

Supplementary Table S1. The relationships between longitudinal brachial-ankle pulse wave velocity adjusted for age and gender and excessive daytime sleepiness using a linear mixed-effects model

Effect	Regression coefficient			Global test	
	Level	Estimate (Standard error)	<i>P</i> value	Effect	<i>P</i> value
Intercept		664.3 (64.3)	<0.001	Time (years)	<.0001
Time (years)	1 year	25.3 (1.9)	<0.001	Excessive daytime sleepiness	0.93
Excessive daytime sleepiness	Yes vs. no	1.91 (20.7)	0.92	Time*Excessive daytime sleepiness	0.03
Time*Excessive daytime sleepiness	1 year for yes	-7.16 (3.36)	0.03	Age (years)	<.0001
Age (years)	1 year	14.7 (1.1)	<0.001	Gender	0.03
Gender	Male vs. female	40.4 (18.6)	0.03		

The longitudinal brachial-ankle pulse wave velocity was analyzed with a linear mixed-effects model using time, excessive daytime sleepiness, their interaction, and age and gender at baseline as fixed effects, and patient as a random effect.

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25 **Supplementary Table S2.** The relationships between longitudinal brachial-ankle pulse wave velocity adjusted for age and gender and PSQI score using a linear mixed-effects model

Regression coefficient				Global test	
Effect	Level	Estimate (Standard error)	<i>P</i> value	Effect	<i>P</i> value
Intercept		632 (64.7)	<0.001	Time (year)	<0.001
Time	1 year	23.8 (1.9)	<0.001	PSQI score	0.04
PSQI score	Average vs. good	35.3 (22.5)	0.12	Time*PSQI score	0.79
	Poor vs. good	73.5 (31.7)	0.02	Age (years)	<0.001
Time*PSQI score	1 year for average	-2.37 (3.69)	0.52	Gender	0.03
	1 year for poor	-1.81 (5.02)	0.72		
Age	1 year	15.0 (1.1)	<0.001		
Gender	Male vs. female	42.1 (18.7)	0.03		

The longitudinal brachial-ankle pulse wave velocity was analyzed with a linear mixed-effects model including time, PSQI score, their interaction, and age and gender at baseline as fixed effects, and

30 patient as a random effect. PSQI: Pittsburgh Sleep Quality Index

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Supplementary Table S3. The relationships between longitudinal brachial-ankle pulse wave velocity adjusted for age and gender and frequency of breakfast intake using a linear mixed-effects model

Regression coefficient				Global test	
Effect	Level	Estimate (Standard error)	P value	Effect	P value
Intercept		796.5 (74.7)	<0.0001	Time (year)	0.01
Time	1 year	21.7 (8.2)	0.01	Frequency of breakfast intake	0.001
Frequency of breakfast intake	1 time per a week	-25.7 (7.6)	0.001	Time*Frequency of breakfast intake	0.85
Time*Frequency of breakfast intake	1 year by 1 time per a week	0.22 (1.22)	0.85	Age (years)	<0.0001
Age	1 year	15.5 (1.2)	<0.0001	Gender	0.07
Gender	Male vs. female	33.3 (18.6)	0.07		

The longitudinal brachial-ankle pulse wave velocity was analyzed with a linear mixed-effects model

55 using time, frequency of breakfast intake, their interaction, and age and gender at baseline as fixed
effects, and patient as a random effect.

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Supplementary Table S4. The relationships between longitudinal brachial-ankle pulse wave velocity adjusted for age and gender and shift worker status using a linear mixed-effects model

Regression coefficient				Global test	
Effect	Level	Estimate (Standard error)	P value	Effect	P value
Intercept		636.5 (64.6)	<0.001	Time (years)	<0.0001
Time (years)	1 year	23.5 (1.6)	<0.001	Frequency of breakfast intake	0.04
Shift worker status	Yes vs. no	64.9 (31.5)	0.04	Time* frequency of breakfast intake	0.46
Time*Shift worker status	1 year for yes	-3.78 (5.12)	0.46	Age (years)	<0.0001
Age (years)	1 year	15.1 (1.1)	<.0001	Gender	0.02
Gender	Male vs. female	42.3 (18.7)	0.02		

80 The longitudinal brachial-ankle pulse wave velocity was analyzed using a linear mixed-effects model including time, shift worker status, their interaction, and age and gender at baseline as fixed effects, and patient as a random effect.

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Supplementary Table 5. The relationship between the frequency of breakfast intake and longitudinal brachial-ankle pulse wave velocity.

