It is not money alone that causes young doctors to leave the country for the U.S.A. or Canada. It is the better, fuller medical life they find there, with hospital attachments and all the facilities they need to practise good medicine. And this view is supported by the fact that a practice vacancy in the U.K. if associated with a general-practitioner hospital will not fail to attract many applicants of high standard. Probably the growth of vocational training envisaged in the Todd Report¹² would make these points even more relevant.

I thank my partner Dr. A. J. M. Cavenagh for compiling the statistics on which this study is based, and the Welsh Hospital Board for their help in financing the project.

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Problems of the Newborn

Feeding

PAMELA A. DAVIES

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"It is gluttony more than genes which causes us to degenerate."
(Leading Article, *B.M.J.*, 1965)

Those burdens of adult life—obesity, atherosclerosis, and hypertension—would seem out of place when discussing the newly born. Yet there is some evidence, and more speculation, that these and possibly other illnesses affecting prosperous countries, may not be entirely unrelated to present infant feeding practices. About 80% of the nation's babies are now fed artificially, and the reasons mothers have for not breast feeding are complex. Perhaps the commonest, as Dr. Mavis Gunther has said, is "the pleasure of seeing the stuff go in. This pleasure takes thousands of people to the zoo and it warms the hearts of little girls who are allowed to feed visiting babies." Too much of the wrong stuff may be going in at present, and perhaps we should stop to consider possible consequences. Some aspects of feeding which strictly speaking concern the older infant more than the newly born will be discussed, for the mother is likely to be seeking her family doctor's advice in the days after delivery, and he will find this a convenient time to provide her with some guidelines for the following months.

Some Differences between Breast-fed and Artificially Fed Infants

Most mothers are now delivered in hospital, and hospitals must assume responsibility for giving their babies relatively large volumes of cow's milk from birth in recent years. Moreover, during the first month of life a sizable proportion of these babies are plied with cereals and within a relatively short time other mixed feeding as well. Breast fed infants are never obese; the artificially fed are becoming so with increasing frequency. This obesity often persists into later childhood, when successful treatment is notoriously difficult. Newly born rats if given very large feeds in the first weeks of life continue

to demand them, grow big and sleek, and tend to die younger than their less well fed controls.

The absorption of foreign proteins from the gut into the circulation is likely to be another consequence of early liberal feeding with cow's milk and a mixed diet, for probably the gut may be unusually permeable in the first weeks of life. Babies given cow's milk from birth soon develop circulating antibodies against it, and there is considerable interest in their possible role in causing later disease. The fact that eczema and asthma are more common in the artificially fed may be relevant in this context. Patients with ulcerative colitis are more likely than healthy controls to have high titres of circulating antibodies to cow's milk protein, and more likely to have been weaned from the breast during the first month of life. There is also similar evidence in patients with coronary artery disease¹—and a necropsy study of infants and young adults has incriminated early feeding with both cow's milk and cereals in the production of atherosclerosis.²

DANGERS OF HYPERNATRAEMIA

Cow's milk contains roughly three times as much salt as human milk. Reconstituted dried milk, if improperly prepared (see below), may contain even more, presenting the newborn kidney with a considerable load which it may have difficulty in excreting. If a baby develops a feverish illness, the intake of salt and fluid may be reduced; but there will also be an increased loss of water from the lungs and skin and, if there is diarrhoea as well, much water may be lost in the stools. So the amount of water available for renal excretion may be very limited, and the concentration of sodium in the serum rises. Such hypernatraemia is almost confined to the artificially fed, and is all too frequently responsible for brain damage and later intellectual retardation.

