



# Statement

Nutrition Committee of the Canadian Paediatric Society and the  
Committee on Nutrition of the American Academy of Pediatrics

## Breast-Feeding — A Commentary in Celebration of the International Year of the Child, 1979

Despite increasing evidence for the apparent superiority of human milk, formula-feeding has progressively supplanted breast-feeding throughout much of the industrialized world, with the exception of the Soviet Union and Israel.<sup>1</sup> The decline of breast-feeding in industrialized society began about 50 years ago, then spread to developing countries. This change in feeding patterns has had implications for infant morbidity and mortality and for the economy of those nations which can least afford to waste their resources.<sup>1</sup>

The need to intensify the promotion of a return to breast-feeding has been stated in several documents.<sup>2,3</sup> A resolution adopted by the World Health Organization in May 1974 urged all member countries to undertake vigorous action,<sup>4</sup> and an International Pediatric Association seminar on nutrition in 1975 placed special emphasis on education programs.<sup>5</sup>

For much of the population in developing countries, both economic and health considerations speak conclusively for breast-feeding.<sup>2,6</sup> The physiologic role of breast-feeding has received less emphasis in the industrialized world because of the low morbidity and mortality of bottle-fed infants, which has resulted from nutritional and technological advances in the formulation and manufacture of infant formulas<sup>7,8</sup> as well as from the higher standards of housing, sanitation, and public health services in these countries.<sup>9</sup> However, newer information suggests that significant advantages still exist for the breast-fed infant,<sup>10,11</sup> including one study in which a lower morbidity was reported during the first year of life.<sup>12</sup> Therefore, it seemed timely to examine and evaluate present-day information, to provide up-to-date guidance for physicians in counseling mothers with regard to feeding their infants, to discuss factors related to the decline of breast-feeding in the United States and Canada, and to propose ways and means to encourage breast-feeding if the advantages of breast-feeding prove compelling.

### NUTRITIONAL AND PHYSIOLOGICAL PROPERTIES OF HUMAN MILK

On teleological grounds, it is reasonable to suppose that the milk of each species is well adapted to the particular needs of that species. On this basis, the various properties of human milk will be compared with those of infant formulas.

#### Nutrition

Differences in the composition of human milk and unmodified cow's milk have been known for many years.<sup>13,14</sup> Early attempts to substitute unmodified cow's milk for human milk were unsatisfactory for feeding infants. Heat treatment, homogenization, and the addition of carbohydrate to cow's milk improved to some extent its usefulness and tolerance by infants, but protein and ash levels were still unphysiologically high, and the fat was absorbed poorly.

Newer knowledge of nutritional and physiological needs of infants and advances in technology have led to the development of newer infant formulas which provide many of the nutritional and physiological characteristics of breast milk.<sup>7,8</sup> However, there are still differences between infant formulas and breast milk,<sup>11</sup> and we believe human milk is nutritionally superior to formulas for the following reasons.

*Fat and Cholesterol.* Lipids of human milk are better absorbed by infants than those of cow's milk,<sup>15</sup> mainly because of the fatty acid composition and the position of the fatty acids on the glycerol molecule. Human milk has a high oleic acid content,<sup>16</sup> and the palmitate residue is mainly in the 2-position of the glycerol molecule.<sup>17</sup> This improves its digestibility. The presence of significant lipolytic activity in human milk may also help fat absorption.<sup>18</sup> Human milk lipids are better absorbed than those of earlier marketed infant formulas.<sup>15,19,20</sup> Vegetable oils, which replace butterfat in newer infant formulas,<sup>7,8</sup> have

significantly improved fat absorption<sup>16</sup>—even in the first month of life—to practically the level achieved with breast milk.<sup>15</sup>

In preterm newborn infants fed formulas, fat malabsorption may still be as high as 25% to 30%.<sup>21</sup> Medium-chain triglycerides (MCT) permit fat absorption similar to that from breast milk.<sup>22,23</sup> Poor fat absorption makes it difficult for preterm infants to meet energy requirements, and nitrogen retention may also be decreased. Breast milk or MCT-containing infant formulas help overcome this problem.

