

LAY ABSTRACT

Gastroschisis is a serious congenital defect of the abdominal wall that requires major surgery immediately following birth, and involves the potential for multiple complications as well as lengthy stays in the neonatal intensive care unit. In contrast to other birth defects, rates of gastroschisis have been increasing worldwide over the last 20 years. The underlying cause of this secular trend is unknown; however, it is thought that environmental factor(s) are contributory. Recently proposed risk factors include young maternal age, low socioeconomic status, and poor maternal diet. During the past decade there has been increasing interest in the concept that maternal/fetal nutritional status is an important and modifiable risk factor for numerous birth defects. The concept that an improvement in maternal diet can result in a markedly reduced risk for certain birth defect is best illustrated by the case of iodine, where fortification of the maternal diet virtually eliminates the risk for cretinism, a birth defect that once occurred with a high incidence ($> 5\%$) in many parts of the world. Most recently, it has been reported that improvements in maternal/fetal folate status due to food fortification with folate can result in up to a 50% reduction in the incidence of neural tube defects. The above illustrates that the identification of specific links between maternal diet and the risk for certain fetal abnormalities can result in policy changes and health recommendation that can have a major impact on child-health. The primary aim of the proposed study is to characterize the nutritional status of mothers and their infants with gastroschisis relative to unaffected mother/child pairs in order to identify possible mechanisms underlying this disorder. This will be accomplished through evaluation of maternal dietary intake as well as analysis of maternal and fetal tissue samples (placenta, blood, serum) for micronutrients including folate, zinc, copper, and flavanols, as well as measures of nitric oxide (NO) and oxidative stress. A secondary objective is to pursue a novel observation made by us concerning fat deposits in the placental membranes that are seen exclusively in children with gastroschisis. We will determine the extent to which the profile of these deposits relates to fat in the maternal diet and/or maternal and infant tissue stores. If our initial observation and hypothesis regarding nutritional deficiencies as an important component in the etiology of gastroschisis is supported by the proposed research, the potential for rapid translation to the clinical setting and consequent impact on child health is great, as dietary intervention can be among the most cost-efficient and easily and ethically applied preventive measure for birth defects across populations.