CHILDBIRTH

The miracle of birth creates babies, changes women into mothers, and turns individuals into families. *Being born* and, in turn, giving birth, are the most transformative and miraculous events human beings experience. Yet, in our society, most families experience birth as a technological and medical event, fraught with the possibility of disaster.

Currently, 25% of babies born in the United States are surgically delivered from their mothers' bodies. Another 50% are born to mothers who are numb from the waist down and tangled in a web of tubes and wires. The rate of Cesarean section in the United States has more than quadrupled in the past 30 years, with no corresponding improvement in neonatal outcomes.

In the midst of all of this birthing technology, the U.S. maintains one of the highest rates of maternal and neonatal mortality among all developed nations. When it comes to birth, most American families equate "safe" with the sterile, closely monitored, technological environment of the hospital.

Giving birth in a "sterile" medical environment, designed to monitor and control the birth process, does not improve the quality or safety of birth. In fact, healthy women with low-to moderate-risk pregnancies, giving birth in a hospital is actually less safe than giving birth at home with a trained midwife.

"Women have been brainwashed about birth, to accept the medicalization of birth, but when they get that birth is a central issue in their lives and a large enough group of women come together, this is going to be a huge threat to doctors and hospitals," says Marsden Wagner, obstetrician, midwife supporter, and former director of the World Health Organization's Women and Children's Health Division.

The truth about giving birth in America isn't pretty. According to the Maternity Center Association's Listening to Mothers Survey in 2002, among those interviewed who had had vaginal births, 93% had continuous electronic fetal heart monitoring (proven in numerous medical studies to be unsafe and unreliable)**, 86% had IVs, 74% had labored and delivered on their backs** (experts widely agree that this is the worst position for giving birth for both mother and baby)**, 71% had been unable or were not allowed to walk during labor, 55% had artificial rupture of membranes to start or speed labor, 53% had been given artificial oxytocin to speed labor, 63% had epidural anesthesia, 44% had labor induction attempted, and 35% had received episiotomy.**

The medical literature reveals that electronic fetal heart monitoring is not reliable, that flat-on-your-back positions for labor and delivery are unwise, and that women heal better without episiotomies. Other studies show that the use of a midwife at a birth helps create a positive birth outcome, and that there are higher complication rates for in-hospital births than at home or in freestanding birth centers. Unfortunately, most childbearing women do not know the facts.

Where are the women whom midwives are meant to serve? How is it that an entire population has been convinced that pregnancy is unsafe and birth is dangerous? What can we do as a united population of believers to reverse this nightmare, the final worst result of which may be an entire population of women unable to birth their babies as their bodies were meant to do?

There is an overall cultural belief that women are inadequate. This is the same line of thinking that kept them out of medical schools for centuries. That denied them the vote. That prevented the passage of the Equal Rights Amendment.

Pregnancy and birth are the work women's bodies are designed for. Women are meant to give birth. Babies are designed to be born, not cut out on some preplanned date and observed in the nursery for 24 hours for the increased risk of respiratory distress that comes with cesarean delivery.

If pregnancy and birth were as difficult as the medical community would have us believe, we would have died off as a species a long time ago. Instead, we are overpopulating this planet at ever-increasing rates. One comparative study, the results showed that planned hospital birth resulted in greater numbers of birth injuries, maternal and infant infections, hemorrhages, and low apgar scores than planned, midwife-attended homebirth. Many other studies support these findings, and no study has ever proven hospital birth to be safer compared to planned, midwife-attended home birth.

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The notion of walking into a practitioner's office and sitting down to discuss when to have an elective cesarean is an absurdity that needs to be stopped before it gains any more momentum. Women give birth. Babies are born. Cesareans are for those rare occasions when the body or the baby cannot tolerate the normal.

Women are not told about cesarean scars, about how their bellies, no matter how thin, will always hang over the edge of the scar because the layers of tissue no longer slide back and forth over themselves, but are stuck together with scar tissue. Women are not told of the risks to them or their babies. Women are not told, really told, how long it takes to heal. What makes the notion of an elective cesarean so inviting to so many women?

Though surgical capabilities have saved lives and cesareans are part of those surgical capabilities, technology in general has not been kind to birth. It has not been kind to women. Birth is being declared too dangerous for women and for their babies. There are serious reasons why elective cesareans should be avoided as far as possible. When a *non-labor* cesarean has been scheduled, there is no guarantee that the baby, particularly its lungs, are perfectly mature.

Maternal and fetal hormones associated with the progress of labor contribute to the maturation of the lungs. The increased risks of respiratory problems with c-sections are well documented. A *non-labor* cesarean implies that the fetus has not participated in the initiation of labor. It also implies that the fetus has not been given the opportunity to put into action its system of stress hormones. Breastfeeding difficulties are more probable in a *non-labor* cesarean than after an *in-labor* cesarean. Furthermore, the chances for a successful vaginal birth after cesarean seem to be higher in the case of an *in-labor* cesarean.

Cesarean deliveries are where you turn when there is nowhere else to go, when you've tried every position, every mode of support, even Pitocin augmentation and epidurals, when there is absolutely no way a baby can safely be born vaginally and its mother survive as well. Cesareans are about saving lives when genetics provide a woman with a contracted pelvis, or the activities of the fetus tie it up in the cord, or there is a complication like *pregnancy-induced hypertension* (PIH) or abruption or *placenta previa*. Women say they get to skip the pain of labor, but they are not thinking about post-surgical pain while trying to take care of a new baby.

The primary objective should be to reduce the need for drugs, since all drugs used during labor are pharmacological substitutes for the hormones a woman is supposed to release when giving birth. All of them block the release of the natural hormones and don't have the same behavioral effects. Decreased needs for drugs and lower rates of cesareans should be the result of rediscovering the basic needs of women in labor, rather than a primary objective.

The essential first step is to improve our understanding of birth physiology and to rediscover the basic needs of women in labor. These basic needs are shared by all mammals. All mammals need to feel secure when giving birth: They postpone the delivery if there is a predator around.

All mammals need privacy: They have strategies for avoiding observation during the period surrounding birth. Stress hormones, like adrenaline, inhibit the release and the action of the hormone necessary to induce and maintain effective uterine contractions during labor and delivery.

The most important aspect of the art of midwifery is, therefore, to protect the mother-to-be against anything that might increase her level of adrenaline. A good understanding of the physiological processes leads the midwife to make sure that nobody is under the effect of adrenaline in the environment of a laboring woman. After thousands of years of culturally controlled childbirth, decades of industrialized childbirth and a proliferation of "methods" of "natural" childbirth, these basic needs have been forgotten.

More and more families are choosing to birth their children in the comfort of their own homes with the help of midwives. Licensed midwives specialize in caring for healthy women throughout their childbearing years. The care provided by *licensed midwives* differs from that of *nurse-midwives* in many important ways. Unlike nurse-midwives, who receive their training and practice primarily *in hospitals*, licensed midwives train and provide care *in home and birth center settings*.

Nurse-midwives typically are unable to spend large amounts of time with individual clients in prenatal visits. Large hospital practices leave clients unsure of which particular nurse-midwife will attend their births. Licensed midwives work in private practices and are able to dedicate great amounts of time to their clients. They recognize that birth is a profound rite of passage and needs to be treated as more than just a medical event.

Licensed midwives offer hour-long prenatal visits, providing ample time to perform the necessary checks on mom and baby's physical wellbeing, as well as to address the emotional and spiritual needs of the mother. Families who hire licensed midwives choose and know who will attend their births as licensed midwives do not work in shifts and they remain on call for each of their individual clients.

Birthing at home offers many distinct advantages over birthing in the hospital. In nature, mammals instinctively seek out quiet, dark, familiar places to give birth; their labors stop if their space is disturbed. Humans also birth best in privacy, and one's own home is the ideal place to create such surroundings.

Most women innately choose to move around during labor, finding the most comfortable positions in which to give birth. At a home birth, midwives encourage such position changes and a woman's freedom of movement is limited only by the size of her house and yard. Licensed midwives also offer their clients the choices of laboring and birthing in water, delivering their babies with their own hands, or having the father catch; none of these options are routinely available at any typical hospital.

After birthing at home, mother and infant may bond without interruption. A comprehensive newborn examination is done right on the family bed next to the mother. Home birth also allows for greater sibling

involvement in the birth process. If the parents desire, older children can be present at the births of their new siblings, an option that is not routinely available at hospitals, especially during the cold and flu season. The familiar comfort of home makes it the safest birthplace for healthy, low-risk women.

In the safety of their own homes, women are less likely to experience complications of labor, such as *hypertension* and *meconium staining*, which may be brought on by stress. The freedom to move about as desired, decreases both length of labor and the need for pain medications, therefore lowering the risk of maternal exhaustion, fetal distress, and cesarean section. Whereas a woman's home usually contains only microbes to which she and her baby are immune to; in daily exposure, the hospital is full of disease-causing microbes, many of which are resistant to most antibiotics.

In fact, any person being admitted to an American hospital has a 4 to 10 per cent chance of acquiring a hospital-based infection. Newborn babies are especially susceptible to such infections due to their immature immune systems. Birth is by nature unpredictable and in some instances families who choose to birth at home may have to transfer to the hospital for technological assistance. The small chance of such a transfer being necessary should not deter women from planning to birth at home.

Birth is a family event and, with very few exceptions, happens most naturally and safely in the mother's home. Families who birth at home with the help of midwives generally report far greater satisfaction with the birth experience than those who have given birth in hospitals.

Women who birth at home and the midwives who attend them understand that birth is as safe as life ever gets, and that attempting to control birth actually causes more complications than it prevents. Midwives maintain the safety and sanctity of the natural birth process, mainly through the practice of non-intervention. When excellent prenatal care has been given, addressing all aspects of a woman's life and relationships, a mother is well equipped to give birth to her baby with minimal assistance.

Midwives specialize in normal birth; they are quick to recognize any deviation from normal and to use the appropriate measures to help correct the situation. Midwives and families who birth at home are not anti-hospital, but feel that the hospital should only be accessed when truly needed. Midwives trust in women's ability to give birth normally and they help instill and reinforce this same trust in the families they serve. Far from being a medical event which must be suffered in order to receive a baby, a midwife-attended homebirth is a joyful celebration of life and the family.

HOME BIRTH: AS SAFE AS BIRTH GETS

Each year in America, approximately 1% of the births occur in home settings. It is probable that many more home births actually took place than statistics show, that weren't recorded due to a discriminatory birth registration practice that places the responsibility for registering midwife-attended home births on the parents and requires a different mechanism than is used for any other occurring births.

One measure of the safety of birthplace is infant mortality, specifically, neonatal deaths within the first 28 days. According to the Center for Disease Control, there were 19,098 neonatal deaths for 1990 for babies born in a hospital. For those babies born at home, there were 260 newborn deaths. Infant mortality is figured as the number of deaths per 1,000 live births.

The death rate for babies born in the hospital was 5.6 and for those born at home was 11.1, which would seem to indicate that a hospital is a better bet for a baby's survival. However, when the homebirth statistics are further broken down into who attended the birth, the picture changes dramatically. Direct Entry

Midwives had the best outcomes with a death rate of 1.9 compared to CNM-attended births (2.9) **or physicians — D.O.'s** (15.1) **or M.D.'s.**

Until 1900, homebirth was the place of birth for most every American. Over 90% of those alive on earth today were born at home! Hospital or institutional birth is a fairly new occurrence, which began to gain in popularity during the 1920's due to physician promotion and increased use of automobiles.

As is the case today, it is a much more efficient use of a physician's time to attend patients in a single place. There is also an economic incentive since a physician can attend to more than one patient at a time in the hospital and other, less important helpers can attend to the more mundane tasks of birthing.

Part of this shift in birthplace must be attributed to the propaganda, denouncing midwives, which took place during this same time. With their economic and organized power, physician groups were able to legislatively increase hospital births by eliminating those who still attended homebirths—by eliminating the midwife. From the 1930's through the 1960's, state after state changed their laws to either restrict the practice of midwifery or wipe out the legal practice entirely. Yet no valid study then or to date has proven planned homebirth to be less safe than hospital birth.

HISTORY
In 1900 half of all Americans were born into the hands of a midwife, at home. Early studies comparing the birth outcomes of physicians versus midwives showed that midwives had fewer maternal and infant losses than the doctors.

