

Supplementary Materials:

L-Ornithine-L-Aspartate (LOLA) Normalizes Metabolic Parameters in Models of Steatosis, Insulin Resistance and Metabolic Syndrome

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Table S1. Patient demographics and baseline characteristics.

Age	Sex	Height	Weight	BMI	GPT	GOT	GGT	FFA	M30	M65	CD36	Steatosis	Ballooning	Lobular Inflamm.	Fibrosis	NAS
	1		172.00	46.00	62.0	39.0	50.0		38.72	824.58	9.07	2	2	2	2	6
	1	188.00	152.00	43.01	34.0	23.0	34.0	22.06	118.01	185.51	4.60	3	2	2	2	7
	0	167.00	173.00	62.03	98.0	55.0	114.0	27.40	410.66	564.07	7.23	3	2	3	2	8
	0	172.00	154.00	52.06	.	.	.	22.26	389.29	610.92	18.85	3	2	2	2	7
	1	190.00	142.00	39.34	165.0	120.0	265.0	20.84	511.89	736.87	43.31	3	2	1	2	6
	1	172.00	167.00	56.45	.	.	.	22.06	91.56	406.57	20.59	1	1	2	2	4
36	1	182.00	208.40	62.92	45.0	29.0	25.0	17.76	368.32	416.22	7.80	2	1	2	2	5
29	0	157.00	111.00	45.03	12.0	22.0	10.0	14.84	136.40	253.52	1.99	0	0	1	2	1
43	0	166.00	139.00	50.44	45.0	30.0	17.0	30.34	140.93	248.27	13.57	2	1	2	2	5
26	0	176.00	159.00	51.33	21.0	14.0	41.0		185.45	260.62	4.63	1	1	2	2	4
30	0	159.00	157.00	62.10	31.0	23.0	18.0		141.68	335.02	2.41	1	0	1	2	2
37	0	163.00	104.00	39.14	22.0	23.0	20.0		308.57	471.17	2.81	0	0	1	1c	1
59	1	190.00	188.00	52.08	25.0	16.0	34.0		121.04	402.80	3.82	1	1	2	2	4
47	0	167.00	160.00	57.37	15.0	17.0	77.0		364.41	519.06	6.20	1	1	1	2	3
51	0	171.00	160.00	54.72	34.0	31.0	25.0		648.48	721.48	2.57	2	1	1	2	4
32	F	159.00	139.00	54.98	27.0	22.0	34.0		120.17	260.92	13.80	0	0	1	2	1
52	F	156.00	142.00	58.35	39.0	27.0	64.0		1044.69	1123.67	1.23	2	1	1	2	4
50	F	158.00	124.80	49.99	17.0	19.0	15.0		356.16	491.69	3.12	1	0	1	1a	2
54	M	172.00	114.00	38.53	20.0	27.0	39.0		746.84	909.16	2.78	0	0	1	2	1
36	F	172.00	186.50	63.04	26.0	25.0	27.0		289.63	410.57	2.10	2	1	3	2	6
54	F	164.00	125.50	46.66	13.0	17.0	24.0		402.31	546.67	2.19	1	0	1	1a	2
53	F	177.00	135.40	43.22	21.0	22.0	17.0		60.23	116.61		1	1	1	2	3
53	F	166.00	160.00	58.06	31.0	26.0	63.0		480.26	636.75	4.79	2	1	1	2	4
37	F	165.00	141.00	51.79	27.0	25.0	25.0		308.95	434.34	4.67	1	0	1	2	2
36	F	176.00	135.00	43.58	23.0	21.0	31.0		1071.77	1064.19	2.40	0	0	1	2	1
59	F	167.00	140.00	50.20	13.0	16.0	21.0		418.35	565.50	3.02	1	0	1	1a	2
35	M	170.00	144.00	49.83	34.0	22.0	38.0		180.66	446.11	2.79	1	1	1	2	3
61	F	172.00	167.00	56.45	50.0	32.0	21.0		212.97	315.82		0	0	1	2	1
43	F	183.00	128.00	38.22	20.0	20.0	26.0		177.40	253.26	5.63	1	1	1	2	3
39	F	165.00	144.00	52.89	70.0	49.0	136.0		1154.01	2669.80	0.64	2	1	2	2	5
