

Supplementary Data

Estimated parameter values for each subject

SUPPLEMENTARY TABLE S1. ESTIMATED VALUES OF INSULIN SENSITIVITY, NET HEPATIC GLUCOSE BALANCE, GLUCOSE EFFECT AT ZERO INSULIN, AND TIME OF PEAK MEAL-GLUCOSE APPEARANCE DURING THE DINNER WINDOW (6 P.M.–11 P.M.)

Subject	$S_I \times 10^{-4}$ (mL/ μ U/min)		τ_m (min)		NHGB ₀ (mg/dL/min)		GEZI $\times 10^{-2}$ (min ⁻¹)	
	LF	HF	LF	HF	LF	HF	LF	HF
1	4.33 (28.02)	1.94 (13.47)	77.00 (16.48)	148.00 (26.29)	1.65 (56.77)	1.51 (46.35)	0.55 (30.58)	0.50 (32.37)
2	9.67 (18.95)	8.38 (11.94)	69.00 (12.31)	74.00 (23.87)	1.65 (38.15)	1.51 (72.06)	0.55 (24.41)	0.50 (35.95)
3	6.39 (22.30)	6.18 (11.93)	75.00 (26.92)	122.00 (16.38)	1.65 (36.81)	6.11 (11.27)	0.55 (26.10)	2.04 (13.97)
4	10.68 (37.25)	10.68 (92.00)	80.00 (15.46)	81.00 (10.97)	1.65 (48.75)	2.81 (38.84)	0.55 (91.96)	0.50 (109.19)
5	6.95 (17.20)	3.62 (26.55)	74.00 (24.07)	148.00 (16.87)	2.39 (39.72)	4.81 (11.56)	0.50 (45.58)	1.61 (21.50)
6	10.71 (10.67)	10.1 (19.98)	46.00 (20.37)	57.00 (29.65)	2.25 (25.60)	1.65 (48.48)	0.75 (28.11)	0.55 (43.49)
7	12.31 (17.43)	9.84 (12.66)	74.00 (26.68)	85.00 (13.79)	6.62 (20.03)	3.08 (43.49)	2.21 (56.49)	0.50 (91.08)
Mean SE	8.72 1.08	7.25 1.08	71.00 1.08	102.00 14.00	2.55 0.69	3.07 0.68	0.81 0.24	0.89 0.25

Values in parentheses show the fractional SDs.

τ_m , time of peak meal-glucose appearance; GEZI, glucose effect at zero insulin; HF, high-fat dinner; LF, low-fat dinner; NHGB₀, net hepatic glucose balance at zero insulin and zero glucose; S_I , insulin sensitivity.

SUPPLEMENTARY TABLE S2. ESTIMATED VALUES OF INSULIN SENSITIVITY, NET HEPATIC GLUCOSE BALANCE, GLUCOSE EFFECT AT ZERO INSULIN, AND TIME OF PEAK MEAL-GLUCOSE APPEARANCE DURING THE BREAKFAST WINDOW (8 A.M.–12 P.M.)

Subject	$S_I \times 10^{-4}$ (mL/ μ U/min)		τ_m (min)		NHGB ₀ (mg/dL/min)		GEZI $\times 10^{-2}$ (min ⁻¹)	
	LF	HF	LF	HF	LF	HF	LF	HF
1	4.81 (16.03)	1.07 (31.95)	45.00 (16.59)	74.00 (16.60)	1.51 (19.44)	1.51 (31.53)	0.50 (31.91)	0.50 (24.34)
2	8.37 (24.75)	8.46 (29.85)	57.00 (17.23)	54.00 (10.96)	1.51 (85.10)	1.51 (49.44)	0.50 (53.64)	0.50 (30.91)
3	3.91 (19.04)	9.09 (25.04)	96.00 (16.12)	61.00 (24.29)	1.65 (63.31)	1.65 (60.69)	0.55 (53.21)	0.55 (122.52)
4	9.68 (26.63)	12.31 (56.15)	43.00 (18.42)	32.00 (10.50)	1.71 (74.50)	1.65 (12.17)	0.50 (44.84)	0.55 (97.22)
5	3.44 (18.97)	2.78 (33.21)	58.00 (11.56)	60.00 (18.62)	1.51 (14.40)	1.51 (51.49)	0.50 (14.94)	0.50 (57.31)
6	12.31 (27.10)	7.1 (18.80)	49.00 (25.68)	46.00 (11.86)	1.51 (20.37)	1.51 (36.84)	0.50 (27.93)	0.50 (58.96)
7	4.55 (12.83)	4.06 (18.14)	72.00 (16.24)	69.00 (19.33)	1.51 (56.30)	1.51 (64.34)	0.50 (30.56)	0.50 (35.71)
Mean SE	6.72 1.29	6.41 1.50	60.00 7.00	57.00 5.00	1.56 0.03	1.55 0.03	0.50 0.01	0.51 0.01

