



Riunione Annuale Congiunta

SID-AMD



Napoli

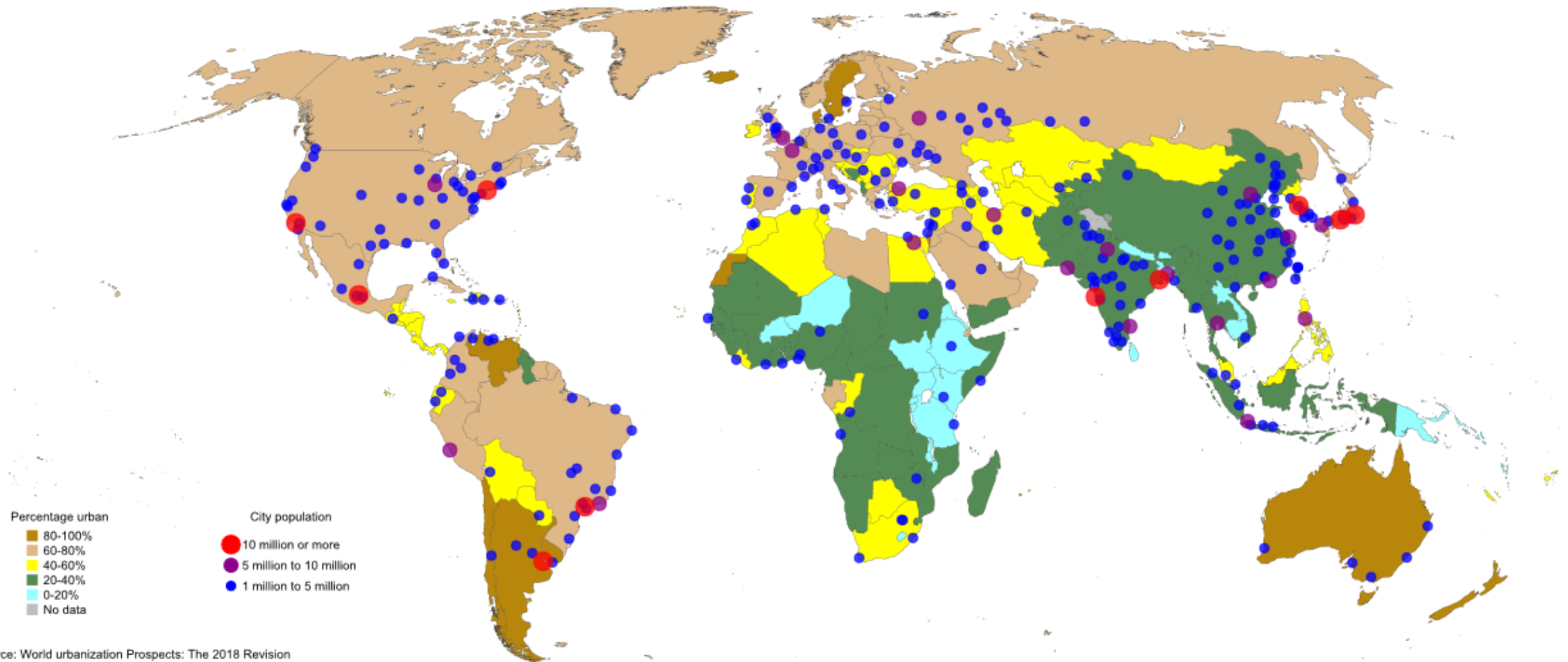
05 ottobre 2024
Hotel Royal Continental

Ritmo, Obesità e Diabete

Prof. Annamaria Colao

The percentage of people living in large cities has increased dramatically in recent decades ...

