

OBESITY

Introduction

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Obesity has recently emerged as an imminent global public health concern over the past several decades. Recent reports from the Centers for Disease Control and Prevention estimate that two-thirds of the adult population and one-third of children and adolescents in the United States are overweight or obese. A combination of lack of physical activity and an increasingly unhealthy food environment is likely responsible. Obesity is a major cause of many secondary illnesses, including Type 2 diabetes, cardiovascular disease, high cholesterol, infertility, and even certain types of cancer, creating a staggering economic burden due to the health care costs to treat such ailments. In the current issue of the *Yale Journal of Biology and Medicine*, we focus on the topic of obesity and related diseases. Articles examine the pathogenesis of obesity from evolutionary, genetic, and biological perspectives, offer new hypotheses for the perpetuation of obesity, and examine the disease from a public health viewpoint.

The etiology of obesity throughout time has focused on several key hypotheses with the thrifty gene hypothesis being perhaps the most widely accepted in the past. This theory states that obesity may be the

result of an adaptive trait developed over the course of human evolution in response to periods of food scarcity and famine. In her review, Genne-Bacon examines evidence for and against this hypothesis and discusses additional hypotheses that should be considered for the origins of obesity.

While obesity is likely the result of many environmental influences, our genes remain an important part of the equation as well. In addition to the thrifty gene hypothesis, recent work has revealed a number of genetic variations that may contribute to the pathogenesis of obesity today. Levian and colleagues explore molecular mechanisms underlying the disease at the level of the genome, transcriptome, and epigenome. This review offers an in-depth look at genetic risk factors, as well as environmental influences on molecular events, and suggests an integrated systems level approach in the future for prevention and treatment of obesity. A mini-review by Wagner similarly examines risk factors, but more specifically related to the pro-inflammatory protein high-mobility group box 1 (HMGB1†) in the regulation of gene expression. Here, he provides evidence suggesting that HMGB1 is elevated in obese individuals, which may

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†Abbreviations: HMGB1, high-mobility group box 1; NAGB, non-adjustable gastric band.

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be liable for the perpetuation of obesity-induced inflammation in adipose tissue and implicates it as a potential therapeutic target in the treatment of obesity.

Though environmental and genetic influences have contributed greatly to the current obesity epidemic, effects of diet and nutrition remain paramount. Dugan and Fernandez explore these aspects further as they review key nutritional elements involved in metabolic syndrome, a disorder characterized by central obesity, high blood pressure, and elevated levels of serum triglycerides. They further suggest that targeting specific dietary elements may provide an alternate strategy for ameliorating factors underlying metabolic syndrome.

Due to the countless and complex elements discussed thus far, the treatment of obesity and related metabolic disorders requires a multidisciplinary approach. In this issue, Horvath et al. propose a novel hypothesis for the development of obesity, suggesting that brain temperature control may be critically involved, specifically in the hypothalamus, a brain region concerned with the regulation of energy homeostasis. They go on to speculate that manipulating hypothalamic temperature could be one way in which to shortcut the metabolic centers of the brain in a non-invasive manner, providing an alluring new treatment approach. Balogh and colleagues discuss other treatment methods in their case report, such as bariatric surgical procedures using a non-adjustable gastric band (NAGB). However, such surgical operations can lead to considerable complications. Here, the authors provide a retrospective re-

view of patients incurring complications following NAGB placement in an effort to relay clinical precautions associated with this and other procedures used that are based on principles similar to NAGB.

Moving forward, it becomes critical to not only provide treatment for obesity and related disorders, but to take a more active role in the prevention of them. To this end, public health and public policy remain integral. An interview with Dr. Marlene Schwartz, director of the Yale Rudd Center for Food Policy & Obesity at Yale University, provides an overview of the many strides that are being taken in this direction. She discusses her research on the effects of media and environment on feeding behavior in children and reviews the many initiatives currently under way at the Yale Rudd Center that are helping to change public policy in attempts to curb the obesity epidemic.

Obesity is a complex, transdisciplinary field that has received increasing attention in response to the burgeoning rates of childhood, adolescent, and adult obesity in the United States and abroad. While the manuscripts in the current issue explore the many levels of environmental, genetic, and social risk factors in the development of obesity, the availability of efficacious treatments is still inadequate, necessitating further research into the etiology of the disease. Numerous disciplines are working together to further understand the origins of obesity with the hopes of generating better pharmacological, surgical, and behavioral treatments to compliment improvements in public policy and prevention research.