

Lactation & Breastfeeding

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EDITORIAL

Dear colleagues, dear members,

Take a cup of coffee or tea, install yourself in a comfortable chair in the sun or nice and warmly inside and take time to read the interesting articles of this issue!

Some weeks ago, it was Mother's Day. And I think we all deserve a pat on the shoulder - for our work for "our" mothers and, among our colleagues who have children, to reward you.

We are all doing such a great job! Some people don't even know that a lactation consultant exists. Some do know about IBCLCs in the meantime, but already have grown-up children. They may wish they had had an IBCLC when they had their newborns and were facing breastfeeding problems, which could not be solved.

Breastfeeding problems are sometimes not so easy to overcome. We do know a lot of solutions. But we also have to adapt our plan to the breastfeeding dyad. And then we need to factor in someone else's motivation, their knowledge, their environment, their history. Lactational care is customized care.

A helpful tool for our work is cooperation and sharing knowledge, informing each other. While this issue is being processed, the board of ELACTA is sharing knowledge in Salzburg at "CERPs International". And while you are reading this magazine, you are being informed. This makes cooperation possible.

Have fun reading!

Karin Tiktak
President ELACTA

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Breastfeeding a Baby with Heart Disease

The ideal, taking into consideration special needs Author: Dr. med. Tina Springer, IBCLC



Photo: © Tina Springer

Fig. 1: Five month old infant with HLHS (hypoplastic left heart syndrome) following a Norwood procedure

Babies with heart diseases have special nutritional needs. Mother's milk is the best food – also for infants with heart disease. This article explains the special factors that must be considered in feeding infants with heart conditions and how the best possible breastfeeding results can be achieved

Which babies are identified as having heart disease?

Above all, it is those babies with anatomical heart defects, who are counted in the special patient group of infants with heart disease. These babies arrive in the world with

congenital heart defects. Furthermore, cardiac arrhythmias can occur in anatomically healthy hearts during childhood. Most of these are harmless. A very few are associated with a very serious prognosis and need drastic measures (i.e. a defibrillator). Children can also suffer from structural (cardiomyopathies) or infectious heart disease (myocarditis, endocarditis). Arrhythmias and structural or infectious heart diseases are very rare at the age in which children are breastfed (Sekarski et al. 2014). In these cases, a good way to breastfeed the babies is usually found as long as they do not need to be in intensive care.

Insights into the frequency and classification of heart defects

Congenital heart defects occur with a frequency of about eight per 1000 births and are, thus, relatively frequent among the congenital abnormalities. Among these, 25% are ranked as critical heart defects. That means that these babies need surgery or intervention on the heart in the first year of life (Fillipps et al. 2015). The congenital heart defects (vitien) can be classified in accordance with different criteria. A sub-division can be made into cyanotic and non-cyanotic vitien. Babies with cyanotic vitien have reduced oxygen satu-

ration in the blood, which can sometimes be seen, sometimes only measured with a pulseoxymeter. Cyanosis occurs because oxygen-poor blood that is meant to flow into the lungs, gets into the systemic circulation. Among the cyanotic vitien are the tetralogy of Fallot (TOF), transposition of the large vessels (TGA), pulmonary atresia (PA, with or without VSD), hypoplastic left heart syndrome (HLHS), tricuspid atresia (TA) and complete displaced lung aperture (TAPVD).

Among the non-cyanotic vitien, the blood flow runs from left (oxygenated) to right (non-oxygenated). So the lungs get back some oxygenated blood along with the unsaturated blood from the body's veins. Among the non-cyanotic vitien are the atrial septal defect (ASD), the ventricle septum defect (VSD), the atrioventricular septum defect (AVSD) and the persistent ductus arteriosus (PDA).

Furthermore, there is congenital stenosis (constriction) of the heart valves or large vessels. Among these are, for instance, aorta valve stenosis, coarctation of the aorta (COA), and pulmonary stenosis. The blood accumulates in front of the stenosis and the adjacent vessel bed is not supplied. A further rough classification of heart defects – into two chamber (biventricular) and one chamber (univentricular) hearts must be made.

With the one chamber heart, an entire heart chamber has not developed or is not large enough due to a valve between the atria and the heart chamber (tricuspid- or mitral atresia) that has not grown well during the embryonic and fetal period.

Prognosis for one- and two-chamber heart defects

The prognosis for children with congenital heart defects has improved a great deal over the last several decades. Surgical correction is possible for most of the biventricular heart defects, with a very good prognosis (i.e. ASD, VSD, TOF, TGA, PA +VSD, CoA, valve stenosis). The survival rate is 95-100% (McCrary et al., 2013). Patients with univentricular vitien can be offered operative palliation with the goal of Fontan circulation. Thereby, in two to three operative steps, the lungs are separated from the systemic circulation. Then the blood drains passively from the lungs because connections between the large body veins and the lung arteries have been created. The survival rate of this operation cascade is 80-90%

Increased nutritional requirements

Infants with heart defects mostly have increased nutritional requirements. Most pronounced is the increased requirement in patients with significant left-right shunt. These are mostly non-cyanotic vitien. A great deal of blood circulates in the lungs and again back to the heart. The heart must pump considerably more than the normal amount. With univentricular hearts, the heart chamber takes over the task of pumping for both circulations (lungs and body). The increased nutritional requirements result, for one thing, from the pulmonary flooding and, for another, from the volume strain of univentricular hearts. The children present with the classic signs of heart insufficiency. Among these are accelerated breathing (tachypnea), sweating, weak sucking, poor weight gain and, possibly, increased infections.

Advantages of mother's milk

Especially for infants with congenital heart defects, mother's milk is the ideal food.

Given its metabolic and immunological properties, it is superior to breast-milk substitutes (Rosti et al. 2011). Mother's milk feeding also has advantages from a non-nutritive perspective: Positive psychosocial effects in conjunction with breastfeeding and pumping for a sick baby are documented. The satisfaction of the mothers in the hospital and their reliability caring for their babies are better for mothers who breast-feed their babies despite illness (Wallis et al. 2007). Maternal stress can be reduced by breastfeeding or pumping because then a mother feels a part of the team that is making efforts to heal her sick baby (Lambert et al. 1998).

Difficulty breastfeeding

If the special needs are considered, there is, in principal, no reason not to breastfeed a baby with a heart defect. Breastfeeding and breastfeeding counselling, as well as breastfeeding support in the hospital, require a lot of professional involvement and there are also spatial requirements. Sometimes, the technique for monitoring patients, lack of personnel, organizational conditions and hospital procedures limit the breastfeeding of babies with heart defects.

How can the increased nutritional requirements be covered?

Infants with heart defects that have not yet been corrected and those having signs of heart insufficiency receive medications to mitigate the symptoms of heart insuf-

ficiency. Available, among other medications, are diuretics, beta-blockers, ACE-inhibitors and digoxin. Infants with heart insufficiency need more frequent, small meals in order to achieve the required daily intake. A gastric tube helps to administer the amount of milk the baby cannot drink himself, due to the weak sucking. If the amount of milk cannot be increased further, the milk must be fortified. For this, mother's milk boosters, oil, maltodextrin and high caloric infant formula are available. In individual cases, better weight gain could be achieved if the infant were given primarily the fat-rich hind milk. The hind milk is that portion which is collected in the second half of the pumping session. By comparison to the foremilk, it is demonstrably higher in fat and, therefore, higher in calories. The preferred feeding of the higher fat hind milk is referred to as lacto-engineering. (Slusher et al. 2012, Galloway et al. 2015).

Breastfeeding and Nutrition in the pre-operative phase

Meanwhile, many heart defects are already being diagnosed prenatally. Immediately after birth, it is essential for some babies with critical heart defects that the ductus arteriosus Botalli remain open. This vessel is a fetal "short-circuit" connection between the aorta and the pulmonary artery. With so-called ductus-dependent heart defects, the spontaneous



LACTOENGINEERING

The term "lactoengineering" is not always used consistently today with respect to content, but it is always used as a term for the processing of mother's milk, mostly for feeding premature and/or sick newborns.

The term is primarily associated with the work of Paula Meier and "hind milk" enrichment. Increasingly, the term lactoengineering is used for the analysis of mother's or human milk for enrichment or in the production of human milk products.

Source: Nicole Kaufmann: Lactoengineering: Mother's milk for feeding infants with special needs. L&S 01-2012

postnatal closing of the duct must be prevented with prostaglandin (i.e. the medication Minprog – in Germany a common intravenous prostaglandin). With an open ductus, the blood flow of either the body or the lungs is secured. Among the ductus-dependent heart defects are, for instance, TGA, HLHS, CoA, PA with VSD and some forms of the tetralogy of Fallot (TOF). These babies must be monitored on the intensive care unit. Because of the special circulatory situation, the blood flow to the intestine is endangered. For a long time, it was not clear whether these newborns should be fed enterally. There was concern because of the increased risk of necrotizing enterocolitis (NEC). A working group in Durham, North Carolina has studied a large population of newborns with ductus dependent heart defects on prostaglandins with respect to the incidence of NEC. It was shown that the incidence of NEC with enteral feeding was not higher than with exclusively parenteral feeding. The risk for NEC is highest among patients with one chamber hearts and among prematures (Becker et al. 2016). In the Leipzig Heart Center we have had very good experience with enteral feeding of infants who have a prostaglandin infusion, preferably with the fresh milk of their own mothers. If the patients are stable enough (no breathing help, no catecholamines), they are breastfed on the intensive care unit. Mother's milk is also tube-fed in addition so as to achieve the necessary amount of nutrients.

