

Serum concentrations of lipids, ketones, and acylcarnitines during the postprandial and fasting state: The Postprandial Metabolism in Healthy Young Adults (PoMet) study.

Åslaug Matre Anfinssen.

Supplementary Table 1. Baseline concentrations of serum ketones, lipids, and acylcarnitines measured in the Postprandial Metabolism Study¹

Biomarker	gMean (gSD)	Mean (SD)	Minimum	Maximum
Ketones				
Acetoacetate, $\mu\text{mol/L}$	37.4 (1.88)	45.9 (33.1)	13.1	167
β -hydroxybutyrate, $\mu\text{mol/L}$	62.6 (2.12)	83.2 (73.9)	17.3	399
Lipids				
HDL-C, mmol/L	1.55 (1.24)	1.58 (0.36)	1.0	2.8
LDL-C, mmol/L	2.51 (1.31)	2.61 (0.72)	1.6	4.3
Triglycerides, mmol/L	0.85 (1.46)	0.92 (0.36)	0.5	1.82
Carnitines				
Free carnitine, $\mu\text{mol/L}$	35.1 (1.19)	35.6 (5.77)	21.6	45.4
<i>Short-chain acylcarnitines</i>				
Acetylcarnitine (C2), $\mu\text{mol/L}$	8.45 (1.45)	9.03 (3.43)	3.45	21
Propionylcarnitine (C3), $\mu\text{mol/L}$	0.32 (1.32)	0.34 (0.09)	0.17	0.58
Butyrylcarnitine (C4), $\mu\text{mol/L}$	0.25 (1.46)	0.27 (0.10)	0.11	0.52
Isovalerylcarnitine (iC5), $\mu\text{mol/L}$	0.12 (1.37)	0.12 (0.04)	0.05	0.217
Glutarylacetyl carnitine (C5-DC), $\mu\text{mol/L}$	0.07 (1.49)	0.07 (0.03)	0.02	0.18
<i>Medium-chain acylcarnitines</i>				
Hexanoylcarnitine (C6), $\mu\text{mol/L}$	0.03 (1.61)	0.04 (0.02)	0.01	0.08
Octanoylcarnitine (C8), $\mu\text{mol/L}$	0.14 (1.88)	0.17 (0.11)	0.03	0.53
Decanoylcarnitine (C10), $\mu\text{mol/L}$	0.30 (1.89)	0.36 (0.22)	0.04	1.14
Dodecanoylcarnitine (C12), $\mu\text{mol/L}$	0.07 (1.82)	0.08 (0.04)	0.01	0.21

¹The ketone bodies were analyzed using gas chromatography-tandem mass spectrometry (GC-MS/MS), while the carnitines were analyzed using liquid chromatography-tandem mass spectrometry (LC-MS/MS) at Bevital AS (<https://bevital.no/>). The lipids were analyzed at the Department of Medical Biochemistry and Pharmacology, Haukeland University Hospital using photometry.

Abbreviations: gMean, geometric mean; gSD, geometric standard deviation; HDL-C, High-density lipoprotein cholesterol; LDL-C, Low-density lipoprotein cholesterol.

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Supplementary Table 2. Serum metabolite concentrations after the consumption of a standardized meal in healthy subjects in the Postprandial Metabolism Study¹

Biomarker	Ref ²	Time after meal												
		15 min	30 min	45 min	60 min	90 min	2 hours	3 hours	4 hours	6 hours	8 hours	10 hours	12 hours	24 hours
<i>n</i>	34	34	34	34	34	34	34	33	33	33	33	33	33	33
Ketones														
Acetoacetate, µmol/L	37.4	24.1	26.8	27.2	29.2	26.2	28.2	31.3	41.5	67.8	80.4	111	141	204
β -hydroxybutyrate, µmol/L	62.6	33.8	32.3	29.3	27.4	23.1	24.9	36.6	65.6	141	187	274	343	464
Lipids														
HDL-C, mmol/L	1.55	1.53	1.49	1.49	1.49	1.48	1.49	1.50	1.50	1.55	1.58	1.61	1.64	1.56
LDL-C, mmol/L	2.51	2.47	2.42	2.42	2.43	2.42	2.41	2.44	2.46	2.53	2.59	2.65	2.67	2.68
Triglycerides, mmol/L	0.85	0.86	0.91	0.94	0.95	0.99	1.02	1.10	1.09	0.85	0.74	0.72	0.74	0.98
Carnitines														
Free carnitine, µmol/L	35.1	36.4	37.3	38.3	38.8	40.1	41.0	40.5	38.6	35.0	33.7	32.3	31.4	35.4
<i>Short-chain acylcarnitines</i>														
Acetylcarnitine (C2), µmol/L	8.45	7.70	6.96	6.33	5.78	5.14	5.05	5.75	7.47	9.65	10.4	10.8	11.4	13.8
Propionylcarnitine, (C3), µmol/L	0.32	0.32	0.33	0.34	0.36	0.37	0.39	0.37	0.32	0.26	0.25	0.24	0.24	0.30
Butyrylcarnitine (C4), µmol/L	0.25	0.24	0.24	0.24	0.25	0.26	0.27	0.27	0.25	0.21	0.20	0.20	0.21	0.29