Values in parentheses show the fractional SDs.

τ_m , time of peak meal-glucose appearance; GEZI, glucose effect at zero insulin; HF, high-fat dinner; LF, low-fat dinner; NHGB₀, net hepatic glucose balance at zero insulin and zero glucose; S_I , insulin sensitivity.

Supplementary Table S3. Estimated values of the fixed parameters and insulin sensitivity, net hepatic glucose balance, and glucose effect at zero insulin during the night (two intervals)

Subject	V_G/A_G (dL)	τ_1 (min)	τ_2 (min)	P_2 (min^{-1})	T_N (a.m.)	C_{INS} (mL/min)	$S_{0(N1)} \times 10^{-4}$ (mL μ U/min)		$GEZI_{(N1)} \times 10^{-2}$ (min^{-1})		$NHGB_{0(N1)}$ (mg/dL/min)		$S_{0(N2)} \times 10^{-4}$ (mL μ U/min)		$GEZI_{(N2)} \times 10^{-2}$ (min^{-1})		$NHGB_{0(N2)}$ (mg/dL/min)	
							LF	HF	LF	HF	LF	HF	LF	HF	LF	HF	LF	HF
1	108.00 (59.84)	206.00 (20.17)	47.00 (39.02)	0.006 (40.72)	All	421.00 (13.90)	5.72 (32.82)	12.30 (18.05)	0.55 (32.41)	0.65 (58.89)	1.65 (26.23)	4.34 (32.42)	3.67 (15.30)	0.45 (18.11)	1.61 (13.43)	0.50 (41.03)	4.8 (17.50)	1.94 (21.40)
2	77.00 (18.67)	153.00 (21.34)	26.00 (47.23)	0.014 (20.45)	6:45	1,191.00 (12.78)	4.59 (19.49)	12.31 (18.98)	0.50 (26.31)	0.50 (73.73)	1.81 (40.31)	3.32 (15.28)	12.31 (26.84)	2.34 (90.84)	1.01 (25.53)	0.50 (17.42)	3.49 (11.95)	1.51 (31.91)
3	80.00 (48.21)	416.00 (21.38)	23.00 (27.66)	0.01 (32.54)	4:18	388.00 (21.32)	7.81 (13.78)	2.76 (15.41)	0.55 (22.73)	0.80 (32.69)	3.26 (58.38)	2.64 (47.09)	2.28 (54.62)	6.2 (26.39)	0.55 (34.07)	0.55 (48.98)	1.65 (49.96)	2.47 (78.74)
4	168.00 (83.38)	120.00 (50.86)	59.00 (71.55)	0.004 (46.30)	4:10	956.00 (15.36)	10.02 (79.23)	12.31 (81.93)	0.55 (49.29)	0.50 (52.41)	1.65 (95.09)	1.51 (74.72)	3.35 (27.37)	12.31 (87.83)	0.50 (113.52)	0.55 (46.38)	1.51 (60.83)	1.65 (74.74)
5	177.00 (39.49)	115.00 (21.55)	115.00 (21.55)	0.006 (27.02)	4:17	788.00 (18.48)	6.24 (28.32)	12.31 (15.91)	0.55 (25.33)	0.70 (100.49)	1.65 (14.19)	4.63 (77.47)	3.35 (45.27)	3.35 (47.71)	0.71 (44.11)	0.50 (13.26)	2.12 (64.72)	2.78 (60.04)
6	206.00 (86.78)	45.00 (17.09)	45.00 (17.09)	0.035 (13.80)	4:04	1,473.00 (29.12)	8.55 (59.51)	12.31 (45.18)	0.50 (63.71)	0.50 (117.74)	1.51 (64.98)	1.51 (43.45)	12.31 (61.77)	12.31 (51.23)	1.50 (43.11)	0.82 (13.15)	4.47 (42.58)	2.62 (17.74)
7	113.00 (80.53)	174.00 (16.29)	40.00 (27.92)	0.034 (23.67)	4:28	1,042.00 (12.85)	12.31 (72.02)	12.26 (30.78)	1.80 (76.95)	0.86 (64.99)	5.36 (30.13)	4.65 (59.36)	12.31 (67.36)	12.31 (63.55)	1.28 (20.35)	0.72 (11.98)	3.84 (28.13)	4.79 (76.35)
Mean	133.00	176.00	51.00	0.016	4:34	894.00	7.89	10.94	0.71	0.64	2.41	3.23	7.08	7.04	1.02	0.59	3.13	2.54
SE	19.00	44.00	12.00	0.005	0:22	150.00	1.01	1.36	0.18	0.06	0.54	0.52	1.86	1.97	0.17	0.05	0.51	0.42

