

Supplementary Table S1. Sequence of primers of mouse genes used in quantitative Real-time PCR analysis

Primer	Forward Sequence (5'-3')	Reverse Sequence (5'-3')
mCeacam1	AATCTGCCCCTGGCGCTTGGAGCC	AAATCGCACAGTCGCCTGAGTACG
rCeacam1	CCCGGTCAGTTTCAGGATAA	GAAGAGGCTGAAGTTGGTCG
Gfp	GAGTACAACACTACAACAGCCAC	CTTGAAGTTCACCTTGATGCC
Srebp-1c	GGAGCCATGGATTGCACATT	GCTTCCAGAGAGGAGGCCA
Fasn	ACTGTGAGAAGCATGTCCCTGGAA	AAGCAACCTCCACTCCTCTGCTTA
Cd36	TCTTGGCTACAGCAAGGCGACATA	AGCTATGCAGCATGGAACATGACG
Fatp-1	GCAGAAGACGCAGGAAGA	GGACGTGGCTGTGTATGG
Fatp-4	GTGAGATGGCCTCAGCTATC	GAAGAGGGTCCAGATGCTCT
Lpl	AAGGTCAGAGCCAAGAGAAGCA	CCAGAAAAGTGAATCTTGACTTGGT
Cpt-1 α	AAGGCAGAAGAGTGGGCTTTCACT	ACCTTGGCTGCGGTAAGACTATGT
Fgf-21	CCTCTAGGTTTCTTTGCCAACAG	AAGCTGCAGGCCTCAGGAT
Ucp-1	GGATGGTGAACCCGACAACCT	AACTCCGGCTGAGAAGATCTTG
Hsl	GGCTTACTGGGCACAGATACCT	CTGAAGGCTCTGAGTTGCTCAA
Cd68	CCTCGCCCTAGTCCAAGGTC	GGATTCGGATTTGAATTTGGGCT
F4/80	CAAGGAGGACAGAGTTTATCGTG	CTTTGGCTATGGGCTTCCAGTC
IL-1 β	CCCTGCAGCTGGAGAGTGTGG	TATTCTGTCCATTGAGGTGGAG
IL-6	CTTGGGACTGCCGCTGGTGA	TGCAAGTGCATCATCGTTGT
Tnf- α	CCACCACGCTCTTCTGTCTAC	AGGGTCTGGGCCATAGAACT
Ifn- γ	ATG AAC GCT ACA CAC TGC ATC	CCA TCC TTT TGC CAG TTC CTC
Col6 α 3	GTCAGCTGAGTCTTGTGCTGT	ACCTAGAGAACGTTACCTCACT
α -Sma	CGTGGCTATTCCTTCGTTAC	TGCCAGGAGACTCCATCC
Tgf- β	GTGGAAATCAACGGGATCAG	ACTTCCAACCCAGGTCCTTC
Smad7	GTT GCT GTG AAT CTT ACG GG	ATC TGG ACA GCC TGC A
18S	TTCGAACGTCTGCCCTATCAA	ATGGTAGGCACGGCGACTA

Supplementary Table S2. Effect of nicotinic acid on the transcript levels of inflammatory and fibrotic markers in white adipose tissue

	RD-S	HF-S	HF-NA
Inflammation			
Cd68	5.62 ± 1.16	9.87 ± 1.38 ^a	17.02 ± 0.82 ^{a,b}
F4/80	6.66 ± 1.96	14.51 ± 1.96 ^a	21.66 ± 0.78 ^{a,b}
Il-1β	4.07 ± 0.58	5.35 ± 0.43	11.70 ± 0.54 ^{a,b}
Il-6	3.76 ± 0.81	5.43 ± 0.58	12.93 ± 1.17 ^{a,b}
Tnf-α	2.29 ± 0.46	6.39 ± 0.96 ^a	12.83 ± 0.48 ^{a,b}
Ifn-γ	7.78 ± 1.93	8.36 ± 1.27	15.39 ± 0.62 ^{a,b}
Fibrosis			
Col6α3	3.18 ± 0.77	12.73 ± 0.77 ^a	8.72 ± 0.99 ^{a,b}
α-Sma	1.36 ± 0.41	4.53 ± 0.46 ^a	2.70 ± 0.45 ^b
Tgf-β	1.43 ± 0.37	4.84 ± 0.62 ^a	2.53 ± 0.42 ^b
Smad7	3.91 ± 0.55	1.43 ± 0.19 ^a	3.09 ± 0.43 ^b

Mice (3 months of age, n=5/group) were fed RD or HF for 30 days. In the last 2 days of feeding, mice were injected with a daily dose of nicotinic acid (NA). WAT extracts were analyzed by qRT-PCR in duplicate using the primers listed in Table S1. Gene expression was normalized to 18S. Values are expressed as mean ± SEM.

^a*P* < 0.05 vs RD-GFP; ^b*P* < 0.05 HF-NA vs HF-S.

