PURPOSE: Many Americans have poor food consumption patterns that may contribute to the development of obesity. This study was designed to determine if large within-day energy balance deficits and/or surpluses, and the time of day that these occur, are associated with body composition and obesity.

METHODS: Forty-five volunteers (mean age 34.1 years) were evaluated for body fat using DXA and hourly energy balance (EB) (NutriTiming®; NutriTiming LLC) based on three-day dietary recalls. We assessed average EB at 10 a.m., 2 p.m., 6 p.m. and 10 p.m. The data were analyzed using correlations, regressions, and descriptive statistics.

RESULTS: The participants had a body fat% of 21.5 ± 10.8% and a fat mass of 15.7 ± 9.8 kg. The 3-day average EB was -877.1 Kcal at 10 a.m.; -843.6 Kcal at 2 p.m.; -891.2 Kcal at 6 p.m. and -619.1 Kcal at 10 p.m., and net daily EB was -392.5 Kcal. Body fat% was inversely related to EB at 10 a.m. (r = -0.29; p = 0.05) and 10 p.m. (r = -0.43; p = 0.00) and fat mass was inversely related to EB for all time periods (10am (r = -0.31 p = 0.04), 2pm (r = -0.29 p = 0.05), 6pm (r = -0.30 p = 0.05), 10pm (r = -0.411 p = 0.01)). A forward stepwise linear regression analysis found that EB at 6pm and 10pm explained a significant proportion of the variance in Body Fat % (SEE = 9.29; R2 = 0.29). Using fat mass as the dependent variable, we found that EB at 10pm explained a significant proportion of variance (SEE = 9.0; R2 = 0.169).

CONCLUSION: These data suggest large negative energy balance (< -400kcal) achieved at different times during the day is associated with significantly higher body fat (both percent and mass). While subjects ended the day in a near energy balance state, high body fat levels were associated with large within day EB deficits, which were achieved at different times during the day. These data suggest that energy consumption patterns should be balanced throughout the day to help mitigate the development of obesity.