Ecstatic Birth: The Hormonal Blueprint of Labor

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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, mother and child, and that an ecstatic birth, a birth that takes us beyond our Self, is the gift of a lifetime.

Four major hormonal systems are active during labor and birth. These involve oxytocin, the hormone of love; endorphins, hormones of pleasure and transcendence; epinephrine and norepinephrine, hormones of excitement; and prolactin, the mothering hormone. These systems are common to all mammals and 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 intuitively will choose the movements, sounds, breathing, and positions that will birth her baby most easily. This is her genetic and hormonal blueprint.

All of these 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, caesarean surgery, and separation of mother and baby after birth.

Hormones in Birth

Oxytocin

Perhaps the best-known birth hormone is oxytocin, the hormone of love, which is secreted 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."1

Oxytocin is made in the hypothalamus, the "master gland" deep in our brains, and stored in the posterior pituitary, 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); the fetal 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);2 and, postpartum, the placental 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 large amounts in pregnancy, when it acts to enhance nutrient absorption, reduce stress, and conserve energy by making us more sleepy.3 Oxytocin also causes the rhythmic uterine contractions of labor, and levels peak at birth through stimulation of stretch receptors in a woman's lower vagina as the baby descends.4 The high levels continue after birth, culminating with the birth of the placenta, and then gradually subside.5

The baby also produces oxytocin during labor, perhaps even initiating labor;6 so, in the minutes after birth, both mother and baby are bathed in an ecstatic cocktail of hormones. At this time ongoing oxytocin production is enhanced by skin-to-skin and eye-to-eye contact and by the baby's first suckling. Good levels of oxytocin also protect against postpartum hemorrhage by ensuring good uterine contractions.7 In breastfeeding, oxytocin mediates the let-down reflex and is released in pulses as the baby suckles. During the months and years of lactation, oxytocin continues to keep the mother relaxed and well nourished. One researcher calls it "a very efficient antistress situation which prevents a lot of disease later on." In her study, mothers who breastfed for more than seven weeks were calmer than mothers who did not.8 Outside its role in reproduction, oxytocin is secreted in other situations of love and altruism, for example, sharing a meal.9 Researchers have implicated malfunctions of the oxytocin system in conditions such as schizophrenia,10 autism,11 cardiovascular disease,12 and drug dependency,13 and have suggested that oxytocin may mediate the antidepressant effect of drugs such as Prozac.14

Beta-endorphin

As a naturally occurring opiate, beta-endorphin has properties similar to meperidine (pethidine, Demerol), morphine, and heroin, and has been shown to work on the same receptors of the brain. Like oxytocin, beta-endorphin is secreted from the pituitary gland, 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 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,15 when levels of beta-endorphin and corticotrophin (another stress hormone) reach those found in male endurance athletes during maximal exercise on a treadmill.16 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.17 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 labour according to both physiological and psychological stress."18 Beta-endorphin also facilitates the release of prolactin during labor,19 which prepares the mother's breasts for

lactation and also aids in the final stages of lung maturation for the baby.20 Beta-endorphin is also important in breastfeeding. Levels peak in the mother at 20 minutes,21 and beta-endorphin is present as well in breastmilk,22 inducing pleasure and 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). They 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.

In the first stage of labor, high CA levels inhibit oxytocin production, therefore slowing or inhibiting labor. CAs also act to reduce blood flow to the uterus and placenta, and therefore to the baby. This makes sense for mammals birthing in the wild, where the presence of danger would activate this sympathetic response, inhibiting labor and diverting blood to the major muscle groups so that the mother can flee to safety.

In humans, high levels of CAs have been associated with longer labor and adverse fetal heart rate patterns.23 After an undisturbed labor, however, when the moment of birth is imminent, these hormones act in a different way. There is a sudden increase in CA levels, especially noradrenaline, which activates the fetal ejection reflex. The mother experiences a sudden rush of energy; she will be upright and alert, with a dry mouth and shallow breathing and perhaps the urge to grasp something. She may express fear, anger, or excitement, and the CA rush will cause several very strong contractions, which will birth the baby quickly and easily.

Some birth attendants have made good use of this reflex when a woman is having difficulties in the second stage of labor. For example, an 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.24

After the birth, CA levels drop steeply. The new mother may feel shaky or cold as a consequence. A warm atmosphere is important, as ongoing high CA levels will inhibit oxytocin and therefore increase the risk of postpartum hemorrhage.25

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.26

For the baby also, birth is an exciting and stressful event, reflected in high CA levels.27 These assist the baby during birth by protecting against the effects of hypoxia (lack of oxygen) and subsequent acidosis. High CA levels at birth ensure that the baby is wide-

eyed and alert at first contact with the mother. The baby's CA levels also drop rapidly after an undisturbed birth, being soothed by contact with the mother.

