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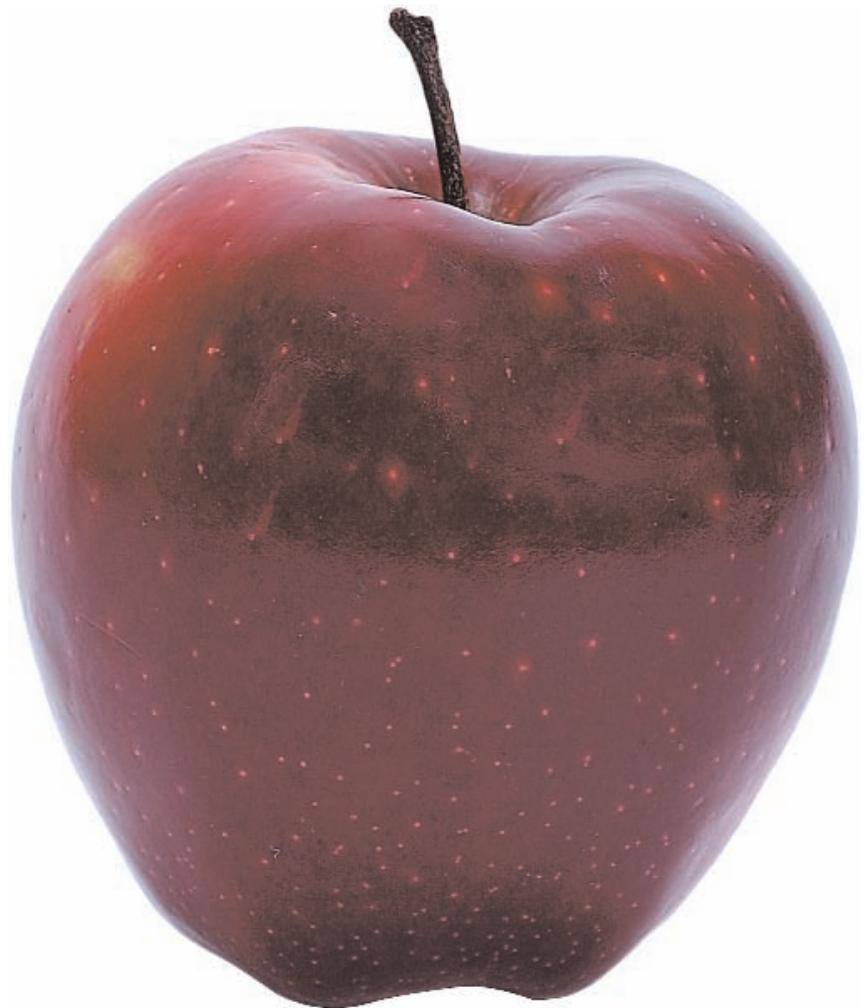
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# Dietary Intake of Patients with Schizophrenia

## BACKGROUND

Body weight variations in patients suffering from schizophrenia have been described long before the introduction of neuroleptic medication. For example, Kraepelin noted that in as early as 1919 that “the taking of food fluctuates from complete refusal to the greatest voracity.... Sometimes, in quite short periods, very considerable differences in the body weight are noticed....”<sup>1</sup> He also argued that sometimes weight gain and remission went hand in hand. Similarly, Jaspers, describing schizophrenia patients, noted “...a great weight gain during convalescence....”<sup>2</sup>

The introduction of neuroleptic medication signified a quantum leap in the treatment of psychotic states. Chlorpromazine, the first agent, was made available in 1950. Similar agents, such as fluphenazine, perphenazine, and later haloperidol, followed. Interestingly, though, it was soon noted that metabolic effects of some of these neuroleptic drugs were very common. For example, Planansky in 1958 stated that “...it is clear that the introduction of tranquilizing treatment on a



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mass scale has brought an entirely new problem into the wards of mental hospitals—obesity on a mass scale...<sup>3</sup> Some of the newer antipsychotics, including clozapine, olanzapine, and quetiapine, seem to have even higher propensity to introduce clinically meaningful body weight gain than some of the older agents.<sup>4</sup>