1990



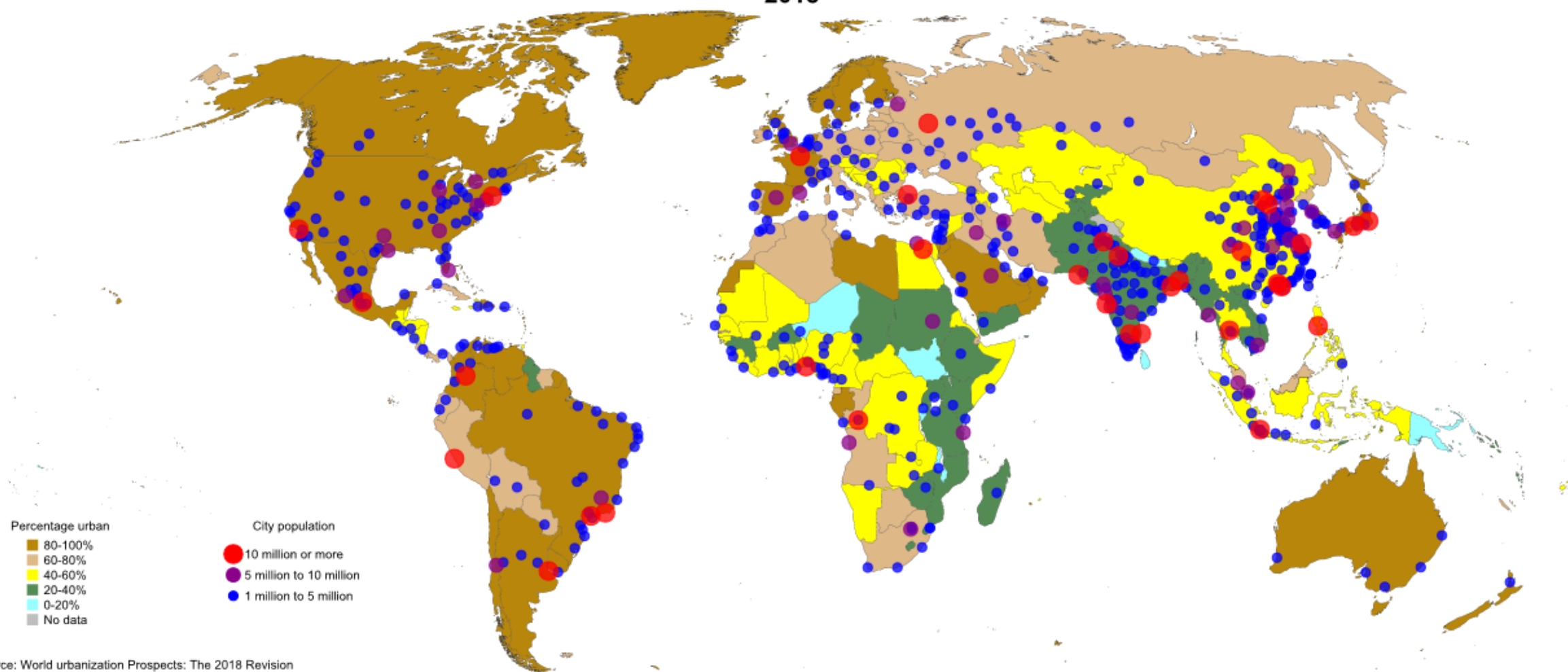
Data source: World urbanization Prospects: The 2018 Revision

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The percentage of people living in large cities has increased dramatically in recent decades ...

