Classification of Type 1 Diabetic Females With Bulimia Nervosa Into Subgroups According to Purging Behavior

MASATO TAKII, MD[1]
YASUKO UCHIGATA, MD[2]
TAKEHIRO NOZAKI, MD[1]
HIROAKI NISHIKATA, MD[1]

KEISUKE KAWAI, MD[1]
GEN KOMAKI, MD[3]
YASUHIKO IWAMOTO, MD[2]
CHIHARU KUBOK, MD[1]

OBJECTIVE — To classify type 1 diabetic females with bulimia nervosa (BN) by type of inappropriate compensatory behavior in order to prevent weight gain (ICB) and to investigate the group differences.

RESEACH DESIGN AND METHODS — Type 1 diabetic females with BN, diagnosed by structured diagnostic interview based on DSM-IV (*Diagnostic and Statistical Manual of Mental Disorders*, 4th ed.) criteria, were classified by type of ICB as follows: *1*) only severe insulin omission as an ICB (BN-I) ($n = 22$), *2*) both severe insulin omission and self-induced vomiting and/or laxative abuse (BN-IP) ($n = 22$), or *3*) no insulin omission but another ICB (BN-NI) ($n = 11$). The clinical characteristics of these three groups and a binge-eating disorder (BED) group ($n = 24$) were compared.

RESULTS — The BN-IP and BN-I groups had the highest HbA$_{1c}$ levels. The BN-IP group had the highest rates of diabetic neuropathy, retinopathy, and nephropathy. The BN-NI group had the second highest rates of neuropathy and retinopathy. The BN-IP group had the highest frequencies of diabetes- and ketoacidosis-related hospital admissions, and the BN-I group had the second highest frequencies. The BN-NI group showed the highest scores on psychological tests related to depression, anxiety, eating disorder psychopathology, and perfectionism. The BN-NI group had the highest rate of history of visits to a psychiatrist, and the BN-IP group had the second highest history.

CONCLUSIONS — Type 1 diabetic females with BN seem not to be homogenous and can be classified into three distinctive subgroups by type of ICB. Individuals with BN-IP had the most severe problems with both medical and psychological/behavioral aspects. Individuals with BN-NI manifested the highest psychological distress. The BN-I group had comparatively mild distress despite having the poorest metabolic control. Each BN group manifested more severe pathology than the BED group.

Diabetes Care 25:1571–1575, 2002

C oncurrence of eating disorders is often problematic for clinicians treating diabetic patients, especially young type 1 diabetic females (1–7). Over the past two decades, a large number of studies focusing on this issue have reported that concurrence of eating disorders results in deterioration of metabolic control in diabetic patients and hastens the development of long-term complications of diabetes (1–5). These studies also point out the difficulties involved in improving the condition of these patients and the urgent necessity for developing effective treatments (2,3). However, few studies have investigated in detail the clinical characteristics of these patients (5), especially the psychological/behavioral aspects. No comprehensively effective treatment regimen has been established.

Research on these patients is inadequate because of the insufficient number of cases and the problem of getting truthful information from patients. Because these patients are ashamed of their problematic behaviors (for example, binge eating or purging) and are fearful of being criticized, they tend to keep their behaviors secret. Therefore, the number of identified patients with eating disorders is probably much smaller than the actual number. Physicians who are not eating disorder specialists often overlook these conditions. Patients often conceal important facts when interviewed by eating disorder specialists for research purposes. Moreover, even when patients confess their problematic behaviors, such as binge eating, they often understate the frequency/amount and lack courage to confess more delicate matters, such as insulin omission. To extract truthful information, therapists with sufficient knowledge of and therapeutic experience with both diabetes and eating disorders should obtain, little by little, more exact information as the therapy progresses.