The United States had a very high percentage of maternal deaths compared to other countries. Reports done by the *White House Conference on Child Health and Protection*, the national *Committee on the Costs of Medical Care*, and *the New York Academy of Medicine* in the 1930's all concluded that using midwives was safer than physicians. These reports chastised doctors for their frequency of interventions which led to problems.
Many physicians, in response to the findings of the reports, placed the blame on the midwives claiming that midwives were "ignorant," "dirty," untrained and a threat to the safety of childbearing women. Medical journals and popular magazines contained many articles bashing midwives and blaming them for the nations' appalling maternal mortality and infant mortality rates.

Many physicians and public health advocates spoke up for the midwives and their excellent statistics, but the prestige of the anti-midwife physicians and the strong push to move births into the hospitals far overshadowed their voices. This barrage of anti-midwife articles and propaganda continues today despite the lack of any studies or statistics to prove claims that physicians guarantee the safest outcomes or healthier babies or mothers.

Undoubtedly, the number of births attended by midwives of all kinds is higher. In some states, nurse-midwives mainly work as employees under physicians and the insurance companies pay more for a physician-attended birth. In order to receive the largest monetary compensation for births, and because the midwife is "under physician supervision" by law, the birth certificate is completed as though the doctor were attending, even if this was not the case.

Additionally, in states where *Direct Entry* Midwives are not licensed or Direct Entry Midwifery is prohibited, many births either go unreported or are reported as unattended or the category of midwife is absent from the birth certificate. Statistics from Center for Disease Control, US Birth Cohort of 1990, Table 43, May 18, 1995.

STUDIES

Many studies have been done in an attempt to prove that hospitals are the safest place to birth. Some of the earlier ones included all births, which took place out of the hospital, regardless of the gestational age or planned place of delivery. Those studies included miscarriages, which took place at home, as well as precipitous births, and births that were unattended. To be valid, a study must compare equals and change only one item. Lewis Mehl did this when he matched 2,092 women and compared their birth outcomes.

The result was that homebirth with a trained attendant was safer than a hospital birth. Most families do not want to know the statistical odds of having a *good outcome*; they want to know more concretely exactly how a homebirth will be *safer*. Many studies address this by listing criteria and comparing the results. Many complications seem to occur with greater frequency in the hospital.

Many women are told they will need an episiotomy in order to prevent tears, but the data from these births shows that this is not so, since there were 9 times as many tears in the hospital group! Fetal distress, often cited as the complication necessitating a cesarean section, occurred 6 times more frequently in the hospital group. There were 4 times more newborn infections, 22 times more forceps deliveries, 30 times more birth injuries and 3 times more cesarean sections in the hospital group.

CESAREAN SECTION

Figures released in the summer of 2003 by the Centers for Disease Control and Prevention show that the cesarean rate in the U.S. has reached an all-time high of 26.1%. The five states with the highest rates are Mississippi at 31.1%, New Jersey at 30.9 percent, Louisiana at 30.4%, West Virginia at 29.3%, and Alabama at 28.7 percent. Of the 18 states with the highest cesarean rates, 11 are in the South and 8 are in the East. In contrast, of the 18 states with the lowest cesarean rates, 10 are in the West and 5 are in the Midwest. The states with the lowest cesarean rates are New Mexico, where 25% of babies are delivered by midwives, at 19.1%, Utah at 19.1%, Alaska at 19.4%, Idaho at 19.7%, and Wisconsin at 20.6%.

Both the World Health Organization and the Coalition to Improve Maternity Services suggest that an acceptable cesarean rate is from 10 to 15 percent, a figure based on international scientific evidence. The federal goal of the U.S. is a 15 percent cesarean rate. In the 1960s, the cesarean rate in the U.S. was just 6.6 percent. The cesarean rate reached its previous high of 24.7 percent in 1988. A public outcry ensued, women insisted on vaginal births after cesarean, and surgical births steadily declined from 1989 to 1996. By 2000, however, the cesarean rate was back up to 22 percent and climbing.

Many experts believe that the rise in the cesarean rate is due to complex factors including doctors' habits and beliefs; the monopoly of obstetrical, hospital birth; the climate of malpractice; increased public acceptance of interventions in childbirth; and lack of education about and public advocacy of normal birth. Tragically, the high rate of surgical birth in the U.S. does not result in better birth outcomes.

The current increase in cesarean births means that more women are dying in childbirth; women are four times more likely to die during cesarean birth than during vaginal birth. In fact, in the last 25 years, there has been no decrease in the number of U.S. women who die during pregnancy and birth.

The U.S. ranks 21st among nations in infant mortality and has not improved measurably since the 1970s. The ten countries with the lowest rates are Sweden, Finland, Japan, Norway, Austria, France, Switzerland, Belgium, Germany, and Spain. Since the late 1970s, the U.S. has dropped to and lingered at around 16th in the world in maternal death. Both infant and maternal mortality can be reduced in the U.S. by adopting five standards common in the countries with better birth outcomes. These standards are:

1. Nutrition—The top ten countries place great emphasis on good nutrition and healthy lifestyle; during prenatal visits, women are educated extensively in appropriate diet.
2. Midwifery—Skillful midwifery, not obstetrics, is the standard of birth care in all of the top ten countries. The majority of pregnant women in these countries are cared for exclusively by midwives; teams of midwives and physicians care for a small percentage.
3. Natural childbirth—Unmedicated birth is the standard. Girls grow up familiar with birth, don't fear its pain and hard work, and appreciate the advantages of childbirth without drugs.
4. Homebirth—Homebirth, not hospital birth, is the standard of care in the top ten countries.
5. Breastfeeding—Breastfeeding rates in the top ten countries are more than 90 percent. Breastfeeding is socially expected in these countries, some of which even have incentives to encourage breastfeeding.

ESTIMATING PREVENTABLE CHILDBIRTH RELATED DEATHS
The following statistics, derived from data accumulated between 1940 and 1980, are conservative estimates of lives lost due to our system of treating pregnancy as a medical event requiring medical intervention and care. About 1,000,000 babies died at or before birth that should have lived.

About 1,600,000 babies, who should have lived, died before their first Birthday. At least 1,500,000 children were left severely brain damaged by medical procedures. At least 45,000,000 children had minimal brain damage who would have been normal. Today, it is estimated that 50 newborns die unnecessarily each day. These deaths are preventable if the *five standards for safe childbearing* were employed.

This breaks down into a preventable baby death every 29 minutes, every hour of the day, each day of the year. NAPSAC writes, "Since 1940 at least a million babies have died in American hospitals who would have lived were it not for the doctor-dominated maternity system that dictates the Standards for American Childbirth."

WHO DECIDES WHAT IS SAFER?
Childbirth is not a laboratory project that can be reproduced at will with the outcomes compared with each other. Nor is birth a medical event, like planned surgery, that can be timed, controlled or forced to obtain the desired outcome. Each year, it seems, scientists discover some aspect of birth that had been unknown or unverified.

Also, it would seem that the technologies that are initially hailed as the "cure" for a certain problem are found to produce unacceptable side effects or increase risks for more serious complications. Birth also has a psychological component, which can place some women at incredible risk in a hospital.

A recent article in a prestigious magazine looked at homebirth and asked the question, "Is it safe? Is it ethical?" The physician writers concluded that homebirth has a "definite small risk" and that "hospital births entail a wider range of risks." They also felt that since the actual risk factors inherent in a home birth are very small, perhaps 1:1000, and the consequences of the birth decision will be borne exclusively by the parents, physicians should support parents who are willing to accept this risk so as to make the experience as safe as possible. The *Oxford Perinatal Project* also came to this conclusion after an exhaustive look at every scientifically valid study performed since the 1950's addressing aspects of care of pregnant and birthing women and their babies.

Since science cannot prove home birth to be less safe than hospital birth, each family has the constitutionally supported right to choose where to give birth. Until science can prove a detrimental effect

on those who choose to birth at home, medical personal should support families in their decision. The International Association of Parents and Professionals for Safe Alternatives in Childbirth, NAPSAC, shares this view and asks, "Who is to decide what is the optimal balance between medical and psychological risk? It must be the parents.

RISKS AND BENEFITS OF HOSPITAL PROCEDURES

In spite of all the advertising touting "home-like" birthing rooms in hospitals, for most women, a hospital birth will be nothing like a home birth. Interventions are routine in the hospitals. Every laboring woman will be hooked up for some period of time to electronic fetal monitor, given vaginal exams, and be told where and in what position she must give birth.

If her membranes are ruptured, she will be required to deliver her baby within a certain time period. If her labor is moving too slowly, she will be given *pitocin* to augment it or have her water artificially ruptured. She will be told how many companions she may have with her. If she has other children she may or may not include them at the birth.

How long she is kept in the hospital will vary depending on her physician and the particular hospital. How soon her baby will be released also will depend on the baby's pediatrician and hospital policy. Some of the more common interventions that take place during hospital births are discussed below.

AMNIOTOMY

Artificially breaking the amniotic sac is done routinely at many hospitals to speed labor up, get labor going, to test the fluid or to get it out of the way so that an internal monitor can be screwed into the baby's head. It was believed that breaking the water would speed up labor by 30 to 60 minutes, but the only randomized control trial done disproved this. This procedure causes cord *prolapse*, a serious complication for the baby and increases the chances of an infection. With less amniotic fluid in the uterus during labor, the baby has a greater risk of cord compression problems leading to fetal distress and *malpositions* of the head.

DRUGS

OPIATE DRUGS

A number of opiate drugs are in current use. These include the classic opiates *morphine* and *pethidine/meperidine* (Demerol)**, the short-acting synthetic opiate *fentanyl*** (Sublimaze) **and the agonist-antagonist opiates *meptazinol*** (Meptid)**, *nalbuphine*** (Nubain)**, and *butorphanol*** (Stadol)**, which occupy the opiate receptor sites, partly activating and partly blocking them. In the U.S., between 39 and 56% of laboring women use an opiate drug, the lower figures reflecting use in smaller hospitals. In the U.K., 37% of women are estimated to use opiates in labor. The most commonly used opiate in most labor wards is pethidine/meperidine.**

Opiates are popular partly because of their ease of use; however their efficacy has been questioned. Even after repeated doses up to 1.5 mg/kg of pethidine/meperidine, a woman's pain score can remain high—between 70 and 80 points out of 100 on *visual analogue score* (VAS)**. Although, the women's VAS pain scores did not decrease significantly after repeated doses, the VAS sedative score increased progressively up to 70-90/100 after the third dose.**

These drugs only cause heavy sedation—the analgesic effect is modest. There is a strong suggestion in the literature that the use of this drug is associated with a lengthening of labor, and this association is dose-related. Studies in animals support this view. Large doses of opiates are needed to relieve labor pain, and such doses can have side effects that range from unpleasant to serious. As nervous system depressants they can lead to excessive sedation and respiratory depression in both mother and baby.

Other maternal side effects include nausea, vomiting, pruritus (itchiness)**, decreased gut motility** (and increased risk of aspiration if a general anesthetic is subsequently used)**, hypotension** (low blood pressure)**, and loss of airway protective reflexes.**

Opiate drugs are lipid-soluble and pass easily to the baby in-utero, and fetal levels can build up, especially when the mother receives repeated doses. After birth, when the mother can no longer metabolize the drug for her baby, the half-life can be very prolonged due to the immature neonatal liver and excretory systems. For example, the half-life of pethidine is three to six hours in the mother but is 15 to 23 hours in the neonate.

Norpethidine (normeperidine)**, the major metabolite of pethidine, has a half-life of 14 to 21 hours in the mother and 63 hours in the neonate. The baby will have the highest opiate levels when drugs are administered between one-and-one-half and four hours before birth. Babies whose mothers received repeated doses of pethidine/meperidine will continue to be exposed to the drug via its long-acting metabolite norpethidine, which will be excreted in the mother's milk for the first 24 hours or so.**

Recognized effects on the baby include neonatal respiratory depression, decreased neonatal alertness, inhibition of suckling, lower neurobehavior scores and a delay in effective feeding. Apart from general anesthesia, pethidine was the drug most inhibiting to breastfeeding. All opiates have similar effects on the fetus and neonate when administered to the mother in equipotent doses. No strong preference for any of the opioids can be recommended.

