Table S1. The inter-assay precision per acylcarnitine species. Calculated from quality control samples (n = 30 in ten experiments). The coefficients of variation (CV) were calculated as the ratio of the standard deviation to the mean. For C5:1-, C12OH-, C14OH-, C18OH-, C18DC-, C24- and C26-carnitine, concentrations were below the limit of detection (shown as not detectable: ND). Acylcarnitines in the low or high QC samples with concentrations below the limit of quantification are in *italic*.

Parameter	Low QC			High QC		
	Average (µmol/L)	SD	CV (%)	Average (µmol/L)	SD	CV (%)
Total	48.75	3.38	6.9	69.02	4.68	6.8
C0	25.50	2.09	8.2	29.84	2.38	8.0
C2	16.74	1.06	6.3	21.49	1.36	6.3
C3	1.94	0.13	6.6	6.17	0.36	5.9
C4	0.18	0.02	10.6	0.40	0.04	9.6
C5:1	ND			*0.01*	*0.01*	*161.3*
C5	0.08	0.01	15.4	0.24	0.03	11.8
C6	0.02	0.00	18.5	0.28	0.03	10.4
C8	*0.04*	*0.01*	*22.6*	1.94	0.17	8.6
C10:1	*0.02*	*0.01*	*38.4*	0.36	0.04	10.8
C10	0.05	0.01	18.9	0.48	0.04	8.1
C12:1	*0.01*	*0.01*	*191.8*	0.09	0.02	17.4
C12	*0.05*	*0.01*	*27.8*	0.29	0.03	10.8
C14:1	*0.05*	*0.01*	*23.1*	0.37	0.04	9.7
C14	0.15	0.02	14.2	0.30	0.02	7.7
C16:1	0.08	0.01	14.2	0.18	0.02	10.9
C16	0.96	0.08	7.9	1.14	0.08	7.1
C18:2	0.31	0.03	10.2	0.42	0.04	9.0
C18:1	1.26	0.11	8.9	1.73	0.14	8.1
C18	0.49	0.05	9.8	1.00	0.09	8.8
C4OH+C3DC	*0.10*	*0.06*	*61.6*	*0.20*	*0.14*	*70.4*
C5OH+C4DC	0.32	0.03	10.4	0.51	0.07	13.3
C5DC	*0.05*	*0.12*	*231.7*	0.92	0.16	17.8
C6DC	*0.01*	*0.01*	*141.2*	0.08	0.01	17.4
C12OH	ND			ND		
C14OH	ND			ND		
C16OH	*0.01*	*0.01*	*120.5*	*0.01*	*0.01*	*141.1*
C18:1OH	*0.01*	*0.01*	*136.6*	*0.02*	*0.01*	*43.9*
C18OH	ND			ND		
C16DC	*0.02*	*0.01*	*51.4*	*0.03*	*0.01*	*28.8*
C18DC	ND			ND		
C24	ND			*0.01*	*0.01*	*63.4*
C26	ND			*0.01*	*0.01*	*95.0*

Table S2. The estimated decay rates of free carnitine and acylcarnitine species upon long-term storage. Estimated decay rates and percent decays for carnitine and the acylcarnitine concentrations with a significant trend upon storage duration, as determined by Jonckheere's trend test. For free carnitine, the trend type was defined as polynomial trend, whereas for C2- and C3-carnitine the trend appeared exponential. For the remaining acylcarnitine species, the trend type was defined as linear. Abbreviation: ND, not determined.

Parameter	Estimated annual decay rate (µmol/L (95% CI))	Estimated annual percent decay from 2017 (% (95% CI))	Estimated percent decay 2017 – 2013 (%(95% CI))
C0	ND	ND	-20.0%
C2	ND	ND	84.4%
C3	ND	ND	65.3%
C4	0.010 (0.006 – 0.014)	6.7% (4.3 – 9.1 %)	26.7% (17.1 – 36.3%)
C5	0.005 (0.003 – 0.008)	5.5% (3.2 – 7.7%)	21.8% (12.7 – 30.9%)
C6	0.004 (0.004 – 0.005)	20.8% (17.8 – 23.9%)	83.4% (71.1 – 95.6%)
C8	0.002 (0.001 – 0.003)	6.0% (3.5 – 8.5%)	24.0% (13.9 – 34.1%)
C10:1	0.002 (0.002 – 0.003)	7.6% (5.1 – 10.1%)	30.4% (20.4 – 40.4%)
C10	0.004 (0.002 – 0.005)	7.1% (5.0 – 9.2%)	28.4% (19.9 – 36.8%)
C12:1	0.003 (0.002 – 0.004)	10.4% (5.9 – 14.9%)	41.5% (23.4 – 59.7%)
C12	0.006 (0.004 – 0.007)	6.3% (4.5 – 8.1%)	25.2% (17.8 – 32.5%)
C14:1	0.007 (0.005 – 0.009)	7.6% (5.7 – 9.5%)	30.4% (22.8 – 37.9%)
C14	0.016 (0.011 – 0.022)	5.8% (3.8 – 7.7%)	23.1% (15.2 – 30.9%)
C16:1	0.009 (0.006 – 0.012)	9.4% (6.5 – 12.4%)	37.7% (26.0 – 49.5%)
C16	0.158 (0.114 – 0.202)	6.9% (5.0 – 8.8%)	27.6% (20.0 – 35.2%)
C18:2	0.019 (0.014 – 0.024)	9.5% (11.8 – 7.1%)	38.0% (47.4 – 28.6%)
C18:1	0.116 (0.095 – 0.137)	8.6% (7.1 – 10.2%)	34.6% (28.3 – 40.9%)
C18	0.062 (0.050 – 0.073)	8.5% (6.9 – 10.2%)	34.2% (27.6 – 40.7%)
C5OH+C4DC	0.024 (0.021 – 0.028)	15.2% (13.3 – 17.2)	60.9% (53.1 – 68.8%)
C18:1OH	0.003 (0.003 – 0.004)	15.4% (18.1 – 12.6%)	61.4% (72.3 – 50.6%)
C16DC	0.003 (0.003 – 0.004)	11.3% (9.3 – 13.4%)	45.3% (37.0 – 53.5%)