45	M	180.00	134.00	41.36	50.0	38.0	74.0	25.64	562.10	994.67		2	1	1	2	4
37	F	169.00	132.00	46.22	46.0	58.0	34.0	23.22	674.19	1321.48		3	1	1	2	5
25	F	177.00	212.00	67.67	30.0	26.0	32.0	20.07	132.88	353.16		0	0	1	1c	1
64	F	159.00	150.00	59.33	24.0	25.0	43.0	18.17	221.57	371.00		2	1	1	2	4
36	F	164.00	119.00	44.24	28.0	17.0	29.0	10.69	95.66	316.31		1	0	1	1a	2
63	F	167.00	135.00	48.41	23.0	16.0	16.0	28.99	74.50	346.60		1	0	1	2	2
41	F	166.00	160.00	58.06	12.0	20.0	29.0	18.98	79.31	156.85		1	1	3	2	5
40	M	177.00	152.00	48.52	51.0	35.0	44.0	32.30	289.90	900.34		3	1	1	2	5
24	F	178.00	145.00	45.76	40.0	27.0	55.0	20.50	112.50	455.63		0	0	0 ?	2	0 ?
44	F	178.00	158.00	49.87	8.0	17.0	17.0	28.54	78.89	789.13		1	1	2	2	4
53	M	183.00	185.00	55.24	39.0	32.0	36.0	30.65	161.12	595.21		1	1	3	2	5
42	M	187.00	162.20	46.38	102.0	50.0	52.0		167.05	287.28		2	1	3	2	6
34	F	176.00	142.10	45.87	56.0	52.0	27.0		213.12	516.85		1	1	1	2	3
44	M	189.00	184.00	51.51	14.0	21.0	29.0	23.40	164.49	412.24		0	0	1	2	1
F	167.00	143.40	51.42	36.0	27.0	25.0			502.51	597.42	26.43	1	1	1	2	3
31	F	180.00	148.00	45.68	24.0	23.0	52.0		290.91	366.95	1.89	2	1	1	2	4
65	F	154.00	137.20	57.85	11.0	17.0	30.0		228.80	334.62	1.71	1	1	3	2	5
44	F	161.00	122.00	47.07	20.0	28.0	20.0		379.11	519.17	3.10	1	1	1	2	3
19	M	172.00	180.00	60.84	48.0	23.0	72.0		365.61	503.05	2.48	2	1	2	1a	5
53	F	175.00	207.00	67.59	36.0	36.0	104.0		292.92	1274.85	9.13	3	1	1	2	5
26	F				18.0	18.0	19.0		219.52	254.22	1.45	0	0	1	2	1
52	F	176.00	134.00	43.26	50.0	45.0	15.0		155.95	455.97	1.73	1	1	2	2	4
44	F	178.00	132.00	41.66	18.0	20.0	18.0		161.15	791.64		1	0	1	1a	2
33	F	173.00	135.00	45.11	56.0	36.0	34.0		351.06	794.70		2	1	2	2	5
45	F	164.00	122.70	45.62	11.0	19.0	38.0					1	1	1	2	3
63	F	160.00	105.00	41.02	32.0	29.0	44.0	23.02	208.93	834.74		1	1	1	2	3
41	F	180.00	145.00	44.75	16.0	16.0	22.0	14.43	128.77	269.78		1	1	1	2	3
36	F	164.00	169.00	62.83	61.0	42.0	30.0	19.54	299.16	573.64		2	1	2	2	5
58	M	191.00	192.00	52.63	38.0	29.0	48.0	18.89	334.42	445.16		1	0	1	2	2
42	F	162.00	135.00	51.44	17.0	20.0	18.0	23.87	305.61	406.79		0	0	1	2	1
41	F	170.00	149.00	51.56	23.0	21.0	27.0	29.38	316.21	745.71		1	1	1	1c	3
50	F	169.00	121.00	42.37	41.0	27.0	24.0	22.35				1	1	1	2	3
43	F	176.00	126.00	40.68	42.0	36.0	20.0	20.83	179.54	499.26		1	1	1	2	3
51	F	165.00	180.00	66.12	18.0	20.0	37.0	24.46	86.22	333.06		2	1	2	2	5
28	F	161.00	118.00	45.52	20.0	15.0	26.0		132.80	371.25		0	0	1	2	1
34	F	155.00	150.00	62.43	18.0	18.0	20.0		122.91	248.26		0	0	1	2	1
32	F	180.00	178.00	54.94	24.0	23.0	47.0					1	2	1	2	4