Breastfeeding and nutrition in the post-operative phase

After a heart operation, particularly after using the heart-lung machine, the newborns have an increased basal metabolic rate. The first two days after the operation are categorized from a physiological perspective as the so-called "acute phase". A pronounced systemic inflammation reaction takes place in the body. In this acute phase, primarily fluids, glucose and electrolyte solutions are given (trophic feeding). Only the smallest amounts of mother's milk or glucose solution are given enterally. Enteral tolerance is only limited. From the third day after the operation, the nutrient needs increase significantly. There is a high need for energy for wound healing. Furthermore, a newborn has only few metabolic reserves. The break-down of the body's own proteins happens quickly if not enough protein is fed. Post-operatively, at the beginning, the baby is fed parenterally (via a central vein catheter) and then, step-by-step, the portion of enteral feeding



Fig. 2: Newborn with d-TGA (dextro-transposition of the great arteries) on the 4th day of life, with a continuous infusion of alprostadil (prostaglandin E1), on the Intermediate Care Station with monitor surveillance.

is increased (Owens et al., 2009). As soon as the baby is hemodynamically stable and the condition of the wounds allow for it, he can be breastfed. After correction of the heart defect, clearly improved feeding efficiency, compared to before the operation, is mostly achieved quickly. This is particularly the case with patients with VSD or AVSD who, until the operation, had to be fed laboriously - to some extent through a tube - over a three to four month period. After the operation, their feeding behavior is impressive and mostly, they no longer need a tube.

A special situation - because the baby cannot be breastfed - is post-operative chylothorax. The accumulation of chyle in the pleural cavities or in the abdominal area occurs in 10% of patients operated on in the neonatal period. Chylothorax requires a low-fat diet for several weeks. Therefore, for this time, a diet of fat-free special formula (i.e. Milupa basic f) is fed. This is fortified with MCT-oil (exclusively medium-chain triglycerides). There are initial good experiences in the case of chylothorax with feeding the newborns with low-fat mother's milk (Kocel et al., 2016). Also in Leipzig, we have successfully produced low-fat mother's milk in the course of the ChyloBEST study. With the diet of fortified, low-fat mother's milk, all patients (n=10) healed from the chylothorax.

Special features after palliative operation on the one chamber heart defects

One chamber hearts cannot be anatomically corrected. Fontan-circulation is pursued step by step. With many one-chamber defects, the first of the operative steps in the neonatal period is the attachment of an artificial "short-circuit" connection between the systemic body circulation and the pulmonary artery. The most frequent surgically-created shunt is the modified Blalock-Taussig shunt. There is a fragile balance between lung and body circulation. For the baby, there is the risk from lack of volume (i.e. with weak sucking, diarrhea, infection and anemia). When the shunt is not well supplied with blood, a thrombosis can occur. Therefore, for so-called "shunt babies", very close weight controls and monitoring of oxygen saturation are necessary. Particularly fragile is the circulation situation in infants with hypoplastic left heart syndrome after the Norwood-I-Operation. The mortality rate between the first and second operation could be dramatically reduced through close follow-up and measurement of the oxygen saturation at home. Here too, nothing argues against breastfeeding. Frequent monitoring in pediatric and pediatric cardiological practices are necessary in order to recognize poor growth in a timely manner and counteract this. For poor



Fig. 3: Same patient as in fig. 2 with mother

growth is not harmless. It is associated with neurodevelopmental deficits. McCrary et al studied a group of 133 “shunt babies”. All of them lay one to two standard deviations under normal weight. 63% had a stomach tube, only 43% received any mother’s milk, only 18% received mother’s milk for six months. The babies fed on mother’s milk had a somewhat better percentile position, but this difference was not significant (McCrary et al. 2013). A Norwegian cohort study, (Tandberg et al, 2009) compared 131 infants with a healthy control group. They showed that babies with heart defects were breastfed less than healthy babies and that the duration was shorter. While in the healthy control group, 15% were still primarily breastfed at six months (which, in any case, is shockingly low), among the babies with heart defects only 10% were still primarily fed with mother’s milk at six months (Tandberg et al. 2009). In Philadelphia, Torowicz and colleagues (2015) observed a group of 62 young infants with operated heart defects in the first month of life. Mother’s milk was pumped for 89% of the babies, but these babies only received 10% of their feed directly from the breast. 60% of the milk was given by bottle, 30% by tube. Only 13% of the babies were put to the breast at all. The results from Jadcherla et al (2009) in Wisconsin showed that feeding of babies with heart defects is difficult:

Babies with cyanotic heart disease reached certain milestones of enteral feeding (i.e. the first bottle feed, the first breastfeed, longer hospital stays) later than babies with non-cyanotic heart defects.

Conclusion: Nothing argues against breastfeeding

Ideally, babies with heart defects should be breastfed. The increased nutritional requirements must be kept in mind. This can be counteracted by fortifying mother’s milk with mother’s milk boosters, oil and/or maltodextrin. Also, lacto-engineering, the preferential feeding of the fat-rich hind milk has proven its worth. Frequent small meals are necessary. For babies who suck poorly, a stomach tube can help the baby to take in the necessary amount of food. The body mass (weight, head circumference) and the oxygen saturation must be monitored regularly and closely. Therefore, regular pediatric cardiological check-ups are recommended. The non-nutritive aspects of breastfeeding (body contact, rest periods, microbiome etc.) have great value. Particular personnel and time engagement is certainly needed to support breastfeeding of babies with heart defects which, considering the advantages described, is worthwhile.



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A Different Way of Breastfeeding

Breastfeeding a baby who cannot suck effectively due to anatomical malformations or physical impairments Author: Ulrike Giebel, IBCLC



Ulrike and Vitus

There are many reasons why a baby cannot immediately feed at his mother's breast on his own. Among them are blockages, tongue-tie, impaired breastfeeding reflexes, prematurity, heart defects, illness/syndromes or oral-facial clefts. For the affected mother-baby pair, breastfeeding is often made difficult and is frequently impeded or even made impossible by very early use of bottle-feeding. This article is intended to show you alternative breastfeeding and nutritional variants to enable the affected mother-baby pair a later start to a normal breastfeeding relationship.

How it all began

I am the mother of three sons. My youngest sons, Linus (currently 8 years old) and Vitus (almost 6 years old) were both born with a complete one-sided cleft lip and palate. When we discovered this with Linus, we began to address this topic actively.

Through my experience as a breastfeeding counsellor, I was aware **that normal breastfeeding could be difficult because a baby with a complete cleft -above all in the area of the soft palate - cannot build up any negative pressure and, thus, cannot "milk" the breast.** To feed the baby with mother's milk despite this, it is generally recommended that the mother's milk be pumped and fed to the baby via the nursing supplementer (SNS) at the breast or by bottle with a special nipple.

Because I had already breastfed my first son for 2½ years, I was very much looking forward to breastfeeding this time and to the independence that was connected with it. **So I could not get enthusiastic about the idea of pumping my milk, filling a bottle and then giving it to my baby at the breast (SNS) or by bottle. I was absolutely determined to find another way.**

I gave birth to Linus at home (and later to Vitus as well). Immediately after the birth, we experienced a wonderful time of bonding and I put him to breast. Naturally, he tried to suck, but it turned out that he couldn't create the necessary vacuum for breastfeeding. **So I began** to follow the current recommendations to **express the colostrum** directly into his mouth, rather than pumping. He drank it eagerly. Because it worked so well, my husband and I asked ourselves, **why not simply continue and make up for the lack of vacuum by hand expression?** Doesn't that come closest to natural breastfeeding?

No sooner said, than done, it worked and the "Giebellinus-Method" was born.

At the beginning, I could only express part of the necessary mother's milk. To further stimulate the milk production, I also pumped additional milk and fed it with a milk collection shell, cup or finger-feeding



**Ulrike
breastfeeding
with the
Gibellinus-
technique**

It took about a month before I was able to completely nourish Linus with the “Giebellinus-Method”. With Vitus, 2 ½ years later, I was able to do without supplementation after two weeks.

When I found that – contrary to the general assumption – I was actually able to feed my children in this way, I was elated and **I wondered why this idea, which is actually so simple, is not yet widespread.**

In this way, I was able to breastfeed Linus, exclusively for 7 months and with complementary foods up to 13 months, and with Vitus even 9 months exclusively up to 14 months with complementary foods

My path to becoming a nutritional consultant for children with sucking difficulties

Already with Linus, we were looked after by Dr. G. Schmidt, Director of the Cleft Lip and Palate Department of the Charité at the Virchow Campus. Even then, she had spoken to me about whether - with my experience and my knowledge - I might be interested in working in her team as a nutritional consultant for children with sucking difficulties

Because I didn't want to leave midwifery, I didn't accept at first. However, when my son Vitus was also diagnosed with a cleft lip and palate, the call of destiny seemed blatantly obvious and I gave up midwifery to devote myself to nutritional counselling for babies with cleft lips and/or palates.

Since 2012, I have been a freelance nutritional consultant for cleft lips and palates at the Charité, Virchow Campus under the leadership of Dr. Schmidt.

I support affected families in finding their way to secure feeding of their babies with lip and palate clefts, with particular attention to the support of mother's milk feeding for as long as possible and, thereby, enable mothers who want to breastfeed to have an alternative way to get there.

Since 2014, more and more parents with children who have difficulty with sucking for other reasons have sought a consultation and I quickly determined that my approach also frequently led to success. I have been able to show many parents an alternative oral feeding way, thereby, often avoiding lengthy tube feeding.

My approach to breastfeeding counselling

When possible, the parents already have **comprehensive counselling during pregnancy** on various feeding possibilities. **From the 38th week of pregnancy (37+0), many women regularly practice breast massage and expressing colostrum by hand.** Not infrequently, they are able to express several 2 ml syringes full. These are frozen until the birth and are a valuable resource as a supplement if there are difficulties at the beginning.

My overriding goal in the counselling is not that all women breastfeed in accordance with the “Giebellinus-Method”. More important to me is empathic support so that the parents find a secure way of nourishing their baby as well as support in establishing and maintaining the milk production. Nothing is worse for affected parents, especially for the mother, than not being able to feed her baby.

Whether the milk comes to the baby via the „Giebellinus-Method“, the SNS, with a cup, finger feeding or by bottle, arises from the individual situation, which is dependent on the kind of impairment, on the mother's wish to breastfeed and on the method that proves to be the most practical in the daily life of the family, especially for the mother.

