Ecstatic Birth

Nature's Hormonal Blueprint for Labor

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This chapter will soon be available as an ebook with audio file from Sarah's website. See www.sarahbuckley.com for more of Sarah's writing and to buy her book and ebooks.

ECSTATIC BIRTH

Nature's Hormonal Blueprint for Labor

Giving birth in ecstasy: this is our birthright and our body's intent. Mother Nature, in her wisdom, prescribes birthing hormones that take us outside (*ec*) our usual state (*stasis*), so that we can be transformed on every level as we enter motherhood.

This exquisite hormonal orchestration unfolds optimally when birth is undisturbed, enhancing safety for both mother and baby. Science is also increasingly discovering what we realize as mothers: that our way of birth affects us life-long, both mother and baby, and that an ecstatic birth — a birth that takes us beyond our Self — is the gift of a lifetime.

Four of our major hormonal systems are active during labor and birth. These produce, during labor and birth, peak levels of oxytocin, the hormone of love; endorphins, hormones of pleasure and transcendence; epinephrine and norepinephrine (adrenaline and noradrenaline) hormones of excitement; and prolactin, hormone of tender mothering. These systems are common to all mammals and mainly originate in our mammalian or middle brain, also known as the limbic system.

For birth to proceed optimally, this part of the brain must take precedence over the neocortex, or rational brain. This shift can be helped by an atmosphere of quiet and privacy, with, for example, dim lighting and little conversation, and no expectation of rationality from the laboring woman. Under such conditions a woman will intuitively choose the movements, sounds, breathing, and positions that will birth her baby most easily. This is her genetic and hormonal blueprint.

All of these hormonal systems are adversely affected by current birth practices. Hospital environments and routines are not conducive to the shift in consciousness that giving birth naturally requires. A woman's hormonal physiology is further disturbed by practices such as induction, the use of painkillers and epidurals, cesarean surgery, and separation of mother and baby after birth, as described below.

Hormones in Birth

Oxytocin

Perhaps the best-known birth hormone is oxytocin, the hormone of love, which is released during sexual activity, male and female orgasm, birth, and breastfeeding. Oxytocin engenders feelings of love and altruism; as Michel Odent says, "Whatever the facet of love we consider, oxytocin is involved."(Odent 2001)

Oxytocin is made in the hypothalamus, deep inside the mammalian brain, and stored in the posterior section of the pituitary, the "master gland" of the endocrine (hormonal) system, from where it is

released in pulses. It is a crucial hormone in reproduction and mediates what have been called the ejection reflexes: the sperm ejection reflex with male orgasm (and the corresponding sperm introjection reflex with female orgasm, which draws sperm into the cervix); the fetus ejection reflex at birth (a phrase coined by Odent for the powerful contractions at the end of an undisturbed labor, which birth the baby quickly and easily)(Odent 1992); and, postpartum, the placenta ejection reflex, and the milk ejection or let-down reflex in breastfeeding.

As well as reaching peak levels in each of these situations, oxytocin is secreted in extra amounts in pregnancy, when it acts to enhance nutrient absorption in the gut; reduce stress; and conserve energy by making us more sleepy.(Uvnas-Moberg and Eriksson 1996) Oxytocin also causes the rhythmic uterine contractions of labor, and levels surge around the time of birth, triggered by stimulation of "stretch receptors" in a woman's lower vagina as the baby descends.(Dawood, Raghavan et al. 1978)

High maternal oxytocin levels during labor and birth also benefit the baby. Research has found that maternal oxytocin crosses the placenta and enters the fetal brain during labor, when it acts to protect brain cells by switching them off,(Tyzio, Cossart et al. 2006) This is beneficial because it reduces the amount of oxygen that the baby's brain requires at this time, when contractions can reduce blood and oxygen supply.

High maternal oxytocin levels continue after birth, peaking around the time the mother births her baby's placenta, (Nissen, Gustavsson et al. 1998) and are enhanced by the baby's pre-breastfeeding and early breastfeeding behaviors.(Matthiesen, Ransjo-Arvidson et al. 2001) Elevated maternal levels of oxytocin will ensure efficient uterine contractions, protecting against postpartum hemorrhage at this crucial time.(Odent 1998)

The baby also has been producing oxytocin during labor, perhaps even contributing to the processes of labor;(Chard 1989) so that, in the minutes after birth, both mother and baby are bathed in this ecstatic hormone of "calm and connection".(Uvnas-Moberg 2003) At this time, ongoing newborn oxytocin production is enhanced by skin-to-skin and eye-to-eye contact. Newborn levels subside during the first hour after birth, but are elevated above normal for at least 4 days.(Leake, Weitzman et al. 1981) Infant oxytocin levels are also elevated during and following breastfeeding, through activation of the vagal nerve.(Uvnas-Moberg 2003)

