Supplementary Methods:

The following is the list of the materials used in the study: rabbit anti-human collagen IV (Novotec, Lyon, France), fluoro-nanogold anti-rabbit (Nanoprobes, New-York, USA), anti-CD31 (M0823, Dako, Glostrup, Denmark), collagenase A (Roche Applied Science, Pensberg, Germany), immunoselection cocktails EasySep ^{TM} "Do it yourself" selection kit (Stemcell technologies, Grenoble, France), Puramatrix (Corning, New-York, USA), human recombinant TGF-β1 and TGF-β3 (R&D Systems, Minneapolis, USA). ELISA tests of leptin, adiponectin and IL-6 (Duoset, R&D Systems, Minneapolis, MN, USA).

Immuno-electron microscopy in human SAT

Collagen IV localization was analyzed using the pre-embedding immunogold method with silver enhancement (30). SAT samples were immersion-fixed in 0.2% glutaraldehyde-2% paraformaldehyde at room temperature (RT) for 30 min. After agarose inclusion, vibratome sections (80 μM) were collected in PBS and incubated for 30 min in PBS with 4% goat serum at RT. Sections were incubated overnight at 4 °C with rabbit polyclonal collagen IV diluted in PBS with 4% goat serum. Sections were rinsed in PBS (3 x 10 min) and incubated with Fluoro-nanogold anti-rabbit antibody diluted in PBS with 0.2% fish skin gelatin and 2% bovine serum albumin (BSA), for 2 h at RT. After 3 x 10 min PBS washes, sections were post-fixed 10 min in 1% glutaraldehyde. After 3 x 10 min PBS washes and 3 x 10 min washes in 0.1M sodium acetate buffer pH7, silver enhancement (HQ silver, Nanoprobes, NY) was performed in the dark for 3 min and stopped by several rinses in 0.1M sodium acetate buffer pH 7.4. Sections were post-fixed 10 min in osmium tetroxide (1% water) at RT. After rinsing, they were dehydrated in serial ethanol dilutions (50%, 70% with 1% uranyl acetate, 95%, and 100%) followed by 10 min in propylene oxide. Samples were then infiltrated with 3:1 propylene oxide:epon resin for 30 min, then with 1:1 propylene oxide:epon resin for 30 min,

and finally with 1:3 propylene oxide:epon resin overnight at 4 °C. Sections were embedded in epon resin and were mounted on sigmacoated glass slides and polymerized at 60 °C for 48 h. Areas of interest were excised and glued to resin blocks. An ultracut UCT microtome (LEICA Microsystems, IL, USA) was used to generate 70 nm-thick sections, which were collected onto copper rhodium-coated grids. Grids were stained for 2 min in 0.2% lead citrate, and then analyzed with transmission electron microscopy (EM 912 Omega, Zeiss; München, Germany) equipped with a laB6 filament at 80kV. Images were captured with a digital camera (SS-CCD, Veleta 2kx2k) with iTEM software (Olympus, Münster, Germany).

Quantigen Plex Assay

Affymetrix has developed individual bead-based oligonucleotide probe sets specific for each examined gene. Samples were analyzed via the Luminex-200 system (Luminex Corporation, TX, USA), and data were acquired using Xponent software V3. Assays were performed according to the manufacturer's protocol. Briefly, cells lysates were incubated overnight at 54 °C with X-MAP beads containing oligonucleotide capture probes, label extenders, and blockers. The next day, beads and bound target RNA were washed and subsequently incubated with preamplifier solution at 50 °C for 1 h, then samples were washed and incubated with amplifier solution at 50 °C for 1 h. Subsequently, samples were washed and incubated with label probe (biotin) at 50 °C for 1 h. Samples were washed again and incubated with streptavidin-conjugated R-phycoerythin, which binds biotinylated probes, at room temperature for 30 min. Streptavidin-conjugated R-phycoerythrin fluorescence was then detected for each analyte within each sample. All data were standardized to housekeeping genes and normalized to control cells.

