

## Womb Ecology: New Reasons and New Ways to Prepare the Prenatal Environment

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**Abstract:** None available.

**Full Text:** Headnote ABSTRACT: This article continues the dialogue on the origins of health as beginning in the womb. It points to the positive effects and changes that can occur when re-evaluating the importance of the pregnancy period for matters of public health. A brief review of the literature on dietary habits preconception/prenatally, and the intrauterine pollution of fat-soluble synthetic chemicals were offered. Followed by the description of a pilot study for the purpose of initiating a new generation of research. Results indicated preconceptional counselling must reflect new preoccupations based on the life-long effects of intrauterine pollutants. KEY WORDS: womb ecology, intrauterine, toxicity, toxicology, preconception, health.

INTRODUCTION An overview of the "Primal Health Research Data Bank" will convince anyone that our health is to a great extent shaped in the womb. We have now compiled hundreds of studies detecting correlations between states of health in adulthood, adolescence or childhood and situations when the mother was pregnant. At the very time when such hard data are now available, other scientific disciplines confirm the paramount significance of the prenatal environment. For example, the conventional ways of separating and contrasting genetic and environmental factors in the genesis of states of health, behaviours, and personality traits are obsolete. When contrasting these two groups of factors it was commonplace, until recently, to refer only to the post-birth environment. Today we are in a position to understand that the expression of our genes is to a certain extent influenced by early experiences, particularly during fetal life. Such an accumulation of data has enormous implications. In terms of public health, it appears that nothing today is more important than the health and well being of pregnant women. In terms of research, nothing is more important than the study of factors influencing fetal growth and fetal development. From a practical perspective, there are new reasons to prepare the intrauterine environment in an optimal manner. THE AGE OF MEDICALIZED PRENATAL CARE The intrauterine environment has always been closely influenced by the lifestyle of the mother-to-be in the framework of the family and the community. We must add that, at a time when the different stages of human reproductive life are more or less controlled by a great diversity of health professionals, these health professionals can likewise influence the prenatal environment. They can undoubtedly affect the emotional states of pregnant women. These health care providers may create a 'nocebo effect' (Odent, 1994) when the only objective of prenatal visits is to screen for pathological conditions and abnormalities. Thus each visit becomes an opportunity to recall, overtly or covertly, all the risks associated with pregnancy and childbirth. However, health professionals can also have a positive effect. I will always remember the joyful faces of pregnant women at the end of singing sessions in the Pithiviers hospital during the 1970s and 1980s. Furthermore, we must also take into account how the nutritional advice of health professionals can influence fetal life. In the early 1990s, in a London hospital, we encouraged 500 pregnant women at random to eat sea fish. There were theoretical reasons to anticipate a reduction in the incidence of preterm births and low weight newborn babies. In fact, the only statistically significant effect we could detect in the perinatal period-compared with a control group of 500 women-was an increased average head circumference (a marker of brain size) (Odent, McMillan, &Kimmel, 1996). This study has been recently replicated and enlarged in another British hospital with similar results (not yet published). Meanwhile Olsen and Secher, in Denmark, explored the relationship between seafood intake in pregnancy and the risk of preterm birth and low birth weight by interviewing 8,729 pregnant women about their dietary habits (Olsen &Secher, 2002). The occurrence of preterm delivery differed significantly across four groups of seafood intake, falling progressively from 7.1% in the group never consuming fish to 1.9% in the

group consuming fish on a regular basis. I was given the opportunity to interpret the apparent contradictions between the results of our studies and the results of the Danish studies (Odent, Colson, & De Reu, 2002; Odent, 2003). The Danish researchers, to a great extent, assessed dietary habits that preceded the beginning of pregnancy. It is probable that dietary recommendations in antenatal clinics occur too late to have detectable effects in the perinatal period. Ideally, we should address the importance of nutrition before the conception of the baby, as a way to prepare the intrauterine environment. The importance of the timing is already well understood regarding the usual recommendation to take folic acid supplements to reduce the risks of neural tube defects. The most effective way to influence the prenatal environment is to prepare it intentionally.

