

Table S1. Diet Composition	Chow	High fat diet (HFD)	AAD Western diet (WD)	AAD WDIL	DIO WD preconditioning	AAD normal fat	AAD WD	WD 1/3xBCAA	AA WDIL
	Global Diet 2018	TD.06414	TD.160186	TD.170484	TD.88137	TD.200693	TD.200690	TD.200691	TD.200692
Protein (% kcal from)	24	18.3	20.7	18.9	15.20%	23.80%	21.10%	21.00%	21.10%
Carbohydrates (% kcal from)	58	21.4	38.5	39.5	42.70%	63.80%	52.40%	52.70%	52.50%
Fat (% kcal from)	18	60.3	40.9	41.6	42%	12.50%	26.50%	26.40%	26.50%
kcal/g	3.1	5.1	4.6	4.5	4.50	3.60	4.10	4.10	4.10
Ingredients in g/kg diet									
Casein		265			195.00				
Ethoxyquin					0.04				
DL-Methionine					3.00				
Anhydrous Milkfat			210	210	210.00		70.00	70.00	70.00
Cholesterol			1.5	1.5	1.50				
Calcium Carbonate					4.00				
L-Alanine	In order of inclusion:		9.38	9.83		9.38	9.38	11.8183	9.8267
L-Arginine	Ground wheat,		6.3	6.3		6.30	6.30	6.30	6.30
L-Asparagine	ground corn, wheat		20.58	20.91		20.58	20.58	22.3380	20.9113
L-Aspartic Acid	middlings, dehulled		20.58	21.25		20.58	20.58	24.2237	21.2475
L-Cystine	soybean meal, corn	4	7.2	7.2		7.20	7.20	7.20	7.20
L-Glutamic Acid	gluten meal, soybean		28.97	29.7		28.97	28.97	32.9963	29.7077
L-Glutamine	oil, calcium		33.77	34.14		33.77	33.77	35.7873	34.1395
Glycine	carbonate, dicalcium		2.96	3.34		2.96	2.96	5.0141	3.3363
L-Histidine HCl, monohydrate	phosphate, brewers		4.6	4.6		4.60	4.60	4.60	4.60
L-Isoleucine	dried yeast, iodized		7.8	2.54		7.80	7.80	2.54	2.54
L-Leucine	salt, L-lysine, DL-		25.4	25.4		25.40	25.40	8.27	25.40
L-Lysine HCl	methionine, choline		20.38	20.38		20.38	20.38	20.38	20.38
L-Methionine	chloride, magnesium		6.7	6.7		6.70	6.70	6.70	6.70
L-Phenylalanine	oxide, vitamin E		6.6	6.6		6.60	6.60	6.60	6.60
L-Proline	acetate, menadione		7.41	7.99		7.41	7.41	10.5596	7.9870
L-Serine	sodium bisulfite		7.41	7.94		7.41	7.41	10.2855	7.9368
L-Threonine	complex (source of		9.7	9.7		9.70	9.70	9.70	9.70
L-Tryptophan	vitamin K activity),		3.4	3.4		3.40	3.40	3.40	3.40
L-Tyrosine	manganous oxide,		6.9	6.9		6.90	6.90	6.90	6.90
L-Valine	ferrous sulfate, zinc		8.4	8.4		8.40	8.40	2.7350	8.40
Corn Starch	oxide, niacin, calcium		49.63	50.24	150.00	302.25	97.24	103.2782	98.46
Maltodextrin	pantothenate, copper	160	49.63	50.24		150.00			
Sucrose	sulfate, pyridoxine	90	341.46	341.46	341.46	150.00	435.00	435.00	435.00
Soybean Oil	hydrochloride,	30				50.00	50.00	50.00	50.00
Lard	riboflavin, thiamin	310							
Cellulose	mononitrate, vitamin A	65.5	50	50	50.00	50.00	50.00	50.00	50.00
Mineral Mix	acetate, calcium	48*	35**	35**	35.00**	35.00**	35.00**	35.00**	35.00**
Calcium Phosphate, monoobasic, monohydrate	iodate, vitamin B12	3.4	8.2	8.2		8.20	8.20	8.20	8.20
Vitamin Mix	supplement, folic acid,	21.0*	10**	10**	10.00**	10.00**	10.00**	10.00**	10.00**
Choline bitartrate	biotin, vitamin D3	3							
TBHQ, antioxidant	supplement, cobalt		0.04	0.04		0.02	0.02	0.0240	0.0240
Food Color	carbonate.	0.1(blue)	0.1 (aqua)	0.1 (red)		0.1 (orange)	0.1 (red)	0.1 (green)	0.1 (blue)