When the butterfat of milk is replaced by vegetable oils in infant formulas to provide better fat absorption, most of the cholesterol is removed. Thus, these formulas are practically devoid of cholesterol, but human milk contains cholesterol. Cholesterol may play a significant role in early feeding of the infant. Even though humans synthesize cholesterol efficiently, some authors have suggested that exogenous cholesterol for formation of nerve tissue or for synthesis of bile salts may be useful to the infant. It would be difficult to determine this experimentally. Another question is prompted by animal studies suggesting that the ingestion of cholesterol during infancy may induce enzymes that can subsequently better metabolize cholesterol and thereby result in lower serum cholesterol levels early in life.<sup>24,25</sup> This has not been confirmed in other animal studies or retrospective and cross-sectional studies carried out in infants. High cholesterol feeding did not protect the subjects against high serum cholesterol levels later in life.<sup>26,27</sup> An ongoing, prospective, longitudinal study in the Boston area<sup>28</sup> seems to show that 30-year-old adults who were exclusively breast-fed for at least two months had significantly lower serum cholesterol levels than those who had been breast-fed for less than two months. This finding is now being tested in a larger group of subjects from four other longitudinal studies. Because subjects in the Boston study had received evaporated cow's milk (which does contain cholesterol), it is difficult to attribute the findings to cholesterol per se. Active research is needed to determine the effects of dietary cholesterol or breast-feeding on serum cholesterol level and the incidence of arterial disease in later life.

A recent concern about the fat composition of infant formulas is the relatively high polyunsaturated fatty acid content of most of them. Vegetable oils, which are well absorbed by the infant, are usually higher in polyunsaturated fatty acid content than the fat in "average" breast milk. Linoleic acid or polyunsaturated fatty acid levels

in human milk vary from 8% to 20% of the fat,<sup>14,29</sup> depending on the type of fat consumed by the mother, but the average level for human milk in recent years is considered to be about 14%.<sup>30</sup> The physiologic consequences of feeding the full-term infant a formula which has a linoleic acid content two or three times the average in human milk are not known. However, in preterm infants, formulas with high levels of polyunsaturated fatty acids may cause a relative or absolute deficiency of vitamin E<sup>31</sup> (characterized by hemolytic anemia) as a result of increased lipid peroxidation, particularly when iron supplements are also given. This is reviewed in a recent statement on feeding low-birth-weight infants.<sup>32</sup>

*Protein.* The neonatal and suckling periods are characterized by a level of anabolic activity almost never equaled later in life. This is especially true in low-birth-weight infants. Clearly then, it is vital to provide an optimum source and level of nitrogen intake.<sup>33,34</sup> Most formulas used for full-term and preterm infants are based on cow's milk protein.<sup>7</sup> Recent studies<sup>35,36</sup> suggest that current estimates of protein requirements of preterm infants may be too high because they are based on cow's milk protein rather than on human milk protein. The total level of protein in formulas is higher than in human milk to provide a margin of safety for the infant.

The proteins in human milk differ qualitatively from those in cow's milk. In the latter, the casein/albumin-globulin whey ratio is approximately 76:24; in human milk it is approximately 40:60. The major fraction of albumin-type protein in cow's milk whey is composed of  $\beta$ -lactoglobulin, which is not present in human milk.<sup>37</sup> The major albumin of human milk whey is  $\alpha$ -lactoglobulin. Some milk-based formulas have been made from demineralized whey and milk to provide a casein/whey ratio similar to that in human milk. The sulfur amino acids in cow's milk are provided mainly by methionine, with a small amount of cystine; relatively more cystine is present in human milk. Because of this lower protein content, human milk also contains less aromatic amino acids than cow's milk. Thus, the amino acid composition of human milk is particularly suited to the metabolic peculiarities of the newborn infant, especially those of the preterm infant, whose liver is inefficient in converting methionine to cystine and in metabolizing tyrosine.<sup>35</sup> There are notable differences between the plasma amino acid patterns of preterm infants fed human milk and those fed cow's milk-based infant formulas,<sup>36</sup> but the importance of this remains unclear.