Supplementary Table:

Table S1: list of the primers sequences used for real-time PCR

Gene	Forward	Reverse
COL4A1	cgggtacccaggactcatag	ggacctgcttcacccttttc
COL4A3	agcccacggacaagacct	gaatggcattgtggtaaatcg
COL4A5	agagcccacggtcaagact	catgaaaggcatggtactaaagc
LAMC1	gtgctgttgttcccaagaca	gccatcatcacagagctcac
NID1	cagttttcagatgagggaacg	tgaaggccagtttcacagtagtt
HSPG2 **(perlecan)**	tctggctcaagtgctgtcc	gaggaggagggctcgatg
SPARC	tttgatgatggtgcagagga	gtggttctggcagggattt
TGFB1	gcagcacgtggagctgta	cagccggttgctgaggta
TGFB3	aagaagcgggctttggac	cgcacacagcagttctcc

Table S2: Correlation between *COL4A1* and BM component expression in obese adipocytes isolated from human subcutaneous or visceral adipose tissue

	Ad. SAT relative mRNA expression	Ad. VAT relative mRNA expressio
COL4A1 vs *LAMC1*	**0.60 (p=0.047)**	**0.57 (p=0.021)**
COL4A1 vs *NID1*	**0.66 (p=0.004)**	**0.76 (p<0.01)**
COL4A1 vs *SPARC*	**0.54 (p=0.026)**	**0.71 (p=0.002)**

Abbreviations: Ad: Adipocytes; SAT: subcutaneous adipose tissue; VAT: Visceral adipose tissue; n=16. Data are expressed as r and p (in parenthesis) values obtained using Spearman's correlation. In bold, significant correlations.

Table S3: Clinical parameters of obese subjects with impaired fasting glucose

n (women/men)	40/20
Age (years)	51.3 ± 1.2
BMI (Kg/m^2)	31.4 ± 0.4
Weight (Kg)	86.9 ± 1.6
Glycemia (mmol/L)	6.1 ± 0.1
HOMA-IR	1.3 ± 0.1
Insulinemia (μU/L)	9.3 ± 0.6
Insulin sensitivity (HOMA-%S)	63.2 ± 2
B-cell function (HOMA-%B)	4.5 ± 0.4

Table S4: Clinical parameters of non-diabetic morbidly obese women subjects before (T0) and six months after surgery (T6)

	T0	T6	P Value
n	16	16	-
Age (years)	48.9 ± 1.8	48.9 ± 1.8	-
BMI (Kg/m^2)	46 ± 2.1	34.8± 1.7	< 0.0001
Glycemia (mmol/L)	5.6 ± 0.24	5.24 ± 0.24	NS (0.078)
Insulinemia	15.1 ± 1.97	7.87 ± 0.72	0.0009
HOMA-IR	3.8 ± 0.51	1.85 ± 0.2	0.0006
HbA1c (%)	6.2 ± 0.2	5.8 ± 0.2	0.001
Leptin (ng/mL)	61.9 ± 8.9	23.3 ± 3.9	0.001
Adiponectin (μg/mL)	5 ± 0.6	6.6 ± 0.36	0.012

P values were obtained using Wilcoxon's tests

Table S5: Clinical parameters of morbidly obese subjects before (T0) and six months after surgery (T6)

	T0	T6	P Value
n	25	25	-
Age (years)	48.9 ± 1.8	48.9 ± 1.8	-
BMI (kg/m^2)	47 ± 1.4	35.7± 1.2	< 0.0001
Type 2-Diabetic (%)	15 (60)	15 (60)	-
Glycemia (mmol/L)	5.9 ± 0.21	5.3 ± 0.2	0.0067
HOMA-IR	4.1 ± 0.49	2.04 ± 0.2	0.0003
HbA1c (%)	6.4 ± 0.16	5.8 ± 0.1	0.0019
Leptin (ng/mL)	62.6 ± 5.6	27.3 ± 3.7	< 0.0001
Adiponectin (µg/mL)	4.5 ± 0.4	6.3 ± 0.36	0.0003

P values were obtained using Wilcoxon's tests.

Additional results

Figure S1 : Collagen IV immuno-electron microscopy in 4 leans (A ; B ; C ; D) and 4 obeses (E ; F ; G ; H) human subcutaneous adipose tissue. Arrows : collagen IV.