Mineral mix, AIN-93G-MX (94046)*

Mineral mix, AIN-93M-MX (94049)**

Vitamin Mix, AIN-93-VX (94047)*

Vitamin Mix, Teklad (40060)**

Supplemental Figs

Supplemental Figures

Fig.S1 (accessory to Material & Methods and Figs.7,9). FAME identification by GC-MS

Fig.S2 (accessory to Fig.3). Timeline of radiolabel accumulation with statistics.

Fig.S3 (accessory to Figs.4,5). MCFA accumulation by dWAT

Fig.S4 (accessory to Fig.5A,B). Loss of fat is the major determinant of decreased body weight for WDIL-fed mice

Fig.S5 (accessory to Fig.6). Detailed labeled ceramide species present in serum, epidermis and sebome.

Fig.S1

Retention times (RT) for standards (Supelco37 FAME standard mixture; cat#CRM47885) were compared to FAMES identified from GC-MS of sebome samples, to confirm their identity. 13 standards matched species from sebome. The remaining FAMES identified in sebome samples are assumed to include hydroxylated species, more saturated FAMES $\geq 18C$ and isomers.

Control species with comigrating species in sebome

	RT	FAME title	acyl	other
1	11.4	Pentadecanoic acid, methyl ester	C15	
2	12.8	Hexadecanoic acid, methyl ester	C16	
3	13.1	9-Hexadecenoic acid, methyl ester, (Z)-	C16:1 $\Delta 6$	
4	14.7	cis-10-Heptadecenoic acid, methyl ester	C16:1 $\Delta 6$	
5	15.9	Methyl stearate	C18	
6	16.4	9-Octadecenoic acid (Z)-, methyl ester	C18:1 $\Delta 9$	
7	19.2	Eicosanoic acid, methyl ester	C20	
8	19.6	11-Eicosenoic acid, methyl ester	C20:1 $\Delta 9$	
9	20.8	Heneicosanoic acid, methyl ester	C21	
10	22.4	Docosanoic acid, methyl ester	C22	
11	22.8	13-Docosenoic acid, methyl ester, (Z)-	C22:1 $\Delta 9$	
12	23.9	Tricosanoic acid, methyl ester	C23	
13	25.4	Tetracosanoic acid, methyl ester	C24	