2018



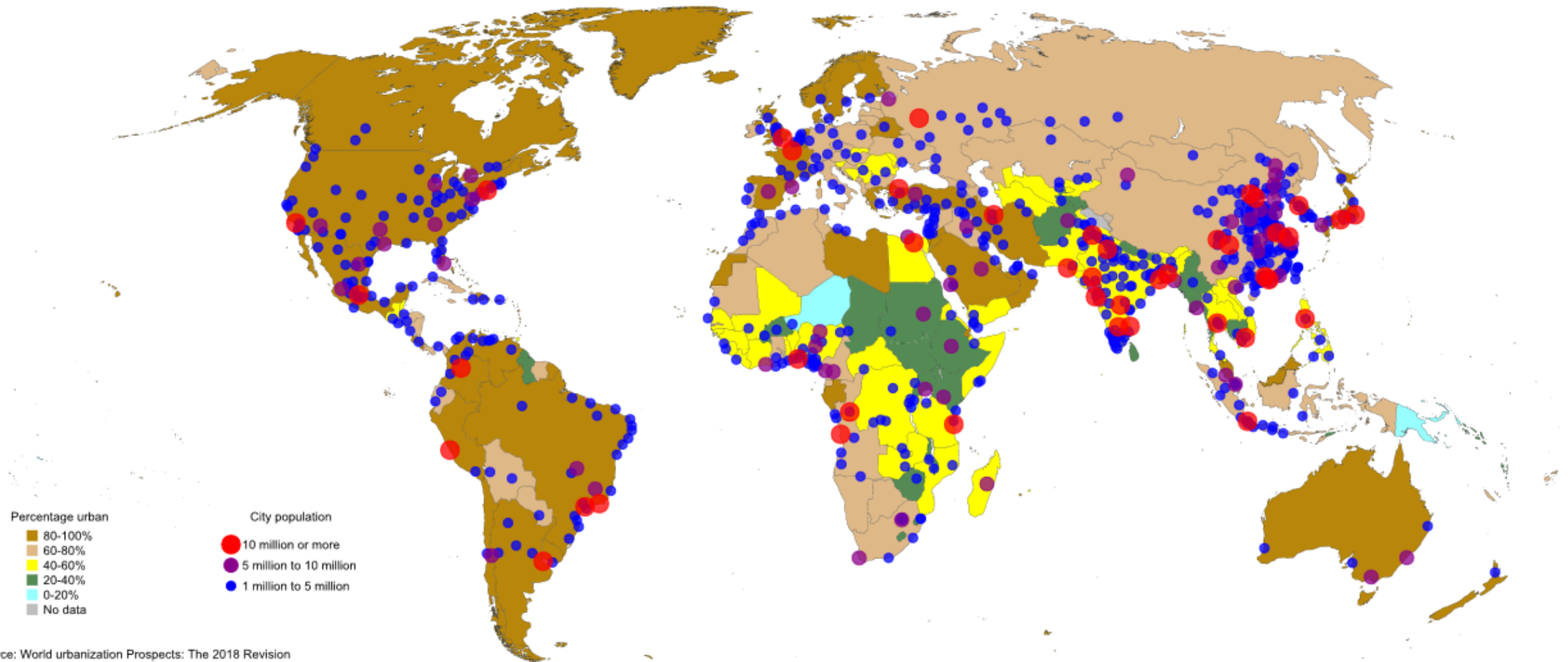
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...and is expected to increase further.

2030



Data source: World urbanization Prospects: The 2018 Revision

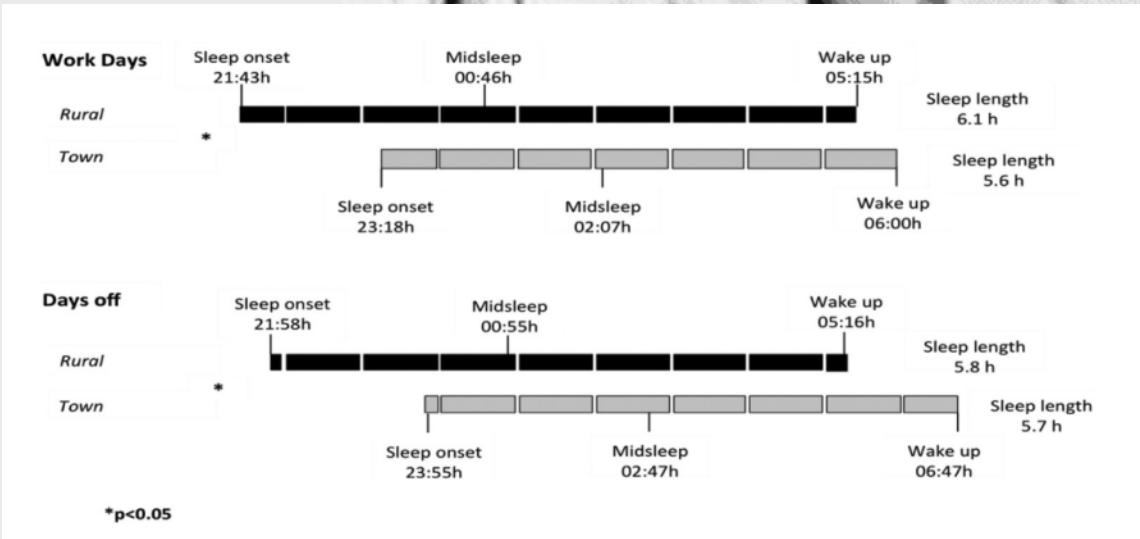
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> [Chronobiol Int.](#) 2020 Sep-Oct;37(9-10):1335-1343. doi: 10.1080/07420528.2020.1802287.
Epub 2020 Aug 11.

