Introduction: Circadian variability of circulating leptin levels has been well established over the last decade. However, the circadian behavior of leptin in human adipose tissue remains unknown. This also applies to the soluble leptin receptor. Objective: We investigated the ex vivo circadian behavior of leptin and its receptor expression in human adipose tissue (AT). Subjects and methods: Visceral and subcutaneous abdominal AT biopsies (n = 6) were obtained from morbid obese women (BMI ≥ 40 kg/m2). Anthropometric variables and fasting plasma glucose, leptin, lipids and lipoprotein concentrations were determined. In order to investigate rhythmic expression pattern of leptin and its receptor, AT explants were cultured during 24-h and gene expression was analyzed at the following times: 08:00, 14:00, 20:00, 02:00 h, using quantitative real-time PCR. Results: Leptin expression showed an oscillatory pattern that was consistent with circadian rhythm in cultured AT. Similar patterns were noted for the leptin receptor. Leptin showed its achrophase (maximum expression) during the night, which might be associated to a lower degree of fat accumulation and higher mobilization. When comparing both fat depots, visceral AT anticipated its expression towards afternoon and evening hours. Interestingly, leptin plasma values were associated with decreased amplitude of LEP rhythm. This association was lost when adjusting for waist circumference. Conclusion: Circadian rhythmicity has been demonstrated in leptin and its receptor in human AT cultures in a site-specific manner. This new knowledge paves the way for a better understanding of the autocrine/paracrine role of leptin in human AT.

Keywords
Leptin receptor, Circadian, Rhythm, Metabolic syndrome, Obesity.

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