Overall, though, it may be hypothesized that an *a priori* increased risk of obesity seems to be associated with schizophrenia *per se* as depicted by historical observations, and such a trend is further aggravated by treatment with antipsychotics. Consistently, patients with schizophrenia in North America tend to be overweight.<sup>5</sup> Even though obesity in mentally healthy Americans is increasing at a fast pace, it seems that this trend is even more prevalent in the group of schizophrenia patients.<sup>6,7</sup> They seem to be at even higher risk for obesity and indeed are often obese to a considerable degree.<sup>8-10</sup>

Physical health risks of excess body weight are numerous and include insulin resistance, diabetes mellitus, and hyperlipidemia. Obesity has been associated with gallbladder disease, sleep apnea, chronic hypoxia and hypercapnia, degenerative joint disease, and certain cancers.

Obesity is an independent risk factor for death from coronary heart disease.<sup>11</sup> Apart from higher morbidity and mortality rates, overweight subjects are also more likely to experience impaired quality of life.<sup>12</sup>

While variations in dietary intake are known to predict the prevalence of body weight and thus physical morbidity and, consequently, dietary modifications and weight loss improve physical health status,<sup>13</sup> a possible influence of diet on mental health has been neglected. There is some evidence that obesity indirectly contributes to psychopathology.<sup>14-16</sup> Schizophrenia patients experience overweight as distress.<sup>17</sup> Their *a priori* poor quality of life is also significantly worsened by overweight.<sup>18</sup>

Yet, while the exact mechanisms of weight gain in schizophrenia are not known, it is generally accepted that the above-average obesity rates in patients are a result of poor dietary choices.<sup>19</sup> Thus, the interesting question arises as to whether the disproportionately high rates of obesity in patients with schizophrenia stem from a diet different to the diet observed in the general population and, if so, what constitutes these differences.

### DIETARY INTAKE OF PATIENTS WITH SCHIZOPHRENIA

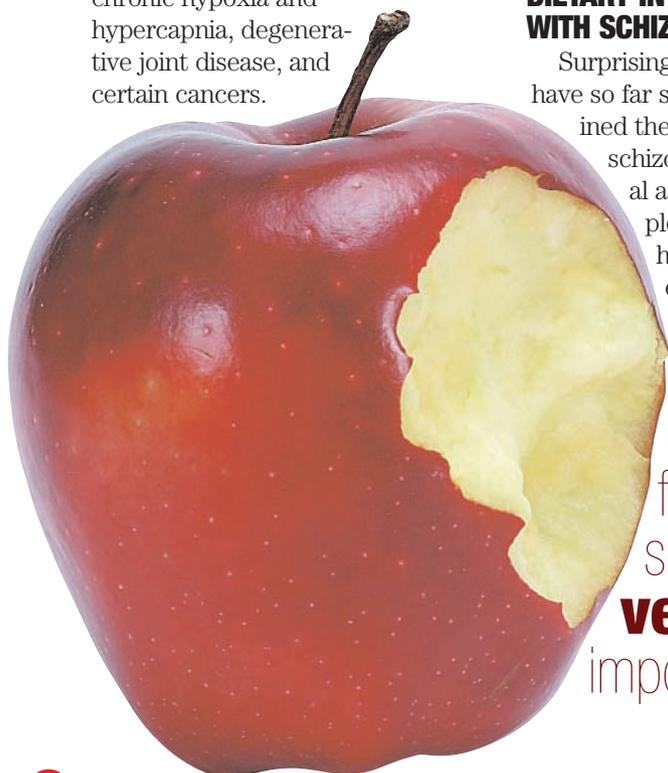
Surprisingly, only a few studies have so far systematically examined the diet in patients with schizophrenia. In a nutritional assessment among people living in “mental health residential houses” in Sydney,

Australia, it was observed that the respondents had a significantly higher prevalence of obesity (including abdominal obesity) than the general population.<sup>20</sup> Also, no subject met the recommended dietary intake for certain standardized “healthy” food groups, such as fruits or vegetables.

Brown, et al., assessed the food intake of 102 subjects with schizophrenia living semi-independently in long-term mental health housing in the UK.<sup>19</sup> The patients’ diets were found to contain more total fat and less fiber than diets of a reference population matched for age, gender, and social class. Intake of unsaturated fat was similar in both groups. Notably, not a single patient met the official British recommendations for a healthy diet, such as daily intake of five portions of fruit or vegetables.