Longer-term studies on neonates exposed to opiates in labor are concerning. Studies following such babies to six weeks found that neurobehavior was affected in a dose-response way for the entire follow-up period. Higher cord blood levels of pethidine were associated with babies who were more prone to respiratory difficulties, drowsy and unresponsive immediately after delivery.

Throughout the six weeks in which the assessments were made, depressed attention and social responsiveness were found in infants with high drug levels. Consolability was also decreased with increasing levels of pethidine exposure. Greater exposure to pethidine results in neonatal behavior that is significantly depressed in areas of functioning which might affect the ability of the mother to adjust to her baby in the first few weeks of life.

In 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. When a mother received three doses of opiates, her child was 4.7 times more likely to become addicted to opiate drugs in adulthood. This study was recently replicated with a U.S. population, with very similar results.

INHALED ANALGESICS

Various anesthetic gases have historically been used, in low doses, in childbirth, but their use has been restricted by various factors including their relaxant effect on the laboring mother's uterus, putting her at risk of postpartum hemorrhage; their propensity to cause drowsiness and amnesia; concerns about toxicity; and difficulties with their administration.

Currently, *nitrous oxide* (N_2O) **is the only inhaled agent with general use in the labor ward. Nitrous oxide is an *analgesic* but not *anesthetic* gas—that is, it reduces sensation without producing unconsciousness. Currently it is usually used as a 50:50 N_2O—oxygen mixture known as *Entonox*. Entonox is usually self-**

administered via a facemask with a one-way valve that opens with inhalation. Nitrous oxide, when offered, is a popular choice, being used by 60% of laboring women in the U.K. and 37% in Canada, although it is less available in the U.S. Nitrous oxide has low solubility in the blood, which gives it a rapid onset (around 50 seconds) **and offset. It is most often used discontinuously—that is, during contractions** (most effective if begun at the very start of a contraction)**—and set aside in between. Side effects include dizziness, excessive sedation and drowsiness, especially if used continuously. The advantage of self-administration is that excessive drowsiness will render a woman unable to get the mask to her face.**

Although N_2O has a reputation as an innocuous form of analgesia, it is well known to lower blood oxygen levels. Pure inhaled N_2O, which was used extensively as an analgesic some years ago, induces cyanosis in a relatively short time. Entonox has been associated with longer and more severe episodes of *oxygen desaturation* than epidural analgesia, although overall maternal *hypoxemia* (during hypoventilation between contractions) **is not increased.**

The combination of N_2O with an opioid, which is not uncommon, may lead to episodes of marked maternal, and hence fetal, oxygen desaturation, especially in obese women. Maternal *pulse oximetry* is recommended when women use this combination in a high-risk situation.

There are also concerns about occupational safety for female staff exposed to this gas, as levels in labor wards can reach 300 ppm. Dental staff, exposed to 100-1000 ppm, have higher rates of miscarriage. Nitrous oxide has also been implicated in adult drug addiction. When laboring women used N_2O for more than 4.5 hours, they gave birth to offspring who were 1.7 times more likely to become addicted to amphetamines or opiates in adulthood.

EPIDURAL DRUGS

The popularity of epidurals for pain relief, as well as for cesarean anesthesia, has increased in recent years, and epidurals are now used by around two-thirds of U.S. women in labor. Epidurals offer the highest degree of pain relief in labor but have significant side effects, as well as a profound effect on the process of labor. Epidural analgesia is one of the most striking examples of the medicalization of normal birth, transforming a physiological event into a medical procedure.

Epidurals involve an injection of one of several types of local anesthetic (all of which are cocaine derivatives) into the *epidural space* around the spinal cord, which blocks sensation from the nerves supplying the lower half of the body, including a woman's pelvis and uterus. An added opiate drug is commonly used. Although an epidural does not usually block the motor nerves, few women are steady or safe enough on their feet to walk after an epidural, and the need for fetal monitoring also keeps most women bed-bound after this procedure.

Side-effects of epidurals are common. A drop in blood pressure occurs for up to 50% of women, although this possibility is usually pre-empted by the use of intravenous fluids to "preload" the laboring woman. Occasionally, treatment with *ephedrine/adrenaline* may be necessary to maintain circulation to the woman's uterus and baby, which will be compromised to some extent by a drop in blood pressure. Sedation occurs in around 21% of women, averaged from multiple studies, and is highest when *sufentanil* is used in the epidural.

A woman's bladder function is likely to be affected by the nerve blocks, and a catheter may be needed to pass urine—this occurs for up to two-thirds of women with epidurals. When opiate drugs are included in the procedure, a woman may experience *pruritus* (generalized itching)**; this occurs mainly in women who have received *fentanyl* or *sufentanil*, when almost two-thirds of women experience this side effect. Epidurals can**

also cause nausea and vomiting, again more likely with the use of opiates, and the risk overall can be as high as 30%.

Shivering is also not uncommon and seems to be a direct effect of the epidural drugs on a woman's thermal regulation. Inadvertent puncture of the spinal cord covering (*dura mater*) **occurs in about 3% of epidural procedures and can give a severe headache that lasts several days. Less common side effects for a woman having an epidural include ongoing numb patches, which usually clear after three months, and weakness and loss of sensation in the areas affected by the epidural, also usually resolving by three months. Potentially life-threatening complications, such as inadvertent injection into the woman's blood stream, occur in about 1 in 4000 cases.**

Other unintended effects of epidurals include longer labors (average increase of around 42 minutes for first stage and 14 minutes for second stage)**, in one meta-analysis of epidural vs. injected opiate drugs; lower rates of spontaneous delivery; increased rates of instrumental deliveries; higher rates of intrapartum fever; and increased risks of neonatal sepsis evaluation, when compared to non-epidural forms of pain relief.**

Studies show that women who have an epidural are 1.5 times as likely to have a cesarean delivery, and that instrumental delivery is 2.2 times more likely when women have been administered an epidural. Because of the delay in labor, women who use an epidural are also more likely to be administered *oxytocin* to accelerate their labor, and there is an increased risk of severe (third- and fourth-degree) **perineal lacerations after an epidural, due to the increase in forceps and vacuum deliveries. When mothers who have received epidurals subsequently have a forceps delivery, the peak force applied to their babies' head is almost doubled, as measured by a tactile sensing device.**

Combined spinal-epidurals (CSE) **have also been developed, which combine an initial injection (usually an opiate drug, sometimes with a local anesthetic) into the spinal space, which provides good but short-lived pain relief, with placement of an epidural needle for ongoing dosage. One large study has linked CSE** (using the synthetic opioid *sufentanil*) **with severe *bradycardia*** (slow heart rate) **necessitating emergency cesarean in 1.5% of women using this method. CSE does not seem to offer any advantages over conventional epidural techniques.**

The effect of epidurals on maternal temperature is well documented but still not well understood. A gradual increase in temperature of around 0.07° F per hour has been documented, and other research has suggested that around 15% of women with epidurals develop fever >100.4° F. Various explanations, which may overlap have been proposed, including vasodilation; a direct thermoregulatory effect; chorioamnionitis; and an anti-pyretic effect of opiates, which are the usual control group in epidural studies. Babies born to feverish mothers (an average of 97% of whom have received epidurals) **are more likely to have low Apgars at one minute and to be hypotonic. They also need resuscitation more often and have a higher rate of neonatal seizures.**

In primate studies, hyperthermia in the absence of infection has been associated directly with development of fetal hypoxia, metabolic acidosis and hypotension. Other animal studies have demonstrated that an increase in brain temperature of even 1° C or 2° C increases the degree of brain damage resulting from an ischemic insult. There is a substantially increased risk of encephalopathy in babies born to febrile mothers.

Whether or not this elevation in maternal temperature directly causes neonatal morbidity, it is likely to lead to a sepsis evaluation in the neonate, which involves separation from the mother, special care nursery admission, invasive diagnostic procedures and possibly antibiotic treatment until test results are available.

One study showed 34% of babies born to epidural mothers had a sepsis evaluation, compared to 9.8% of non-epidural babies.

There has been a noticeable lack of research and information about the effects of epidurals on babies, with many unanswered questions. Drugs used in epidurals can reach levels at least as high as those in the mother, and, as with opiates, these drugs take a long time to be cleared from the baby's body, because of the baby's immature excretory systems. For example, the half-life of *bupivicaine*, the most popular local anesthetic used in epidurals, is 8.1 hours in the neonate, as compared to 2.7 hours in the mother. Although findings are not consistent, possible problems, such as rapid breathing in the first few hours and vulnerability to low blood sugar, suggest that these drugs have measurable physical effects on the newborn baby.

Several studies have found subtle but definite changes in the behavior of newborn babies after epidurals, with one study showing that behavioral abnormalities persisted for at least six weeks. Other studies have shown that, after an epidural, mothers spent less time with their newborn babies and described their babies at one month as more difficult to care for.

The hormonal effects of epidurals may explain some of these findings. Women who use epidurals in labor have diminished release of labor hormones, including *catecholamines*, which catalyze the final powerful contractions of labor; *oxytocin*; and *beta-endorphin*. Such changes may disrupt early maternal and/or neonatal hormones, as well as the subtle interaction between new mother and baby. Although there is scant research about the effects of epidurals on breastfeeding, there is evidence that babies born after an epidural have diminished suckling reflexes and capacity, consistent with drug-related neurobehavioral deficits as above. A recent study showed that, for healthy full-term babies born vaginally, exposure to an epidural reduced their chances of being fully and successfully breastfed before hospital discharge.

In light of the studies, which link use of drugs in labor with increased risk of addiction in adult offspring, it is interesting to note that an upsurge in cocaine addiction began around 20 years after the introduction of epidural drugs, all of which contain cocaine derivatives. The popularity of epidurals reflects their strong analgesic efficacy, but this does not guarantee satisfaction after childbirth.

In fact, contrary to the expectation that a pain-free birth is best, many studies show that women who use no analgesia (and have the highest pain ratings) **are the most satisfied long-term. Pain relief and satisfaction with pain relief are not the same. Epidurals also increase the number of obstetric interventions, which is associated with lower overall satisfaction ratings in large surveys.**

Many surveys of satisfaction with childbirth are done while the women are captive, in hospitals, within a few days of birth. These studies are likely to be colored by either a halo effect or the "what is, must be best" effect, as well as by the relationship between researcher and participant.

OCYTOCIN

The pituitary hormone *oxytocin* was first synthesized in 1955 by the American biochemist Vincent du Vigneaud, who received a Nobel Prize for his work. Now, *Syntocinon/Pitocin* is one of the most widely used and abused drugs in obstetrics. Synthetic oxytocin (Syntocinon, Pitocin) **is used to *induce* and to *augment*** (or accelerate) **labor, as well as for prevention and treatment of postpartum hemorrhage. Currently, almost all women giving birth under obstetric care will receive oxytocin for one of these indications. In some circumstances, oxytocin can be a life-saving drug, but its administration in labor can also put both mother and baby at serious risk.**

When used for induction and/or augmentation, oxytocin is administered to the pregnant women via an IV drip, with the dose usually being doubled every 30 minutes until adequate contractions are produced. It has been estimated that oxytocin drip at 32 mU/minute, with a half-life for oxytocin of 3-5 minutes (which may be actually longer)**, will have blood levels of 40,000 mU/ml. This is between 130 and 570 times greater than oxytocin levels in a natural labor** (70-300 mU/ml.)

The risks of these abnormally high levels are well documented. A woman's oxytocin-induced contractions will be longer, stronger and closer together than her body would normally produce, and the resting tone of her uterus will be higher. All of these factors reduce her baby's blood supply during contractions and give less of a break in between to recover. The situation is analogous to holding an infant under the surface of the water, allowing the infant to come to the surface to gasp for air, but not to breathe. With this loss of blood and oxygen, the baby will be at risk, as the pitocin package insert warns, of fetal heart abnormalities (bradycardia, premature ventricular contractions and other arrhythmias)**; low 5-minute Apgar scores; neonatal jaundice; neonatal retinal hemorrhage; permanent central nervous system or brain damage and fetal death. It is ironic that babies induced because of concerns about their health will be exposed to further risks through the process of induction.**

These stronger, oxytocin-induced, contractions can be hazardous to women, as well as their babies. Uterine rupture may occur, which may result in emergency hysterectomy or even maternal death. In addition, the induction may fail, as oxytocin is more effective at causing a woman's *uterus to contract* than causing her *cervix to dilate*. It is also highly likely that women who have an induction with oxytocin will have a more painful labor, necessitating drugs for pain relief, as well as beginning the "cascade of intervention" that can end with a cesarean or instrumental delivery.

