# Physical activity is a confounding factor of the relation between eating frequency and body composition[1–3]

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**ABSTRACT**

**Background:** It has been shown that eating frequency (EF) is related to body composition in women, but the results are inconclusive. These inconsistent findings could be due to the influence of additional factors such as physical activity.

**Objective:** We aimed to investigate the relation between EF and body composition in premenopausal women and to explore the effect of physical activity energy expenditure (PAEE) and physical fitness on that association.

**Design:** Eighty-five premenopausal women [$\bar{x} \pm$ SD age: 49.9 ± 2.0 y; body mass index (in kg/m$^2$): 23.2 ± 2.2] were studied at the onset of a prospective observational study. Seven-day food diaries were used to measure energy intake and EF. Body composition (measured with dual-energy X-ray absorptiometry), physical fitness (measured by the peak oxygen consumption), and PAEE (measured by using an accelerometer) were also measured.

**Results:** Mean EF was 4.6 ± 0.9 eating occasions/d. A significant positive correlation was found between EF and energy intake ($r$ = 0.31, $P < 0.01$). Moreover, EF was negatively correlated with body mass index ($r = -0.25$, $P < 0.05$), waist circumference ($r = -0.32$, $P < 0.01$), percentage body fat ($r = -0.26$, $P < 0.05$), and fat mass ($r = -0.27$, $P < 0.05$). The associations between adiposity and EF were no longer significant after correction for PAEE and peak oxygen consumption.

**Conclusion:** The relation between EF and body composition could be mediated by PAEE and physical fitness. *Am J Clin Nutr* 2008;88:1200–5.

## INTRODUCTION

It has been reported that reduced eating frequency (EF) could contribute to the development of obesity (1) and that higher EF is associated with better body-weight control (2). Fabry et al (3, 4) were the first investigators to show an inverse association between EF and body weight. Many epidemiologic and clinical studies subsequently explored the association between EF and body weight, but results have been inconsistent. Some studies observed an inverse relation between EF and body weight (5–9), whereas others failed to detect any significant association (10–12). Drummond et al (13) showed that eating more frequently is related to leanness in men but not in women. In women, although a positive correlation between EF and energy intake (EI) was observed, no relation was found between body weight and EF (13, 14). The inconsistent results pertaining to the relation between EF and adiposity in women should be explored further to allow consideration also of the contribution of potential confounders such as physical activity energy expenditure (PAEE).

Most studies of EF and energy metabolism have failed to show any influence of EF on energy expenditure (EE) (15–19). It was also found that higher EF has no effect on resting EE (REE) (18), and the studies of the thermic effect of food were inconclusive (20–22). Few of the published studies of EF and body weight have included a measure of the subjects' daily physical activity (13, 14). In those studies, self-reported questionnaires and physical activity diaries were used to assess daily physical activity. A positive correlation between EF and EE during leisure time (13) and at home (14) was found in women, which suggests that women who ate more frequently had greater EE from physical activity. This correlation could partly explain the absence of a relation between EF and body composition in women, despite a higher EI. Little information relating EF to PAEE and body composition is available.

The relation between EF and adiposity remains unclear. To our knowledge, no study has investigated the effect of EF on body composition in premenopausal women by using a direct measurement of PAEE and physical fitness. Hence, the present study was performed to investigate the relation between EF and body composition in premenopausal women and to further explore the effect of PAEE and physical fitness on this relation.

## SUBJECTS AND METHODS

### Subjects

Eighty-five premenopausal women were evaluated for a prospective observational study. Volunteers were recruited through

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newspaper advertisements and information sessions. All participants took part in a screening session to ensure that they met the following inclusion criteria: *1*) premenopausal women between 48–55 y old; *2*) regular menstrual cycle; *3*) nonsmoker; *4*) body mass index (BMI; in $kg/m^2$) between 20 and 29; *5*) weight stability ($\pm$2 kg) for $\geq$6 mo before enrollment in the study; *6*) no known disease or disability; and *7*) no current medications that could influence food intake or metabolism.

Written informed consent was obtained from each participant. The study received approval from the University of Ottawa and Montfort Hospital ethics committees.

