Life in the Womb: Dangers and Opportunities*

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Full Text: Headnote ABSTRACT: As scientific knowledge of life before birth continues to increase, the prenate is revealed to be more sensitive and capable than we ever thought possible, opening up new opportunities for growth and ideal communications between babies and their mothers and fathers. Working against this force for good, the world environment becomes ever more toxic and invasive bringing hazards directly into the womb. A mother's own stresses and emotions constitute yet another environmental hazard. At stake is the future health of individual persons, the stability of families, and the peace of society. INTRODUCTION We are rapidly accumulating research which reveals the true dimensions of life before birth. Through many windows of observation, we can now see-for the first time in human history-what is actually happening in the womb. There is good news and bad news. We can no longer think that the placenta can protect the prenate from anything bad going on in the mother's body, or that the mother's body can protect the prenate from bad things going on in the world. Mother and baby are one, facing together the perils of air, water, and earth compromised by the toxic residues of modern chemistry and physics. Parents are perhaps the last ones to learn-and their children the first ones to suffer-these tragic realities of modern life. This is bad news. At the same time, research is revealing the true capacities of the unborn, their precocious sensory development, their exquisite sensitivity and responsiveness, and their ability to learn from what is happening in the world of mother and father. This should be good news. Of course, the prenatal environment can be a blessing or a curse depending on the parents. The opportunities are surprising. In this presentation, I will first emphasize the supreme importance of the stage of life between conception and birth as a time which is formative. As everyone knows, it is a time when the physical body is formed, including all the essential organs, the hormonal glands, the immune system, and the nervous system-which together determine to such a great degree the quality of a person's life. A well-formed body is surely a parent's greatest gift to a child. Secondly, I will share some of the research which tells us that emotional and mental patterns are also being formed from conception to birth. Most of the world is not yet awake to this new reality.1 Parents can help or hinder development, depending on their knowledge of the remarkably alert prenate who is growing inside the mother. Scientific discoveries can now be used to support the intuitive efforts of parents to begin parenting at conception, rather than at birth, to maximize their love and assistance to their developing child. In the third section of this paper, I will summarize the findings from prenatal enrichment programs hi other parts of the world, which like yours here in Valencia, have been subjected to scientific scrutiny. FORMATION OF THE PHYSICAL BODY Parents provide the immediate physical environment which will determine whether the baby's equipment for living will be poor, average, or maximum in potential development. Note well: As the foundations of physical life are laid, each new part is built upon the previous one so that both limitations and advantages are preserved. Although some degree of "plasticity" is possible in the developing system, the original foundations will never be replaced. Parents who wait to think about this until after their child is born will be too late. In the late 20th Century, parents face hazards of reproduction which are both old and new.2 These include bacteria and viruses, nutritional deficiencies, an army of industrial chemicals, ever-present stimulants and sedatives like nicotine, caffeine, and alcohol, tempting "street" drugs like opiates and amphetamines, drugs prescribed by physicians, and various forms of radiation including electromagnetic radiation from electric blankets and from ultrasound when it is used for entertainment in prenatal medical visits. Because of all this environmental disturbance, the safety and sanctity of the womb has been forever changed. This is bad news. Although philosophers like Plato long ago warned about the

poisonous effects of alcohol on human gestation, our modern awakening to birth defects came in the 1940's with the discovery that if a pregnant woman became ill in the first trimester with rubella ("German measles" we called it), her child would probably be born with defective heart valves. I remember when this knowledge prompted mothers to hold "measles parties" at which their daughters could deliberately catch the disease (and develop the antibodies) at an early age when the symptoms were mild and the effects harmless. A new discovery is that exposure to influenza early in pregnancy disturbs brain development and contributes to schizophrenia, the most common form of psychosis. Since the rubella discovery over 50 years ago, many bacteria and viruses have been identified which can cause physical malformations in utero.3 A mother's diet is another factor in birth defects. Science has (slowly) found a connection between deficiencies of folic acid and the malformations anencephaly and spina bifida-defects which occur when the neural tube fails to close 18 to 26 days after conception. If the error occurs at the top end of the tube, the baby will be born without a brain: If the lower section fails to close, the child is born with an open spine, a condition which usually means living in a wheelchair or on crutches. Famine conditions create widespread birth defects. Long-term studies of children born to mothers who were starved in early