Counselling depending on the duration of the anticipated impairment

In my counselling there are two alternative starting positions, depending on the expected duration of the impairment of the sucking ability. To estimate this duration, good cooperation with the attending physicians is necessary.

1. Counselling with an estimated impairment of the sucking ability < 6 months

If it is estimated that the impairment will be brief, maintenance of all breastfeeding reflexes and the imprinting of the baby to the mother's breast as the food source are in the foreground. Thereby, a later start in normal breastfeeding for the mother-baby pair can be made possible.

This can be accomplished via feeding on the breast, with a feeding tube, a feeder or an SNS. If there is not only a limited ability to suckle, but the baby is, for instance, not able to suck at all, as the result of a cleft in the soft palate, frequently he also cannot attach well to the breast and is, thereby, restless and discontented. In this case, I support feeding at the breast with as large a nipple shield as



Photo: © Ulrike Giebel



CONTINUING EDUCATION

I regularly offer continuing education on practical implementation of the methods mentioned and on supportive measures for affected families. I am also happy to come to your facility or hospital for continuing education or a workshop on this topic as well as on the promotion of oral feeding of sick babies.

If you are interested, please contact me at:

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possible. Tubes from the SNS or a feeding tube can be positioned under the nipple shield. If, in addition, the nipple shield with tubing is fixed with Fixomull-Plaster, peaceful, alternative breastfeeding is possible within a short period/time.

Initially, supplementation is often necessary. If at all possible, this should be with cup-feeding (i.e. with the milk collection shell, because the baby should satisfy his need to suck (which babies who cannot suck also have) only on the breast, not on a finger, a bottle nipple or a pacifier.

In addition, good pump management, with pumping 6-8 times daily, is needed for stabilization of the mother's milk production.

For the affected mother, this is a great challenge and a great expenditure of time and requires great support from the accompanying environment, so she can manage this until the ability to suck has been acquired.

But it is worthwhile!!! If the impairment is overcome, most mother-child pairs will achieve normal breastfeeding after targeted suck training with the support of the SNS.

2. Counselling with anticipated impairment of the sucking ability > 6 months

With large clefts, syndromes and serious illnesses of the baby, impairment mostly lasts longer than 6 months or even for ever.

Because normal breastfeeding seems to be almost unachievable for such reasons,

most women decide on pumping and feeding by bottle. Unfortunately, collecting the mother's milk which, with 6-8 pumping sessions daily, is very stressful in everyday life, this is often discontinued quickly and many women switch to infant formula. However, for these babies above all, long-term mother's milk feeding is particularly important. I think, that in this context, I don't need to go into great detail about the reasons for this.

For this mother-baby pair, breastfeeding with the "Giebellinus-Method" can be a real alternative. It comes closest to normal breastfeeding. To support milk production after establishing it - about 4-6 weeks postpartum - only 1-2 pumping sessions a day are necessary. This represents an enormous easing of everyday life compared to 6-8 times a day with other methods. With this method, the woman is just as flexible as with normal breastfeeding because she has everything at hand and does not need any aids.

If she is going to succeed at breastfeeding with this method - completely or partially - she needs competent support and, above all, a great deal of patience with herself and the baby in the first 4-6 weeks, particularly in the first several days after the birth

At the beginning, supplementation is mostly unavoidable. This can be easily done with a cup or finger-feeding, but it should remain a SUPPLEMENTARY variant in order to keep the breast as the primary feeding source.

Unfortunately, there is a **small disadvantage** here. With this method, **the baby loses the search and sucking reflexes**, since they are no longer needed. However, this has **no negative effects for the baby. The milking and swallowing reflexes remain intact.** For this reason, I don't recommend this method for short-term impairments.

However, if the mother does not want to breastfeed via GLM, she can, of course, breastfeed with a feeding tube or the SNS.



Ulrike Giebel
Midwife, lactation consultant
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consultant for babies affected by
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herself an affected mother.

But with Cream, Please!

How to increase the fat content of the mother's milk

Authors: Dr. med. Alexandra Glaß and Andrea Hemmelmayr

- ▶ **Your baby is not gaining enough weight or has even lost weight so you need help quickly?**
- ▶ **Your baby cannot take in the amount he should be drinking because he was born too early, arrived in the world at a low birth weight or, for example, needs additional energy due to a congenital heart defect?**

There are many reasons why it can be helpful to give your baby extra calories. In order to provide the greatest possible concentration of energy and nutrients with the least amount of fluid intake, the fat content of the mother's milk given to him can be increased.

For babies who suckle poorly, this can be the jump-start that you and your baby long for in order to continue breastfeeding – stress free – without supplementing with infant formula. .



Photo: © Anne-Marie Kern

Let the cream separate from the milk in the syringe: before using it, carefully press the clear whey out of the syringe and then feed the fat-rich milk

There are several approaches here

A

Skimming the cream in mother's milk

The first possibility for increasing the fat content of the mother's milk is skimming it, i.e. separating the fat-rich milk from the watery fraction. If the expressed mother's milk is allowed to stand, it is known that it separates into an upper layer of fat (cream) and a lower, watery layer (whey). The separation of the layers works well in the refrigerator. Then the cream is also somewhat firmer and easier to feed. The fat that collects on top can be skimmed off and given to the baby by spoon, pipette or syringe. It

contains a lot of nutrients and fat in small volumes and, thereby, takes less space in the stomach. The remaining watery solution should not be fed. You can add it to the bath water because, naturally, we don't want to discard the tiniest bit of the valuable milk.

With a pumped amount of 30–75 ml, the experience is that 5–10 ml of cream can be obtained depending on when and how the milk was pumped.

B

Fractionated Pumping

The fat content of mother's milk increases with every milk ejection reflex. Because there are always several milk ejection reflexes while breastfeeding – even if they aren't always noticed – the fat content of the mother's milk over the course of pumping time steadily increases. We can make use of this fact with so-called "fractionated pumping": While pumping, the collection bottle is changed multiple times: The first milk fraction, which is collected at the beginning of pumping is comparatively low in milk fat. The last milk fraction is highest in milk fat. When feeding it, we proceed in the reverse order, i.e., we feed the last, high fat milk fraction first, then the less fat fractions, one after the other, until the baby is satisfied. The first fraction can, if desired, be skimmed off.



Photo: © Andrea Hemmelmayr

If the mother's milk is stored for a while in the refrigerator, the mother's milk cream rises to the top, which can be seen clearly here. Here pumping was interrupted and the output from the second pumping was collected in a different container. It can be clearly seen that, while the second portion has a lesser total amount, more cream has risen to the top



IBCLC

International Board Certified Lactation Consultants are the only internationally approved breastfeeding and lactation specialists having a medical background.

The decision to breastfeed or not to breastfeed has short- and long-term impact on the health of child and mother. However, breastfeeding sometimes turns out to be difficult and perhaps professional, competent assistance is needed.

C

Increase the fat content of the mother's milk

You can also actively influence the fat content of the expressed milk: Studies show that the fat content of the milk is particularly high 30 minutes after breastfeeding. You can make use of this fact by choosing the time to pump and taking measures, such as breast massage or special pumping methods, that further increase the fat content, for example "hands-on pumping". Here, you first massage both breasts, then pump with a double pump set, during which you can gently compress the breast. You do this until the milk is clearly flowing more slowly. Then you massage again and afterwards get milk from both sides by hand. This procedure allows you to get significantly larger amounts of milk and increase the fat content of the milk.



Photo: © Regina Fotografie

The fat content of the mother's milk can also be increased with breast massage.

Contact your IBCLC

The Cream Top-Up That Can Save the Breastfeeding Relationship

Author: Andrea Hemmelmayr, IBCLC

I first heard of using the fat-rich portion of mother's milk from Paula Meier. She used the fat-rich hind milk (in the framework of lacto-engineering) to provide premature babies with somewhat more calories. Why should something that has been used successfully with premature infants not also be used with full-term babies? All of us support breastfeeding relationships which don't begin easily and babies whose weight gain always remains at the lower edge. We all know pediatricians who all-too-quickly advise feeding infant formula. All the better then, when many possibilities are available to us to support mother and baby.

Case Study of Twins Ayse* and Ali*

The mother of the twins (born in the 37th week of pregnancy) came for a consultation and explained that she was pumping

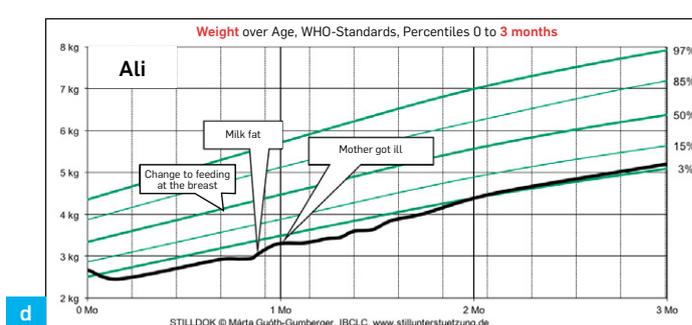
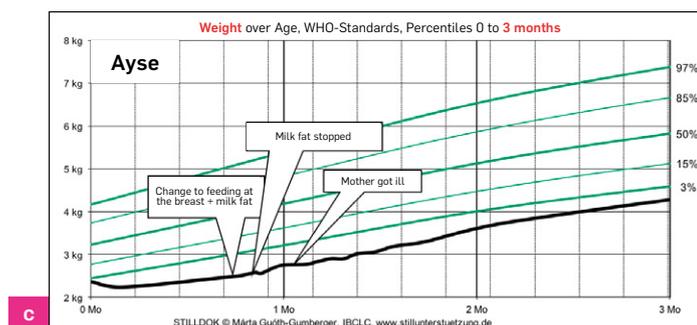
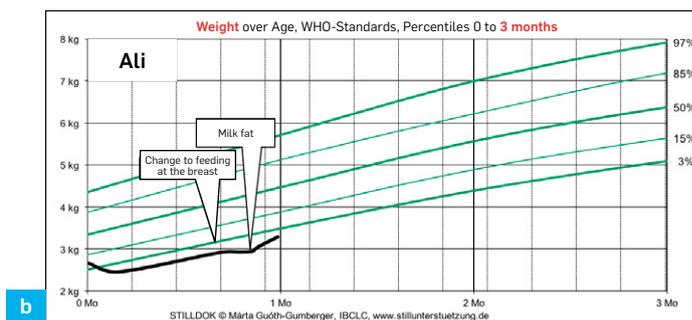
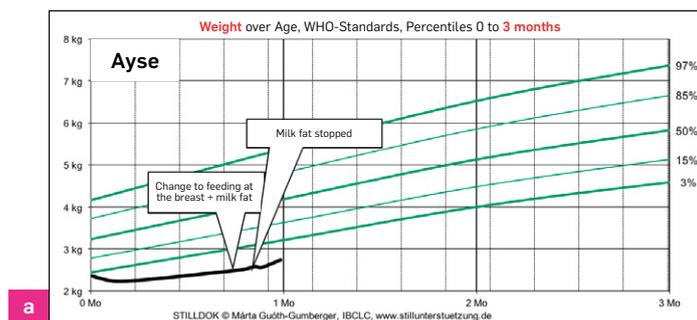
her milk and feeding it with the bottle because she was told that the twins were too weak to feed directly from the breast. Meanwhile, the babies were 3 weeks old. Despite this measure, according to the pediatrician, the babies – especially Ayse – were gaining poorly. Slowly, pumping was becoming ever more difficult, the amount of milk pumped was less and less so that the pediatrician had already recommended mixing an additional nutrient solution (the mother could not say which one) into the mother's milk and, in addition, to feed infant formula. The mother was extremely unhappy with this. She desperately wanted to breastfeed.

