OBSERVATIONS

Visfatin: The Link Between Inflammation and Childhood Obesity

Low-grade inflammation that coexists with obesity has mainly been studied in adults, whereas data in children are limited. Visfatin is a newly discovered adipokine. It is expressed in visceral adipose tissue and has been shown to exert insulin-mimetic effects (1). Although some studies have addressed its relation to obesity, visfatin's biological roles are largely unknown. Besides expression in adipose tissue, visfatin is also expressed in peripheral blood neutrophils upon stimulation by inflammatory factors, such as tumor necrosis factor-α (TNF-α) (2).

In light of the rising prevalence of pediatric obesity, it is important to assess the role of visfatin as a predictor of BMI and to unravel its association with inflammation markers. To address this, we measured its expression as well as those of TNF-α and leptin in adipose tissue and peripheral blood mononuclear cells (PBMNCs) in 31 children (14 girls), aged 7–14 years, who were admitted for surgery with a diagnosis of appendicitis. All patients' parents gave written informed consent approved by the Bioethics Committee of Harokopio University for Integrity in Research on Humans. The mean ± SD BMI values were 20.0 ± 3.9 kg/m^2 for boys and 18.5 ± 2.9 kg/m^2 for girls.

The expression of visfatin and leptin in adipose tissue correlated positively with BMI ($\beta = 0.464$, $P = 0.006$, and $\beta = 0.476$, $P = 0.006$, respectively) after adjustment for age and sex. In adults, a positive correlation of visfatin mRNA from visceral adipose tissue with BMI was demonstrated and a negative or no correlation between the expression from subcutaneous adipose tissue and BMI was found (3). The fact that we found visfatin and leptin expression in adipose tissue associated with BMI in children suggests that visfatin is probably another adipokine with great importance—at least when compared with leptin in childhood.

Visfatin was correlated with TNF-α expression ($\beta = 0.452$, $P = 0.013$) of them from adipose tissue, and both were positively correlated with leptin expression ($\beta = 0.657$, $P = 1 \times 10^{-4}$, and $\beta = 0.752$, $P = 6 \times 10^{-7}$, respectively). A stronger correlation between TNF-α and visfatin expression was found in PBMNCs ($\beta = 0.695$, $P = 2 \times 10^{-5}$). We have recently shown in adults that leptin and visfatin are expressed by PBMNCs and correlated with TNF-α (4,5).

Here, we report for the first time the following results in children: visfatin expression by PBMNCs and adipose tissue; associations of visfatin expression with cytokines, both in PBMNCs and in adipose tissue; and association of visfatin expression in adipose tissue with BMI. The presence of the mRNA of these two adipokines in PBMNCs of healthy children supports the finding that their actions begin already in childhood, but the exact mechanisms linking them are not known.

In conclusion, the present study is the first to consider adiposity together with inflammation in children by studying adipokines and cytokines in adipose tissue and PBMNCs of the same children. Even though we studied a relatively small number of subjects, because of the difficulties in obtaining adipose tissue (especially from children), our results suggest that further investigation of visfatin in relation to inflammation in children could be very promising. We propose an important implication of this new adipokine in inflammatory mechanisms of obesity starting already in childhood.

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