More so than other eating disorders, those with binge eating have special clinical importance because of their high prevalence and severe influence on metabolic control. In a previous study (5), we classified type 1 diabetic females with recurrent binge eating into two groups—bulimia nervosa (BN) and binge-eating disorder (BED)—according to DSM-IV (*Diagnostic and Statistical Manual of Mental Disorders*, 4th ed.) criteria (8) and compared the clinical characteristics of these two groups with those of a control

group without eating disorders. The primary difference between the BN group and the BED group is the presence of inappropriate compensatory behavior in order to prevent weight gain (ICB), which occurs at least twice a week in the BN group. The BN group had the most severe medical problems, the poorest metabolic control, the most long-term diabetic complications, and the most severe psychological/behavioral factors, including eating disorder psychopathology, depression, and anxiety. The control group showed the mildest pathology, and the BED group was between the BN and control group. Moreover, serum HbA_{1c} levels were most associated with the presence of severe insulin omission in these type 1 diabetic females with binge eating.

Insulin omission, a behavior in which patients intentionally omit or reduce their prescribed insulin, has been reported to be prevalent in type 1 diabetic patients (9). Insulin is often omitted for purposes of preventing weight gain, especially in young women, and has been discussed in relation to eating disorders (6,9). DSM-IV diagnostic criteria for BN has for the first time accepted insulin omission as an ICB, which is necessary for the diagnosis of BN. According to the DSM-IV criteria, type 1 diabetic patients with recurrent binge eating who do not exhibit other ICBs in addition to insulin omission are now for the first time being diagnosed as having BN. Although these diabetes-specific BN patients had been observed to have severe medical problems, there have been few detailed studies about their overall clinical characteristics. No studies have compared these subjects with type 1 diabetic patients with BN who exhibit any other ICB.

This study was designed to increase the knowledge of clinical characteristics of type 1 diabetic females with recurrent binge eating, especially those of severe cases such as individuals with BN. Throughout the process of treatment of these patients, clinical characteristics were investigated in detail through interviews. Patients were classified by the presence or absence and type of ICB as follows, and the clinical characteristics of the groups were compared: *1*) BED patients, *2*) BN patients only using severe insulin omission as an ICB, *3*) BN patients using both severe insulin omission and self-induced vomiting and/or laxative abuse, and *4*) BN patients not using insulin omission but using another ICB. Our main hypotheses were as follows:

- Each BN group would have more severe medical and psychological problems than the corresponding BED group.

- BN patients can be divided into several distinct subgroups according to type of ICB, because each BN group shows special clinical characteristics.

RESEARCH DESIGN AND METHODS

Subjects
Subjects included 79 females with type 1 diabetes and BN or BED, age 14–36 years. From June 1994 to December 2001, they were referred to the Department of Psychosomatic Medicine, Graduate School of Medical Sciences, Kyushu University, for treatment of disordered eating and type 1 diabetes and fulfilled the following participation criteria: *1*) diagnosed with type 1 diabetes for at least 1 year and *2*) binge eating for at least 6 months. Binge eating was defined according to the DSM-IV diagnostic criteria for BN: *1*) the consumption of a large amount of food, *2*) loss of control over eating at the time, and *3*) bingeing at least twice a week for 3 months. A large amount of food was defined as the consumption of ≥500 calories at one sitting, not as part of a regular meal or for its nutritional value (10).

Classification of BN and BED groups
At the first visit to the outpatient clinic, each patient underwent a diagnostic interview and was placed into one of two groups according to whether or not their symptoms met the DSM-IV diagnostic criteria for BN. The diagnostic interview followed a format based on the DSM-IV criteria for eating disorders: the Structured Clinical Interview for DSM-IV (11). A total of 55 patients met the criteria for BN, and 24 met the DSM-IV research criteria for BED (8). As mentioned above, the primary difference between the two groups was the presence of an ICB at least twice a week for 3 months in subjects with BN. An ICB did not occur or occurred at a frequency of less than twice a week in subjects with BED. Although insulin omission or reduction at least twice a week could be considered an ICB in the DSM-IV diagnostic criteria for BN, insulin omission as an ICB in type 1 diabetic females with BN is usually done more frequently and in a more extreme way (more than one in four injections or a corresponding reduction in the amount of insulin injected) (5). In this study, insulin omission as an ICB (severe insulin omission) was defined as omission of at least one-quarter of the prescribed insulin to prevent weight gain.