Similarly, McCreadie et al. examined 30 patients suffering from schizophrenia living in assisted-living facilities in Scotland for their dietary intake.<sup>21</sup> Results were again compared to diets of a control group matched for sex, age, smoking, and employment status. Most schizophrenia patients in their sample were overweight or obese, and saturated fat intake was higher than recommended. Conversely, patients consumed significantly less energy, total fiber, retinol, carotene, vitamin C, vitamin E, and alcohol than the reference population. They also consumed fewer fruits and vegetable portions.

In 2003, McCreadie, et al., conducted another similar trial, this time incorporating a larger sample



Several studies point to decreased intake of “healthful food” [in schizophrenic patients], such as **fruits and vegetables**, which carry important vitamins and minerals.

of community-dwelling people with schizophrenia.<sup>22</sup> One-hundred and two patients were assessed for their dietary habits (with special emphasis on fruit and vegetable intake) and smoking behavior. Resulting cardiovascular risk factors were estimated as well. Again, a significant number of patients (73%) were overweight. When compared to Scottish reference intakes, male patients consumed a diet containing less cooked green and root vegetables, fresh fruit, skimmed or semi-skimmed milk, raw vegetables, or salad, potatoes, pasta, rice, and pulses. Female patients ate fewer potatoes, less pasta and rice, raw vegetables or salad, and also consumed less skimmed milk products. Regarding biochemical markers, more than half of the patients (53%) were outside the recommend low-density lipoprotein (LDL) to high-density lipoprotein (HDL) cholesterol ratio indicating increased saturated fat intake. There were no significant between-group differences in plasma glucose and serum lipid levels or in body mass index (BMI) between patients receiving long-acting intramuscular typical antipsychotic medication with or without other antipsychotics (27%); those receiving oral typical medication with or without atypicals (22%); and those receiving atypicals alone (43%) or no psychiatric medication at all (6%). Forty-two percent of subjects were below the recommended reference range for beta-carotene intake, whereas serum vitamin C content met recommended standards. Smokers (70% of the sample) had even lower fruit and vegetable intake than non-smokers. The authors concluded that patients made poor dietary choices; with males especially susceptible to poor dietary patterns.

**TABLE 1. Dietary intake of key nutrients in schizophrenia patients and the US population\***

	<b>Patients n = 146</b>	<b>Controls n = 13148</b>	<b>p</b>
<b>Total caloric intake</b>	<b>3057±1132</b>	<b>2206±31</b>	<b>0.002</b>
<b>Protein intake (g)</b>	<b>95±40</b>	<b>82.9±1.5</b>	<b>0.028</b>
<b>% of calories from protein</b>	<b>12.8±3.8</b>	<b>15.5±0.12</b>	<b>0.62</b>
<b>Carbohydrate intake (g)</b>	<b>394±166</b>	<b>262.9±4.1</b>	<b>0.003</b>
<b>% of calories from carbohydrates</b>	<b>51.8±10.6</b>	<b>48.7±0.46</b>	<b>0.41</b>
<b>Total fat intake (g)</b>	<b>121±61</b>	<b>86.1±1.71</b>	<b>0.006</b>
<b>% of calories from fat</b>	<b>35.1±9.2</b>	<b>34.1±0.36</b>	<b>0.74</b>
<b>Saturated fat intake (g)</b>	<b>42±24.1</b>	<b>29.9±0.68</b>	<b>0.001</b>
<b>Total cholesterol intake (mg)</b>	<b>341±241</b>	<b>293±8.6</b>	<b>0.45</b>

\* Population data adapted from the National Health and Nutrition Examination Survey, Cycle III<sup>25,26</sup>

Gothelf, et al., prospectively monitored food intake and concurrent energy expenditure of adolescent male inpatients with schizophrenia over a four-week observation period.<sup>23</sup> A dietitian closely monitored food intake for two consecutive days. All foods, beverages, and snacks were weighted before and after meals. Patients were allowed to choose freely what they wanted to eat. These authors found significantly increased caloric intake in a subgroup treated with the atypical antipsychotic olanzapine compared to a subgroup receiving haloperidol. The relative dietary percentages of protein, carbohydrates, and fat did not differ. Rather, the subgroup receiving the atypical antipsychotic simply ate more of the same foods and thus ended up with significantly higher weight gain. As a side note, physical activity was also measured via accelerometry monitor and a heart rate monitor. Ninety percent of subjects spent less than 10 continuous

minutes a day in moderate activity despite intensive staff efforts to promote exercise.

