

Symposium 3: Nutrition and Growth

Nutrition and growth before birth

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Background - It has long been known that babies born small are at increased risk of dying before or immediately after birth. They are also at high risk of infection, lung disease and poor growth, and of adverse developmental outcomes. We now know that these small babies are also at increased long-term risk particularly of heart disease, stroke and diabetes.¹ However the role of nutrition in the cause and possible treatment of these problems remains uncertain.

Review - Although severely undernourished women have smaller babies, nutritional supplements make little difference to mean birthweight. However animal studies show that maternal under-nutrition can and does limit fetal growth. This apparent paradox can be resolved if the clear distinction is drawn between fetal nutrition and maternal nutrition. Fetal nutrition regulates fetal growth both directly and by regulating circulating levels of fetal hormones. In contrast, maternal nutrition may have little influence on fetal nutrition depending on the capacity of the fetal supply line to transfer those nutrients from mother to fetus.²

More recent data from human populations shows that maternal nutrition does influence size at birth. The balance of macronutrient intake, and particularly protein: carbohydrate balance, appears to be important, with an imbalance associated with reduced birthweight and adverse long-term effects. The timing of maternal nutritional changes are also important. Maternal undernutrition in late pregnancy in both rats and humans is associated with reduced birthweight and increased postnatal risk of diabetes. However maternal undernutrition around conception is associated with other risks including obesity, heart disease and reduced birthweight in the second generation.³ In sheep, periconceptual undernutrition sets a slow fetal growth trajectory and results in lambs with altered pancreatic function, altered endocrine development, altered metabolism and early delivery.^{4,5} The role of maternal micronutrient intake in fetal growth remains unclear, but there is growing evidence of its potential importance.

Whether growth that has been impaired by inadequate nutrition before birth can be improved after birth remains unclear. Nutritional supplements in very low birthweight babies can improve early growth rates.⁶ This may be advantageous for short-term outcomes such as neonatal respiratory function and time of discharge. However the longterm implications both for continuing postnatal growth and for subsequent adult health remain of concern.

Conclusions - Growth before birth is regulated by fetal nutrition. The role of maternal nutrition in human pregnancy is unclear but undoubtedly important. Specific recommendations about diet before, during and after pregnancy must await further research.

References

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