Control species with no homologs in sebome

1	4.4	Butanoic acid, methyl ester	C4	
2	5.34	Hexanoic acid, methyl ester	C6	
3	6.38	Octanoic acid, methyl ester	C8	
4	7.43	Decanoic acid, methyl ester	C10	
5	7.98	Undecanoic acid, methyl ester	C11	
6	8.6	Dodecanoic acid, methyl ester	C12	
7	9.33	Tridecanoic acid, methyl ester	C13	
8	10.3	Methyl tetradecanoate	C14	
9	10.7	Methyl myristoleate	C14:1 $\Delta 3$	
10	12	14-Pentadecenoic acid	C15:1 $\Delta 6$	
11	14.3	Heptadecanoic acid, methyl ester	C17	
12	16.7	9,12-Octadecadienoic acid (Z,Z)-, methyl ester	C18:2 $\Delta 6 \Delta 9$	
13	17.1	9,12-Octadecadienoic acid (Z,Z)-, methyl ester	C18:2 $\Delta 6$ (cis)	
14	17.6	gamma-Linolenic acid, methyl ester	C18:3 $\Delta 6 \Delta 9 \Delta 12$	
15	18.1	9,12,15-Octadecatrienoic acid, methyl ester, (Z,Z,Z)-	C18:3 $\Delta 6 \Delta 9 \Delta 12$ (cis)	
16	20.5	Cpd 50: cis-11,14-Eicosadienoic acid, methyl ester	C20:2 $\Delta 6 \Delta 9$ (cis)	
17	20.9	Cpd 52: 8,11,14-Eicosatrienoic acid, methyl ester	C20:3 $\Delta 6 \Delta 9 \Delta 12$	
18	21.2	Cpd 54: 5,8,11,14-Eicosatetraenoic acid, methyl ester, (all-Z)-	C20:4 $\Delta 3 \Delta 6 \Delta 9 \Delta 12$	
19	21.5	Cpd 55: 11,14,17-Eicosatrienoic acid, methyl ester	C20:3 $\Delta 3 \Delta 6 \Delta 9$	
20	22.2	Cpd 58: 5,8,11,14,17-Eicosapentaenoic acid, methyl ester, (all-Z)-	C20:5 $\Delta 3 \Delta 6 \Delta 9 \Delta 12 \Delta 15$	
21	23.7	Cpd 63: cis-13,16-Docosadienoic acid, methyl ester	C22:2 $\Delta 6 \Delta 9$	
22	25.8	Cpd 66: 4,7,10,13,16,19-Docosahexaenoic acid, methyl ester, (all-Z)-	C22:6 $\Delta 3 \Delta 6 \Delta 9 \Delta 12 \Delta 15 \Delta 18$	
23	26	Cpd 67: 15-Tetracosenoic acid, methyl ester, (Z)-	C24:1 $\Delta 9$	

Fig.S2 (accessory to Fig.3). **Dietary triglyceride radiolabel persists for 2 weeks in skin and adipose depots.** Average data shown in Fig.3 are shown here for independent mice, with statistical analysis.