Classification of BN patients
The most frequent ICBs were severe insulin omission of more than one in four injections or the whole prescribed dosage of insulin, self-induced vomiting, and laxative abuse. BN patients were classified according to the presence/absence of severe insulin omission and self-induced vomiting/laxative abuse. Of the three possible ICBs, the patients in the BN–insulin omission group (BN-I) ($n = 22$) had only severe insulin omission. The patients in the BN–insulin omission/other purging group (BN-IP) ($n = 22$) had severe insulin omission and self-induced vomiting and/or laxative abuse. The patients in the BN–no insulin omission group (BN-NI) ($n = 11$) did not have severe insulin omission but did have another ICB, including self-induced vomiting, laxative abuse, or other ICBs.

Psychological measures
Psychological/behavioral traits common to eating disorders were assessed using the Eating Disorder Inventory (EDI), a 64-item self-reporting multiscale measure (12). The EDI consists of eight subscales: Drive for Thinness, Interoceptive Awareness, Bulimia, Body Dissatisfaction, Ineffectiveness, Maturity Fears, Perfectionism, and Interpersonal Distrust.

The degree of depression was assessed with the Zung Self-Rating Depression Scale (SDS), a 20-item self-reporting quantitative measure of depressive symptomatology (13). A strong correlation was reported between SDS and the Hamilton Rating Scale for Depression (14).

Anxiety was assessed with the State-Trait Anxiety Inventory (STAI), which comprises two separate 20-item self-reporting scales for measuring state and trait anxiety (15). Trait anxiety refers to relatively stable individual differences in anxiety proneness as a personality trait, whereas state anxiety refers to a transitory and unpleasant emotional state or condition. Only the Trait-Anxiety scale of STAI (STAI-T) was used in this study.

Beginning about halfway through the study, perfectionism was assessed for 50 patients with the Multiple-Dimension

Table 1—Demographic and medical factors for each group

	BED	BN-I	BN-IP	BN-NI	P	F (df = 3, 75), χ^2
n	24	22	22	11	—	—
Age (years)	25.2 ± 5.4	22.3 ± 4.4	23.7 ± 4.7	22.3 ± 3.1	0.1615	1.763
Onset of type 1 diabetes (years)	17.5 ± 8.1	15.9 ± 5.8	13.1 ± 5.4	14.0 ± 4.4	0.1059	2.111
Duration of type 1 diabetes (years)	7.1 ± 5.7	6.4 ± 3.8	10.5 ± 7.0	8.3 ± 5.1	0.1151	2.043
Onset of eating disorder (years)	21.7 ± 5.7	17.9 ± 4.5	17.5 ± 3.6	17.9 ± 2.3	0.0060	4.482
Duration of eating disorder (years)	3.5 ± 3.1	4.2 ± 3.5	6.3 ± 4.0	4.4 ± 3.0	0.0556	2.639
BMI (kg/m^2)	24.1 ± 2.6	22.1 ± 2.7	20.4 ± 2.2	22.3 ± 2.7	<0.0001	8.431
HbA$_{1c}$ (%)	9.8 ± 1.7	12.4 ± 2.1	13.0 ± 3.1	9.7 ± 2.4	<0.0001	10.387
Neuropathy (%)	16.7	28.6	72.7	54.5	0.0006	17.202
Retinopathy (%)	8.3	19.0	54.5	45.5	0.0026	14.259
Nephropathy (%)	8.3	4.8	27.3	0	0.0469	7.957
Admission frequency (times/year)	0.368 ± 0.297	0.936 ± 1.059	1.163 ± 0.918	0.431 ± 0.364	0.0028	5.117
Admission for DKA (times/year)	0.025 ± 0.093	0.190 ± 0.526	0.444 ± 0.852	0.029 ± 0.050	0.0479	2.762
Admission for hypoglycemia (times/year)	0.017 ± 0.049	0.102 ± 0.456	0.100 ± 0.246	0	0.5607	0.690
Eating disorder preceded diabetes (%)	12.5	13.6	0	0	0.1601	5.165

Data are means ± SD unless otherwise indicated.

