The prevalence of obesity is steadily increasing so much, so that obesity has become a pandemic in developed and developing nations. The increased risk of morbidity and mortality and more particularly of atherosclerotic cardiovascular disease associated with obesity and insulin-resistant states is of great public health concern. Each 5 kg/m² increase above a body mass index (BMI) of 25 kg/m² results in a 40% increase in cardiovascular mortality. Dyslipidemia is a prominent feature of obesity and insulin-resistant states. The typical dyslipidemia associated with these conditions is mainly characterized by elevated plasma triglyceride concentration, low high-density lipoprotein-cholesterol (HDL-C) level, increased proportion of small and dense low-density lipoprotein (LDL), and postprandial hyperlipidemia. These abnormalities contribute to the high residual cardiovascular risk observed in obesity and insulin-resistant states, even if low LDL-C levels are achieved by statin treatment.

**Objective**—The dyslipidemia of obesity and other insulin-resistant states is characterized by the elevation of plasma triglyceride-rich lipoproteins (TRL) of both hepatic (apoB-100–containing very low-density lipoprotein) and intestinal (apoB-48–containing chylomicrons) origin. Bariatric surgery is a well-established and effective modality for the treatment of obesity and is associated with improvements in several metabolic abnormalities associated with obesity, including a reduction in plasma triglycerides. Here, we have investigated the effect of bariatric surgery on TRL metabolism.

**Approach and Results**—Twenty-two nondiabetic, obese subjects undergoing bariatric surgery: sleeve gastrectomy (n=12) or gastric bypass (n=10) were studied. Each subject underwent 1 lipoprotein turnover study 1 month before surgery followed by a second study, 6 months after surgery, using established stable isotope enrichment methodology, in constant fed state. TRL-apoB-100 concentration was significantly reduced after sleeve gastrectomy, explained by a decrease (P<0.05) in TRL-apoB-100 production rate and an increase (P<0.05) in TRL-apoB-100 fractional catabolic rate. TRL-apoB-48 concentration was also significantly reduced after sleeve gastrectomy, explained by reduction in TRL-apoB-48 production rate (P<0.05). For gastric bypass, although TRL-apoB-100 concentration declined after surgery (P<0.01), without a significant decline in TRL-apoB-48, there was no significant change in either TRL-apoB-100 or TRL-apoB-48 production rate or fractional catabolic rate. The reduction in TRL-apoB-100 concentration was significantly associated with a reduction in plasma apoC-III in the pooled group of patients undergoing bariatric surgery.

**Conclusions**—This is the first human lipoprotein kinetic study to explore the mechanism of improvement of TRL metabolism after bariatric surgery. These effects may contribute to the decrease of cardiovascular mortality after surgery.

**Clinical Trial Registration**—URL: http://www.ClinicalTrials.gov. Unique identifier: NCT01277068.

**Key Words:** atherosclerosis ♦ chylomicrons ♦ general surgery ♦ obesity ♦ triglycerides
overproduction of VLDL and chylomicrons and to defective TRL removal because of impaired lipoprotein lipase (LPL) activity, to abnormalities in the composition of TRL including that of its apolipoproteins and to a defect in the hepatic uptake of TRL. TRL-apoB-100 and TRL-apoB-48 and their remnants are directly and indirectly proatherogenic.

Bariatric surgery has recently become a widely accepted, effective, therapeutic option for the treatment of marked obesity, in view of the absence of safe and effective pharmacotherapy and the relative ineffectiveness of conventional treatment modalities, such as dietary modification, psychological support, and physical activity, in achieving long-term weight reduction. Two main procedures are performed: sleeve gastrectomy (SG) and gastric bypass (BP). Bariatric surgery is associated with long-term weight loss, and a reduction of 29% in overall mortality was compared with obese controls receiving conventional, nonsurgical treatment. Decreased mortality after bariatric surgery is mainly because of the reduction of cardiovascular deaths compared with control groups. Improvements in several cardiovascular risk factors, such as plasma lipids, diabetes mellitus, and hypertension, in the short- and long-term follow-up are postulated to contribute to the improvement of cardiovascular outcomes after bariatric surgery.

