treatment may well be "moderated" by these comorbidities (7). In this regard, the Institute of Medicine study notwithstanding, and as attested by several clinical practice guidelines (8), the PTSD diagnosis does predict a favorable response to a number of treatments, in addition to prolonged exposure therapy. Finally, brain imaging and other laboratory tests are emerging to add to the list of potential moderators that will predict differential response to treatment, but we have not yet reached a point where a biomarker will qualify as a diagnostic criterion for PTSD or any other DSM-5 disorder.

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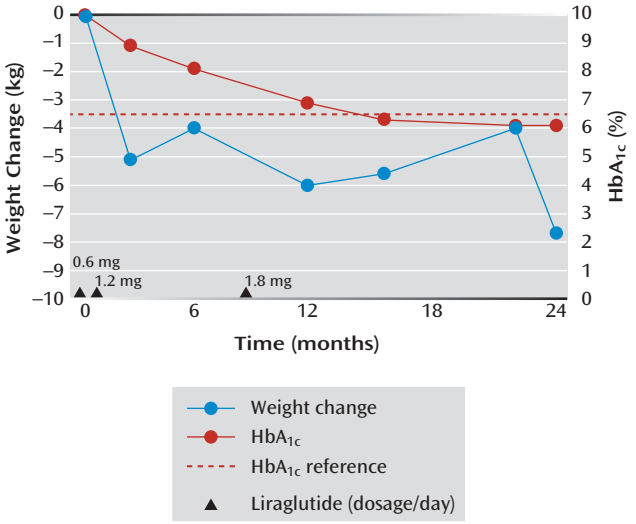
Sustained Weight Loss After Treatment With a Glucagon-Like Peptide-1 Receptor Agonist in an Obese Patient With Schizophrenia and Type 2 Diabetes

TO THE EDITOR: Obesity, diabetes, and cardiovascular disease associated with antipsychotics represent major unresolved clinical issues that contribute to the increasing mortality gap between patients with schizophrenia and the general population (1). At best, current interventions against antipsychotic-induced weight gain (e.g., metformin) facilitate a weight loss of up to 3 kg, but the long-term stability of this weight reduction is questionable (2). Glucagon-like peptide-1 (GLP-1) receptor agonists efficiently reduce blood glucose levels and confer only a negligible risk of hypoglycemia. For these reasons, GLP receptor agonists are widely used in the treatment of type 2 diabetes. GLP-1 receptor agonists stimulate glucose-induced insulin secretion, inhibit glucagon secretion, and reduce gastrointestinal motility, which reduce appetite and food intake. Ultimately, this also leads to weight loss in patients without type 2 diabetes (3). Currently, Novo Nordisk is pursuing U.S. Food and Drug Administration approval for liraglutide for obesity.

This case report describes the effects of GLP-1 receptor agonist treatment in a schizophrenia patient with antipsychotic-induced obesity and type 2 diabetes. The patient provided consent for publication.

FIGURE 1. Body Weight and Glycated Hemoglobin A_{1c} (HbA_{1c}) Levels During 2 Years of Glucagon-Like Peptide-1 (GLP-1) Receptor Agonist Treatment[a]



[a] Body weight timeline (blue line) and HbA_{1c} (red line) over 2 years of GLP-1 receptor agonist treatment in an obese patient with schizophrenia and dysregulated type 2 diabetes (baseline body mass index, 33.5). The dotted red line indicates the reference value for HbA_{1c} used to define diabetes (≥6.5%). Black triangles on the x-axis indicate time points and dosage increases of the GLP-1 receptor agonist liraglutide.

Case Report

A 60-year-old woman with clozapine-treated disorganized schizophrenia (hebephrenia) and a past history of drug abuse was referred to our diabetes outpatient clinic for dysregulated type 2 diabetes. The patient had been living in supported housing for 19 years.

Clinical and biochemical data from somatic and psychiatric records covering a 2-year period were obtained. At referral, the patient weighed 89 kg (body mass index, 33.5), and her glycated hemoglobin A_{1c} (HbA_{1c}) level was 10.0%. She was being treated with clozapine (375 mg/day), insulin (44 IU/day, biphasic insulin aspart), metformin (2 g/day), and simvastatin (10 mg/day). We initiated add-on

treatment with liraglutide (0.6 mg/day, subcutaneous injection), which was well tolerated, and self-administration was uncomplicated. After 3 weeks, the liraglutide dosage was increased to 1.2 mg/day, and after 8 months it was increased to 1.8 mg/day.

Three months of treatment reduced her HbA_{1c} level to 8.9% and her body weight by 5.1 kg. After 2 years of treatment, her total weight loss was 7.7 kg (an 8.7% body weight reduction) (Figure 1). After 14 months, her HbA_{1c} level was less than 6.5%, and the amount of insulin needed gradually decreased (28 IU/day). The patient's lifestyle and psychiatric status were stable during the 2-year period (a score of 30 on the Global Assessment of Functioning Scale), without hospital admissions.

Discussion

Two years of liraglutide treatment markedly decreased HbA_{1c} levels and resulted in a substantial weight loss in an obese patient with schizophrenia and dysregulated diabetes. To our knowledge, this is the first clinical evidence supporting the use of GLP-1 receptor agonists in the treatment of antipsychotic-induced weight gain (2).

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Monthly Injectable Naltrexone for Pathological Gambling

To the Editor: No medication is approved for the treatment of pathological gambling. Although oral naltrexone appears to be the most promising among seven therapeutic drugs investigated for gambling (1), poor adherence to oral naltrexone can be a problem (2). In addition, hepatotoxicity can occur in gambling patients taking oral naltrexone and nonsteroidal anti-inflammatory drugs (NSAIDs) concurrently (3). In contrast to oral naltrexone, injectable naltrexone did not cause hepatotoxicity in patients taking NSAIDs (4) and could improve medication adherence. Injectable naltrexone is approved for the treatment of alcohol dependence and opioid dependence, but the use of injectable naltrexone for gambling has not been reported. We report here the first case to our knowledge of gambling successfully treated with naltrexone injection.

Case Report

A 58-year-old man with alcohol dependence in remission, depression, and a 4-year history of pathological gambling presented to a clinic for the treatment of gambling. His gambling started after the initiation of pramipexole to control leg spasm and restless leg syndrome. He took pramipexole more than prescribed (up to 4 mg/day) as it significantly reduced his physical symptoms. This led to more gambling (casinos and pull tabs) and adversely affected his business, self-esteem, family relationships, and finances (he incurred gambling losses of $100,000). Gamblers Anonymous was not available nearby. Oral naltrexone was prescribed, and the dosage was increased to 200 mg/day to treat his gambling (3). Eight months later, after missing several appointments, he returned to the clinic confessing that he had not adhered to his oral naltrexone regimen after taking the drug for only a few weeks because it did not help him. He continued to gamble and lost up to $2,000 per month even after pramipexole was switched to clonazepam. A 5-week residential gambling program was not effective. He finally agreed to receive intramuscular naltrexone, 380 mg/month. A few months later, he denied having any craving to gamble. Clonazepam was switched back to pramipexole, which was more effective for restless leg syndrome. He abstained from gambling during the next 12 months of follow-up while receiving monthly injectable naltrexone and taking pramipexole. He abstained from alcohol during the treatment, and his depression, treated with citalopram, remained relatively stable.

Discussion

This case indicates that injectable naltrexone may successfully control gambling cravings and behaviors. Once-monthly intramuscular naltrexone may have an advantage over oral naltrexone for gambling patients with poor adherence to daily oral naltrexone, those with concurrent use of dopamine agonist for Parkinson's disease and other