During breastfeeding, oxytocin mediates the maternal let-down reflex and is released in pulses as the baby suckles. During the months and years of lactation, oxytocin continues to act to keep the mother relaxed and well nourished. Swedish oxytocin expert Dr Kerstin Uvnas Moberg calls it "a very efficient anti-stress situation which prevents a lot of disease later on." (Chapman 1998, 7 August) In her study, mothers who breastfed for more than seven weeks were calmer, when their babies were six months old, than mothers who had not breastfed.(Sjogren, Widstrom et al. 2000)

Outside its role in reproduction, oxytocin is secreted in other situations of love and altruism, for example, sharing a meal.(Uvnas-Moberg 2003) Researchers have implicated malfunctions of the oxytocin system in conditions such as schizophrenia,(Feifel and Reza 1999) autism,(Insel, O'Brien et al. 1999; Carter 2007) cardiovascular disease(Knox and Uvnas-Moberg 1998; Uvnas-Moberg 2003) and drug dependency,(Sarnyai and Kovacs 1994) and have suggested that oxytocin may mediate the antidepressant effect of drugs such as Prozac.(Uvnas-Moberg, Bjokstrand et al. 1999)

More recent research has suggested that we release oxytocin with trusting interactions between individuals, (Zak, Kurzban et al. 2005) which may reflect its role in lowering activity in the amygdala: a brain structure that processes fearful emotions.(Kirsch, Esslinger et al. 2005)

Beta-endorphin

As a naturally occurring opiate, beta-endorphin has properties similar to opiate drugs such as Demerol (meperidine, pethidine), morphine, and heroin, and has been shown to work on the same receptors of the brain. Beta-endorphin is also secreted from the pituitary gland, (and other parts of the brain and nervous system) and high levels are present during sex, pregnancy, birth, and breastfeeding.

Beta-endorphin is also a stress hormone, released under conditions of duress and pain, when it acts as an analgesic (pain killer) and, like other stress hormones, suppresses the immune system. This effect may be important in preventing a pregnant mother's immune system from acting against her baby, whose genetic material is foreign to hers.

Like the addictive opiates, beta-endorphin induces feelings of pleasure, euphoria, and dependency or, with a partner, mutual dependency. Beta-endorphin levels are high in pregnancy and increase throughout labor,(Brinsmead, Smith et al. 1985) when levels of beta-endorphin and corticotrophin (another stress hormone) reach those found in male endurance athletes during maximal exercise on a treadmill.(Goland, Wardlaw et al. 1988) Such high levels help the laboring woman to transmute pain and enter the altered state of consciousness that characterizes an undisturbed birth.

Beta-endorphin has complex and incompletely understood relationships with other hormonal systems.(Laatikainen 1991) In labor, high levels will inhibit oxytocin release. It makes sense that when pain or stress levels are very high, contractions will slow, thus "rationing labor according to both physiological and psychological stress."(Jowitt 1993)

Beta-endorphin also facilitates the release of prolactin during labor,(Rivier, Vale et al. 1977) which prepares the mother's breasts for lactation and also aids in the final stages of lung maturation for the baby.(Mendelson and Boggaram 1990)

Beta-endorphin is also important in breastfeeding. Levels peak in the mother at 20 minutes (Franceschini, Venturini et al. 1989) and beta-endorphin is also present in breast milk (Zanardo, Nicolussi et al. 2001) inducing a pleasurable mutual dependency for both mother and baby in their ongoing relationship.

Fight-or-Flight Hormones

The hormones epinephrine and norepinephrine (adrenaline and noradrenaline) are also known as the fight-or-flight hormones, or, collectively, as catecholamines (CAs). Epinephrine and, to a lesser extent norepinephrine, are secreted from the adrenal gland, above the kidney, in response to stresses such as fright, anxiety, hunger or cold, as well as excitement, when they activate the sympathetic nervous system for fight or flight. Noradrenaline is also part of an important brain signaling system that activates (and is activated by) the fight-or-flight response and increases attention and alertness.

High maternal CA levels are associated with the inhibition of labor, which may reflect their direct inhibiting effects on uterine muscle (Segal, Csavoy et al. 1998) and possibly a reduction in oxytocin release.(Douglas, Leng et al. 2002) CAs also act to divert blood to major muscle groups for flight or flight activity: this leads to reduced blood flow to the uterus and placenta, and therefore also to the baby.

This makes sense for mammals birthing in the wild, where the presence of danger would activate this fight or flight response, inhibiting labor and providing the muscular energy to flee to safety.

Once the laboring mother was feeling out of danger, levels of these hormones would quickly reduce, restoring blood supply to the baby.

