Decreased caloric intake in normal-weight patients with bulimia: comparison with female volunteers[1,2]

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ABSTRACT Patients with bulimia (binge-purge syndrome) frequently complain that they consume a very restrictive diet to avoid gaining weight. To investigate this claim, 23 hospitalized bulimic patients were assessed daily for body weight, caloric intake, macronutrient diet content, activity measures, and body composition estimates during weight-stable periods. Bulimic patients ate fewer kilocalories per kilogram body weight (22.1 ± 4.6 kcal/kg) than did age-matched normal women (29.7 ± 6.5 kcal/kg) but had similar activity levels and body composition. Clinical variables, such as history of laxative abuse, anorexia, or obesity, and physiological characteristics, such as body weight, activity level, or dietary content, could not account for this difference in caloric consumption. Bulimic patients tended to eat a diet lower in fat and higher in protein than did control subjects. These results agree with observations of increased efficiency of caloric utilization in obese patients and support patient complaints of a tendency to gain weight easily. *Am J Clin Nutr* 1989;49:86–92.

KEY WORDS Bulimia, obesity, caloric requirements, caloric efficiency, diet, macronutrients, body composition

Introduction

Bulimic disorder is a psychiatric illness in which patients binge eat enormous quantities of food. When bulimic disorder occurs in normal-weight individuals, the binge-eating behavior is often accompanied by immediate purging, either by vomiting or by the use of laxatives (1). Frequently, bulimic individuals claim that the vomiting preceded the binge-eating and that vomiting was utilized early as a means of weight control. Such patients complain that they are unable to maintain a so-called normal weight merely by restricting their intake and that they tend to gain weight on a diet that other individuals of their age consider to be normal. It was previously thought that such statements were distortions of reality and were merely another manifestation of the illness. This study was undertaken to ascertain objectively whether hospitalized patients with bulimic disorder demonstrate a higher degree of metabolic efficiency than do normal control subjects.

It has been debated in recent years whether alterations can occur in the efficiency with which animals metabolize the energy contained in their food (2, 3). In human adults, studies of metabolic efficiency have mostly investigated obese subjects or subjects who were formerly obese; a number of the studies found that such individuals have more efficient caloric utilization than control subjects have. For example, obese or formerly obese subjects have a smaller metabolic response to such thermogenic stimuli as glucose (4), mixed meals (5), postprandial exercise (6), or a thermogenic drug (7). Kaye et al (8) reported that anorexic patients studied during a weight-stable period after refeeding have greater levels of caloric consumption than do healthy control women. This finding did not persist in a population of previously low-weight patients studied ≥ 6 mo after weight recovery. The former group also had increased activity levels compared with control subjects (8). Furthermore, bulimic anorexic subjects consumed significantly fewer calories corrected for body surface area (BSA) than did nonbulimic anorexic subjects (9). This data, coupled with other uncontrolled investigations reporting greater premorbid body weight among bulimic anorexic subjects than nonbulimic anorexic subjects (10, 11), suggests that bulimic subjects are highly efficient at utilizing ingested calories.

Methods

Subjects

All patients were hospitalized on a clinical research unit of the National Institutes of Mental Health. All subjects gave writ-

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ten informed consent for the study, met DSM-III criteria for bulimia (1), and were at weights ranging from 80 to 120% of Metropolitan Life Table (12) ideal body weight (IBW) for height. The patients consisted of two groups: 13 bulimic women without history of anorexia nervosa, studied during a 4–6 wk inpatient hospitalization and 10 bulimic women who had been underweight with anorexia nervosa (ie, < 75% IBW) in the past and had gained weight and maintained this weight gain, for > 6 mo (long-term weight recovered). These long-term weight-recovered patients were actively binge eating and purging up to the time of their 5–8 d hospital stay. All long-term weight-recovered subjects had some degree of continuing anorexic symptoms, including distorted body image, peculiar eating habits, and obsessions concerning dietary intake or food. Caloric data from a subset of these long-term weight-recovered subjects were previously presented (8).

Control subjects consisted of 15 healthy women who were free of medical, psychiatric, and neurological conditions and whose first-degree relatives were free of psychiatric illness. Control subjects were determined to be free of mental disorders on the basis of a structured psychiatric interview by one of the investigators (HEG). All subjects were medication free during the study.