### Anthropometric measurements

Body weight and height were measured with a BWB-800AS digital scale and a Tanita HR-100 height rod (Tanita Corporation of America, Inc, Arlington Heights, IL), respectively, while participants were wearing a hospital gown and no shoes. Waist circumference was measured with a conventional measuring tape at the midpoint between the last floating rib and the upper part of the iliac crest. An average of 2 measurements was taken. Body composition was measured by using dual-energy X-ray absorptiometry (DXA; GE-LUNAR Prodigy module; GE Medical Systems, Madison, WI.). CVs and correlation for percentage body fat (%BF) measured in 12 healthy subjects tested in our laboratory were 1.8% and $r = 0.99$, respectively.

### Dietary assessment

EI and macronutrient intake were assessed with the use of a 7-d food diary. Subjects were asked to record the type and amount of foods and beverages consumed for 7 consecutive days. The time and place of eating of food were recorded as well. Participants received oral and written instructions on recording their food intake. They were asked to be as specific as possible in their description by indicating all main ingredients and the quantity, the brand of products, and the cooking method. Participants were also asked to bring food labels, when possible, to facilitate the analysis of the food diary. Recorded data were carefully verified on the return of the food diary to obtain forgotten data or to correct misreported data. The food diaries were analyzed by a registered dietitian with the use of FOOD PROCESSOR SQL software (version 9.6.2; ESHA Research, Salem, OR).

### Establishing the number of eating occasions

Data from the food diaries were also used to calculate the average number of eating occasions per day, ie, EF. Eating occasions were defined as any occasion when food was consumed (13). The definition excluded drinks (alcoholic drinks, soft drinks, juices, water, or coffee and tea) that were consumed in the absence of food. If 2 eating occasions occurred in $\leq$15 min, both events were counted as a single eating occasion. When >15 min separated 2 eating occasions, those occasions were considered distinct eating occasions. This method of calculating the number of eating occasions was described previously (13, 14, 23). Details concerning EF, the caloric and macronutrient intake for meals, and the snacks and drinks (consumed without food) are provided in **Appendix A**.

### Assessment of underreporting

Underreporting was assessed by direct comparison of recorded EI and measured EE. The ratio between EI and TEE was determined for each subject. Total EE (TEE) was calculated by using the following formula:

$$TEE = (PAEE + REE) \times 1.11 \qquad (1)$$

where the thermic effect of food was fixed at 10% of TEE. Participants with a ratio of <0.74 were classified as underreporters (24, 25). PAEE was assessed by using 7-d accelerometry, and REE was measured by indirect calorimetry (Deltatrac II metabolic cart; SensorMedics Corporation, Yorba Linda, CA). REE was measured for 30 min after a 12-h overnight fast. The first and last 5 min were excluded from the calculations, and thus minutes 6–25 were used in the calculation. Mean REE was calculated by using the equation of Weir (26). CV and correlation for the determination of REE with the Deltatrac II metabolic cart in our laboratory was 2.3% and $r = 0.98$, respectively, as determined in 12 healthy subjects.

### Assessment of physical activity energy expenditure

Assessment of PAEE was performed by using biaxial accelerometry units (Actical; Mini Mitter Co, Inc, Bend, OR), which have been shown to be reliable (27). The accelerometer was used to estimate mean daily EE from physical activity. Participants put on the accelerometer upon waking up and took it off just before going to bed. Accelerometry and dietary data were collected simultaneously for 7 d. Such a duration was chosen because it is estimated to result in 90% reliability for the measurement of physical activity in both males and females (28). The accelerometer was worn at the lower back, because that placement, when evaluated along with lower leg or foot, upper leg, head and trunk, lower arm or hand, and upper arm placements, was the best predictor of EE ($r = 0.92$–$0.97$) (29). The accelerometers used in this study were validated previously with the use of doubly labeled water measurements (30).

### Maximal aerobic capacity

A maximal aerobic capacity ($\dot{V}O_{2max}$) (31) test was performed to determine maximal oxygen uptake of the participants. Participants were asked to refrain from any vigorous exercise and consumption of alcoholic beverages for the 6 h before the test and to abstain from eating and drinking coffee for 2 h before the fitness test. The test consisted of 3-min stages (progressing from walking to running) on a treadmill with an increasing workload to the point of exhaustion. Breath-by-breath samples of expired air were collected through a mouthpiece throughout the test, and measurements of $\dot{V}O_2$ and the respiratory exchange ratio were made automatically by using a Vmax 229 series metabolic cart (SensorMedics Corporation). The indirect calorimetry unit was calibrated according to the manufacturer's specifications before every test to further ensure the reliability of the data collected. After a brief warm-up, subjects performed the test protocol; the assessment was terminated when $\geq$2 of the following criteria were achieved: *1*) predicted maximal heart rate was reached; *2*) respiratory quotient was >1.1; *3*) oxygen consumption remained stable or decreased with an increase in workload; and *4*) the rate of perceived exertion measured with the Borg scale reached 19 or 20 (32). Because a plateau of $\dot{V}O_2$ was not achieved in most subjects, peak oxygen consumption ($\dot{V}O_{2peak}$) will be used henceforth to describe the results.