There is another theoretical and as yet unproved danger in a sustained high salt intake during early infancy—that of later hypertension. Unfortunately research trying to determine whether there is a relation between an excessive intake of salt and hypertension has concentrated on population studies and the adult salt intake. Yet experiments with rats known to be predisposed to hypertension suggest that they develop it more readily if they are fed salt when they are young. Today, in the

human baby ever more salt is added to the diet as meat, chicken, and vegetable broths, which are ladled down expectant throats at ever younger ages. In contrast, the infant giraffe can indulge in mixed feeding only when he has grown tall enough to reach the lowest branches of his favourite acacia tree; and the baby bear has to wait until his mother wakes and emerges from her winter hibernation before he tastes anything but her milk.

"NEONATAL TETANY"

In the first week the newborn kidney is also not very adept at dealing with the high phosphate load presented to it by too liberal feeds of cow's milk. This load leads to a lowering of serum calcium levels and some such infants develop fits, most commonly on the 6th-8th days after birth. This condition is often called "neonatal tetany," and can be prevented largely by restricting the intake of cow's milk in healthy well grown babies in the first week of life.

INFECTION

Gastroenteritis is exceptionally rare in the breast fed, who are also less prone to upper and lower respiratory infections. Sudden, unexpected "cot" deaths too are significantly less common even if breast feeding has been carried out for the first two weeks of life only. Though their aetiology is still uncertain respiratory infections are almost certainly an important contributory cause. Where the gastrointestinal tract is concerned, breast milk probably has a protective effect in three main ways. Firstly, it contains the antibody immunoglobulin A(IgA), which is active against *Escherichia coli*. Secondly, its content of lysozyme also has an antibacterial effect; and, thirdly, the predominance of the anaerobic *Lactobacillus bifidus* in the stools, which leads to an acid pH. These factors ensure that there are relatively few *Escherichia coli* and coliform organisms by comparison with the artificially fed.

Principles of Feeding

Despite these facts, however, an excess of zeal for breast feeding among the medical and nursing profession is unlikely to change things. Artificial feeding may be entrenched as a way of life, for preventive medicine—and breast feeding must surely rank as sound preventive medicine—does not always appeal. A fundamental change in education would be necessary—of doctors and nurses in training, and of the general public, starting with the schoolgirl. Perhaps the best practitioners can do at the moment is to restate to mothers and to midwives and health visitors attached to their practices, certain basic principles of infant feeding which in recent years seem to have become obscured by the dictates of fashion and the baby food manufacturers.

- (1) For most babies, the milk produced by most mothers is better adapted to their nutrition than the milk of any other animal or artificial substitutes.
- (2) Breast feeding, when it works well, provides an experience which is more enriching to mother and child than bottle feeding.
- (3) When artificial feeding is decided on, or breast feeding fails, the most convenient and suitable cow's milk preparations are the dried and evaporated (unsweetened) milks. Undiluted, unboiled liquid cow's milk should be avoided.
- (4) The calorific requirements for growth are met for the average baby by milk feeds (see below) of 150 ml/kg (2½ oz/lb) daily. Very few babies need more for satisfactory growth; some grow normally on less, and their individuality should be respected. In the first few days of life the healthy well grown infant should not be given this amount, which should be achieved gradually by the end of 7-10 days.
- (5) Milk alone is satisfactory for adequate growth at least until 3 months of age, and probably until 4 or 5 months. The

introduction of mixed feeding before 3 months at the earliest is therefore unnecessary, and probably undesirable.

- (6) Mothers should be warned at an early stage against the dangers of the dummy "reservoir" filled with syrup; or the overuse of liberally sweetened orange juice or other preparations of vitamin C and of the habit of leaving a young infant with his bottle propped beside him, or giving him one in his cot for the night hours. Apart from the undesirability of a high intake of sugar early in life on general grounds, all these practices may lead to the development of dental caries.

Dried Milks

During the neonatal period the half-cream or humanized preparations of dried milk are preferable because of their lower protein and fat content. Of the two, the half-cream milks are cheaper and perfectly satisfactory, but most regrettably they are not always stocked by the infant welfare centres. They are reconstituted by adding one level (*not* heaped or compressed) measure to 30 ml (1 oz) of water. The measures are provided in the tins, and are specific for that particular brand. The addition of sugar is unnecessary. After the first few weeks a full-cream preparation is preferable. A convenient rule of thumb for reconstitution, which lessens the very high protein intake, is to use one less measure of dried milk than the total of fluid ounces required for a given feed (for example, four measures to 5 oz (150 ml) water, adding a level teaspoonful of sugar, usually given as cane sugar (sucrose), for each feed.