In humans, high levels of CAs in early labor have been associated with longer labor and more adverse fetal heart rate patterns (an indication of lack of blood and oxygen for the baby in labor).(Lederman, Lederman et al. 1985) These findings reinforce our understanding that all mammalian females need to feel private, safe and unobserved in labor, and suggest that an ongoing lack of these conditions may contribute to the most common complications in modern maternity care: slow labor and fetal distress.

After an undisturbed labor, however, when the moment of birth is imminent, these hormones can act in a different way. A sudden increase in CA levels activates the "fetus ejection reflex", giving the mother a sudden rush of energy, She will usually adopt an upright, alert position and may experience the dry mouth and shallow breathing associated with high epinephrine levels. She may also have the urge to grasp something. She may express fear, anger, or excitement, and the CA rush will cause several very strong contractions, birthing her baby quickly and easily. (Odent 1992) This reflex is designed to protect mother and baby by hastening birth when danger is present in the final stages of labor. It does not seem to be activated when labor has been disturbed. (Odent 1992)

This physiological model is supported by research showing that low levels of epinephrine inhibit uterine contractility, while very high levels of mixed epinephrine/norepinephrine, as may occur at the end of an undisturbed labor, increase contractility.(Segal, Csavoy et al. 1998) Other studies show a wide range of maternal CA levels at birth, with some women having 5 to 10 times higher levels of epinephrine or norepinephrine than others,(Lederman, McCann et al. 1977; Lederman, Lederman et al. 1978; Lederman, Lederman et al. 1985) which may reflect a fetus ejection reflex in those women.

Some birth attendants have made good use of this reflex when a woman is having difficulties in the second stage of labor. For example, one anthropologist working with an indigenous Canadian tribe recorded that when a woman was having difficulty in birth, the young people of the village would gather together to help. They would suddenly and unexpectedly shout out close to her, with the shock triggering her fetal ejection reflex and a quick birth.(Odent 1992)

After the birth, the mother's CA levels drop steeply, and she may feel shaky or cold as a consequence. A warm atmosphere is important, because if the mother is not helped to warm up, the ongoing cold stress will keep her CA levels high, because cold is a trigger for CA release. This can inhibit her uterine contractions and increase the risk of postpartum hemorrhage.(Saito, Sano et al. 1991)

Noradrenaline, as part of the ecstatic cocktail, is also implicated in instinctive mothering behavior. Mice bred to be deficient in noradrenaline will not care for their young after birth unless noradrenaline is injected back into their system.(Thomas and Palmiter 1997)

For the baby also, birth is an exciting and stressful event, reflected in high CA levels.(Lagercrantz and Bistoletti 1977) In the final stages of labor, the baby experiences a CA surge, which assists during birth by protecting against the effects of hypoxia (lack of oxygen). These hormones also prepare the baby for life outside the womb by enhancing lung function; increasing metabolic fuels; and activating newborn thermogenic (heat producing) systems.(Lagercrantz and Slotkin 1986)

High CA levels at birth also ensure that the baby is wide-eyed and alert at first contact with the mother.(Lagercrantz and Slotkin 1986) The baby's CA levels also drop rapidly after an undisturbed

birth, being soothed by contact with the mother. This CA reduction is important because these hormones are metabolically costly, increasing the use of glucose at a time when newborn supplies are very limited.

Prolactin

Known as the mothering hormone, prolactin is the major hormone of breast milk synthesis and breastfeeding. Traditionally it has been thought to produce aggressively protective behavior (the "mother tiger" effect) in lactating females, and human studies suggest that prolactin increases vigilance in new mothers.(Uvnas-Moberg 1989) Prolactin is also involved in immune functioning and nutrient absorption, among other roles, and is one of the hormones of growth and lactation.(Freeman, Kanyicska et al. 2000)

Levels of prolactin increase in pregnancy, although milk production is inhibited hormonally until the placenta is delivered. Levels in labor initially decrease, and then increase in late labor, peaking at birth and remaining elevated for several hours.(Stefos, Sotiriadis et al. 2001)

Prolactin is also a hormone of submission or surrender — in primate troops, the dominant male has the lowest prolactin level(Keverne 1978) — and produces some degree of anxiety. In the breastfeeding relationship these effects activate the mother's vigilance and help her to put her baby's needs first.(Uvnas-Moberg 1989)

The baby also produces prolactin in pregnancy, and levels are high following labor,(Heasman, Spencer et al. 1997) where it may enhance newborn adaptation of the respiratory (Mendelson and Boggaram 1990) and heat regulating(Mostyn, Pearce et al. 2004) systems.

Undisturbed Birth

Undisturbed birth is exceedingly rare in our culture, even in birth centers and home births.
Two factors that disturb birth in all mammals are firstly being in an unfamiliar place and secondly the presence of an observer. Feelings of safety and privacy thus seem to be fundamental – and necessary to keep CA levels low and labor safe and efficient, as above. Yet the entire system of Western obstetrics is devoted to observing pregnant and birthing women, by both people and machines, and when birth isn't going smoothly, carers respond with yet more intense observation. It is indeed amazing that human females can give birth under such conditions, which would disrupt labor in every other mammalian species.