Prolactin
Known as the mothering hormone, prolactin is the major hormone of breastmilk synthesis and breastfeeding. Traditionally it has been thought to produce aggressively protective behavior (the "mother tiger" effect) in lactating females.28 Levels of prolactin increase in pregnancy, although milk production is inhibited hormonally until the placenta is delivered. Levels further increase in labor and peak at birth. Prolactin is also a hormone of submission or surrender (in primate troops, the dominant male has the lowest prolactin level) 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.29 The baby also produces prolactin while in the womb, and high levels are found in amniotic fluid, possibly of uterine or placental origin.30 The function of prolactin in the baby is unknown.

Undisturbed Birth
Undisturbed birth is exceedingly rare in our culture, even in birth centers and homebirths. 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. Yet the entire system of Western obstetrics is devoted to observation of pregnant and birthing women, by both people and machines; when birth isn't going smoothly, obstetricians respond with yet more intense observation. It is indeed amazing that any woman can give birth under such conditions. 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 needs for feelings of safety and privacy. How would it be to attempt to make love in the conditions under which we expect women to give birth?

For birthing Maia Rose, my fourth baby, I arranged a situation where I felt very safe and very private, and I had my shortest, easiest, and most ecstatic labor and birth--one and a half hours with an 8-pound, unexpectedly breech baby. I believe this birth proceeded optimally because I was totally free to follow my instincts, and because I felt safe and private. Each woman must labor where, and with whom, she feels safest, and my situation would not suit everyone. But it underscores the huge gap between what was ideal for me and my baby, physiologically and hormonally, and the standard care offered in most hospitals.

Impact of Drugs and Procedures

Induction and Augmentation
In Australia, approximately 20 percent of women have induced labor, and another 20 percent have an augmentation--stimulation or speeding up of labor--with synthetic oxytocin (Syntocinon, Pitocin).31 In the US, these rates are 19.8 percent and 17.9 percent,32 adding up in both countries to around 40 percent of birthing women being administered synthetic oxytocin by IV during labor.

Synthetic oxytocin administered in labor does not act like the body's own oxytocin. First, Syntocinon-induced contractions are different from natural contractions, and these differences can cause reduced blood flow to the baby. For example, waves can occur almost on top of each other when too high a dose of synthetic oxytocin is given, and it also causes the resting tone of the uterus to increase.33

Second, oxytocin, synthetic or not, cannot cross from the body to the brain through the blood-brain barrier. This means that Syntocinon, introduced into the body by injection or drip, does not act as the hormone of love. However, it does provide the hormonal system with negative feedback--that is, oxytocin receptors in the laboring woman's body detect high levels of oxytocin and signal the brain to reduce production. We know that women with Syntocinon infusions are at higher risk of bleeding after the birth, because their own oxytocin production has been shut down. But we do not know the psychological effects of giving birth without the peak levels of oxytocin that nature prescribes for all mammalian species.

As for the baby, "Many experts believe that through participating in this initiation of his own birth, the fetus may be training himself to secrete his own love hormone."34 Michel 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.

Opiate Painkillers

The most commonly used drug in Australian labor wards today is pethidine (meperidine, Demerol). In one state, 34 percent of laboring women in 1998 were given this drug.35 In the US, several opiate-like drugs have been traditionally used in labor, including meperidine nalbuphine (Nubain), butorphanol (Stadol), alphaprodine (Nisentil), hydromorphone (Dilaudid), and fentanyl citrate (Sublimaze). The use of simple opiates in the labor room has declined in recent years, with most women now opting for epidurals, which may also contain these drugs (see below).36 As with oxytocin, use of opiate drugs will reduce a woman's own hormone production,37 which may be helpful if levels are excessive and inhibiting labor. The use of pethidine, however, has been shown to slow labor, more so with higher doses.38

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? Some researchers believe that endorphins are the reward we get for performing reproductive functions such as mating and birthing; that is, the endorphin fix keeps us having sex and having babies.39 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 birthrates in recent years.

Of greater 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.40

This study was recently replicated with a US population, with very similar results.41 The authors of the first study suggest an imprinting mechanism, but I wonder whether it may be a matter of ecstasy: if we don't get it at birth, as we expect, 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 administered chronically in late pregnancy can cause effects in brain structure and function (e.g., chemical and hormonal imbalance) in offspring that may not be obvious until young adulthood.42-45 Whether such effects apply to human babies who are exposed for shorter periods around the time of birth 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."46

Epidural Drugs

Epidural drugs are administered over several hours via a tube into the space around the spinal cord. Such drugs include local anaesthetics (all cocaine derivatives, e.g., bupivicaine/marcaine), more recently combined with low-dose opiates. Spinal pain relief involves a single dose of the same drugs 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 previously mentioned hormones of labor. Epidurals inhibit beta-endorphin production47 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 to hospital birth attendants, who are not prepared, practically or professionally, to deal with the irrationality, directness, and physicality of a woman laboring on her own terms.) When an epidural is in place, the oxytocin peak that occurs at birth is also inhibited because the stretch receptors of a birthing woman's lower vagina, which trigger this peak, are numbed. This effect probably 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.48

A woman giving birth with an epidural will thus miss out on the fetal ejection reflex, with its strong final contractions designed to birth her baby quickly and safely. She must then use her own effort, often against gravity, to compensate. This explains the increased length of the second stage of labor and the extra need for forceps when an epidural is used.49 Use of epidurals also inhibits catecholamine release,50 which may be advantageous in the first stage of labor; close to the time of birth, however, a reduction in CA levels will, as with oxytocin, inhibit the fetal ejection reflex and prolong the second stage.