The dangers of concentrated feeds (using heaped or compressed measures of dried milk with too little water, sometimes accidentally also added as measures instead of ounces) must be emphasized to mothers preparing feeds for the first time, and regularly reiterated. They should be warned to keep sugar and salt jars clearly labelled, for salt has been added by mistake for sugar on occasions, with disastrous results.

Evaporated (Unsweetened) Milk

For the newborn 1 part of evaporated milk should be added to 2½ parts of water. After the first few weeks the proportions can be changed to 1 part of milk to 2, and later to 1½ parts of water. Sugar should be added as for the full-cream dried milks. Once tins of dried and evaporated milks are opened, possibilities for contamination exist.

Breast Feeding

For an admirably practical account of breast feeding see Mavis Gunther's short text.³

Vitamin Supplements

VITAMIN K

Breast milk contains less vitamin K than cow's milk, and haemorrhagic disease of the newborn is more common in the breast fed, and in infants of African descent—though whether because more of the latter are breast fed is uncertain. A suitable and safe preparation for such babies at birth which should largely prevent this complication is phytomenadione injection B.P. (Konakion, K₁) of which 1.0 mg is given intramuscularly.

VITAMINS A, C, AND D

If the mother's dietary intake of vitamin C is satisfactory, her breast fed infant is unlikely to develop scurvy. Vitamin C is heat-labile, and as there is less of it in cow's milk to begin with

supplements are necessary for the artificially fed. Both breast-fed and cow's-milk-fed infants need 400 I.U. of Vitamin D daily. Some is added to dried and evaporated milks, and to many cereals. A preparation containing vitamins A, C, and D dispensed as drops is now available at infant welfare centres, with different dose recommendations for the breast-fed and the artificially fed.*

Problems

Failure to suck well, vomiting, failure to gain weight, and excessive crying are the main difficulties met with in the first weeks of life.

A tight seal between the tongue and the hard palate is necessary for effective sucking. Some congenital anomalies preclude this—such as complete hare lip and cleft palate; a very small lower jaw with or without posterior cleft palate (the Pierre Robin syndrome); and congenital paralysis of the facial muscles (Möbius's syndrome). A long labour, a difficult delivery, or much maternal sedation may lead to a quiet, inactive infant who sucks poorly over the first 48 hours or so, and then slowly improves. In some this period is more prolonged. Provided he is well grown and mature, and able to maintain a normal temperature, the infant should come to little harm.

FAILURE TO SUCK

Failure to suck after a period of normal feeding should be regarded as a danger signal, and in the absence of technical reasons such as an engorged breast, inverted or insufficiently protractable nipples, or an inadequate or blocked hole in the teat, the cause lies in the infant and must be actively sought. It may herald the start of an infection. A blocked nasal airway due to either infection or a bilateral congenital obstruction (choanal atresia) makes it difficult or impossible for a baby to suck, and so does breathlessness. The latter may be the first sign of congestive heart failure in previously unsuspected congenital heart disease.

VOMITING

Small vomits during the first days of life are common in healthy infants, but may worry the mothers. Some infants continue to have these regurgitations for many months after birth, but thrive normally. Larger vomits may occur, with explosive burping. Prevention of prolonged crying before feeds, and attention to the technique of bottle feeding should minimize air swallowing. Sustained forceful vomiting, and in particular bile stained vomiting is an important symptom and should be taken as indicating intestinal obstruction until proved otherwise. Frequent changes of food should be regarded as thoroughly bad practice.

