

INTERNATIONAL REVIEW OF

---

# NATURAL FAMILY PLANNING

---

**The Science and Art of Breast-feeding**  
*William F. Walsh*

**The American Academy of Natural Family Planning**  
*Thomas W. Hilgers*

**Legal Issues in NFP**  
*Thomas J. Prebil*

**Continuous Mucus in the Use of the Ovulation Method**  
*Thomas W. Hilgers*

**NFP in the Health Care Institution**  
*Patricia F. Cook, Catherine Durr, & John T. (Tim) Farrell*

Volume VII, Number 4      Winter 1983

\$5.00 a copy

---

---

---

## The Science and Art of Breast-feeding

---

---

William F. Walsh

**T**HIS PAPER will include the physiology of breast-feeding, breast-feeding and prolactin production, maternal nutrition in breast-feeding, and ideal things that could be done to help mothers breast-feed.

We will begin with the human breast, its development, the establishment of lactation, the maintenance of lactation, and the milk ejection reflex.

It has been difficult to study this subject because, prior to 1972, accurate methods of assaying prolactin were not available. Prolactin could not be separately measured from human growth hormone. In the early 1970's, radioimmunoassay methods were developed that accurately distinguished prolactin from human growth hormones and, since that discovery, a gradual consensus has developed about the relationship of breast-feeding and the production of prolactin.

### Breast Development

The human breast, unlike other mammals, is highly developed in a sequential manner and it does not take a great deal of stimulation in order to produce milk.<sup>1</sup> The mother's breast is already

---

---

William F. Walsh, M.D., N.F.P.M.C., is a diplomate of the American Board of Family Practice and is currently the program director of the UCLA-Antelope Valley Family Practice Residency. He is an associate professor in the Department of Medicine of the UCLA School of Medicine, a medical associate of the Southern California LaLeche League, and a contributing professional member of the International Childbirth Education Association.



in advanced development by the time the baby is born, and it requires minimal stimulation to lactate. There are multiple ducts underneath the nipple or aureola that develop during puberty and under the influence of estrogen and progesterone. They sprout, branch, and form terminal glandular tissue buds from which the future secretory alveoli and lobules develop. Under the influence of progesterone, the alveoli and lobules continue to develop during the luteal phase of the menstrual cycle. Ovarian estrogen and progesterone are the main influence on the developing breast of a pubertal, early adult female. In addition, the steroidal hormones of the adrenal glands contribute somewhat to early breast development. The overall process, however, is totally dependent on the ovary. In a child who has congenital absence of the ovary or has lost the ovary prior to puberty, the breast will not develop. During pregnancy, the ducts continue to branch, bud, and form sacs which then develop into lobules. From approximately the third month in pregnancy, these ducts and their lobules lose their second layer and form a single layer which then develops into a secretory cell from which milk production occurs. Throughout pregnancy this is under the influence of both ovarian and placental hormones. At this point, however, there is no milk in the system. Figure 1 demonstrates these relationships.

#### Establishment of Lactation

Throughout pregnancy, there is a very high level of prolactin in the bloodstream, but it is prevented from acting on milk production by the placental steroids. Prolactin peaks at delivery, but only after the placenta is delivered is the prolactin released in order to stimulate production (fig. 2, p. 284). There is an interesting case report concerning this mechanism. The authors of the case report tell of two women who were most anxious to breast-feed and who appeared to be lactation failures. Each patient had delayed postpartum bleeding, one on the fourteenth and the other on the twenty-first day postpartum. Their attending physicians realized that they had retained placental fragments. Both women underwent D&C's and both began lactating successfully the following day.<sup>2</sup> In each patient, one residual fragment

Fig. 1. H  
lo-alveol  
be steroi  
ing preg  
secretor  
Suppl. 4.

of her  
indicat

One  
mainte  
partiall  
import  
trolled  
inhibiti  
though  
cause I  
very er  
of prol  
sucking  
which a  
milk. A

rn, and it  
 iple ducts  
 g puberty  
 me. They  
 uds from  
 Under the  
 ontinue to  
 e. Ovarian  
 e develop-  
 n, the ster-  
 newhat to  
 er, is total-  
 al absence  
 breast will  
 to branch,  
 From ap-  
 s and their  
 which then  
 ion occurs.  
 oth ovarian  
 e is no milk  
 ips.

of prolactin  
 n milk pro-  
 elivery, but  
 released in  
 is an inter-  
 thors of the  
 us to breast-  
 Each patient  
 rteenth and  
 ir attending  
 l fragments.  
 ting success-  
 ial fragment

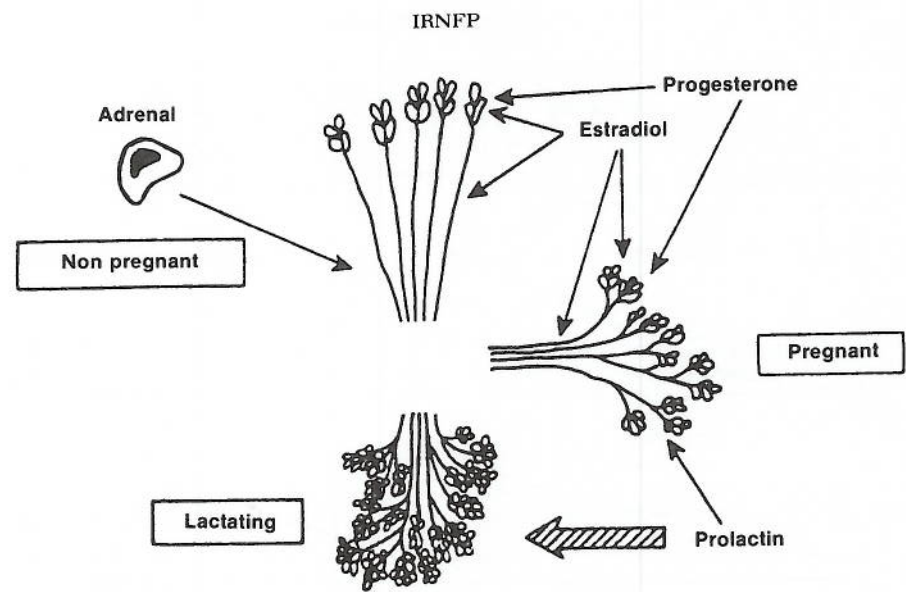


Fig. 1. Hormonal requirements for mammogenesis and lactogenesis in the human. Lobulo-alveolar and ductal development in the breast before and during pregnancy appear to be steroid dependent with an undetermined role for prolactin or placental lactogen during pregnancy. Lactation requires prolactin for lactogenesis and maintenance of milk secretion. (Illustration is reprinted with permission from the *Journal of Biosocial Science*, Suppl. 4, 1977, Galton Foundation, Cambridge, England; see reference 1.)

of her placenta was significant enough to block her prolactin, indicating what a sensitive mechanism it is.

**Maintenance of Lactation**

Once milk production has been established, its physiological maintenance is called galactopoesis. The hormonal factor is only partially understood, but we do know that prolactin is of primary importance. Its action in milk production appears to be controlled by the presence or absence of a hypothalamic prolactin inhibiting factor. At this stage of our knowledge, this factor is thought to be Dopamine. This is of practical consequence, because Dopamine is released when the mother is very tired or very emotionally upset, and it can actually block the secretion of prolactin. However, the recurrent stimulation of the baby's sucking overrides the inhibiting factor and releases prolactin which affects the secretory cells at the cellular level to produce milk. At the same time that this is going on, a second hormone