Procedure

Caloric intake and activity measurements were quantified in the hospital during a period of stable weight. Bulimic subjects were instructed to maintain a stable body weight (±1.0 kg) during their hospitalization. This weight-stable phase of hospitalization lasted from 2 to 6 wk while studies were performed. During this phase of hospitalization, patients could only leave the unit if accompanied by staff. Normal control subjects and long-term weight-recovered anorexic subjects were also instructed to maintain a stable body weight (±1.0 kg) during the weight-stable study period of 6–10 d. Every morning before breakfast and after voiding, subjects were weighed in a hospital gown on the same metabolic scale. During activity measurements all subjects remained restricted to the inpatient unit to ensure a consistent range of movement.

All food was ordered from the hospital kitchen and caloric content was documented before the food was given to the patients. The uneaten food was returned to the kitchen and reweighed and an estimate of daily caloric intake was made. In an independent study (13) we calibrated the accuracy of the method of caloric estimation used in this report by methods reported elsewhere. Subjects were only allowed to eat three 45-min meals per day and three 15-min snacks. Neither food nor water was available at any other times. Water intake was limited to 2 L/d and no water fountains were available. No patients on the ward were allowed to have food in their rooms. All bulimic subjects were observed 24 h/d on the ward including meal times and bathroom visits to make every effort to prevent patients from secretly bingeing or vomiting. It was therefore highly unlikely that any patient could consistently binge or vomit without being discovered.

Because the subject groups differed in weight, some method of weight-adjusted comparison of caloric intake between the groups was necessary. Several methods of expression have been used (14–16) but there is no clear agreement on the best method (17, 18). We corrected total daily caloric intake for overall weight ($kcal \cdot kg^{-1} \cdot d^{-1}$) or for factors dependent upon both height and weight ($kcal \cdot$ body mass index $[BMI]^{-1} \cdot d^{-1}$ and $kcal \cdot BSA^{-1} \cdot d^{-1}$). Body composition was estimated in 16 of the bulimic patients and in 8 control subjects. This was done by measuring ^{40}K, a naturally occurring isotope of potassium, to obtain an estimate of the total body K (TBK). Lean body mass (LBM) for each individual was then determined by assuming 0.056 mol K/kg LBM (19). Fat mass was calculated as the difference between total weight and LBM, and percent fat was derived by dividing total body weight by fat mass.

Bulimic patients occasionally had fluid and electrolyte imbalances on admission. Thus weight and calorie data from the period immediately after admission (usually the first 1–10 d of hospitalization) were discarded. During this initial interval the dietitian, working with the subjects, adjusted caloric intake to establish the amount necessary to maintain a stable weight. For this study we used the longest sequential number of days where weight remained within ±1.0 kg and where there was no overall weight gain or loss for each individual. To determine that there was no trend in weight gain or loss during this period of time (20, 21), a linear regression coefficient was calculated (daily weight vs days). The number of days was adjusted until the regression coefficient was nonsignificant ($p > 0.05$), indicating that there was no positive or negative linear trend in weight over this time interval. Bulimic subjects had several clinical characteristics that were considered to be related to energy metabolism. Thus, history of laxative abuse, history of obesity (defined as > 115% IBW), and current body weight as a percent of IBW were analyzed as independent variables in relation to caloric consumption (22).

Long-term weight-restored bulimic anorectic patients and normal control subjects were only willing to remain on the locked unit for relatively brief periods (5–8 d). Thus fewer data are available for these groups. Twelve long-term weight-recovered subjects were studied but two lost weight during their inpatient stay and are not included. All normal control subjects were able to remain within 1 kg of their admission weights during this study.

Motor activity was automatically and continuously recorded for 24 h/d for 3–5 d by methods previously reported (23, 24). Motor activity was measured by an acceleration-sensitive device with a solid-state memory that stores data on the number of movements per unit time over a 64-h period (25). Motor activity counts were recorded for consecutive 15-min periods (8). The monitors were worn continuously, attached to a belt around the waist of each subject. Two monitors were used throughout the study. These monitors were initially calibrated to be equal to each other and throughout the study maintained a variance of < 7%.

The activity monitor noted trunk movement but did not quantify energy expenditure. Our rationale for locating the monitor on the waist was the observation that patients and volunteers most often exercised by pacing or doing calisthenics.

The continuous variables were evaluated with a one-way ANOVA and Student's t test (two-tailed) (22). Differences found on the one-way ANOVA were evaluated by the Scheffe Test (22).