Supplementary Table S3. Effect of Adenoviral-redelivery of CEACAM1 on the mRNA levels of genes involved in lipid metabolism, inflammation and fibrosis in liver 21 days post-adenoviral injection

	RD-GFP	HF-GFP	HF-rWT	HF-rSA
Lipid Metabolism				
Srebp-1c	1.89 ± 0.24	4.11 ± 0.97 ^{a,c}	1.80 ± 0.49 ^b	3.75 ± 0.70 ^{a,c}
Fasn	0.37 ± 0.09	0.95 ± 0.20 ^{a,c}	0.38 ± 0.07 ^b	1.37 ± 0.16 ^{a,c}
Cd36	0.57 ± 0.18	2.59 ± 0.74 ^{a,c}	0.79 ± 0.23 ^b	2.62 ± 0.84 ^{a,c}
Fatp-1	0.68 ± 0.05	1.42 ± 0.30 ^{a,c}	0.59 ± 0.09 ^b	1.16 ± 0.13 ^{a,c}
Fatp-4	1.03 ± 0.11	1.70 ± 0.17 ^{a,c}	0.82 ± 0.14 ^b	1.98 ± 0.32 ^{a,c}
Cpt-1 α	1.03 ± 0.07	0.39 ± 0.07 ^{a,c}	1.27 ± 0.30 ^b	0.27 ± 0.06 ^{a,c}
Fgf-21	0.69 ± 0.10	0.35 ± 0.07 ^{a,c}	1.02 ± 0.19 ^b	0.37 ± 0.10 ^{a,c}
Inflammation				
F4/80	0.80 ± 0.27	2.16 ± 0.29 ^{a,c}	0.98 ± 0.18 ^b	2.62 ± 0.46 ^{a,c}
Tnf- α	1.55 ± 0.32	3.46 ± 0.67 ^{a,c}	1.30 ± 0.44 ^b	2.50 ± 0.22 ^{a,c}
Fibrosis				
Col6 α 3	1.48 ± 0.09	3.13 ± 0.22 ^{a,c}	1.27 ± 0.21 ^b	3.92 ± 1.42 ^{a,c}
α -Sma	0.63 ± 0.09	7.06 ± 2.26 ^{a,c}	1.60 ± 0.93 ^b	9.19 ± 2.92 ^{a,c}

Mice (2 months of age, n=5/group) were fed RD or HF for 41 days. On the 20th day, mice were injected with equal titers of adenoviral particles of Ad-GFP, Ad-rWT and Ad-rSA CEACAM1. Liver extracts were removed 21 days post-injection and analyzed by qRT-PCR in duplicate using the primers listed in Table S1. Gene expression was normalized to 18S. Values are expressed as mean ± SEM. ^a*P* < 0.05 vs RD-GFP; ^b*P* < 0.05 vs HF-GFP; ^c*P* < 0.05 vs HF-rWT.

Supplementary Table S4. Effect of Adenoviral-redelivery of CEACAM1 on the mRNA levels of genes involved in inflammation in the liver of mice 3 days post-adenoviral injection

	RD-GFP	HF-GFP	HF-rWT	HF-rSA
Inflammation				
F4/80	0.86 ± 0.04	2.89 ± 0.10 ^a	2.58 ± 0.18 ^a	2.94 ± 0.04 ^a
Tnf- α	1.33 ± 0.08	3.41 ± 0.13 ^a	2.83 ± 0.15 ^a	3.16 ± 0.15 ^a

As in Table S3, except for mice were sacrificed 3 days post-injection and the liver removed to analyze lysates by qRT-PCR in quadruplet using the primers listed in Table S1. Gene expression was normalized to 18S. Values are expressed as mean ± SEM. ^a*P* < 0.05 vs RD-GFP.

Supplementary Table S5. Effect of Adenoviral-redelivery of CEACAM1 on the mRNA levels of genes involved in adipogenesis, inflammation and fibrosis in white adipose tissue 21 days post-adenoviral injection

	RD-GFP	HF-GFP	HF-rWT	HF-rSA
Brown adipogenesis				
Ucp-1	0.73 ± 0.21	0.26 ± 0.04 ^{a,c}	0.83 ± 0.21 ^b	0.29 ± 0.04 ^{a,c}
Inflammation				
F4/80	0.29 ± 0.06	1.38 ± 0.42 ^{a,c}	0.42 ± 0.12 ^b	1.47 ± 0.49 ^{a,c}
Tnf- α	0.65 ± 0.12	1.91 ± 0.62 ^{a,c}	0.53 ± 0.08 ^b	1.45 ± 0.28 ^{a,c}
Fibrosis				
Col6 α 3	0.67 ± 0.07	6.86 ± 3.49 ^{a,c}	0.83 ± 0.14 ^b	4.58 ± 1.94 ^{a,c}
α -Sma	0.29 ± 0.04	1.08 ± 0.41 ^{a,c}	0.24 ± 0.08 ^b	0.78 ± 0.15 ^{a,c}
Smad7	1.04 ± 0.13	0.31 ± 0.09 ^{a,c}	1.04 ± 0.20 ^b	0.39 ± 0.07 ^{a,c}

WAT tissues were removed from the male mice (n=5/group) described in Table S3 and their lysates were analyzed by qRT-PCR in duplicate using the primers listed in Table S1. Gene expression was normalized to 18S. Values are expressed as mean ± SEM. ^a*P* < 0.05 vs RD-GFP; ^b*P* < 0.05 vs HF-GFP; ^c*P* < 0.05 vs HF-rWT.