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 experienced a decrease in PGF2 alpha, and average labor times were increased from 4.7 to 7.8 hours.51 Drugs administered by epidural enter the mother's bloodstream immediately and go straight to the baby at equal, and sometimes greater, levels.52,53 Some drugs will be preferentially taken up into the baby's brain,54 and almost all will take longer to be eliminated from the baby's immature system after the cord is cut. One researcher found bupivacaine and its breakdown products in the circulation of babies for the first three days.55

Another indication of the effects of epidurals on mother and baby comes from French researchers who gave epidurals to laboring sheep.56 The ewes failed to display their normal mothering behavior; this effect was especially marked for the ewes in their first lambing that were given epidurals early in labor. Seven out of eight of these mothers showed no interest in their offspring for at least 30 minutes.

Some studies indicate that this disturbance may apply to humans also. Mothers given epidurals in one study 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.57 In another study, mothers who had epidurals described their babies as more difficult to care for one month later.58 Such subtle shifts in relationship and reciprocity 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.

Incredibly, there have been no good studies of the effects of epidurals on breastfeeding, although there is evidence that babies born after epidural have a diminished suckling reflexes and capacity.59,60

Cesarean Surgery

Cesarean section involves major abdominal surgery and increases the risk of maternal death by about four times,61 as well as possibly affecting mother and baby's health in subsequent pregnancies.62 Cesarean rates are currently 21.1 percent in Australia63 and 22.9 percent--the highest level on record--in the US.64 Obviously there is a shorter or absent labor with cesarean birth, and the peaks of oxytocin, endorphins, catecholamines, and prolactin are absent. Furthermore, mothers and babies are usually separated for some hours after birth, so breastfeeding 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 postoperative 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 experienced a marked improvement in mood and an elevation of self-esteem after delivery. By contrast, 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.65

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, and the authors conclude that "other factors" can compensate for deficient hormonal release."66 Other research has shown that early and frequent suckling positively influences milk production and the duration of breastfeeding.67,68 The authors of the hormonal study above add, "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."69

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 after a natural birth--a lifelong effect, in my experience--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.

Early Separation

Even in non-interventionist settings, it is uncommon for a baby to remain in his mother's arms for the first one to two hours. And yet nature's blueprint for this time includes a specific and genetically encoded activation of the brain and nervous system for both mother and baby. For example, when the newborn baby is in skin-to-skin contact at the mother's left breast (which is where new mothers in all cultures instinctively cradle their babies) and in contact with her heart rhythm, "a cascade of supportive confirmative information activates every sense, instinct and intelligence needed for the radical change of environment…. Thus intelligent learning begins at birth."70

For the mother also, "A major block of dormant intelligences is activated" the mother then knows exactly what to do and can communicate with her baby on an intuitive level."71 This awakening of maternal capabilities is well known among animal researchers, who link it to the action of pregnancy and birth hormones on the brains of mothers who have recently delivered.72 Such intuitive capacities are sorely needed in our

human culture, where we rely so heavily on outside advice from books and "experts" to tell us how to care for our babies.

According to Joseph Chilton Pearce (see Note 70), when these activations do not occur within about 45 minutes of birth, "cut off from his mother's nurturing and with none of the encoded expectancies met, the newborn's adrenals continue to release steroids in the face of maximum fear and abandonment. The infant screams for a short time and then silence falls." The damage caused by separation, Pearce writes, is "massive and past the point of repair." Like Odent, he believes that our current birth practices are psychologically crippling to babies, mothers, and society as a whole, and the evidence in his book Evolution's End: Reclaiming the Potential of Our Intelligence is compelling.

Optimizing the Ecstasy

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

- Take responsibility for your health, healing, and wholeness throughout the childbearing years.
- Choose a model of care that enhances the chance of a natural and undisturbed birth (eg, homebirth, birth center, one-on-one midwifery care).
- Arrange support according to an individual woman's needs; trust, a loving relationship, and continuity of care with support people are important.
- Consider having an advocate at a hospital birth, e.g., a 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 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 enjoy it!

One way to ensure minimum interference in the third stage is to practice Lotus Birth, or nonseverance of the cord. This is only compatible with a physiological third stage, and also keeps mother and baby together and secluded in the hours and days after birth. It is the subject of a new book and, having had three Lotus-born babies myself, I highly recommend both the practice and the book.73.

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 but that 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 hospital 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].74

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