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Associations of Adipose Tissue Architecture, Adipokines & Inflammatory Markers with Body Mass Index and Gestational Weight Gain in Non-diabetic Pregnancies

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Background: Some pregnancy weight gain is stored as adipose tissue (AT). Human AT depots vary in their capacity for expansion. Data suggests that subcutaneous (SQ) is adapted for healthy lipid storage. Conversely visceral (V) accumulation is associated with inflammation, obesity-related co-morbidities and Type 2 diabetes (T2DM) risk. We investigated SQ and VAT histologic architecture along with insulin, adipokines and inflammatory markers in relationship to prepregnancy BMI and gestational weight gain (GWG).

Methods: Subset of non-diabetic singleton gravidas from the Pregnancy & Postpartum Observational Dietary Study (PPODS), undergoing Cesareans and consenting to SQ & VAT biopsies were included. Average adipocyte size assessed in 10 sections/depot/subject. Maternal and cord blood insulin, adiponectin, leptin, PAI-1, CRP, TNF α , IL1b, IL6 and IL8 evaluated using Luminex MAGPIX, laser based fluorescent analytical test instrumentation with MILLIPLEX[®] multi-analyte panels. GWG determined by difference in pre-pregnancy and last prenatal visit weight.

Results: Of 110 subjects enrolled, 19 (17.3%) delivered by Cesarean with 14 consenting to AT sampling, and 7 (50%) having both SQ and VAT available for analysis. These 7 had mean pre-pregnancy BMI 27.8 ± 5.6 kg/m² and GWG 50.0 ± 25.7 lb (range 19-83) with delivery age 39.2 ± 0.7 wks. Mean SQ and VAT adipocyte sizes were 2892 ± 716 pixels² (range 1866-3775) and 2427 ± 641 pixels² (range 1416-3397) respectively ($p=0.310$); neither were statistically correlated with BMI or GWG. Pre-pregnancy BMI statistically correlated with maternal serum insulin (0.786 , $p=0.036$) at delivery and cord blood leptin (0.886 , $p=0.019$); GWG statistically correlated only with cord blood adiponectin (-0.900 , $p=0.037$).

Conclusions: In a small sample of normoglycemic pregnancies undergoing Cesareans and AT sampling, adipocyte size was no different in SQ versus visceral depots, and did not correlate with BMI or GWG. Surprisingly, pre-pregnancy BMI but not GWG correlated with maternal serum insulin at delivery, suggesting that pre-pregnancy weight status may be associated with glycemic control at pregnancy end.