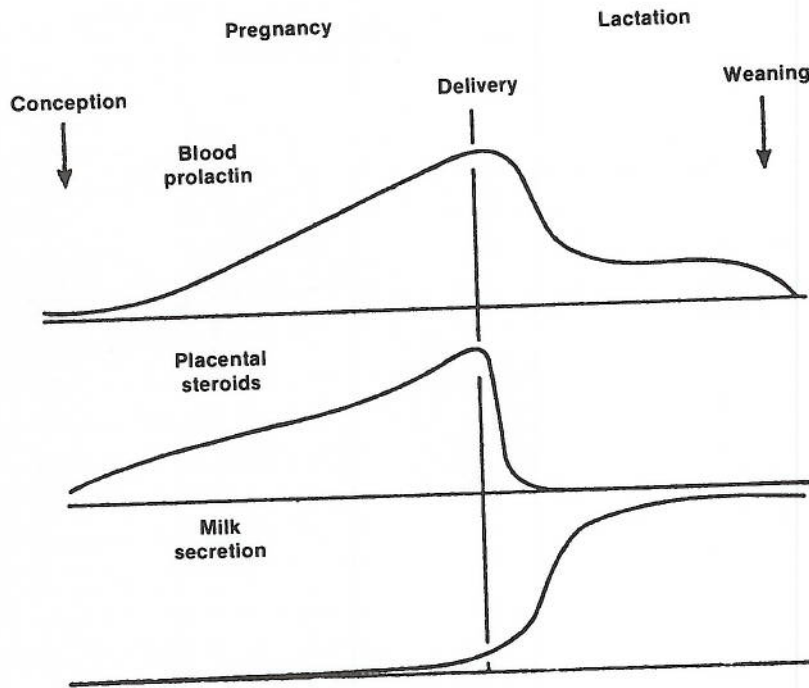


Fig. 2. The temporal relationships between blood levels of prolactin and placental steroids and the initiation of milk secretion. Although levels of prolactin are high during pregnancy, milk secretion occurs only as the levels of placental steroids decline, suggesting a direct inhibitory action of these steroids on the breast. Copious milk secretion is induced by the suckling-induced increase in prolactin levels which remain above non-pregnant levels as long as an adequate suckling stimulus is maintained. (Illustration is reprinted with permission from the *Journal of Biosocial Science*, Suppl. 4, 1977; Galton Foundation, Cambridge, England; see reference 1.)

called oxytocin is released by suckling. This is mediated through a neuronal arch that acts through the posterior pituitary, releasing oxytocin which causes myoepithelial cells in the breast stroma to compress and release the produced milk (fig. 3). Unlike prolactin, which can only be produced by nipple stimulation, oxytocin can be triggered by other types of cues. If you block the nipple with anesthesia, the baby can suck and prolactin will appear in the mother's bloodstream. Oxytocin, however, can be elicited by sound, sight, or even certain odors. Any woman who breast-feeds, has had the experience of being in another part of the house and, without actually hearing the baby, has felt tingling in the

Suckling

Fig. 3. Discharge of prolactin and oxytocin during suckling. Prolactin release is stimulated by suckling, e.g., the child's mouth on the breast (reference 1.)

nipple  
awaken  
to hear  
Because  
importa  
let-dow  
if the m  
The mil  
not acc  
the bac  
breast a  
is born  
port pe  
reflex i  
can be a

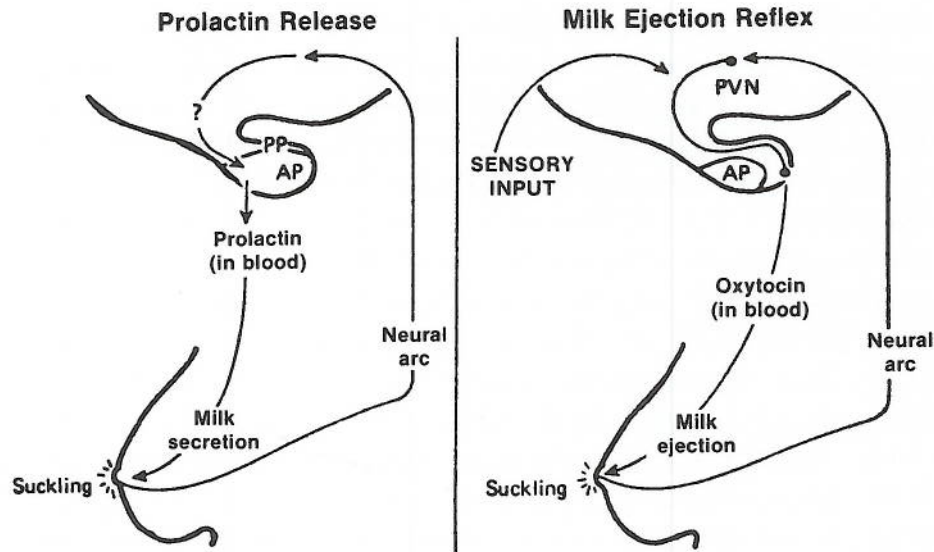


Fig. 3. Diagrammatic representation of the pathways involved in suckling induced prolactin and oxytocin release. Both hormones are released in response to nipple stimulation during suckling. The release of these hormones is otherwise independent. Prolactin release does not occur in response to other stimuli associated with nursing while oxytocin release resulting in milk ejection may occur spontaneously or be induced by, e.g., the cry of the infant. (Illustration is reprinted with permission from the *Journal of Biosocial Science*, Suppl. 4, 1977, Galton Foundation, Cambridge, England; see reference 1.)

nipple and has had some let-down; seconds later her baby has awakened. Or having been away from home, she has returned to hear the baby crying and has immediately let-down milk. Because sensory input can inhibit this process, one of the most important causes of lactation failure is this failure of the milk let-down reflex. If the baby sucks, milk will be produced, but, if the milk cannot be let-down, it will produce secondary effects. The milk can accumulate for about 48 hours and the system cannot accommodate milk longer than that. If milk is not let-down, the back pressure of milk will cause mastitis which can lead to breast abscess. If maternal complications occur or if the infant is born prematurely, it is extremely important for medical support personnel to assist the mother in developing the let-down reflex if she subsequently contemplates breast-feeding. This can be accomplished by a combination of effective breast pump-



ing and/or hand massage until the infant is capable of nursing.

Of additional interest regarding the mechanism of sucking, milk production, and the let-down reflex, is the response the infant elicits when it nurses. Two things occur simultaneously: Sucking induces the alveolar cells to produce milk and facilitates the let-down of milk already produced. In effect, the infant is drinking its meal while ordering the next.

The foremilk that comes down first is very high in protein, more liquid, and very blue and light looking. It satisfies the infant's fluid requirements. The hindmilk, that is the latter milk that comes from deep in the breast, is very high in cholesterol, caloric content, and fat. We now recognize that two very beneficial things happen to breast-fed babies. Early in life they are exposed to high levels of cholesterol—as a result they are able, in future life, to properly process and handle cholesterol which, in the first months of life, is very important to their brain development. The additional advantage of the cholesterol and high fat content in breast milk is that it turns the baby off. It sates the baby. A breast-feeding baby, therefore, controls how much food it will eat. Long-term studies are beginning to indicate that children who are breast-fed for prolonged periods tend to be less obese as children and young adults. Because formula does not contain the satiety factor of breast milk, an infant fed artificially can easily be over fed, a factor which can lead to obesity in later life.

#### **Prolactin and Postpartum Amenorrhea**

I have covered the role of prolactin in milk production and maintenance and I would now like to discuss the role of prolactin in postpartum amenorrhea. Before prolactin could be accurately measured, there were epidemiological studies that showed an association between postpartum amenorrhea and prolonged breast-feeding. The most classic studies were reported by British investigators on various African tribes. Of great interest were observations made of the !Kung hunters, a nomadic tribe inhabiting the Kalageri plains of Southeast Central Africa.<sup>3</sup> Among African tribes, statistics regarding postpartum amenorrhea are

not  
after  
not  
ery  
cont  
motl  
with  
entir  
!Kur  
tribe  
with  
decr  
V  
inves  
these  
these  
note  
inter  
most  
and  
foun  
A  
cling  
nursi  
norm  
(p. 2  
and  
This  
sing  
prola  
drop  
by fi  
eleva  
secon  
serum  
and in

of nursing.  
 of sucking,  
 response the  
 ultaneously:  
 nd facilitates  
 the infant is

gh in protein,  
 tisfies the in-  
 e latter milk  
 n cholesterol,  
 o very bene-  
 life they are  
 hey are able,  
 esterol which,  
 r brain devel-  
 erol and high  
 ff. It sates the  
 ow much food  
 indicate that  
 ds tend to be  
 formula does  
 fant fed artifi-  
 ead to obesity

roduction and  
 ole of prolactin  
 d be accurately  
 at showed an  
 nd prolonged  
 orted by British  
 t interest were  
 ic tribe inhabit-  
 Africa.<sup>3</sup> Among  
 amenorrhea are

not comparable. In some tribes, intercourse is not resumed until after the first postpartum menstruation. The !Kung hunters do not have this taboo and resume intercourse normally after recovery from childbirth. The women carry their babies with them continuously during the first three years, and the infant and mother are never separated. At night the infants sleep on a pallet with their parents. They are exclusively breast-fed during this entire three-year period. The natural child spacing interval for !Kung hunters is four years. When selected groups from these tribes moved into villages and began to supplement their infants with grain and/or cow's milk, their birth intervals dramatically decreased with a subsequent sharp rise in their birth rates.