In the present study, we investigated the effect of 2 of the most commonly performed bariatric surgical procedures: SG and BP, on hepatic TRL-apoB-100 and intestinal TRL-apoB-48 metabolism, in a constant fed state, using stable isotope enrichment methodology and multicompartmental modeling. We hypothesized that these 2 procedures of bariatric surgery, which are accompanied by significant weight loss, improved insulin sensitivity, and improved metabolic parameters including plasma triglycerides, are associated with reduction in hepatically and intestinally derived TRL particle production and an increase in particle clearance. Our study was not powered or designed to compare the effectiveness of the 2 surgical procedures, one against the other. We specifically chose to examine nondiabetic obese individuals to eliminate the potential confounding effect of marked changes in glycemia and concomitant diabetes mellitus therapies after bariatric surgery.

**Materials and Methods**

Materials and Methods are available in the online-only Supplement.

**Results**

**Demographic Characteristics, Fasting Biochemical Parameters, Energy Expenditure, and Energy Intake of Obese Subjects in Presurgery**

At baseline (fasting state of the presurgery condition), we found no statistical difference between the SG and the BP groups other than a significantly lower TRL-C level (P<0.05) in the BP group associated with a trend toward lower plasma triglyceride (P=0.099), TRL-triglyceride (P=0.057), plasma insulin levels (P=0.086), homestasis model assessment-insulin resistance (HOMA-IR; P=0.065), and a higher BMI (P=0.099) in the BP group (Table 1).

**Effects of Bariatric Surgery on BMI, Fasting Biochemical Parameters, Energy Expenditure, and Energy Intake**

In the fasting state, when we compared presurgery with postsurgery (6 months after surgery), we found a significant reduction in weight, BMI, plasma glucose, plasma insulin, HOMA-IR, plasma total cholesterol (TC), energy intake, and resting energy expenditure after surgery in both the SG and the BP groups. Plasma triglyceride, TRL-triglyceride, TRL-C, TRL-apoB-48, and plasma apoC-III decreased, and HDL-C increased significantly after surgery only in the SG group (Table 1).

When we analyzed the pooled group of subjects who underwent either type of bariatric surgical procedure, we found a significant reduction in weight, BMI, plasma glucose, plasma insulin, HOMA-IR, plasma TC, plasma triglyceride, plasma LDL-C, plasma apoC-III, TRL-triglyceride, TRL-C, TRL-apoB-48, energy intake, and resting energy expenditure after surgery and a significant increase in HDL-C (Table I in the online-only Data Supplement).

**Effects of Bariatric Surgery on Biochemical Parameters During Lipoprotein Kinetic Studies Performed in a Constant Fed State**

In the constant fed state (ie, during the kinetic studies), when we compared the SG and the BP groups in presurgery, we found that TRL-triglyceride and TRL-C levels were higher in the SG group (P<0.01 and P<0.05, respectively; Table II and Figure III in the online-only Supplement).

When we compared surgery with postsurgery, we found a significant reduction in plasma triglyceride, TRL-triglyceride, TRL-C, and TRL-apoB-100 in SG (P<0.01 for all parameters) and BP (P<0.05 for all) groups (Figure 1B; Table II and Figure IIIA, IIIC, and IIID in the online-only Data Supplement). TRL-apoB-48 decreased significantly only in the SG group (P<0.01; Figure 1A; Table II in the online-only Data Supplement) and plasma free fatty acid level decreased only in the BP group (P<0.05) after surgery (Table II and Figure IIIIB in the online-only Data Supplement).

When we analyzed the pooled group of bariatric surgical patients, we found a significant reduction in plasma
triglyceride, TRL-triglyceride, TRL-C, and TRL-apoB-100 (P<0.01 for all) and a trend toward a reduction in TRL-apoB-48 (P=0.053; Table III in the online-only Data Supplement).

