**Objective:** To examine the relationship of early fractional arm (Avol) and thigh (Tvolf) volumes to neonatal adiposity estimates from after delivery.

**Methods:** Prospective longitudinal fetal growth data was acquired from 18 weeks to delivery. Fetal biometry was obtained at 3-4 week intervals. Eighty-four of these normally grown newborns had air displacement plethysmography for % body fat (%BF) within 48 hours of delivery. Linear mixed models and regression analyses were performed on fetal Avol and Tvolf growth trajectories between 22-34 weeks gestation with neonatal %BF. All models were corrected for maternal age and infant gender.

**Results:** Neither fractional limb volume size nor growth were related to % BF at birth. The Tvolf/Avol ratio (but not its growth) was significantly correlated with neonatal %BF (p=0.02).

**Conclusion:** Our results document the relationship between Tvolf/Avol ratio size between 22-25 weeks in predicting neonatal body fat.

**Significance of Study:** These results have potential implications for the early detection and monitoring of fetuses at risk for development of childhood obesity and subsequent adult diseases.