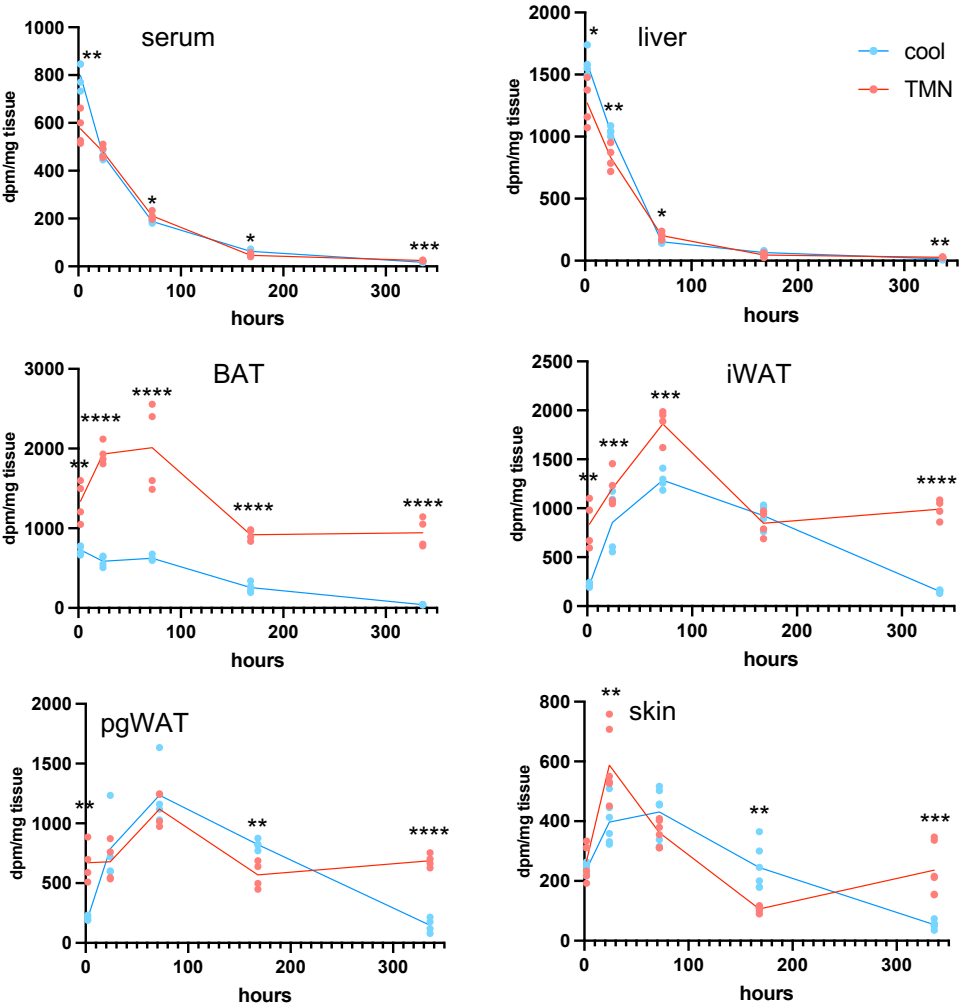


Fig.S3 (supplementary to Figs 4, 5). **dWAT assimilates dietary MCFAs.** **A.** Total amounts of MCFA acyl chain-containing triglycerides in dWAT collected from C57BL/6 female mice fed WD, WDIL for 3 days (compared to chow fed controls). **B.** Total amounts of specific MCFA acyl chains (in order of abundance), showing specific accumulation of 15:0 and 13:0 MCFAs

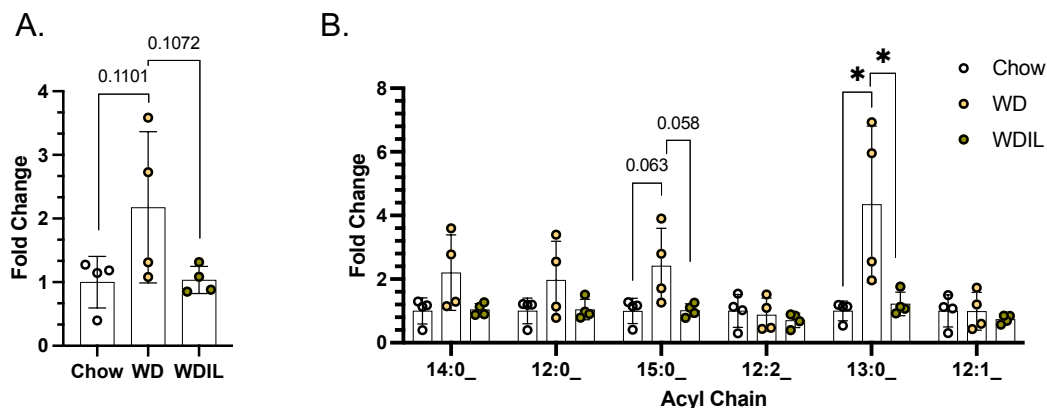


Fig.S4 (supplementary to Fig.5I). **Loss of fat is the major determinant of decreased body weight for WDIL-fed mice.** Body weight change is presented for comparison with the total fat weight change (assayed by EchoMRI) shown in Fig.5I.

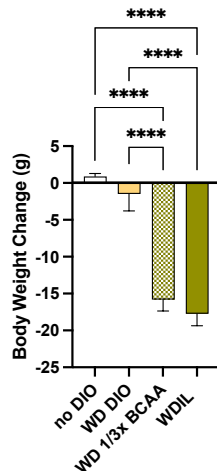


Fig.S5 (supplementary to Fig 6). **Ceramides present in serum, skin and sebome are largely specific to each tissue.** Mice fed WD accumulate ceramides in all 3 tissues. Heat map shown in Fig.6D presented here with ceramide labels, together with excel file ().