The second important aspect of oxytocin administration relates to its hormonal effects. Oxytocin has been called the *hormone of love* because of its connection with sexual activity, orgasm, birth and breastfeeding. In addition, oxytocin is produced in social situations, such as sharing a meal, making it a hormone of altruism, of "forgetting oneself." Oxytocin is naturally secreted from a laboring woman's posterior pituitary gland, being distributed firstly at local areas in her brain and then in her general circulation, and so reaching her uterus, where it causes her uterus to contract.

In labor, oxytocin levels are relatively constant until close to the time of birth, but the uterotonic effect strengthens, because the woman's uterus becomes increasingly responsive to oxytocin as labor progresses. In her brain, oxytocin helps to prepare her for motherhood, as well as continuing, as in pregnancy, to keep her feeling relaxed and loving.

When oxytocin is administered into a laboring woman's blood stream, however, it cannot cross from her body back to her brain through the blood-brain barrier. This means that Syntocinon/Pitocin cannot act as the hormone of love, nor of maternity. 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.

It is known that women with Syntocinon infusions are at higher risk of bleeding after the birth, because their own oxytocin production has been shut down. However, the equally important effects of a reduction in oxytocin levels on brain, emotions and mothering behaviors has not yet been researched.

Other risks of oxytocin relate to induction of labor. These include iatrogenic prematurity (because of mistakes in dates)**; increased risk of cesarean** (around twice overall for first-time labors) **compared to non-**

induced labors and even more when the woman's cervix is unripe; increased risk of uterine rupture after previous cesarean; and umbilical cord prolapse, if the membranes are artificially ruptured as well.

BARBITURATES

Barbiturates are powerful nervous system depressants and were widely used as sleeping pills until the 1970s, when *benzodiazepines* became available. The first barbiturate to be used clinically was *phenobarbitone* in 1912, and barbiturates were subsequently given to women in childbirth to relax and sedate them. Like twilight sleep, which barbiturates largely replaced, moderate doses of barbiturates induce a retrospective amnesia. The results are usually very satisfactory; the patient knows nothing about her labor, and awakening several hours after the baby has been born.

Barbiturates readily cross the placenta and accumulate in the fetal brain and liver. Large doses may cause a drop in blood pressure and pulse rate as well as respiratory depression in mother and/or baby. Euphoria and impairment of fine judgment may persist for many hours after the drowsiness and sedation has worn off. For the baby, barbiturates cause neurobehavioral depression that lasts several days. A 1988 study noted that barbiturates were still being used in obstetrics to prevent epileptic seizures and *hyperbilirubinemia* and to placate "the stressful effects of labor." These researchers found that administration of phenobarbitone for three days before birth altered brain development in rats.

Studies of drug addiction in adult offspring exposed to drugs in labor also implicate barbiturates. When barbiturates and/or opiates were administered between 0.5 and 1.5 hours before birth, offspring had 3.5 times the risk of becoming addicted to opiates in adulthood. Single doses increased the risk by 1.6 for opiates and 1.7 for barbiturates. Barbiturates continue to be used for the treatment of epilepsy, but the only barbiturate still commonly used in childbirth is the short-acting *thiopentone* (Pentothal)**, used for induction of general anesthetic.**

BENZODIAZEPINES

Benzodiazepines were first synthesized in 1933 and became popular substitutes for barbiturates because it was erroneously believed that, unlike barbiturates, these new drugs had no addictive potential. Benzodiazepines include the long-acting drug *diazepam* (Valium)**, used as a sedative and muscle relaxant and shorter-acting compounds such as *midazolam*** (Hypnovel, Versed)**, used to induce sedation and amnesia before general anesthetic and other medical procedures. Like the barbiturates, benzodiazepines were used to sedate laboring women, with little analgesic effect.**

Benzodiazepines can cause a drop in maternal blood pressure and respiratory depression; the latter can be severe when these drugs are given with opiates. Diazepam is slowly metabolized and crosses the placenta. Because of the long action of its active metabolite, *demethyldiazepam*, diazepam has a half-life of 43 hours in the adult, 20 to 50 hours in the full-term neonate and up to 400 hours in a premature baby. Diazepam can cause side effects in the neonate ranging from mild sedation, *hypotonia* and reluctance to suck, to severe hypotonia (floppy baby syndrome)**, apneic spells, cyanosis, and impaired thermoregulation. Because of these effects, diazepam is not generally used in the labor ward today.**

CONCLUSION

There is much that is not known. Firstly, most people are dangerously ignorant of the effects that obstetric drugs may have on the developing brains of their babies. In no other time in an individual's life is his or her brain more vulnerable to alteration, trauma and permanent injury than during the hours which surround that individual's birth. Our embarrassingly high rate of learning disabled children may well be due to the toxic effects of drugs used during labor.

Secondly, the effects of our widespread interference in the natural processes of labor and birth go well beyond drug side effects and toxicity and include disruption of the delicate and complex hormonal orchestration of birth that has served our species for millions of years. Again, the long-term sequellae of this interference are not known.

The current situation is analogous to our understanding and beliefs about infant feeding 50 years ago. The damage being caused by current birth practices (especially the very liberal use of obstetric drugs) is at least equal to the damage caused to generations of babies raised on human milk substitutes. Protecting mothers and babies involves prioritizing systems and models of care that value drug-free labor and birth and that support laboring women in achieving this. Birth without drugs and medical intervention is the best birth day gift possible for all mothers and babies, and one they all deserve.

ENEMAS
This procedure is still done routinely at many hospitals, although no research proves any benefits for the mother or baby. Home birth and natural birth advocates recognize that for the vast majority of women, the process of labor will empty the bowels.

EPISIOTOMY
Although many believe that an *episiotomy* is necessary to have a baby to prevent damage to the baby's head, trauma to the mother's perineum, and the cut will heal faster and prevent 3rd and 4th degree tears, no research supports these myths.

In the U.S., 9 out of 10 American women will have an episiotomy with her first baby, although in Holland, only 2 or 3 out of 10 will. The facts are that episiotomy is a cultural phenomenon. Research shows that episiotomy is done because the doctor was trained to do it, not because it was a necessary procedure. It can be avoided by using more physiologic positions to give birth (not *lithotomy*)**, pushing only when mom feels need to, giving birth gently, slowly to the head, preparing for the birth by doing *perineal massage* and *Kegel exercise*, avoiding forceps delivery.**

FORCEPS & VACUUM EXTRACTOR
Forceps are obstetrical tools which are shaped like large spoons that have been in use since the 1500's. Years ago, forceps were used for many problems which are now handled by cesarean section. Today, most forceps deliveries are low forceps, which means they are applied when the baby's head is low in the pelvis and birth is imminent.

There is no research to support the elective use of forceps. The risks to the mother are perineal trauma, extensive episiotomy, and possible *extension tearing* from episiotomy, hematoma, and nerve damage. Lasting effects of forceps or vacuum extraction to the mother may be anal incontinence in spite of a repaired third degree tear. The baby may have damage to the head, eyes, the nerves that lead to the face and neck and arms. However, an article, written by a physician, that appeared in *Parents* magazine claims, "Medical studies comparing outlet forceps deliveries with spontaneous (no forceps) **deliveries have shown that there is no difference in risk to the baby."**

Vacuum extraction is a newer technology that sometimes takes the place of forceps. As with low forceps, the baby's head must be very low in the pelvis before the suction cup can be attached. It has the benefit of not requiring an episiotomy and maternal perineal trauma is less than with forceps, but the baby still has the possibility of trauma to the head and face. Chiropractors also recognize that pulling a baby out by the head tractions the spinal column and affects alignment, although this is not recognized in any medical texts.

IMMOBILITY

Along with the *lithotomy* position comes immobility. It is impossible to move around when you are flat on your back. It's even more difficult if you have internal and external fetal monitors attached to your body, an IV running into your arm and after a narcotic drug was given to "take the edge off." If you have an epidural, you will not be going anywhere at all as your legs would have no feeling. Some hospitals encourage walking and moving around. Others do not like you to be out of your room, which may be quite small and loaded with equipment, making any real walking about nearly impossible. Studies have shown that moving about and being upright can shorten labor as well as changing positions.

INDUCTION

According to statistics from health departments, one-third of all births in some states are the result of *induction*, the artificial starting of labor. Most inductions are accomplished using Pitocin in an intravenous solution or artificially rupturing the amniotic sac. The reasons for doing this are many. One of the most common for healthy full-term women is fear of going too far past the "due date" and having a baby with *postmature syndrome* or *meconium staining*.

Another reason is fear of having a big baby. However, studies fail to confirm this line of thought. The actual amount of time needed for a baby to grow to term varies and figuring an exact due date for each baby has not yet been done. Ultrasounds have at best a 10 day window of error if done in the first trimester. The phenomenon of postdates, is poorly understood. *Macrosomia* occurs prior to postdates as does "postmature syndrome." The entity of postmature syndrome is based on a single physicians "subjective evaluation of 37 babies." Research seems to indicate that watchful waiting is the more prudent course of action for healthy women.

IV

At a great many U.S. institutions, one of the first items of care to be rendered to the obstetric patient will be her IV, "just in case." Just in case she needs drugs or surgery or her veins collapse making insertion of an IV impossible. Many labor and delivery nurses have been interviewed to find out how frequently a laboring woman's veins collapsed. They learned that this does not happen. This is not the way birth happens in other nations, where a laboring woman is permitted to eat and drink lightly.

This cultural warping began in the 1940's when anesthesia was being given to nearly all birthing women by mask and vomiting and food aspiration were risks associated with this. Eliminating food and drink, they felt, would eliminate this risk. Today, however, anesthesia methods have improved, and this is no longer the problem it once way. Improved intubation techniques make this problem virtually a thing of the past. It seems that the cause was not eating or drinking prior to the surgery but caused by incompetence of the anesthesiologist.

General anesthesia is given to approximately 4% of those who undergo cesarean section. Approximately 0.3% cesarean surgeries will require intubation that will be difficult to do yet not all women who require intubation will aspirate. This translates into denying all laboring women food and drink because one cesarean-sectioned woman out of 10,000 may aspirate.

Although IV's are supposed to keep the stomach empty, a glucose IV actually works to slow down the emptying of the stomach. It also may encourage tissues to swell so that it makes it more difficult to intubate, if that becomes necessary. IV fluid accumulates in the bladder and that may slow down labor. Some women may have sensitivities to the IV and have a reaction from one. It restricts the woman's mobility. The needle in the arm is painful and inhibits free movement. The baby also may suffer from the mother's IV, as the excessive sugar in a glucose IV may harm the baby.

LITHOTOMY

Lithotomy **used to be the position of choice for physicians doing hospital births. The mother lies flat on her back with her knees in the air. It is a most un-physiologic position for mom and baby, but it does give the physician a good view of the mother's perineum. While in this position, the mother must push the baby out uphill. It is known to cause fetal distress due to the baby lying on the mother's arteries and veins. Most women will not choose this position if given alternatives.**

Dr. Roberto Caldeyro-Barcia is considered an expert on this position for labor and delivery. He and his researchers found that this lithotomy or *supine* position is the worst one for laboring women because it adversely affects every facet of birth: makes labor more painful, reduces uterine activity, and can dangerously lower blood pressure. He says, "The supine position is the worst conceivable position for labor and delivery."

MONITORING

Electronic fetal monitoring is required at nearly every hospital for at least a short time. When it was first available, it was used only for the most high risk situations. However, it is now used for everyone regardless of risk status. A large reason why EFM is used so extensively is that staff is in short supply and this technology allows for fewer caregivers. There are two kinds of monitors: *external* and *internal*. The external monitors are attached to a heavy elastic band that is strapped across the mother's abdomen. She must lie quietly so the monitors do not slip. The baby's heartbeat is recorded on a machine that documents the moment-to-moment heart rate on graph paper along with the mother's contractions.