Failure to gain weight is most likely to be due to under-feeding, and therefore most common in the breast-fed though by no means unknown in the bottle-fed. If increasing the supply does not correct matters, and if the doctor is certain that the infant is taking and retaining a feed adequate in amount and content, and is not having diarrhoea, further investigation will be called for.

Babies cry urgently and compellingly when they are hungry, as well as for other reasons, and it is important to be sure that food is not used as a universal comforter—for after a little it may come to be needed as such. Nevertheless, when hunger may be so overwhelmingly felt in infancy it should be sated, and as soon as possible, provided other emotional and physical needs have been considered. The army of doting grandmothers and maiden aunts who would dangle crying babies and charm them

into silence because only loving attention was necessary is fast disappearing. Excessive crying may drive a young isolated mother to despair as well as provoking feelings of irrational anger, and a battered baby may be avoided by timely hospital admission.

Low Birth Weight

Low birth weight babies may be truly immature, of whom only a few can be looked after at home from birth, or small for the period of gestation. Small-for-dates babies are usually defined as those having a birth weight below the 10th percentile for their gestational age—these 10th percentile weights, taken from the National Birthday Trust's Perinatal Mortality Survey, are shown below from 36 to 41 weeks of gestation, when home delivery is most likely to be considered feasible, so that these babies can be identified.

Weeks of gestation	Birth Weight		
	g	lb	oz
36	2,100	4	10
37	2,355	5	3½
38	2,550	5	10
39	2,720	6	0
40	2,835	6	3½
41	2,890	6	6

Both types of baby are less generously endowed with fat than the well-grown mature baby, who breaks down body tissues to provide himself with energy during the time of relative starvation after birth. The starved low birth weight baby develops a more definite and prolonged metabolic acidosis, and there are additional good reasons for seeing that feeding is earlier and more liberal for him. Blood glucose levels are considerably lower in the first weeks of life than later, but in the small for dates baby particularly, they may reach dangerously low levels, usually on the second and third days of life. If accompanied by abnormal behaviour such as failure to suck, apathy, unresponsiveness, or most seriously fits, there is a very high risk of permanent brain damage and intellectual retardation. This state of affairs is almost completely preventable if adequate milk feeds (starting at 60 ml/kg in the first 24 hours and increasing up to 150 ml/kg by the fourth day) are given. Ideally the feeds should be of breast milk whenever possible, but these amounts are unlikely to be provided at this stage by breast feeding. If milk from a human bank is impossible to obtain, dried or evaporated milk feeds may be used for the artificially fed or to complement the breast feed during the danger period, care being taken to see they do not exceed 150 ml/kg (2½ oz/lb).

Another important reason for avoiding starvation, more relevant to the immature low birth weight infant, is that adequate intakes of milk will lessen the so-called physiological jaundice of the first days of life, to which he is particularly prone. Furthermore, feeding will lessen the period of metabolic acidosis, and allow bodily metabolism to stabilize earlier; otherwise there will be no growth. An early resumption of nutrition is particularly urgent for the very low birth weight infant, whose brain would have been growing very fast had he remained in the uterus during the last trimester of pregnancy. Starvation for a day or two after birth is the natural lot of the normal term baby, and presumably not harmful.

The immature baby may be slow over feeds initially and suck poorly. Occasional use of the feeding tube if the midwife or health visitor is able and willing may go a long way to relieving anxiety on the mother's part.

Vitamin supplements should be started within two weeks of birth. Iron supplements are necessary for the premature baby, starting at about one month of age, as iron stores are transferred in the last weeks of intrauterine life.

*1 ml of the multivitamin preparation contains 1,500 µg of vitamin A, 150 mg of vitamin C, and 50 µg of vitamin D. Dosage recommended for the breast fed is 3-7 drops daily and for the artificially fed 2-4 drops daily.