When she tried putting the babies to breast, both babies were able to suckle effectively so that it was agreed with the mother to feed them directly at the breast and, if necessary, supplement them with some pumped mother's milk afterwards

(by bottle, at the mother's request). To increase the milk production, the mother pumped with a double pump set and we discussed a practical pumping plan. With a small syringe, Mama was to siphon off a little of the cream swimming on top and always give Ayse a little additional mother's milk fat. With this measure, Ayse gained wonderfully and was more interested in feeding directly from the breast. However, with this change to the breast, now Ali's weight gain began to stagnate. With daily weight monitoring, the mother began to provide Ali with somewhat more fat and soon both babies gained better. (Fig. a, b)

Although the mother became ill shortly afterwards and, for a short period, battled for milk production and the babies' appropriate weight gain, the breastfeeding relationship was able to be rescued without additional feeding of infant formula in accordance with her wishes. (Fig. c, d)

*(names altered)



Thin Silicone Nipple Shields

Excerpts from *The Breastfeeding Atlas*, written by Barbara Wilson-Clay and Kathleen L. Hoover



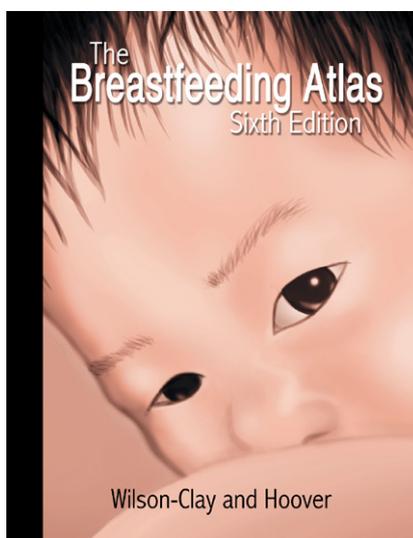
The pros and cons of nipple shields – the discussion continues

In this issue we want to continue the discussion about the use of nipple shields. In the last issue, we published a scientifically supported plea by Claudia Wronsky El-Awamry for the use of nipple shields and a brief statement by Jack Newman against their use. In this issue, Jack Newman explains his position in detail and expands on it with additional arguments.

For a broader view, we have published excerpts from *The Breastfeeding Atlas* by Barbara Wilson-Clay and Kathleen L. Hoover. The authors consider the use of nipple shields appropriate under certain circumstances and outline the indications for and practical aspects of this from their perspective.

With this series of articles on the controversy, we hope to have broadly illuminated the potential advantages and disadvantages of nipple shields, possible areas of application and precautionary measures

Please address letters to the editor to magazin@elacta.eu



When a newborn struggles to latch on, or refuses the breast, mothers describe feeling rejected. Not only is breastfeeding jeopardized, there may be disruptions in the bonding process. Therefore, it is important to understand causes of breast rejection. With information, reassurance, and effective case management, most problems can be corrected over time, and the baby can receive mother's milk until direct breastfeeding is established.

A chart review by Wilson-Clay (1996) identified 32 women who were given thin silicone nipple shields as an intervention to correct breast refusal, latch problems, or sore nipples. All the mothers identified themselves as being in danger of imminent weaning and viewed the nipple shield intervention as a final attempt to bring their babies to the breast. Of these women, 38 percent weaned prior to 6 weeks, but 51 percent, a significant number

of this high risk group, continued to breastfeed beyond 6 weeks. The results suggest that use of a thin silicone nipple shield can successfully remediate some serious breastfeeding problems, including infant breast refusal. In this case series, 15 of the mothers presented with flat or inverted nipples. They were significantly more likely to wean. The higher weaning rate among this subset suggests that flat and inverted nipples are a significant risk factor for lactation failure.

Ekstrom (2014) investigated whether increased training of health care professionals influenced the outcomes of nipple shield-using women, and how shield use affected infant weight gain and duration of breastfeeding. In this study, the most common reason for using a nipple shield was inability of the baby to grasp the nipple. In the Ekstrom study, shield-using mothers who did not receive care from trained helpers had shorter breastfeeding duration, and their babies had significantly lower weight at 3 months. Mothers who received care from well-trained helpers had a different experience using nipple shields and their breastfeeding durations were prolonged. The authors concluded: "Probably it is not the nipple shields themselves that affect breastfeeding, but rather the combination of nipple shields with professional support that gives the most successful outcome for the duration of breastfeeding."

The biggest risk many practitioners identify is that nipple shields can disguise poor infant milk intake and result in an understimulated milk supply. If a nipple shield is provided, close

follow-up care is vital, and infant growth should be monitored.

The Clinical Importance of Nipple Shield Design

Nipple shields have a remarkably persistent longevity as a tool. Written descriptions of the device appeared over 500 years ago, and they have been constructed of various materials (some toxic, such as nipple shields made of lead in Victorian England.) Most of the materials used to make nipple shields have been so rigid that they undoubtedly contributed to impaired milk intake and poor breast stimulation. This basic design problem has been improved upon with the use of thin silicone as the teat fabric. While allergy to silicone can be an issue, silicone is widely used in medicine, and topical silicone has been used as a treatment for keloid scars as well as for scar prevention (Weissman 2010).

Mothers may purchase a nipple shield without appropriate guidance. The nipple

shield in **Fig. 1** was purchased at a pharmacy (chemist's shop) in London, UK in 2002. This device is likely to contribute to poor milk transfer and inadequate breast stimulation owing to the fact that it does not fit closely to the breast. Thick latex shields sat directly on the breast, but they, too, were associated with decreased milk transfer and infants who failed to thrive. Shields of these designs should be avoided. Thin silicone nipple shields do not appear to alter infant sucking patterns (Woolridge 1980) and infant weight gain (Chertok 2009).

Shield thickness is not the only issue to consider. For a nipple shield to be an effective therapeutic tool, it must be a good fit with regard to the mother's nipple (Chow 2015). The shield should be centered over the nipple, and the shield must not be so long that it triggers the infant's gag reflex, or causes jaw closure and tongue compression to fall on the shaft of the teat. Using a too-long nipple shield creates a real risk that the baby will be unable to



Fig. 1: This ill fitting nipple shield was acquired in 2002 at a pharmacy in London



CASE STUDY 1



Fig. a illustrates the lack of elasticity in the nipple of a first-time mother with a non-nursing infant. Her nipple is pictured moments later.



Fig. b After her infant took his first effective breastfeeding at 2 weeks old using a nipple shield. A test weight performed before and after the breastfeeding confirmed that the infant consumed 79 ml. The infant continued to breastfeed with the shield for several weeks, and continued to gain > 1oz/day (>30g/day). The nipples gradually became more elastic, and the mother experienced no difficulty in transitioning the baby to direct breastfeeding without the nipple shield.

extract milk effectively. Considerations relating to nipple shield height may not be fully appreciated unless one considers that the heights of commercially available nipple shields range from 1.9 cm to 6.4 cm (Drazin 1998).

The diameter of nipple shields also can vary widely (Frantz 1994). This variability appears to be an attempt by manufacturers to accommodate the wide ranges of human nipple diameters. **Fig. 2** demonstrates graduating sizes of 3 Medela nipple shields. Sizes pictured are 16 mm, 20 mm, and 24 mm. Several researchers have looked at the variability in size of human nipples. The average nipple diameter appears to be 15-16 mm (Ziemer 1993, Stark 1994, Ziemer 1995, Ramsay 2005). Wilson-Clay and Hoover first presented similar findings on ranges and averages of nipple sizes in the second edition of **The Breastfeeding Atlas** (2002), and expand the discussion in the current edition. (See Ch. 10.)

Infants have been observed to have difficulty manipulating large maternal nipples. Large nipple shields cause similar problems for some babies. The LC must calculate the effect of the height and base diameter of nipple shields. There are differences in opinion between experienced practitioners with regard to fitting the shield. The authors prefer to use the shortest available teat with the smallest base diameter in order to ensure the shield fits in the baby's mouth. Inevitably, some of the small size shields are not wide enough at the base to accommodate larger diameter nipples, although some can be stretched to accommodate the mother.

Powers and Tapia (2012), on the other hand, recommend fitting the shield to the nipple, and assert that even preterm infants can open wide enough to accommodate the 24 mm shields. However, the ability to sustain a seal around such a large diameter object remains an issue for the infant whether the mother with large nipples is wearing a shield or not.