**Effects of Bariatric Surgery on TRL-apoB-48 and TRL-apoB-100 Pool Size, Fractional Catabolic Rate, and Production Rate**

Before undergoing bariatric surgery, there were no significant differences in TRL-apoB-48 pool size (PS) or TRL-apoB-100 PS, in TRL-apoB-48 fractional catabolic rate (FCR) or TRL-apoB-100 FCR, and in TRL-apoB-48 production rate (PR) or TRL-apoB-100 PR between SG and BP groups (Table 2; Figure 2A–2F).

Table 1. Mean Pre- and Postsurgery Demographic Characteristics, Fasting Biochemical Parameters, Energy Expenditure, and Energy Intake in the SG and BP Groups of Obese Subjects

<table>
<thead>
<tr>
<th>Parameters</th>
<th>SG (n=12)</th>
<th>Postsurgery</th>
<th>BP (n=10)</th>
<th>Postsurgery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, y</td>
<td>37.4±3.4</td>
<td>...</td>
<td>40.9±3.4</td>
<td>...</td>
</tr>
<tr>
<td>Sex (% women)</td>
<td>75</td>
<td>...</td>
<td>70</td>
<td>...</td>
</tr>
<tr>
<td>Weight, kg</td>
<td>116.7±2.9</td>
<td>83.2±2.9*</td>
<td>125.0±3.5</td>
<td>97.9±4.4*</td>
</tr>
<tr>
<td>BMI, kg/m²</td>
<td>42.7±0.8</td>
<td>30.4±0.8*</td>
<td>45.5±1.7</td>
<td>35.5±1.5*</td>
</tr>
<tr>
<td>Glucose, mmol/L</td>
<td>5.16±0.22</td>
<td>4.27±0.11**</td>
<td>4.83±0.22</td>
<td>4.26±0.06†</td>
</tr>
<tr>
<td>Insulin, pmol/L</td>
<td>164.26±19.22</td>
<td>59.15±9.32*</td>
<td>121.39±20.79</td>
<td>62.16±8.82†</td>
</tr>
<tr>
<td>HOMA-IR</td>
<td>3.70±0.70</td>
<td>1.60±0.25*</td>
<td>1.03±0.08</td>
<td>1.04±0.05</td>
</tr>
<tr>
<td>Plasma TG, mmol/L</td>
<td>1.11±0.11*</td>
<td>1.24±0.13†</td>
<td>1.06±0.18</td>
<td>0.98±0.14</td>
</tr>
<tr>
<td>Plasma TC, mmol/L</td>
<td>4.57±0.28‡</td>
<td>5.00±0.92†</td>
<td>5.55±1.43</td>
<td>4.60±0.63</td>
</tr>
<tr>
<td>Plasma LDL-C, mmol/L</td>
<td>2.89±0.23</td>
<td>0.55±0.05</td>
<td>0.52±0.07</td>
<td>0.51±0.06</td>
</tr>
<tr>
<td>Plasma FFA, mmol/L</td>
<td>60.33±7.82*</td>
<td>60.33±7.82*</td>
<td>73.14±7.96</td>
<td>49.10±6.75</td>
</tr>
<tr>
<td>Plasma apoC-III, mg/L</td>
<td>96.79±14.69</td>
<td>91.79±10.41</td>
<td>80.27±9.96</td>
<td>80.27±9.96</td>
</tr>
<tr>
<td>TRL-apoB-48, mg/L</td>
<td>9.51±2.01</td>
<td>5.00±0.92†</td>
<td>5.55±1.43</td>
<td>4.60±0.63</td>
</tr>
<tr>
<td>TRL-apoB-100, mg/L</td>
<td>122.37±18.64</td>
<td>91.79±10.41</td>
<td>73.14±7.96</td>
<td>49.10±6.75</td>
</tr>
<tr>
<td>TRL-TG, mmol/L</td>
<td>1.06±0.15</td>
<td>0.65±0.08†</td>
<td>0.57±0.10‡</td>
<td>0.52±0.08</td>
</tr>
<tr>
<td>Energy intake, kcal/d</td>
<td>2260±202</td>
<td>1020±95*</td>
<td>1595±355</td>
<td>1040±147†</td>
</tr>
<tr>
<td>REE, kcal/d</td>
<td>1677±78</td>
<td>1300±81†</td>
<td>1595±41</td>
<td>1330±64†</td>
</tr>
</tbody>
</table>