Contraindications to Milk

Once in his medical lifetime a practitioner may meet an infant unable to tolerate either human or cow's milk. This state of affairs may be found in some of the rare inborn errors of metabolism. Diarrhoea virtually from birth with failure to thrive might suggest a disaccharidase deficiency; other enzyme deficiencies may affect the metabolism of amino and fatty acids and when normal pathways cannot be followed a toxic amount of some metabolite may accumulate, often damaging the brain relatively quickly. Nevertheless, these illnesses present with clinical abnormality in the neonatal period even more rarely; if they do, feeding difficulty is likely to be a presenting symptom. Diagnosis needs specialized laboratory facilities, and if confirmed the baby is likely to need a synthetic milk.

Contraindications to Breast Feeding

Chronic and debilitating maternal diseases are usually considered to debar breast feeding. Drugs are excreted in breast milk but precise knowledge on this subject is lacking. In practice, it seems safe to allow breast feeding to continue, though antithyroid or immunosuppressive drugs would probably constitute a definite contraindication. Where the anticoagulants are concerned it may be safest for the infant not to feed from the breast until his own vitamin-K—dependent factors,

low in the first few days of life, have returned to normal.

A slowly developing and sustained jaundice may be seen in some breast-fed infants. If there is no evidence that it is obstructive or haemolytic in nature, or due to infection, it may be associated with a substance in the milk that interferes with the conjugation of bilirubin. Sometimes the supply of breast milk is inadequate, but when this is not the case the jaundice can usually be safely ignored, and breast feeding allowed to continue. The jaundice disappears as soon as artificial feeding is started.

The Future

The general practitioner working in a stable community has an excellent opportunity to answer some of the queries raised by infant feeding practice. For instance, *does* an increased salt intake in early life lead to later hypertension? No one else in the medical community can follow his patients so closely from birth through their adult life.

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Therapeutic Conferences

Supraventricular Tachycardia—I

FROM THE DEPARTMENT OF THERAPEUTICS AND CLINICAL PHARMACOLOGY, ABERDEEN UNIVERSITY

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DR. R. A. WOOD: There are four patients in the ward who have had a supraventricular tachycardia. In three of these the rhythm precipitated admission. The other patient has atrial flutter.

STUDENT: I did not realize that atrial flutter was the same as supraventricular tachycardia.

PROFESSOR A. G. MACGREGOR: It's not the same, but the two rhythms have a lot in common with one another, and with atrial fibrillation. Doctors often talk in terms of flutter-fibrillation and flutter-tachycardia. In some patients after myocardial infarction all three rhythms may occur within the space of a few seconds (Fig. 1). This suggests that the aetiology and mechanism are similar.

DR. WOOD: I agree, but there is still argument about the mechanisms. In atrial fibrillation the electrical activity of the atria is disorganized, with local variations in refractoriness and conduction which may allow continuous re-excitation to take place. Flutter is a more organized rhythm, and, though it could also be due to re-excitation, it may be caused by rapid

regular discharge from automatic (alternative pacemaker) tissue in the atrial conducting bundles.

DR. J. C. PETRIE: The action of drugs does little to solve these problems. An explanation can usually be put forward to fit either of the suggested mechanisms of the rhythm.

Case 1—Atrial Flutter

HOUSE PHYSICIAN: This 61-year-old man has a long history of chronic obstructive lung disease and was admitted with an exacerbation of bronchitis and with heart failure. He was cyanosed and his jugular venous pressure was raised. The pulse was regular at 75 per minute but the heart sounds were difficult to hear. His liver was enlarged, and he had considerable leg and sacral oedema, together with ascites.

DR. PETRIE: He was not in normal sinus rhythm. His neck veins showed rapid pulsations and the electrocardiogram confirmed that he had atrial flutter at 300 per minute with 4:1 atrioventricular block (Fig. 2A). A more usual degree of block would be 2:1 or 3:1.

STUDENT: Does that suggest that he had been getting digoxin before admission?

DR. PETRIE: You might have expected that from the degree of atrioventricular block, but he had not. But he had been on diuretic therapy with spironolactone, 25 mg every six hours,

Appointments of Speakers

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