Perfectionism Scale (MPS), a self-reporting multiscale measure (16). The MPS consists of six subscales: Concern Over Mistakes, Personal Standards, Parental Expectations, Parental Criticism, Doubts About Actions, and Organization.

A higher score indicates more severe psychopathology on each psychological measure. Reliability and validity have been established for all measures.

Clinical interview and questionnaire
At the first visit to our outpatient clinic, each patient had a detailed clinical interview. We obtained information concerning current and past binge eating, the frequency (days/week), and the number of kilocalories consumed most commonly at one sitting, and the presence, type, and frequency of ICBs. The frequency, dose, and motive for insulin omission were carefully determined. We also asked the number of admissions for diabetes, for hypoglycemia, and for diabetic ketoacidosis (DKA). These findings were confirmed and corrected at every opportunity, for example, in inpatient or outpatient therapy and in follow-up interviews.

Blood glucose control and BMI
HbA$_{1c}$ levels were measured by high-performance liquid chromatography. The normal range in our laboratory was 4.3–5.8%. Height and weight were measured, and BMI was calculated.

Long-term diabetic complications
Each patient routinely underwent fundus, urinary, and neurological examinations at the hospital that they were attending. Diabetic retinopathy and neuropathy were obtained from medical records.

Statistical analysis
Statistical analysis consisted of one-way ANOVAs and χ^2 tests. Multiple comparisons were performed using Fisher's adjusted t tests.

RESULTS — The demographic and medical characteristics of each group are presented in Table 1. There were no significant between-group differences in the mean age at first visit, the mean age at onset, or the duration of type 1 diabetes. The BED group had a significantly later onset of eating disorder than any of the three BN groups, and the disorder tended to be of shorter duration than that of the BN-IP group. Individuals with BED had a significantly higher BMI than individuals with BN-I and BN-IP. Individuals with BN-I and BN-NI had a significantly higher BMI than individuals with BN-IP. The BN-I and BN-IP groups had significantly higher HbA$_{1c}$ levels than the BED and BN-NI groups. The BN-IP group had a significantly higher rate of diabetic neuropathy, retinopathy, and nephropathy. Individuals with BN-NI had the second highest rate of neuropathy and retinopathy. Individuals with BN-IP had a significantly higher frequency of diabetes-related hospital admissions than individuals with BED and BN-NI, and individuals with BN-I had a significantly higher frequency than individuals with BED. The BN-IP group had a significantly higher frequency of hospital admissions related to DKA than the BED and BN-NI groups.

There were three BED patients and three BN-I patients for whom the onset of the eating disorder was earlier than that of type 1 diabetes. Therefore, the onset of type 1 diabetes preceded the eating disorder in 92.4% (72 of 79) of the subjects.

The psychological and behavioral characteristics of each group are presented in Table 2. The three BN groups showed significantly higher total EDI, EDI Interceptive Awareness, Bulimia, and Ineffectiveness subscale scores than the BED group. The BED group showed a tendency to have a lower score on the EDI subscale of Maturity Fear than the BN-IP group and on the subscale Perfectionism than the BN-NI group. The BN-NI group had significantly higher SDS and STAI-T scores than the BED and BN-I groups, and the BN-IP group had significantly higher scores than the BED group.

The BN-IP and BN-NI groups significantly ingested the largest amount at one sitting when binge eating, with the BN-I group ingesting the next largest amount. The BN-I and BN-IP groups had a tendency to have a higher frequency of binge eating than the BED group. The BN-NI group had the highest rate of history of visits to a psychiatrist, with the BN-IP group having the next highest rate.

