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Authors

Wadhwa, Pathik D
Sandman, Curt A
Garite, Thomas J

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Chapter 9 The neurobiology of stress in human pregnancy: implications for prematurity and development of the fetal central nervous system

Pathik D. Wadhwa ^{1, 2} , Curt A. Sandman ¹, Thomas J. Garite ²

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Abstract

Adverse early experience, including prenatal maternal psychosocial stress, has the potential to negatively influence developmental processes through both physiological and behavioral mechanisms. This in turn may have adverse consequences for the mental and physical health, well-being and aging of the individual throughout the entire life-span. We have initiated a program of research on humans to examine the consequences of maternal stress and related factors in pregnancy on the length of gestation, fetal growth, and brain development. We have also investigated the physiological mechanisms that are involved. In this chapter we outline the theoretical rationale for this work and give an overview of our findings to date. These findings support a significant and independent role for behavioral processes such as maternal prenatal stress in the etiology of prematurity-related outcomes, and suggest that these effects are mediated, in part, by the maternal-placental-fetal neuroendocrine axis; specifically by placental corticotropin-releasing hormone. Using a fetal challenge paradigm as a novel method for quantifying fetal neurologic maturity in utero, we have found that the maternal environment exerts a significant influence on the fetal autonomic nervous system and on central nervous system processes related to recognition, memory and habituation. Finally, our findings provide preliminary evidence to support the notion that the influence of prenatal stress and maternal-placental hormones on the developing fetus may persist after birth, as assessed by measures of temperament and behavioral reactivity in the first 3 years of postnatal life. The implications of these studies for life-span development and health are discussed.