#### THE AGE OF MAN-MADE FAT-SOLUBLE CHEMICALS

The concept of timing appears particularly important concerning the effects of fat-soluble synthetic chemicals on health. Over the years we all have accumulated hundreds of chemicals in our adipose tissue that would not have been there sixty years ago because such chemicals did not exist at that time. Many of these pollutants have a long half-life and we do not have mechanisms to break them down; therefore they cannot be eliminated by the kidneys. Since the 1990s we have gathered sufficient data to realize that a major threat to the health of future generations is intrauterine pollution by such man-made molecules. It is during this period that molecules used by cells to 'talk' to 'each other' (e.g., hormones) can effect the way that genes express themselves. They are biologically active in parts per trillion, thousands of times more diluted than the level at which toxicological testing is usually performed. The majority of the genes in our bodies are only switched on for short windows of development, and then they shut down until the next generation. This explains why seemingly very low levels of chemicals can have biological effects on the fetus through cell signalling disruption at extremely low levels. Researchers who wanted to explore the long-term effects of human milk pollution, which is easily detected and therefore well-documented, provided the first warnings regarding neurological and intellectual development. Dutch (Huisman, Koopman-Esseboom, et al., 1995; Koopman-Esseboom, Weisglas-Kuperus, et al. 1996; Patandin, Lanting, et al., 1999), American (Jacobson & Jacobson, 1996), and Spanish (Ribas-Fito, Cardo, Sala, et al., 2003) studies, after taking into account many associated factors, concluded that the focus should be on evaluating intrauterine pollution. The negative effects of such pollution were detectable in all studies. On the other hand, the advantages of breastfeeding outweigh the theoretical risks associated with human milk pollution. Once more the concept of timing is the key to asking the right questions. Studies of tooth development also implicated the significance of intrauterine pollution. After combining the results of animal experiments and clinical studies (Alaluusua, Lukinmaa, et al., 1993; Alaluusua, Lukinmaa, et al., 1999), Finnish dentists concluded that mineralization defects of the permanent first molars were the best available indicator of dioxin exposure during fetal life. The increasing rates of male genital tract disorders are also related to intrauterine pollution (increased incidence of cryptorchidism (Garcia-Rodriguez, Garcia-Martin, et al., 1996), hypospadias (Paulozzi, Erickson, & Jackson, 1997), and cancers of the testicles (Forman & Moller, 1994), reduced average sperm counts (Auger, Kunstmann, Czyglik, & Jouannet, 1995). The most plausible interpretation is that many synthetic chemicals accumulated over the years in adipose tissues are hormonal disruptors (more precisely "oestrogen mimickers"); they interfere with the development of the testis at the very beginning of intrauterine life. The increasing male/female ratio of miscarriages (Mizuno, 2000) and the decreasing male/female ratio at birth (Davis, Gottlieb, & Stampnitzky, 1998) are also explained by the vulnerability of male fetuses to new environmental hazards.

#### NEW OBJECTIVES FOR PRECONCEPTIONAL PROGRAMMES

This list of preliminary warnings will probably lengthen in the near future. Meanwhile preconception programmes must encompass new preoccupations. One new objective should be to reduce the body's burden of fat-soluble chemicals during the period before conception. Our approach is based on lipid mobilization: the primary objective is to renew the stored fats. Fasting and physical activity are two mechanisms that can mobilize stored lipids and fat-soluble chemicals. When there are more free fatty acids in the blood and therefore more fat-soluble chemicals, the body must rely on extra-renal means of excretion (sweat, bile and intestinal excretion). Our preconception programme takes