Breast milk also contains a variety of nucleotides.<sup>38</sup> They provide a source of nonprotein nitrogen which has been postulated to play a role in anabolism and growth. In this context, it is interesting to note that recent analyses of human milk from well-nourished mothers who had been lactating for two to three months showed that the average protein concentration was only 0.88 gm/dl, representing about 75% of the total nitrogen; the remaining 25% was supplied as nonprotein nitrogen.<sup>39</sup> Previous estimates of breast milk protein were based on determination of total nitrogen by Kjeldahl N-analysis, which did not distinguish protein nitrogen from nonprotein nitrogen. In cow's milk, only 6% of the total nitrogen is supplied as nonprotein nitrogen<sup>40</sup>; the remainder is supplied as intact protein. Whether some of the factors in the nonprotein nitrogen in human milk are of nutritional significance to the infant remains to be studied.

*Iron.* The iron content of milk from all mammalian species is low. In a recent study,<sup>41</sup> an average of 0.2 to 0.3  $\mu\text{g}/\text{ml}$  was found in term human milk. Teleologically, the low iron concentration in human milk may be extremely useful because there are two bacteriostatic proteins in human milk<sup>42</sup>—lactoferrin and transferrin—which lose their bacteriostatic properties when saturated with iron. A review of the relation of the iron content of milk to the incidence of infection was recently published.<sup>43</sup> Lactoferrin is present in human milk in much higher quantities than in cow's milk.<sup>44</sup> The small amount in milk used to make infant formulas is denatured, and its bacteriostatic properties have been lost in processing the formula.

Data suggest that about 50% of the iron in human milk is absorbed; iron in pasteurized cow's milk is less well absorbed.<sup>45-47</sup> McMillan et al.<sup>46</sup> recently reported that the iron in human milk is sufficient to meet the iron requirements of the exclusively breast-fed, full-term infant until he triples his birth weight. It has been postulated that the better availability of iron in human milk, as compared to cow's milk, may be the result of the lower content of protein and phosphorus and the higher levels of lactose and vitamin C.<sup>46</sup> Present-day infant formulas include most of these advantages (i.e., lower protein and phosphorus and a greater lactose and vitamin C content). Heat treatment in making the formula has also significantly improved iron absorption.<sup>48</sup> In 1970, Gross found that about 50% of the iron in infant formula containing 1.4  $\mu\text{g}/\text{ml}$  was retained by infants.<sup>49</sup> The infant fed pasteurized cow's milk too early in life is prone to iron deficiency partly

because the milk is a poor source of iron and partly because cow's milk which has not been properly heat-treated causes significant gastrointestinal blood loss in some infants.<sup>50</sup> This is not found with heat-treated formulas.

### Overfeeding and the Obesity Question

The relationship between infant feeding and obesity in later life is still poorly understood, but it has been the subject of many conferences and papers.<sup>51</sup> Obesity is extremely prevalent in Canada<sup>52</sup>; 10% of the men and 30% of the women are obese. Obesity is also prevalent in the United States, where current estimates indicate that 25% to 33% of the population is overweight or obese.<sup>53</sup> The effects of obesity probably include decreased life expectancy, but evidence for increased mortality from hypertension and cardiovascular disease is still conflicting.<sup>54</sup>

Some studies have shown a higher prevalence of obesity in formula-fed infants than in breast-fed infants<sup>2</sup>; other studies show no difference between formula-fed and breast-fed infants.<sup>55</sup> Studies have suggested that obese infants may be at increased risk of becoming obese children<sup>56</sup> and adults,<sup>57,58</sup> but the evidence is fragmentary and at times conflicting. Although animal studies suggest that early overfeeding increases the cellularity of the adipose tissue, there is also evidence that fat-cell multiplication in humans continues throughout childhood.<sup>59</sup> In any event, because the first few years of life may be a critical time for adipose tissue development, excessive weight gain should be avoided during this time and throughout childhood. Overfeeding in infants may affect food habits and regulation of energy intake later in childhood and adult life.<sup>40,60</sup> Although current infant feeding practices are associated with a high prevalence of obesity in infants, the extent to which this predisposes to obesity in childhood and adult life is still uncertain.