Data are mean±SEM. apo indicates apolipoprotein; BMI, body mass index; BP, gastric bypass; FFA, free fatty acid; HDL-C, high-density lipoprotein-cholesterol; HOMA-IR, homeostasis model assessment-insulin resistance; LDL-C, low-density lipoprotein-cholesterol; REE, resting energy expenditure; SG, sleeve gastrectomy; TG, total cholesterol; TC, triglyceride; and TRL, triglyceride-rich lipoproteins.

Mean data were compared in presurgery between SG and BP group (‡P<0.05) and for each group between presurgery and postsurgery (*P<0.01; †P<0.05).
When we analyzed the pooled group of bariatric surgical patients, we found a significant decrease of TRL-apoB-100 PS (34% decline; \( P < 0.01 \)) that was associated with a significant decrease in PR (23% decline; \( P < 0.01 \)) and a significant increase in FCR (22% increase; \( P < 0.05 \)) after surgery. TRL-apoB-48 PS declined significantly (33% decline; \( P < 0.05 \)), but there were no significant changes in PR or FCR after surgery (Table VI in the online-only Data Supplement).

**Correlations Between TRL-apoB-48 and TRL-apoB-100 Kinetic Parameters and BMI, HOMA-IR, and Fasting or Constant Fed State Metabolic Parameters**

There was a strong positive association between ΔTRL-apoB-100 PS and fasting Δplasma triglyceride (\( r = 0.851; P < 0.01 \)), ΔTRL-triglyceride (\( r = 0.817; P < 0.01 \)), ΔTRL-C (\( r = 0.817; P < 0.01 \)) in the constant fed state for the pooled surgical group. There were no significant or significant weaker associations (\( r < 0.7 \) or \( r > -0.7 \)) between the other kinetic parameters and BMI, HOMA-IR, fasting, or constant fed state metabolic parameters.

**Discussion**

In the present study, to our knowledge, the first lipidprotein kinetic study performed before and after bariatric surgery in humans, the marked weight reduction, reduction in energy intake and the improvement in insulin sensitivity that accompanied both types of bariatric surgical procedures were accompanied by a reduction in fasting total plasma cholesterol. Significant reductions in fasting plasma triglyceride, TRL-triglyceride, TRL-C, TRL-apoB-48, and plasma

![Figure 2](image.png)

Figure 2. TRL-apoB-48 pool size (A), fractional catabolic rate (B), and production rate (C); TRL-apoB-100 pool size (D), fractional catabolic rate (E), and production rate (F) in presurgery (pre-S) and in postsurgery (post-S) for the sleeve gastrectomy (SG) and gastric bypass (BP) groups of obese subjects. Data are mean±SEM. Mean data were compared in pre-S between SG and BP groups (\( P = \text{NS} \)) and for each group between presurgery and postsurgery (\( ^* P < 0.01; ^† P < 0.05 \)). Apo indicates apolipoprotein; and TRL, triglyceride-rich lipoproteins.
apoC-III and an increase in HDL-C were seen only in those who underwent SG although this finding may be a result of the small sample size of this mechanistic study because similar trends in many of these parameters were also seen after the BP procedure. Indeed, the analysis of the pooled group of surgical patients confirmed the significant reductions in fasting plasma TC, plasma triglyceride, plasma LDL-C, TRL-triglyceride, TRL-C, TRL-apoB-48, and plasma apoC-III and an increase in HDL-C after surgery. Our study was not designed or powered to compare the effects of one versus the other surgical procedure. These findings are in keeping with the results of several studies and meta-analysis showing an improvement of dyslipidemia, mainly a decrease in fasting plasma triglyceride, plasma TC, and an increase in HDL-C, in the short-term (6–12 months) or long-term (≥12 months) after bariatric surgery.21,23,24