Variable	Comparison	Adjusted odd ratio (95% confidence interval)	P value
Intercept		123.5 (-364.9, 611.9)	0.62
Time	1 year	23.3 (20.2, 26.4)	<0.0001
Age	1 year	13.3 (10.9, 15.8)	<0.0001
Gender	Female vs. male	3.7 (-41.8, 49.3)	0.87
Morningness-Eveningness Questionnaire score	Neither type vs. evening type	17.2 (-26.2, 60.5)	0.44
	Morning type vs. evening type	15.5 (-44.2, 75.6)	0.61
Pittsburgh Sleep Quality Index score	Average vs. good	33.7 (-8.2, 75.6)	0.12
	Poor vs. good	42.7 (-21.5, 106.8)	0.19
Sleep duration (hours)	Intermediate vs. short	-1.03 (-51.0, 48.9)	0.97
	Long vs. short	-4.82 (-101.6, 91.9)	0.92
Beck Depression Inventory-II score	1 point	-1.61 (-4.01, 0.79)	0.19
Caloric intake	1 kcal/day	-0.02 (-0.05, 0.01)	0.20
Physical activity	METs·h/week	-0.11 (-0.34, 0.13)	0.36
Alcohol consumption	g/day	0.29 (-0.65, 1.23)	0.54
Current smoker	Former smoker vs. current smoker	-6.93 (-54.7, 40.8)	0.78
	Former smoker vs. never-smoker	-6.80 (-54.2, 40.5)	0.78
Frequency of breakfast intake	7 times vs. <4 times a week	-116.7 (-193.2, -40.8)	0.003
	≥4 and <7 times vs. <4 times a week	-106.7 (-199.7, -13.7)	0.02
Time of dinner	1 hour	-6.30 (-22.9, 10.3)	0.46
Excessive daytime sleepiness	Yes vs. no	-16.4 (-54.0, 21.2)	0.39
Shift worker status	Yes vs. no	39.3 (-17.1, 95.6)	0.17
Estimated duration of diabetes	1 year	3.56 (0.99, 6.14)	0.01
Body mass index	kg/m ²	-14.2 (-19.3, -9.0)	<0.0001
Systolic BP	mmHg	5.36 (4.09, 6.63)	<0.0001
HbA1c	mmol/mol	1.31 (-0.47, 3.09)	0.15
Total cholesterol	mg/dl	0.24 (-0.49, 0.98)	0.52
HDL cholesterol	mg/dl	-0.92 (-2.54, 0.71)	0.27
Triglyceride: log-transformed value	1 unit	55.6 (13.4, 97.8)	0.01
eGFR	ml/min/ 1.73 m ²	1.12 (0.00, 2.23)	0.05
Uric acid	mg/dl	25.8 (9.27, 42.3)	0.002
Diabetic retinopathy	Yes vs. no	21.3 (-15.7, 58.3)	0.26
Diabetic nephropathy	Macroalbuminuria vs. normoalbuminuria	25.8 (-20.2, 71.8)	0.27
	Microalbuminuria vs. normoalbuminuria	100.8 (4.95, 196.6)	0.04
Diabetic neuropathy	Yes vs. no	-25.9 (-65.3, 13.5)	0.20
Insulin therapy	Yes vs. no	2.97 (-56.8, 62.8)	0.92
Anti-hypertension drugs	Yes vs. no	-3.93 (-39.8, 32.0)	0.83
Anti-hyperlipidemia drugs	Yes vs. no	-26.4 (-61.2, 9.1)	0.15
Anti-platelet drugs	Yes vs. no	127.5 (33.7, 221.3)	0.01
Sleep apnea syndrome	Yes vs. no	1.87 (-97.4, 101.5)	0.97

100 Longitudinal brachial-ankle pulse wave velocity was analyzed with a linear mixed-effects model
using time, lifestyle habits, and possible atherosclerotic risk factors at baseline as fixed effects, and
patient as a random effect. Subjects were divided into three groups according to the frequency of
breakfast intake. BP: blood pressure, eGFR: estimated glomerular filtration rate, HDL-C: high-density
lipoprotein cholesterol.

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Supplementary Table 6. Changes in each parameter according to frequency of breakfast intake.