Some writers have observed that, for a woman, having a baby has a lot of parallels with making a baby: same hormones, same parts of the body, same sounds, and the same need to feel safe and private. How successful would conception be, if the environment for sexual activity was the same as the environment that we provide for labor and birth?

Impact of Drugs and Procedures

Induction and Augmentation

In the US, between 22.5%(Martin, Hamilton et al. 2009) and 41% (Declercq, Sakala et al. 2006) of women have their labor induced, (from 2006 Vital Statistics and the Listening to Mothers II survey respectively) and up to 55% of women report having their labor augmented (Declercq, Sakala et al. 2006)—stimulated or sped up —with synthetic oxytocin. (Pitocin, syntocinon).

Synthetic oxytocin administered in labor does not act like the body's own oxytocin. First, Pitocin-induced contractions are different from natural contractions, and can occur almost on top of each other, with very little break between for the baby to recover. This "overstimulation" can reduce blood and oxygen supplies to the baby, causing fetal distress. Pitocin also increases the pain of contractions, usually before the laboring woman has had time to build up levels of her natural pain killer, beta-endorphin, and it is very likely that she will require drugs for pain relief, including an epidural, which can cause further complications, as below.

Second, oxytocin, synthetic or not, cannot substantially cross from the mother's bloodstream back to her brain in significant amounts because of the blood-brain barrier. This means that Pitocin, introduced into the mother's body by injection (IV), does not act within her limbic system as the hormone of love, and may interfere with the laboring woman's own oxytocin system.

For example, research has shown that, following the use of Pitocin, the number of oxytocin receptors in the laboring woman's uterus is down-regulated (reduced) by the body to prevent over-stimulation.(Phaneuf, Rodriguez Linares et al. 2000) This means that a woman who has been administered a Pitocin infusion during labor will be at higher risk of bleeding after the birth, because her uterus will have lost sensitivity to oxytocin due to a reduction in her receptor numbers.

Further, given our growing understanding of the life-long psycho-emotional effects of oxytocin, a major hormone of social relationships, we might also be concerned about the developmental and maternal consequences of interfering with this calm and connection system at birth.

As Michel Odent comments, "Many experts believe that through participating in this initiation of his own birth, the fetus [unborn baby] may be training himself to secrete his own love hormone." (Odent 1992) Odent speaks passionately about our society's deficits in our capacity to love self and others, and he traces these problems back to the time around birth, particularly to interference with the oxytocin system.(Odent 2001)

For more information about the effects of induction, including induction for post dates, see chapters 4 (Your Body, Your Baby, Your Choice: A Guide to Making Wise Decisions) and 6: (Undisturbed Birth: Mother Nature's Blueprint for Safety, Ease, and Ecstasy) in Gentle Birth, Gentle Mothering: A Doctor's Guide to Natural Childbirth and Gentle Early Parenting Choices *(Celestial Arts 2009) Ebooks and Sarah's discussion on audio file coming soon.*

Opiate Painkillers

Opiate drugs are derived from, or chemically related to, substances found in the opium poppy. In the U.S., several opiate drugs have been traditionally used in labor. These include the classical opiates meperidine (Demerol, pethidine) and morphine, as well as nalbuphine (Nubain), butorphanol (Stadol), alphaprodine (Nisentil), hydromorphone (Dilaudid), and fentanyl citrate (Sublimaze).

The use of opiates in the labor room, usually administered by injection into the muscle (IM) or intravenously (IV), has declined in recent years, with many women now opting for epidurals, which may also contain these drugs (see below).

Opiate drugs may interfere with a woman's own beta-endorphine (BE) system in labor, reducing her BE levels (Thomas, Fletcher et al. 1982) as well as producing possible side effects such as nausea, drowsiness, pruritis (itching) and dysphoria.(American College of Obstetricians and Gynecologists 1996) Several studies have suggested that the analgesic effect of these drugs is modest, and that the major effect is heavy sedation.(Olofsson, Ekblom et al. 1996; Tsui, Ngan Kee et al. 2004)

Note also that, at a brain level, opiates reduce oxytocin release from the pituitary, which implies that use of these drugs may prolong labor. This has not been well studied. Thomson and Hiller summarize, "There is a strong suggestion in the literature that the use of this drug [pethidine/Demerol] is associated with a lengthening of labor and this association is dose-related. Studies in animals support this view."(Thomson and Hillier 1994)

And again we must ask: "What are the psychological effects for mother and baby of laboring and birthing without peak levels of these hormones of pleasure and mutual dependency?" Beta-endorphin powerfully activates the brain reward system, and some researchers believe that endorphins are the mammalian reward for performing crucial reproductive functions such as mating and birthing.(Kimball 1979)