A few studies have investigated the effect of bariatric surgery on postprandial lipoprotein concentrations. In patients with obesity and type 2 diabetes mellitus, the plasma concentrations of triglyceride, TC, and the incremental area under the curve of triglyceride decreased and HDL-C increased after a test meal performed 2 weeks after bariatric surgery, with a similar effect after SG and BP procedures.23 In patients with morbidly obese, the area under the curve and the incremental area under the curve of VLDL-triglyceride but not chylomicron-triglyceride decreased after a test meal 3 months after SG. In our study, which was performed in the constant fed state, we confirmed that plasma triglyceride, TRL-triglyceride, TRL-C, TRL-apoB-100 levels, and TRL-apoB-100 PS decreased after both surgical procedures. TRL-apoB-48 level and TRL-apoB-48 PS decreased significantly only in the SG group. The analysis of the pooled group of patients in the constant fed state confirmed the decrease of plasma triglyceride, TRL-triglyceride, TRL-C, TRL-apoB-100 levels, TRL-apoB-100 PS, and TRL-apoB-48 PS, with a trend toward a reduction in TRL-apoB-48 levels after surgery.

The novel aspect of the present study is the in-depth assessment that we performed of hepatic and intestinal TRL particle kinetics after bariatric surgery. We have shown that the marked weight loss and improvement in insulin sensitivity after surgery was accompanied by a reduction in TRL-apoB-100 concentration that was explained by a reduction in PR (significant in SG and trend in BP) and an increase in particle clearance (significant in SG and trend in BP). The analysis of the pooled group of patients undergoing bariatric surgery confirmed the significant decrease in TRL-apoB-100 concentration explained by a significant reduction in PR and an increase in FCR after surgery. The decrease in TRL-apoB-48 concentration in SG and in the pooled group of patients was explained by a significant decrease in PR in SG and a trend toward a reduction in the pooled group with no change in clearance.

Overproduction of TRL of both hepatic and intestinal origin has been shown in insulin-resistant states. VLDL are overproduced in type 2 diabetic27 and obese men32,29 or women with visceral obesity30 when compared with healthy subjects. Likewise, chylomicrons are overproduced in type 2 diabetic31 in obese,23 and in hyperinsulinemic insulin-resistant men3 when compared with control subjects. This increase in TRL production seems to result, in part, from decreased sensitivity to the acute inhibitory effects of insulin on VLDL and chylomicron secretion, as well as other abnormalities in the biogenesis and secretion of these particles.5 It is not surprising, therefore, that the marked decline in body weight and improvement in insulin sensitivity that follows bariatric surgery is associated with reductions in VLDL and chylomicron particle production, as we have demonstrated here.

