

# Clinical Implications for the Treatment of Obesity

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## Combining Behavior and Biology

This conference has underscored the magnitude and complexity of the obesity problem across the globe (1). Efforts to effectively prevent and treat obesity must be grounded in a precise understanding of etiology and pathophysiology. Although the fundamental energy imbalance is well known, the myriad of factors that affect that imbalance are less well understood (2). In addition, obese persons are quite heterogeneous both behaviorally and biologically, making one size fits all treatments less likely to succeed in the long term.

Given the complex and refractory nature of obesity, it is useful to employ treatment strategies that attempt to address both the biology and behavior of obesity. This conference has focused on the considerable science around the regulation of food intake, including the brain, the gut, and beyond (3–7). These systems are complex and, unfortunately, for weight reduction purposes, redundant. Therefore, efforts to trick the physiological system are likely to be subject to habituation, compensation, and/or adaptation.

As Mela (7) suggests, consumers are eager for products that manage hunger, although it is less clear what is meant by hunger (8). It may be internally mediated by going long periods without eating or more externally driven by multiple triggers associated with eating (sight, smell, activities and emotions, places). Attempts to develop products or agents that modify the internal milieu are best complemented by behavioral strategies that seek to manage the multiple external prompts to eat more and move less. The remainder of this paper will describe the principles of behavior treatment and its efficacy.

## Behavioral Treatment

Behavioral treatment is based largely on principles of classical conditioning, which posit that eating is often prompted by antecedent events (i.e., cues) that become strongly linked to food intake (9). Behavioral treatment, as described below, helps patients identify cues that trigger inappropriate eating (and activity) and learn new responses to them (10,11). Treatment also seeks to reinforce (or reward) the adoption of positive behaviors, while also reducing the aversiveness associated with some types of behavior change.

In the last 20 years, cognitive therapy also has been incorporated in the behavioral treatment of obesity. The underlying assumption of cognitive therapy is that thoughts (or cognitions) directly affect feelings and behaviors (12). Negative thoughts frequently are associated with negative outcomes, as in the case of a male, who overeats, tells himself he has blown his diet, and then proceeds to eat triple the original amount because of feelings of disgust and despair. With cognitive therapy, patients learn to set realistic goals for weight and behavior change, to evaluate their success in modifying eating and activity habits, and to correct negative thoughts that occur when they do not meet their goals (11,13,14). Cognitive interventions for weight management are based on those developed for the treatments of depression and anxiety (15,16).

## Defining Characteristics

Behavioral treatment has several distinguishing characteristics (17). First, it is goal-directed. It specifies very clear goals in terms that can be easily measured. This is true whether the goal is walking four times a week, lengthening meal duration by 10 minutes, or decreasing the number of self-critical comments. Specific goals facilitate a clear assessment of success.

Second, treatment is process-oriented. It is more than helping people to decide what to change (i.e., eating, activity, thinking habits); it is helping them identify how to change (13). Thus, once a goal is specified, patients are encouraged to examine factors that will facilitate or hinder

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goal achievement. In cases in which the desired behavior is not implemented, problem-solving skills are used to identify new strategies to overcome barriers. In this view, successful weight management is based on skills that can be learned and practiced, in the same manner that an individual can learn to play the piano through frequent practice. Skill power, not will power, is the key to success.

Third, the behavioral approach advocates small rather than large changes. This is based on the learning principle of successive approximation in which incremental steps are taken to achieve more distant goals. Making small changes gives patients successful experiences on which to build rather than attempting drastic changes that are typically short-lived.

The behavior change process is facilitated through the use of a variety of problem-solving tools. The behavior chain, a typical chain of events that lead to an unwanted behavior like overeating, is one of the tools commonly used in treatment (11,18). By examining the cues and events that lead up to an overeating episode, one can identify areas where modifications in behavior can be made to break the chain of events and prevent an overeating episode from occurring in the future. This tool can be used to extinguish conditioned responses that have been established over time with repeated pairing. For example, if a patient has identified television watching as part of the sequence of events leading up to an overeating episode, limiting eating to a more appropriate location (i.e., table in the kitchen or dining room) can be an effective strategy for weakening the association between eating and television watching. The more often the patient refrains from eating in front of the television, the less likely that television watching will automatically trigger food intake.

### **The Behavioral Package**

Behavioral treatment usually includes multiple components such as keeping food and activity records (i.e., self-monitoring), controlling cues associated with eating (i.e., stimulus control), nutrition education, slowing eating, physical activity, problem solving, and cognitive restructuring (i.e., cognitive therapy) (10,11). These components comprise the behavioral package, which has been summarized in manuals such as the LEARN Program for Weight Management 2000 (11). Studies have shown that two components, self-monitoring (19,20) and physical activity (21,22), are consistently associated with better weight control, short and long term, respectively. Surprisingly, there is little empirical evidence to support the use of stimulus control, problem solving, or cognitive restructuring, either because the necessary studies have not been conducted or negative results were obtained. Further research clearly is needed to identify the most potent components of the package and additional interventions that might be added (such as body image therapy) (23). In the interim, researchers and practitioners

probably will continue to use the behavioral package because it is well validated, as a whole, and different patients are drawn to different components of the intervention.