It is interesting to note that most countries that have adopted Western obstetrics, which prizes drugs and interventions in birth above pleasure and empowerment, have experienced steeply declining birth rates in recent years. As feminist Germaine Greer noted in 1984, "…if we succeed in crushing all pride and dignity out of child bearing, the population explosion will take care of itself."(Greer 1984)

Of perhaps greater social concern is a study that looked at the birth records of 200 opiate addicts born in Stockholm from 1945 to 1966 and compared them with the birth records of their non-addicted siblings. When the mothers had received opiates, barbiturates, and/or nitrous oxide gas during labor, especially in multiple doses, the offspring were more likely to become drug addicted. For example, when a mother received three doses of opiates, her child was 4.7 times more likely to become addicted to opiate drugs in adulthood.(Jacobson, Nyberg et al. 1990)

This study was recently replicated with a U.S. population, with very similar results.(Nyberg, Buka et al. 2000) The authors of the first study suggest an imprinting mechanism, but perhaps it is equally a matter of ecstasy—if we don't experience it at birth, as our genetic code dictates, we look for it later in life through drugs. Perhaps this also explains the popularity (and the name) of the drug Ecstasy.

Animal studies suggest a further possibility. It seems that drugs and other substances administered around the time of birth, even in single doses, can cause effects in the brain structure and chemistry of offspring that may not be obvious until adulthood,(Kellogg, Primus et al. 1991; Livezey, Rayburn et al. 1992; Mirmiran and Swaab 1992; Nyberg, Buka et al. 2000; Csaba and Tekes 2005) Whether such effects apply to humans is not known; but one researcher warns, "During this prenatal period of neuronal [brain cell] multiplication, migration and interconnection, the brain is most vulnerable to irreversible damage."(Mirmiran and Swaab 1992)

For more information about the effects of opiate drugs on mother and baby, see chapter 6: "Undisturbed Birth: Mother Nature's Blueprint for Safety, Ease and Ecstasy" in Gentle Birth, Gentle Mothering: A Doctor's Guide to Natural Childbirth and Gentle Early Parenting Choices *(Celestial Arts 2009) Ebook and Sarah's discussion on audio file coming soon.*

Epidural Drugs

Epidural drugs are administered over several hours via a catheter (tube) into the space around the coverings of the spinal cord. Such drugs include local anesthetics (all cocaine derivatives, e.g. bupivicaine/Marcaine), which have more recently been combined with low-dose opiates, most commonly fentayl or sufentanil. Spinal pain relief usually involves a single dose of an opiate drug injected through the coverings of the spinal cord, and is usually short acting unless given as a combined spinal-epidural (CSE).

Epidural pain relief has major effects on all of the above-mentioned hormones of labor. Epidurals dramatically inhibit beta-endorphin release (Browning, Butt et al. 1983; Scull, Hemmings et al. 1998) and therefore also inhibit the shift in consciousness that is part of a normal labor. This may be one reason why epidurals are so acceptable in labor and delivery rooms, where carers may not have the resources to deal with the irrationality, directness, and physicality of a woman laboring on her own terms.

When an epidural is in place, oxytocin levels decline, and the oxytocin peak that occurs at birth is also inhibited (Rahm, Hallgren et al. 2002), possibly because the stretch receptors of a birthing woman's lower vagina, which trigger this peak, are numbed. This effect likely persists even when the epidural has worn off and sensation has returned, because the nerve fibers involved are smaller than the sensory nerves and therefore more sensitive to drug effects.(Goodfellow, Hull et al. 1983)

A woman giving birth with an epidural will therefore miss out on the strong final contractions of labor, designed to birth her baby quickly and safely. She must then use her own effort and, because her legs are usually too paralysed to support an upright position, she is unlikely to have the benefit of gravity. These effects contribute to the increased length of the second stage of labor and the extra need for forceps when an epidural is used. (Lieberman and O'Donoghue 2002)

Use of epidurals also inhibits catecholamine release,(Neumark, Hammerle et al. 1985) which may be advantageous if fear and anxiety are inhibiting the first stage of labor; close to the time of birth, however, a reduction in CA levels may inhibit the fetus ejection reflex and further prolong the second stage.(Lieberman and O'Donoghue 2002)

Another hormone also appears to be adversely affected by epidurals. Prostaglandin F2 alpha helps to make a laboring woman's uterus contractible and levels increase when women labor without epidurals. In one study, women with epidurals actually experienced a decrease in PGF2 alpha, and average labor times were increased from 4.7 to 7.8 hours.(Behrens, Goeschen et al. 1993)

Drugs administered by epidural enter the mother's bloodstream within minutes and go straight to the baby at equal, and sometimes greater, levels.(Brinsmead 1987; Fernando, Bonello et al. 1997) Some drugs will be preferentially taken up into the baby's brain,(Hale 1998) and almost all will take longer to be eliminated from the baby's immature system after the cord is cut. For example, the "half life" of bupivacaine- the time it takes to reduce blood levels by 50%- is 2.7 hours in the adult, but around 8 hours in a newborn baby,(Hale 1997) making elevated drug levels likely during the critical newborn hours.