There are several reasons why breast-feeding may better control caloric intake than formula-feeding. Milk intake by the breast-fed infant is determined primarily by the amount needed to satisfy the infant; the mother of the formula-fed infant may see some formula left in the bottle and induce the infant to consume more.<sup>40</sup> In addition, recent studies have shown that milk samples from nursing mothers at the end of feeding contain much higher levels of lipid and protein than at the beginning of the feeding; this change in composition may satiate the infant or in some way signal a cessation of feeding.<sup>61</sup>

However, a more significant fact may be that the early introduction of solid foods, which adds

greatly to the caloric intake of the infant, has paralleled the use of infant formulas. In a study in England, twice as many bottle-fed infants as breast-fed infants were receiving solid foods at age 2 months.<sup>62</sup>

### Immunologic Considerations

At birth the newborn infant is suddenly transferred from a regulated environment to one in which prompt adaptation is required for survival. He must receive adequate nourishment and quickly develop immunologic mechanisms to enable him to exist in a hostile environment. There is increasing evidence that newborn infants can acquire certain important elements of host resistance from breast milk while maturation of his own immune system is taking place.<sup>63</sup> The human breast secretes antibodies to some intestinal microorganisms, and this may help protect breast-fed infants from enteric infections.<sup>64-66</sup> An important recent observation has established the presence of an enteromammary system by which enteric antigen-stimulated mucosal plasma cells in the mother migrate to breast tissue where they secrete antibodies or are secreted directly into breast milk where antibodies are produced.<sup>67</sup> Most of the factors contributing to immunologic protection *cannot* be supplied by heat-treated formula.

The critical role of breast-feeding in the prevention of gastroenteritis in infants in developing countries has been demonstrated. Although gastroenteritis is less common in infants in industrialized countries, breast-fed infants have been shown to be less susceptible.<sup>68</sup> A recent study<sup>69</sup> further suggests that breast-feeding is protective against intestinal infections, but only when it is an ongoing process. Respiratory infections, meningitis, and Gram-negative sepsis are also reported to be less frequent among breast-fed infants.<sup>12,70,71</sup> However, a small study in an affluent community has shown no difference in resistance to infection between breast- and formula-fed infants.<sup>72</sup> A study in a Canadian Eskimo population concluded that children who had been breast-fed for at least one year had an incidence of chronic otitis media that was one eighth that of children who had been bottle-fed as infants.<sup>73</sup>

The newborn infant does not receive a full complement of antibodies transplacentally. Immunoglobulin G (IgG) is provided in this manner; IgA and IgM are not. The serum levels of these three immunoglobulins are significantly higher in colostrum-fed infants. Some intestinal absorption of these macromolecules may take place,<sup>74</sup> although, unlike other animal species, human

colostral antibodies are not absorbed from the intestine in significant quantities during the neonatal period. In colostrum and breast milk, secretory IgA is the dominant immunoglobulin.<sup>75</sup> It is resistant to proteolysis and confers passive mucosal protection of the gastrointestinal tract against the penetration of intestinal organisms and antigens.<sup>76</sup>

Breast milk is also a source of the iron-binding whey protein, lactoferrin. It is normally about one third saturated with iron and has an inhibitory effect on *Escherichia coli* in the intestine. Its bacteriostatic effect is diminished as it becomes saturated with iron.<sup>47,77</sup> Heating also results in loss of its iron-binding capacity as well as of its inhibitory effect on *E. coli*. Arguments against the fortification of infant formula with iron, on the basis of saturating lactoferrin, have no validity because heat-treated infant formula has no inhibitory effect on the growth of *E. coli* when compared to fresh, unprocessed human or cow's milk. The addition of iron (12 mg/liter) does not change the rate of growth of *E. coli* in formula.<sup>78</sup> There is no evidence of an increased incidence of infection in infants fed iron-fortified formulas compared with those fed unfortified formulas.

Lysozymes are bacteriolytic enzymes which are more abundant in human milk than in cow's milk.<sup>79</sup> Bacterial lysis by IgA antibodies does not occur unless lysozymes are present.<sup>80</sup> The biologic importance of low concentrations of specific complement fractions C3 and C4 in human milk is unknown at present.