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Biomarker	Ref ²	Time after meal												
		15 min	30 min	45 min	60 min	90 min	2 hours	3 hours	4 hours	6 hours	8 hours	10 hours	12 hours	24 hours
Isovalerylcarnitine (iC5), µmol/L	0.12	0.11	0.12	0.12	0.13	0.13	0.14	0.14	0.12	0.10	0.10	0.10	0.10	0.13
Glutarylcarnitine (C5-DC), µmol/L	0.07	0.07	0.07	0.06	0.06	0.07	0.06	0.06	0.06	0.06	0.06	0.06	0.07	0.07
<i>Medium-chain acylcarnitines</i>														
Hexanoylcarnitine (C6), µmol/L	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.04	0.04	0.05	0.07
Octanoylcarnitine (C8), µmol/L	0.14	0.11	0.08	0.05	0.04	0.05	0.06	0.08	0.10	0.11	0.12	0.12	0.16	0.28
Decanoylcarnitine (C10), µmol/L	0.30	0.22	0.16	0.11	0.10	0.11	0.13	0.18	0.21	0.24	0.27	0.28	0.35	0.63
Dodecanoylcarnitine (C12), µmol/L	0.07	0.06	0.04	0.03	0.03	0.03	0.03	0.04	0.05	0.06	0.07	0.07	0.08	0.15

¹All values are reported as geometric means. ² Reference values were determined from the pre-breakfast blood draw. **Abbreviations:** HDL-C, High-density lipoprotein cholesterol; LDL-C, Low-density lipoprotein cholesterol

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Supplementary Table 3. Serum metabolite concentrations after the consumption of a standardized meal in male ($n= 18$) and female ($n = 16$) participants in the Postprandial Metabolism Study¹

Biomarker	Sex ²	Ref ³	Time after meal													
			15 min	30 min	45 min	60 min	90 min	2 hours	3 hours	4 hours	6 hours	8 hours	10 hours	12 hours	24 hours	
<i>n</i>		34	34	34	34	34	34	34	34	33	33	33	33	33	33	
Ketones																
Acetoacetate, µmol/L	M	40.9	27.4	30.4	28.9	30.9	27.9	28.7	32.4	41.2	71.1	83.6	108	148	219	
	F	33.8	20.9	23.2	25.3	27.4	24.5	27.7	30.0	41.9	64.0	76.7	116	134	187	
β -hydroxybutyrate, µmol/L	M	63.8	36.7	33.1	29.3	27.1	23.0	24.5	38.5	63.1	132	183	248	323	479	
	F	61.2	30.9	31.5	29.3	27.8	23.2	25.5	34.4	68.7	152	192	310	368	445	
Lipids																
HDL-C, mmol/L	M	1.45	1.43	1.39	1.39	1.39	1.40	1.39	1.40	1.41	1.44	1.48	1.51	1.53	1.47	
	F	1.66	1.64	1.62	1.61	1.62	1.58	1.59	1.62	1.63	1.68	1.73	1.74	1.78	1.69	
LDL-C, mmol/L	M	2.58	2.55	2.50	2.48	2.50	2.48	2.49	2.52	2.55	2.61	2.65	2.72	2.76	2.80	
	F	2.44	2.39	2.33	2.35	2.35	2.35	2.32	2.34	2.35	2.44	2.52	2.56	2.57	2.54	
Triglycerides, mmol/L	M	0.90	0.92	0.95	0.99	1.02	1.08	1.13	1.16	1.16	0.87	0.76	0.73	0.75	1.01	
	F	0.81	0.81	0.86	0.89	0.87	0.89	0.92	1.02	1.01	0.84	0.72	0.71	0.73	0.95	
Carnitines																
Free carnitine, µmol/L	M	38.3	39.6	40.6	41.5	42.4	43.0	44.2	43.6	41.7	38.3	36.9	35.6	35.1	39.2	
	F	31.8	33.0	33.9	35.0	35.1	37.1	37.7	37.2	35.3	31.4	30.2	28.6	27.5	31.4	
<i>Short-chain acylcarnitines</i>																
Acetylcarnitine (C2), µmol/L	M	8.86	8.29	7.50	6.87	6.26	5.48	5.41	6.30	7.53	9.60	10.4	10.6	11.3	14.2	
	F	8.01	7.08	6.40	5.78	5.29	4.77	4.67	5.15	7.39	9.72	10.3	11.1	11.6	13.3	

