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The Endocrine Function of Adipose Tissue

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INTRODUCTION

The traditional view of the adipocyte as a passive receptacle for storage and combustion of triacylglycerol is undergoing rapid change. It is now recognized that a variety of adipocyte and adipose stromal cell derived proteins act both locally and distally through autocrine/paracrine and endocrine effects to regulate fat cell differentiation, and sense and adjust systemic energy balance.¹ These adipokines are molecules that were previously identified to be derived from immune cells, while others, cytokines produced by adipocytes, were known to be involved in hemostasis, inflammatory response, vasoregulation, and steroid metabolism (Figure 1). Many of these proteins increase as fat mass accumulates and, thus contribute to the multiple morbidities of obesity. Increased activity of three of these, tumor necrosis factor, interleukin 6, and resistin, play a role in the development of the insulin resistance present in obesity. In contrast, other adipokines, like adiponectin and leptin, are insulin sparing through stimulatory effects on the beta oxidation of fatty acids in skeletal muscle.

The concept of "lipotoxicity" postulates that the accumulation of excess lipids in hepatocytes and skeletal muscle cells interferes with insulin signaling,² and the increased lipolytic activity of visceral fat contributes to this process by shunting fatty acids through the portal vein to the liver. Local overproduction of glucocorticoids in visceral fat ("Cushing's disease of the omentum") is also pathogenic. Increased activity of 11 hydroxysteroid dehydrogenase (11 HSD-1) raises adipose tissue cortisol levels, adversely partitioning fat into visceral sites and stimulating release of metabolically harmful adipokines.² Many of these adipokines also act centrally. Leptin, tumor necrosis factor (TNF) and interleukin (IL-6) enter the hypothalamus where they affect sympathetic tone, feeding behavior, thermogenesis, reproduction, and the activity of various hypothalamic-pituitary axes. Adipocyte

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Letter from the Editor:

The lead article in this issue covers a very current topic, one which pediatric endocrinologists may not be thoroughly familiar or are just beginning to incorporate into their sphere of interest (outline of article at www.gghjournal.com). However, it is a subject about which we all will be hearing a great deal more in the near future as pediatric endocrinologists become more involved in the care of obese patients. The epidemic of obesity is confronting our profession more than ever. Consequently, most readers of *Growth Genetics and Hormones* will benefit from having this article as a source for reference to broaden their knowledge about The Endocrine Function of Adipose Tissue. To serve this purpose the presentation of this article by necessity was very inclusive and written as an introduction to, and compilation about, the existence and known function of the many hormones outlined in the text. Dr. Diamond is to be commended for undertaking a difficult task and achieving the intended goal.

For the Editorial Board
Robert M. Blizzard, MD
Editor-in-Chief

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