Our group examined a total of 146 adult community-dwelling outpatients suffering from schizophrenia for their dietary habits.<sup>24</sup> We compared the elicited nutritional values (i.e., caloric, protein, fat, and carbohydrate intake) to age- and gender-matched US population standards obtained from the NHANES III (National Health and Nutrition Examination Survey, Cycle 3). NHANES is a periodical public health survey that publishes thorough estimates of the average nutritional status for the US population and subgroups.<sup>25,26</sup> Table 1 shows our results.

Although not intentionally sampled, most patients in our sample were overweight or obese. Mean body mass index was 32.8 (±7.8). Mean BMI of male subjects was 30.8 (±7.3), and of female subjects 35.1 (±8.0).

As a group, patients ate consid-

erably more calories derived from quantitatively higher protein, carbohydrate, and fat intake than observed in the age- and gender-matched US population. Yet, the relative percentages of protein, carbohydrates, and fat comprising dietary intake were not different from the pattern observed in the general population. Thus, our patients appeared to make dietary choices similar to subjects in the population would make, but they simply ate more of the same food.

## SYNOPSIS

Overall, schizophrenia patients do not appear to have decreased intake of the protein, carbohydrates, or fat comprising the bulk of foods. Rather, their caloric intake is equal to or higher than the pattern observed in various population samples and evidently contributes to the consistently reported disproportionately high rates of overweight and obesity. Patients also do not seem to prefer or “crave” a certain nutrient group, such as fat or sugar, but eat more of all available food when given the opportunity.<sup>23</sup> Yet, higher quantitative intake does not simply translate into better food quality. Several studies point to decreased intake of “healthful food,” such as fruits and vegetables, which carry important micronutrients, such as vitamins and minerals. Whereas it has been shown that vitamin C intake was adequate in a sub-sample of schizophrenia patients, they lacked dietary beta-carotene at the same time.<sup>22</sup> It may be hypothesized that the overall increased dietary intake may “make up” for some deficits associated with poor dietary quality, but

micronutrient deficits may still be expected.

From a physical health perspective, the observed pattern of above-average caloric intake from a diet rich in saturated fat and sugar seems worrisome. Health burdens of such a constellation are apparent. High fat intake *per se*, for example, has been linked to a variety of medical problems such as coronary artery disease, hypertension, and cancer.<sup>27</sup> It may also predispose schizophrenia patients to premature death from complications of these disorders.<sup>28</sup> They already have a decreased life expectancy,<sup>29</sup> and the overtly high total fat intake together with a pattern of low fruit and vegetable consumption may only accelerate this trend.

From the mental health perspective, the patients’ subjective assessment of quality of life is considered to be a critical outcome variable in the care of individuals with schizophrenia.<sup>30</sup> Patients already suffer from low quality of life inherent to the chronic nature of their illness.<sup>31</sup> Overweight only further impairs quality of life.<sup>17</sup> Distress related to high body weight is a modifiable factor, and the quality of life of schizophrenic patients can be improved substantially by proper weight management, apart from obvious advantages for physical health.<sup>15</sup>

Fortunately, excess body weight is a modifiable risk factor. While weight gain is undoubtedly a complex occurrence and many factors, including use of antipsychotic medication, are involved, the main contributors to the currently observed public health obesity crisis are easily sidelined. The ongoing obesity

epidemic is primarily fueled by increased *per capita* caloric consumption and larger portion sizes, along with a lack of adequate physical exertion.<sup>32</sup>

In the clinical care of schizophrenia patients, however, body weight management has not been a primary concern. Usually, overweight becomes the focus of attention only after related medical comorbidities occur. Such situations, though, may be easily avoided. Contrary to popular belief, most schizophrenia patients seem to be well aware of their weight status and are willing to lose weight, but need proper guidance to do so.<sup>33</sup> Several structured weight loss programs tailored to the needs of patients with schizophrenia have been developed.<sup>34,35</sup> In fact, clinically meaningful reversal of weight gain while patients were still receiving antipsychotic medication has been reported. For example, O’Keefe, et al., showed successful weight control and, in several instances, weight loss through simple behavioral interventions among patients treated with neuroleptics.<sup>36</sup> Other more radical and invasive procedures have also been suggested for morbidly obese patients with schizophrenia.<sup>37</sup> These authors report excellent results from a small case series of schizophrenia patients refractory to conservative weight loss methods who underwent bariatric surgery and showed very similar rates of weight loss to a control group of mentally healthy yet equally obese individuals.