Another indication of the effects of epidurals on mother and baby comes from French researchers who gave epidurals to laboring sheep. The ewes failed to display their normal mothering behavior; this effect was especially marked for the ewes in their first lambing who were given epidurals early in labor: seven out of eight of these mothers showed no interest in their offspring for at least 30 minutes.(Krehbiel, Poindron et al. 1987) These researchers subsequently showed that epidural sheep had lower brain oxytocin levels and also demonstrated a partial reversal of the effects on maternal behavior when oxytocin was administered directly into the new mother's brain.(Levy, Kendrick et al. 1992)
Some studies indicate that this disturbance may apply to humans also. In one study, mothers given epidurals spent less time with their babies in hospital, in inverse proportion to the dose of drugs they received and the length of the second stage of labor.(Sepkoski, Lester et al. 1992) In another study, mothers who had epidurals described their babies as more difficult to care for one month later.(Murray, Dolby et al. 1981)

Such subtle shifts in relationship and interactions may reflect hormonal dysfunctions and/or drug toxicity and/or the less-than-optimal circumstances that often accompany epidural births—long labors, forceps, and cesareans.

There have been few high-quality studies of the effects of epidurals on breastfeeding, which is surprising given the widespread use of this intervention. Babies born after epidural may have subtle neurobehavioral deficits, as above, that interfere with breastfeeding.

Epidural studies confirm that babies with higher drug levels have worse neurobehavior scores (Radzyminski 2005) and that babies with worse scores have more compromised breastfeeding abilities,(Chang and Heaman 2005) including diminished suckling reflexes and capacity(Riordan, Gross et al. 2000).

Two recent studies have particularly implicated epidural opiates in breastfeeding difficulties. Researchers randomized 176 women who had previously breastfed and intended to breastfeed again into receiving epidurals with nil, low- or high-dose fentanyl. At six weeks, 19% of mothers and babies in the high-dose group had ceased breastfeeding, compared to 6% and 2% in the low-dose and nil fentanyl groups respectively All women with breastfeeding problems attributed the difficulties to their infant, not themselves.(Beilin, Bodian et al. 2005)

In an observational study, researchers found increasing risk of formula feeding at hospital discharge following: intravenous opiate; epidural with local anesthetic; epidural with morphine: epidural with fentanyl. Consistent with the above study, and with the ability of fentanyl to easily cross the blood-brain barrier and risk newborn neurobehavioral effects, these researchers also found increased formula feeding with increasing doses of fentanyl.(Jordan, Emery et al. 2005, Jordan, Emery et al. 2009)

The mother's breastfeeding physiology may also be affected. Researchers found that women who had received an epidural plus Pitocin during labour had a marked reduction in their oxytocin release during breastfeeding. In this study, the more Pitocin the mother had received during labor, the lower her breastfeeding oxytocin release, two days after birth.(Jonas, Johansson et al. 2009)

Another detailed observational study that included over 500 epidural mothers found that the chances of their babies not suckling within the first four hours was almost four times higher, and the chance of the baby receiving formula in hospital was doubled, compared with mothers and babies not exposed to epidurals. In this study, the opiate sufentanil was routinely administered in the epidural.(Wiklund, Norman et al. 2009)

For more information about the effects of epidurals see chapters 6 (Undisturbed Birth: Mother Nature's Blueprint for Safety, Ease, and Ecstasy) and 7 Epidural Risks and Concerns for Mothers and Babies in Gentle Birth, Gentle Mothering: A Doctor's Guide to Natural Childbirth and Gentle Early Parenting Choices *(Celestial Arts 2009) Ebook and Sarah's discussion on audio file coming soon.*

Cesarean Surgery

In 2007 31.8% of US women gave birth by cesarean: the largest percentage in US history, and representing over 1.3 million babies born by "vaginal bypass" (Hamilton, Martin et al. 2009). Cesarean section involves major abdominal surgery and increases the risk of maternal death by about four times overall, and around two times for low-risk mothers having elective surgery.(Enkin, Keirse et al. 2000; Deneux-Tharaux, Carmona et al. 2006). Recent research also suggests higher infant mortality following cesarean birth,(MacDorman, Declercq et al. 2006) which may reflect

increased risks of respiratory and other serious health problems for cesarean newborns.(Levine, Ghai et al. 2001)