Results

Data for bulimic patients and control subjects are presented in **Table 1.** Bulimic patients did not differ from control subjects in age or height. Activity levels in controls were slightly and nonsignificantly lower than those seen in patients. Bulimic patients weighed significantly less than did control subjects and also had significantly lower BMIs, a trend towards lower BSAs, and a trend toward a lower TBKs. Bulimic patients also ate significantly fewer calories per day and ate fewer kilocalories per kilogram body weight as well as fewer kilocalories per

TABLE 1
Clinical and dietary variables for bulimic patients and control subjects

	Bulimic patients	Control subjects	*p*
Age (y)	23.7 ± 4.6	22.9 ± 3.8	
Height (mm)	1642 ± 57	1654 ± 59	
Weight (kg)	53.3 ± 6.0	58.0 ± 7.5	<0.05
Percent IBW	91.8 ± 10.9	100.3 ± 11.9	<0.05
Laxative abuse (*n*)	6	0	
Previously anorectic (*n*)	10	0	
Previously overweight (*n*)	6	0	
BMI (kg/m^2)	19.7 ± 2.1	21.2 ± 2.4	<0.05
BSA (m^2)	1.6 ± 0.1	1.6 ± 0.1	
Energy (kcal/d)	1172.6 ± 260.3	1693.7 ± 299.2	<0.001
TBK†	86.1 ± 10.9	93.7 ± 10.6	0.08
Percent body fat	25.7 ± 7.2	23.0 ± 6.9	
LBM (kg)†	39.1 ± 5.0	42.6 ± 4.8	
Energy per wt (kcal/kg)	22.1 ± 4.6	29.7 ± 6.5	<0.001
Energy per BMI (kcal/BMI)	59.7 ± 13.7	81.5 ± 19.5	<0.001
Energy per BSA (kcal/BSA)	745.6 ± 152.9	1038.7 ± 185.0	<0.001
Energy per kg LBM (kcal/kg LBM)	29.1 ± 5.9	39.0 ± 6.4	<0.01
Activity counts‡	1646 ± 484	1400 ± 445	
Fat intake (%)	29 ± 6	35 ± 5	<0.001
Carbohydrate intake (%)	52 ± 5	50 ± 5	
Protein intake (%)	19 ± 3	15 ± 3	<0.001

* $\bar{x}$ ± SD. Unless otherwise noted, for bulimic patients $n = 23$ and for control subjects $n = 15$.
† Bulimic patients, $n = 16$; control subjects, $n = 8$.
‡ Bulimic patients, $n = 17$; control subjects, $n = 10$.

unit of BMI or BSA (**Fig 1**). The lower caloric intake per kilogram body weight in bulimic patients could not be accounted for by differences in activity because control subjects had lower activity levels than bulimic patients.

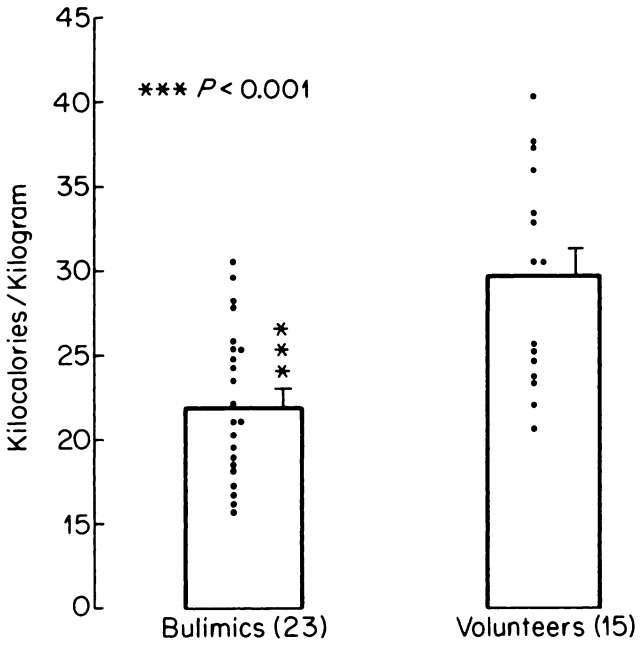

FIG 1. Normal-weight bulimic patients ($n = 23$) had significantly lower caloric intake per kilogram body weight than age- and sex-matched volunteers ($n = 15$). This was highly significant ($p < 0.001$) by one-way ANOVA.