## Statistical analysis

Statistical analyses were performed with the use of SPSS software (version 11.5; SPSS Inc, Chicago, IL). Relations between EF and body composition, EI, macronutrient composition, PAEE, and $\dot{V}O_{2peak}$ were investigated by using Pearson correlation coefficients (one-tailed). Associations between EF and body composition, EI, and macronutrient composition were further explored by using partial correlations after control for PAEE and $\dot{V}O_{2peak}$ (one-tailed). All effects were considered significant at $P < 0.05$. Data are presented as means ± SDs.

## RESULTS

### Low energy reporters

As described in Methods, low energy reporters were identified and excluded from the analyses. Records from 16 subjects had ratios of EI to TEE (EI:TEE) below the cutoff of 0.74, and those subjects were identified as underreporters. The underreporters represented 18.8% of the study population. Data from a total of 69 premenopausal women, whose characteristics are presented in **Table 1**, were thus included in the final analyses. The underreporters, as compared with valid reporters, had significantly higher body weight (64.6 ± 5.4 and 59.8 ± 6.9 kg, respectively; $P < 0.05$), BMI (24.4 ± 2.4 and 23.0 ± 2.2, respectively; $P < 0.05$), waist circumference (81.7 ± 5.8 and 77.2 ± 6.8 cm, respectively; $P < 0.05$), %BF (34.3 ± 5.2% and 30.4 ± 6.7%, respectively; $P < 0.05$), and fat mass (22.1 ± 4.2 and 18.3 ± 5.4 kg, respectively; $P < 0.01$). With regard to their dietary intake, underreporters, as compared with valid reporters, had significantly lower EI (1684.5 ± 333.9 and 2069.8 ± 369.6 kcal, respectively; $P < 0.001$), carbohydrate intake (224.3 ± 51.7 and 262.6 ± 62.4 g, respectively; $P < 0.05$), protein intake (67.9 ± 14.8 and 80.6 ± 15.1 g, respectively; $P < 0.01$), and fat intake (57.9 ± 17.0 and 74.8 ± 19.1 g, respectively; $P < 0.01$).

**TABLE 1**
Characteristics of the premenopausal women[1]

| Variable | Value |
|---|---|
| Age (y) | 50.0 ± 2.0 (47–56)[2] |
| Body weight (kg) | 59.8 ± 6.9 (46.8–79.7) |
| Height (m) | 1.61 ± 0.07 (1.50–1.81) |
| Waist circumference (cm) | 77.2 ± 6.8 (62.2–93.0) |
| BMI (in kg/m$^2$) | 23.0 ± 2.2 (19.3–28.5) |
| BMI distribution (%) | |
| <25 ($n$ = 53) | 76.8 |
| 25 < BMI < 30 ($n$ = 16) | 23.2 |
| Percentage total body fat | 30.4 ± 6.7 (18.2–41.7) |
| Percentage total body fat distribution (%) | |
| <35% ($n$ = 50) | 72.5 |
| ≥35% ($n$ = 19) | 27.5 |
| Fat mass (kg) | 18.3 ± 5.4 (9.6–31.6) |
| Fat-free mass (kg) | 41.1 ± 4.4 (33.2–52.2) |
| $\dot{V}O_{2peak}$ (mL · kg$^{-1}$ · min$^{-1}$) | 34.0 ± 6.0 (20.9–52.0) |
| PAEE (kcal/d) | 747.4 ± 206.8 (326.3–1268.0) |
| REE (kcal/d) | 1214.3 ± 109.0 (946.0–1460.0) |
| Energy intake (kcal/d) | 2069.8 ± 369.6 (1436.8–2940.1) |
| Energy source | |
| Protein (% of energy) | 15.4 ± 2.8 (9.0–22.3) |
| Carbohydrate (% of energy) | 49.4 ± 6.5 (30.4–65.9) |
| Fat (% of energy) | 31.5 ± 5.2 (19.7–42.7) |
| Alcohol (% of energy) | 3.4 ± 3.2 (0.0–14.3) |
| Protein (g) | 80.6 ± 15.1 (35.2–121.8) |
| Carbohydrate (g) | 262.6 ± 62.4 (138.4–422.5) |
| Fat (g) | 74.8 ± 19.1 (38.1–124.9) |
| Alcohol (g) | 10.2 ± 9.2 (0.0–37.2) |
| Eating frequency (eating occasions/d) | 4.6 ± 0.9 (3.0–7.1) |

