Supplementary Information.

Human 'brite / beige' adipocytes develop from capillary networks and improve metabolic homeostasis

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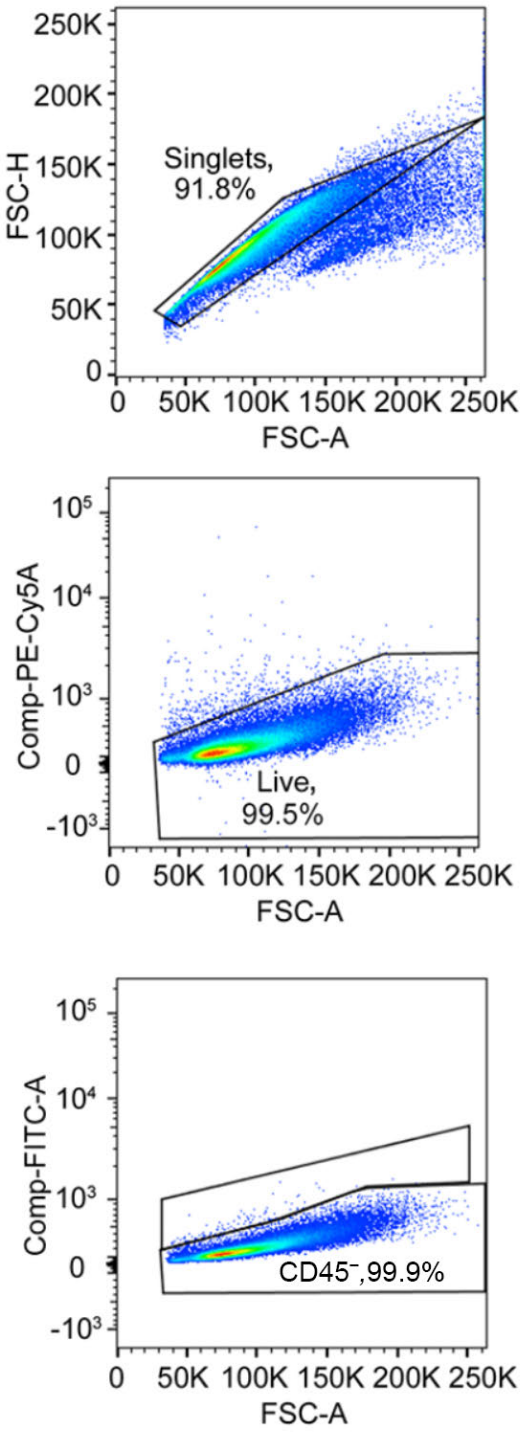