There was also no statistically significant correlation between kilocalories ingested and activity levels when the group as a whole was considered or when control or bulimic groups were considered separately. Additionally, the difference in ingested kilocalories per kilogram between bulimic patients and control subjects could not be accounted for by altered differences in body composition because both percent body fat and LBM did not differ either clinically or statistically in the two groups. Furthermore, when caloric intake was expressed in terms of kilograms LBM to adjust for the small difference in LBM in those subjects whose TBK levels were measured, energy per kilogram (kcal/kg) LBM was still significantly lower in bulimic patients than control subjects.

Bulimic patients with no history of anorexia ($n = 13$) were compared with bulimic patients with a history of anorexia ($n = 10$). The data on a proportion of this latter group were presented previously (8). The former group had a higher frequency of binge-vomit episodes (38.2 ± 3.5 vs 6.3 ± 8.6 per week, $p < 0.01$) and a higher body weight (97.5 ± 8.8 vs 89.7 ± 7.2% IBW, $p < 0.05$). However, the two groups of bulimic subjects did not differ in age, height, duration of illness, activity, or kilocalories per kilogram ingested (**Table 2, Fig 2**). Previously anorexic bulimic patients had slightly lower BMIs than did nonanorexic bulimic patients (18.7 ± 2.0; $p < 0.05$) but did not differ on kilocalories ingested per BMI.

An analysis dividing bulimic patients who did or did not have associated laxative abuse found that 6 of 23 (26%) of the bulimic patients studied had associated laxative abuse. There was no difference found between laxative abusers and nonabusers in age, duration of illness,

TABLE 2
Previously anorexic and nonanorexic bulimic subjects compared with control subjects

Subject ID	Age	Ht	Avg wt	% IBW	Days at stable wt	Energy/wt
	y	*m*	*kg*	%	*d*	*kcal/kg*
Nonanorexic bulimic subjects (n = 13)						
49	20	1.625	54.6	98	33	21.5
23	22	1.520	47.3	96	10	16.5
59	25	1.590	54.5	102	25	22.9
22	26	1.620	55.2	99	17	21.6
26	19	1.650	68.5	118	17	17.6
29	21	1.650	53.0	92	9	18.4
20	19	1.655	53.7	92	25	24.5
18	24	1.730	59.8	94	13	18.1
21	21	1.590	59.4	111	13	25.2
56	29	1.650	52.6	91	8	18.9
58	25	1.676	49.6	89	9	30.9
60	24	1.645	54.2	94	18	19.6
65	34	1.630	50.1	89	26	29.2
$\bar{x}$	23.8	1.633	54.8	96.6	17.2	21.9
SD	4.3	0.050	5.4	7.3	7.9	4.5
Previously anorexic bulimic subjects (n = 10)						
30	21	1.610	52.8	97	8	18.9
51	23	1.730	51.6	86	28	28.0
19	22	1.670	50.4	91	20	24.1
68	20	1.680	50.0	84	3	25.1
28	31	1.570	39.6	81	4	23.6
74	28	1.525	41.8	85	8	15.9
62	16	1.689	59.4	98	6	25.6
52	32	1.701	49.8	81	4	16.0
24	24	1.720	60.1	96	5	17.0
71	19	1.630	55.9	99	14	28.7
$\bar{x}$	23.6	1.653	51.4	87.9	10.0	51.2
SD	5.2	0.067	6.2	9.9	8.2	6.6
Control subjects (n = 15)						
43	35	1.720	59.3	94	3	40.8
41	21	1.640	61.0	107	7	30.6
42	23	1.625	49.9	89	7	36.6
47	26	1.700	59.9	98	7	23.1
44	22	1.750	70.2	108	4	22.4
40	21	1.530	54.4	110	5	25.7
48	22	1.615	53.2	96	5	33.2
39	20	1.660	65.2	112	8	25.3
46	25	1.610	49.5	90	8	30.6
70	20	1.645	46.1	86	2	37.1
45	21	1.710	60.2	97	3	23.8
63	21	1.670	51.2	93	6	37.4
64	23	1.680	59.0	99	3	33.7
80	23	1.575	58.8	112	4	20.7
81	21	1.690	71.8	115	6	24.5
$\bar{x}$	22.9	1.654	58.0	99.6	5.7	29.7
SD	3.8	0.054	7.4	9.8	3.0	6.5

frequency of binging and purging, body type, percent IBW, or caloric consumption, either in absolute terms or per unit of body mass. Additionally, bulimic subjects who were previously obese were compared with those who had never been > 110% of IBW. The former group weighed significantly more than the latter group (57.5 ± 6.7 kg vs 51.9 ± 5.2 kg, $p < 0.05$) but the two groups did not differ on any other variable.

