

Changes in SCD1 promoter DNA methylation after bariatric surgery in morbid obese patients are associated with free fatty acids levels

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Introduction

Epigenetic is acquiring great importance in complex diseases, providing mechanisms whereby environmental factors can influence complex diseases such as obesity and type 2 diabetes. Experimental animal and human studies have revealed the association between SCD1 and obesity and insulin resistance.

Aims

The aim of this study was to evaluate whether metabolic changes after intervention are associated with DNA methylation pattern and if these changes are related to weigh loss.

Desing & Methods

The study included 65 subjects with morbid obesity underwent laparoscopic Roux-en Y gastric by-pass. These subjects were studied before and 6 months after bariatric surgery. Serum biochemical and hormone variables were measured. The methylation status of the CpG island region of the SCD1 gene promoter was determined.

Results

DNA methylation levels of the SCD1 gene promoter increased after the intervention (1.54 vs 2.17, $p < 0.001$) (Figure 1). There were no significant differences in SCD1 DNA methylation levels between males and females, neither according to age (data not shown).

A negative association was observed between changes in SCD1 gene promoter methylation and changes in FFA and HOMA-IR ($r = -0.442$; $p = 0.006$, and $r = -0.249$; $p = 0.035$, respectively). On the opposite, a positive association was found between changes in SCD1 gene promoter methylation levels and changes in adiponectin levels ($r = 0.389$, $p = 0.019$).

Table 1. Anthropometric and biochemical variables of the non-obese and morbidly obese subjects.

	Before RYGB	Six months after RYGB	P value
Age (y)	43.2±9.4		
Sex (Male/female) (%)	30.2/69.8		
Weight (Kg)	140.2±25.1	96.2±19.6	<0.001
Waist (cm)	137.3±16.4	108.8±13.1	<0.001
BMI (kg/m ²)	50.9±7.1	35.1±6.6	<0.001
Glucose (mg/dl)	116.3±46.9	83.6±10.6	<0.001
Insulin (μIU/ml)	21.2±9.3	9.9±3.8	<0.001
HOMA-IR	6.2±4.1	2.1±0.9	<0.001
FFA (mmol/L)	0.63±0.21	0.52±0.17	0.003
Adiponectin (μg/ml)	8.2±3.5	11.8±8.7	0.008
Leptin (ng/ml)	122.1±86.1	30.9±31.4	<0.001

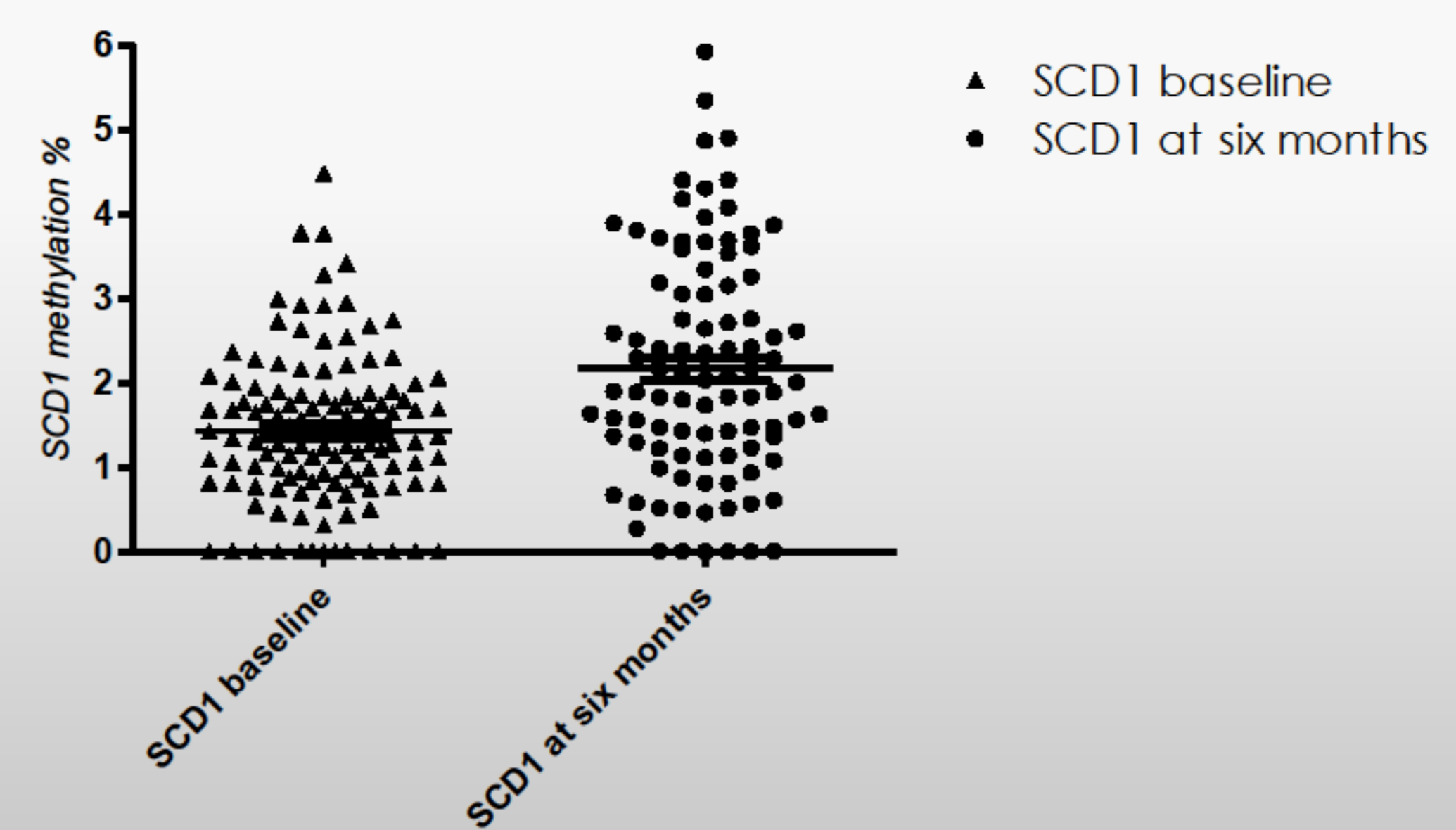


Figure 1. DNA methylation levels of the SCD1 gene promoter increased after the intervention (1.54 vs 2.1, $p < 0.001$)

To test which variables could explain the variation of SCD1 gene promoter methylation levels, a regression linear model was performed. We showed that FFA levels at baseline was significantly associated with SCD1 methylation levels changes in a model adjusted for age, sex, weight, HOMA-IR and adiponectin levels at baseline (Table 2)

Table 2. Baseline predictor variables of SCD1 promoter methylation changes found in morbidly obese subjects after RYGB

	Standardized β	P value
	$R^2 = 0,326$	
Sex (males/females)	-0,370	0,075
Age (years)	0,281	0,120
Weight (Kg)	-0,383	0,095
FFA	-0,434	0,020
HOMA-IR	0,026	0,884
Adiponectin	0,051	0,752

Conclusions

-The main finding of our study is the association found between changes of metabolic parameters and changes in SCD1 methylation levels after bariatric surgery

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