Living leukocytes are normally present in human colostrum.<sup>79,81</sup> Macrophages comprise about 90% of the cells and are found in a concentration of about 2,100/cu mm. These cells have the ability to synthesize complement, lysozyme, and lactoferrin. Lymphocytes comprise 10% of the cells; some are T cells which may have the ability to transfer delayed hypersensitivity from the mother to her infant; others are B cells which synthesize IgA. Although the biologic importance of the colostral cells to the infant has yet to be determined, pregnant women orally immunized with a nonpathogenic strain of *E. coli* during the last month of gestation produce colostrum with IgA-producing plasma cells that can synthesize antibodies to *E. coli* liposaccharide.<sup>82</sup>

Another component of the possible "nutritional immunity" conferred by breast milk is the maintenance of a microflora in which *Lactobacillus bifidus* is predominant.<sup>83</sup> The alimentary canal is sterile at birth; within a few hours bacterial colonization occurs. After three or four days, more than 99% of the flora consists of the anaer-

obic *L. bifidus*, with a paucity of putrefactive bacteria such as the Gram-negative anaerobes (*Bacteroides*, *Proteus*, *Clostridium*, and *E. coli*). The mechanisms by which a wholly breast-fed infant is able to maintain an acid stool with *L. bifidus* as the predominant organism are poorly understood, but they probably involve several complex, interdependent factors, including the low buffering capacity of breast milk,<sup>84</sup> the high lactose content of milk,<sup>84</sup> specific *L. bifidus* growth-promoting factors,<sup>38</sup> and the destruction of ingested *E. coli* by lactoferrin in the alkaline pH of the small intestine.<sup>79</sup> Even though most infant formulas provide a lactose content similar to that of human milk and a buffering capacity almost as low as that of human milk, the predominantly *L. bifidus* flora is not maintained. With the introduction of supplementary milk feedings or solid foods in breast-fed infants, the microflora changes to the usual adult type.

Breast milk also spares the gastrointestinal tract from exposure to foreign food antigens at a time when macromolecules may be readily absorbed<sup>85</sup> and may cause a local reaction. Evidence suggests that allergic manifestations later in childhood (such as eczema, rhinitis, and asthma) are more prevalent in bottle-fed infants than in breast-fed infants, presumably because of the early exposure to cow's milk and other food antigens.<sup>86-88</sup> The incidence of cow's milk allergy is low, but, when it does occur, it may cause a wide spectrum of clinical symptoms and affect the jejunal mucosal histology and growth.<sup>89,90</sup> In a Boston study,<sup>28</sup> a slightly reduced occurrence of allergic manifestations during childhood and adult life was found in persons who were wholly breast-fed up to 2 months of age. This reduction was more evident when breast-feeding was coupled with a negative history of allergy. A recent study has noted a reduction in allergic disease in breast-fed infants with a strong family history of allergy, strict environmental control, and delayed immunization.<sup>91</sup>

Immunologic immaturity of the gut is considered to be a factor of possible importance in the pathogenesis of necrotizing enterocolitis.<sup>92</sup> This frequently fatal condition is rare in low-birth-weight, breast-fed neonates. Its frequency is apparently increased in preterm infants fed hypertonic formulas.<sup>93</sup> A similar disorder can be produced experimentally in goats by feeding dialyzed milk of higher osmolality.<sup>94</sup> Fresh rat breast milk is protective in the newborn rat subjected daily to hypoxia.<sup>92</sup> However, the degree of protection offered by breast milk against necrotizing enterocolitis in the human infant is not yet

known. At a recent workshop on human milk in premature infant feeding, the need for active research to determine if it is protective and to identify the properties most important for such protection was emphasized.<sup>95</sup>

Much remains to be learned about the role of the secretory immunoglobulin system and its relationship to viral, bacterial, and food antigens in the early months of life.

The sudden infant death syndrome (SIDS) is the most frequent cause of death in infants between 1 and 12 months of age.<sup>96</sup> It has been reported by some<sup>97,98</sup> to occur significantly less often in breast-fed infants, although others<sup>99,100</sup> have found no association with the type of feeding. SIDS is probably a multifactorial condition of presently unknown etiology and pathogenesis.