pregnancy show damage to the mechanisms of appetite control and growth regulation, resulting in obesity in the offspring.4 Famines produce increased rates of diabetes and schizophrenia, partly through zinc deficiency which contributes to both diseases.6 Sub-optimal nutrition is one of the factors behind the rising number of low weight babies-an alarming trend. Such babies are not simply "thin" and needing to be fattened. Construction of their organs and brains are correspondingly "thin" and vulnerable to disease and malfunction. A baby cannot reconstruct itself to make up for shortages of building supplies during construction any more than you can put more flour into a loaf of bread after it is baked. Low-weight babies face the many hazards of premature birth and may have to run the gauntlet of neonatal intensive care. In the Age of Chemistry, reproductive perils have multiplied.6 Modern parents face a cornucopia of industrial chemicals which are generally invisible, but nevertheless reach them in the workplace, the marketplace, and in the home. These have ominous names: carcinogens (chemicals that cross the placenta to promote childhood cancers), teratogens (chemicals that cause abortion, stillbirth, growth retardation and birth defects), mutagens (chemicals that damage genes and chromosomes which carry genetic codes), and other toxic gases and radiations which reduce fertility. Certain people are particularly at risk of damage from chemicals: firemen, painters, farmers, printers, electronic equipment operators, vehicle manufacturers, dentists, and dental assistants.7 In industrial societies, this list will undoubtedly expand. Ingestion of alcohol, nicotine, and "street" drugs such as cocaine, heroin, amphetamines, marijuana, and methadone all damage prenatal growth. Even caffeine has an effect on fetal behavior. Ironically, medical drugs must be added to the list of dangers.8 You will no doubt recall how thalidomide produced some 5,000 grossly distorted fetuses across Europe in the 1960's. Later, the prescription of the estrogen steroid DES for pregnant women was ultimately recognized as carcinogenic to female offspring. More seriously, recent studies show the majority of those affected were changed in their sexual orientation to bisexual or homosexual-proving that sexual development is a fragile process.9 (In the world of turtles, just painting an egg with PCB's will change its sex.) At certain times during pregnancy, even common medicines like aspirin can be hazardous. In fact, the effect of most drugs on mother and baby is still unknown-a fact that has made most physicians cautious and many parents protective.10 Apart from the dangers of drugs, medical ultrasound technology, when overused, may have negative consequences. In a large study in Australia, mothers who had five routine ultrasounds, instead of just one, produced lower weight babies than those who had just one ultrasound.11 Scientists are warning that the most recent threat to reproductive health is the accumulation of abnormally high concentrations of estrogenic compounds in the public environment. Estrogen, in its natural place, in the right proportions, in the correct sequences plays many roles in sexual development, but when it is loose in the environment, it can play havoc with male and female sexuality, fertility, sperm morphology, semen production, and may contribute to cancer of sexual organs like the testicles, cervix, and breast.12 Sources of estrogenic compounds include all of the following: direct prescription of synthetic estrogen,

estrogens in contraceptive pills, estrogens in food and dairy products, and estrogen in a growing list of pesticides and pollutants which reach us every day in air, food, and water. Just a few examples: Among the pollutants which mimic estrogen are those called APE's (alkylphenol polyethoxylates) which are widely used in detergents. These end up in water supplies. Scientists at the University of Granada have learned that the chemical bisphenol-A is also estrogenic. It is used to coat food cans, bottle tops, and water pipes! How easily these chemicals sneak into our lives! Although scientists have generally thought the estrogenic effect of these ubiquitous substances was small, new evidence suggests that when they are combined, their estrogenic potency can be magnified as much as a thousand times.18 Advances in our understanding of brain development have removed much of the mystery surrounding sexual development. During gestation, brain development and sexual development are linked. The brain is sexualized in stages by the delicate balance and flow of powerful hormones like androgen and estrogen.14 Deficiencies and excesses in flow-partly determined by psychosocial stressors-result in natural sexual variations. Two periods of high vulnerability for upset have been identified as the year prior to conception, as well as the second trimester.15 Even the neurotransmitters which mediate between genes, sexual hormones, the environment, and stress are themselves affected by both genes and the environment. It is from this dynamic matrix that our sexual identity and orientation is formed before birth! Formation of Emotional and Mental Patterns Over the past three decades, researchers have turned increasing attention toward infants, including newborns and prenates. The new discoveries make it necessary to change our view of infants.16 Research has leaped forward through the use of sonography to verify what is happening in the womb. I will cite some of the more important findings as a basis for understanding the communications that are possible with babies in the womb. Undergirding life in the womb is a sensory system that develops early and works well in utero. The sense of touch is operative in the second month and