When the feasibility of measuring prolactin became possible, investigators began to measure the serum prolactin levels among these exclusively breast-feeding tribes. The results of several of these studies will be displayed in the next few figures. You will note a lack of uniformity among investigators as some will use international units and some will use nannograms. Currently most investigators are reporting serum prolactin in nannograms, and the resting state among non-lactating cycling women was found to lie at 20 nannograms or less.

At birth, prolactin levels are 8 to 20 times higher than in cycling, non-lactating women. This applies to both nursing and non-nursing mothers. In the absence of lactation, the levels drop to normal between the 15th and 20th day, postpartum. Figure 4 (p. 288) shows the mean basal prolactin concentration in nursing and non-nursing mothers during the first 126 days postpartum. This was taken from a study by J. E. Tyson et al.<sup>4</sup> At birth both nursing and non-nursing mothers have high levels (220 nannograms of prolactin). At two weeks the non-breast-feeding mother's levels drop rapidly, reaching the level of cycling, non-lactating women by five to six weeks. The breast-feeding mother's levels remain elevated through the 12th month with, in this study, a slight secondary rise at 16 to 17 months. Figure 5 (p. 289) shows mean serum prolactin levels during the first 24 months in menstruating and in amenorrheic nursing mothers. This study was from Delvoye



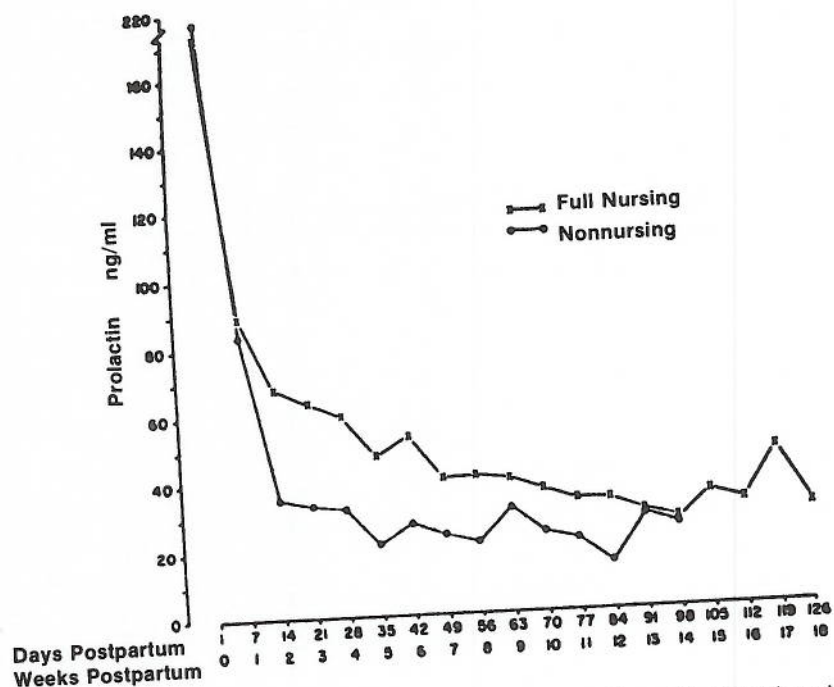


Fig. 4. Mean basal plasma concentration of prolactin in breast-feeding (nursing) and non-breast-feeding (non-nursing) mothers during the first 126 days postpartum. (Illustration is reprinted with permission from *Breast-feeding and the Mother*, Ciba Foundation, London, England, 1976; see reference 4.)

et al.<sup>5</sup> The double bar represents mean basal prolactin levels in cycling non-breast-feeding women from the same region. Serum prolactin levels remain high in both groups until the 12th postpartum month. Among the amenorrheic nursing mothers, there were significantly higher prolactin levels through the 18th month and then a decline in both groups between the 18th and 24th month to levels seen in non-pregnant, non-lactating women. This illustrates that you can have elevated prolactin levels in a lactating mother who is menstruating. This study does not define the style of breast-feeding between the two groups. Figure 6 (p. 290) relates the prolactin level to the incidence of amenorrhea in 465 nursing mothers during the first 24 postpartum months. At ten months, 60% remain amenorrheic with high prolactin levels. Thereafter the prolactin levels decline in parallel with the onset of menstru-

Fig. 5.  
 (●—) subject  
 postpar  
 ard erro  
 in a gro  
 is reprim  
 Mar. 15  
 ation.  
 lags s  
 Re  
 nancy  
 at wh

IRNFP

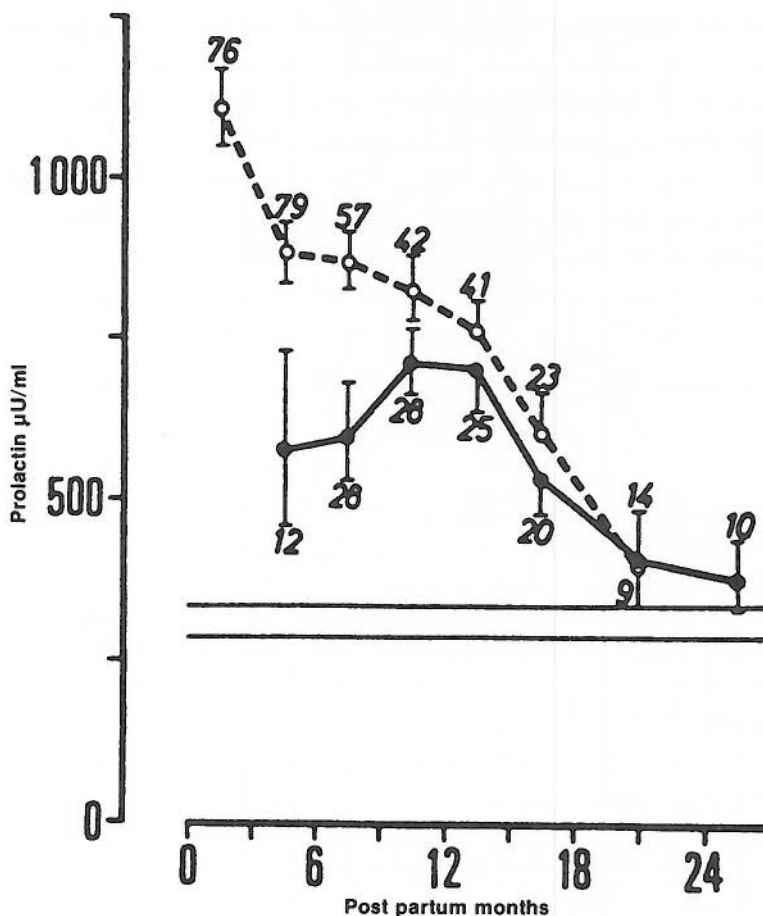


Fig. 5. Mean serum prolactin during the first two postpartum years in menstruating (●—●) and in amenorrheic (○—○) nursing mothers (Kivu, Zaire). Number of subjects for each trimester until 27 months postpartum, but for the semester between postpartum months 18 and 24, is indicated above the vertical bar representing the standard error of the mean (S.E.M.). Horizontal bars represent mean serum prolactin  $\pm$  S.E.M. in a group of 64 nonpregnant and nonnursing women from the same region. (Illustration is reprinted with permission from the *American Journal of Obstetrics and Gynecology*, Mar. 15, 1978, C.V. Mosby Co.; see reference 5.)

ation. The graph in this study does show that the amenorrhea lags slightly behind the drop in prolactin levels.