38	F	161.00	150.00	57.87	18.0	19.0	37.0			1	1	2	2	4
46	F	168.00	153.00	54.21	19.0	22.0	20.0			1	1	1	1a	3
50	M	178.00	220.00	69.44	30.0	26.0	41.0	558.52	980.33	1	1	1	2	3
37	F	158.00	170.00	68.10	39.0	28.0	34.0	112.50	455.63	1	1	1	2	3
24	F	180.00	131.00	40.43	33.0	23.0	28.0	186.36	430.58	1	2	2	2	5
46	F	167	192	68.84	26.0	22.0	20.0	200.44	1013.23	2	2	2	2	6
54	F	156	106	43.56	17.0	21.0	33.0	168.53	507.68	1	1	1	2	3
46	M	176	150	48.42	31.0	30.0	37.0	347.16	822.61	1	1	2	2	4
	F	174	140	46.24	13.0	20.0	17.0			0	0	1	2	1
60	F	154	130	54.82	22.0	21.0	28.0	243.41	316.11	1	1	1	2	3
39	F	173	178	59.47	49.0	34.0	68.0	417.57	696.70	2	1	1	2	4
38	M	165.00	148.00	54.36	36.0	30.0	17.0	221.62		1	1	1	2	3
41	F	176.00	163.00	52.62	13.0	45.0	36.0	269.10	643.03	2	2	3	3	7
37	M	200.00	177.00	44.25	37.0	26.0	23.0	178.12	1350.04	1	0	1	2	2
30	F	171	189	64.64	36.0	34.0	30.0	229.02	620.48	2	1	2	2	5
47	F	170	126	43.60	18.0	22.0	23.0	267.47	301.02	1	1	3	1a	5
46	F	171.00	208.00	71.13	26.0	21.0	24.0	94.51	283.50	1	1	1	2	3
52	F	164.00	157.00	58.37	51.0	31.0	42.0		370.19	2	1	1	2	4
60	F	178	182	57.44	27.0	23.0	30.0			1	1	1	2	3
38	F	160	115	44.92	19.0	22.0	70.0			1	1	1	2	3
47	F	175	143	46.69	31.0	29.0	17.0		186.79	1	1	1	2	3
35	F	162	120	45.72	42.0	29.0	17.0		342.34	1	1	1	2	3
35	F	170.00	161.00	55.71	22.0	40.0	21.0	102.02	216.84	1	0	1	2	2
44	F	174.00	191.00	63.09	22.0	25.0	64.0	196.37	355.07	1	1	2	1a	4
43	F	160.00	142.00	55.47	16.0	19.0	34.0	232.13	240.54	1	1	1	2	3
45	F	168.00	180.00	63.78	15.0	20.0	27.0	380.92	521.25	2	1	1	2	4
56	F							727.72	1462.56	2	1	2	2	5
33	F	175.00	171.00	55.84	47.0	37.0	18.0	266.63	874.81	1	1	1	2	3
29	F	174.00	165.00	54.50	26.0	23.0	21.0	106.70	254.09	1	1	1	2	3
51	F	172.00	125.00	42.25	15.0	20.0	24.0	86.20	176.99	1	1	1	2	3
27	F	170.00	156.00	53.98	20.0	24.0	22.0	326.90	326.72	0	0	1	2	1
39	M	183.00	154.00	45.99	45.0	28.0	67.0	112.07	370.86	2	1	2	1b	5
27	F	169.00	128.00	44.82	27.0	18.0	48.0	366.11	935.15	1	1	1	2	3
40	F	163.00	125.00	47.05	74.0	50.0	132.0		1956.85	3	1	3	1b	7
39	F	178.00	177.00	55.86	47.0	40.0	31.0	315.77	358.49	1	1	1	1a	3
30	F	162.00	142.00	54.11	21.0	22.0	20.0	95.88	1176.46	1	0	1	1b	2
41	F	164.00	173.00	64.32	29.0	26.0	10.0	104.54	680.97	2	1	1	1a	4
44	F	177.00	188.00	60.01	16.0	17.0	33.0	140.54	686.26	1	1	3	1b	5
45	F	167.00	163.00	58.45	27.0	22.0	22.0	325.39	1950.69	2	1	3	2	6
49	M	188.00	206.00	58.28	107.0	69.0	82.0	1105.62	2456.71	3	1	2	2	6
56	F	165.00	161.00	59.14	45.0	33.0	49.0	557.34	763.35	1	1	1	2	3
35	F	172.00	172.00	58.14	15.0	21.0	30.0	126.07	153.32	1	1	1	2	3