The internal monitor does the same things, but it is attached directly into the baby's head by a metal screw. The uterine contractions are monitored by a probe that is inserted into the uterus. Some feel that this is a more accurate reading. During most labors and deliveries, no other method of monitoring the baby's heart rate will be used. However, EFM does not reduce infant deaths, improve outcomes or give information that permits potentially bad situations to be corrected or avoided. The strips are frequently misread. One study found that 71-95 % of babies diagnosed by EFM as distressed were not.

Additionally, studies have shown that most causes of brain damage are not related to actual distress during the birth process but rather due to distress prior to labor. In spite of near universal use of EFM, little evidence exists that any change has taken place in the numbers of brain-damaged babies being born. *Auscultation* with a *fetoscope*, *stethoscope*, *pinard horn* and other low-tech devices for listening to the baby have been found to be as effective for monitoring most laboring women. The risks of using EFM are well known: higher intervention rate of all kinds due to misinterpretation of strips leading to a misdiagnosis of fetal distress. The use of EFM may increase the risk of cerebral palsy by increasing the risk of infection.

More babies have abnormal fetal heart rate patterns when monitored by EFM than by auscultation, and it may be that this finding is caused by EFM rather than simply being detected by it. Mothers may report not remembering parts of their labors due to anxiety that was created by using the monitors. One of the greatest risks to the baby who receives an internal monitoring electrode is that of infection at the insertion site. The woman with a history of herpes may be wise to forego internal monitoring out of concern of passing this disease on to her baby via the scalp electrode.

HOW THE CORD CLAMP INJURES YOUR BABY'S BRAIN

Immediate cord clamping is clearly identified as a cause of newborn neurological (brain) injury ranging from neonatal death through cerebral palsy to mental retardation and behavioral disorders. Immediate cord clamping has become increasingly common in obstetrical practice over the past 20 years; today, rates of

behavioral disorders (ADD/ADHD) **and developmental disorders** (autism, Asperger's, etc.) **continue to climb and are not uncommon in grade school.**

A major error in modern obstetrical practice is routine premature clamping of the umbilical cord. Some sections require medical knowledge for full comprehension and the language is very technical, but overall, medical jargon is avoided or explained in terms that most expectant parents can understand. The error was defined very clearly over 200 years ago:

"Another thing very injurious to the child, is the tying and cutting of the navel string too soon, which should always be left till the child has not only repeatedly breathed but until all pulsation in the cord ceases. As otherwise the child is much weaker than it ought to be, a portion of the blood being left in the placenta, which ought to have been in the child." –*Erasmus Darwin,* *(Charles Darwin's grandfather)* ***1801.***

Despite repeated publications illustrating the effects of the error, and official notification, medical academia and its peer review press have yet to acknowledge the possibility of any error. Public exposure and knowledge of the issue is intended to accelerate correction of the error. The nature of the injury caused by this practice unhappily precludes a cure; for the unfortunate parents of an impaired child, the knowledge may assuage any guilt they may have and give them reassurance regarding future births.

Modern obstetrics ignores the normal functions of the cord and placenta from the moment that the child is born, and in most hospitals the umbilical cord is clamped and cut at the earliest convenient time after birth. At premature births and when the newborn is depressed or "at risk," immediate cord clamping is routinely performed in order to rush the child to a resuscitation table and to obtain cord blood samples for medico-legal purposes. Placental blood, which ought to have been in the child, is either thrown away or used to provide stem cells or other commercial products.

Doctors are taught (and believe) **that delayed cord clamping / placental transfusion gives the baby too much blood,** (*hypervolemia*) **while neonatal intensive care units** (NICU) **are filled with weak, fast-clamped newborns exhibiting signs of severe blood loss—*pallor*, *hypovolemia*** (low blood volume) ***anemia*, (low blood count) *hypotension*** (low blood pressure)**, *hypothermia*** (cold)**, *oliguria*** (poor urine output)**, *metabolic acidosis*, *hypoxia* (low oxygen supply), and *respiratory distress* (shock lung)—to the point that some need blood transfusions and many more receive blood volume expanders.**

At this point, an explanation of the terms *anemia*, *polycythemia*, *hypovolemia* and *hypervolemia* is required. Blood is a mixture of red cells and plasma, a fluid. Blood is usually about half cells and half plasma. When blood contains too few cells, the term *anemia* is used; the blood is "dilute."

***Polycythemia* means there are too many red cells— "concentrated" blood. The -*volemia* terms refer to the total volume of blood in the child's heart and blood vessels; blood vessels are elastic and are constantly filled by the heart pumping blood through them, like a long, circular balloon.**

Too much blood volume (*hypervolemia*) overworks the heart and overfills the "balloon." Too little blood volume (*hypovolemia*) lets the balloon and the heart collapse; it makes no difference if the blood is diluted or concentrated. Anemia and polycythemia are about the *quality* of blood; hypo- and hyper-volemia are about *quantity* of blood. An anemic baby may be hypervolemic—too much fluid, and a polycythemic child may be hypovolemic—dehydrated. A normal child that suffers acute blood loss will have a normal blood count and low blood volume (*hypovolemia*)**.**

During recovery from the hemorrhage, blood volume is restored with fluid (plasma), and the child becomes anemic (diluted blood) as it takes much longer to restore the lost red cells. Early infant anemia is a strong indication that the child has suffered significant previous blood loss.

BEFORE BIRTH, THE CORD AND PLACENTA "BREATHE" FOR THE BABY.
Humans and all other mammals have evolved, over millions of years, a very safe mechanism for closing umbilical cords at birth without interrupting "breathing," and ensuring optimal survival of their offspring. An occasional natural accident such as a ruptured cord may rarely occur, but it is biologically impossible for that mechanism to routinely give a child too much, or too little, blood; mammals that routinely give their offspring the wrong amount of blood for survival become extinct in one generation.

Erasmus Darwin's late clamping method is safe because the tie is placed on vessels that the child has already closed physiologically (by natural constriction) **after it has received the right amount of blood; the tie does no harm because it virtually does nothing. Safe cord closure at birth involves closing the placental life support system and starting the child's life support systems without significant interruption of life support during the changeover process.**

Oxygen supply and blood to carry the oxygen are crucial to life support; blue blood contains little oxygen, red (pink) **blood is saturated with oxygen. Brain cells die quickly from lack of oxygen; they do not regenerate, and asphyxiation** (choking / lack of oxygen) **for about six minutes will cause permanent brain damage.**

NORMAL CORD AND PLACENTAL FUNCTION AFTER BIRTH (NO CORD CLAMP USED)
Before birth, the lungs are filled with fluid and very little blood flows through them; the child receives oxygen from the mother through the placenta and cord. This placental oxygen supply continues after the child is born until the lungs are working and supplying oxygen—that is when they are filled with air and all the blood from the right side of the heart is flowing through them. When the child is crying and pink, the cord vessels clamp themselves. During this interval between birth and natural clamping, blood is transfused from the placenta to establish blood flow through the lungs. Thus the natural process protects the brain by providing a continuous oxygen supply from two sources until the second source is functioning well.

Placental blood transfusion occurs by gravity or by contraction of the mother's uterus which forces blood into the child. Transfer of blood into the child through the cord vein can occur after the arteries are closed (no cord pulsation). The transfusion is controlled by the child's reflexes (cord vessel narrowing) **and is terminated by them when the child has received enough blood** (cord vessel closure)**.**

The switch from *placental* to *pulmonary* oxygenation also involves changing the fetal circulation to the adult circulation—the one-sided heart (body blood flow only) **changes to a two-sided heart** (blood flows through the lungs, then through the body)**. Ventilation of the lungs and placental transfusion effect this change. This is a very basic account of a very complex process. It all happens usually within a few minutes of birth, and when the cord pulsations have ceased and the child is crying and pink, the process is complete. Clamping the cord during the changeover process disrupts these life support systems and may cause serious injury.**

THE EFFECTS AND THE INJURIES OF IMMEDIATE CORD CLAMPING (ICC)
The American College of Obstetricians and Gynecologists (ACOG) **and the Society of Obstetricians and Gynecologists of Canada** (SOGC) **advocate immediate cord clamping at birth before the child has breathed. This instantly cuts off the placental oxygen supply, and the child remains asphyxiated until the lungs function. Blood, which normally would have been transfused to establish the child's lung circulation,**

remains clamped in the placenta, and the child diverts blood from all other organs to fill the lung blood vessels.

After immediate clamping, the normal term baby usually has enough blood to establish lung function and prevent obvious brain damage, but it is often pale, weak, and slow to respond. Occasionally, a child will cry as soon as the head is delivered, and the uterine contraction that delivers the child may also squeeze in some placental transfusion before the fast clamp can be applied; however, cord clamping before the first breath always causes some degree of asphyxia and loss of blood volume:

(1) It totally cuts off the infant brain's oxygen supply from the placenta before lungs begin to function.

(2) It stops placental transfusion - the transfer of a large volume of blood (up to 50% increase in total blood volume) **that is used mainly to establish circulation through the child's lungs to start them functioning.**

CEREBRAL PALSY CAN RESULT FROM PREMATURE CORD CLAMPING

While ICC is a danger to all newborns, if a child is born asphyxiated and depressed following fetal distress from cord compression (e.g. a tight cord around the neck) **immediate cord clamping may very well be fatal. A child deprived of oxygenated placental blood before birth is in dire need of oxygenated blood after birth. Immediate clamping in such circumstances often produces a hypovolemic and asphyxiated child who cannot begin to breathe adequately to relieve the asphyxia; oxygen in the lungs will never reach the brain if the newborn does not have enough blood to flow from lungs to brain.**

The medical term for the condition that causes *cerebral palsy* (CP) **is *hypoxic, ischemic encephalopathy* (HIE). *Hypoxic* means lack of oxygen— the child has no placental oxygen supply; *ischemic* means lack of blood flow— half of the child's blood is in the placenta; *encephalopathy* means brain damage. HIE is often treated with blood transfusion or blood volume expanders after a large part of the child's own oxygenated blood has been discarded with the placenta.**

In addition, babies with HIE usually develop anemia. The obvious correct way to resuscitate the depressed child is to keep the cord and placenta functioning while ventilating the lungs. If a child is born depressed with a knot in the cord, should the knot be loosened or tightened? A newborn depressed from lack of blood and lack of oxygen is quickly restored to normal with a large transfusion of oxygenated placental blood and is unlikely to develop HIE. Rapid restoration of oxygenation is crucial in preventing brain damage in the depressed child, and that child must have enough blood to transport oxygen to the brain.

If hypoxic brain damage has occurred before birth, placental oxygenation and transfusion will not cure it after birth—nothing will—but progression of the damage will be prevented. Blood transfusion given after the child has developed HIE will not restore the dead brain cells.

Blood transfusions given in the NICU are usually examples of "too little and much too late." Fetal distress *(intra-partum asphyxia)* **from cord compression, such as occurs with a cord prolapsed during labor** (a cord squeezed between the head and the cervix,) **may be rapidly reversed by relieving the compression, elevating the presenting part** (head) **or changing the mother's position. The fetal heart rate and monitor tracing soon return to normal and at delivery by emergency c-section, the child may show no sign of asphyxiation.**

The same result can be obtained at birth in a child asphyxiated with a tight cord around the neck by reducing (unwinding) **the cord and allowing the placental circulation to resuscitate the child. The current standard obstetrical practice is to clamp the cord immediately to obtain a cord pH—this maximizes the asphyxiation**

and hypovolemia and accelerates HIE; the life-saving blood in the placenta is thrown away while parts of the child's brain die.

LEARNING DISORDERS AND MENTAL DEFICIENCY

The varying degrees of *cerebral palsy* and *spastic paralysis* are usually evident soon after birth in the movement and reflexes of the child, but lesser degrees of hypoxic, ischemic brain damage may remain hidden for years. Iron deficiency anemia in infants is associated with learning disorders and behavioral problems to the point of mental retardation when these children reach grade school; the degree of mental retardation increases with more severe degrees of infant anemia.

At birth, no newborn is anemic; adequate iron is supplied from the mother regardless of her iron status. Any newborn that receives a full placental transfusion at birth has enough iron to prevent anemia during the first year of life. It is, therefore, reasonable to conclude that full placental transfusion will prevent the mental retardation, behavioral disorders and learning disabilities that occur following infant anemia.