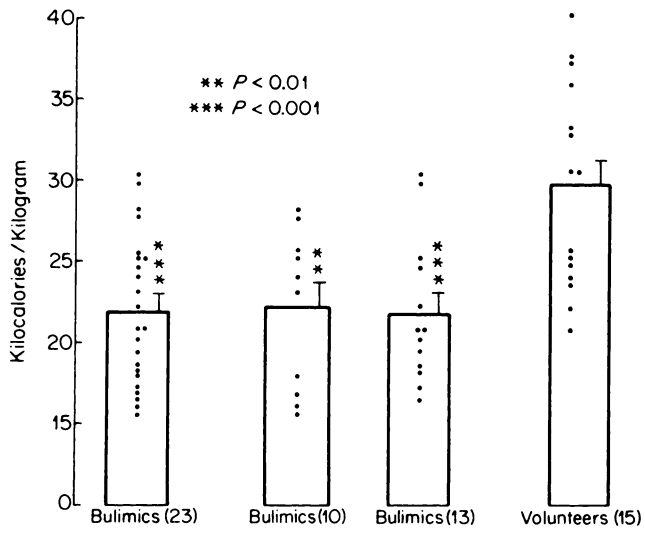

FIG 2. Bulimic patients with (n = 10) and without (n = 13) previous anorexia had similar caloric intake (kcal/kg) and all differed significantly from volunteers.

All the bulimic patients were studied only during a weight-stable period when no significant trend in weight change could be elicited by regression analysis. Weight-stable periods were defined as a string of consecutive days in which no linear trend in weight could be detected. In addition, we double-checked these weight-stable periods by comparing the average weight of the last 2d of the weight-stable period with the average weight of the first 2d of the weight-stable period. This revealed individual weight changes that ranged from −0.6 kg to +0.6 kg for bulimic patients and from −0.7 kg to +0.7 kg for normal subjects. Results from paired t tests indicated the mean weight differences of −0.07 ± 0.30 kg and −0.16 ± 0.34 kg for bulimic patients and control subjects, respectively, were both nonsignificant. Furthermore, there was no correlation between individual weight changes and caloric intake. Thus, subjects whose weight change during the weight-stable period was slightly negative did not tend to have a lower caloric intake than those whose weight change was slightly positive. Finally, recalculating the mean caloric intake of each individual to account for weight changes that occurred did not significantly alter the relationship between the caloric intakes of the groups. On the contrary, adjusting caloric intake for weight differences widened the gap in caloric intake between bulimic patients and control subjects (1162 kcal vs 1709 kcal, respectively). Thus four lines of statistical analyses, linear regression of daily weights, paired t test of weight changes, noncorrelation between caloric intake and weight change, and average caloric intake adjusted for weight changes, support the contention that the weight-stable periods reflect caloric requirements for weight maintenance in the hospital setting.

Bulimic patients (n = 13) were studied for a prolonged period so that determinations could be made of weight and caloric intake during the first and fourth weeks of hospitalization. There were no significant differences found in caloric intake or weight between these two periods. Therefore, merely being hospitalized on an inpatient unit did not change the caloric requirements of the patients studied.

As previously mentioned, weight did not correlate with caloric requirements in any group. However because bulimic patients did weigh slightly less than the control subjects weighed, we felt that it was important to rule out weight as a confounding variable in this study. Consequently we divided the bulimic sample into those who were < 95% IBW (n = 12; 83.9% IBW) and those who were > 95% IBW (n = 11; 100.5% IBW) at the time of the study. It was found that higher-weight bulimic patients were younger than lower-weight bulimic patients (21.5 ± 1.2 y vs 25.7 ± 1.2 y) but did not differ on any other variable. Higher-weight bulimic patients were not different in weight from control subjects. Furthermore, when each subgroup of bulimic patients was compared with control subjects, it was found that the caloric intake of lower-weight bulimic patients (1139 ± 80 kcal/d) and higher-weight bulimic patients (1209 ± 84 kcal/d) were both less than that of control subjects (1694 ± kcal/d). This relationship held even when caloric intake was expressed as kcal/BMI.

