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ISPNE ABSTRACT BOOK
Prenatal programming of newborn and infant telomere length

**Rationale/Statement of the Problem:** Substantial evidence suggests conditions in intrauterine life may play a critical role in subsequent health and disease susceptibility related outcomes (i.e., the concept of fetal or developmental programming of health and disease). The elucidation of biological mechanisms underlying these effects is an area of active investigation. We suggest that telomere biology may represent a novel mechanism underlying the effects of a disparate set of suboptimal intrauterine exposures on various health and disease risk phenotypes. From an evolutionary-developmental perspective, energy substrate availability (i.e., nutrition) and challenges that have the potential to impact the structural or functional integrity and survival of the organism (i.e., stress) likely represent the most important environmental considerations underlying natural selection and developmental plasticity. Maternal stress and nutrition in pregnancy therefore represent attractive candidate processes in the context of fetal programming of telomere biology. Our previous work has established an important role for prenatal stress and stress-related processes in adult telomere biology.

**Methods:** In two longitudinal birth cohorts, stress- and nutrition-related processes were assessed during pregnancy and telomere length (TL) was subsequently measured in newborns (cord blood) and infants (buccal cells).

**Results:** (1) Among the nutrition-related factors, maternal lower folate levels (an essential methyl donor) and higher triglyceride concentrations in early pregnancy were significantly and independently associated with shorter newborn TL. (2) Among psychosocial stress-related measures, higher maternal pregnancy-specific stress was associated with shorter newborn TL. (3) Maternal estrogen (E3) levels during early pregnancy were associated with longer infant TL.

**Conclusion:** Taken together, our findings provide the first evidence in humans that maternal nutrition and stress-related processes during pregnancy may exert a programming effect on the newborn and infant telomere biology system. *In utero* telomere biology represents a potential molecular mechanism whereby different exposures in this critical developmental period before birth could impact subsequent health and disease susceptibility related outcomes over the life span, including aging and longevity.

Keywords: telomere biology; telomere length; newborn; health; stress; aging

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