For women with wide diameter nipples, their breastfeeding problem may be related to large nipple diameter in the first place. Issues of "fit" must be factored into clinical observations, and there will always be some degree of experimentation involved regarding equipment choices.

Nipple Shields and the Preterm or Weak Infant

Some small infants and infants with neuromuscular issues (for example, infants with Prader-Willi Syndrome, Down Syndrome,



Fig. 2: Three nipple shields in different sizes

and other genetic disorders) appear to feed better with a nipple shield. They may need to rely on the nipple shield intervention for longer periods of time than would a more robust infant. Preterm infants seem especially to benefit from nipple shields. Meier studied a group of 34 premature babies who averaged 31.9 weeks gestational age. These babies were able to take in 14 ml more milk when at the breast using a nipple shield than when at the breast without a nipple shield (Meier 2000). They took, on average, approximately 75 percent more milk (3.9 ml without the nipple shield and 18.4 ml with the nipple shield). This represents a statistically and clinically significant

increase in intake. The researchers further observed that use of the shield helped correct problems like "slipping off the nipple" and "falling asleep" at the breast.

The data from the Meier (2000) study indicate that "for preterm infants who demonstrate insufficient milk intake during breastfeeding, the nipple shield can serve as an effective, temporary milk transfer device without adversely affecting the total duration of breastfeeding." Most of the babies were off the nipple shield in 2 to 3 weeks. Duration of breastfeeding was longer for the babies whose mothers used the nipple shields compared to those who did not.



CASE STUDY 2



This figure pictures a 7 day-old infant who is poorly latched to a nipple shield. This baby had latch difficulties in the hospital following a traumatic delivery and little milk transfer was occurring. Note how the baby's mouth is positioned on the shaft of the shield. The baby had lost more than 9 percent of his birth weight, and was still losing weight. This picture and case illustrate the pitfalls of unsupervised nipple shield use. The need for the shield implies that an infant is feeding dysfunctionally. Such infants need close follow-up and

their mothers require additional support to ensure good latch and milk transfer.

When repositioned and appropriately latched with the shield in place, test weights showed that the baby consumed 52 ml of milk from the breast in approximately 15 minutes. The LC recommended weight checks every other day until the baby recovered his birth weight, which occurred within 4 days. As the baby gained strength and recovered from the traumatic birth, the mother was able to withdraw the use of the shield. By week 3, the baby nursed well from the breast, and was gaining over 1 ounce a day.



CASE STUDY 3

This figure shows a newborn infant breast-feeding with a thin silicone nipple shield placed over his mother's nipple. This 6 day-old infant refused the breast and was exclusively bottle-feeding when first evaluated by the LC. His mother was ready to wean. With the nipple shield mimicking the familiar sensation of the bottle teat, the infant went to the breast easily, sucked with

good rhythm, swallowed audibly, and perceptibly softened the breast. Test weights confirmed that the infant consumed 74 ml. Note how the baby's lips are flanged on the breast, suggesting that the baby has a good latch.



Fig. b in Box I is of special interest when discussing Meier's findings. In this photograph, the nipple remains in an extended position even though the baby has come off the breast. After the first suck, the baby is relieved of the work necessary to keep the nipple elongated. Additionally, the pooled milk in the tip of the shield serves as a reservoir that provides the baby with an encouraging milk reward when nutritive sucking resumes. These observations may identify the shield mechanisms that assist the weak or preterm infant to sustain more stable feeding behavior.

Anyone who provides a mother with a nipple shield must provide follow-up. Positioning and latch should be directly assessed to make sure the baby is not sucking only on the shaft of the shield. Many mothers with well-established milk supplies find it unnecessary to pump when they are using a shield. However, until milk transfer is assessed and found to be adequate with the shield in place, the mother should pump after most feedings to insure a robust milk supply. Weight checks provide the information needed to decide whether the baby is able to maintain the milk supply during the period of nipple shield use.

Many clinicians have concluded that keeping the baby at the breast with a simple, inexpensive device such as a shield is reasonable when measured against the work of pumping, bottle-feeding, and the risks of weaning. While breastfeeding without any paraphernalia is optimal, mothers whose infants are finally brought to the breast with nipple shields are usually grateful the tool exists.



SOURCES:

The excerpts derive from Wilson-Clay B. & Hoover K.L.: **The Breastfeeding Atlas**, 6. Edition, 2017; LactNews Press, www.breastfeedingMaterials.com. Permission for reprinting these excerpts was kindly provided by the authors.

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Anything is Done Better Without Nipple Shields

Based on 33 years of helping mothers with breastfeeding Dr. Jack Newman is convinced that there is nothing that can be done with a nipple shield than cannot be done better without one.

Author: Dr. Jack Newman

The use of nipple shields has become almost epidemic in North America and Europe. Nipple shields are seen as the answer to all breastfeeding problems, from babies not latching on, to nipple soreness, to routine use for premature babies. Even the perception of a mother's nipples being "flat" often results in the recommendation of a nipple shield without even an attempt to try the baby at the breast. This has occurred without any evidence that nipple shields are safe to use and actually do what they are supposed to do:^[1] *"Introducing nipple shields in the first postpartum week may seem like an easy fix for a frustrated family, but such intervention may preclude a thorough evaluation of the mother-infant dyad to determine why breastfeeding has been problematic and may cause more problems such as lack of effective milk transfer, sore nipples, and loss of milk supply. The pervasive use of nipple shields as an intervention in the very early course of breastfeeding can relay a false message of breastfeeding success and safety to mothers. Widespread retail access to nipple shields might also signal to mothers that nipple shield use is a norm that warrants little concern."*^[2] **In clinical medicine, it is generally accepted that one must prove the safety and usefulness of an intervention, in this case the use of nipple shields, before one can generally recommend it.**

The nipple shield is a recommendation without a regard to the long term, not only when recommended in the first few days but even in the mother whose baby has started to refuse the breast due to late onset decreased milk supply. But it is particularly pernicious when used to get the baby to take the breast when so many babies who do not latch on during the first few days would easily latch on when the

milk supply and milk flow increase on day 3 or 4. The questions that are not asked are: "How will a mother whose baby is on a nipple shield continue breastfeeding long term?", "How will the mother in such a case be able to stop using the nipple shield?", "What will the effect of the nipple shield be on her milk supply both in the short and long term?", "What are other side effects of the use of nipple shields?". And "What happens to these mothers and babies when they forget the nipple shields on leaving home with the baby who otherwise does not take the breast?"

The most important question is whether something else could not be done instead of introducing a nipple shield. I am convinced, based on 33 years of helping mothers with breastfeeding that there is nothing that can be done with a nipple shield than cannot be done better without one. The problem is that the more nipple shields are used, the less experience people have applying or searching for other solutions. And the nipple shield solution is an attractive one because it seems to work quickly, indeed, immediately. We do love quick solutions. Unfortunately, patience is necessary to solve some breastfeeding problems; both the mother and the person wanting to help her need to be patient. There is nothing terrible about waiting a few days to get a baby to latch on, if, in the meantime, the mother is given the tools to apply during this time. I would also suggest that a large part of a lactation consultant's work is to counsel the mother and part of this is to counsel patience and provide a temporary solution that leads to successful breastfeeding long term. Let me propose that for each problem for which a nipple shield is used, there is a real solution which takes into account the long term perspective.

So, what are the problems with the use of nipple shields?

1. Let us be frank: A baby on a nipple shield is not latched on; it is an illusion to believe he is. Breastfeeding with a nipple shield is not the same as breastfeeding directly. No matter how thin the nipple shield, it's still not the breast. So why will a baby seemingly take the breast with a nipple shield and not take the breast directly? Instead of the baby latching on to the naked breast, the soft, supple, pliable breast which is an active process, the nipple shield, which is not soft, supple, or pliable, is essentially pushed into the baby's mouth. The "nipple" of the nipple shield has a much harder texture than the mother's nipple and is wider and longer. The nipple shield makes the breast into a bottle essentially. With a nipple shield in his mouth, the baby uses his tongue and cheek muscles just as he does on a bottle or pacifier and not the way he would when breastfeeding. In order to get milk out of the breast, the baby needs to suck hard. When a baby feeds directly from the breast, he is using a whole different process. He stimulates the breast to release the milk which then flows to the baby. And this is obvious because it is so difficult in most cases to get a baby who is hooked on a nipple shield to then take the breast directly. If they were the same as so many suggest, then why is that so?

2. Some people believe that nipple shields are a tool for teaching a baby how to breastfeed. This is the reason they are used so frequently in the premature baby. But as I stated above, this is pure fantasy.

3. A baby on a nipple shield is actually not latched on. A baby on a nipple shield will never do what he is supposed to do on the breast. And delatching a baby

from a nipple shield is extremely easy to do, not as it would be if he were directly latched on *well*.

4. One of the most common reasons for milk supply to decrease with time is that the baby's latch is not as good as it could be. For example, when the baby has a tongue tie. But a baby on a nipple shield is not latched on at all, and so with time, the milk supply may decrease. The reason this is controversial is that in a small number of cases, when a mother begins with an abundant milk supply, she and the baby may manage for several months, but if the milk supply decreases enough, the baby will start to refuse the breast and/or become very unhappy at the breast, with the result that the mother introduces bottle supplements. This often occurs within weeks of birth. As an aside, if the mother's milk supply was so abundant, it should have made it easy to get the baby to latch on in the first week of life.

5. When the flow of milk is constricted due to a poor latch, including nipple shield use, the mother may begin to have problems with recurrent blocked ducts, mastitis and even breast abscess. Blocked ducts/mastitis occur at first when the mother has a fairly generous milk supply but the baby's latch is not good and the breast does not drain well. The exact situation of a baby sucking on a nipple shield.

6. Even though nipple shields are supposed to treat sore nipples, in fact, some mothers actually develop nipple pain while on nipple shields.