Rolland et al.<sup>6</sup> studied ten healthy women during late pregnancy and puerperium until the onset of their first menstruation, at which point an endometrial biopsy was taken. As noted by



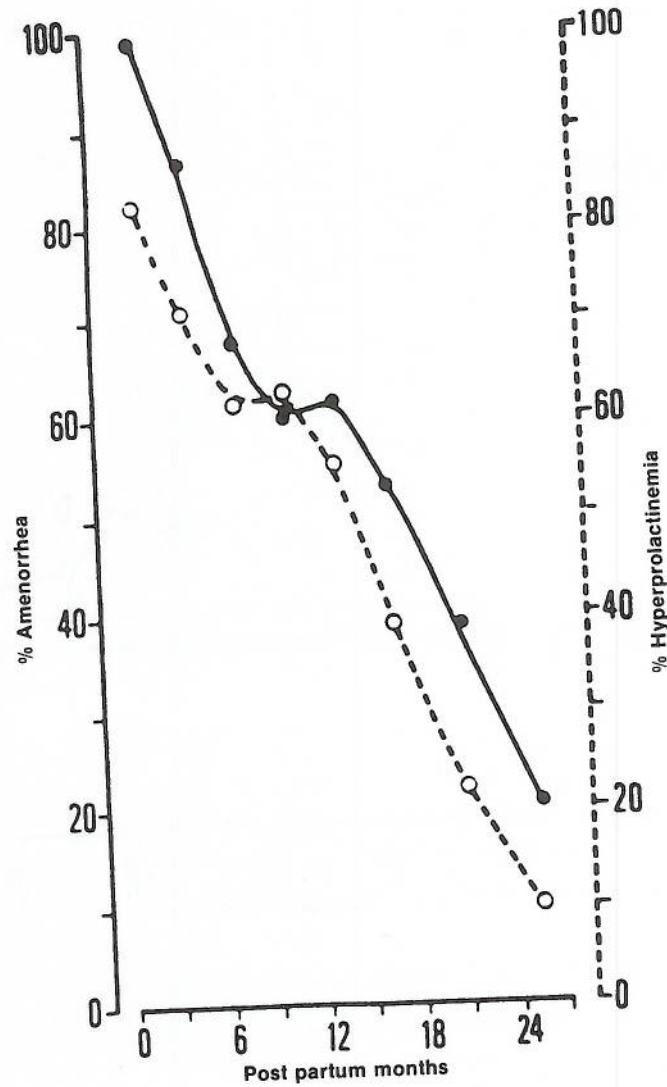


Fig. 6. Incidence of amenorrhea (●—●) and of hyperprolactinemia (○—○), i.e., serum prolactin higher than 600  $\mu$ U of MRC 71/222 per milliliter or 25 (ng. of VLS-2 per milliliter, in the 465 nursing mothers investigated during the two first postpartum years. (Illustration is reprinted with permission from the *American Journal of Obstetrics and Gynecology*, March 15, 1978, C.V. Mosby Co.; see reference 5.)

other investigators, prolactin levels were high during late pregnancy and declined after delivery but remained high (above 30 ng/ml plasma) during the period of breast-feeding. In addition,

they  
and  
the p  
first  
out, a  
follic  
estro  
of th  
FSH-

50  
30  
10  
7  
5  
2  
1  
20,000  
10,000  
300  
200  
100

Fig. 7. I  
of prola  
zonal li  
permissi  
ford, En

In  
a drop  
below

they studied FSH, LH, 17  $\beta$ -Estradiol, and progesterone levels and correlated them with the period of prolactinemia. In figure 7, the profiles show a subject who was amenorrheic through the first 96 postpartum days. The prolactin levels remain high throughout, and, by the 30th day, the FSH levels have returned to normal follicular levels. In this subject, there is no LH surge and the estrogen/progesterone levels remain suppressed. The absence of the LH surge indicates that the prolactinemia interferes with FSH-LH feedback at the ovarian level.

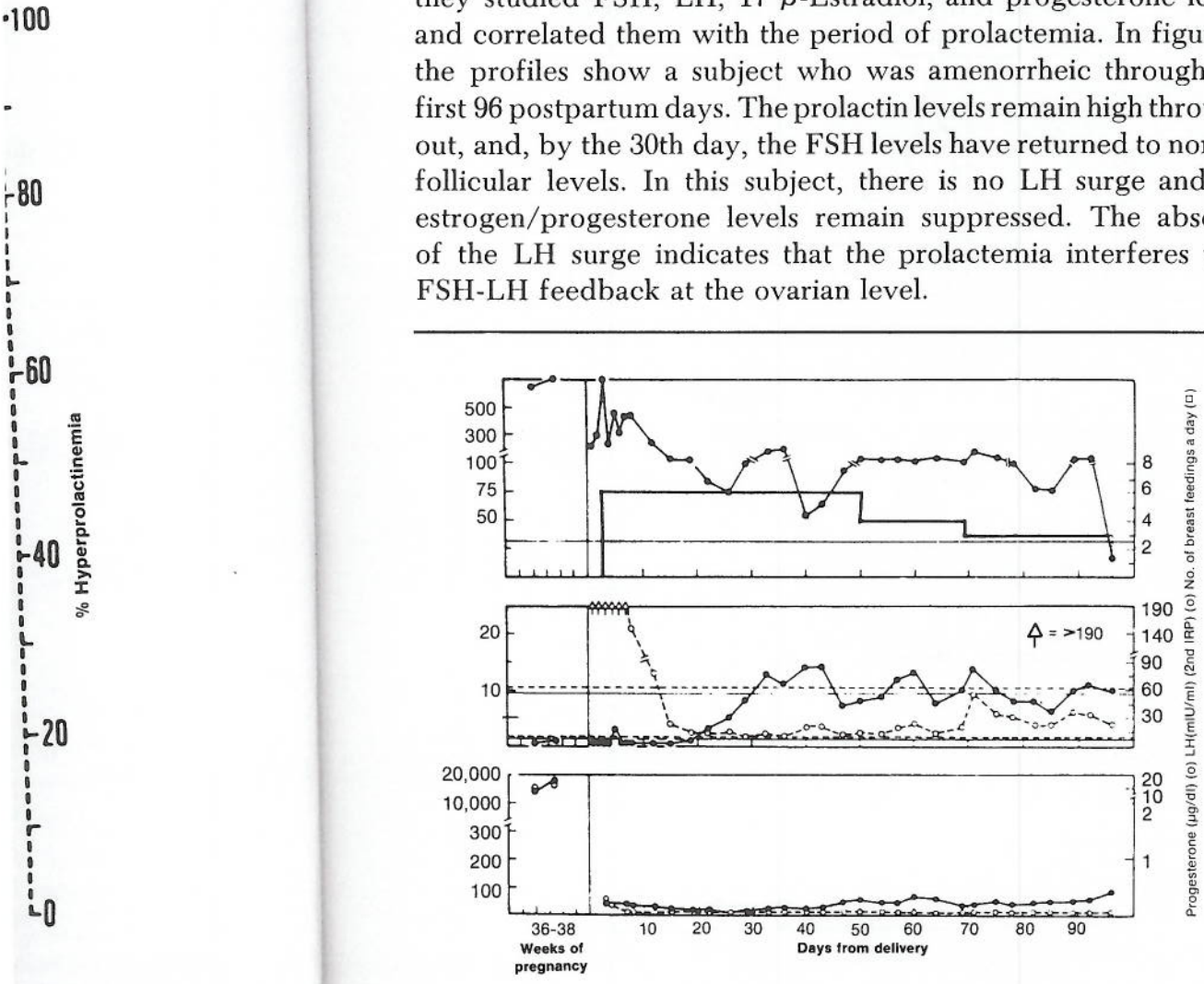


Fig. 7. Subject V. The relationship between breast-feeding, peripheral plasma levels of prolactin, FSH, LH, 17 $\beta$ -oestradiol and progesterone during the puerperium. (Horizontal lines indicate the range in normal cycling women.) (Illustration is reprinted with permission from *Clinical Endocrinology*, Blackwell Scientific Publications, Ltd., Oxford, England, 1975; see reference 6.)

In another subject (fig. 8), who lactated for 48 days, there is a drop in the prolactin level at 30 days with a further decrease to below 30 ng/ml on day 38. This patient exhibited cycling levels

ctinemia (o—o),  
iliter or 25 (ng. of VLS-2  
e two first postpartum  
an *Journal of Obstetrics*  
ice 5.)