### **Short-Term Results of Behavioral Treatment**

A large number of clinical studies have been conducted examining the effects of behavioral treatment on weight loss. The research has ranged in length from 3 weeks (24) to >10 years (25). The typical design of most behavioral treatment weight loss studies is group meetings weekly for the initial treatment phase (~3 to 6 months), biweekly (every other week) meetings for the maintenance phase (6 to 12 months), and monthly or bimonthly for the later phases of the study (12 to 24 months) (25–28). Wing et al. (10) reviewed several behavioral weight loss studies from 1996 to 1999, which resulted in a mean short-term weight loss of 9.6 kg during the treatment phase (21 weeks) and 6.0 kg during follow-up (18 months). Several more recent studies have been published from 2000 to 2006, which have produced similar results (26,29–34). Maximum weight losses are usually achieved during the initial phases of the research. Average weight losses were 10.7 kg after 6 months. Short-term weight loss averages ~9.1 kg after 1 year. This indicates an average of 1.6-kg weight regain during the follow-up phase (26,29–34).

### **Strategies for Augmenting Outcomes**

Although behavioral treatment provides individuals with a set of skills to handle barriers to eating healthy and being active, overcoming barriers is a difficult endeavor, particularly in a fast-paced environment that encourages consumption of large portions of tasty, low-cost foods and promotes sedentary behavior. A healthy lifestyle requires significant planning, proficiency in making healthy choices and estimating portion sizes, and diligence in monitoring caloric intake and activity, all of which take time to develop and maintain. As such, strategies for simplifying and making this process more practical have been investigated and are described below. In general, these strategies provide structure and reduce or eliminate time spent planning and decision making.

### **Increased Structure**

Jeffery et al. (35) examined the impact of food provision on weight loss outcomes. Individuals who received food along with standard behavioral treatment lost more weight at 6, 12, and 18 months (–10.1, –9.1, and –6.4 kg) than those who received standard behavioral treatment alone (–7.7, –4.5, and –4.1 kg). Wing et al. (36) conducted a follow-up study to determine whether the food provision itself or the limited dietary decision making affected weight loss outcome. Weight loss was greater in groups that re-

ceived food or menus compared with the group that received standard behavioral treatment at 6 and 18 months; however, no differences in weight loss were observed between the groups that were provided food and the group that received menus and grocery lists.

Similar findings are observed in studies that compare meal replacements (37–40) or prepackaged entrees (41,42) with self-selected diets. These studies suggest that replacing two of three meals with a liquid and/or solid meal replacement or at least two meals with a portion-controlled entrée result in greater weight loss than traditional self-selected diets and an improved nutrient intake profile (i.e., decreased dietary fat intake and improved micronutrient intake) with the exception of fiber intake, which may be low if diets using meal replacements are not supplemented with high-fiber foods (43). Although some weight regain is observed over time, a greater reduction in weight is observed even up to 4 years in individuals receiving meal replacements (38). Based on a meta-analysis by Heymsfield et al. (44), individuals consuming meal replacements lose ~7% to 8% body weight, whereas those on a standard self-selected diet lose 3% to 7% body weight at 1 year. It is unclear, however, whether meal replacements are superior to other structured weight loss approaches that provide menus and recipes. Noakes et al. (43) found similar decreases in weight in individuals using meal replacements (9.0 kg or –9.4% body weight) and following structured diets (9.2 kg or 9.3% body weight) for 6 months (43). These findings suggest that guidance in making food choices and/or determining portion size may improve compliance to a dietary plan and make following an energy-restricted diet easier.

### Pharmacotherapy

Combining behavioral and pharmacological treatments creates synergies to address internal and external modulators of food intake. Wadden et al. (45) recently reported that behavioral treatment combined with pharmacotherapy produced greater weight loss than drug alone. Moreover, higher doses of behavioral treatment (in terms of treatment intensity and frequency) produced greater weight losses than lower doses (45,46). In addition, across both pharmacological and non-pharmacologic treatments, higher rates of self-monitoring (kept food records) were associated with greater weight loss (45,35). As more safe and effective anti-obesity agents become available in prescription and over-the-counter settings, we can hopefully learn how to best couple behavioral and pharmacological treatments.

### Summary

The serious, complex, and refractory nature of obesity requires treatments that are based on a precise understanding of etiology at the individual level. Although our understanding of etiology has progressed during the last decade,

especially on the physiological side, our fund of knowledge is insufficient to target treatments based on individual heterogeneity. In the meantime, it is optimal to combine approaches that seek to alter the internal milieu with those that modify the external environment such as behavioral treatments at the individual level and public health policy at the macrolevel.

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