51	F	178.00	162.00	51.13	63.0	46.0	45.0	868.67	2755.26	2	1	1	2	4
40	F	175.00	164.00	53.55	18.0	21.0	33.0	120.69	234.44	1	0	1	2	2
22	F	168.00	126.00	44.64	58.0	33.0	41.0	283.73	704.54	2	1	1	2	4
37	F	180.00	154.00	47.53	27.0	26.0	13.0			0	0	1	2	1
30	F	178.00	180.00	56.81	21.0	22.0	20.0			2	1	2	2	5
42	F	169.00	119.00	41.67	20.0	21.0	18.0		234.82	1	1	3	2	5
44	M	180.00	172.00	53.09	48.0	35.0	46.0			3	1	1	2	5
59	F	165.00	172.00	63.18	6.0	21.0	24.0		483.37	1	0	1	2	2
44	F	167.00	113.00	40.52	24.0	21.0	20.0	1309.39	2349.57	2	1	1	2	4
43	F	168.00	156.00	55.27	41.0	27.0	25.0	1182.89	1339.92	1	0	1	2	2
28	M	175.00	147.00	48.00	53.0	32.0	28.0	947.62	2971.51	2	2	2	2	6
38	F	168.00	158.00	55.98	30.0	29.0	40.0			1	1	1	1a	3
60	F	162.00	118.00	44.96	23.0	24.0	60.0			1	1	1	2	3
34	F	165.00	165.00	60.61	8.0	21.0	16.0			1	0	1	2	2
53	F	168.00	125.00	44.29	33.0	22.0	31.0			3	1	2	2	6
52	F	165.00	109.00	40.04	44.0	31.0	56.0			3	1	3	2	7
27	F	195.00	260.00	68.38	8.0	16.0	51.0			1	0	2	2	3
31	F	160.00	107.00	41.80	38.0	31.0	25.0			1	0	1	2	2
51	F	158.00	130.00	52.07	51.0	41.0	42.0			2	1	3	2	6
35	F	165.00	111.00	40.77	111.0	70.0	112.0			2	1	2	2	5
31	F	163.00	170.00	63.98	28.0	25.0	30.0	269.80	416.55	1	0	1	2	2
45	F	170.00	200.00	69.20	22.0	23.0	23.0	180.39	438.01	1	1	2	2	4
50	M	181.00	126.00	38.46	49.0	42.0	86.0	441.37	956.84	2	1	2	2	5
39	M	194.00	248.00	65.89	34.0	23.0	36.0	103.85	319.56	2	1	3	2	6
36	F	173.00	143.00	47.78	28.0	19.0	21.0	145.93	245.26	1	0	2	2	3
45	F	168.00	130.00	46.06	33.0	25.0	39.0	218.24	436.07	1	0	1	2	2
37	F		117	49	15.0	17.0	20.0			0	0	1	1a	1
50	F		157	50	27.0	22.0	96.0			1	0	1	2	2
46	F		174	59.5	18.0	20.0	20.0			1	1	1	2	3
30	F		106	37.5	41.0	65.0	27.0			2	1	1	2	4
43	F		222	79	16.0	21.0	21.0			1	0	2	1a	3
56	F		188.4	65	24.0	23.0	21.0	138.58	170.75	1	2	2	2	5
41	F		123	43	27.0	21.0	34.0	869.55	1275.66	2	2	2	2	6
38	F		128	43.5	34.0	28.0	22.0	110.80	110.89	1	1	1	0	3
43	F		186.8	63	30.0	28.0	14.0	144.12	229.66	2	1	1	2	4
39	F		166	56	18.0	24.0	37.0	425.67	330.96	2	1	0	2	3
52	F		123	44	32.0	59.0	226.0	569.85	849.16	2	2	1	4	5
38	F		147.6	52	24.0	17.0	13.0	284.90	1494.25	3	2	2	1c	7
53	F	163	114.2	43.0	31.0	24.0	71.0			3	2	1	2	6
40	M	185	186	54.0	86.0	50.0	28.0			1	1	0	2	2
58	F	178	142	45.0	28.0	22.0	27.0			2	2	0	1c	4
30	F	163	147	55.0	14.0	15.0	13.0			0	0	1	1c	1
61	F	168	148	52.0	15.0	23.0	46.0			0	1	0	2	1
43	M	181	141	43.0	27.0	20.0	30.0			1	1	0	3	2
41	M	170	140	48.0	78.0	41.0	79.0			3	2	1	2	6
47	F			47.0	14.0	20.0	13.0			0	2	2	2	4
60	F	177	137	44.0	17.0	24.0	24.0			1	2	2	2	5