[1] $n$ = 69. $\dot{V}O_{2peak}$, peak oxygen uptake; PAEE, physical activity energy expenditure; REE, resting energy expenditure.
[2] $\bar{x}$ ± SD (all such values).

**TABLE 2**
Correlations of energy intake and macronutrient composition with eating frequency in premenopausal women[1]

| | Eating frequency | |
|---|---|---|
| | $r$ | $P$ |
| Energy intake | 0.31 | 0.005 |
| Energy source | | |
| Protein (% of energy) | 0.02 | 0.44 |
| Carbohydrate (% of energy) | 0.21 | 0.045 |
| Fat (% of energy) | −0.11 | 0.19 |
| Alcohol (% of energy) | −0.17 | 0.08 |
| Protein (g) | 0.31 | 0.005 |
| Carbohydrate (g) | 0.37 | 0.001 |
| Fat (g) | 0.13 | 0.14 |
| Alcohol (g) | −0.13 | 0.14 |

[1] $n$ = 69. Values obtained with the use of Pearson's correlation coefficient.

### Correlations between eating frequency and body composition

Mean EF was 4.6 ± 0.9 (range: 3.0–7.1) eating occasions/d. EF was negatively correlated with BMI ($r = -0.25$, $P < 0.05$), waist circumference ($r = -0.32$, $P < 0.01$), %BF ($r = -0.26$, $P < 0.05$), and fat mass ($r = -0.27$, $P < 0.05$). These findings suggest that women who ate more frequently also tended to have lower adiposity.

### Correlations of eating frequency with energy intake and macronutrient composition

The correlation coefficients of EF with EI and macronutrient composition are shown in **Table 2**. A significant positive correlation was found between EF and EI, which suggests that women who ate more frequently also tended to have higher EIs. Significant positive correlations were also observed between EF and the percentage of energy from carbohydrates and between EF and carbohydrate and protein intakes expressed in grams.

### Correlations of eating frequency with physical activity energy expenditure, resting energy expenditure, and peak oxygen consumption

Significant positive correlations were found between EF and PAEE ($r = 0.29$, $P < 0.01$) and between EF and $\dot{V}O_{2peak}$ ($r = 0.45$, $P < 0.001$). No significant correlation was noted for EF and REE.

### Partial correlations of eating frequency with body composition, energy intake, and macronutrient composition

Partial correlations of EF with body composition, EI, and macronutrient composition were performed after control for PAEE and $\dot{V}O_{2peak}$. The results of these analyses (**Table 3**) show

**TABLE 3**
Partial correlations of body composition, energy intake, and macronutrient composition with eating frequency in premenopausal women[1]

| | Eating frequency | |
|---|---|---|
| | *r* | *P* |
| BMI | −0.04 | 0.37 |
| Waist circumference | −0.21 | 0.04 |
| Percentage body fat | 0.06 | 0.31 |
| Fat mass | −0.02 | 0.43 |
| Energy intake | 0.11 | 0.19 |
| Carbohydrate (g) | 0.19 | 0.06 |
| Carbohydrate (% of energy) | 0.15 | 0.11 |
| Protein (g) | 0.21 | 0.04 |

[1] $n = 69$. Partial correlations after control for physical activity energy expenditure and peak oxygen uptake.

that the associations between adiposity and EF disappeared after correction for PAEE and $\dot{V}O_{2peak}$. Among adiposity variables, only the association between EF and waist circumference remained significant after correction. The significant relations between EF and EI also disappeared, whereas correlations remained significant between protein intake (in g) and EF.