	Serum	Skin	Sebome
Cer_ADS d22:0 16:0	Present	Not present	Not present
Cer_AP t21:1 23:0	Present	Not present	Not present
Cer_NDS d16:0 27:1	Present	Not present	Not present
Cer_NDS d23:0 15:1	Present	Not present	Not present
Cer_NP t18:0 16:0	Present	Not present	Not present
Cer_NP t18:0 23:0	Present	Not present	Not present
Cer_NP t18:0 24:0	Present	Not present	Not present
Cer_NS d18:1 23:0	Present	Not present	Not present
Cer_NS d18:1 24:2	Present	Not present	Not present
Cer_NS d18:2 16:0	Present	Not present	Not present
Cer_BS d18:1 15:0	Not present	Present	Not present
Cer_BS d17:1 15:0	Not present	Present	Not present
Cer_NS d18:1 26:0	Not present	Present	Not present
Cer_BDS d17:0 26:0	Not present	Present	Not present
Cer_NDS d18:0 26:0	Not present	Present	Not present
Cer_AS d18:1 17:0	Not present	Present	Not present
Cer_ADS d18:0 16:0	Not present	Present	Not present
Cer_BDS d17:0 24:0	Not present	Present	Not present
Cer_BDS d17:0 15:0	Not present	Present	Not present
Cer_BS d17:1 21:0	Not present	Present	Not present
Cer_AP t27:1 16:0	Not present	Present	Not present
Cer_ADS d18:0 26:0	Not present	Present	Not present
Cer_BS d18:1 26:0	Not present	Present	Not present
Cer_NP t30:1 18:2	Not present	Present	Not present
Cer_NS d17:1 17:0	Not present	Present	Not present
Cer_ADS d17:0 14:0	Not present	Present	Not present
Cer_ADS d16:0 26:0	Not present	Present	Not present
Cer_BDS d17:0 16:0	Not present	Present	Not present
Cer_NS d18:1 28:0	Not present	Present	Not present
Cer_AS d18:2 20:0	Not present	Present	Not present
Cer_NDS d18:0 28:0	Not present	Present	Not present
Cer_AP t18:0 26:1	Not present	Present	Not present
Cer_BDS d18:0 15:0	Not present	Present	Not present
Cer_NS d17:1 16:0	Not present	Present	Not present
Cer_NP t17:0 22:0	Not present	Present	Not present
Cer_AP t18:0 17:0	Not present	Present	Not present
Cer_ADS d26:0 16:1	Not present	Present	Present
Cer_BS d17:1 26:0	Not present	Present	Present
Cer_ADS d18:0 16:0	Not present	Present	Present
Cer_BS d18:1 26:0	Not present	Present	Present
Cer_BS d16:1 26:0	Not present	Present	Present
Cer_NS d17:1 26:0	Not present	Present	Present
Cer_ADS d17:0 16:0	Not present	Present	Present
Cer_NDS d17:0 26:0	Not present	Present	Present
Cer_BS d17:1 16:0	Not present	Present	Present
Cer_AP t17:0 16:0	Not present	Present	Present
Cer_BS d17:1 24:0	Not present	Present	Present
Cer_ADS d18:0 18:0	Not present	Present	Present
Cer_ADS d20:0 18:0	Not present	Present	Present
Cer_ADS d16:0 16:0	Not present	Present	Present
Cer_NDS d20:0 18:0	Not present	Present	Present
Cer_AS d18:2 16:0	Not present	Present	Present
Cer_NS d17:1 24:0	Not present	Present	Present
Cer_AS d18:1 18:0	Not present	Present	Present
Cer_AP t17:0 26:1	Not present	Present	Present
Cer_NDS d18:0 18:0	Not present	Present	Present
Cer_BS d18:1 16:0	Not present	Present	Present
Cer_BDS d17:0 24:1	Not present	Present	Present
Cer_NDS d17:0 24:0	Not present	Present	Present
Cer_BDS d17:0 25:0	Not present	Present	Present
Cer_AS d18:2 18:0	Not present	Present	Present
Cer_ADS d20:0 20:0	Not present	Not present	Present
Cer_AS d17:1 16:0	Not present	Not present	Present