The BN-NI group had significantly higher scores than the other three groups on the total MPS and MPS Personal Standards subscale. The BN-NI group had a significantly higher score than the BED and BN-I groups, and the BN-IP group had a significantly higher score than the

Table 2—Psychological and behavioral characteristics of each group

	BED	BN-I	BN-IP	BN-NI	P	F, χ^2
n	24	22	22	11	—	—
Total EDI	63.9 ± 24.6	85.8 ± 35.9	93.7 ± 26.9	103.1 ± 25.2	0.0011	6.003
Drive for Thinness	10.0 ± 5.6	10.9 ± 6.0	13.4 ± 4.7	12.3 ± 6.0	0.2492	1.403
Interoceptive Awareness	6.0 ± 4.9	11.3 ± 8.3	12.6 ± 5.3	14.8 ± 7.0	0.0010	6.027
Bulimia	8.8 ± 4.5	12.3 ± 6.0	14.7 ± 5.4	16.1 ± 5.0	0.0006	6.568
Body Dissatisfaction	18.5 ± 6.3	18.6 ± 6.3	18.0 ± 6.4	21.0 ± 6.7	0.6472	0.554
Ineffectiveness	7.7 ± 4.9	12.4 ± 7.1	14.2 ± 6.2	16.4 ± 6.9	0.0008	6.216
Maturity Fears	5.6 ± 3.9	8.4 ± 4.7	9.8 ± 5.5	9.1 ± 4.2	0.0284	3.206
Perfectionism	2.6 ± 3.5	4.9 ± 5.3	4.6 ± 4.6	7.1 ± 3.4	0.0458	2.810
Interpersonal Distrust	4.6 ± 3.7	7.1 ± 4.2	6.5 ± 4.2	6.4 ± 4.5	0.2307	1.469
SDS	44.5 ± 7.3	48.5 ± 8.3	53.4 ± 10.0	55.8 ± 8.2	0.0006	6.425
STAI-T	50.9 ± 9.8	53.5 ± 9.5	59.5 ± 10.4	62.5 ± 9.3	0.0029	5.103
Binge eating amount	—	—	—	—	0.0001	—
≤500 kcal	13	9	1	1	—	—
≤1,000 kcal	10	7	6	3	—	—
≤2,000 kcal	1	6	15	7	—	—
Binge eating frequency (days/week)	4.4 ± 2.0	6.0 ± 1.7	5.8 ± 1.7	5.5 ± 1.8	0.0564	2.995
Attend psychiatry (%)	8.3	18.2	50.0	63.6	0.0008	—
n	11	14	19	6	—	—
Total MPS	99.1 ± 17.7	92.5 ± 23.0	102.3 ± 16.6	122.8 ± 25.0	0.0272	3.340
Concern Over Mistakes	23.4 ± 7.0	23.4 ± 8.8	27.2 ± 7.4	31.5 ± 9.6	0.1320	1.968
Personal Standards	19.3 ± 2.5	17.8 ± 5.8	19.3 ± 4.4	24.8 ± 6.2	0.0338	3.149
Parental Expectations	13.7 ± 4.1	12.0 ± 4.8	11.9 ± 4.7	15.2 ± 5.3	0.3896	1.027
Parental Criticism	10.8 ± 4.7	9.7 ± 3.7	10.9 ± 4.0	11.7 ± 3.4	0.7373	0.423
Doubts About Actions	11.9 ± 4.4	12.0 ± 2.8	14.3 ± 3.4	17.0 ± 2.8	0.0128	4.017
Organization	20.0 ± 3.1	17.6 ± 4.7	18.7 ± 4.7	22.7 ± 4.7	0.1213	2.041

Data are means ± SD unless otherwise indicated.

BED group on the MPS subscale Doubts About Actions.

The extent of insulin omission in patients for whom the extent could be confirmed showed that 14 of 16 (87.5%) BN-I patients omitted or reduced at least half of their prescribed insulin, as did 15 of 18 (83.3%) BN-IP patients. Preventing weight gain was the most significant motivation reported by patients who did severe insulin omission. In the BN-IP group, 19 patients did self-induced vomiting, 8 did laxative abuse, and 5 did both as ICBs. In the BN-NI group, six patients did only self-induced vomiting, one did only laxative abuse, two did self-induced vomiting and laxative abuse, and, of the two patients without self-induced vomiting or laxative abuse, one did vigorous exercise and the other fasted.