There was a significant correlation between caloric intake and LBM among the 22 patients whose TBK levels and caloric intakes were measured. When caloric intake was covaried with LBM, the above results were not altered. Thus, when adjusted for differences in LBM, caloric intake (1158 vs 1649 kcal/d for bulimic patients and control subjects, respectively) and intake per kilogram LBM (29.1 vs 41.4 kcal/kg LBM for bulimic patients and control subjects, respectively) were significantly lower for the bulimic patients ($p < 0.0004$).

The macronutrient content of the diet was examined in the study population. It was found that the whole group of bulimic patients ate a diet that was higher in percent protein (19.0 ± 3.1 vs 15.4 ± 2.7%) and lower in percent fat (29.7 ± 5.9 vs 35.2 ± 5.0%) than the diet of control subjects (**Fig 3**). This relationship also held up in previously anorexic bulimic patients, bulimic patients without past anorexia, low- and high-weight bulimic patients, bulimic patients with or without laxative abuse, and bulimic patients with or without past obesity. Carbohydrate intake was similar in all the groups. Thus eating-disordered patients achieved a lower caloric content in their diets by choosing a low-fat, high-protein diet. Despite this low-fat diet bulimic patients had lower caloric requirements than did the control subjects.

Discussion

The major finding in this study is that patients with bulimia require a lower caloric intake per unit of body mass than do age-matched and sex-matched normal control subjects. This finding could not be accounted for by differences in activity levels, clinical variables (such as history of anorexia or obesity, or coexisting laxative abuse), or by differences in body composition in the pa-

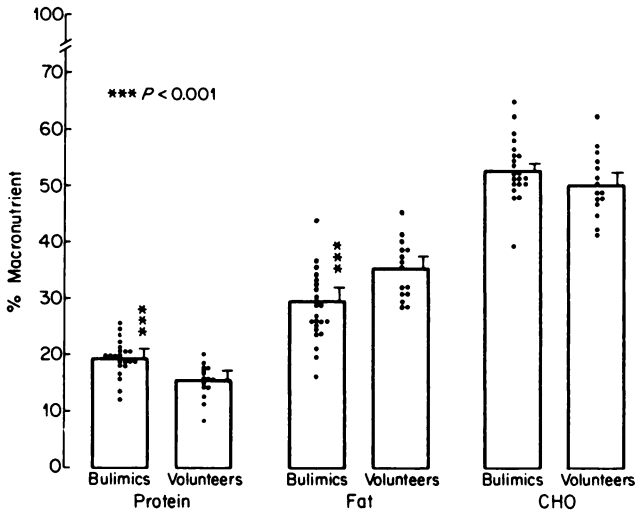

FIG 3. Normal-weight bulimic patients (n = 23) ate significantly more protein ($p < 0.001$) and significantly less fat ($p < 0.001$) than did volunteers (n = 15). Carbohydrate content of the diet did not differ between bulimic patients and volunteers.

tients studied. Additionally, when the patient sample was divided into lower- and higher-weight classes, the energy efficiency of each weight class of bulimic patients was higher than those of the normal control subjects. One month of hospitalization did not alter these findings because the caloric requirements of the patients studied for ≥ 1 mo remained elevated. It is unlikely that any portion of the caloric intake was achieved through surreptitious eating because patients were observed 24 h/d by trained nursing staff, even when patients were in the bathroom and the showers. Moreover, patients would have had to consistently binge and vomit for a number of days to achieve a significant impact on mean caloric intake or body weight. Considering the extent of behavioral control and observation, it is highly unlikely that this could have occurred without being discovered. Although bulimic patients sometimes show signs of edema or altered fluid and electrolyte balance, data were included in this study only when fluid and electrolyte balance was completely stabilized.