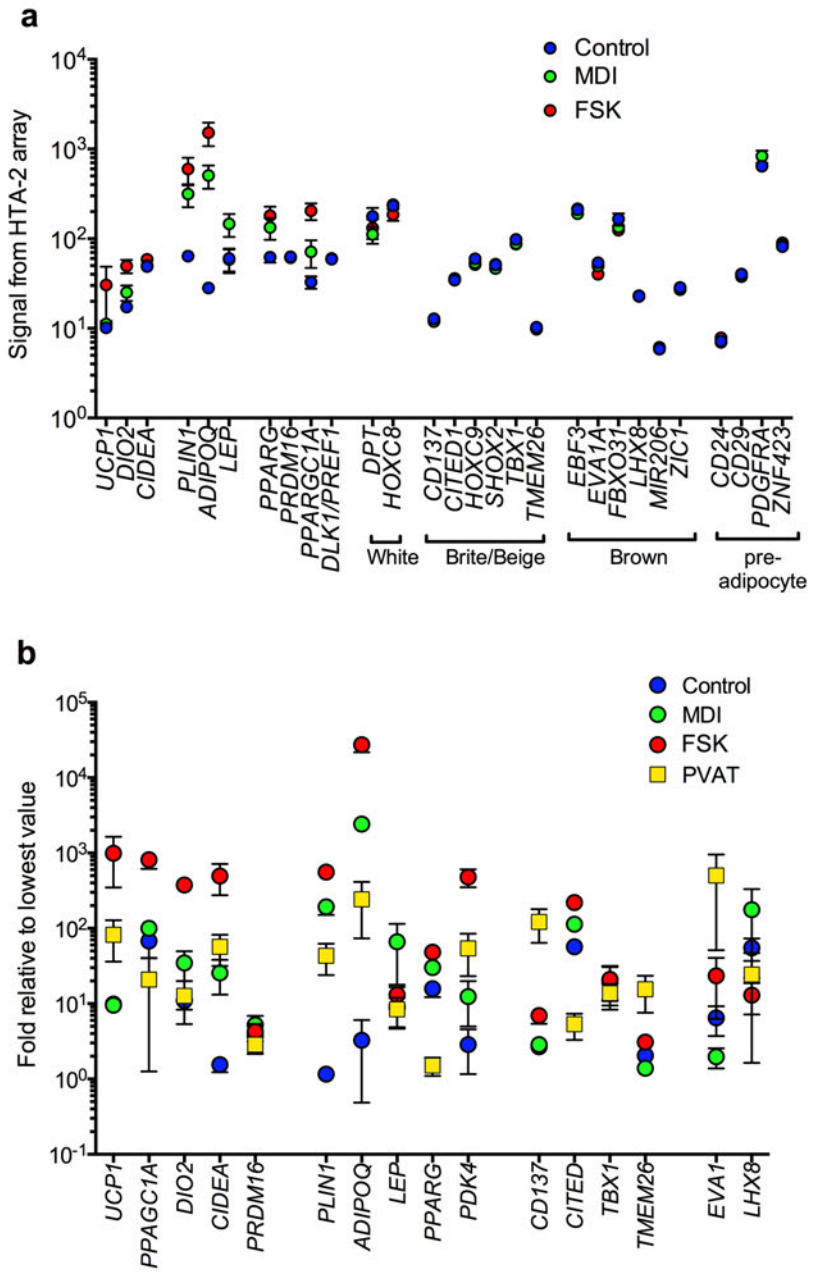
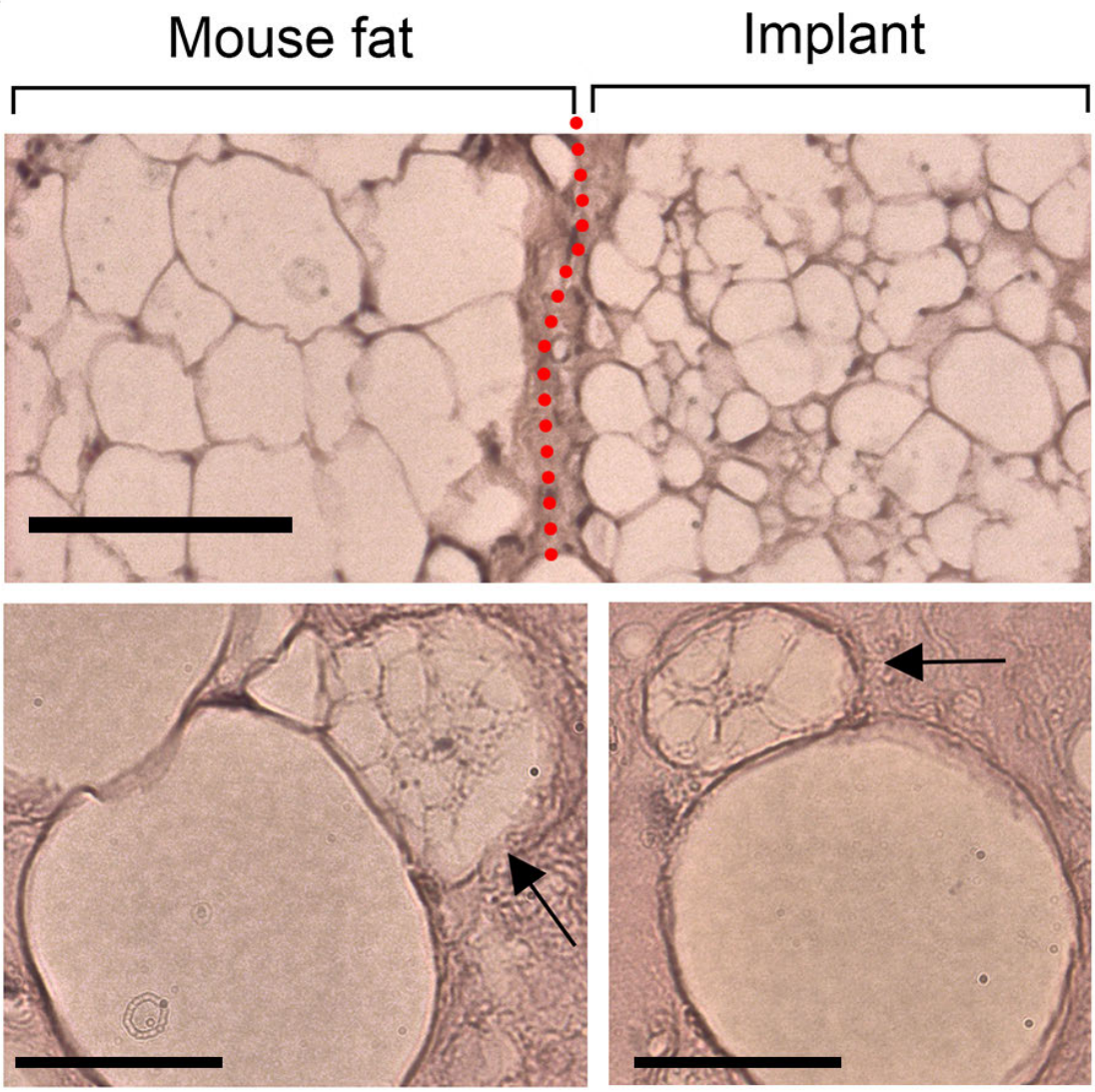