7. To reiterate, once the baby is used to the nipple shield it is difficult for that baby to start to take the breast directly. Mothers intrinsically understand that using the nipple shield is not really what they wanted, but we may have taken breastfeeding directly away from them. Those of us working with mothers and babies on a nipple shield find it is much more difficult to get the baby

breastfeeding directly from the breast than if the baby were on a bottle, which is not to say that the bottle is a solution either. The older the baby, the more difficult it is.

8. A very big problem associated with the use of nipple shields is that the mother believes that the nipple shield has corrected her problems and she may see no need to do anything further until it's too late. Typically, a mother coming to us for help, has had a decrease in her milk supply because of the nipple shield and has found that her baby fusses at the breast, is not satisfied and not getting as much milk as before. And the longer this goes on, the more difficult it is to get the baby to the breast. So nipple shield + decrease in milk supply due to nipple shield = greater and greater difficulty in latching the baby on.

Even if some believe that nipple shields do treat certain breastfeeding problems, the risks associated with the use of nipple shields (see above), should give us pause. Any medical treatment or device that causes so many problems, would not be approved for use by any regulatory agency.

Preventing the "need" for nipple shields

The causes of early breastfeeding problems include, modern birthing practices, lack of breast crawl and skin to skin contact between mother and baby, separation of mother and baby often for unnecessary reasons, early introduction of artificial nipples, feeding by the clock, and the use of % weight loss to determine the adequacy of breastfeeding.

Babies often will have difficulty latching on after a birth because of the large amounts of intravenous fluids given to the mother during labour, birth and after. Intravenous fluids during labour and birth go to the baby as well as to the mother and so result in the baby being "overhydrated" at birth and thus loses more weight, approaches the dreaded 10% weight loss (for which, incidentally, there is no scientific ba-

sis) and panic begins to overtake the staff in hospital.^[3,4] In addition, the mother's nipples are often oedematous due to her being overhydrated and thus the baby has difficulty latching on. The answer to dealing with these issues is to help the mother get the baby well latched on. This may require "reverse pressure softening" of the breast.^[5] And it also requires knowing how to know a baby is getting milk from the breast. The answer is not a nipple shield.

Nipple "shape" is a frequent excuse for giving the mother a nipple shield. Intravenous fluids are one cause of "flat nipples". Amazingly the nipples are no longer flat after the mother has had a diuresis, but that happens only several days later, too late if she has started a nipple shield. One of our patients had a nipple shield slapped on her while she was still on the delivery table, before she even tried to put the baby to the breast the first time. Interestingly, with a little help at our clinic, the baby latched on, though not without considerable difficulty. But he did latch on and went on to breastfeed exclusively. No shape of nipple – "flat", "inverted" – should make it impossible for a baby to latch on and to be a reason for using a nipple shield.

The most common reasons for mothers being advised to use a nipple shield are the following:

- a. The baby is not latching on.
- b. The mother has sore nipples and
- c. The baby is premature.

a. Dealing with a non-latching baby

Some babies just do not latch on from the very beginning, many for reasons that are not obvious. It seems that people always knew this. At the beginning of the 19th century, Goethe remarked on this in his drama Faust where Mephistopheles says to the student:

*So nimmt ein Kind der Mutter Brust
Nicht gleich im Anfang willig an,
Doch bald ernährt es sich mit Lust.
So wird's Euch an der Weisheit Brüsten
Mit jedem Tage mehr gelüsten.*⁶

- › Current hospital practices are geared to instant solutions, but this needs to change and an atmosphere should be created in which mothers and babies are not rushed or forced to get the baby to the breast as soon as possible, immediately.
- › It is frequent that many mothers will have an intravenous during labour, birth and after and this may result in oedema of the nipples and areolas. This oedema will regress, which is important to appreciate and if appreciated will help us develop the patience that is necessary to avoid jumping in with a nipple shield. It is also frequent that mothers will receive epidural and/or spinal analgesia. The evidence is strong that the drugs used do indeed affect the baby and result in babies being “confused” or too sleepy. Again, patience is important. So what to do?
- › The breast crawl, where the baby is skin to skin with the mother immediately after birth and allowed to crawl to the breast and latch on is of supreme importance. It takes precedence over weighing the baby, washing the baby and so many other routine practices that interfere with the breast crawl and latching on of the baby. The breast crawl may take an hour or more and obviously clashes with the current hospital ambience and practices.
- › Even after the initial breast crawl, mothers and babies should be skin to skin as much as possible.
- › Every baby should be checked at birth for tongue tie. This should be as routine as checking the baby’s breathing.
- › As soon as there is a concern that the baby is not latching on or does not actually drink from the breast, the mother’s milk should be expressed and fed to the baby by spoon or cup and not by bottle or through a nipple shield.

- › Hospital staff, including midwives, nursing staff, physicians and lactation consultants need to know how to help a reluctant baby latch on when he is showing early signs of being ready to feed. There is a real technique to helping babies latch on well.
- › The mother should be reassured that her baby will eventually latch on and she should start a routine of hand expression of her milk, cup and/or spoon feeding and she should be taught the technique of latching on her baby.
- › Followup of any baby not latching on should be within a day or two of discharge from hospital by someone who is experienced in helping reluctant babies latch on.

b. Dealing with sore nipples

Sore nipples are almost always due to a baby’s less than adequate latch. No matter what the latch looks like from the outside, if the mother has pain, something is wrong with how the baby takes the breast. An anecdote: About 1 year ago, I was called to see the new grandchild of a good friend of mine. The baby was 36 hours old when I arrived. The mother was starting to have sore nipples and the baby actually never was satisfied after feeding and cried constantly. It took me 1 minute to fix the problem by helping the mother latch the baby on differently from what she was doing. I also taught her breast compression and for the first time the baby fed well and was calm. I should say that in many cases, this is very possible and much easier to deal with than if the baby had been 3 weeks old.

So, the key to preventing problems such as sore nipples is to make sure the baby has a good latch and that the baby is drinking well from the breast.⁶ This means that soon after the baby is born, someone should observe a feeding and if the mother complains of pain, something needs to be done, and that something is not “try a nipple shield”. Assuming examination of

the baby for tongue tie has been done, as it should be, then release of the tongue should not be deferred.

Other measures, such as the use of ointments on the nipple can be used as stop gaps. Nipple shields are not the answer.

c. Dealing with premature babies

Nipple shields are not a method of teaching premature or any other babies “how to suck”. Babies learn to breastfeed by breastfeeding and getting milk from the breast.

Based on work particularly from Scandinavia but also in other sites including Columbia, babies can and should be going to the breast by 27 or so weeks gestation. The North American approach of “no breastfeeding until 34 weeks gestation has been shown to be detrimental to premature babies learning to breastfeed. The idea that they need to learn to bottle feed before they can start breastfeeding is bizarre to say the least.⁷

So, what about mothers who say that the nipple shield saved their breastfeeding?

I will repeat it: there is nothing that can be done with a nipple shield that cannot be done better without one. Measures can be taken to help mothers with breastfeeding problems which would have prevented the “need” for the nipple shield in the first place. The reason we hear stories that “the nipple shield saved my breastfeeding” is the same as those stories that “a couple of bottles of formula in the first days saved my breastfeeding”. This may be true, but there was still a better way. For each mother who believes that the nipple shield saved her breastfeeding, there are countless mothers whose breastfeeding was marked by decreasing milk supply, breast refusal, painful nipples and premature weaning. The means we use to help mothers with breastfeeding problems are important and should be those means that allow the mother and baby to develop the skills that lead to a happy and long term breastfeeding relationship.



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- > ^[5] For a video of “reverse pressure softening”, click <https://www.dropbox.com/s/pf8ymhevdi2m8do/26-Reverse%20pressure%20softening.mp4?dl=0>
- > ^[6] The child, offered the mother’s breast,
Will not in the beginning grab it;
But soon it clings to it with zest.
And thus at wisdom’s copious breasts
You’ll drink each day with greater zest.
- > ^[7] Click this link <https://goo.gl/se8Brf> for the technique of breast compression
- > ^[8] See these documents which list many articles on the **premature baby and kangaroo mother care**: <https://goo.gl/vvUjl3> and <https://goo.gl/EaD8Ap>



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Breastfeeding as Pain Relief

Effective measures for immunizations and drawing blood Author: Zsuzsa Bauer, Ph.D. biologist www.still-lexikon.de

Even small babies must endure painful medical procedures. Only a few days after birth, blood is taken from the heel to identify possible metabolic disorders early. A few months later, a series of immunizations are on the schedule. While pain killers are routinely given for greater medical interventions, the small jabs are done without medicinal analgesia. Thus, parents, midwives and physicians look for possibilities to alleviate the pain of these small interventions with the help of non-medicinal measures. Here, a great deal of contact with the parents, carrying, swaddling, as well as giving a pacifier or sugar solution are employed.

Meanwhile, however, the body of scientific evidence has substantiated that breastfeeding represents the most effective non-medicinal measure to alleviate the pain of immunizations and taking blood. At the same time, breastfeeding is free from side-effects. The effectiveness of breastfeeding for painful procedures is now at the highest scientific level - documented by systematic reviews of the renowned Cochrane Collaboration.

Breastfeeding contains several synergistically effective components, which also act analgesically:

- › The familiar sight and smell of the mother
- › Direct skin-to-skin contact with her
- › Sucking
- › A distraction
- › The sweet taste of the mother's milk
- › A high concentration of tryptophan in the mother's milk by comparison to infant formula

Tryptophan is a precursor to melatonin which, in turn, increases the concentration of beta-endorphins and is possibly respon-

sible for the analgesic effect of mother's milk. Mother's milk alone – administered artificially – is not, however, sufficient to alleviate pain.

It is true that small babies cannot say that they are in pain and how severe this is but, nevertheless, scientists can estimate the pain and allocate a point value to it on a scale. In medicine and in research, body parameters as well as behavioral signs are used, with the aid of a pain scale, to determine pain in infants: Observers note the characteristics for crying, facial expression, breathing, body tension, level of alertness and heart frequency, as well as the time and duration of the crying.