Values in parentheses show the fractional SDs.

τ_1 and τ_2 , insulin time constants for subcutaneous insulin concentration and plasma insulin concentration, respectively; C_{INS} , insulin clearance; $GEZI$, glucose effect at zero insulin; HF, high-fat dinner; LF, low-fat dinner; N1, 11 p.m.–T_N; N2, T_N–8 a.m.; $NHGB_0$, net hepatic glucose balance at zero insulin and zero glucose; S_1 , insulin sensitivity; T_N, transition time; V_G/A_G , ratio of the glucose distribution volume to the bioavailability of meal carbohydrate.

Supplementary meals information

SUPPLEMENTARY TABLE S4. SUPPLEMENTARY MEALS GIVEN TO EACH SUBJECT AND THE ESTIMATED TIME OF PEAK MEAL-GLUCOSE APPEARANCE FOR EACH MEAL UNDER BOTH THE LOW-/HIGH-FAT DINNER SCENARIOS

Subject	Low-fat dinner			High-fat dinner		
	Time (clock h)	Carbohydrate (g)	τ_m (min)	Time (clock h)	Carbohydrate (g)	τ_m (min)
1	22:20	15.0	148 (67.45)	23:30	15.0	37 (15.73)
	22:40	15.0	148 (20.85)	00:00	15.0	148 (50.16)
	23:00	15.0	148 (35.64)	00:30	15.0	148 (22.41)
	23:20	15.0	139 (34.55)	01:00	15.0	148 (19.04)
	00:30	15.0	116 (22.81)	04:05	15.0	148 (32.43)
	11:10	15.0	148 (24.03)			
	11:30	15.0	148 (12.36)			
2	23:30	7.5	87 (17.02)	23:00	15.0	148 (21.57)
3	07:05	7.5	119 (10.42)	07:15	7.5	148 (25.84)
				11:09	15.0	41 (20.89)
4	11:30	15.0	43 (18.42)	22:40	15.0	148 (43.76)
				23:38	7.5	148 (42.92)
				00:00	15.0	35 (11.23)
				04:30	15.0	43 (12.53)
				11:40	15.0	89 (22.70)
5	22:20	15.0	66 (40.67)	03:00	15.0	52 (24.61)
	22:40	15.0	38 (35.52)			
	23:30	15.0	97 (15.54)			
6	04:00	7.5	119 (29.93)	11:00	15.0	148 (14.24)
	07:00	15.0	148 (53.82)	11:20	15.0	148 (24.80)
	07:30	15.0	148 (58.04)			
	10:40	15.0	148 (19.46)			
	11:40	15.0	148 (19.11)			
7				22:20	15.0	134 (34.25)

Values in parentheses show the fractional SDs.