## DISCUSSION

EF has been shown to be related to body composition, but results are inconsistent (2). It was postulated that these inconsistent findings could be the result of the influence of additional factors, such as those that may affect TEE (13). The present study was thus performed to investigate the presence of a relation between EF and body composition in premenopausal women and to explore the effect of PAEE and $\dot{V}O_{2peak}$ on this association. We found that EF was positively associated with EI and negatively associated with adiposity. It is interesting that the associations between EF and adiposity disappeared after correction for PAEE and $\dot{V}O_{2peak}$. To our knowledge, the present study is the first to investigate the effect of EF on body composition in premenopausal women by using a direct assessment of PAEE and physical fitness.

### Eating frequency and body composition

The results of the present study confirm previous findings on the relation between EF and body composition in women. Indeed, the inverse association found between body composition and EF in women is consistent with the findings of several other studies (5, 7, 8). However, in more recent studies by Drummond et al (13) and Yannakoulia et al (14), no such relation was found. The methodologic discrepancies that have been proposed to explain these contradictory results include underreporting of food intake, various definitions of eating occasions, various methods of assessing food intake and body composition, and the fact that many studies did not take into account factors related to EE (33). As in the studies by Drummond et al (13) and Yannakoulia et al (14), the present study took measures to ensure that underreporting did not bias the results. We screened the individual food diary results for underreporting by using validated procedures (25, 26), and we excluded all low energy reporters from the analyses. The proportion of underreporting in the present sample was ≈19%, which is similar to that in another recent study (13). This percentage was not surprising, considering that approximately one-third of our sample was considered obese according to %BF. Indeed, research evidence indicates that underreporting is habitually more frequent in overweight and obese persons (25, 32, 34). In support of that, we found that the underreporters had a higher BMI, %BF, and fat mass than did the valid reporters.

The type of definition used to describe eating occasions may significantly influence the outcomes and interpretation of the studies (33, 35). As did Drummond et al (13) and Yannakoulia et al (14), we opted for a widely used definition, in which 2 consecutive eating occasions were considered separate if they occurred >15 min apart. This definition was chosen to avoid the ambiguities of classifying eating events as either "meals" or "snacks," which can mask the number of actual eating occasions, especially when EF is high (33). Unlike the definition used in the present study, the eating occasion definition used by Yannakoulia et al (14) included all drinks consumed in the absence of food, which may have led to higher EF than was seen in present study (5.9 and 4.6/d, respectively). In the present study, we found a mean EF of 4.6 ± 0.9 eating occasions/d (range: 3.0–7.1 eating occasions/d). The studies that used EF as the definition of eating occasions also found little variation in EF among the women. Drummond et al (13) had a mean EF of 4.4 ± 1.1 eating occasions/d (range: 2.7–9.0 eating occasions/d), and Yannakoulia et al (14) had a mean EF of 5.9 ± 1.4 eating occasions/d (range: 2.7–10.0 eating occasions/d).

The method used to assess food intake is worth taking into account when measuring EF. Various methods have been used in EF studies, but results do not differ consistently according to the method of assessment. Indeed, Metzner et al (5) (24-h dietary recall) and Burley et al (8) (4-d food diary) found an inverse relation between EF and adiposity, whereas Drummond et al (13) (7-d food diary) and Yannakoulia et al (14) (3-d food diary) found no such relation. However, Longnecker et al (36) found that the day-to-day variation in a person's EF is larger than between-subject variation, which suggests that data from multiple days of a food diary are needed to measure a person's EF with precision. It has also been suggested that the use of a 7-d food diary provides a more accurate measurement of EI and is more representative of usual intake than is the use of food-frequency questionnaires or dietary recall (37–40). Considering the fact that the reliability of food estimates increases along with the increase in the number of days of survey recorded, we decided to assess dietary intake by using a 7-d food diary.

The method of assessment of body fatness can have an effect on the relation between EF and body composition. Most studies of EF used BMI or included a measure of body composition using skinfold-thickness measurements taken with calipers to assess body fatness. Yannakoulia et al (14), in the only study to have used dual-energy X-ray absorptiometry for the measurement of body composition, did not find any relation between EF and adiposity. It is important to note that, in the present study, the BMI range was 19–29, whereas, in the study of Yannakoulia et al (14), it was 19–39. The difference in the BMI range may have had an effect on the results. Given that controversy persists regarding the effect of EF on body composition in persons of various adiposities, future studies should pay particular interest to this aspect.