The immediately clamped newborn may be missing one third to one half of its normal blood volume and is very prone to develop infant anemia, and as shown previously, it is also at risk for hypoxic, ischemic brain damage at birth.

While some studies on treatment of the anemia in infancy have shown some behavioral improvement, most studies show no improvement or prevention of the brain dysfunction following correction of anemia, making it difficult to establish a cause and effect relationship between anemia and brain dysfunction.

In HIE and CP (severe brain dysfunction) **anemia develops AFTER the brain is damaged. Moderate hypovolemia and hypoxia at birth will produce infant anemia; it may also cause undiagnosed minor brain damage that will later produce behavioral defects. Evidence strongly points to infant anemia and behavioral brain dysfunction having a common cause—immediate cord clamping; in other words, both anemia and brain dysfunction are *effects*, not a *cause* and an *effect*.**

In a comprehensive review of cord clamping in 1982, Linderkamp concluded: "immediate clamping can result in hypovolemia and anemia. … A medium placental transfusion appears to be more appropriate in order to avoid the risk of hyperviscosity, whereas iron deficiency in later infancy is probably less dangerous."

And in a similar review in 1981, Peltonen stated: "Closing of the umbilical circulation before aeration of the lungs has taken place is a highly unphysiological measure, which should thus be avoided. Although the normal infant survives without harm, under certain unfavorable conditions, the consequences may be fatal." Within a few years, reports of these unharmed, "normal," anemic infants being mentally retarded in grade school began to appear in the literature.

While Linderkamp never proved that *hyperviscosity*, (a hematocrit of >65%) **was any risk at all to a newborn, Peltonen's remarks were based on his observations of newborns' chests viewed under a fluoroscope, and he described incomplete filling of the cardiac ventricles following immediate clamping; his use of the word "fatal" indicates that, after immediate clamping, he witnessed a cardiac arrest that was not reversed. His blunt advice to avoid the procedure (he mentions no exceptions) emphasizes that the "normal" child may not be free from risk.**

He did not advise repeating his experiment; the American College of Obstetrics and Gynecology and the Society of Obstetrics and Gynecology in Canada do. Cardiac arrest, or inadequate cardiac output for a few minutes, will produce permanent brain damage.

TO ANNOUNCE TO EVERY OBSTETRICIAN IN VERY LARGE PRINT:

1. That immediate cord clamping is no longer officially sanctioned as standard care.

2. That the person who clamps the cord before the lungs are oxygenating the child should have sound, documented, clinical justification for doing so and

3. That the person who clamps the cord immediately or prematurely is individually responsible and liable for the resulting injuries.

Selecting Your Midwife
Questions to Ask
How long has she been a midwife?
Where did she attain her training?
How long did she train?
How many births did she attend while under supervision?
How many children does she have and where were her births attended and by whom?
How many mothers has she delivered and how many were home births?
Does she work alone? With apprentices? Other midwives?
What happens if she must transfer to the hospital?
What is her transfer rate?
What are her views on episiotomy? What is her rate?
How often do mothers have intact perineums?
How often do they require stitches?
Does she suture?
When does she go on vacation?
Does she have a back-up if something happens during her absence?
What is her fee? What does this include? When does it have to be paid?
Ask when she attended her last three births.
Ask to be given their names and phone numbers as references.

WHAT IF YOUR DOCTOR ADVISES AGAINST HOME BIRTH?
Why should you want a home birth, if your doctor is against it? Because your doctor might be wrong. Many experts in childbirth—midwives and obstetricians—believe that home birth is a safe and sensible option for healthy women with normal pregnancies. There's much of research which supports this view. Of course, there are also plenty of midwives and doctors who do not support home birth. Their views may be based upon their own experience, beliefs and fears, or just on habit. It may be that they are not aware of research on home birth safety—family doctors may not have time to read specialist literature, for example. Their reasons will vary.

If you ask 100 doctors for their beliefs on this subject, you will receive 100 different answers—not all of them compatible. They can't all be right! Listen to the opinions of your medical advisors but remember that there are other experts who might well have a different view on the matter. Your doctor/midwife can offer you advice based on her own experience, but she is not infallible, and you do not have to take her advice. Ask what evidence the advice is based on. Ask what particular details of your own case lead them to recommend/not recommend a home birth.

It is not an insult to your doctor to ask these questions; it just shows that you are an intelligent adult who wants to know more about her healthcare options. Consider showing your doctor some printed pages from this book and other sources. The sources that are likely to carry most weight are the respected medical journals. Some family doctors are opposed to home births because they worry that they will be asked to

attend the birth, and that their experience and skills will not be sufficient. It is understandable that this would concern them, as the job of a family doctor is demanding enough without the need to keep up to date on obstetric research and practice. However, your doctor will not usually be needed to attend the birth—the lead professional will normally be a qualified midwife.

In some situations your midwife might want to call upon a doctor in an emergency, but she can arrange cover from another doctor if your family doctor is not comfortable with this. Your family doctor should certainly not be required to have any specialist obstetric skills—if these are needed, you should transfer to hospital. There are some surprising misconceptions among family doctors about home birth. A recent family doctors' magazine, had an editorial explaining why many GPs did not support home births, primarily because they "do not have the time, skills or inclination to spend hours with women in labor." There is no reason why a GP should normally be expected to attend a home birth. If a respected family doctors' trade journal can be so misinformed about the doctor's role in a home birth, it would not be surprising if some individual doctors were also misinformed about what might be expected of them.

Their negative reactions to the idea of home birth might reflect the thought that their own skills would not be adequate to cope with an emergency, rather than a realistic assessment of the safety of home birth attended by a specialist midwife. There are some situations where home birth will be safer than hospital birth, and others where it will be less safe.

You might decide, after studying the evidence that home is not the best place for you to give birth this time. Just remember that it is your decision. If you feel that your doctor or midwives do not support your wish for a home birth, or you think that they are not giving you objective advice on the matter, then you could consider hiring an independent midwife.

Many independent midwives specialize in home births and are experts in the field. Data which lump planned home births together with unplanned out-of-hospital births are misleading; the unplanned out-of-hospital births are very high-risk, including teenagers who deliver their babies in secret, and unexpected rapid premature births at 28 weeks, for example.

In one study, 976 women who booked a home birth were compared with a matched group of 2,928 women planning a hospital birth. Women in the home birth group had longer labors (presumably because they would not have been accelerated with drugs or other interventions), but were less likely to have induction, caesarean, or other operative delivery, and were less likely to have complications of labor overall.

Babies in the home birth group were in better condition at birth—hospital group babies were more likely to take a while to start breathing, to need resuscitation, and to have Apgar scores under #8. Perinatal mortality was slightly higher overall in the home birth group—no explanation for this is given—but the authors of the study state that the increase was not (statistically) **significant. However, *neonatal mortality*** (after birth) **was significantly higher in the hospital group.**

Another study found no significant differences between the two groups in maternal morbidity (ill mothers)**, or fetal morbidity of mortality** (ill or sick babies)**. The only difference which the researchers found significant was that more mothers in the simulated home birth group were satisfied with the care they received.**

There is more to home birth than sympathetic care in a nicely-decorated room. For many, the benefit comes from being at home, where you feel secure, and where you are in control. Humans are territorial animals.

We do not know enough yet about the way environment affects the production of hormones necessary for birth.

For those giving birth in hospital: if providing midwife-led care and comfortable birthing rooms is just as safe as consultant care in conventional delivery rooms, and if women prefer it, then why are all women not offered this option? Cost should not be an obstacle, as midwife-led care is cheaper than consultant-led care; the savings should help to furnish a few birthing rooms. Researchers looked at data on damage to the perineum for 1068 women who delivered at home with a nurse-midwife in attendance. Most of the women—69.6%—had an 'intact perineum', defined as no tears, minor abrasions (grazes) **and small tears that were not stitched. Only 1.4%—15 women—had an episiotomy, whilst 28.9% had first- or second-degree tears. Only 0.7% had third- or fourth-degree tears. An episiotomy is equivalent to a second-degree tear, involving a cut through underlying tissue as well as skin.**

THREATS TO THE FETUS

Bathed in its warm cerebro-spinal fluid and protected by a barrier of cells, the brain is like a child in a shielded womb. And yet, the brain is not immune from the effects of many drugs. But, then, neither is a woman's placenta, the organ that surrounds the real child. Pregnant women are themselves exposed to a number of foreign substances. Cosmetics, household chemicals, fumes, prescription drugs, and over the counter drugs all get into a woman's circulatory system. Alcohol, for example, travels through both the *placental barrier* and the infant's *blood-brain barrier*. Fetal alcohol levels reach those of the drinking mother in about 15 minutes and can even be detected on the baby's breath at birth.
Anesthesia, often used to relieve the pain of mothers in labor, also gets into the infant. Ten minutes after *secobarbital* is injected into the mother, the blood levels of the anesthetic are nearly identical in both mother and newborn baby. The infants delivered this way are lethargic.

Though the baby and the mother share the same blood, the dosage of drugs are given according to the mother's body weight, which is 40 times more than the baby's. Narcotics, barbiturates, DDT, mercury, and nicotine eventually get to meet the fetus. Natural vitamin-A provided by liver, eggs, butter, cream and cod liver oil is well recognized as providing excellent protection against birth defects. Vitamin-A deficiency in pregnant mothers results in offspring with *eye defects, hydrocephalus, displaced kidneys, harelip, cleft palate* and major *malformations of the heart and large blood vessels*. Vitamin-A stores are rapidly depleted during exercise, fever and periods of stress.

Vitamin-A deficiencies are widespread and contribute to *high infant mortality, blindness, stunting, bone deformities* and *susceptibility to infection*. These occur even in communities that have access to plentiful carotenes in vegetables and fruits. It is required for cellular differentiation (determines the function that cells will have)**: this assures that the cells which are lost from natural turnover, stress, insult, injury, disease, etc. are reproduced in the exact same form as the ones being replaced.**

Growing children actually benefit from a diet that contains considerably more calories as *fat* than as *protein*. Generous amounts of vitamin-A insure healthy reproduction and offspring with attractive wide faces, straight teeth and strong sturdy bodies. This vitamin assists in normal *pregnancy, embryonic development, successful reproduction, fertility, lactation* (nursing)**, and *reproductive organ function*, *spermatogenesis*, to *adrenal, thyroid,* and other gland functions.**

Vitamin-A is important for normal eyesight, necessary for night vision. A high-fat diet that is rich in vitamin-A will result in steady, even growth, a sturdy physique and high immunity to illness. Vitamin-A-rich foods like liver, egg yolk, cream and shellfish confer resistance to infectious diseases in children and prevent cancer in adults.

Children with measles rapidly use up vitamin-A, which can result in irreversible blindness. An interval of three years between pregnancies, allows mothers to rebuild vitamin-A stores so that subsequent children will not suffer diminished vitality. *Kwashiorkor* is as much a disease of vitamin-A deficiency, leading to impaired protein absorption, as it is a result of absence of protein in the diet.

High-protein, low-fat diets are especially dangerous because protein consumption rapidly depletes vitamin-A stores. Children brought up on high-protein, low-fat diets often experience rapid growth. The results—tall, myopic, lanky individuals with crowded teeth, and poor bone structure, are commonplace in America. High-protein, low-fat diets can even cause blindness.

Cigarette smoke has long been associated with increased health risks to the unborn baby. It has been calculated that cigarette smoke contains over four thousand different chemicals, including the toxic *carbon monoxide gas, nicotine, cyanide, sulfides,* and carcinogenic (cancer-inducing) **compounds. Most of these compounds cross the human placenta and circulate in the baby's blood.**

Take for example the gas *carbon monoxide*. In the blood carbon monoxide binds to the *hemoglobin*, not allowing this protein to carry oxygen. Inside cells, it poisons the breathing processes and the vital utilization of oxygen. This is probably why babies of smokers are smaller, because their bodies do not benefit from the same amounts of oxygen. To make things even tougher, a baby's hemoglobin binds carbon monoxide tighter than the hemoglobin of adults, resulting in more damage than would have been predicted in adults.