27	F	177	153	48.0	62.0	55.0	47.0	3	0	1	2	4
54	M	186	196	56.0	42.0	29.0	36.0	3	1	0	2	4
34		176	152	49.0	141.0	92.0	236.0	3	1	1	3	5
51	M	174	144.00	46.00	33.00	23.00	37.00	3	2	3	3	8
50	F	178	197	62	19	/	35	2	1	1	2	4
31	M	189	169	47	48	23	35	2	2	1	2	5
43	F	167	148	53	20	/	16	3	2	2	2	7
38	F	165	156	57	12	/	16					
51	F	168	148	52	39	32	47	1	2	2	3	5
25	M	/	/	/	30	/	72	0	0	1	3	1
50	F	168	111.6	39.5	101	50	99	0	1	1	2	2
54	F	160	158	62	27	/	32	0	2	1	2	3
33	F	169	106.8	37.4	51	23	83	2	2	0	3	4
34	F	169	118	41	15	/	14	0	0	0	2	0
50	M	195	179	47	31	/	21	0	0	1	2	1
41	F	172	150	50.7	36	32	13	0	0	0	1C	0
38	F	170	121	42	34	/	16	0	2	1	3	3
46	F	168	123	43.6	124	102	165	2	2	3	3	7
51	F	185	147	43	24	/	13	1	2	1	3	4
63	F	171	140	47.8	18	/	28	1	1	1	1A	3
62	F	165	135	49.6	19	/	31	3	2	1	3	6
49	F	168	112	40	18	/	21	1	1	2	1C	4
44	M	180	206.6	63.8	36	/	33	2	1	2	4	5
45	F	171	145.3	49.7	29	/	15	1	1	1	2	3
42	F	175	180	58.9	37	33	47	1	1	2	2	4
40	F	170	157.7	54.6	18	/	31	1	2	2	2	5
27	F	172	149.2	50.4	45	29	35	3	2	2	1A	7
50	F	172	130	45	36	27	74	3	2	3	1C	8
25	F	173	162.3	54.2	23	/	32	0	1	2	2	3
43	F	166	143.5	43.7	21	/	10	0	1	1	1C	2
44	M	183	146	42.7	8	/	15	1	2	1	2	4
53	F	170	128	44.5	15	/	18	0	1	1	1C	2
50	F	166	123	44.7	35	/	61	0	1	1	2	2
34	F	166	166	59	21	/	13	3	2	3	2	8
53	M	185	155	45.3	120	79	109	3	1	2	2	6
44	F	170	153	52.9	24	/	14	1	2	2	2	5