Additionally, schizophrenic patients tend to be sedentary,<sup>23</sup> and encouragement to engage in physical activity seems to be a largely neglected intervention.<sup>38</sup> Just as for

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mentally healthy individuals, a combination of dieting and exercise seems the most appropriate way to achieve long-term weight loss.<sup>39</sup> Along those lines, Menza, et al., reported results from a 52-week-long prospective, controlled study with subjects suffering from schizophrenia.<sup>40</sup> The authors employed a multimodal weight loss program that included both exercise and nutrition interventions and a behavioral therapy approach. Subjects participating in this program experienced significant weight loss and improvement in several associated health parameters (e.g., blood pressure and hemoglobin A1c levels), whereas a control group receiving no such intervention did not show these positive changes. Overall, increasing awareness in the field of schizophrenia care regarding the possibility to change diet and lifestyle factors is but a starting point to improve patient care, and ultimately, to prevent associated serious medical comorbidities.

## REFERENCES

- Kraepelin E. *Dementia Praecox and Paraphrenia*. Edinburgh, Scotland: E and S Livingstone, 1919.
- Jaspers K. *Allgemeine Psychopathologie, Sixth Edition*. Berlin, Germany: Springer, 1953.
- Planansky K. Changes in weight in patients receiving a tranquillizing drug. *Psychiatr Q* 1958;32:289-303.
- Allison BD, Casey DE. Antipsychotic-induced weight gain: A review of the literature. *J Clin Psychiatry* 2001;62(Suppl 7):22-31.
- Allison DB, Mentore JL, Heo M, et al. Antipsychotic-induced weight gain: A comprehensive research synthesis. *Am J Psychiatry* 1999;156:1686-96.
- Hedley AA, Ogden CL, Honson CL, et al. Prevalence of overweight and obesity among US children, adolescents, and adults, 1999-2002. *J Am Med Assoc* 2004;291(23):2847-50.
- Coodin S. Body mass index in persons with schizophrenia. *Can J Psychiatry* 2001;46(6):549-55.
- Hemel P, Casey D, Allison DB. Changes in body mass index for individuals with and without schizophrenia, 1987-1996. *Schizophr Res* 2002;55(3):277-84.
- Aronne LJ. Epidemiology, morbidity, and treatment of overweight and obesity. *J Clin Psychiatry* 2001;62(Suppl 23):13-22.
- Gopalaswamy AK, Morgan R. Too many chronic mentally disabled patients are too fat. *Acta Psychiatr Scand* 1985;72(3):254-8.
- Pi-Sunyer FX. Medical hazards of obesity. *Ann Intern Med* 1993;119(7pt2):655-60.
- Han TS, Tijhuis MAR, Jean MEJ, Seidell JC. Quality of life in relation to overweight and body fat distribution. *Am J Public Health* 1998;88:1814-20.
- Mertens IL, Van Gaal LF. Overweight, obesity, and blood pressure: The effects of modest weight reduction. *Obes Res* 2000;8(3):270-8.
- Eremis S, Cetin N, Tamar M, et al. Is obesity a risk factor for psychopathology among adolescents? *Pediatr Int* 2004;46(3):296-301.
- Kawachi I. Physical and psychological consequences of weight gain. *J Clin Psychiatry* 1999;60(Suppl 21):5-9.
- Foster GD, Sarwer DB, Wadden TA. Psychological effects of weight cycling in obese persons: A review and research agenda. *Obes Res* 1997;5(5):474-88.
- Strassnig M, Brar JS, Ganguli R. Body mass index and quality of life in community-dwelling patients with schizophrenia. *Schizophr Res* 2003;62(1-2):73-6.
- Allison DB, Mackell JA, McDonnell DD. The impact of weight gain on quality of life among persons with schizophrenia. *Psychiatr Serv* 2003;54(4):565-7.