CONCLUSIONS — The BN-IP group showed the most severe medical problems, such as the poorest metabolic control, the highest rates of diabetic long-term complications, and the highest frequency of hospital admission related to diabetes and to DKA. The main reason for

the development of DKA was almost always extreme insulin omission. BN-I patients also had serious medical problems, such as poor metabolic control, equal to that of BN-IP patients and had a high frequency of hospital admissions related to diabetes, second to that of BN-IP patients. However, the rates of diabetic neuropathy and retinopathy were lower than those for BN-IP and BN-NI patients. A shorter duration of type 1 diabetes or an eating disorder seems to be the reason for the lower rate, but the difference was not statistically significant. Although the severity of poor metabolic control in BN-NI patients was significantly milder than that in BN-IP and BN-I patients, the rate of concurrent neuropathy and retinopathy was the highest after BN-IP patients. We will investigate in detail the risk factors for the development of diabetic long-term complications in type 1 diabetic females with binge eating and report this issue in a future study.

On the contrary, in psychological tests, the BN-NI scores tended to be the highest. The BN-NI group scored the highest on SDS and STAI-T, which mea-

sure the degree of depression and anxiety, respectively, and showed significantly higher total MPS scores than the other groups. They also scored higher on some subscales of this psychological test related to perfectionism. Although there were no significant differences among the BN groups on the EDI, the BN-NI group tended to show higher scores than the BN-IP and BN-I groups. The rate of past and/or current visits to a psychiatrist was the highest for the BN-NI group. These psychological findings seem to indicate that BN-NI patients have more severe subjective distress than patients of the other groups.

The basic difference between the BN-NI groups and the other two BN groups was whether or not they regularly used insulin omission. Insulin omission is the most reliable ICB by which diabetic patients can easily prevent weight gain. Young type 1 diabetic females often have a conviction that good metabolic control results in weight gain. These patients, especially those with binge eating, are often in a latently/obviously conflicting condition in which they feel they must choose

body weight or metabolic control, while exposed to the strong temptation of insulin omission.

Patients who give body weight priority often omit insulin to evade this conflict. Through insulin omission, they can ease their mind by keeping slim despite their binge eating. They will surely have to pay a heavy price in destructive medical outcomes, including early development of long-term complications because of extremely poor metabolic control. Severe insulin omission is the most predictive factor of higher HbA$_{1c}$ level in type 1 diabetic females with binge eating (5). However, they feel little or no fear of the forthcoming tragedy because they are in denial. An irrational, emotional focus on body weight is now all consuming.

On the other hand, patients who do not omit insulin are often more conscious of the importance of metabolic control and continue to have distress related to uncontrollability of both body weight and metabolic control. There seems to be a relationship between the high scores on psychological tests for perfectionism and the absence of insulin omission in BN-NI patients: *1)* originally, most perfectionist patients are not likely to omit insulin because they cannot neglect poor metabolic control, and *2)* struggling inefficiently to control both body weight and metabolic control seems to raise the score of perfectionism.

Thus, the initial psychological tendency seems to considerably influence by the choice of ICB. However, change or increase in the chosen ICB is often observed over the course of the disease. We will investigate the ICB course in detail and clarify this question in a future study.

The rates of patients with severe medical and psychological/behavioral problems were the highest in the BN-IP group. Especially notable was the high number of BN-IP patients who met the criteria for personality disorders according to the DSM-IV criteria. There may be two reasons for the high rate of problematic patients in the BN-IP group: *1)* patients who originally have severe psychopathology may often develop more severe eating disorders that result in multiple ICBs, and *2)* because the duration of diabetes and eating disorders is the longest in the BN-IP group, patients may tend to be gradually driven into more severe eating disorder psychopathology over the course of disease, often coming to use multiple ICBs.

We will also investigate the concurrence of personality disorders and report this issue in a future study.

The findings of this study confirm the severity of insulin omission in type 1 diabetic females with recurrent binge eating, with the majority of patients omitting over one-half of their prescribed insulin. Insulin omission as an ICB used to diagnosis BN might be better defined to include only the most severe omissions, such as more than one-fourth of the prescribed insulin.