Table S2. Antigens, primary anti-human antibodies (top) and secondary conjugated antibodies (bottom). Target antigens are listed in alphabetical order (except for Greek letters).

1. Primary Anti-Human Antibodies

Antigen	Type	Host	Clone	Class	Conjugate	IB	IHC	Context	Vendor	Catalog No.
ACC1*	mAb	R	C83B10	IgG	–	+	–	Gluconeogenesis + <i>de-novo</i> lipogenesis	CS	3676
β-Actin	mAb	M	AC-15	IgG	–	+	–	Microfilament protein	SA	A1978
AIF	mAb	R	D39D2	IgG	–	+	–	Apoptosis-inducing factor + caspase-independent apoptosis	CS	5318
AKT	pAb	R	–	IgG	–	+	–	Gluconeogenesis	CS	9272
AMPK-α	mAb	R	D5A2	IgG	–	+	–	Master regulator of energy metabolism, homeostasis, lipogenesis, gluconeogenesis	CS	5831
Arginase1	mAb	R	D4E3M	IgG	–		+	Urea cycle		
Bax	pAb	R	–	IgG	–	+	–	Apoptosis through mitochondrial stress	CS	2772
BCAT2	mAb	R	D8K3O	IgG	–	+	–	BCAA metabolism	CS	79764
β-Catenin	mAb	R	D10A8	IgG	–	+	–	EMT/WNT signaling	CS	8480
CD36	pAb	R	–	IgG	–	+	–	Fatty acid transporter	NB	NB400-144
CD73	mAb	R	D7F9A	IgG	–	+	–	AMP to adenosine-converting enzyme	CS	13160
Citrate synthase	mAb	R	D7V8B	IgG	–	+	–	Mitochondrial enzyme (TCA cycle)	CS	14309
Cleaved caspase 3	pAb	R	–	IgG	–	+	–	Apoptosis	CS	9661
CP51	pAb	R	–	IgG	–	+	+	Urea cycle	NB	NBP1-86019

E-Cadherin	mAb	M	36/E	IgG	–	+	–	Carcinogenesis (EMT) and zonation	BD	610182
FASN	mAb	R	C20G5	IgG	–	+	–	<i>De-novo</i> lipogenesis	CS	3180
GAPDH	mAb	R	14C10	IgG	–	+	–	Energy metabolism	CS	2118
GLUL	mAb	R	D2O3F	IgG	–	+	–	NH ₃ homeostasis	CS	80636
HSP27	mAb	M	G31	IgG _i	–	+	–	Mainly cytosolic, but also in other organelles, except mitochondria; inhibits apoptosis, among other functions	CS	2402
HSP60	mAb	R	D6F1	IgG	–	+	–	Mitochondrial protein import and macro-molecular assembly	CS	12165
OTC	pAb	R	–	IgG	–	+	+	Urea cycle	NB	NBP1-87408
p21	mAb	R	12D1	IgG	–	+	–	Tumor suppressor, inhibitor of cell cycle progression	CS	2947
p-AKT	mAb	R	193H12	IgG	–	+	–	Gluconeogenesis	CS	4058
p-AMPK- α	mAb	R	40H9	IgG	–	–	–	Master regulator of energy metabolism, homeostasis, lipogenesis, gluconeogenesis	CS	2535
PARP	pAb	R	–	IgG	–	+	–	Enzyme involved in transcriptional regulation, DNA repair, cell death, inflammation	CS	9542
PHB1	pAb	R	–	IgG	–	+	–	Mitochondrial chaperone acting as a tumor suppressor, and involved in homeostasis, cell cycle control, proliferation, and apoptosis	CS	2426
PPAR- γ	mAb	R	C26H12	IgG	–	+	–	<i>De-novo</i> lipogenesis	CS	2435
p-PTEN	mAb	R	44A7	IgG	–	+	–	Tumor suppressor	CS	9549
PTEN	mAb	R	138G6	IgG	–	+	–	Tumor suppressor	CS	9559
Slug-Snail	pAb	R	–	IgG	–	+	–	Carcinogenesis (EMT)	abcam	Ab180714
SOD1	mAb	M	71G8	IgG	–	+	–	Antioxidant	CS	4266

2. Secondary Conjugated Antibodies

Antigen	Type	Host	Clone	Class	Conjugate	ICC	IHC	Application	Vendor	Catalog No.
Mouse IgG	N/A	H	N/A	N/A	HRP	+	+	Visualizing bound primary murine IgG	CS	7076
Rabbit IgG	N/A	H	N/A	N/A	HRP	+	+	Visualizing bound primary rabbit IgG	CS	7074