Nicotine, a potent substance in the brain, has been shown to adversely affect the developing brain of animals. It is now evident that the above fetal damages occur not only if the mother is actively smoking, but also when she is exposed to second-hand smoke. The damage done to smokers' babies during pregnancy often is irreversible, however. Smoking during pregnancy is associated with dire consequences for the baby as a fetus, as a newborn, and even as a child. Recognition of the evidence of this damage has prompted researchers to designate it as "fetal tobacco syndrome." Miscarriage is two to three times more common in smokers, as are stillbirth due to fetal oxygen deprivation and placental abnormalities induced by the carbon monoxide and nicotine in cigarette smoke.

Smokers have a fourfold risk of having a low birth weight baby; such babies are more likely than normal-weight babies to have impaired physical, emotional, and intellectual development. The authors of a 1996 study found that women who smoked during pregnancy were 50 percent more likely to have a child with mental retardation of unknown cause than were nonsmoking women. *Sudden infant death syndrome* is significantly associated with smoking, as is impaired lung function at birth. Women who quit smoking as late as the first trimester may diminish some of these risks, but the risk of certain congenital malformations—such as cleft palate—is increased even in women who quit early in pregnancy.

BLOOD-BRAIN BARRIER

The *blood-brain barrier* is a normal mechanism that is supposed to restrict the entry of substances into the brain. The transfer of substances such as nutrients, waste products, oxygen and carbon dioxide, hormones, and poisons in and out of the cells of the body, is accomplished through the smallest of blood vessels, the capillaries. The capillaries of the brain have a special structural design to provide extra protection for the critical brain cells. Unlike capillaries elsewhere in the body, the cells lining the brain capillaries are overlapped and less porous. This special structure prevents many substances from passing into or out of the brain that would easily pass to and from other body cells.

Substances that can dissolve in fats readily penetrate the membranes of cells, as these membranes have large amounts of fat-containing molecules. Elemental mercury vapor and methylmercury are fat-soluble and therefore easily penetrate cell membranes, including those of the placenta and the blood-brain barrier. This barrier does, however, selectively allow passage of certain smaller water-soluble substances necessary to the brain, such as glucose and essential amino acids. Mercury vapor has no electrical charge (non-ionic) and is fat soluble, which accounts for its extremely potent toxicity in the elemental vapor form.

The oxidation of mercury vapor occurs in the blood and in the body cells. Ionic mercury is the harmful form of mercury because it is now chemically active and can readily combine with body substances, exerting its toxic influence in that manner. Elemental mercury vapor, after entering the blood stream, is oxidized through the *mercurous* into the *mercuric ion*. Completion of these reactions requires several minutes; because of this delay, elemental mercury exists in the blood for a sufficiently long time to reach all tissues and organs. In its elemental form, mercury easily penetrates the blood-brain barrier and infiltrates nerve cells, where final oxidation proceeds.

By easily overcoming the *blood-brain* and *placental* barriers, elemental mercury is particularly dangerous during long-term or chronic exposures, representing a potentially serious hazard in many occupations. Once mercury has penetrated the blood-brain barrier, its oxidation to the *ionic* form is completed. This ionic mercury now has an electrical charge and is no longer fat soluble. Ionic mercury is very active chemically and readily combines with body substances, thereby exerting its toxic effect. This ionic mercury can no longer easily penetrate the blood-brain barrier and is very resistant to removal from the brain.

Mercury is retained in brain tissue for extremely long periods of time. Autopsy studies have demonstrated a definite correlation between levels of mercury found in the brain and the number and surfaces of dental amalgam fillings present. When mercury ions are absorbed into the bloodstream, though of minute amounts (less than 1.0 parts per million)**, they are capable of impairing the blood-brain system within 4-6 hours, leading to an extravasation of normally barred plasma solutes, allowing passage into the brain of harmful substances from the blood that otherwise would be denied entry.**

Mercury will not only damage the brain, but it will also increase exposure of the brain to other harmful substances in the blood. The blood-brain barrier is also an active site for the regulation of the uptake of metabolites from the blood to the nervous system. The impairment of the blood-brain barrier, together with the possible inhibition of certain associated enzymes by the mercury, is probably responsible for the great reduction of the uptake of amino acids and other metabolites by the nervous system after mercury administration.

Amino acids are the building blocks of proteins which are the structural materials used to construct the cells of the body, as well physiological materials such as enzymes and hormones. There is no scientific evidence that brain cells can be regenerated. This is why mercury damage to the brain is permanent and irreversible. Since mercury vapor readily traverses the placental membrane, the oxidation of mercury vapor in the fetal blood or at the fetal blood-brain barrier itself no doubt results in damage to the fetal blood-brain barrier. But the damage to the fetal blood-brain barrier may be even more important, preventing the uptake of vital amino acids for the construction of the irreplaceable brain cells. There is absolutely no doubt that exposure to methylmercury in pregnant women presents a serious threat to the fetus.

A number of studies have described the effects on infants of prenatal exposure to methylmercury, while the exposed pregnant mothers exhibited little or no observable signs or symptoms from exposure. The neurological effects on these infants were as severe as cerebral palsy and even death, but less easily recognizable symptoms were more common, such as delayed mental development, delayed speech

development, delayed motor development, and learning deficits. The major influence of mercury vapor on the fetus is not the promotion of birth defects, but rather the toxic effect on the body cells, particularly those of the brain. In spite of the wealth of information strongly demonstrating the potential risk of elemental mercury vapor to the unborn child, the scientific community has not yet seen fit to responsibly investigate this awesome question.

THE PLACENTA

The circulatory systems of the mother and fetus are separated by a very thin membrane in the placenta. The purpose of this membrane is to ensure that there is no actual mixing of maternal blood with the fetal blood. This placental membrane was formerly called the *placental barrier*. Its function was assumed to be one of protecting the fetus from possible damage from any of the potentially toxic drugs or substances that might be present in the mother's blood. The *Thalidomide* disaster in 1961 demonstrated that the passage of toxic substances from mother to fetus did occur and could result in tragic birth defects and deformities.

Mercury reduces the blood's ability to carry oxygen and, although fetal blood flow might be normal, the reduced oxygen content of the blood would parallel the hypoxic condition. Mercury has the ability to affect the balance or status of most of the body's essential nutrients. No scientific study has ever addressed the relationship between chronic mercury exposure and placental weight/birth weight. From the time of fertilization until birth, the offspring is dependent upon maternal sources for all nutrition. There are four major areas that are considered to be critical or determinants in the outcome of fetal development:

(1) the mother's nutritional status.
(2) the structural and functional quality of the placenta.
(3) the genetic makeup of the offspring.
(4) the presence of physical, chemical, or mechanical insults to mother and child during pregnancy. Mercury can also affect the satisfactory outcome of fetal development in all four of these areas.

A possibly contributory factor in cadmium and mercury fetotoxicity may be an effect on the *transmembrane transport* of nutrients, such as amino acids, across the placenta to the fetus. An inhibition of nutrient transport may cause fetal death, congenital malformations, or growth retardation. The toxic effects of cadmium and mercury may be occurring in the placenta where the presence of these metals might be preventing the passage of required nutrients to the embryo/fetus. The placental membrane will stop many substances. However, it is made of fat molecules, and mercury vapor and methylmercury, being fat soluble will penetrate the membrane.

The lack of knowledge concerning the mechanisms of mercury toxicity as they relate to the human reproductive cycle is compounded by the scarcity of scientific studies investigating the effects of mercury vapor. The majority of scientific studies on mercury have dealt with methylmercury or inorganic mercury. Very little attention has been paid to the threat posed by low-level chronic exposures to toxic metals.

A great deal of the available scientific data was derived from acute exposures where a large single injection of the toxic metal being investigated was administered and the results examined. While there is no barrier preventing the transfer of mercury, there is a slight barrier to the transfer of lead, and the greatest barrier is to the transfer of cadmium. Mercury is mercury once it reaches the body's cells, and mercury vapor enters the body and its cells far more readily than most other forms of mercury.

Researchers have found that the placental transfer of mercury varies with the chemical form of mercury; that is, *methylmercury* is more readily transferable than *mercuric nitrate*. The mercury concentrations in the placenta and the infant's hair are directly related to the infant's body burden of mercury. Total mercury and methylmercury, cadmium, and iron were *higher* in cord blood than in maternal blood, whereas copper and

zinc were *lower*. Significant positive correlations were observed between maternal and cord blood with regard to total mercury and methylmercury, lead, cadmium, and manganese contents.

Significant correlations were also observed between many pairs of metals, particularly in the umbilical cord and its blood. These results suggest a more serious and complicated influence of heavy metals on *infants* than their *mothers*. The presence of selenium in the placenta can modify and greatly reduce the transplacental passage of mercury to the embryo/fetus. Environmental chemicals taken into the body, may considerably increase the fetal body burden of mercury and its concentration in certain tissues like the liver or thyroid, after mercury vapor inhalation.

Most scientists and researchers are ignoring elemental mercury vapor in their research and in their recommendations for future research areas considered critical. These researchers either do not know or have forgotten that once in the blood, elemental mercury vapor remains in its elemental form for minutes, during which time it can penetrate most tissues easily.

It is this capability that permits it to also to readily move through the placenta to the embryo or fetus, as does organic mercury. Most of the published research has assumed that the only exposure to elemental mercury vapor is from a minute amount contained in the atmosphere. Most research therefore has only focused on probable exposure from dietary mercury, which is usually in the form of organic methylmercury. A glaring omission has been made by not considering the exposure to elemental mercury vapor from mercury amalgam dental fillings.

MERCURY
Chronic inhalation of mercury vapor from amalgam fillings for twenty years or more can result in accumulation of pathologic quantities of mercury in the brain and other critical organs and tissues. Human autopsy studies of accident victims have shown a positive correlation between the numbers of mercury amalgam dental fillings and the concentration of mercury in the brain. Other human autopsy studies have shown accumulation of mercury in the kidneys, liver, heart, muscles, lungs, spleen, and pancreas, as well as specific accumulations of mercury in the pituitary.

The onset of clinically observable signs or symptoms of mercury toxicity may take as long as 20-30 years to appear, depending on a person's biochemical individuality. Female dental personnel have higher rates of spontaneous abortion, raised incidence of premature labor and elevated perinatal mortality and a high incidence of *spina bifida* births, than females in other professions. Folic acid deficiency has been associated with spina bifida, and mercury is a known inhibitor of folate metabolism in the body. There is a positive correlation between mercury levels, reproductive failures, and menstrual disorders. About 8 percent of U.S. women of childbearing age have enough mercury in their blood to be at risk. The National Academy of Sciences estimates that 60,000 newborns a year could be at risk of learning disabilities because of mercury their mothers absorbed during pregnancy.

A special relationship regarding mercury distribution exists between the mother and the fetus. Mercury has been shown to pass the placental membrane in pregnant women and cause permanent damage to the brain of a developing baby. Much higher levels of methyl mercury have been reported in *cord* blood versus that contained in *maternal* blood. There is a much higher accumulation of mercury in the fetal brain tissue than in the maternal brain tissue. Mercury is one of the *sulfhydryl-reactive* metals.

Mercury will steal sulfur groups from biologically active proteins and inactivate them. Many of these proteins are enzymes, hormones, or cell receptors, and their destruction wreaks havoc on the body's well-organized systems, such as the body's energy-producing system. Mercury also destroys the mucous

membrane of the gastrointestinal tract, one of our most powerful immune defenses. It is especially destructive against the kidneys, liver and brain.