The validity of this study relies upon the accuracy of the estimate of caloric requirements and upon the activity data. The accuracy of the caloric intakes was confirmed by an independent study (13) during which aliquots of food were analyzed by complete proximate analysis. Estimates of caloric requirements for weight maintenance were based upon periods of ~17.2 ± 7.9 d during which no gain or loss in body weight > 1 kg nor any trend in weight gain or loss was demonstrated by the more sensitive method of linear regression. Therefore, the mean caloric intake during the period under investigation is a reasonably accurate estimate of energy requirements for weight maintenance. Unfortunately, we were only able to measure caloric intake in our normal control subjects and in some of our bulimic patients (n = 6) for a mean of only 6 and 8 d, respectively. Although this brief evaluation provides only limited data, the findings in these bulimic patients are consistent with those (n = 17) for whom we were able to measure caloric intake for a mean of 29 d. Moreover, the caloric intake in the early part of hospitalization did not vary from the caloric intake in the later part of hospitalization in the bulimic patients for whom we had extended data. Note that despite differences in body weight among the groups, when caloric intake was expressed in terms of various indicators of body mass, ie body weight, BSA, and BMI, all yielded similar relationships to the caloric cost of weight maintenance among the groups of subjects. Thus caloric intake was relatively stable during the course of inpatient stay.

An associated finding in this study was that bulimic patients tended to consume less fat and more protein than did normal control subjects. This was surprising because we had expected the bulimic patients to continue to crave carbohydrates in the hospital. However, under conditions where subjects were prevented from binging and purging, they ate a low-fat, high-protein diet. Despite the thermogenic effect of a high-protein diet (26), this did not appear to increase the caloric requirement of the bulimic patients. Thus bulimic patients still tended to use food with greater efficiency than did control subjects even though differences in the macronutrient composition of the diets of bulimic patients and control subjects would favor increased caloric utilization for the bulimic patients.

What might account for these differences in energy requirement? One possible explanation is that chronic binging and purging behavior may alter energy efficiency. In this study this behavior appeared to be the critical clinical variable that differentiated patients from control subjects with respect to caloric efficiency. In a related study restrictor anorexic subjects were compared with bulimic anorexic subjects and always demonstrated significant differences in caloric efficiency (9). A spectrum of energy efficiency may exist in human beings, with nonbulimic anorexic individuals at one extreme, normal individuals in the middle, and bulimic and obese individuals at the other extreme. There is some recent data indicating that obese individuals have enhanced caloric efficiency compared with lean control subjects (6). It also was found that previously obese anorexic subjects (perhaps a bulimic subgroup) gained weight more rapidly on the same food intake than did anorexics who were previously of normal weight (27). Finally it is also possible that repeated bouts of weight loss, as seen in bulimic subjects, alter energy efficiency (K Brownell, personal communication, 1986).

Other investigators suggested that the mechanism underlying regulation of energy efficiency may in part involve adrenergic and thyroid systems. Although bulimic subjects did not show abnormalities in thyroxine levels, they appeared to have lowered triiodothyronine levels (28) and an abnormality in the thyroid stimulating hormone (TSH) response to thyrotropin releasing hormone (TRH) (29, 30). Our group has been involved in the intensive investigation of the noradrenergic system in bulimia. We found a significant reduction in sympathetic

activity associated with reduced caloric intake (WH Kaye et al, unpublished observation, 1986) (9) similar to preclinical observations in laboratory rodents (31). Whether reduced thyroid or sympathetic nervous system activity is secondary to reduced caloric intake or is the cause of reduced caloric intake has not been determined.

These findings have important clinical implications. When bulimic patients are induced to cease their binging and vomiting behavior, we suggest that physicians and dietitians prescribe a diet in which the caloric level is lower than might be expected. Our experience suggests that some patients will tend to gain weight if this is not done, especially when hospitalized. Because patients are often averse to any gain in body weight, this may lead to grave mistrust between patient and physician or dietitian. It is not possible to determine at this point whether the abnormality in energy utilization is a trait-related phenomenon or is caused by the binging and vomiting or by cycles of weight loss. However, it is well known that vomiting is an effective means of weight control. Unless bulimic patients are counselled about dietary intake with the above considerations in mind, they will return to vomiting as a means of weight control. Although there are no known chemical means of altering energy efficiency, we suggest that physicians and dietitians prescribe regular aerobic exercise as an integral part of the treatment program for a proportion of their normal-weight bulimic patients provided there are no contraindications to such exercise. Perhaps this will allow bulimic patients in the abstinent phase to attain a relatively normal caloric intake for weight and height. Furthermore, if obese individuals have increased caloric efficiency, such clinical considerations may be all the more compelling for this group.

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