progresses rapidly. Motor activity and expression is remarkably early: By 10 to 15 weeks, we can see a nearly complete repertoire of bodily movements.17 At this early date, nearly all prenates will move in response to a mother's cough or to a mother's laugh. These early movements are spontaneous and graceful, not merely reflexive or mechanical, and can be viewed as a vehicle for interest and self-expression. The prenate's auditory system provides a continuous stream of stimulation throughout gestation. First regular reactions to sound are confirmed via ultrasound by at least 16 weeks, which is almost two months before the ear is fully formed.18 Similarly, visual activities begin long before the eyes are completed and well before the eyes open around week 26. Taste receptors are already in service by 14 weeks and are intimately linked to developments in the sense of smell. Babies are gaining experience from their chemoreceptors long before birth. All things considered, the prenate is well equipped for life in the womb. Ultrasound reveals extraordinary perception by the fetus during the procedure of amniocentesis. Mothers (and sometimes fathers) watch while a needle enters the womb to withdraw a sample of fluid. At times, viewers have been startled to see a fetus attack the needle barrel repeatedly-an action which is hard to explain at around 16 weeks when amniocentesis is usually done. In these scenes, a prenate displays acute awareness, self-defense, aggression, fear and fearlessness, muscle coordination, and identification of a threatening target (the needle)-all while the eyelids are shut. Are babies using some combination of vision and hearing? And how do they know the needle should be attacked? Precocious development is also plainly visible in the interactions of twins at only 20 weeks of gestation. Ultrasound observations from various parts of the world have reported affectionate, friendly behavior, playing cheek to cheek, kissing, aggressive punching, pushing, and kicking-behaviors which reflect a spectrum of feelings.19 This social and emotional behavior of twins relating to each other halfway through gestation has been a total surprise in psychology and medicine. Emotions in utero were considered to be impossible. Even pain was considered impossible-before, during, and after birth. In psychotherapy, clients sometimes recover the memory of a twin dying in utero, one who had totally disappeared by the time of birth. Statistically, there are many less twin births than twin gestations: Chances of losing a twin partner may be as high as 50%. Pathologists call it the "vanishing twin" phenomenon.20 The dying twin is usually reabsorbed, leaving no trace

at delivery so that knowledge of the twin's death may exist only in the survivor. Considering the intimacy displayed by twins under ultrasound, it seems unlikely that a twin's death could pass without notice or without emotions. Just as prenates form a special attachment to their twins, they can, of course, form positive or negative attachments to their parents. Studies show prenates like hearing the voices of their parents, especially the mother's voice which is a constant and central feature of uterine life: They will listen for both mother's and father's voices at birth. In the womb, prenates develop a preference for the mother's native language: They can discriminate this language from another language. In the womb, babies learn intonations, rhythms, and other speech patterns of the mother's voice, something which can be seen in matching spectrographs as early as 26 weeks.21 Not surprising, prenates are keenly aware of their parents' sexual experiences: Their hearts fluctuate wildly in precise synchrony with male and female orgasms. We must assume they can tell the difference between making love and making war. Prenates show appropriate hyperactivity in response to danger, to sounds of danger in war movies, and to the loud sounds of rock music. They will empty their bladders in response to the high stress of a sudden loud sound.22 Ultrasound captured a fetus after the mother received an electric shock while ironing. It sat upright in the womb and remained immobile for two days before becoming active again. A more relaxed fetus was seen lounging, hands behind his head, as if resting in a hammock. Prenates are finely tuned communicators. Their heart activity reveals a preference for speech aimed directly to them. Their heart rates go predictably up or down as they are addressed directly, then indirectly, and directly again. This preference continues after birth. By communicating directly with prenates, parents have taught them to kick on cue, to kick where touched, or to kick in a circle-perhaps as early as 25 weeks gestational age. Obstetricians in Phoenix, Arizona, have been talking to babies in breech midline spine position and getting them to turn for easier delivery.23 They have used a machine, an electro-larynx, to do this, possibly because they were too shy to use their own voices. I have known cases where nurses, midwives, and doctors were successful in speaking very strongly, but in ordinary language, to babies in critical situations. I think if we all started talking to babies, we would find the babies surprisingly cooperative. (Of course, some of your colleagues will think you are crazy.) Judging from their reactions, babies seem to sense when they are wanted or unwanted. In a study of 8,000 pregnant women, divided into wanted and unwanted pregnancies, researchers made the alarming discovery that the unwanted babies had almost two and one half times the risk of dying in the first 28 days of life!24 A cross-cultural study of "planned" and "unplanned" babies in the US and Greece showed that at three months of age, the planned babies were more attached