Introduction

The Neurobiology of Eating Disorders: A Resurgence of Investigations

By Katherine A. Halmi, MD

The term “eating disorder” usually refers to either anorexia nervosa (AN) or bulimia nervosa (BN), both of which are complex syndromes involving the interaction of environmental, psychological, and physiological factors. AN is characterized by severe weight loss and an intense fear of gaining weight whereas BN is mainly distinguished by its central feature of “binge” eating.

In 1914, Simmonds1 reported a destroyed pituitary gland in a woman who died of emaciation and was thought to have AN. For the next 20 years, AN was frequently diagnosed as Simmonds’ disease. Bliss and Branch2 reviewed the physiology of AN and recommended that anyone with a 25-lb weight loss due to any kind of psychiatric condition be diagnosed as having nervous malnutrition. With the increased sophistication of genetic analyses, neuroimaging techniques, and identification of neuropeptides influencing energy balance, a resurgence of investigations concerning the neurobiology of eating disorders has occurred.

Family and twin studies have provided preliminary evidence that genetic factors may strongly influence the development of AN and BN. Cynthia M. Bulik, PhD, and Federica Tozzi, MD, provide a clear explanation of the more recent techniques of genetic analyses, such as association and linkage studies, and critically review those studies conducted on eating disorders. Linkage analysis of the restricting AN subtype has yielded evidence for a susceptibility locus on chromosome 1, and a linkage study of BN has shown significant linkage on chromosome 10. However, association-type analyses have produced some contradictory results. Genetic studies will likely be useful in better understanding how environment influences the risk of developing an eating disorder.

Neuropeptides produced in the hypothalamus or the gut have been measured in the plasma and cerebral spinal fluid of eating disorder patients. Their responses to various perturbation tests have also been measured. Most of these measurements have been related to state-related alterations such as weight loss or periods of fasting. Understanding how these various neuropeptides interact with each other to play a role in initiating the onset or maintenance of eating disorders should provide clues on potential treatment interventions. David C. Jimerson, MD, and Barbara E. Wolfe, PhD, RN, give a thorough review of neuropeptide research in eating disorders, including the methodological problems in considerations for interpreting these studies.

Palmiero Monteleone, MD, and colleagues have conducted a series of studies to show that changes in leptin secretion in eating disorder patients most likely reflect adaptive mechanisms to chronic malnutrition and starvation. They conclude that changes in leptin production may have an impact on the course and prognosis of AN and BN since leptin acts as a modulator of many other physiological events.

Diane A. Klein, MD, and colleagues have investigated exercise behavior in AN within the framework of an addictive disorder. The authors determine that exercise could be measured in phenomenology analogous to that exhibited in substance dependence in ~50% of the AN patients studied. Understanding the neurobiology of the reward circuitry in exercising AN patients should lead to the development of useful treatments and interventions.

Finally, Guido K. Frank, MD, and colleagues deal with neuroimaging studies in the eating disorders. Although these imaging studies are plagued with methodological problems and small numbers, they allow direct assessment of brain function. The authors suggest that receptor imaging studies indicate a dysregulation of the serotonergic neurotransmitter system in AN and BN patients. The implications of serotonin receptor alterations on the core behaviors present in eating disorders are necessary investigations.

This month’s issue of CNS Spectrums highlights the neurobiology of eating disorders, an area of a recent resurgence of investigations. The development of methodologies to examine the effect of environmental events on neurobiological phenomena will most likely produce the most useful information for understanding the development of eating disorders and creating useful intervention and prevention strategies.

REFERENCES


Dr. Halmi is professor of psychiatry at the Weill Cornell Medical College in New York City and director of the Eating Disorders Program at the Westchester Division of the New York Presbyterian Hospital in White Plains.