* Abbreviations: ACC1, acetyl-CoA carboxylase 1; AIF, apoptosis-inducing factor; AKT, PI-3'K, phosphoinositide 3-kinase; AMPK- α , AMP-activated protein kinase α ; Bax, BCL2-associated X protein; BCAT2, branched-chain amino acid aminotransferase 2; BD, Becton Dickinson, Heidelberg, Germany; CD36/FAT, fatty acid translocase; CD73, ecto-5'-nucleotidase (AMP-to-adenosine converting enzyme); CS, Cell Signaling Technology Europe, Frankfurt/Main, Germany; CPS1, carbamoyl phosphate synthetase 1; EMT, epithelial-mesenchymal transition; FASN, fatty acid synthase; GAPDH, glyceraldehyde-3-phosphate dehydrogenase; GLUL, glutamate-ammonia ligase (obsolete: glutamine synthetase); H, horse; HRP, horseradish peroxidase; HSP27, heat shock protein 27; HSP60, heat shock protein 60; IB, immunoblotting; IHC, immunohistochemistry; M, mouse; mAb, monoclonal antibody; N/A, not available; NB, Novus Biologicals, Centennial, CO, USA via Bio-Techne, Wiesbaden-Nordendstadt, Germany; OTC, ornithine transcarbamylase; p21, a tumor suppressor; pAb, polyclonal antibody; pAKT, phosphorylated AKT; pAMPK- α /AMPK- α , ratio of phosphorylated AMPK- α to non-phosphorylated AMPK- α ; PARP, poly ADP ribose polymerase; PPAR α , peroxisome proliferator-activated receptor α ; p-PTEN,

phosphorylated phosphatase and tensin homolog; R, rabbit, SA, Sigma-Aldrich (formerly) / now: Merck, Darmstadt, Germany; Slug, a key EMT regulator; Snail 2, a key EMT regulator; SOD1, superoxide dismutase 1; TCA, tricarboxylic acid.

Table S3. Primer oligonucleotide sequences for qRT-PCR in alphabetical order of their transcript-related specificities. Transcripts are listed in alphabetical order. See footer for abbreviations.

Transcript	Primer Sequence	Context	Vendor	Catalog No.
<i>bcat2</i>	Not available	BCAA metabolism	Q	QT00077406
<i>bckdha</i>	Not available	BCAA metabolism	Q	QT00057988
<i>bckdk</i>	Not available	BCAA metabolism	Q	QT00088389
<i>cd36</i>	Forward: 5'-AACAGTTCTCTCAAAGTTCTGACTTG-3' Reverse: 5'-AACAGAGGCTGACAACTTCACA-3'	Fatty acid transporter	EG	N/A
<i>cd73</i>	Forward: 5'-CTCCTCTCAATCATGCCGCT-3' Reverse: 5'-CAAATGTGCCTCCAAAGGGC-3'	Carcinogenesis (EMT) and zonation	EG	N/A
<i>cpt1</i>	Forward: 5'-TGTGCTGGATGGTGTCTGTC-3' Reverse: 5'-CAAACCTGGACCGGGAGGAAA-3'	Energy metabolism	EG	N/A
<i>fasn</i>	Forward: 5'-GATGCGGGAATACAGGTGAC-3' Reverse: 5'-GACACTGCCGTGGAGAACAT-3'	De-novo lipogenesis	EG	N/A
<i>foxo1</i>	Forward: 5'-TTATGACCGAACAGGATGATCTTG-3' Reverse: 5'-TGTTGGTGATGAGAGAAGGTTGAG-3'	Insulin-dependent gluconeogenesis	EG	N/A
<i>gadph</i>	Forward: 5'-GGTGACCAGGCGCCCAATACG-3' Reverse: 5'-TTCTTTTGCCTCGCCAGCCGA-3'	Household enzyme and, <i>inter alia</i> , energy metabolism, glycolysis enzyme, transcription activation, and initiation of apoptosis	EG	N/A
<i>hmf4</i>	Forward: 5'-CGCACTGCCGGCTAAATCTGC-3' Reverse: 5'-CGACACGTCCCCATCAGAAGGC-3'		EG	N/A
<i>hprt</i>	Forward: 5'-GACCAGTCAACAGGGGACAT-3' Reverse: 5'-CTTGCGACCTTGACCATCTT-3'	Household enzyme	EG	N/A
<i>ikk-β</i>	Forward: 5'-TGTCACAGGGTAGGTGTGGA-3' Reverse: 5'-AAGGCCCTGGATGACATCTT-3'	Inflammation	EG	N/A
<i>il-6</i>	Forward: 5'-TTTCACCAGGCAAGTCTCCT-3' Reverse: 5'-AGGCACTGGCAGAAAACAAC-3'	Inflammation	EG	N/A
<i>p21^{Cip1}</i>	Forward: 5'-GACTCTCAGGTCGAAAACG-3' Reverse: 5'-GGATTAGGGCTTCTCTTGG-3'	Tumor suppressor, inhibitor of cell cycle progression	EG	N/A
<i>p53</i>	Forward: 5'-GCGCACAGAGGAAGAGAATCTCCG-3' Reverse: 5'-TTTGGCTGGGGAGAGGAGCTG-3'	Tumor suppressor, involved in carcinogenesis (EMT) and zonation	EG	N/A
<i>pgca</i>	Forward: 5'-CAGCACACTGCTGCTCGTAATA-3' Reverse: 5'-AGCTTTGCCTACATGGCAGC-3'	Energy metabolism, insulin-dependent gluconeogenesis, fatty acid β-oxidation	EG	N/A
<i>ppara</i>	Forward: 5'-ACTCCACCTGCAGAGCAACCA-3' Reverse: 5'-TAGATCTCCTGCAGTAGCGGG-3'	Lipogenesis, fatty acid β-oxidation	EG	N/A
<i>pten</i>	Forward: 5'-GAACTGGCAGGTAGAAGGCA-3' Reverse: 5'-CATAACGATGGCTGTGGTTG-3'	Carcinogenesis (EMT) and zonation	EG	N/A
<i>scd</i>	Not available	De-novo lipogenesis	Q	QT00052381
<i>sdha</i>	Forward: 5'-CAAAGGGCTTCTTCTGTTGC-3' Reverse: 5'-ACACAGACCTGGTGGAGACC-3'	Participates in TCA cycle and electron transport chain (household enzyme)	EG	N/A