to their mothers and were doing better cognitively than the unplanned babies were.25 Results of this kind are consistent with the findings in the largest European study of children of unwanted pregnancies.26 These were children of mothers who were denied abortion (some twice), whose pregnancies were undesired both at the beginning and during the pregnancy. In this controlled study, infant mortality was significantly higher among the unwanted children, and they had higher rates of all types of handicaps such as cerebral palsy, mental retardation, and minimal brain dysfunction, as well as other types of physical and emotional problems. They were breastfed for a shorter length of time. In the Prague cohort, which provided matched-pair controls, mothers more often described their unwanted preschool children as naughty, stubborn, and bad-tempered. In school, teachers rated them more often as hyperactive and less sociable than their classmates who were wanted. More of the unwanted reported feeling rejected by their mothers, had problems relating to both parents, and reported more disappointments in their own love lives. When they married, they rated their marriages as less satisfying, their pregnancies as less welcome, and they required more time to develop a close relationship with their babies in the womb than did the controls. Prenatal conditioning had a very long life, finally passing on to the next generation! Babies taken out of the womb too soon and thrust into intensive care thrive on sounds they remember from the womb. In experiments, babies have responded to the sound of heartbeats playing in the nursery by gaining weight more rapidly than babies did without the sound of heartbeats. Intubated, monitored, and agitated premies improved in behavior state and absorbed more oxygen when hearing recordings of intrauterine sounds and sounds of

women singing, as they would have sounded inside the womb.27 Others in intensive care nurseries responded well to a special crib (Nature's Cradle) providing intrauterine sounds, 2-plane rotation movements mimicking a mother walking, tactile sensations from head bolster rolls, and light controls. These babies, apparently recalling normal conditions, improved their growth, breathing, heart rate, and sleep patterns: They cried less, and were less fussy than babies in regular cribs.28 Premies notice when a "breathing" teddy bear is placed in the crib near them.29 They move steadily toward the bear, make contact with it, and adjust their own breathing rate in sleep as a result of hearing the bear's slower breathing rate. After being with the breathing bears, they spent more time in quiet sleep, showed significantly fewer startles, and smiled more often during sleep. They paid no attention to ordinary teddy bears and were unaffected by them. Numerous experiments have made it clear that prenates listen to music and stories and can identify them later. (For a review, see Busnell et al., 1992.)30 These provide further evidence of memory and learning. When mothers sang a particular lullaby to them in the womb, the babies preferred this lullaby to ones they had not heard. If they had heard the bassoon solo from Prokoviev's "Peter and the Wolf" or "Mary Had A Little Lamb," or even a repeated statement like "This is your father," they gave special attention to these sounds at birth. Prenates exposed regularly to the theme music of the British television series "Neighbors" gave that music unique attention after birth.31 Likewise, when particular children's stories were repeated by mothers during pregnancy, the newborns recognized these stories and preferred listening to them rather than to other stories.32 The most recent research of this type tested learning while babies were still in the womb. A French and American team had mothers repeat a children's rhyme three times in succession daily for one month, between week 33 and 37 of gestation. When tested with recorded rhymes at week 37, while they were still in the womb, the babies showed by their heart beats that they discriminated between the rhymes, and that they definitely preferred the one they had already heard.33 The womb is a school! Prenatal Enrichment Programs From the beginning of human time, I feel sure, there were parents who were aware of the spiritual presence of their babies in the womb and who invented their own songs, dances, and words to relate to them, perhaps beginning even before conception. The ancient Chinese had traditions surrounding pregnancy which drew attention to the special needs of the baby for high quality food, music, and conversation. For these mothers and babies, pregnancy was protected and controlled for quality. Prenates in all cultures are, of course, constantly stimulated by virtue of their total involvement with the sounds and movements of the mother. In modern urban society, this stimulation may be hectic and overwhelming, and pregnancy may be an additional stress. In the last fifteen years, books, tapes, and exercises have been created to help parents understand and communicate with babies in the womb. Here, I will limit myself to comments about organized programs of prenatal stimulation which have been subjected to scientific measurement. Beginning in 1979, in a private obstetrical practice in Hayward, California, obstetrician Rene Van de Carr created a program known as The Prenatal University. (For the best overall description, see Van de Carr &Lehrer, 198834 and for the present program, Van de Carr &Lehrer, 1992.35) Although the original title was somewhat whimsical, Dr. Van de Carr firmly believed that babies in the womb were attentive, responsive little learners. The program gave parents many opportunities to interact with babies beginning in the fifth month with simple words like