One amalgam filling can place as much as 500 mg of mercury, the most toxic, nonradioactive metal known to man, 5 centimeters from your child's brain! Silver mercury fillings emit mercury vapor at a rate of 2.8 micrograms per cubic meter of air breathed in the resting state, and their emission rate accelerates dramatically (as high as 49 micrograms) **after minimal mechanical, chemical, and temperature stimulations. It is also very volatile, which means that "metallic" mercury gives off *mercury vapor* when agitated, compressed or exposed to increases in temperature.**

Vapor detectors, held above amalgams, revealed an increase from 3 micrograms to over 500 micrograms, ten seconds after a hot drink is swallowed. Mercury vapor–which is colorless, tasteless and odorless–when inhaled into the lungs can pass into your blood stream for distribution to all body tissues. Mercury vapor inhaled into the lungs, is absorbed almost 100 percent, and immediately passes into the bloodstream. In its *elemental* mercury vapor state, it takes approximately four minutes before it is converted or oxidized into an *ionic* state. While in its elemental form, mercury vapor is lipid (fat) **soluble and readily passes through the blood-brain barrier and the placental membrane. The estimated average daily intake of mercury from dental amalgams is 3.8 - 21 micrograms per day. Two-thirds of the body burden of mercury is derived from the mercury vapor released from amalgams.**

The static, unstimulated release of mercury vapor from amalgam fillings, which goes on 24 hours a day, 365 days a year, is a major contributor to total mercury body burden. Scientific data clearly demonstrates that mercury, even in small amounts, can damage the brain, heart, lungs, liver, kidneys, thyroid gland, pituitary gland, adrenal glands, blood cells, enzymes and hormones, and suppresses the body's immune system. One part per million (PPM) will alter cell membrane function. Stopping cell growth or reproduction can occur at levels as low as 0.2 ppm. One ppm *ionic* mercury will substantially reduce the activity of *succinic dehydrogenase*, *ATPase*, and *alkaline phosphatase* in the brain. *Glioma* brain cells are destroyed at 0.2-ppm ionic mercury, and only 0.04-ppm of *methylmercury*.

Even the most resistant parts of the central nervous system are destroyed at 2.5-ppm. Ten ppm ionic mercury will induce cancer-producing DNA-DNA *cross-links*. This amount can also cause genetic defects. Only 2-ppm of the inorganic form will inhibit the rejoining of single-strand breaks in DNA. The blood-brain barrier loses its protective selectivity at 1-ppm within hours of administration of either the *ionic* form or *methylmercury*. Mercury exposure leads to hormone and immune disturbances that can reduce fertility. Reduced fertility among dental assistants with occupational exposure to mercury is a common problem. Many of the female fertility cycle events are related to *posterior pituitary* activity, so amalgam is another factor that can disturb fertility as well as non-pregnant functions. Estrogen function can also be influenced by amalgam. Lubricated *condoms* and birth control *creams* or *gels* have mercury as the primary spermicide. The reason it's unnecessary for the word *mercury* to appear on the label is that it's assumed that 'everyone knows mercury is in there.' The uterus is a collection center for mercury. Hal Huggins reported that more than 90% of the imbalances, created by sex hormone disturbances, corrected within a few weeks of amalgam removal. His patients noted differences in fertility, less pain during periods, relief from endometriosis, and a trend toward optimization of the days of menstrual flow. PMS is one of the most common symptoms to change after removal.

***Amenorrhea*, or the complete absence of a menstrual flow, responds to amalgam removal. This is usually in women in their twenties or thirties. Even in women who have gone through a sort of premature menopause in their early forties, the periods may start up again for a couple of years. This has resulted in surprise pregnancies. Women should avoid pregnancy for at least six months after amalgam removal.**

EPA WARNING TO PREGNANT WOMEN

After analyzing an Environmental Protection Agency (EPA) **report, the environmental coalition, *Clear the Air*, found more than half the fish living in lakes and reservoirs have excessive levels of mercury. So much so, these fish aren't safe for children and child-bearing women to eat. The EPA report studied 268 chemicals from some 2,500 fish living in 500 lakes and reservoirs around the United States. Environmental groups like Clear the Air analyzed the EPA report to highlight more information about contamination, states suffering from high levels of contamination and the companies responsible for the problem. Clear the Air is pressing the EPA to set tougher mercury emissions standards for coal-fired power plants than the current federal administration wants. Although new standards for power plants are to be finalized next spring, the EPA isn't expected to complete their final survey until 2006.**

Among the EPA findings:

- **Texas power plants produce the most mercury emissions annually. Five of the 10 leading power plants with the highest mercury emissions are located in the Lone Star State.**
- **More than three-quarters of the samples surpassed the safe limit for children under 3 eating fish twice a week and more than half the women of an average weight who eat a similar amount. Even with the controls, Clear the Air claims they aren't nearly enough. EPA defended its findings, believing mercury to be a serious public health issue and that's why they are working with the FDA to provide warnings to consumers about fish consumption and mercury.**

Earlier this year, both agencies issued a joint warning that advised women in their child-bearing years and children not to eat shark, swordfish and king mackerel, fish known to have high levels of mercury. Industry groups defended EPA's stance against the environmental coalition's findings, arguing coal-fired power plants make up less than 1 percent of worldwide mercury emissions. Although an independent analyst from another environmental organization agreed with that number, coal-fired power plants account for 41% of all mercury emissions (some 90,000 pounds of mercury) **and 80% in some regions including the Great Lakes and Northeast.**

FDA SOFTENS WARNING TO PREGNANT WOMEN

***The FDA recommends pregnant women avoid: swordfish, shark, king mackerel,* and *tilefish.* The Environmental Working Group says pregnant women should avoid: *swordfish, shark, king mackerel, tilefish, tuna steaks, sea bass, gulf coast oysters, marlin, halibut, pike, walleye, white croaker*, and *largemouth bass*. The Food and Drug Administration softened its warning to pregnant women about the dangers of mercury in some fish, notably tuna, under industry pressure, an environmental group charges in a report released in 2002. A 2000 National Academy of Sciences report estimated 60,000 women nationwide are putting their fetuses "at risk" of brain damage because of mercury in the fish they eat. In 2001, the FDA warned pregnant women not to eat shark, swordfish, king mackerel or tilefish. But the agency said they could eat up to 12 ounces— equal to two cans of tuna—of any other fish weekly, potentially exposing them to mercury levels that the NAS report deemed dangerous.**

The Environmental Working Group (EWG), an organization best known for raising concerns about pesticides, obtained 1,036 pages of FDA transcripts from focus group meetings with consumers conducted two years ago to test safety messages about mercury and fish. EWG officials say FDA scientists told participants that following the agency's advice wouldn't protect a fetus from harm. "What we see in the FDA documents is an agency in disarray," says Laura Chapin of EWG. The focus group meetings show the FDA was considering a broader warning for pregnant women that would limit tuna steak consumption to three times monthly and canned tuna to 9 ounces weekly. Some women in the focus groups said they ate a can of tuna daily while pregnant.

Of the five most popular seafood—shrimp, trout, salmon and catfish are the others— only tuna has worrisome mercury levels, EWG says. In one focus group transcript, an FDA scientist warns that a woman should eat only one can of tuna a week. In another, the same scientist says, "The action levels we have in place are not protective enough for this— the fetuses." But Chapin's group says that after three meetings with the seafood industry, the FDA opted only to suggest that pregnant women eat fish in moderation. About 40 states have separate mercury-level fish warnings to pregnant women. The EPA recommends pregnant women and young children eat only small amounts of fresh-caught fish once a week.

Nutritional Deficiencies

Pantothenic acid deficiency causes edema and cleft palate. Folic acid deficiency causes cleft lip, cleft palate, oblique facial clefts, and atrophy of nostrils. Vitamin C deficiency causes diminished bone formation, hemorrhages in the bone marrow, and formation of medullary substances. Vitamin E deficiency causes *hydrocephalus, scoliosis, agnathous, cleft mandible, receding maxilla and mandibles, cleft lip, cleft palate*, and *harelip*. Mercury affects the maternal status of each of these nutrients. When the effects of lead and alcohol are added to those of mercury, the potential effects on the embryo and fetus can be devastating.

SIDS

Both national and international studies have shown vaccination to be a cause of *SIDS* (Sudden Infant Death Syndrome). Estimates range from 5,000 to 10,000 cases each year in the US. One study found the peak incidence of SIDS occurred at the ages of *two* and *four* months in the US—precisely when the first two routine immunizations are given., while another found a clear pattern of correlation extending three weeks after immunization. Another study found that 3,000 children die within four days of vaccination each year in the US, while yet another researcher's studies led to the conclusion that half of SIDS cases—that would be 2,500 to 5,000 infant deaths in the US each year—are caused by vaccines. In the mid-1970s the Japanese raised their vaccination age from *two months* to *two years*; their incidence of SIDS dropped dramatically. In spite of this, the US medical community has chosen a posture of denial. Coroners refuse to check the vaccination status of SIDS victims, and unsuspecting families continue to pay the price, *unaware* of the dangers and *denied* the right to make a choice.

FLUORIDE

***Sodium fluoride* is the most violent protoplasmic poison known to science. The National Library of Medicine's computerized data service on toxic substances rates fluorides 4-5 (very toxic–extremely toxic) on a scale of five. Many scientific papers exist showing fluoride to be both mutagenic and carcinogenic. The weight of the evidence from studies on mutagenic effects of fluoride indicate that it is mutagenic (causes mutations) at low concentrations, and there appears to be virtually no margin of safety for fluoride. Many psychoactive drugs are fluorinated. The primary ingredients of most psychoactive drugs suppress enzyme production, and the fluorine ion is also an enzyme inhibitor. So now we have fluoride in our water–mass-medication of the population. Fluoride has been added to toothpaste, mouth rinses, and dental floss. Dentists treat the teeth topically with fluoride and doctors prescribe fluoride supplements. And of course, if fluoride is in the water, it's in the food chain. Food is irrigated with fluoridated water, washed with fluoridated water, and processed with fluoridated water, so we're consuming much more fluoride than we think.**

Independent lab reports show high levels in common products: .98 to 1.2 ppm in Coca-Cola, 1 ppm in Minute Maid orange juice, 2.1 ppm in Fruit Loops, 10 ppm in *Wheaties*, 6.8 ppm in *Gerber's* white grape juice which is often used as a sweetener in baby foods. (Grapes are commonly sprayed with an insecticide that contains fluoride. A 1996 study published in the *Journal of the American Dental Association* warned parents to limit their children's intake of juices due to excessive fluoride content.) In fact, according to a

1993 government survey, children in non-fluoridated communities are already receiving at least 3 times the amount of fluoride recommended for total consumption, while children in fluoridated communities are receiving 4.6 to 7 times the recommended amount.

The National Research Council of Canada has done extensive research on the many environmental sources of fluorides and the multiple avenues by which they enter the human food chain. Most packaged foods are processed with fluoridated water, and many fruits and vegetables contain fluorides in pesticide and fertilizer residues. Foods such as sardines, tea, lettuce, spinach, and others have particularly high fluoride contents. Many medications, especially tranquilizers (Prozac is 90% fluoride), are composed of large amounts of fluoride. People taking such drugs might exceed 5 mgs. in just one prescribed application. If fluoride is ingested, even though a person is eating a nutritious diet and taking the best supplements in the world, all the good nutrition is rendered almost completely ineffective and development or advancement of degenerative disease will ensue.

The harmful effects of fluoride have been known for over one hundred years. Calcium is the main structural mineral in the body. *Osteoporosis* is a result of calcium loss in the skeleton. During the last trimester of pregnancy, between 200 and 300 mg. of calcium is deposited every day in the skeleton of the fetus. Pregnant women are given synthetic prenatal vitamins with added fluoride. Biochemical research has established that chemical poisons, like fluoride, form hydrogen bonds with protein *amide* groups together. Since "DNA" strands are connected by hydrogen bonds, fluoride will damage chromosomes. Because its electro-negativity is higher than that of any other element, fluorine occurs with a positive oxidation state in any compound.

Fluoridated areas have an exceptional number of stillbirths. Fluoride passes through the placenta. Dr. Ionel Rapaport, University of Wisconsin, carried out two studies showing that *mongolism*, a birth defect characterized by mental and physical retardation, occurs more often in areas where there is a relatively high fluoride content in the water. The summer 1959 issue of *Clinical Physiology* reported on page 96, a study done by experimental embryologist James D. Eberrt and published in *Scientific American* March 1959. It relates: "...he found that sodium fluoride in low concentrations blocked, almost completely, the regions destined to form heart muscle but left the developing brain and spinal cord intact." He correlated this with the high incidence of *ventricular septal defect*, which was relatively uncommon before the 1950s, and fluoridation. The Pituitary gland takes up several times as much fluorine as any other soft tissue, which is especially dangerous, because the pituitary is the master gland of the endocrine system of the body.

X-RAYS

In 1927, Hermann J. Muller had demonstrated that x-rays caused inheritable genetic damage, and he received a Nobel Prize for his efforts. In 1956, Alice Stewart showed that a single X-ray of a fetus in the womb would double the likelihood of childhood leukemia. Medical X-rays accounted for 90% of all radiation from human-created sources.