#### Miscellaneous

The low renal solute load in breast milk provides a margin of safety for the young infant with physiologically immature renal function.<sup>2</sup> This was extremely important some years ago when high-protein, high-solute formulas were fed. It is of less consequence today because infant formulas now provide renal solute loads which are not greatly in excess of those of breast milk. In low-birth-weight infants weighing less than 1,500 gm, the low sodium<sup>101</sup> and calcium<sup>102</sup> content of formulas, and perhaps of pooled term human milk,<sup>103</sup> may lead to hyponatremia and impaired growth and provide insufficient calcium for skeletal mineralization. Based on these considerations, some increases in mineral levels might be made in formulas intended for use by premature infants to achieve a mineral retention equivalent to that in utero.<sup>32</sup>

At a global level, breast-feeding may play a role as a means of contraception,<sup>104</sup> but it is not reliable for the individual mother. There may be a significant delay in ovulation in many mothers when infants are fully breast-fed. Ovulation and menstruation are delayed for at least ten weeks in some women, and up to six months in others.<sup>1,104,105</sup> In some cultures, the contraceptive effect is attributed in part to the taboo of sexual intercourse while the mother is breast-feeding the infant.<sup>1,106</sup> Although earlier oral contraceptives—which contained large doses of both estrogens and progestins—tended to suppress lactation, the newer preparations—which contain progestins alone—do not interfere with milk secretion and may even increase it.<sup>104</sup>

Many drugs ingested by a lactating mother will be present in her milk and excreted in amounts depending on various factors, such as blood levels,

dissociation constants, and fat solubility. This subject has been well reviewed.<sup>107</sup> Drugs such as antithyroid compounds, antimetabolites, anticoagulants, and most cathartics may be hazardous to the nursing infant, and a nursing mother should be advised not to take these drugs.<sup>108</sup> Recent findings of organochlorine insecticides such as DDT, polychlorinated biphenyls (PCBs), and other environmental pollutants in breast milk have raised questions which have not as yet been resolved in regard to the safety of breast-feeding by all mothers.<sup>109</sup> The restriction of the use of DDT resulted in a decrease in the concentrations found.<sup>110,111</sup> No such change has been seen for PCBs, but banning of the compound is more recent.<sup>111</sup>

Early and prolonged contact between a mother and her newborn infant can be an important factor in mother-infant "bonding" and in the development of a mother's subsequent behavior to her infant.<sup>112,113</sup> It has been reported that mothers who have had prolonged physical ("skin-to-skin") contact with their newborn infants exhibit greater soothing behavior, engage in more eye-to-eye contact with the infant later in infancy, and are more reluctant to leave their infants with someone else than mothers who have had the lesser amount of contact which prevails in most maternity wards.<sup>113</sup> Breast-feeding may promote maternal-infant bonding, particularly when this contact is desired by the mother.<sup>10</sup>

#### EPIDEMIOLOGY OF BREAST-FEEDING

A steady decline in breast-feeding was documented in both developed and developing countries until recently. Before 1950, in the industrialized world, breast-feeding was more common among the lower social classes. However, in the past 10 to 15 years the decline in breast-feeding as a concomitant of socioeconomic development has changed. Data from the United States show that breast-feeding is even less commonly practiced among lower income groups than among higher income groups.<sup>114</sup> In the 1940s, approximately 65% of the infants in the United States were breast-fed while in the hospital.<sup>115</sup> By 1972, only 28% and 15% were nursed by their mothers by the time they reached the age of 1 week and 2 months, respectively.<sup>116</sup> Statistics from the United Kingdom also reveal a significant decline, with figures of 60% in 1948 and a little more than 40% in 1968.<sup>117</sup> In a marketing survey completed in 1973 by Ross Laboratories in Canada, 35% of the infants were breast-fed during the first week of life; by 3 and 6 months, only 17% and 6%,

respectively, were still breast-fed. *Consumer Reports* states that, in 1975 in the United States, 38% of the women leaving the hospital after childbirth reported they were breast-feeding. In 1976, surveys by Mead Johnson Company and Ross Laboratories found that 53% of infants in the United States and 48% of those in Canada were breast-fed at the time of discharge from the hospital.