Variable		Frequency of breakfast intake at baseline			Est	P value
		<4 times a week (n=42)	≥4 and <7 times a week (n=52)	7 times a week (n=639)		
Body mass index (kg/m ²)	Baseline	26.6±4.6	25.9±5.0	24.4±3.9	-4.13	<0.001
	1 year	26.7±4.7	26.0±4.9	24.2±3.8	-4.70	<0.001
	2 year	26.7±4.3	25.5±4.7	24.1±3.8	-4.42	<0.001
	3 year	26.3±4.1	25.2±4.7	24.1±3.7	-4.00	<0.001
	4 year	26.6±4.1	25.2±4.7	23.9±3.6	-4.67	<0.001
	5 year	26.3±4.0	25.3±4.3	23.7±3.6	-4.67	<0.001
Systolic BP (mmHg)	Baseline	127±13	128±13	126±14	-0.72	0.47
	1 year	129±14	129±15	128±14	-0.50	0.62
	2 year	127±15	127±14	129±15	0.77	0.44
	3 year	130±14	128±12	129±14	-0.26	0.8
	4 year	128±14	131±13	130±15	0.29	0.77
	5 year	130±15	126±14	129±14	0.12	0.91
Diastolic BP (mmHg)	Baseline	80±11	79±12	77±10	-2.39	0.017
	1 year	80±10	80±11	79±11	-0.87	0.38
	2 year	80±12	79±10	79±11	-0.70	0.48
	3 year	81±9	78±10	78±10	-1.64	0.10
	4 year	80±10	79±12	79±10	-0.74	0.46
	5 year	80±9	77±10	78±10	-0.53	0.60
HbA1c (%)	Baseline	7.3±1.0	7.3±1.4	6.9±1.0	-3.14	0.002
	1 year	7.2±1.1	7.3±1.4	6.9±1.0	-2.27	0.023
	2 year	7.2±1.0	7.4±1.3	7.0±1.0	-2.19	0.029
	3 year	7.1±1.2	7.4±1.5	7.0±1.1	-1.61	0.11
	4 year	7.1±1.1	7.4±1.6	7.0±1.0	-1.83	0.068
	5 year	7.3±1.4	7.3±1.0	7.1±1.1	-1.61	0.11
HbA1c (mmol/mol)	Baseline	56.0±10.5	56.2±15.1	52.0±10.5	-3.14	0.002
	1 year	54.8±11.5	56.4±15.1	52.2±11.4	-2.27	0.023
	2 year	55.1±10.5	57.1±14.3	52.7±11.3	-2.19	0.029
	3 year	54.5±12.6	57.2±16.7	52.9±12.0	-1.61	0.11
	4 year	54.5±12.1	57.6±17.1	52.8±11.3	-1.83	0.068
	5 year	55.8±14.8	56.7±10.7	53.6±12.0	-1.61	0.11
Total cholesterol (mg/dl)	Baseline	185±22	187±32	185±28	-0.27	0.79
	1 year	183±29	190±34	185±27	-0.27	0.78
	2 year	180±22	186±31	185±29	0.75	0.45
	3 year	183±32	191±33	188±30	0.66	0.51
	4 year	176±21	187±35	185±28	1.41	0.16
	5 year	179±29	179±34	185±31	1.34	0.18
HDL cholesterol (mg/dl)	Baseline	55±11	59±14	59±14	1.82	0.069
	1 year	52±10	58±12	58±14	2.23	0.026
	2 year	54±12	58±15	60±15	2.56	0.011
	3 year	54±11	59±15	61±15	2.66	0.008
	4 year	53±11	57±13	60±15	3.01	0.003
	5 year	54±11	58±12	60±15	2.32	0.02
Triglyceride: log-transformed value (actual value, median (interquartile range): mg/dl)	Baseline	4.80±0.48 (131 (96, 164))	4.76±0.52 (119 (84, 163))	4.64±0.56 (99 (69, 149))	-2.29	0.022
	1 year	4.79±0.50	4.78±0.58	4.61±0.55	-2.77	0.006
	2 year	4.80±0.35	4.74±0.66	4.59±0.54	-2.77	0.006
	3 year	4.82±0.44	4.82±0.57	4.67±0.58	-2.17	0.03
	4 year	4.71±0.54	4.86±0.57	4.63±0.55	-1.86	0.064

eGFR (ml/min/ 1.73 m ²)	5 year	4.87±0.54	4.70±0.48	4.63±0.57	-2.44	0.015
	Baseline	80±19	81±16	78±18	-1.22	0.22
	1 year	76±20	77±16	74±17	-1.12	0.26
	2 year	74±21	74±18	73±18	-0.22	0.83
	3 year	73±22	71±16	71±18	-0.65	0.52
	4 year	72±24	71±19	69±18	-1.03	0.3
Uric acid (mg/dl)	5 year	70±22	69±20	68±18	-0.57	0.57
	Baseline	6.0±1.0	5.7±1.4	5.5±1.2	-3.04	0.002
	1 year	6.0±1.3	5.6±1.1	5.4±1.2	-2.80	0.005
	2 year	5.8±1.2	5.6±1.1	5.5±1.3	-1.74	0.083
	3 year	5.8±1.2	5.5±1.3	5.4±1.3	-1.83	0.068
	4 year	5.8±1.0	5.7±1.3	5.4±1.3	-1.89	0.059
UAE: log-transformed value ((actual value, median (interquartile range): mg/g creatinine)	5 year	6.0±1.3	5.6±1.3	5.4±1.2	-2.55	0.011
	Baseline	2.88±1.40 (12.1 (6.2, 35.1))	2.88±1.55 (10.6 (6.2, 42.4))	2.60±1.28 (10.0 (5.6, 22.2))	-1.79	0.028
	1 year	2.76±1.52	2.90±1.68	2.58±1.42	-1.33	0.1
	2 year	2.78±1.37	2.79±1.42	2.61±1.38	-1.02	0.18
	3 year	2.72±1.42	3.05±1.69	2.62±1.47	-1.17	0.14
	4 year	2.33±1.58	3.00±1.67	2.61±1.40	0.17	0.73
	5 year	2.61±1.50	2.69±1.58	2.64±1.45	-0.004	0.6

130 Data are mean±SD or median (interquartile range). Est is a regression coefficient for linear trends across quintiles and is based on linear regression analysis for continuous variables or logistic regression analysis for categorical variables. BP: blood pressure, eGFR: estimated glomerular filtration rate, HDL-C: high-density lipoprotein cholesterol, UAE, urinary albumin excretion.

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