### Eating frequency and energy intake

The positive correlation found in the present study between EF and EI suggests that women did not compensate for more frequent eating episodes by reducing the quantity of kilocalories consumed per eating occasion. These results are consistent with other recent studies (13, 14). Poor EI compensation is generally associated with obesity (41, 42), but, in the present study, it was related to leanness. Women who ate more frequently were leaner than others, even if the former group tended to eat more. This finding emphasizes the need to measure energy output when the relation between EF and body composition is investigated. Indeed, physical activity is an important factor in the prevention of weight gain and the promotion of weight-loss maintenance (43, 44). Even though higher PAEE in women may promote a higher EF and EI to meet the increased energy requirements, increased physical activity may be sufficient to prevent weight gain.

### Eating frequency, physical activity energy expenditure, and peak oxygen consumption

In the present study, EF was positively correlated with PAEE and $\dot{V}O_{2peak}$. These correlations could explain why women with higher EF also tended to have lower adiposity, despite a higher EI, as was previously proposed (13, 14). Indeed, a physically active lifestyle could compensate for the positive association between EF and EI with respect to body composition. Only 2 studies have included a measure of PAEE in women (13, 14). When physical activity was assessed, it was mostly done with the use of a self-reported questionnaire or physical activity diary, which can increase the rate of overreporting of physical activity (45). In the present study, the use of more objective measures (ie, accelerometer and $\dot{V}O_{2peak}$) to assess PAEE and physical fitness may have contributed to the presence of a relation between EF and PAEE. Physical fitness has not been assessed in previous studies of EF and body composition, and this aspect is a novel contribution to the field.

### Eating frequency and body composition after control for physical activity energy expenditure and peak oxygen consumption

To investigate the effect of PAEE and $\dot{V}O_{2peak}$ on the relation between EF and body composition, we performed partial correlations. The results showed that, after correction for PAEE and $\dot{V}O_{2peak}$, the associations between adiposity and EF were no longer significant, which suggests that the relation between EF and body composition may be an artifact of higher PAEE and greater physical fitness. Therefore, a higher EF resulting from higher physical activity and greater physical fitness could very well be a marker of a physically active lifestyle, at least in leaner persons.

### Conclusion

Results from the present study suggest that the negative relation between EF and body composition, despite higher EI, may in fact be explained by greater physical fitness and PAEE in premenopausal women. Although more studies are needed to confirm this finding, it can be concluded that a higher eating frequency in the absence of physical activity may not lead to enhanced adiposity control. Future research on this relation should include subjects with a wide range of adiposity, and there is also a need for longitudinal data documenting the relation between eating occasions and adiposity.

The authors' responsibilities were as follows—IS, DP, RR-L, and ED: the conception of the study; KD and M-JC: data collection; ED and KD: analysis and interpretation of the data; KD: wrote the manuscript; and all authors: critical revision of the manuscript. None of the authors had a personal or financial conflict of interest.

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**APPENDIX A**

Eating frequency (EF) and energy content and macronutrient composition of the meals, snacks, and drinks[1]

| | Meals | Snacks | Drinks |
|---|---|---|---|
| EF (intake occasions/d) | 2.8 ± 0.2 | 1.8 ± 0.9 | 1.0 ± 0.8 |
| Energy intake (kcal/d) | 1639.8 ± 355.1 | 371.5 ± 248.6 | 80.5 ± 80.9 |
| Protein (g) | 70.8 ± 14.5 | 8.7 ± 7.2 | 1.4 ± 1.7 |
| Protein (% of energy) | 17.3 ± 3.6 | 8.6 ± 2.6 | 8.9 ± 9.1 |
| Carbohydrate (g) | 197.0 ± 49.0 | 55.8 ± 38.0 | 13.0 ± 17.4 |
| Carbohydrate (% of energy) | 47.1 ± 6.1 | 59.1 ± 12.9 | 62.9 ± 27.1 |
| Fat (g) | 60.4 ± 17.7 | 13.2 ± 9.7 | 1.1 ± 1.9 |
| Fat (% of energy) | 32.4 ± 5.5 | 30.1 ± 11.7 | 10.6 ± 12.7 |
| Alcohol (g) | 7.5 ± 7.9 | 1.0 ± 2.3 | 2.2 ± 3.6 |
| Alcohol (% of energy) | 3.0 ± 3.1 | 1.5 ± 3.2 | 17.6 ± 27.6 |

[1] All values are mean ± SD. $n = 69$.