Consistently in all studies, breastfeeding while having blood drawn and being immunized reduced the duration of crying and the point value on the pain scale. Breastfeeding was, thereby, more effective than a sugar solution, local pain gels, cooling sprays or the cuddling or a massage by the mother.

This pain relieving effect of breastfeeding is scientifically proven, both for the newborn period as well as for the entire first year of life. It can be assumed that, beyond the first year of life, breastfeeding remains effective for alleviating pain.

The authors of the studies recommend that breastfeeding be routinely practiced in hospitals and doctors' practices when drawing blood or giving immunizations

Incidentally, one frequently hears the warning that, during a painful procedure, you should not breastfeed since the baby will associate breastfeeding with pain and ultimately reject the breast. However, there is no evidence for this claim. In the studies, no negative effects of breastfeeding during immunization or drawing blood could be observed. According to Dr. Jack Newman,

a Canadian paediatrician and lactation counsellor, this warning is as absurd as the suggestion not to comfort a child when he has pain, so he will not associate comforting with pain.



QUELLEN:

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Breastfeeding of Infants and Young Children with Diabetes Mellitus Type 1

New Guidelines of the Academy of Breastfeeding Medicine, Overview by Elien Rouw

Although mother's milk is the normal food for an infant and a young child and breastfeeding is the normal procedure after birth, we still know astonishingly little about the influence of breastfeeding on the baby and the mother. It is only in the last 30 years that this area has been researched – whereby this research is, unfortunately, very underfunded, when we consider how important breastfeeding is.^[1] Fortunately, more and more, breastfeeding is seen scientifically as the norm and not just for healthy mother-baby-pairs, but also in more difficult situations. Faced with the illness of the mother or the baby and the uniqueness of breast-feeding and mother's milk feeding, it is not always easy to find the right way to proceed.

The Academy of Breastfeeding Medicine, a world-wide physician's organization with the goal of expanding knowledge about breastfeeding, particularly among physicians and other medical professionals, regularly issues guidelines on various topics around breastfeeding. Care is taken to ensure that these guidelines are as scientifically grounded as possible and are applicable globally. Many of these guidelines are translated into various languages – also into German.

New protocols on the most varied topics as well as the guidelines, are revised and brought up to date regularly (at least every 5 years). They can be found at <http://www.bfmed.org/Resources/Protocols.aspx>

The newest guidelines, Nr. 27, deal with breastfeeding an infant or young child with insulin-dependent diabetes mellitus.^[2] Unfortunately, the incidence of type 1 diabetes mellitus is steadily increasing. In about 4% of the patients, the diagnosis is made even before the 2nd birthday. Mothers of a child with diabetes mellitus often wish

to (continue) to breastfeed, but frequently have difficulties controlling the blood sugar levels in light of irregular breastfeeds and amounts of mother's milk. Thus, they are often advised to wean, although the advantages of breastfeeding for mother and child are clearly proven. The challenge is calculating the amount of carbohydrates in the mother's milk on which basis the amount of insulin needed can be determined. These guidelines make recommendations for how these calculations can be made and how both hyper- and hypoglycemia can be prevented. They show how the family can be supported in their choice to continue breastfeeding an infant or a young child. Finally, recommendations for further research are made.

The guidelines can already be found on the homepage of the Academy, where the German translation (by Denise Both) will also be published.



Elien Rouw

physician, Board member of the Academy of Breastfeeding Medicine, medical expert for the Association of Free Breastfeeding Groups in Germany (AFS) and member of the Germany's National Breastfeeding Commission.



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The Breastfeeding-Friendly Pediatric Office Practice

81.1% of the American women initiate breastfeeding, but since only 22.3% still breastfeed after six months, the American Academy of Pediatrics (AAP) recently published a position paper calling American pediatricians to support breastfeeding: Authors: Joan Younger Meek, Amy J. Hatcher. SECTION ON BREASTFEEDING: The

Breastfeeding-Friendly Pediatric Office Practice. Pediatrics, April 2017

Abstract

The landscape of breastfeeding has changed over the past several decades as more women initiate breastfeeding in the postpartum period and more hospitals are designated as Baby-Friendly Hospitals by following the evidence-based Ten Steps to Successful Breastfeeding. The number of births in such facilities has increased more than sixfold over the past decade. With more women breastfeeding and stays in the maternity facilities lasting only a few days, the vast majority of continued breastfeeding support occurs in the community. Pediatric care providers evaluate breastfeeding infants and their mothers in the office setting frequently during the first year of life. The office setting should be conducive to providing ongoing breastfeeding support. Likewise, the office practice should avoid creating barriers for breastfeeding mothers and families or unduly promoting infant formula. This clinical report aims to review practices shown to support breastfeeding that can be implemented in the outpatient setting, with the ultimate goal of increasing the duration of exclusive breastfeeding and the continuation of any breastfeeding.

These practices are transferable to Germany. They offer relevant options for the cooperation between medical offices and IBCLCs.



Summary of Breastfeeding Supportive Office Practices

- 1 Have a written breastfeeding-friendly office policy
- 2 Train staff in breastfeeding support skills
- 3 Discuss breastfeeding during prenatal visits and at each well-child visit
- 4 Encourage exclusive breastfeeding for 6 months
- 5 Provide appropriate anticipatory guidance that supports the continuation of breastfeeding as long as desired
- 6 Incorporate breastfeeding observation into routine care
- 7 Educate mothers on breast-milk expression and return to work
- 8 Provide non-commercial breastfeeding educational resources for parents
- 9 Encourage breastfeeding in the waiting room, but provide private space on request
- 10 Eliminate the distribution of free formula
- 11 Train staff to follow telephone triage protocols to address breastfeeding concerns
- 12 Collaborate with the local hospital or birthing center and obstetric community regarding breastfeeding-friendly care
- 13 Link with breastfeeding community resources
- 14 Monitor breastfeeding rates in your practice

Hyperbilirubinemia

Prevention, breastfeeding management and a new, more family-friendly therapeutic approach.

Authors: Petra Schwaiger, RN, pediatric nurse, IBCLC and Anke Prothmann, MD, pediatrician

Newborn jaundice is a manifestation of the adjustment process of the newborn to extrauterine life and, thus, a physiological characteristic of the newborn period. The fetal hemoglobin (Hgb) of the fetus is replaced with adult hemoglobin, step-by-step, after birth. Hgb has a very high oxygen-binding capacity which, however, is no longer needed after the development of the lungs immediately after birth. The peak of physiological jaundice is reached on the 5th to 7th day of life. Thereby, the bilirubin concentration of 18 mg/dl corresponds to the 95th percentile and 20 mg/dl to the 99th percentile of mature newborns. Values over 25 mg/dl occur in 0.001% of all newborns and values over 30 mg/dl in 0.0001%. Despite the good and comprehensive screening for newborn jaundice in Germany, there are still cases of kernicterus (0.00001%). Deaths are extremely rare (according to the literature 0.000001%). Kernicterus is associated with life-long cerebral palsy, sight impairment, hearing impairment, reduction in intelligence, tooth enamel defects and speech development impairments with autistic features.

Bilirubin is a strongly lipophilic protein, so that it can easily reach the central nervous system (CNS), but it is also found in other tissues. It has a strong ability to bind with oxygen radicals, which is why protective properties (i.e. protection against retinal disease in prematures) is assumed. Certain disruptions of bilirubin breakdown, such as the UDP-GT defect (Gilbert's-Syndrome), are associated with a low risk for diabetes mellitus type II.

With a higher concentration in the blood, there may be a "precipitation" of intracellular bilirubin aggregates (particularly in the CNS in the area of the basal ganglia).

The illness goes through three stages:

- › In Stage 1, the newborns are tired, weak and feed poorly, so that the bilirubin concentration increases even more
- › Stage 2 is characterized by shrill crying, fever and overstretching of the head
- › In Stage 3 stupor, apnea, and seizures dominate. Deaths occur above all in babies with genetic defects, due to the rapid increase in bilirubin within a few hours and a complete failure of bilirubin breakdown. It is similar to severe sepsis.

It is important to differentiate between normal jaundice and pathological forms and to identify babies at risk early. In Germany, kernicterus is overwhelmingly the consequence of treatment that was started too late. Newborns and their mothers are, for the most part, discharged on the 3rd day of life, thus even before the peak of the increase in bilirubin. We understand the term *icterus praecox* to mean an increase in bilirubin in the first 24 hours of life. *Icterus gravis* is characterized by jaundice with values significantly above the phototherapy threshold and *icterus prolongatus* as jaundice that continues until the 14th day of life. The so-called "mother's milk icterus" belongs to this group.

How does so-called „mother's milk icterus" occur?

Mother's milk contains maternal hormones, which, coupled with albumin, are transported in the newborn's blood stream, just as is the bilirubin that has not yet been metabolized in the liver. Hormones and bilirubin compete, so to speak, over the common transport route. That can lead to the bilirubin being forced out of the protein binding and not transported to be broken down in the liver. Mother's milk icterus can persist for several weeks and only breaks down slowly as the synthesis performance of the liver increases. According to the AWMF guidelines, giving 5ml of

infant formula 6-8 times a day (at about every second breastfeed) can be helpful with mother's milk icterus. Furthermore, the resorption of the excreted bilirubin that is already in the baby's intestine – the enterohepatic circulation – also plays a role. But to date, why breastfed babies have higher bilirubin, values compared to newborns fed on infant formula, has not been fully explained.

If the jaundice lasts longer than 14 days – *icterus prolongatus* – serious causes, such as cholestasis (bile duct disorder) as well as biliary atresia, hepatitis, hypothyroidism, neonatal hemochromatosis and thyroid function disorder, must be ruled out. An underactive thyroid is possible despite an unremarkable newborn screening (central hypothyroidism is not determined!) A blood test with the measurement of the total bilirubin, direct (i.e. the bilirubin already metabolized in the liver) and other values, as well as a comprehensive ultrasound of the abdomen, with representation of the gall bladder and bile ducts, are absolutely essential.