#### FACTORS RESPONSIBLE FOR THE DECLINE OF BREAST-FEEDING

Historically, bottle-feeding was intended to replace the wet nurse when breast-feeding by the mother was not possible, because many wet nurses were irresponsible and only the wealthy could afford a healthy wet nurse.<sup>118</sup> Pasteurization of milk helped initiate sanitation practices which permitted some substitution of cow's milk for breast-feeding. Late in the 19th century, heat treatment of evaporated milk reduced curd tension; the addition of carbohydrate early in the 20th century decreased excessive protein and electrolyte levels, which further improved bottle-feeding. The technologic progress and nutritional discoveries of more recent decades made bottle-feeding a viable alternative. Bottle-feeding gradually replaced breast-feeding and resulted in the development of infant formulas which provide the best alternative for meeting nutritional needs during the first year when breast-feeding is unsuccessful, inappropriate, or stopped early.<sup>10</sup>

With the profound social transformations which have taken place in the Western world, breast-feeding is frequently considered incompatible with modern life-styles or with work outside the home. Furthermore, the advantages of breast-feeding in terms of nutrition, immunity, and psychophysiological interaction between the mother and her offspring are frequently considered to be outweighed by possible inconvenience, by fear or failure of lactation, and by anxieties concerning infection and/or cosmetic effects on the breasts. In addition, the act of breast-feeding is frequently regarded as a source of embarrassment or shame, and it is usually carried out privately. It is a curious commentary on our society that we tolerate all degrees of explicitness in our literature and mass media as regards sex and violence, but the normal act of breast-feeding is taboo.

When breast-feeding was universal, as it still is in some societies, the "art" was handed down through the generations. This familiar personal heritage was comforting and reassuring to the young mother. In Western societies, the new

mother frequently receives little encouragement to breast-feed from her husband, relatives, friends, and even physicians. Furthermore, because formula-feeding is safe, acceptable, and promoted as "nearly identical" in nutritional composition to breast milk, the new mother may have little inclination to breast-feed.

Nowadays, mothers in many maternity wards are expected to formula-feed their infants for the convenience of the hospital staff. To enable the new mother to breast-feed, she needs free access to her infant, knowledgeable help, encouragement, and instruction. Recent studies have shown a dramatic increase in breast-feeding with in-hospital instruction from staff and mothers.<sup>119-121</sup> Sedgwick<sup>122</sup> has found that 96% of the mothers were able to breast-feed successfully when circumstances were favorable.

Successful lactation is the result of reflex interactions between the mother and her offspring.<sup>123</sup> Stimulation of the breast, the areola, and the nipple leads to the secretion of prolactin in the mother's circulation and to milk secretion in the alveoli.<sup>124</sup> The suckling stimulus brings about the release of oxytocin, which contracts myoepithelial cells around the alveoli, thereby ejecting milk into lacteals.<sup>125</sup> Emotional tension and stress readily inhibit this reflex; therefore, the anxieties of the young mother during a short stay on an obstetric ward—where she often receives inadequate instruction and little emotional support—may explain why success is elusive, even when the mother wishes to breast-feed. The main cause of lactation failure is thought to be inhibition of the "milk ejection reflex."

Drugs such as chlorpromazine and oxytocin nasal spray<sup>105</sup> can be used for a short period to assist a mother who is having difficulty with "let down" in establishing successful lactation. The reasons for stopping breast-feeding after the mother goes home include cracked nipples and infection<sup>126</sup> or erroneous advice to adhere to a rigid three- to four-hour feeding schedule.<sup>105,112</sup> Many infants cry to be fed every two to three hours during the first two weeks of life. This can lead some mothers to feel that they have an inadequate supply of milk. If mothers resort to supplemental feeding, lactation may cease within a week or so because the development of full milk production is dependent on emptying the breasts.<sup>105,127</sup> This is also the problem with the advice to feed "ten minutes on each breast," which may deprive the infant of the nutritional benefits of milk of a somewhat different composition at the end of a feed.<sup>61</sup> Good breast-feeding

techniques are described in detail by Applebaum<sup>105</sup>; when they are practiced, breast-feeding can be a convenient and pleasant way for the majority of women to feed their infants.<sup>112,128</sup>

#### WAYS TO INCREASE BREAST-FEEDING

Breast-feeding is strongly recommended for full-term infants, except in the few instances where specific contraindications exist. Ideally, breast milk should be practically the only source of nutrients for the first four to six months for most infants. When the nursing mother is healthy and well fed, fluoride and possibly vitamin D may be the only supplements which need to be provided to the infant. Iron may also be given after about four months.<sup>47</sup>

Because the decision to breast-feed or not is the result of many factors—including education, cultural background, and personality—information about breast-feeding should be included in nutrition and sex education in schools.<sup>129,130</sup> This information and education should also be provided for boys because the husband's attitudes are important in successful lactation.<sup>5,129</sup>

There is also a need for all physicians to become much more knowledgeable about infant nutrition and the physiology, value, and technique of breast-feeding. Education about breast-feeding should be directed to the undergraduate curriculum of physicians and nurses and to the residency training program of obstetricians and pediatricians.