Supplementary Figure 1. FACS sorting of single, live cells from capillary networks used for clonal analysis.



Supplementary Figure 2. Expression of pre-adipocyte and beige/brown adipocyte markers in cells from human capillary networks. a) Mean probe intensity values obtained in HTA-2.0 Affymetrix arrays for the genes indicated on the x-axis, for cells without exposure to differentiation cocktail (Control), exposed to MDI for 3 days and cultured for an additional 11 days (MDI), or treated as in MDI but exposed to forskolin for 7 days prior to RNA extraction (FSK). **b)** RT-PCR analysis for genes indicated in the x-axis, for cells prepared as described in (a), compared to samples from peri-carotid fat obtained from 4 individuals. Values are expressed as the fold over the lowest detected value in the set for each gene. Values for C, MDI and FSK represent the mean and SEM from cells derived from three individuals.



Supplementary Figure 3. Multilocular adipocytes in implants of human 'brite/beige' cells. H&E staining of adipose structure formed from implanted human cells. The adjacent regions of host adipose issue and implanted cells are indicated by the red dotted line (top), and arrows (bottom) point to examples of multilocular cells in the sections. Scale bars, 200 μm (top), and 25 μm (bottom).

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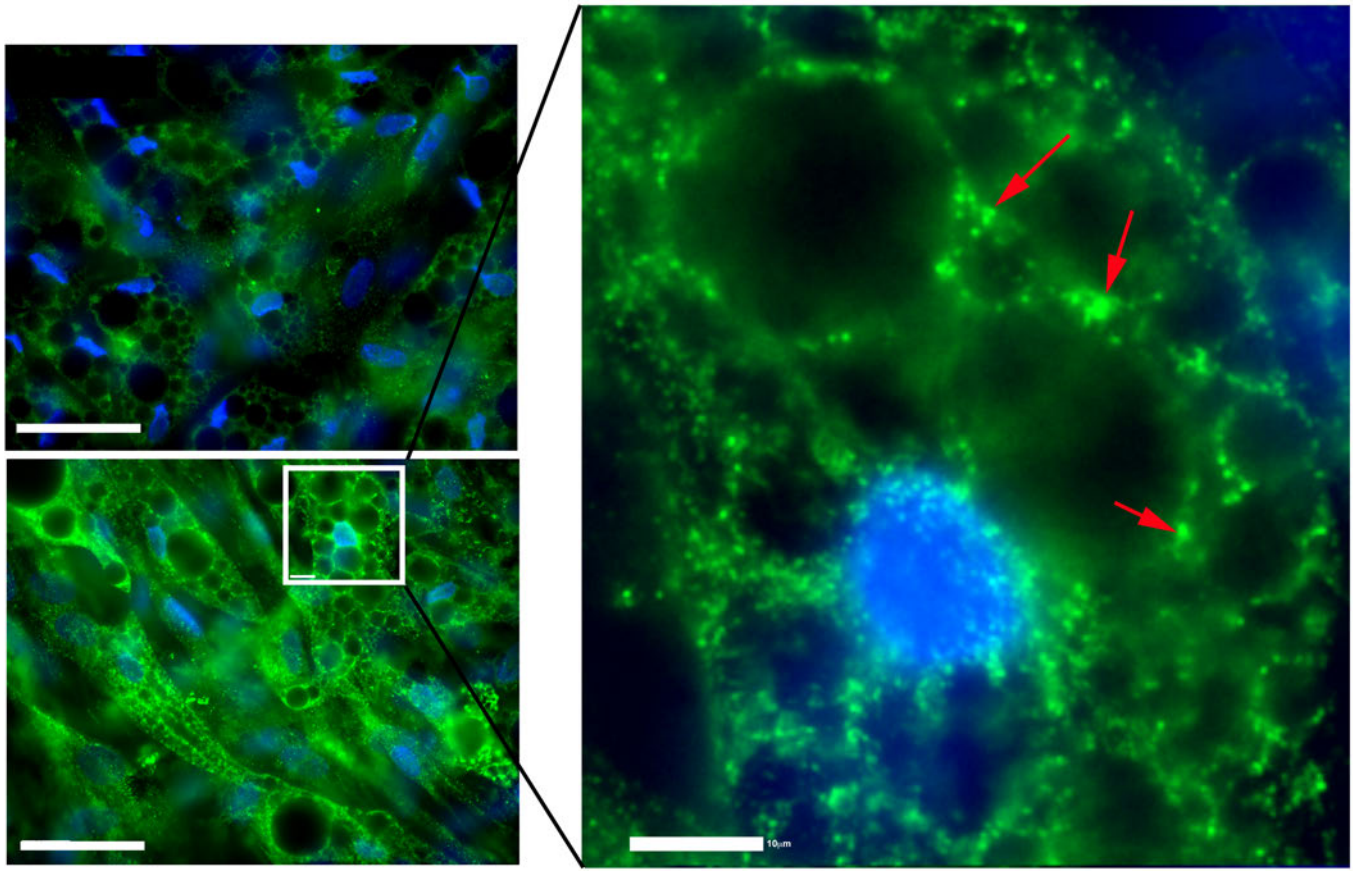

Supplementary Figure 4. Expression of IL-33 in 'brite/beige' adipocytes. Cells isolated from capillary networks were sub-cultured on coverslips, grown to confluence and subjected to adipogenic differentiation. Differntiated cells (top left) or differentiated cells treated with forskolin for 7 days (bottom left), were fixed, permeabilized and stained with antibody to human IL-33. Scale bars, 25 μm and 10 μm (enlargement, right). Arrows point to numerous vesicular structures containing IL-33.