Prevention

Defining the prevention of newborn jaundice as a care goal on a maternity unit makes sense because, in the end, the personnel can be relieved and unnecessary stress for the parents at the beginning of parenthood can be avoided. "Jaundice" in adulthood is pathological. Parents are anxious and worry a great deal if they don't know that jaundice in newborns is assessed differently.

It is important that parents already be informed before the birth that their baby might possibly be yellow and that this must not necessarily be a reason for concern. Informing parents before the birth about good breastfeeding management (breastfeeding frequency, signs of milk transfer, frequency of bowel movements, techniques for putting the baby to breast) is, in the end, also a relief for the personnel. ›

High bilirubin values make people tired. Putting the baby to breast frequently, with good milk transfer, leads to the bilirubin being better able to be excreted because colostrum has a laxative effect. Thus parents and personnel can actively contribute to ensuring that babies don't become too tired in the first place. When the bilirubin has already risen, babies are tired and are hard to put to breast. They no longer suck well and also no longer signal their hunger on their own, so a situation occurs that means stress for all those involved and frequently could have been avoided with smart breastfeeding management.

If parents know how frequently a newborn must be breastfed and recognize the signs of milk transfer, when they know how often a newborn should pass urine and bowel movements and how the excretions should look, then, as a rule, the babies signal in a more timely manner, before they get tired and can no longer suck well.

Risk groups/Risk Factors

Hyperbilirubinemia in full-term healthy newborns is assessed differently than for the following risk groups

- › Babies < 37. week of pregnancy (late preterm)
- › SGA (small for gestational age) babies
- › Positive Coombs test or blood group incompatibility (ABO or rhesus-factor negative)
- › Large hematoma, i.e. after VE (vacuum extraction)

With these babies, particular attention should be paid to frequent breastfeeds, especially in the first 24 hours (8 and - even better - 10-12 feeds in 24 hours and also afterwards). This recommendation applies particularly when the mother has diabetes and/or is overweight.

So that these points don't get lost in the everyday life of the unit, a comment, i.e., *Cave Bili* or something similar, could be introduced in the curve. What is important here is that we, as carers, keep this in mind without making the parents anxious.

Thus, it is important that nursing personnel on a maternity unit be able to identify risk factors for hyperbilirubinemia and constantly be aware that they must observe and document, refer anomalies and take appropriate action if needed. At the same time, they need to keep in mind that their communication with the parents about this must be empathetic and caring.

Breastfeeding management on the maternity unit with elevated bilirubin values or risk factors

If a baby already has elevated bilirubin values or belongs to a risk group, it is particularly important to pay attention to good breastfeeding management or, if necessary, to review it. As a rule, these parents need more attention. Avoiding any separation of mother and baby and enabling and promoting the highest possible breastfeeding frequency are also decisive.



“Brick dust” sediment after the 4th day of life is frequently a sign of too little milk transfer

Important measures/approaches:

- › High breastfeeding frequency (8-12x/24 hrs.)
- › Wake the baby after 2.5 hours at the latest
- › Pump mother's milk and give it to the baby with an alternative method in case he cannot suck effectively or is too weak.
- › Only when sufficient mother's milk is not available or on doctor's orders, feed infant formula, never tea, glucose, primergen, NE (hydrolysate) or maltodextrin!

Accompanying measures to stimulate milk production:

- › Breast massage and expressing the breast by hand
- › Stimulating the milk production with a pump as needed
- › Supplementing with colostrum (obtained by hand expression or pumping) directly at the breast or with a cup

Important measures when phototherapy is necessary in the hospital

All of the above points plus:

- › Acquaint the mother with positioning the baby in the incubator
- › Carry out the therapy in the mother's room or treat the baby in a BiliBed
- › If supplementation is necessary, feed with a cup or, best of all, directly with a tube on the breast
- › Do not separate mother and baby
- › When possible, provide a family room so the father can support the mother well

Is my baby getting enough milk?

Development of the bowel movement in the first few days of life



© Pictures and idea: Petra Schwaiger, IBCLC



Photo: © Petra Schwaiger

Supportive measures: Small amounts of colostrum in the early postpartum hours improve intestinal transit and make tired babies more alert.

Discharge

Parents whose babies are discharged with an elevated newborn icterus that does not, however, require treatment, need clear information about breastfeeding frequency and excretion and should be given an option for close, easily accessible, monitoring.

The following questions should be clarified before discharge:

- › Does the mother know how often the baby should go to breast?
- › Does she recognize the signs of milk transfer?
- › Does she know how she can wake up a sleepy baby?
- › Does she know how often her baby has a bowel movement and what color this should be?
- › Are her nipples intact or does the mother have pain when she puts the baby to breast?
- › Before discharge, does she need help and support once again with putting the baby to breast and was she informed about good care of the nipples?
- › Does she know when her baby should see the pediatrician again?
- › If the baby still has to be supplemented, does she know about alternative feeding methods and can she manage this?
- › Does she possibly need a milk pump, does she have a prescription for it and does she know where she can get a pump?
- › Does she have a post-partum midwife?

Ambulatory mobile phototherapy: a baby- and family-friendly therapy concept.

Pathological newborn jaundice is a frequent clinical picture which can be treated well. Despite the easy use of phototherapy, it still means a longer stay on the maternity unit or even the admission of the child with the mother to a pediatric hospital. Young families particularly suffer under this because admission to the hospital always represents a disturbance and interruption of settling into the family environment. Women whose children need phototherapy wean more frequently than women whose children do not need phototherapy. This is due, for one thing, to the hospital's own procedures. The baby lies in a warming bed or incubator, the mothers do not trust themselves to take the baby out of it. Or they are worried because they read that breastfeeding promotes jaundice. Only rarely can fathers or even the siblings be admitted to the hospital. Altogether, many factors contribute to phototherapy – although it is completely pain-free - being perceived as a considerable burden during the newborn period. In Germany, this has led to the development of a new type of therapy concept – ambulatory phototherapy.

New therapy concept of ambulatory phototherapy

The phototherapy takes place at home and not in the hospital. It is carried out on a special LED blue light mat in the baby's home environment. Ideally, before therapy begins, the bilirubin values, the ba-



Source: Anke Prothmann

Phototherapy begins with a light mat and a phototherapy lamp in the pediatric practice.

by's blood group and the Coombs test are available, but they are not always decisive! This plays a role in calculating the phototherapy limit, which must be worked out differently if the blood group and Coombs test are not known. With concurrent determination of the bilirubin in the blood and transcutaneously, the therapy monitoring can be carried out exclusively transcutaneously.

Before the beginning of the therapy, the parents are given an intensive introduction to the correct use of the light mat. Ideally, the initial briefing will take place in the family's home. In this way, the correct handling can be demonstrated and practiced in the baby's sleeping space. It is also possible to introduce the therapy in the pediatrician's practice for several hours and then to continue it at home if the baby sucks well and the mother manages well caring for her newborn. Breastfeeding management and the importance of putting the baby to breast frequently must be thoroughly discussed parallel to this. These are much easier for the mother to implement since the irradiation does not have to be interrupted when the baby goes to breast.

Continual pediatric monitoring of parents and newborns up to the end of the therapy is essential. At each diaper change, the parents record the temperature, the feeding behavior and the baby's excretions. As a rule, 48-hour therapy is sufficient to adequately reduce the bilirubin levels. Further (transcutaneous) controls are, however, required until the bilirubin level sinks further by itself without special measures. ›

Advantages of ambulatory phototherapy

The delicate mother (parent)-baby-relationship is significantly less disrupted. Therapy in a familiar environment promises fewer interfering influences than through procedures typical of hospitals. The parents have significantly less anxiety about contact when they care for their newborn, since the baby is not lying in an incubator and they can continue to care for him themselves. This means that the parents perceive themselves as the primary support of the therapy and not as a disruptive factor.

Therapy at home facilitates the important skin contact between mother and baby and, thereby, has a less disruptive influence on the bonding and breastfeeding behavior.

Generally, in many cases in which phototherapy is medically necessary, a stressful stay in the pediatric hospital can be avoided for the new family.

The cost for the average two days of ambulatory phototherapy for those covered by state insurance amounts to ca. 150,-€. Each additional day is about 60,- €. Up to now, the cost has not been covered by the state insurance companies and must be paid by the parents themselves. Those privately insured can submit the bill to their insurance company as usual because there is a GOA (German Scale of Medical Fees) number.



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MD, pediatrician in Munich; a total of 5 years' experience in premature and newborn medicine; otherwise occupied as mother of three children.



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Formula for determining threshold level

(See also AWMF-Guidelines on this)

Birth in the week of pregnancy	Phototherapy levels with normal full body therapy								Phototherapy levels with phototherapy with BiliBed/ BiliBlanket							
	Normal				Coombs-Test positive				Normal				Coombs-Test positive			
	from 72 hrs.	48-72 hrs.	24-48 hrs.	0-24 hrs.	ab 72 hrs.	48-72 hrs.	24-48 hrs.	0-24 hrs.	ab 72 hrs.	48-72 hrs.	24-48 hrs.	0-24 hrs.	from 72 hrs.	48-72 hrs.	24-48 hrs.	0-24 hrs.
35+	15	13	11	9	13	11	9	7	13	11	9	7	11	9	7	5
36+	16	14	12	10	14	12	10	8	14	12	10	8	12	10	8	6
37+	17	15	13	11	15	13	11	9	15	13	11	9	13	11	9	7
38+	20	18	16	14	18	16	14	12	18	16	14	12	16	14	12	10
39+	20	18	16	14	18	16	14	12	18	16	14	12	16	14	12	10
40+	20	18	16	14	18	16	14	12	18	16	14	12	16	14	12	10

According to: AWMF-S2k-Leitlinie Hyperbilirubinämie des Neugeborenen – Diagnostik und Therapie, 08/2015, Idea: Petra Schwaiger.

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- **Complies with the most stringent hygiene standards, providing maximum protection against contamination**
- **Value for money**



SWISS QUALITY 

Ardo medical AG - Switzerland - www.ardomedical.com

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