- Brown S, Birtwistle J, Roe L, Thompson C. The unhealthy lifestyle of people with schizophrenia. *Psychol Med* 1999;29(3):697-701.
- Wallace B, Tennant C. Nutrition and obesity in the chronic mentally ill. *Aust N Z J Psychiatry* 1998;32(1):82-5.
- McCreadie R, MacDonald E, Blackcock C, et al. Dietary intake of schizophrenic patients in Nithsdale, Scotland: Case-control study. *BMJ* 1998;317:784-5.
- McCreadie RG, Scottish Schizophrenia Lifestyle Group. Diet, smoking, and cardiovascular risk in people with schizophrenia: Descriptive study. *Br J Psychiatry* 2003;183:534-9.
- Gothelf D, Falk B, Singer P, et al. Weight gain associated with increased food intake and low habitual activity levels in male adolescent schizophrenic inpatients treated with olanzapine. *Am J Psychiatry* 2002;159:1055-7.
- Strassnig M, Brar JS, Ganguli R. Nutritional assessment of patients with schizophrenia: A preliminary study. *Schizophr Bull* 2003;29(2):393-7.
- Alaimo K, McDowell MA, Briefel RR, et al. Dietary intake of vitamins, minerals, and fiber of persons ages two months and over in the United States. Third National Health and Nutrition Examination Survey, Phase 1, 1988-91. Advance data from vital and health statistics; No 258; 1994: Hyattsville, Maryland: National Center for Health Statistics.
- McDowell MA, Briefel RR, Alaimo K, et al. Energy and macronutrient intakes of persons ages two months and over in the United States: Third National Health and Nutrition Examination Survey, Phase 1, 1988-91. Advance data from vital and health statistics; No 255; 1994: Hyattsville, Maryland: National Center for Health Statistics.
- Prentice AM. Overeating: The health risks. *Obes Res* 2001;9(Suppl 4):234S-8S.
- Weisburger JH. Eat to live, not live to eat. *Nutrition* 2000;16(9):767-73.
- Simpson JC, Tsuang MT. Mortality among patients with schizophrenia. *Schizophr Bull* 1996;22(3):485-99.
- Steinwachs DM, Fischer EP, Lehman AF. Outcomes assessment: Information for improving mental health care. *New Dir Ment Health Serv* 1996;71:49-57.
- Ritsner M, Kurs R, Gibel A, et al. Predictors of quality of life in major psychoses: A naturalistic follow-up study. *J Clin Psychiatry* 2003;64(3):308-15.
- Goldberg JP, Belury MA, Elam P, et al. The obesity crisis: Don't blame it on the pyramid. *J Am Diet Assoc* 2004;104(7):1141-7.
- Strassnig M, Brar JS, Ganguli R. Self-reported body weight status and dieting practices in community-dwelling patients with schizophrenia. *Schizophr Res* [in press].
- Ganguli R, Pandina G, Turkoz I, et al. The effectiveness of behavioural treatment for weight loss in patients with schizophrenia. Presented at the 43rd Annual Meeting of the New Clinical Drug Evaluation Unit (NCDEU); Boca Raton, FL, 2003.
- Vreeland B, Minsky S, Menza M, et al. A program for managing weight gain associated with atypical antipsychotics. *Psychiatr Serv* 2003;54(8):1155-7.
- O'Keefe CD, Noordsy DL, Liss TB, Weiss H. Reversal of antipsychotic-associated weight gain. *J Clin Psychiatry* 2003;64(8):907-12.
- Hamoui N, Kingsbury S, Anthonie GJ, Crookes PF. Surgical treatment of morbid obesity in schizophrenic patients. *Obes Surg* 2004;14(3):349-52.
- Callaghan P. Exercise: A neglected intervention in mental health care? *J Psychiatr Ment Health Nurs* 2004;11(4):476-83.
- National Task Force on the Prevention and Treatment of Obesity. Overweight, obesity, and health risk. *Arch Intern Med* 2000;160(7):898-904.
- Menza M, Vreeland B, Minsky S, et al. Managing atypical antipsychotic-associated weight gain: 12-month data on a multimodal weight control program. *J Clin Psychiatry* 2004;65(4):471-7. ●