Supplementary Table 1: Patient characteristics

Experiment	Patient	Age	Gender	Type of Surgery	BMI	DM	Insulin	Oral hypoglycemic	HMG CoA Reductase Inhibitor
Neck adipose tissue	1	64	M	CEA	29	No	No	No	Yes
	2	57	M	CEA	28	No	No	No	Yes
	3	59	F	CEA	25	No	No	No	Yes
	4	77	F	CEA	29	Yes	No	No	Yes
	mean:	64.25			27.75				
HTA-2 arrays, RT-PCR	7	39	F	PAN	26	No	No	No	No
	8	47	F	PAN	24	No	No	No	No
	9	43	F	PAN	37	No	No	No	No
	11	35	F	PAN	30	Yes	Yes	No	No
	mean:	41			29.25				
NSG-HFD at thermoneutrality	12	35	F	PAN	30	No	No	No	No
	15	50	F	PAN	41	Yes	No	Yes	Yes
	mean:	42.5			35.5				
NSG-Room Temperature; Metabolic Phenotyping	18	63	F	PAN	36	No	No	No	No
	19	58	M	PAN	32	No	No	No	Yes
	mean:	60.5			34				

CEA:carotid endartarectomy; PAN: panniculectomy; BMI: body mass index, at time of surgery; DM: Diabetes Mellitus

Supplementary Table 2. Probes used for RT-PCR

Gene	Forward ; Reverse
Mouse *Ucp1*	GTGAACCCGACAACTTCCGAA ; TGCCAGGCAAGCTGAAACTC
Human *UCP1*	AGAAGGGCGGATGAAACTCT ; ATCCTGGACCGTGTCGTAG
PPARGC1A	TCTGAGTCTGTATGGAGTGACAT ; CCAAGTCGTTCACATCTAGTTCA
DIO2	GGATGCCCCCAATTCCAGTG ; GGCTCGTGAAAGGAGGTCAAG
CIDEA	TTATGGGATCACAGACTAAGCGA ; TGCTCCTGTCATGGTTGGAGA
PRDM16	CTTCGGATGGGAGCAAATACTG ; TCCACGCAGAACTTCTCACTG
Human PLIN1	ACCAGCAAGCCCAGAAGTC ; CATGGTCTGCACGGTGTATC
ADIPOQ	TGCTGGGAGCTGTTCTACTG ; TACTCCGGTTTCACCGATGTC
LEP	TGCCTTCCAGAAACGTGATCC ; CTCTGTGGAGTAGCCTGAAGC
PPARG	GGGATCAGCTCCGTGGATCT ; TGCACTTTGGTACTCTTGAAGTT
PDK4	GGAGCATTTCTCGCGCTACA ; ACAGGCAATTCTTGTCGCAAA
CD137	AGCTGTTACAACATAGTAGCCAC ; GGACAGGGACTGCAAATCTGAT
CITED	CCTCACCTGCGAAGGAGGA ; GGAGAGCCTATTGGAGATCCC
TBX1	ACGACAACGGCCACATTATTC ; CCTCGGCATATTTCTCGCTATCT
TMEM26	ATGGAGGGACTGGTCTTCCTT ; CTTCACCTCGGTCACTCGC
EVA1	TTAATGGGACAGATGCTCGGT ; AAGACACCCGGTCCTTAAACC
LHX8	GAATGACCTATGCTGGCATGT ; ACCCAGTCAGTAGAATGGATGTG
PENK	CTGGATGGCATTGTGACGGAT ; GCCCCAGCTTGCACTGTAAA
PCSK1	CGGTTCCTGACACTTTGCACT ; CACATTCCATTACGCAAGCCA
IL33	GTGACGGTGTTGATGGTAAGAT ; AGCTCCACAGAGTGTTCCTTG
SLC2A4	TGGGCGGCATGATTTCCTC ; GCCAGGACATTGTTGACCAG
FABP4	ACTGGGCCAGGAATTTGACG ; CTCGTGGAAGTGACGCCTT
RPL4	GCCTGCTGTATTCAAGGCTC ; GGTTGGTGCAAACATTCGGC