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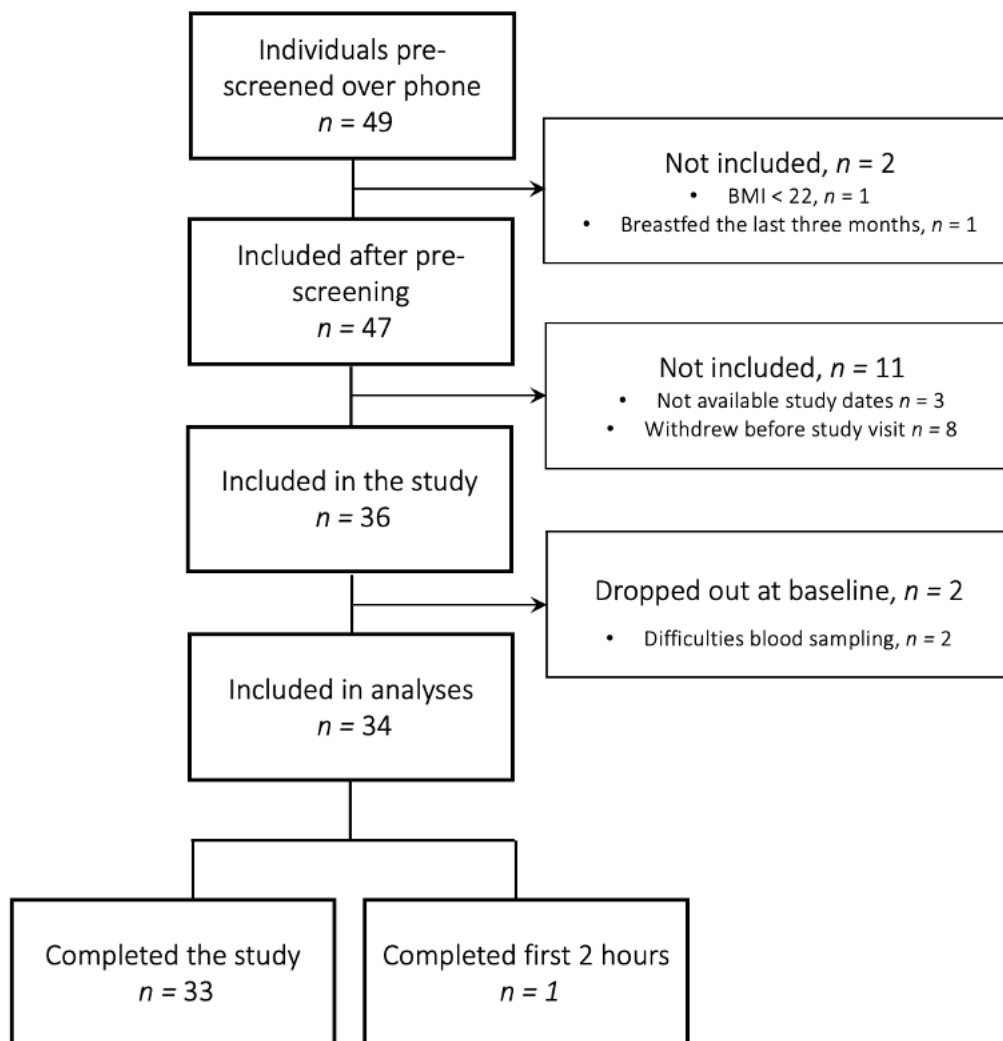
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Biomarker	Sex ²	Ref ³	Time after meal												
			15 min	30 min	45 min	60 min	90 min	2 hours	3 hours	4 hours	6 hours	8 hours	10 hours	12 hours	24 hours
<i>n</i>		34	34	34	34	34	34	34	34	33	33	33	33	33	33
Propionylcarnitine (C3), µmol/L	M	0.36	0.37	0.38	0.38	0.40	0.42	0.43	0.40	0.35	0.29	0.28	0.27	0.27	0.33
	F	0.29	0.28	0.29	0.30	0.31	0.33	0.34	0.33	0.29	0.23	0.22	0.21	0.21	0.27
Butyrylcarnitine (C4), µmol/L	M	0.28	0.26	0.26	0.26	0.26	0.28	0.28	0.28	0.26	0.23	0.22	0.21	0.24	0.34
	F	0.22	0.22	0.22	0.23	0.23	0.23	0.26	0.26	0.24	0.19	0.18	0.18	0.18	0.25
Isovalerylcarnitine (iC5), µmol/L	M	0.13	0.12	0.13	0.14	0.14	0.15	0.15	0.14	0.13	0.11	0.11	0.11	0.12	0.14
	F	0.11	0.09	0.11	0.11	0.12	0.12	0.12	0.13	0.11	0.09	0.09	0.09	0.08	0.11