In summary, the findings of this study suggest that type 1 diabetic patients with BN are not homogenous and can be classified into three distinct subgroups. Patients who did both insulin omission and self-induced vomiting/laxative abuse (BN-IP) were the most problematic from the medical aspect, and they also had serious psychological/behavioral problems. Patients who did not omit insulin but did self-induced vomiting or laxative abuse (BN-NI) manifested comparatively mild metabolic control problems, but the rate of long-term complications was high. Distress manifested in psychological tests and history of psychiatry attendance were the most severe. Patients who did only insulin omission as an ICB (BN-I) manifested the mildest distress of the three BN groups on psychological tests. The apparent comparative lack of distress of these patients largely results from taking the easy way of keeping their body slim, insulin omission, as an avoidance mechanism. Although these three subgroups of BN had distinctive characteristics, each had more severe medical and psychological/behavioral problems than the patients with BED. Clinicians may be able to recognize the clinical characteristics of each type 1 diabetic female with BN by paying attention to the type of ICB she exhibits and tailor the treatment accordingly.

References
1. Rodin GM, Daneman D: Eating disorders and IDDM: a problematic association. *Diabetes Care* 15:1402–1412, 1992
2. Rubin RR, Peyrot M: Psychosocial problems and interventions in diabetes: a review of the literature. *Diabetes Care* 15: 1640–1657, 1992
3. Marcus MD, Wing RR: Eating disorders and diabetes. In *Neuropsychological and Behavioral Aspects of Diabetes*. Holmes CS, Ed. New York, Springer-Verlag, 1990, p. 102–121
4. Rydall AC, Rodin GM, Olmsted MP, Devenyi RG, Daneman D: Disordered eating behavior and microvascular complications in young women with insulin-dependent diabetes mellitus. *N Engl J Med* 336:1849–1854, 1997
5. Takii M, Komaki G, Uchigata Y, Maeda M, Omori Y, Kubo C: Differences between bulimia nervosa and binge-eating disorder in females with type 1 diabetes: the important role of insulin omission. *J Psychosom Res* 47:221–231, 1999
6. Rodin GM, Johnson LE, Garfinkel PE, Daneman D, Kenshole AB: Eating disorders in female adolescents with insulin dependent diabetes mellitus. *Int J Psychiat Med* 16:49–57, 1986
7. Fairburn CG, Peveler RC, Davies B, Mann JI, Mayou RA: Eating disorders in young adults with insulin dependent diabetes mellitus: a controlled study. *Br Med J* 303: 17–20, 1991
8. American Psychiatric Association: *Diagnostic and Statistical Manual of Mental Disorders.* 4th ed. Washington, DC, American Psychiatric Association, 1994
9. Polonsky WH, Aponte JE, Anderson BJ, Jacobson AM, Lohrer PA, Cole CF: Insulin omission in women with IDDM. *Diabetes Care* 17:1178–1185, 1994
10. LaGreca AM, Schwarz LT, Statin W: Eating patterns in young women with IDDM: another look. *Diabetes Care* 10:659–660, 1987
11. First MB, Gibbon M, Spitzer RL, Williams JBW: *User's Guide for the Structured Clinical Interview for DSM-IV AXIS I Disorders: Research Version.* New York, Biometrics Research Department, Columbia University, 1996
12. Garner DM, Olmsted MP, Polivy J: Development and validation of a multidimensional eating disorder inventory for anorexia nervosa and bulimia. *Int J Eat Disorder* 2:15–34, 1983
13. Zung WWK: The depression status inventory: an adjunct to the self-rating depression scale. *J Clin Psychol* 28:539–543, 1972
14. Hamilton M: A rating scale for depression. *J Neurol Neurosur Psychiatry* 23:56–62, 1960
15. Spielberger CD, Gorsuch RL, Lushene R, Vagg PR, Jacob GA: *Manual for the State-Trait Anxiety Inventory (Form Y)*. Palo Alto, CA, Consulting Psychologists Press, 1983
16. Frost RO, Marten P, Lahart C, Rosenblate R: The dimensions of perfectionism. *Cognitive Ther Res* 14:449–468, 1990