We also demonstrated a significant increase in TRL-apoB-100–containing particle (VLDL) clearance in the SG group (+30%) and in the pooled group (+22%). This improvement in VLDL clearance contributes to the significant reduction of TRL-apoB-100 PS after both surgical procedures, in association with a reduction in VLDL production. Furthermore, this decline in PS was strongly associated with the significant reductions in plasma triglyceride, TRL-triglyceride, and TRL-C in the fasted and fed states after bariatric surgery. Several studies have shown impaired TRL-apoB-100 clearance in insulin-resistant states: in type 2 diabetic32,33 and in obese subjects34 when compared with controls. The rates of conversion of VLDL-apoB to LDL and LDL-apoB were decreased in viscerally obese when compared with that in lean men.23 The improvement of TRL-apoB-100 FCR after surgery could be because of several potential mechanisms. Reduced activity of LPL, the main enzyme implicated in TRL-triglyceride hydrolysis, has been demonstrated in the fasting state in insulin-resistant versus noninsulin-resistant, nondiabetic subjects39 and in the postprandial state in insulin-resistant, type 2 diabetic versus nondiabetic control subjects, with an inverse relationship with HOMA-IR in the latter study.36 In the present study, the increase in insulin sensitivity after bariatric surgery could be linked to improvements of LPL activity and, therefore, of TRL-apoB-100 FCR and TRL-apoB-100 PS. Unfortunately, we did not take postheparin plasma samples for the measurement of LPL activity in the present study. However, after SG, it has been shown in morbidly obese subjects a slower return of VLDL-triglyceride to baseline after a fat meal that could be consistent with a reduction, rather than an increase, in clearance of VLDL.26 Moreover, we found no evidence of an increase in TRL-apoB-48 FCR after bariatric surgery. A common, saturable removal mechanism for chylomicrons and VLDL at the level of LPL has been shown in humans35 with a preferential clearance of chylomicrons in the fed state.38 The significant decline of 49% in TRL-apoB-48 PR of the SG group might have contributed to the improved clearance of TRL-apoB-100 after surgery in this competitive removal system.

Another possibility that could be invoked to explain the increase in TRL-apoB-100 FCR is an alteration in TRL particle composition, such as reduction in apoC-III concentration. In the pooled group of subjects who underwent bariatric surgery, we found a strong positive association between the reduction of plasma apoC-III and TRL-apoB-100 PS, which may suggest a role for reduction in apoC-III in the increased clearance of VLDL after bariatric surgery. Plasma apoC-III level is strongly correlated with triglyceride level39,40 and is increased in insulin-resistant, overweight, or obese subjects.41 Elevated apoC-III has been postulated to contribute to the
TRL clearance defect in this condition, possibly by inhibiting the activity of LPL or by interfering with the interaction between TRL particles and hepatic lipoprotein receptors. In a kinetic study in obese men, plasma apoC-III was significantly and positively associated with VLDL-apoB-100 concentration, similar to our study, and negatively with VLDL FCR. It is thus interesting to speculate that the increase of the TRL-apoB-100 FCR in our study could be partly explained by the decrease of apoC-III after bariatric surgery, but this hypothesis requires further testing.

In the present study, changes in lipoprotein metabolism were more profound in those who underwent the SG versus the BP procedure. Significant positive relationships between fasting plasma concentration of apoB-48 and postprandial kinetics of apoB-48 and between fasting plasma triglyceride, TRL-triglyceride and TRL-C concentrations, and postprandial triglyceride concentrations have been demonstrated in humans. The better lipid profile of our BP group compared with our SG group at the fasting state before surgery might explain the more drastic changes observed in the SG group. This is illustrated in our study by the higher fed state TRL-triglyceride and TRL-C concentrations in the SG versus the BP group at baseline before surgery. However, we caution against over interpreting these results in view of the relatively small sample size. We cannot completely exclude a differential effect between the 2 bariatric surgical procedures about TRL metabolism because our study was not designed to test the superiority of one procedure instead of the other. Larger studies are needed to compare the different bariatric surgery procedures.

Despite several methodological differences (ie, the choice of the modeling method; the adjustment or not of plasma volume based on body weight; the expression of PR in mg/d or mg/kg per day), we attempted to compare the kinetic parameters between our study and other isotope kinetic studies using similar or close methodology, to assess the baseline levels of our kinetic parameters in presurgery and to determine whether our subjects normalized their TRL kinetic parameters postsurgery. In presurgery, the mean TRL-apoB-100 FCR of SG and BP was in a similar range and mean TRL-apoB-100 PR of SG and BP was in the lower range when compared with those published in obese subjects. After surgery, mean TRL-apoB-100 FCR and mean TRL-apoB-100 PR of SG and BP did not completely reach those of nonobese controls and were lower for mean TRL-apoB-100 FCR and higher for mean TRL-apoB-100 PR when compared with those of nonobese controls. We should bear in mind that our subjects remained obese at the time of the second kinetic study. In presurgery, the mean TRL-apoB-48 FCR of SG and BP and mean TRL-apoB-48 PR of SG were in the range, whereas mean TRL-apoB-48 PR of BP was below the range when compared with those published in obese subjects. After surgery, mean TRL-apoB-48 PR of SG was close to the mean TRL-apoB-48 PR of BP in presurgery and in the range of those of nonobese controls. Despite no significant difference in presurgery between mean TRL-apoB-48 PR of SG and BP, the lower mean TRL-apoB-48 PR of BP compared with SG and to other studies of obese subjects might explain the absence of reduction in TRL-apoB-48 PR of BP after surgery.