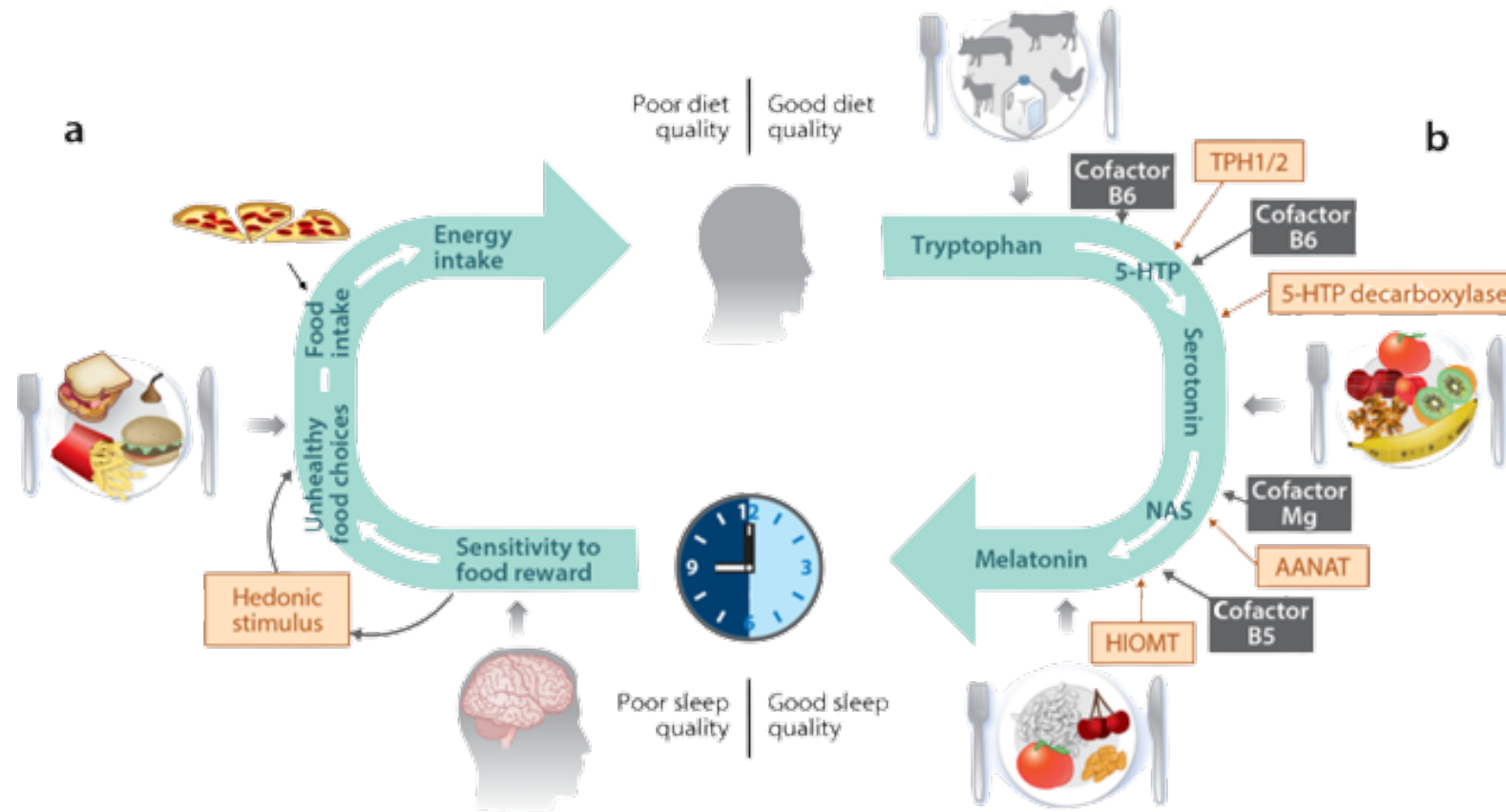
The effect of urbanization on sleep, sleep/wake routine, and metabolic health of residents in the Amazon region of Brazil

