

What is “Fetal Programming”?

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The idea of “fetal programming” was first discussed in Europe (and particularly in England at Southampton University and at King’s College in London) but people all over the world who are concerned about the effects of maternal substance abuse during pregnancy may begin to encounter this new term as they read about research and practice. Based on this idea that conditions during pregnancy determine health later in life, one advocate states, “How we are ushered into life determines how we leave” (Nathanielsz, 1999). David Barker at Southampton originated the term, fetal programming, to describe his findings from epidemiological studies that linked health problems in middle-aged adults with low birthweight. In studying their medical problems, Dr. Barker found that heart disease and diabetes were more common among people who were born with lower birthweights. He suggested that deprivation prenatally, due to poor nutrition, alcohol and drug use, and other factors, like poverty, caused changes in the fetus and the way its organs developed. These changes, later in life led to a higher risk of certain kinds of disease. Others have suggested that this idea can be applied to the effects of stress experienced by the pregnant woman. Stress leads to higher levels of the stress-related hormone, cortisol, that may affect how the baby responds to stress as a child and as an adult thereby creating additional challenges and problems.

Recently, another factor has been added to this puzzle. As we have come to understand human genetic make-up, a number of genes have been identified that

determine how people respond to various exposures. Generally, there will be differences in the type of gene that people have, called alleles. So that one person may have Type 1 of a particular gene while another person has Type 2 or Type 3. As these differences have been identified, scientists have discovered that these different types of genes react in different ways to prenatal exposures and events. So that a person with a Type 1 gene may deal very well with stress and the child will be of normal birthweight while the Type 2 person will have an excessive amount of cortisol and this infant will be programmed for later problems. An example of this process was given by Stoler and her colleagues in 2002 studying the effect of prenatal exposure to alcohol and one of the naturally made substances (enzymes) that rid the body of alcohol, called alcohol dehydrogenase. They noted that there are three different alleles (types) of the alcohol dehydrogenase (ADH2) gene: (ADH2-1, ADH2-2, and ADH2-3) and that these types lead to different levels of enzymatic activity. They found that the level of enzymatic activity alters the risk of fetal alcohol effects. The type of gene that the mother had was related to the number of alcohol related physical features that the baby showed. In particular, if the mother had the ADH2-2 allele, which leads to a more in rapid clearing out of alcohol from her body, then the infant was not likely to have birth defects. Studies of this kind will help us understand who is at high risk for having a baby with later problems and will help in prevention.

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