Because we anticipated marked weight reduction after bariatric surgery and because the meal content in nutrients influences postprandial lipid levels, we designed the study to provide identical caloric and macronutrient load to achieve a constant fed state during the kinetic studies performed before and after bariatric surgery, rather than the more traditional method of calculating food intake based on daily caloric needs, which takes into account body weight. The same amount of nutrients (2000 kcal) ingested by our subjects during the kinetic studies before and after the surgery, despite a drastic reduction in BMI and mean caloric intake of ~1000 kcal/d at 6 months after surgery, may have reduced potential differences in TRL metabolism, particularly TRL-apoB-48 PR. Moreover, the constant fed state used in our study, which is necessary to study chylomicron metabolism, with an hourly small amount of liquid food ingested, could have reduced potential different effects of the 2 types of surgical procedures on TRL metabolism and mainly TRL-apoB-48 PR. Indeed, the specific malabsorptive effect of the BP compared with the SG was probably not induced by this way of eating.

In conclusion, we have shown improved TRL metabolism after bariatric surgery in nondiabetic, obese humans with normolipidemia or mild dyslipidemia. This improvement seemed to be more pronounced in the more dyslipidemic subjects (the SG group in the present study). The beneficial effect of bariatric surgery on TRL metabolism is manifested in decreased production and improved clearance of hepatic lipoproteins (TRL-apoB-100 or VLDL) and in decreased production with no change in clearance of intestinal lipoproteins (TRL-apoB-48 or chylomicrons). This improvement of fasting and postprandial dyslipidemia after bariatric surgery may contribute to the decrease of cardiovascular morbidity and mortality.

Acknowledgments

We thank Jeanine Dupont-Roussel, Lydia Abou, Myriam Coffin, the AP-HM (Promoteur), and the DRCI for their technical assistance.

Sources of Funding

This work was supported by fundings from a AORC Excellence (AP-HM-2010), Fondation de France, Nutricia (SFNEP) and Novo Nordisk. G.F. Lewis is funded by an operating grant from the Canadian Institutes of Health Research and is the holder of the Sun Life Financial Chair in Diabetes and the Drucker Family Chair in Diabetes Research.

Disclosures

None.

References

Bariatric Surgery on TRL Metabolism in Obesity


Significance

Bariatric surgery is known to improve potentially atherogenic metabolic parameters such as plasma apoB-containing triglyceride-rich lipoproteins, but the mechanism of this effect has not previously been studied. In the present study, we have examined the effect of 2 commonly performed bariatric surgical procedures (sleeve gastrectomy and gastric bypass) on hepatic (very low-density lipoprotein) and intestinal (chylomicron) triglyceride-rich lipoproteins production and clearance in obese, nondiabetic individuals. The main finding was a marked reduction in very low-density lipoprotein particle concentration, which was explained by a decrease in particle production and an increase in particle clearance. The effect on chylomicrons was clearer in the sleeve gastrectomy group, with reduction in the concentration explained by a decrease in particle production only in the sleeve gastrectomy group, with no change in clearance in sleeve gastrectomy or gastric bypass groups. Improvement of triglyceride-rich lipoproteins metabolism after bariatric surgery may contribute to the decrease of cardiovascular disease after surgery.