during late preg-  
ed high (above 30  
eding. In addition,



*Prolactin and ovarian function*

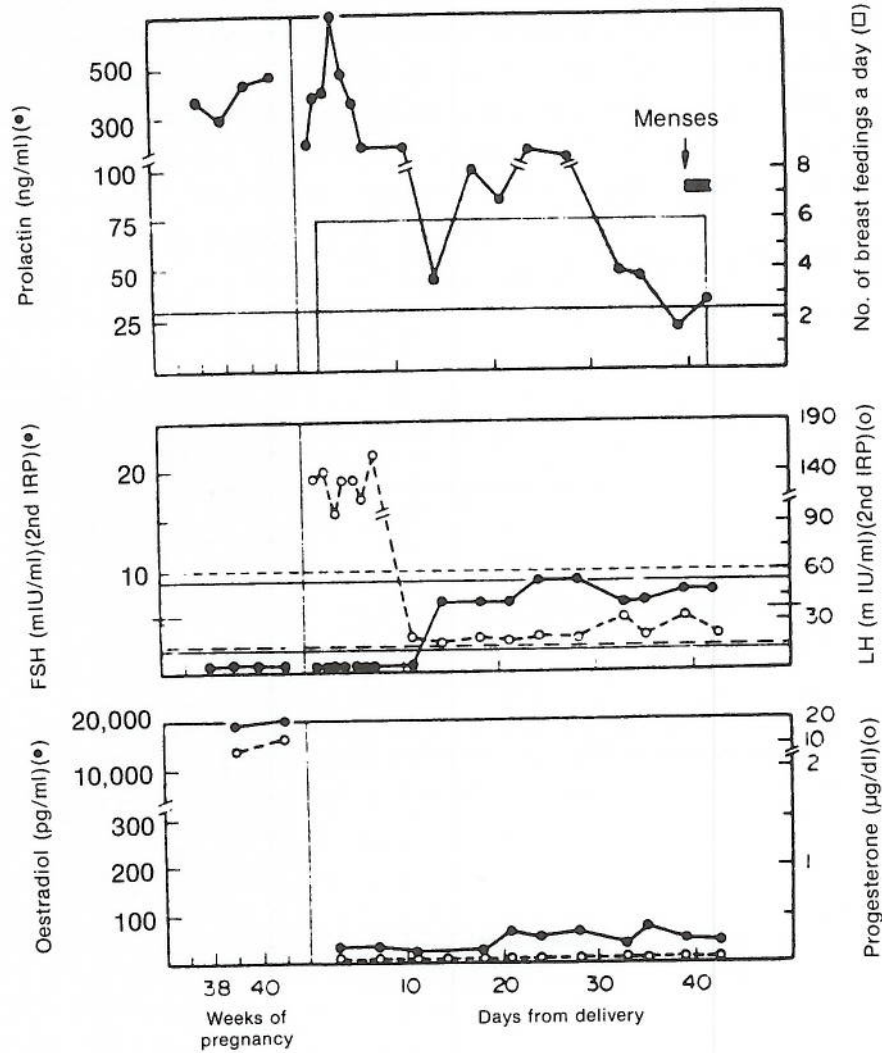


Fig. 8. Subject IX. The relationship between breast-feeding, peripheral plasma levels of prolactin, FSH, LH,  $17\beta$ -oestradiol and progesterone during the puerperium. (Horizontal lines indicate the range in normal cycling women.) (Illustration reprinted with permission from *Clinical Endocrinology*, Blackwell Scientific Publications, Ltd., Oxford, England, 1975; see reference 6.)

of FSH, no significant LH rise, and a flat progesterone-estrogen curve followed by menses on the 42nd day. This represents an anovulatory cycle. Unfortunately, the pattern of breast-feeding

for any  
I suspe  
to the  
Fig  
a subje

PROLACTIN (ng/ml)

FSH • (µg/100 ml)

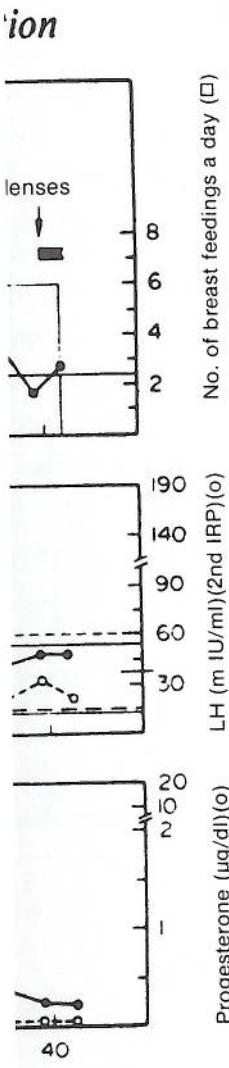
PROGESTERONE (ng/100 ml)

ESTRADIOL (ng/100 ml)

Fig. 9. Ser  
in two lact  
during the  
nongravid  
of Obstetr.

for any of the patients in this study is not described by the authors. I suspect that this patient was not lactating successfully compared to the previous subject.

Figure 9 contrasts a fully-lactating amenorrheic subject with a subject who was unsuccessful in lactation and shows their result-



peripheral plasma levels during the puerperium. (Illustration reprinted with permission from the American Journal of Obstetrics and Gynecology, Nov. 1, 1972, C.V. Mosby Co., Oxford, England.)

progesterone-estrogen levels. This represents an attempt to maintain a level of breast-feeding

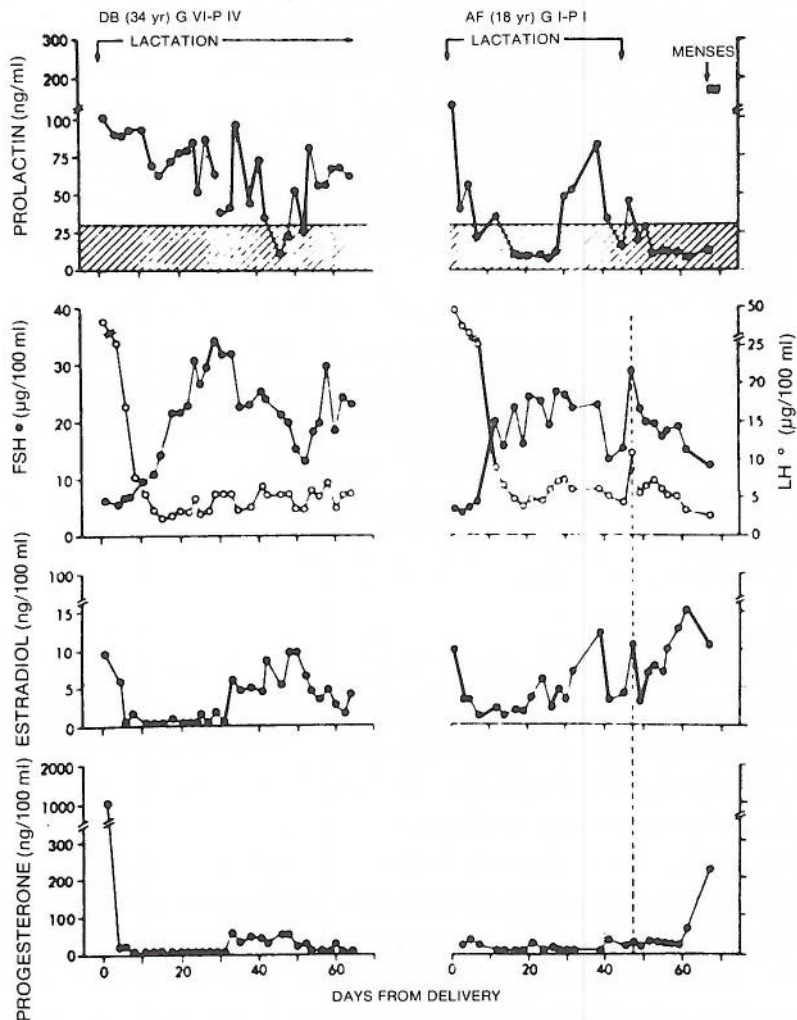


Fig. 9. Serum concentrations of prolactin, FSH, LH (HCG), estradiol, and progesterone in two lactating subjects, D. B. (successful lactation) and A. F. (unsuccessful lactation), during the puerperium. The hatched bars for the prolactin data represent the normal nongravid range. (Illustration is reprinted with permission from the *American Journal of Obstetrics and Gynecology*, Nov. 1, 1972, C.V. Mosby Co.; see reference 7.)



ing hormonal profiles. D.B. on the left, a 34-year old, gravida six, para four, has persistently elevated prolactin levels. Her FSH returns to normal follicular levels while her LH levels remain quiescent; her estrogen levels fluctuate and there is no progesterone rise. Subject A.F., an 18-year old prima-gravida who introduced solids early, initially has low prolactin levels with a brief rise and prompt fall below 30 ng/ml. Her FSH values are normal follicular phase levels and, on the 40th day when she stops nursing, there is an FSH-LH surge followed by an estrogen rise, a delayed progesterone rise, and then menstruation. This was probably an "ovulatory event" with an inadequate luteal phase. This patient demonstrates the rapid return of ovulatory gonadotropin levels following abrupt weaning. This study is from Reyes et al.<sup>7</sup>

The duration and the degree of elevated prolactin levels in many studies vary due to the lack of any uniform methodology concerning the timing of the collection of the samples in relation to a nursing episode. In order to overcome this deficiency, D.L. Bunner and associates<sup>8</sup> placed indwelling venous catheters in four nursing mothers and studied their prolactin levels over a 24-hour period at four hourly intervals during their normal routines, including nursing on demand. The results are depicted in figure 10. Patients A, B, and C were amenorrheic at the time of the study. Patients A and B show clear elevations of prolactin levels at two months and to a lesser degree at six months. Patient C was tandem nursing twins who, at 13 months, were also receiving supplemental feedings. Her prolactin levels were clearly above normal cycling women.