pat, pat, pat, rub, rub, rub in association with touch, making a game of baby kicks, exposing them to musical scales on a xylophone, and to story-telling in the last month. Activities are planned for five minutes twice a day. Outcome results were published in 1986 and 1988. The first study used a questionnaire sent to 50 mothers who used the program 10 minutes per day, 50 who used it less than half the prescribed time, and 50 non-participants.36 They found significant differences in parent-infant bonding between babies and their mothers and fathers, and in early infant speech attempts, early development of teeth, and in duration of breastfeeding. Their second study utilized 20 experimental and 20 control subjects with data obtained from the mothers using the Neonatal Perception Inventory (Broussard &Hartner, 1971), a Pregnancy-Birth Questionnaire and a Mother-Newborn Scale created by the researchers.37 Experimental mothers gave significantly higher ratings to their infants, saw them more positively, were more pleased with their pregnancies and birth

experience, felt more able to read the baby's signals, and had more confidence in being able to meet their needs than the women in the control group. Experimental babies had a significantly higher 5-minute Apgar Score. Modeled on the California program, obstetrician Chairat Panthuraamphorn created a Prenatal Enrichment Program at Hwa Chiew Hospital in Bangkok, Thailand.38 Beginning in the 12th week, the program suggested an evening ritual of bathing, relaxing, sitting in a rocking chair looking at beautiful pictures and listening to classical Thai music. Abdominal massage, breathing exercises, and visualizing the birth, the baby, and the experience of motherhood. At 20 weeks, the program included daily 20-minute sessions using a recorded tape of the parent's voices, calling the baby's name, talking to the baby, and playing light music. The program progressed to include nature sounds, bell sounds, fingertip massage, the Kick Game, experiences of hot and cold, and water play with a shower spray on the mother's abdomen. The purpose was to systematically utilize auditory, tactile, visual, and vestibular senses to enhance bonding and maximize human potential. This program was tested in experimental and control groups of 12 each, using clinical measurements, questionnaires for the mothers to fill out, and the Denver Developmental Test. The experimental infants turned to voices, held their heads steady at birth, smiled more in the first week following their births, rolled over at one month, and showed significantly larger head circumference and height at two months. In addition, they displayed superior fine and gross motor performance, as well as earlier speech and language acquisition. They showed better emotional control by calming themselves more quickly when rocked and patted than did the control babies. The largest program to be tested so far, directed by psychologist Beatriz Manrique in Caracas, Venezuela, involved 680 families in a controlled design with a battery of tests administered at 2 days, 1 month, 18 months, and annually to age 5. In addition to questionnaires, they used the Brazelton, Bayley, Stanford-Binet, McCarthy, and Weschler Scales. The program description is contained in a 43 page brochure containing 14 Charts of the findings to date (1995).39 Mothers attended a 13-week class for two hours at the local health center using "Hello Baby" and "Hello Family" as guides to a healthy pregnancy and labor. Another booklet, "Answer Your Baby" focused on techniques of communication with the baby in the womb. Test results revealed the advantages of prenatal stimulation in virtually every category over the entire span of time including auditory, speech, memory, and motor skills. In addition, experimental mothers felt more confident, were more active in labor, had greater success in breastfeeding, showed more intense bonding, and greater family stability. Because of these results, the government of Venezuela has decided to make the program available throughout the country. At this important conference, our eyes are turned to Spain, to Valencia, and to the medical and psychological studies of the promising firststart program of prenatal stimulation. I congratulate you on your creativity, dedication and teamwork in this challenging field of service. CONCLUSION Finally, in the long history of humankind, the veil of secrecy covering our life in the womb is being lifted. Science is dispelling the myth that developing babies are isolated, impervious, and senseless. New knowledge of life inside-much of it surprising and inspiring-will provoke changes in medicine and psychology and lead to a larger paradigm describing the nature of body, mind, and spirit. Pregnancy is not a grace period free of consequences before birth. Pregnancy is the ultimate period of opportunity for parents to create fully loved, fully formed babies who are truly prepared to live a good life and create a better world. Footnote * This paper was presented to the International Congress of Aprendizaje y Comunicacion Pre- y Perinatal, Valencia, Spain, June 1996. The Congress was inspired by the first research report on the Firstart prenatal stimulation program. Previously published only in Spanish, it is available here in English for the first time. References REFERENCES 1. Verny, T. R. with Kelley, J. (1986), The secret life of the unborn child. NY: Dell. Chamberlain, D. B. (1998), The mind of your newborn baby. Berkeley CA: North Atlantic Books; Chamberlain, D. B. (1994), The sentient prenate: What every parent should know. Pre- and Perinatal Psychology Journal, 9(1), 9-31. 2. Barker, D. J. P. (Editor) (1992), Fetal and infant origins of adult disease. 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