

Electrical Stimulation as Treatment for Obesity and Diabetes

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Abstract

The prevalence of obesity is growing, is driving an increase in the prevalence of diabetes, and is creating a major public health crisis in the United States. Lifestyle and behavior therapy rarely give durable weight loss. There are few medications approved for the treatment of obesity. Those that exist are limited in efficacy and using them in combination does not result in greater weight loss. Surgical treatments for obesity are effective and give durable weight loss, but are accompanied by measurable morbidity and mortality. Several pacing approaches are being tried and are an outgrowth of pacing for gastroparesis. The Transcend[®] pacemaker blocks vagal efferents and delays gastric emptying, giving a 40% loss of excess body weight, if certain screening procedures are employed. The Tantulus[™] pacemaker is still in development but increases antral muscular contractions and delays gastric emptying by stimulation during the absolute refractory period. Weight loss has been 30% of excess body weight, and glycohemoglobin decreased 1.6% in a trial of obese type 2 diabetes. Stimulation to the subdiaphragmatic sympathetics, vagal nerve stimulation with or without unilateral vagotomy, and intestinal pacing are other approaches that are still being evaluated preclinically. Clearly a safe, effective, and durable treatment for obesity is desperately needed. Electrical pacing of the gastrointestinal tract is promising therapeutically, and because pacemakers work through different mechanisms, combining pacemaker treatments may be possible. Rapid progress is being made in the field of electrical stimulation as a treatment for obesity and even greater progress can be expected in the foreseeable future.

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Abbreviations: (CCK) cholecystokinin, (GLP-1) glucagon-like peptide 1, (NYHA) New York Heart Association

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