Cer_BDS d20:0 17:0	Not present	Not present	Present
Cer_AS d16:1 16:0	Not present	Not present	Present
Cer_BDS d18:0 24:0	Not present	Not present	Present
Cer_AS d38:1 1	Not present	Not present	Present
Cer_BDS d18:0 26:0	Not present	Not present	Present
Cer_BDS d20:0 18:0	Not present	Not present	Present
Cer_ADS d44:0	Not present	Not present	Present
Cer_ADS d39:0	Not present	Not present	Present
Cer_AS d40:1	Not present	Not present	Present
Cer_NDS d18:0 17:0	Not present	Not present	Present
Cer_NS d20:1 18:0	Not present	Not present	Present
Cer_AS d17:1 18:0	Not present	Not present	Present
Cer_NDS d18:0 24:1	Not present	Not present	Present
Cer_BDS d35:0	Not present	Not present	Present
Cer_BS d17:1 25:0	Not present	Not present	Present
Cer_BS d18:1 17:0	Not present	Not present	Present
Cer_BDS d18:0 24:1	Not present	Not present	Present
Cer_NP t40:0	Not present	Not present	Present
Cer_ADS d43:1	Not present	Not present	Present
Cer_ADS d41:0	Not present	Not present	Present
Cer_AS d44:1	Not present	Not present	Present
Cer_NDS d20:0 24:1	Not present	Not present	Present
Cer_NDS d20:0 19:0	Not present	Not present	Present
Cer_AP t34:1	Not present	Not present	Present
Cer_AP t30:1	Not present	Not present	Present
Cer_BDS d18:0 16:0	Not present	Not present	Present
Cer_EODS d54:0	Not present	Not present	Present
Cer_AS d40:1 1	Not present	Not present	Present
Cer_NS d18:1 26:1	Not present	Not present	Present
Cer_BDS d18:0 18:0	Not present	Not present	Present
Cer_AS d42:2	Not present	Not present	Present
Cer_BDS d18:0 17:0	Not present	Not present	Present
Cer_ADS d35:0 1	Not present	Not present	Present
Cer_NDS d18:0 18:1	Not present	Not present	Present
Cer_EODS d23:0 18:0	Not present	Not present	Present
Cer_NDS d19:0 18:0	Not present	Not present	Present
Cer_AP t35:0	Not present	Not present	Present
Cer_AP t18:0 24:0	Not present	Not present	Present
Cer_ADS d44:0 1	Not present	Not present	Present
Cer_EODS d56:1	Not present	Not present	Present
Cer_AP t23:2 15:0	Not present	Not present	Present
Cer_ADS d19:0 18:0	Not present	Not present	Present
Cer_AP t42:1	Not present	Not present	Present
Cer_BS d17:1 28:0	Not present	Not present	Present
Cer_AS d41:1	Not present	Not present	Present
Cer_NDS d20:0 20:1	Not present	Not present	Present
Cer_AS d29:1	Not present	Not present	Present
Cer_ADS d17:0 17:0	Not present	Not present	Present
Cer_NDS d46:0	Not present	Not present	Present
Cer_BS d17:1 22:0	Not present	Not present	Present
Cer_NS d39:1	Not present	Not present	Present
Cer_EODS d68:3	Not present	Not present	Present
Cer_NP t39:1	Not present	Not present	Present
Cer_BS d17:1 27:0	Not present	Not present	Present
Cer_AP t18:0 16:0	Not present	Not present	Present
Cer_AS d18:1 16:0	Not present	Not present	Present
Cer_NDS d18:0 16:0	Not present	Not present	Present
Cer_NS d18:1 16:0	Not present	Not present	Present
Cer_NS d18:1 18:0	Not present	Not present	Present
Cer_NS d18:1 20:0	Not present	Not present	Present
Cer_NS d18:1 22:0	Not present	Not present	Present
Cer_NS d18:1 24:0	Not present	Not present	Present
Cer_NS d18:1 24:1	Not present	Not present	Present