TACSM Abstract

The Relationship of Visceral Adipose Tissue with Markers of Energy Homeostasis Following Weight-Loss

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ABSTRACT

Excess levels of adipose tissue, in particular visceral adipose tissue (VAT), is closely associated with the metabolic syndrome and dysregulation of energy homeostasis. It is hypothesized that leptin resistance results in overconsumption of calories and reduced satiety. Recently, brain derived neurotrophic factor (BDNF), beyond functioning in learning and memory, is shown to play a role in energy homeostasis via its positive satiety effects on the hypothalamus. However, it remains to be elucidated how changes in visceral adipose tissue are associated with changes in circulating leptin and BDNF after weight-loss. **PURPOSE**: To identify changes in adiposity and circulating leptin and BDNF following a 3-month weight-loss program. **METHODS**: Sixty-five obese (mean±SEM; age=47.9±1.1 years; BMI=34.5±0.8 kg/m^2;), men and women completed a 3-month weight-loss program that consisted of a reduced energy intake of 1200-1500 kcals/day using a high-volume low-calorie diet combined with a progressive walking program to target 300 min/wk. Fasted (12 hr) blood samples were collected at baseline and post-weight-loss (3 months) and assayed for concentrations of glucose, insulin, BDNF, and leptin. Using DXA, total VAT and subcutaneous (SubQ) adipose tissue mass were measured at baseline and post-weight-loss (3 months). To identify significant changes over time, ANOVA with repeated measures was performed with significance set at $p<0.05$. **RESULTS**: Following the 3-month weight-loss program, both BMI and HOMA-IR were significantly reduced 9.3% and 49%, respectively. The reduction in BMI and HOMA-IR were matched by a significant reduction in both VAT (-658 g; -33%, $p<0.001$) and SubQ (-367 g; -17%, $p<0.001$). Interestingly, leptin was reduced and BDNF was increased by 43% ($p<0.001$) and 42% ($p=0.011$), respectively. Linear regression revealed that changes in VAT were associated with changes in leptin ($\beta=0.298$, $p=0.026$), but not with BDNF ($\beta=0.027$, $p=0.896$). **CONCLUSION**: This study shows that the reduction in VAT, by caloric restriction and physical activity, was associated with the reduction in circulating leptin concentrations, but not with changes in BDNF. Changes in leptin and BDNF may be in part responsible for the normalization of the energy homeostasis observed after weight-loss; however, changes in BDNF may be independent of VAT.