Glutaryl carnitine (C5-DC), µmol/L	M	0.07	0.07	0.08	0.07	0.08	0.08	0.07	0.07	0.07	0.07	0.07	0.08	0.07	0.08
	F	0.06	0.06	0.06	0.06	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.06
<i>Medium-chain acylcarnitines</i>															
Hexanoylcarnitine (C6), µmol/L	M	0.04	0.03	0.03	0.02	0.02	0.02	0.03	0.03	0.03	0.04	0.04	0.04	0.05	0.09
	F	0.03	0.02	0.02	0.01	0.01	0.01	0.02	0.02	0.03	0.03	0.03	0.04	0.04	0.06
Octanoylcarnitine (C8), µmol/L	M	0.18	0.14	0.11	0.07	0.05	0.07	0.08	0.10	0.13	0.14	0.15	0.15	0.19	0.33
	F	0.11	0.08	0.05	0.04	0.03	0.03	0.04	0.05	0.07	0.09	0.09	0.10	0.13	0.22
Decanoylcarnitine (C10), µmol/L	M	0.36	0.28	0.21	0.15	0.14	0.16	0.18	0.24	0.27	0.29	0.33	0.33	0.38	0.76
	F	0.24	0.18	0.12	0.08	0.07	0.07	0.09	0.13	0.16	0.19	0.22	0.23	0.32	0.51
Dodecanoylcarnitine (C12), µmol/L	M	0.08	0.07	0.05	0.04	0.04	0.04	0.04	0.06	0.06	0.07	0.08	0.07	0.09	0.17
	F	0.06	0.04	0.03	0.03	0.02	0.02	0.03	0.03	0.04	0.05	0.06	0.07	0.08	0.14