As well as these short-term risks, a previous cesarean will increase risks for mother and baby's health in all subsequent pregnancies. Increased long-term risks include: infertility and ectopic pregnancy;(Hemminki and Merilainen 1996) unexplained stillbirth;(Smith, Pell et al. 2003) placental problems including placental abruption,(Odibo, Cahill et al. 2007) placenta previa, placenta accreta and percreta,(Wu, Kocherginsky et al. 2005) and emergency postpartum hysterectomy,(Habek and Becarevic 2007) all of which pose life-threatening risks for mother and baby

Obviously there is a shorter or absent labor with cesarean birth, and the peaks of oxytocin, endorphins, catecholamines, and prolactin are absent or reduced. Furthermore, post-cesarean mothers and babies are usually separated for some hours after birth, so the first breastfeed is usually delayed. Both will also be affected to some extent by the drugs used in the procedure (epidural, spinal, or general anaesthetic) and for post-operative pain relief.

The consequences of such radical departures from our hormonal blueprint are suggested in the work of Australian researchers who interviewed 242 women in late pregnancy and again after birth. The 50 percent of women who had given spontaneous vaginal birth were the most likely to experience a marked improvement in mood and an elevation of self-esteem. In comparison, the 17 percent who had cesarean surgery were more likely to experience a decline in mood and self-esteem. The remaining women had forceps or vacuum assistance, and their mood and self-esteem were, on average, unaltered.(Fisher, Astbury et al. 1997)

Another study looked at the breastfeeding hormones prolactin and oxytocin on day two, comparing women who had given birth vaginally with women who had undergone emergency cesarean surgery. In the cesarean group, prolactin levels did not rise as expected with breastfeeding, and the oxytocin pulses were reduced or absent. In this study, first suckling had been at 240 minutes average for cesarean babies, and 75 minutes average for babies vaginally born. Duration of breastfeeding was not significantly different for the mothers.

The authors comment, "These data indicate that early breastfeeding and physical closeness may be associated not only with more interaction between mother and child, but also with endocrine [hormonal] changes in the mother." (Nissen, Uvnas-Moberg et al. 1996)

Other research has shown that early and frequent suckling positively influences milk production and the duration of breastfeeding. (Salariya, Easton et al. 1978)

These studies not only indicate important links between birth and breastfeeding, but also show how an optimal birth experience can influence the long-term health of mother and baby. For example, successful breastfeeding confers advantages such as reduced risk of breast cancer and osteoporosis for the mother and reduced risk of diabetes and obesity long-term for the child. And enhanced self-esteem and confidence after a natural birth is a solid base from which to begin our mothering.

The connections between events at birth and long-term health certainly deserve more study. (See Michel Odent's Primal Health Database www.birthworks.org/primalhealth for a summary of current research.) But we cannot afford to wait for years for researchers to "prove" the benefits of an undisturbed birth. Perhaps the best we can do is trust our instincts and vote with our birthing bodies, choosing models of care that increase our chances of undisturbed- and ecstatic- birthing.

For more information about the effects of cesarean on mother and baby see chapters 6 (Undisturbed Birth: Mother Nature's Blueprint for Safety, Ease, and Ecstasy) and 9 Cesarean: the Whole, Story, in Gentle Birth, Gentle Mothering: A Doctor's Guide to Natural Childbirth and Gentle Early Parenting Choices *(Celestial Arts 2009) Ebook and Sarah's discussion on audio file coming soon.*

Early Separation

Even in non-interventionist settings, it is uncommon for the baby to remain undisturbed in the mother's arms for the first one to two hours. And yet this time is exceptional, from a hormonal perspective, and will never again occur for this mother and baby. Mother Nature's superb design, as described above, includes peak levels of the hormones of love, pleasure, excitement and tender mothering, which optimize attachment as well as the initiation of breastfeeding for both partners. Interference with this opportunity by separation of mother and baby may have significant implications in the short, medium, and long terms.

For both mother and baby, the time immediately after birth is associated with high CA levels which increase alertness and energy and enhance breastfeeding initiation. Peak maternal levels of oxytocin in the first hour enhance maternal responsiveness and activate the "maternal circuit" — brain areas that mediate instinctive mothering behaviors – in all mammalian mothers. High beta-endorphin levels at this time imprint pleasure and reward for maternal-infant interactions, and optimal prolactin levels may be important for ensuring a good long-term breast milk supply.

