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BODY FAT DISTRIBUTION IS A PREDICTOR OF ARTERIAL STIFFNESS

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Background: Fat distribution affects metabolism and cardiovascular risk. Truncal obesity is associated with insulin resistance, dyslipidemia, and hypertension. Arterial stiffness and wave reflections are markers of cardiovascular health and outcomes. Although arterial health is influenced by weight, it is not known whether fat distribution differentially modulates arterial function. We hypothesized increased abdominal fat (android fat) but not subcutaneous fat (gynoid fat) would predict increased arterial stiffness, independent of body mass index (BMI), waist circumference, and waist-to-hip ratio (WHR).

Methods: Fat distribution was measured in 606 healthy volunteers (414 females and 192 males, mean age 48±11) recruited into the Emory Center for Health Discovery. Android and gynoid fat were quantitatively measured by dual energy X-ray absorptiometry (GE Lunar Densitometry, iDXA®). Pulse wave velocity (PWV), augmentation index (AIx), and subendocardial viability ratio (SEVR) were derived non-invasively using applanation tonometry (Sphygmocor®, Atcor). Anthropometric, lipid and chemistry panels were measured. Multivariate regression models were conducted adjusting for relevant variables.

Results: Univariately, BMI, waist circumference, WHR, and android fat mass correlated with PWV. After multivariate adjustment for BMI, waist circumference, WHR, and other covariates including age, race, gender, mean arterial pressure, diabetes, tobacco, HDL, and total cholesterol, android fat mass remained an independent predictor of PWV (B= 0.127, p= .002), AIx (B= 0.593, p= .042), and SEVR (B= -3.934, p= .00008). In addition to android fat, the remaining independent predictors of PWV were age, gender, race, mean arterial pressure, and tobacco and of AIx were age, gender, race, mean arterial pressure, and BMI. Gynoid fat exhibited no relationship with arterial stiffness.

Conclusions: Increased android but not gynoid fat is associated with increased arterial stiffness, independent of traditional cardiovascular risk factors and other conventional measures of weight. Whether android fat mass is an independent predictor of cardiovascular outcomes needs to be further investigated.