these facts into account. It is based on a series of three-day fasting sessions. The principle is to lose weight and to mobilize fatty acids during each session and to recover immediately one's previous weight between two sessions ("accordion method"). During a session there is no other food available except a specially- designed cocktail made from a mixture of maple syrup, palm tree syrup and lemon juice (adding 100 ml of 'Natural tree syrup' and 100 ml lemon juice to 1300 ml water). Cayenne pepper is added after dilution (a way to slightly increase the body temperature). The cocktail can be consumed at any time without restriction. It provides ideal ratios of zinc to manganese to iron, of calcium to magnesium and of potassium to sodium. The lemon juice represents the main source of natural vitamin C. This cocktail provides about 600 calories/24 hours. Steam baths, saunas and exercise are also combined during a session. Physical activity is adapted to individual lifestyles. Women must make sure that they cannot become pregnant before, during or immediately after a session, when they have more chemicals in their blood. Lactation is another contraindication. The duration of the programme is six monthly sessions. During the sessions, subjects consume two servings a day of powdered Psyllium husks (seed husks of 'plantago ovata'). The lipophilic fibres of psyllium husks increase the purging rate of fat-soluble toxic wastes. Our programme had been originally designed for mothers-to-be. Today the concept of 'male mediated developmental toxicity' (Infante-Rivard & Sinnett, 1999; Dimich-Ward, Hertzman, et al., 1999; Nelson, Moorman & Shrader, 1996) justifies the participation of both genders. EVALUATING THE EFFICACY OF THE "ACCORDION METHOD" In order to evaluate the efficacy of the 'accordion method', we compared the data provided by blood samples before and after a six-month programme. Thirty-four volunteers (23 women and 11 men) presented themselves for the first blood sample. Groups of three to four participants were then given written and oral explanations about the programme. They also received the necessary ingredients (tree syrup, psyllium husks, cayenne pepper). The local possibilities for steam baths, saunas and exercise were discussed according to each case. Fourteen participants presented themselves for the second blood sample. A great diversity of reasons was given for not having the second blood test: two women became pregnant; one attempted an in vitro fertilization after two fasting sessions; one woman was diagnosed with cancer; there were several divorces and separations leading to a lack of interest for the programme. The difficulty of enduring three-day fasting sessions without disturbing a busy life was often presented as the main reason. Among the 14 participants who came for the second blood sample, seven (five women and a couple) had seriously completed the whole programme. The other seven could not overcome a great range of difficulties apparently related to their diminishing motivation. In an unexpected way, we could therefore compare a study (treated) group and a control (untreated) group. The Central Science Laboratory in York (UK) tested for 46 orthoPCBs, used as markers of fat-soluble chemicals. Their method has been validated and published after peer review (Fernandes, White, Dsilva, & Rose, 2004). The analytical performance of the laboratory in international comparative studies (Yrjänheikki, 1991; Stephens, Rappe, Hayward, Nygren, Startin, Ersböll, Carle & Yrjänheikki, 1992; Nygren, Yrjänheikki, Ersböll, Carié & Startin, 1993), using essentially the same method, has been judged to be acceptable or better. Results are calculated using internationally-accepted (Van Leeuwen & Younes, 2000) Toxic Equivalency Factors and expressed in µg/kilogramme. Since 46 PCBs were measured twice among the fourteen participants who had two blood samples taken, the laboratory provided 1288 results. For each participant we calculated the sum of the 46 results for each blood sample, knowing that the calculations were limited by the fact that 95.20% of the results (1226) were given as an upper limit and only 4.80% as a more precise evaluation. In the treatment group, the average sum per person decreased from 1.87 µg to 1.61 µg. This trend to decrease (14% decrease) could not reach statistical significance ( $p = 0.11$ ). In the control group, on the other hand, the average sum per person increased from 1.51 µg to 1.76 µg, though the difference was still not statistically significant ( $p = 0.10$ ): is it what we might expect without the accordion method? Therefore we must confine ourselves to trends and note that the trend in the treatment group is to decrease, while the trend in the untreated group was to increase. MAIN LESSONS FROM OUR PILOT STUDY The results of our pilot study confirm the need for larger studies, if possible in populations with higher than average body burdens

of fat-soluble chemicals. The major difficulties we had to face at every phase of our pilot study were predictable. It is still not yet commonly understood that human health is shaped to a great extent during intrauterine life and that prenatal pollution is a threat for the health of the future generations. The first difficulty was funding. The response of the British National Lottery was a typical example. After filling countless forms, we received a polite, diplomatic letter suggesting that there are other priorities than evaluating the efficacy of a preconceptional programme. Ironically, we learned recently that National lottery lets £2.4 billion sit in banks. (Sherman & Bale, 2005) The second difficulty was to recruit volunteers. While many young persons can easily accept nutritional supplements, very few are sufficiently motivated to follow a six-month programme that interferes with their lifestyle and involves fasting. Finally, among the 34 participants who presented themselves for the first blood sample, only seven have completed the whole programme. This fact provides the evidence that such a preconception programme demands strong motivation and commitment. However we must emphasize that there is literally no other approach that would not be invasive. In further research it would be beneficial to recruit participants living in the same geographical area. This would make monthly supportive interviews possible. Furthermore it would be beneficial to encourage the participation of the males. Several women emphasized the difficulty of preparing meals for another person while fasting. Other criteria might be used in further studies. For example, biopsies of adipose tissue might be more reliable than blood samples. Many other liposoluble molecules than PCBs can also be measured. We need to improve our understanding of the routes the body can use to eliminate man-made molecules that suddenly appeared in the environment some decades ago.

**CONCLUSION** The objective of our pilot study was to initiate a new generation of research. The development of this new generation of research implies a necessary new awareness. In the future, preconceptional counselling must reflect new preoccupations based on the life-long effects of intrauterine pollutants. This new generation of research will develop more easily when "Womb ecology" will be recognized as the most vital branch of Human Ecology.

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