¹All values are reported as geometric means. ²Male/Female ³Reference values were determined from the pre-breakfast blood draw. **Abbreviations:** HDL-C, High-density lipoprotein cholesterol; LDL-C, Low-density lipoprotein cholesterol.

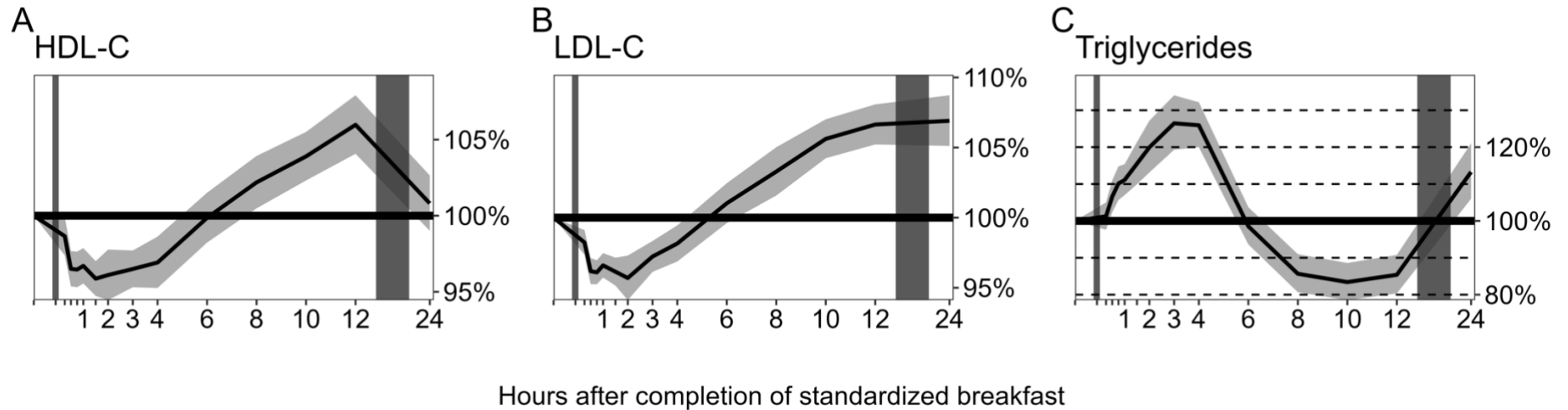
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Supplementary Figure 1. Flowchart of the inclusion process for participants in the Postprandial Metabolism Study (Reproduced from Anfinssen *et al.*, 2023, British Journal of Nutrition, doi: [10.1017/S0007114523002490](https://doi.org/10.1017/S0007114523002490))

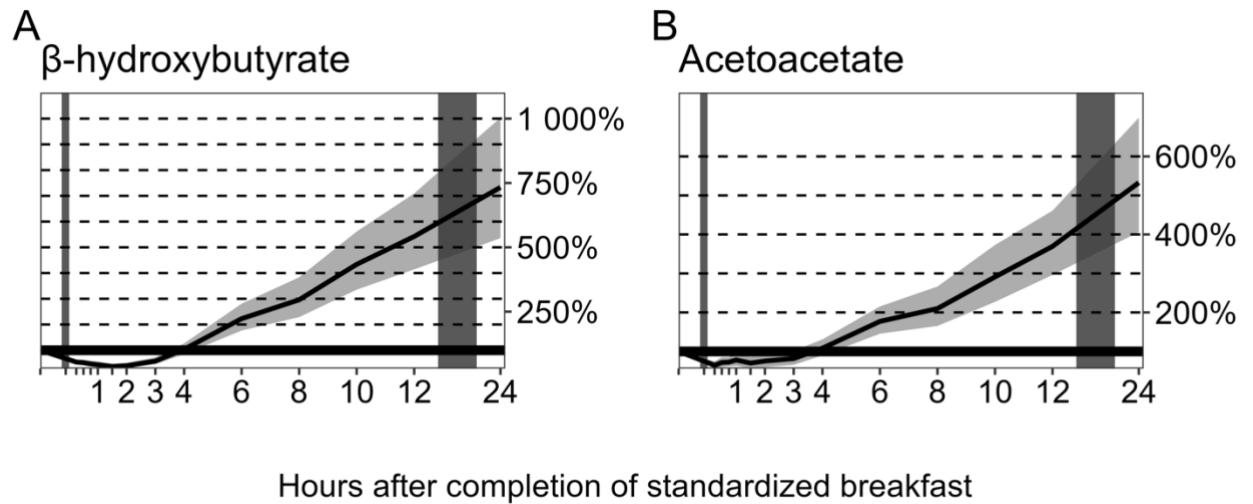
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Supplementary Figure 2. The relative change in lipid concentrations (% change from reference values) as a function of time since completion of the standardized breakfast meal in participants in the Postprandial Metabolism Study ($n = 34$). The solid black line represents the geometric mean, while the grey shaded area represents the 95% geometric confidence intervals. The leftmost vertical line indicates the time of the standardized breakfast meal, while the rightmost vertical line indicates time spent outside the study center.