Patient D was studied at five and one-half months and had had one prior menstrual period. Her milk production was normal as documented by the normal growth of her child. Her prolactin levels, however, were comparable to normal cycling women who were not nursing and she exhibits very little prolactin response to sucking. The introduction of supplemental feedings prior to the sixth month would seem to be associated with lower prolactin levels and the early return of menses. The mean pro-

Prolactin [ng/ml]

Fig. 10. (C  
Solid bars  
collection  
of Obstet

lactin le  
occasio  
lead onc  
women  
that, wi  
tion of  
and the  
Of add  
rise in p  
One  
women  
Horowi  
group w

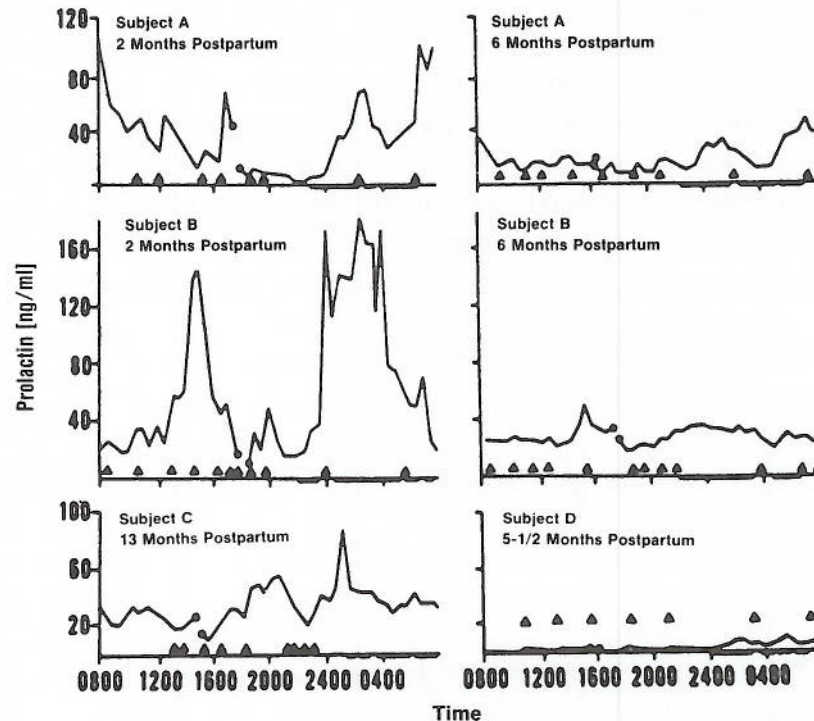


Fig. 10. Clock time plotted against hPRL levels. Triangles indicate nursing periods. Solid bars on time axis indicate sleep periods. Circles indicate beginning and end of collection periods. (Illustration is reprinted with permission from the *American Journal of Obstetrics and Gynecology*, June 1, 1978, C.V. Mosby Co.; see reference 8.)

lactin levels for the amenorrheic subjects do remain elevated with occasional returns to lower levels, and single samples could easily lead one to believe that the nursing mothers and the normal cycling women have comparable prolactin levels. This study indicates that, with sufficient nursing pressure and the delayed introduction of supplemental feedings, the prolactin levels remain high and the nursing mothers correspondingly remain amenorrheic. Of additional interest in this study is the pronounced nocturnal rise in prolactin in most of these subjects.

One final observation regarding prolactin levels: Lactating women are often advised to have a very high intake of fluid. Horowitz et al.<sup>9</sup> divided puerperal women into two groups. One group was allowed a high fluid intake, four liters a day, and the



second group was restricted to 800 mls per day. Basal and post-sucking serum prolactin levels and the production of breast milk were similar in each group. Figure 11 depicts these results. Osmotic influences on prolactin secretion appear to be unimportant and there is no basis for prescribing changes in fluid intake for the control of human lactation. A nursing mother should simply drink to satisfy her natural thirst.

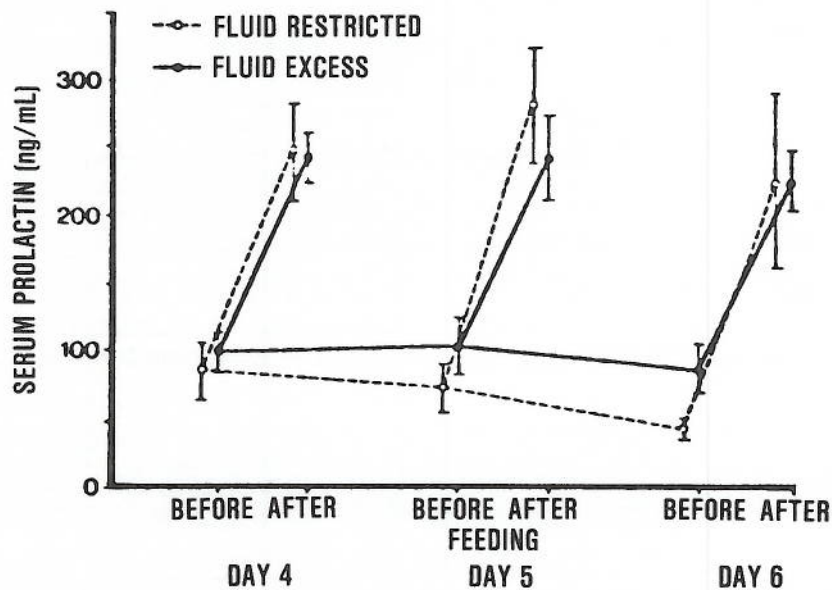


Fig. 11. Basal and suckling-stimulated prolactin levels in fluid-restricted and fluid-loaded groups of mothers on the fourth, fifth, and sixth days postpartum. (Copyright © 1980, *Medical Journal of Australia*. Reprinted with permission, see reference 9.)

### Maternal Nutrition

What about nutrition and the effect of nutritional supplements on lactation? Many observers have commented on the prolonged amenorrhea in developing countries and have postulated that, in poorly nourished women, breast-feeding prolongs the protective effect of lactational infertility. This is probably true. Conversely, in highly developed societies with excellent nutrition, the infant is provided with a much more nourishing breast-

feed a  
probal  
either  
caloric  
to a d  
mothe  
diet in  
a lacta  
nancy,  
and th  
the per  
an ade  
with th  
dation  
D, and  
fed inf  
artificia  
of refin  
not sup  
foods b  
carbohy  
analyse  
quite ac  
fornia,  
manufa  
I do agr  
supplen  
In r  
need to  
ride occ  
is enoug  
unneces  
  
This  
ideal do  
The

ly. Basal and post-  
tion of breast milk  
; these results. Os-  
ear to be unimpor-  
ges in fluid intake  
other should simply



BEFORE AFTER

DAY 6

fluid-restricted and fluid-  
postpartum. (Copyright ©  
n, see reference 9.)

ditional supplements  
ed on the prolonged  
ive postulated that,  
; prolongs the pro-  
is probably true.  
with excellent nutri-  
e nourishing breast-

feed and correspondingly has shorter sucking times with the probable results of shorter periods of lactational infertility. In either case, breast-feeding represents a tremendous transfer in caloric terms between the mother and the nursling. It amounts to a daily energy transfer of 500-800 calories a day. A nursing mother consuming 2,000 calories is really on a 1,200-1,500 calorie diet in respect to her own nutrition. In practice, this means that a lactating mother should eat as well as she did during her pregnancy, consuming 2,000 calories with 80-100 grams of protein, and that she should continue with her prenatal vitamins through the period of active lactation. Such a course will insure her nursling an adequate intake of sufficient vitamins. I personally disagree with the American Academy of Pediatrics and their recommendation that all nursing infants require supplemental vitamins A, D, and fluorides. Fluorides would seem appropriate for bottle-fed infants who are fed conventional baby foods, since both artificial formula and commercial baby foods contain an excess of refined carbohydrate. In contrast, breast-fed babies who are not supplemented until the sixth month and are then fed regular foods blended by the mother have very little exposure to refined carbohydrate. Secondly, improved techniques of breast milk analyses have recently disclosed a water soluble form of vitamin D quite adequate for the infant's needs. In my home state of California, you would have to stay indoors all year round to avoid manufacturing your own vitamin D from simply being outdoors. I do agree that, after six months, breast-fed babies should receive supplemental vitamins.

In respect to fluoride supplementation, the amount or the need to give fluoridated vitamins must relate to the natural fluoride occurring in the water. In many sections of the country, there is enough natural fluoride in the water to make supplementation unnecessary.

#### Helping Breast-feeding Mothers

This part really describes what would be, in my opinion, an ideal doctor-nurse-mother-father-infant situation.