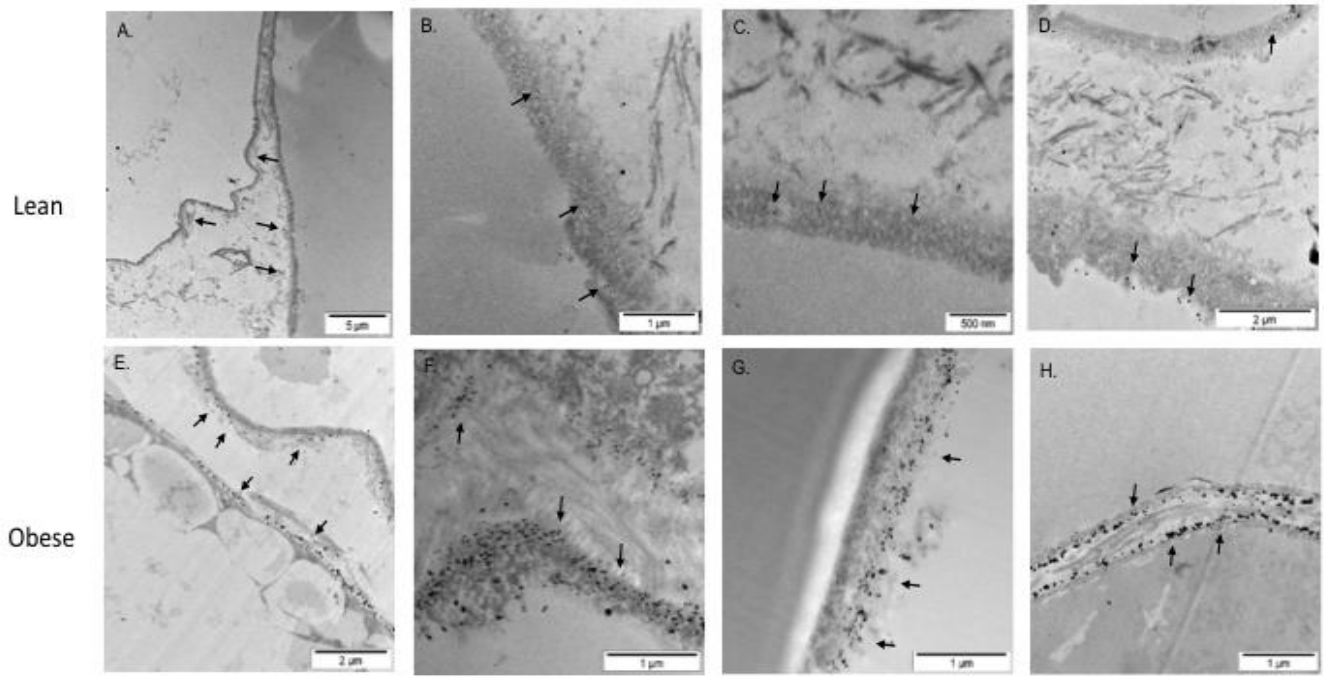
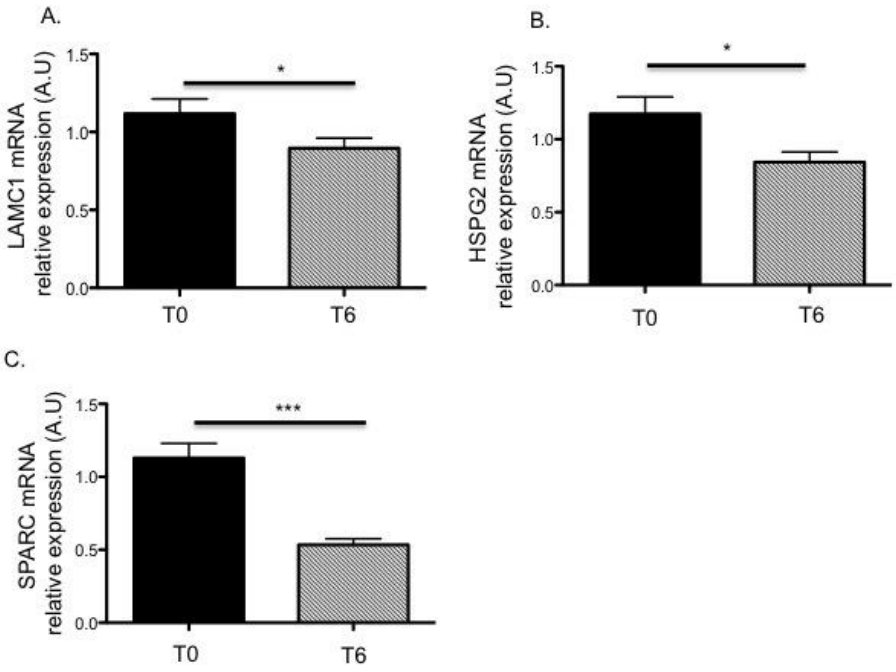


Figure S2: The reduced expression of *LAMC1*, *HSPG2*, and *SPARC* in subcutaneous adipose tissue seen with weight loss, is also associated with variations in *TGFB1* and *TGFB2* expression.



D.

Gene expression	Delta TGFβ1	Delta TGFβ3
Delta LAMC1	r=0.36; p=0.08	r=0.64; p=0.0005
Delta perlecan/ HSPG2	r=0.35; p=0.08	r=0.6; p=0.0021
Delta SPARC	NS	r=0.48; p=0.0151