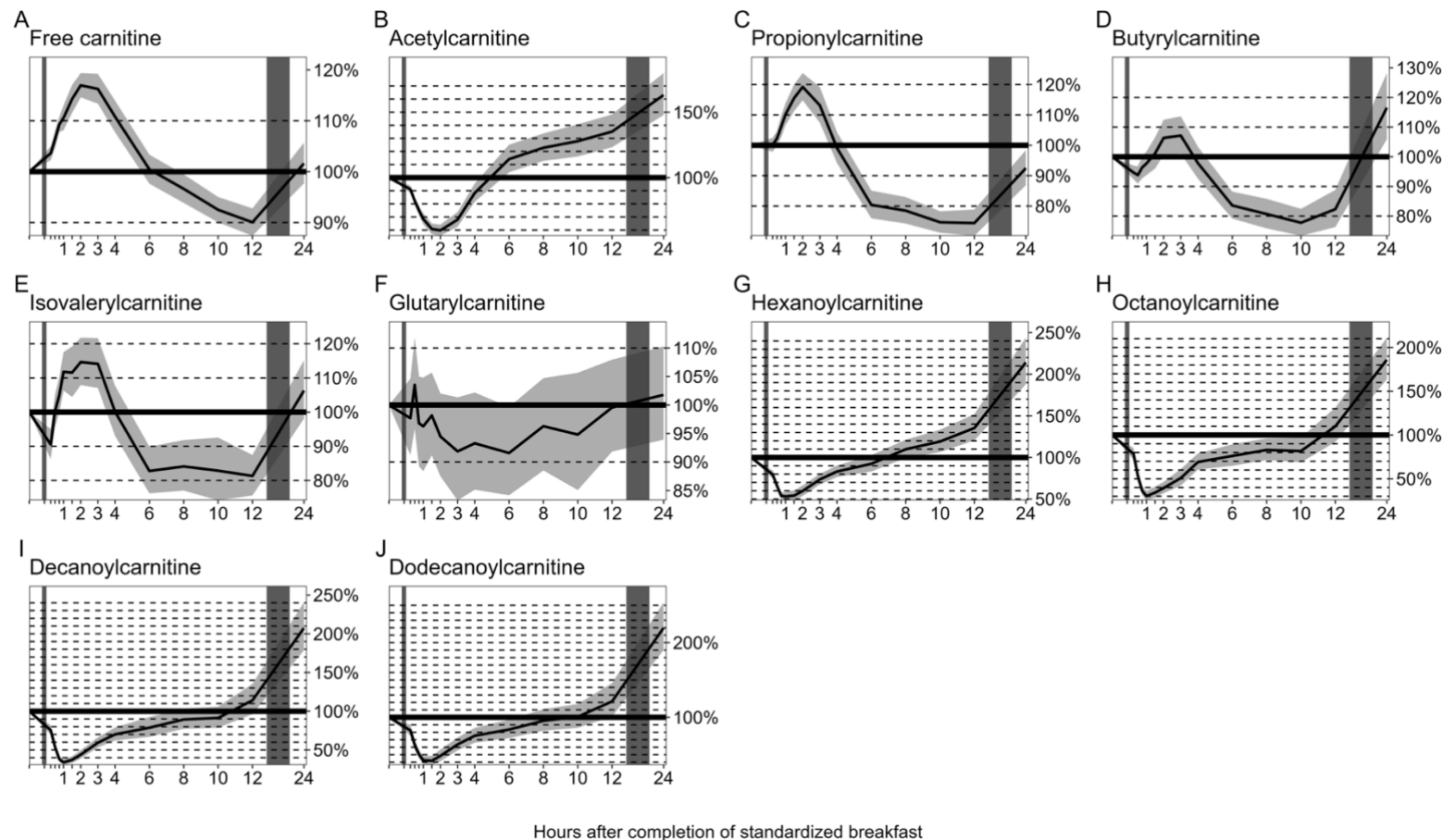
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Supplementary Figure 3. The relative change in β -hydroxybutyrate and acetoacetate concentrations (% change from reference values) as a function of time since completion of the standardized breakfast meal in participants in the Postprandial Metabolism Study ($n = 34$). The solid black line represents the geometric mean, while the grey shaded area represents the 95% geometric confidence intervals. The leftmost vertical line indicates the time of the standardized breakfast meal, while the rightmost vertical line indicates time spent outside the study center.

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Supplementary Figure 4. The relative change in free carnitine and acylcarnitine concentrations (% change from reference values) as a function of time since completion of the standardized breakfast meal in participants in the Postprandial Metabolism Study ($n = 34$). The solid black line represents the geometric mean, while the grey shaded area represents the 95% geometric confidence intervals. The leftmost vertical line indicates the time of the standardized breakfast meal, while the rightmost vertical line indicates time spent outside the study center.