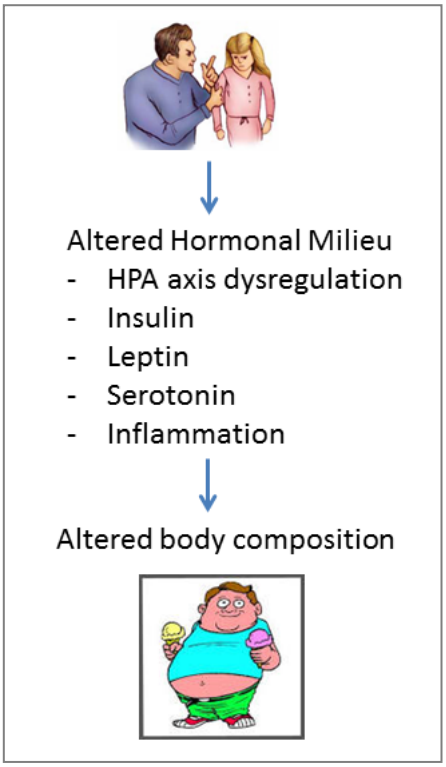
Early life origins of obesity: the relationship between childhood maltreatment and visceral obesity

By Li Li



Obesity, affecting 17% of children and adolescents and 36% of adults, is a major risk factor for developing type 2 diabetes. Accumulating evidence indicates that visceral obesity is a crucial regional adipose tissue involved in high risk for diabetes. Childhood is a period of incessant physical growth and brain development. Any interruption during this critical period would increase the risk for adult pathophysiology. Childhood maltreatment (CM), approximate 3 million cases reported annually in the U.S. alone, has been demonstrated to have lasting effects on endocrine, immune and central nervous systems, leading to various physical illnesses, including obesity. The aim of this pilot project is to determine whether CM is associated with visceral obesity risk, and its mechanisms.

To date, about 80 study subjects were enrolled with age 19-55 years old. Participants were excluded if they: (1) had been taking corticosteroids, antibiotics or anti-inflammatory medication; (2) had current infectious diseases or history of autoimmune, endocrine, inflammatory, or neurological disorders; (3) were pregnant or lactating; or (4) had a history of psychosis, bipolar disorder and drug or alcohol abuse or dependence within 1 year prior to enrollment. Assessments included the Childhood Trauma Questionnaire for CM exposures. Subjects were divided into two groups, i.e. with exposures of CM (CM group), and without exposures of CM (non-CM group). Body mass index (BMI) was computed as the ratio between body weight (kg) and height (m^2). Waist and hip circumferences were measured for waist-to-hip ratio calculation. Body composition was measured by dual-energy X-ray absorptiometry. All participants were requested to provide saliva samples at wake-up, 15, 30 and 60 mins post wake-up for the determination of cortisol awakening response and the calculation of area under curve, representing the HPA axis activity. BMI and waist-to-hip ratio did not differ between these two groups. Compared with non-CM group, CM subjects had greater visceral fat mass but not total body fat or android fat. Correlation analysis indicated that 5 different subtypes of CM had differential effects on visceral fat mass and cortisol awakening response. Moreover, CM subjects had a blunted cortisol awakening response, and elevated inflammatory factors. Our current results suggest that CM exposure is associated with increased visceral fat deposition, and perturbation of the HPA axis and activation of immune system were associated with visceral fat mass.

Future work will continue to enroll more subjects, so we will sufficient power to detect if depressed patients with a history of CM would differ from non-depressed individuals in

terms of their body composition. Another work will be focused on epigenetic modification by CM, including FKBP5 and GRs mRNA expression levels and methylation in promoters. Peripheral blood mononuclear cells will be collected and analyzed. Findings from this study may lead to novel ways to prevent, delay or reverse a pre-programmed risk for visceral obesity and its related disorders.