<i>sirt1</i>	Forward: 5'-AACGATTGGTGGCAAAAC-3' Reverse: 5'-CAGTGGCTGGAACAGTGAGA-3'	<i>De-novo</i> lipogenesis, fatty acid β -oxidation, insulin-dependent gluconeogenesis	EG	N/A
<i>smile</i>	Forward: 5'-AAAAGAGGCGGAGAAAGTCC-3' Reverse: 5'-CTCTGAAGAGCGAGGTGGTC-3'	<i>De-novo</i> lipogenesis	EG	N/A
<i>srebp-1c</i>	Forward: 5'-CTGACCGACATCGAAGGTGA-3' Reverse: 5'-GAAAGTGCAATCCATGGCTCC-3	<i>De-novo</i> lipogenesis, gluconeogenesis	EG	N/A
<i>tnf-α</i>	Forward: 5'-GAGCTCCACGCCATTGGCCA-3' Reverse: 5'-GCCCCAGAGGGAAGAGTTCCTCC-3'	Inflammation	EG	N/A

* Abbreviations: BCAT2, branched-chain amino acid aminotransferase 2; BCKDHA, branched-chain keto acid dehydrogenase; BCKDK, branched-chain keto acid dehydrogenase kinase; CD36, fatty acid translocase; CD73, ecto-5'-nucleotidase (AMP-to-adenosine converting enzyme); CPT1, carnitine palmitoyltransferase 1; EG, Eurofins Genomics, Ebersberg, Germany; FASN, fatty acid synthase; FOXO1, forkhead box protein O1; GAPDH, glyceraldehyde-3-phosphate dehydrogenase; HNF4, hepatocyte nuclear factor 4; HPRT, hypoxanthine phosphoribosyl transferase 1; IKK- β , I κ B kinase- β (part of the IKK kinase complex, i.e., the core element of the NF- κ B cascade); IL-6, interleukin 6, p21Cip1, a tumor suppressor; p53, a tumor suppressor; PGC1 α , peroxisome proliferator-activated receptor γ coactivator 1- α ; PPAR α , peroxisome proliferator-activated receptor α ; PTEN, phosphatase and tensin homolog; Q, Qiagen, Hilden, Germany. SCD1, stearyl-CoA desaturase; SDHA, succinate dehydrogenase complex, subunit A; SIRT1, for short: sirtuin 1 (sirtuin silent information regulator 1); SMILE, small heterodimer partner interacting leucine zipper protein; srbf1, besides other isotypes also encoding for the hepatic isoform, SREBP-1c, sterol regulatory element-binding protein-1c; TNF- α , tumor necrosis factor α ; TCA, tricarboxylic acid.