Relationship between adipocyte size and adipokine expression and secretion.

Abstract:
CONTEXT: Adipocytes are known to release a variety of factors that may contribute to the proinflammatory state characteristic for obesity. This secretory function is considered to provide the basis for obesity-related complications such as type 2 diabetes and atherosclerosis. OBJECTIVE: To get a better insight into possible underlying mechanisms, we investigated the effect of adipocyte size on adipokine production and secretion. DESIGN, PATIENTS, AND MAIN OUTCOME MEASURES: Protein secretion and mRNA expression in cultured adipocytes separated according to cell size from 30 individuals undergoing elective plastic surgery were investigated. RESULTS: The mean adipocyte volume of the four fractions ranged from 205 +/- 146 to 1.077 +/- 471 pl. There were strong linear correlations for the secretion of adipokines over time. Secretion of leptin, IL-6, IL-8, TNF-alpha, monocyte chemoattractant protein-1, interferon-gamma-inducible protein 10, macrophage inflammatory protein-1beta, granulocyte colony stimulating factor, IL-1ra, and adiponectin was positively correlated with cell size. After correction for cell surface, there was still a significant difference between fraction IV (very large) and fraction I (small cells), for leptin, IL-6, IL-8, monocyte chemoattractant protein-1, and granulocyte colony-stimulating factor. In contrast, antiinflammatory factors such as IL-1ra and adiponectin lost their association after correction for...
cell surface area comparing fraction I and IV. In addition, there was a decrease of IL-10 secretion with increasing cell size. CONCLUSIONS: The results clearly suggest that adipocyte size is an important determinant of adipokine secretion. There seems to be a differential expression of pro- and antiinflammatory factors with increasing adipocyte size resulting in a shift toward dominance of proinflammatory adipokines largely as a result of a dysregulation of hypertrophic, very large cells.