while offering as much choice as possible to women who are HIV positive, enabling them to decide what is most appropriate for their circumstances and supporting them in their choice.

This statement has caused a great deal of controversy. Recognition that the virus can be transmitted through breastmilk came at a time of tremendous effort to improve breastfeeding rates generally. The United Nations Programme on HIV/AIDS (UNAIDS) estimates that 800,000 children were newly infected with HIV in 2002, and that 90% of these new infections occurred in sub-Saharan Africa (UNAIDS/WHO 2002). Almost all HIV-1 infected children acquire HIV-1 from their mothers, either during pregnancy, at birth or via breastfeeding. Clearly in many of these sub-Saharan areas a safe alternative source of nutrition cannot be guaranteed, either on the grounds of sanitation, supply or cost.

In Uganda for example, HIV-positive mothers were until recently given free formula milk via a UNICEF program. However these supplies have now discontinued (due to lack of reaching the target group and on cost grounds) and most of the women involved have reverted to breastfeeding because of cost (Wendo 2003). Even amongst those who chose formula, many were breastfeeding during the night for convenience, and it is suggested that mixed feeding increases the risk of transmitting HIV through breastmilk (Coutsoudis et alia 1999, 2001).

It will noted that the WHO recommendation cited above puts the final decision of whether to breast-feed or not on the HIV-infected mother. This is a very ethical and responsible approach provided of course the Mother has all the facts at her disposal, is sufficiently educated and intelligent to use the information and that she has an available safe alternative. Clearly in many societies these factors are not met, either wholly or partially.

Most of the published studies which provide this information are based on the extremely difficulty “mortality balance” (For example: WHO 2000a, Weinberg 2000). One the one hand, so many breast-fed children will die of AIDS, whilst on the other hand so many children will die of unhygienic practices arising from the improper use of alternative feeding methods.

However, as Dabis and Ekpini (2002) point out, “prevention of mother-to-child transmission should become a universal standard of care in Africa, and research should continue to reduce the transmission risk to well below 5%. In the opinion of the present author this statement is true of all parts of the world, developed or not.
HIV cycle needs to be broken, using a multi-faceted approach – safe sex, not breast-feeding unless absolutely necessary, and a co-ordinated health care system dedicated to this particular task.
Appendix VIII

Mastitis

Mastitis in the lactating mother is important for a number of reasons:

- It is a major cause of reduction in milk production.
- Approximately a quarter of mothers cite mastitis as their reason for stopping breast-feeding (WHO 2000b).
- By altering the cellular composition of milk sand local defences within the breast itself, mastitis is a powerful risk factor promoting vertical transmission of infections (Michie and Gilmour 2001).
- The condition may go on to give rise to a local abscess.

Mastitis is an inflammation of the breast. It is commonest during lactation and is usually caused by infection with organisms such as Staphylococcus aureus entering through cracks or abrasions in the nipples. Symptoms are high fever, redness, hardening and tenderness. Treatment is with antibiotics but an abscess may form which may have to be drained surgically.

Mastitis is relatively common, a range of 5% to 33% being often quoted in the literature (Michie et alia 2003). For example, Riordan and Nichols (1990) found one third of mothers had mastitis while breastfeeding their last baby and Jonsson and Pulkkinen (1994) suggested that the rates were somewhat higher than commonly supposed. However, differences in case definition and reporting make accurate figures difficult to collect.

The problem mostly develops in the early stages of feeding, with 74-95% of cases observed in the first three months. All respondents to the Riordan and Nichols survey reported continuing to breastfeed through the infection. Mothers reported that the following factors (in order of importance) preceded their mastitis: fatigue, stress, plugged duct, change in the number of feedings, engorgement/stasis, an infection in the family, breast trauma and poor diet.

Fetherston (1997) found a cumulative incidence rate for lactation mastitis of 27.1% in breastfeeding mothers for the first three months postpartum. Mastitis was given as the reason for cessation of breastfeeding by 18% of women who ceased to breastfeed - it was the third most commonly stated reason given for cessation of breastfeeding.

Blocked duct(s) and increased levels of stress are significant predictors for mastitis in mothers who had breastfed a previous infant and blocked duct(s), restriction from a tight bra, attachment difficulties, and nipple pain during a feed are significant predictors for mastitis in first time breastfeeding mothers (Fetherston 1998). However, it seems clear that mastitis is most frequently caused by stasis (reduction or cessation of flow) of milk. The reasons for this is not altogether clear (Michie et alia 2003).

As has been already shown in this report, breast milk has the potential to transmit a number of viral infections. Clinical mastitis and breast abscess increases the risk of viral transmission from mother to infant (Michie and Gilmour 2001). For retroviruses
(HIV-1, HIV-2 and HTLV-1) this has been estimated as increasing the risk 2-4 times (Semba et alia 1999a, 1999b).

Mastitis and breast abscess are preventable in most situations (WHO 2000b). Early exclusive breast feeding, ensuring unrestricted access of the infant to the breast, together with support to establish and encourage exclusive demand breast feeds will reduce the risk of stasis. Correct positioning of the infant leading to proper attachment is likely to significantly reduce the majority of potential cases. Counselling and direct coaching of mothers has been shown to reduce subclinical mastitis too (Michie et alia 2003).

Where mastitis is apparent, it is important to continue feeding from both breasts (WHO 2000b), except in cases where viral infections are diagnosed (WHO 2000b). There are a number of treatments, including analgesics (preferably non-steroidal anti-inflammatory agents.)
Appendix IX

Silicone breast implants and breast-feeding

Approximately 800 000 to 1 million women in the United States have received breast implants containing silicone (elemental silicon with chemical bonds to oxygen) in the implant envelope or in the envelope and the interior gel.

Concern has been raised about the possible effects to the nursing infant if mothers with implants breastfeed. This concern was initially raised in reports that described esophageal dysfunction in 11 children whose mothers had implants (Levine and Ilowite 1994; Levine et alia 1996). This finding has not been confirmed by other reports.

Silicone chemistry is extremely complex; the polymer involved in the covering and the interior of the breast implant consists of a polymer of alternating silicon and oxygen atoms with methyl groups attached to the oxygen groups - methyl polydimethyl-siloxane (LeVier et alia 1993). The length of the polymer determines whether it is a solid, gel, or liquid. There are only a few instances of the polymer being assayed in the milk of women with implants; the concentrations are not elevated over control samples (Berlin 1994).

There is no evidence at the present time that this polymer is directly toxic to human tissues; however, concern also exists that toxicity may be mediated through an immunologic mechanism. This has yet to be confirmed in humans. Except for the Levine study cited above, there have been no other reports of clinical problems in infants of mothers with silicone breast implants (Kjoller et alia 1998). It is unlikely that elemental silicon causes difficulty, because silicon is present in higher concentrations in cow milk and formula than in milk of humans with implants (Semple et alia 1998). The anticolic compound simethicone is a silicone and has a structure very similar to the methyl polydimethylsiloxyane in breast implants. Simethicone has been used for decades in the USA and Europe without any evidence of toxicity to infants.

The AAP Committee on Drugs does not feel that the evidence currently justifies classifying silicone implants as a contraindication to breastfeeding (AAP 2001).
References