The routine in many hospitals makes breast-feeding difficult; therefore, efforts should be made to change obstetrical ward and neonatal unit practices to increase the opportunity for successful lactation. Changes may include the following:

1. Decrease the amount of sedation and/or anesthesia given to the mother during labor and delivery because large amounts can impair suckling in the infant.<sup>105</sup>
2. Avoid separation of the mother from her infant during the first 24 hours.
3. Breast-feed infants on an "on demand" schedule rather than on a rigid three- to four-hour schedule, and discourage routine supplementary formula feedings.
4. Reappraise physical facilities to provide easy access of the mother to her infant. Rooming-in of mother and infant is important to successful lactation.

Many women require encouragement to foster the "milk ejection reflex"<sup>126</sup>; therefore, the personnel involved in the care of pregnant

women and new mothers should be psychologically oriented toward breast-feeding and should be well informed about the preparation of the breasts, lactation, and the management of breast-feeding. Nursing personnel with personal experience in breast-feeding can be extremely helpful.<sup>131</sup> In addition, mothers should be taught the details of breast-feeding during prenatal classes as well as during the postpartum period. Consultation between maternity services and members of La Leche League International (9616 Minneapolis Avenue, Franklin Park, IL 60131) or the Human Lactation Center Ltd. (666 Sturgis Highway, Westport, CT 06880) may be helpful in encouraging breast-feeding.

The availability of infant formulas and other infant foods has influenced infant feeding practices throughout the world. Apathy and lack of knowledge about infant nutrition by health professionals and the medical profession have been important problems. Effective and, at times, unfair publicity of formula-feeding, lack of financial support from governments in developing countries, and the need for many women to work outside the home have also been contributory factors. These factors have resulted in a decrease in breast-feeding in sections of society where formula use may not be suitable.<sup>1,3,132,133</sup> Breast-feeding along with provision of inexpensive "multi-mix" weaning foods have been suggested as two immediate priorities in developing countries. Also, supplies of infant formulas similar in nutritional quality to breast milk must be available for infants who cannot breast-feed; particular care must be paid to ensure safe water and sanitary conditions for mothers using these formulas.

Many women in both industrialized and developing countries now work outside the home, either for economic or personal reasons. Increasing numbers of married women have a full-time career that they are either reluctant or unable to give up. Therefore, it is recommended that countries adopt legislation to enable new mothers to obtain three to four months of leave after delivery to care for their infants. In addition, studies need to be carried out to determine whether it is feasible or practical for mothers to continue to breast-feed their infants—possibly in day nurseries adjacent to places of work—after returning to work.

#### SUMMARY

1. Full-term newborn infants should be breast-fed, except if there are specific contraindications or when breast-feeding is unsuccessful.

2. Education about breast-feeding should be provided in schools for all children, and better

education about breast-feeding and infant nutrition should be provided in the curriculum of physicians and nurses. Information about breast-feeding should also be presented in public communications media.

3. Prenatal instruction should include both theoretical and practical information about breast-feeding.

4. Attitudes and practices in prenatal clinics and in maternity wards should encourage a climate which favors breast-feeding. The staff should include nurses and other personnel who are not only favorably disposed toward breast-feeding but also knowledgeable and skilled in the art.

5. Consultation between maternity services and agencies committed to breast-feeding should be strengthened.

6. Studies should be conducted on the feasibility of breast-feeding infants at day nurseries adjacent to places of work subsequent to an appropriate leave of absence following the birth of an infant.

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Initiated by the Nutrition Committee of the Canadian Paediatric Society, this statement was prepared by both the Committee on Nutrition of the American Academy of Pediatrics and the Nutrition Committee of the Canadian Paediatric Society.

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