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### Light Physical Activity Relates to Insulin Sensitivity and Earlier Time of Day in Metabolic Syndrome

Jaclyn K. Dosik<sup>1</sup>, Tristan J. Ragland<sup>1</sup>, Emily M. Heiston<sup>2,3</sup>, Udeyvir Cheema<sup>2</sup>, Andrea Spaeth<sup>2</sup>, and Steven K. Malin<sup>1,2</sup>, FACSM. <sup>1</sup>Rutgers University, New Brunswick, NJ; <sup>2</sup>University of Virginia, Charlottesville, VA; <sup>3</sup>Virginia Commonwealth University, Richmond, VA

**PURPOSE:** Low insulin sensitivity is linked to metabolic syndrome (MetS). However, it is unclear whether the time of day when light physical activity (LPA) occurs affects insulin sensitivity. We tested the relationship between LPA time of day and insulin sensitivity in MetS.

**METHODS:** Thirty adults with MetS were classified as morning (n=11, 9F), midday (n=9, 6F), or afternoon (n=10, 6F) by active LPA time using 7-d tri-axial hip-worn accelerometry (Actigraph). Time of day was defined by which part of the day had the highest percentage (>50%) of LPA. Peripheral insulin sensitivity was measured using a 2-hr hyperinsulinemic-euglycemic clamp (40mU/m<sup>2</sup>/min, 90 mg/dl), while hepatic (HOMA-IR), and adipose (Adipose-IR) insulin resistance were estimated from fasting glucose, FFA, and insulin, respectively. Aerobic fitness (VO<sub>2</sub>max) and anthropometrics (BMI, waist circumference) were also examined.

**RESULTS:** There were no differences amongst groups in age (53.7±2.1 vs. 53.8±1.9 vs. 51.3±6y, *P*=0.60), ATP III criteria (3.6±0.2 vs. 3.6±0.2 vs. 3.5±0.3, *P*=0.91), or VO<sub>2</sub>max (22.8±1.1 vs. 22.2±1.5 vs. 21.5±1.3 ml/kg/min, *P*=0.76). While there were no differences in time in sedentary (73.8±1.8 vs. 74.2±1.7 vs. 77.4±2.8%, *P*=0.44) or moderate-to-vigorous activity (4.9±0.7 vs. 4.7±0.8 vs. 4.1±0.6%, *P*=0.66) amongst groups, the morning and midday groups had increased time in LPA compared to afternoon (21.3±1.7 vs. 21.1±1.3 vs. 16.5±1.2%, *P*=0.04). Further, energy expenditure was higher in the morning versus afternoon (33.2±3.2 vs. 32.9±5.6 kcal/hr, *P*=0.01), which coincided with morning having a lower BMI (33.1±1 vs. 41±2 kg/m<sup>2</sup>, *P*=0.004) and waist circumference (107.9±1.8 vs. 123.1±5.4 cm, *P*=0.02). Although clamp-derived insulin sensitivity (2.8±0.5 vs. 2.5±0.5 vs. 1.9±0.3 mg/kg/min, *P*=0.43), HOMA-IR (3.0±0.9 vs. 5±1 vs. 3.9±0.9 a.u., *P*=0.3), and adipose-IR (9.2±3.1 vs. 11.5±2.1 vs. 11.0±2.4 a.u., *P*=0.81) were similar across groups, higher LPA (%) related to increased peripheral insulin sensitivity (*r*=0.33, *P*=0.04) and lower adipose-IR (*r*=-0.36, *P*=0.02). **CONCLUSION:** Time spent in LPA relates to insulin sensitivity and earlier times of day. Future work should look at whether time of day influences appetite and cardiovascular health to optimize disease prevention/treatment.

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