

## Two Models for Assessment of Body Composition during Pregnancy and Their Associations with Insulin Resistance

Ami Eho, Calah Coleman, Janeen Amason, Katherine H. Ingram (mentor)

**Introduction:** High levels of body fat are associated with cardiometabolic conditions, like insulin resistance, a precursor to diabetes. It is challenging to study these associations in pregnancy because body water levels fluctuate widely. The best known formula—the four-compartment model (4CM)— is unsuitable to use during pregnancy because it requires bone mineral content (BMC) from dual-energy x-ray absorptiometry (DEXA), which can only be used postpartum because of radiation exposure.

**Objective:** This study compares the associations between two formulas used to measure body fat content (a 4CM and a two compartment model (2CM) that does not require BMC) and insulin resistance during pregnancy.

**Methods:** At 20 weeks gestation, 33 pregnant women (73.1% white, aged  $27.6 \pm 4.2$  years, BMI  $27.6 \pm 6.3$ ) received body composition measures: body density (BD) via air displacement plethysmography (BodPod) and total body water (TBW) via bioelectrical impedance (InBody 720). Bone mineral content (BMC) was measured post-partum using DEXA. Body fat was calculated by 4CM (Selinger:  $[(2.747/BD) - .714(TBW/wght) + 1.129(BMC/wght) - 2.037] \times 100$ ) and 2CM (Van Raaij:  $Wght - (TBW/0.732)$ ). Insulin resistance was calculated by the Homeostasis Model Assessment of Insulin Resistance (HOMA-IR=  $\text{fasting insulin (mU/L)} \times \text{fasting glucose (mg/dL)} / 405$ ) measured from fasting blood measures collected at 24-26 weeks gestation. Correlation analyses were used to assess relationships among the two body composition models and HOMA-IR.

**Results:** The mean percent body fat was  $40.5 \pm 7.1\%$  using 4CM and  $38.7 \pm 7.3\%$  using 2CM. Both formulas were in close agreement with one another ( $r=.970$ ,  $p<.001$ ). HOMA-IR was strongly correlated to both 4CM ( $r=.524$ ,  $p=.009$ ) and 2CM ( $r=.547$ ,  $p=.006$ ).

**Conclusion:** The results indicate that estimating body composition using a 2CM would be an appropriate substitute for a 4CM in pregnant women.