The subject of infant feeding should be an integral part of



prenatal care. At prenatal visits, the doctor or counselor should discuss with the mother her personal feelings about infant feeding and give her correct information. To be successful, a lactation counselor should know the family. If the husband has hang-ups about breast-feeding, he should be given information and encouragement before the baby comes. Another problem which is not mentioned in literature about lactation, counseling, and difficulties, is that most women now bearing children were born in the late fifties and through the middle sixties. This corresponded to a time in medicine when doctors advised parents to bottle feed, and doctors knew best. As a result, mothers who help breast-feeding mothers come from that background and have very little personal knowledge about nursing. One should be aware of this in the postpartum period, as both the nursing mother and her caregiver may need to be educated.

Because I am in family practice, I feel that a woman who has one attendant who both manages her pregnancy and her well child care has a distinct advantage. In the case of a woman who has an obstetrician deliver the baby and a pediatrician take care of the baby, there can be a problem unless the obstetrician is at least neutral, if not in favor, of breast-feeding. The reason for my statement is that there are a number of things that the obstetrical provider can do to help with successful lactation. One of these is to look at the nipples, not just glance at them, but really look at them and make sure they are not inverted. If they are inverted, the patient should begin to wear Woolrich Shields during the prenatal phase and be taught finger massage to get the nipple developed before the baby is born. From the seventh month on, the mother should be shown how to hand express milk from her breast by gentle massage because this will help with the let-down reflex after birth. Of course, everyone in the hospital should be knowledgeable and know what to say, being a help to the mother rather than a hindrance. Early and continuous contact between the mother and the infant should be the norm, not the exception. Ideally there should be immediate contact, but certainly within two hours, provided the mother's and infant's con-

ditions  
partur

I lil  
of preg  
and nu  
goes h  
you've  
should  
when s  
in the h  
caesare  
Practic  
and alr  
chargec  
know e  
them, a  
In addi  
them v  
48 hour  
tween t  
telling l  
that wi  
again at  
growth  
occurs,  
feel tha  
Stating  
only inc  
abandon

The  
and im  
attitude  
countrie  
are stan  
importa



ditions allow it. In most hospitals, the mother has to go to postpartum recovery for the first two hours.

I like to designate the neonatal period as the fourth trimester of pregnancy. We place a great deal of emphasis on prenatal care and nutrition and the birthing experience, but then the patient goes home and the attitude of our society seems to be, "Well, you've had a baby, so what!" While the mother is pregnant there should be a discussion of the arrangements to be made for her when she returns home. In California, it is very unusual to stay in the hospital for more than two days. We let our uncomplicated caesarean sections go home now on the third day. In the Family Practice Center, we are large users of the alternate birthing room and almost all of our alternate birthing center patients are discharged within 12 hours. Implicit in this arrangement is that we know exactly where they are going, who is going to take care of them, and that a nurse will visit their home at 48 hours postpartum. In addition, for women having their first baby, we normally see them very early in the postpartum period: the visiting nurse at 48 hours, a phone call on the fourth day, and an office visit between the fifth and seventh day. Anticipatory guidance includes telling breast-feeding mothers that babies have a growth spurt that will occur somewhere between the third and fourth week, again at the sixth week, and later at the third month. When these growth spurts and the consequent increasing demands to nurse occurs, many breast-feeding women, without this knowledge, feel that they have failed and often abandon breast-feeding. Stating that these growth spurts are perfectly normal and require only increased nursing has saved many women from prematurely abandoning successful lactation.

#### Society and Breast-feeding

The last thing I will discuss is our society. It would be a great and immense help if our society could somehow change their attitude about the postpartum period. Even in the Iron Curtain countries, long maternity leaves are allowed, and such leaves are standard in Europe. In both societies, they feel that it is very important for the mother to stay home with her newborn baby.



Also, in the continent of Europe, there are a number of countries that now make arrangements for working mothers to bring their babies along and breast-feed them while at work. I do not know that this will ever come to pass in this country, but the benefits would certainly outweigh the minor inconveniences, and society would benefit far more in the long run.

Presently, our increasingly complex society has collective fears about the perfectly natural phenomenon of breast-feeding; as a matter of fact, it has trouble coping with normality in general. Breast milk is the species-specific food for the human child, and it has immense benefits to both the child and its mother. Breast milk is anallergic, and breast-fed children appear to be much healthier; the cost of caring for them in the first year of life is usually much less.

#### Resources for the Breast-feeding Mother

Networking is also important. Besides making adequate arrangements for postpartum help at home, knowledgeable prenatal care givers should get the mother involved with breast-feeding organizations like the LaLeche League, expert childbirth educators, and professional natural family planning practitioners. Some of the education manuals that I have found successful are *The New Revised LaLeche League Manual*, a pamphlet by Dr. Richard Applebaum called "Abreast of the Times," Karen Pryor's book, *Nursing Your Baby*, and Shiela Kitzinger's book, *The Experience of Breast-Feeding*.

The *LaLeche League Manual* is, of course, the standard and the most widely read lay manual in existence. Dr. Applebaum's book clears away the cultural stereotypes that many people have regarding breast-feeding, and it discusses all the ways that people around a breast-feeding mother can turn her off. Karen Pryor's book has a very valuable chapter dealing with the feelings of sexuality during the postpartum nursing period. Some breast-feeding mothers are hypo-estrogenic to the point of having dry, almost menopausal vaginas, leading to painful intercourse and the feeling that something is wrong. Karen Pryor handles this problem in a very informative manner. Shiela Kitzinger's book

is particu  
and gives  
when a la

*Audience*  
writte  
sultati  
hotline  
proble

*Walsh: TH*  
*Audience*

called.  
inverte  
just wa  
ple for

*Walsh: W*

tween  
and it

nately,  
rying t  
import

to use  
breast  
that br

and th  
to pull  
lem w

etc.—i  
And on  
they co

that th  
it nurse  
titis is



number of countries  
others to bring their  
work. I do not know  
ry, but the benefits  
niences, and society

society has collective  
n of breast-feeding;  
ormality in general.  
e human child, and  
d its mother. Breast  
appear to be much  
rst year of life is usu-

#### Mother

making adequate  
ne, knowledgeable  
nvolved with breast-  
ie, expert childbirth  
anning practitioners.  
found successful are  
a pamphlet by Dr.  
imes," Karen Pryor's  
zinger's book, *The*

se, the standard and  
e. Dr. Applebaum's  
at many people have  
the ways that people  
r off. Karen Pryor's  
with the feelings of  
eriod. Some breast-  
point of having dry,  
nful intercourse and  
a Pryor handles this  
iela Kitzinger's book

is particularly valuable because she recognizes lactation failure and gives excellent advice on how to counsel people to persevere when a lactational failure occurs.

\* \* \* \* \*

#### Question and Answer Period

*Audience:* I'd like to add to that list a book called *Heart Start* written by Eileen Bryce, who runs the breast-feeding consultation service out of Saint Paul, Minnesota. She also has a hotline number that you can call if you have breast-feeding problems, and I have used her services many, many times.

*Walsh:* Thank you. Somebody else had their hand up.

*Audience:* Saturday night one of my new postpartum ladies called. Her baby was a week old, and she said her nipples were inverted. She had to use some kind of a shield, and the milk just wasn't letting down. You mentioned some kind of a nipple for them to use.

*Walsh:* Well, there's a Woolrich shield that they can wear between nursings. It's a glass cup that fits around the aureola, and it has a little dome that forces the nipple out. Unfortunately, that should have been taken care of when she was carrying the baby, but it can be dealt with now. I think the most important thing to do with a nipple problem is to continue to use that breast, even if she can only tolerate sucking on that breast for two or three minutes. She should continue to use that breast everytime, wear the Woolrich shield in between, and then she should be taught the gentle art of nipple massage to pull the nipple down before the baby hooks on. The problem with most breast problems—mastitis, nipple inversion, etc.—is that 50% of doctors will tell the mother to stop nursing. And one of the problems I have with my own interns is that they come from their motherhouse, UCLA, firmly convinced that the baby is going to die of staphylococcal septicemia if it nurses on a mastitis. Even when I point out to them the mastitis is in the interstitial and supportive tissues of the breast,



not in the milk ducts, they are not really convinced until they see a couple of mothers nurse their way out of mastitis.

*Audience:* If a mother has to pump her breasts, is the prolactin production affected?