All of these hormonal systems are enhanced through skin-to-skin contact between mother and baby immediately after birth, which reduces crying and stress, keeps the newborn warm, and enhances physiological adaptation and maturity,(Christensson, Siles et al. 1992; Ferber and Makhoul 2004) with measurable benefits even up to two days later.(Bystrova, Widstrom et al. 2003)

For the mother, skin to skin contact and early breastfeeding initiation also enhance early breastmilk production,(Bystrova, Widstrom et al. 2007) and early and frequent breastfeeding is also associated with increased breastfeeding duration.(Salariya, Easton et al. 1978)

Conversely, removal of human newborns from their mothers at birth, even for short periods, disturbs the innate sequence of newborn pre-breastfeeding behaviour, which includes crawling up the mother's abdomen, locating the breast and spontaneous sucking and rooting behaviour.(Righard and Alade 1990)

As Bergman comments, "The neurobehaviour called 'breastfeeding' is a critical survival strategy for the newborn human being, and is a behaviour which depends entirely on a limbic system brain programme, which in turn depends entirely on being in the right habitat: the maternal milieu. Any separation results in an opposing and potentially harmful neurobehavioural programme. Thus, the maternal milieu is specifically needed from the moment of birth, and should be continuous. Without this, the neurobehaviour that results is 'protest-despair', which actively shuts off the breastfeeding behaviour."(Bergman 2006)

Several older studies have shown advantages, up to age three, for the relationship between mothers and children who experienced extra contact in the hour after birth. These include more positive interactions;(de Chateau and Wiberg 1977; de Chateau and Wiberg 1977; de Chateau and Wiberg 1984) longer duration of breastfeeding (Klaus, Jerauld et al. 1972; de Chateau and Wiberg 1984); and more complex language interactions at age two.(Ringler, Kennell et al. 1975)

More recently, a randomised controlled trail in Russian maternity hospitals by Bystrova and colleagues has had simlilar findings. Using groups of mothers and babies who were either given early skin to skin contact plus rooming in; early contact with the baby clothed and roming in; no early contact but rooming in; or separated at birth and cared for in a nursery, these four groups also were divided amongst those swaddled and not swaddled.

Authors concluded: "The practice of skin-to-skin contact, early suckling, or both during the first 2 hours after birth when compared with separation between the mothers and their infants positively affected …maternal sensitivity, infant's self-regulation, and dyadic mutuality and reciprocity at 1 year after birth. The negative effect of a 2-hour separation after birth was not compensated for by the practice of rooming-in.

"These findings support the presence of a period after birth (the early "sensitive period") during which close contact between mother and infant may induce long-term positive effect on mother-infant interaction."(Bystrova 2009)

For more information about the effects of early separation see chapters 6 (Undisturbed Birth: Mother Nature's Blueprint for Safety, Ease, and Ecstasy) and 8 (Leaving Well Enough Alone: Natural Perspectives on the Third Stage of Labor): in Gentle Birth, Gentle Mothering: A Doctor's Guide to Natural Childbirth and Gentle Early Parenting Choices *(Celestial Arts 2009) Ebook and Sarah's discussion on audio file coming soon.*

Optimizing the Ecstasy

The following suggestions will help a woman to use her hormonal blueprint and so optimize the experience and safety for herself and her baby.

Remember that birth is "orgasmic in its essence"(Baker 2001) and can be actually orgasmic (Bubnaitiene, Kalediene et al. 2005; Pascali-Bonaro 2007; Buckley 2010) so that the ideal conditions for birth are as close as possible to conditions for lovemaking, with an emphasis on safety, privacy and lack of disturbance.

- Take responsibility for your health, healing, and wholeness throughout the child-bearing years
- Choose a model of care that enhances the chance of a natural and undisturbed birth (eg. home birth, birth center, one-on-one midwifery care).
- Arrange support according to individual needs; trust, a loving relationship, and continuity of care with support people are important.
- Consider having an advocate at a hospital birth- eg private midwife or doula.
- Ensure an atmosphere where the laboring woman feels safe, unobserved, and free to follow her own instincts
- Reduce neocortical stimulation by keeping lighting and noises soft and reducing words to a minimum.
- Cover the clock and any other technical equipment.
- Avoid drugs unless absolutely necessary.
- Avoid procedures (including obvious observations) unless absolutely necessary.
- Avoid cesarean surgery unless absolutely necessary.
- Don't separate mother and baby for any reason, including resuscitation, which can be done with the cord still attached.
- Breastfeed and take the time to enjoy it!

Giving birth is an act of love, and each birth is unique to the mother and her baby. Yet we also share the same womanly physiology and the same exquisite orchestration of our birthing hormones. Our capacity for ecstasy in birth is also both unique and universal, a necessary blessing that is hard-wired into our bodies, However birthing ecstasy also requires, especially in these times, that we each trust, honor, and protect the act of giving birth according to our own instincts and needs.

Dutch professor of obstetrics G. Kloosterman offers a succinct summary, which would be well placed on the door of every birth room:

> Spontaneous labour in a normal woman is an event marked by a number of processes so complicated and so perfectly attuned to each other that any interference will only detract from the optimal character.
> The only thing required from the bystanders is that they show respect for this awe-inspiring process by complying with the first rule of medicine—nil nocere [Do no harm].(Kloosterman 1982)

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