*Walsh:* Well, prolactin will only respond to nipple stimulation. Prolactin cannot be produced by hand massage. Hand massage will help because the oxytocin can be released by other cues. So, in addition to hand pumping, there has to be nipple stimulation. And if you have seen the Egnel pump, which is the cadillac of electric pumps, one of the things you notice is that it *does* pull the nipple out each time. The little cow horn that most nurses bring to the nurseries—the little glass thing that looks like a bulb—is useless, because it doesn't pull the nipple out sufficiently. There is a better hand pump that looks like a syringe, an inverted syringe. I wish I had brought one, because we use it. You put it over the nipple. When you create the vacuum, it pulls on the nipple. And that's critical, because if you don't stimulate the nipple, the pituitary will not make prolactin.

*Audience:* Do you have any good manuals or books that will teach a client to have good nipple stimulation?

*Walsh:* In Dr. Applebaum's book, there are actual illustrations which show nipple massage and how to work with an inverted nipple. Also, in the newer LaLeche manual, there is a specific section about how to prepare your nipples as well as demonstrations of another shield besides the Woolrich shield.

*Audience:* I would just like to add, from personal experience, that I have been using a Kaneson pump, the syringe type, and it is an excellent pump. You get a lot in a short period of time, and it doesn't hurt. It's easy to use.

*Audience:* What would you recommend to a client if they were complaining of dryness during intercourse? In the past, I have heard petroleum jelly and K Y jelly recommended, but then I heard that the K Y jelly is spermicidal.

*Walsh:* Yes, I know the K Y jelly could be spermicidal. I don't think it is very spermicidal, but I have been tempted to rec-

ommen  
ally just

*Audience:*  
to have  
lergies t  
mended  
teract a  
tions lik  
to be re

*Walsh:* I th  
trate, ar  
the edg  
is very  
diarrhea  
It occur  
nursery  
lems, ar

*Audience:*  
101° to  
know if

*Walsh:* I us  
I don't  
things ou  
in the b  
There a  
Theoreti  
anticoag  
to take 7

*Audience:*  
the mon  
dangerou

*Walsh:* I do  
don't thi  
hands, a  
whatever  
before a



convinced until they  
out of mastitis.

ests, is the prolactin

o nipple stimulation.  
massage. Hand mas-  
be released by other  
here has to be nipple  
gnel pump, which is  
e things you notice is  
e. The little cow horn  
-the little glass thing  
se it doesn't pull the  
hand pump that looks  
h I had brought one,  
ipple. When you cre-  
nd that's critical, be-  
the pituitary will not

s or books that will  
ation?

e actual illustrations  
ork with an inverted  
al, there is a specific  
es as well as demon-  
oolrich shield.

personal experience,  
he syringe type, and  
short period of time,

a client if they were  
e? In the past, I have  
ommended, but then

spermicidal. I don't  
been tempted to rec-

ommend Premarin or estrogen cream, but just tempted; I usu-  
ally just stick with Petrolatum.

*Audience:* Mothers who are severely allergenic have been found  
to have difficulties with their babies seeming to develop al-  
lergies to their milk. A clinical ecologist in Omaha has recom-  
mended using sublingual drops of diluted breastmilk to coun-  
teract allergenic reactions in the totally breast-fed baby, reac-  
tions like hyperperistalsis in the bowel, rashes, etc. This seems  
to be really helpful.

*Walsh:* I think that's a field that we are just beginning to pene-  
trate, and I think you are absolutely correct. We are just on  
the edge of beginning to understand these things. One thing  
is very clear: a breast-fed baby almost never gets infectuous  
diarrhea. One of the real tragedies is necrotizing enterocolitis.  
It occurs in small infants. You get them through the neonatal  
nursery period, over their breathing and circulation prob-  
lems, and then they die of necrotizing enterocolitis.

*Audience:* What do you recommend if the mom is running a  
101° to 103° fever? Sometimes I get calls, and they want to  
know if they should continue nursing.

*Walsh:* I usually advise that they take Tylenol if it's just a fever.  
I don't know that this is true, but theoretically, the aspirin  
thins out the platelets. Anything the mother takes will appear  
in the breastmilk. There are almost no exceptions to this.  
There are some drugs that don't get through, but very few.  
Theoretically, if the mother takes aspirin, it might have an  
anticoagulant effect on the baby. I tell the mothers with fevers  
to take Tylenol if they have to control their fevers.

*Audience:* Is there any chance of the baby getting the fever from  
the mom if there is an infection someplace in her body? Is it  
dangerous for a sick mom to continue nursing her baby?

*Walsh:* I don't think so, and that is such a broad question that I  
don't think there is a correct answer. The germs are on the  
hands, and I think that if the mother has a flu syndrome or  
whatever, she has to use very careful handwashing techniques  
before and after she handles the baby.



*Audience:* What about low weight gainers? Has it been your experience that smoking counteracts prolactin? Do you have any tips for mothers of low weight gainers?

*Walsh:* Yes, smoking can impair the quality and the release of milk, because smoking releases dopamine, dopamine is an anti-prolactin factor. Secondly, you have to look at slow weight gainers in the context of the family. I have a very fine pediatrician that works for me. She really takes a look at each case, and she has taught me something about slow weight gainers. When you look at a slow weight gainer, one of the first things you want to know is: what's the family history? And there are a lot of families that have very small children that are very, very low on the weight curve, but they continue to gain within their own channel. They may be off the weight curve, but they continue to relate well to themselves, and they turn out to be perfectly average-sized people. One of the most difficult situations is where a woman is on chronic medications. We have a number of patients in our practice that have seizure disorders. And that definitely can give the baby a bad time. Some of the time, very reluctantly, we have to take the baby off the breast because the baby is on such high doses of Dilantin or whatever, and it really is affecting the baby's sucking and behavior. Those are very difficult cases.

#### References

- 1 McNeilly, A. S., Physiology of lactation, *J. Biosoc. Sci.*, Suppl. 4 (1977), pp. 5-21.
- 2 Neifert, M. R., et al., Failure of lactogenesis associated with placental retention, *Amer. J. Obstet. Gynecol.*, vol. 140, no. 4, June 15, 1981, pp. 477-478.
- 3 Konner, M. and Worthham, C., Nursing Frequency, Gonadal Function, and With Spacing Among !Kung Hunter-Gatherers, *Science*, vol. 207, February 15, 1980, pp. 788-791.
- 4 Tyson, J. E., et al., Significance of the secretion of human prolactin and gonadotropin for puerperal lactational infertility, in symposium on breast-feeding and the mother, London 1976. *Breast-feeding and the Mother*. Amsterdam, Elsevier/Excerpta/Medical/North Holland, 1976. (Ciba Foundation Symposium New Series 45), pp. 49-71.
- 5 Delvoe, P., et al., Serum prolactin, gonadotropins, and estradiol in menstruating and amenorrheic mothers during two years' lactation, *Amer. J. Obstet. Gynecol.*, vol. 130, March 15, 1978, pp. 635-639.
- 6 Rolland, Rune, et al., The role of prolactin in the restoration of ovarian function during the early postpartum period in the human female, *Clinical Endocrinology*

is? Has it been your prolactin? Do you have others?  
 y and the release of prolactin, dopamine is an important factor to look at slow weight gain. We have a very fine pediatrician, let's look at each case, especially the slow weight gainers. One of the first things in the history? And there are children that are very, very slow to continue to gain with the weight curve, but they are very, very slow, and they turn out to be one of the most difficult chronic medications to practice that have seizure activity that give the baby a bad time. We have to take the baby on high doses of Dilantin to help the baby's sucking and

- (1975), 4, pp. 15-25.
- 7 Reyes, F. I., et al., Pituitary ovarian interrelationships during the puerperium, *Amer. J. Obstet. Gynecol.*, vol. 114, no. 5, November 1, 1972, pp. 589-594.
  - 8 Brunner, D. L., et al., Prolactin levels in nursing mothers, *Amer. J. Obstet. Gynecol.*, vol. 131, no. 3, June 1, 1978, pp. 250-252.
  - 9 Horowitz, M., et al., Effect of modification of fluid intake in the puerperium on serum prolactin levels and lactation, *Med. J. Aust.*, 1980, 2, pp. 625-626.

*Obstet. Gynecol.*, Suppl. 4 (1977), pp. 5-21.  
 associated with placental retention, *Obstet. Gynecol.*, 1981, pp. 477-478.

, Gonadal Function, and With  
*Obstet. Gynecol.*, vol. 207, February 15, 1980,

human prolactin and gonadotropin-releasing hormone on breast-feeding and lactation. Amsterdam, Elsevier/ Foundation Symposium New

, and estradiol in menstruating women, *Amer. J. Obstet. Gynecol.*,

restoration of ovarian function in the female, *Clinical Endocrinology*