Andressa J Martins ¹, Cheryl M Isherwood ², Suleima P Vasconcelos ³, Arne Lowden ⁴,
Debra J Skene ², Claudia R C Moreno ^{1, 4}



The introduction of electric light also introduced shift work, including night work (24-hour economy).

Sleep and Diet: growing evidence of a cyclical relationship



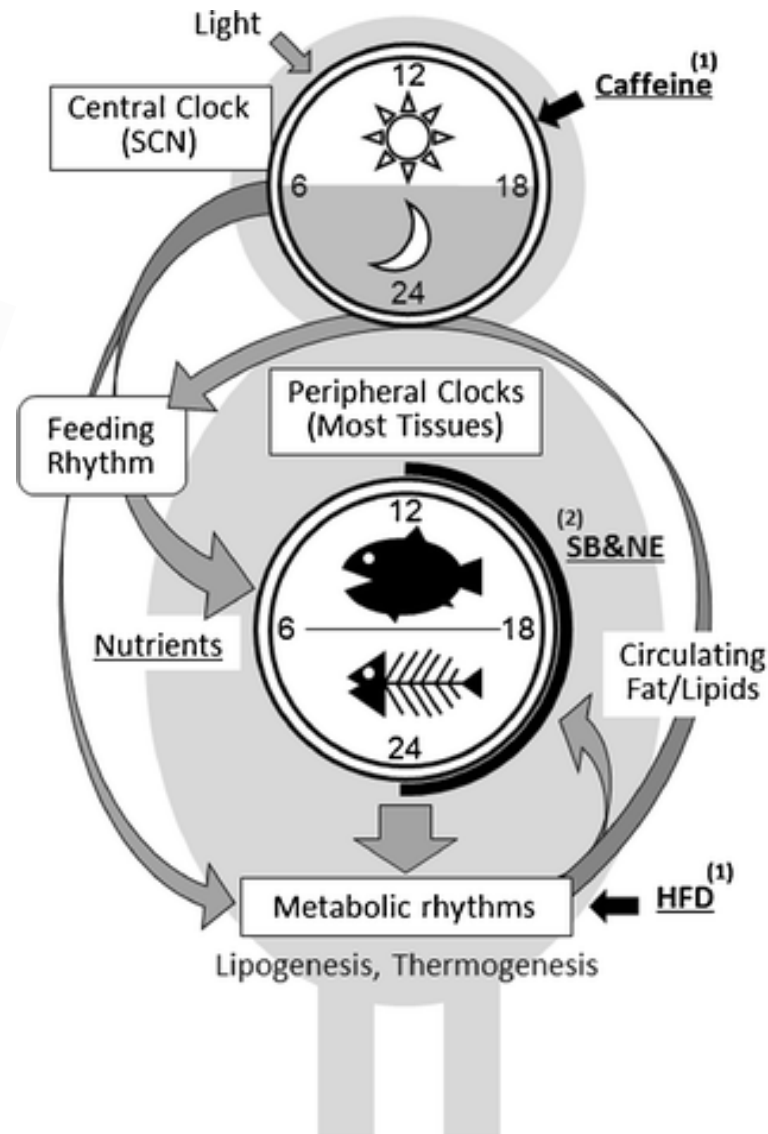
Chrononutrition

Chrononutrition' refers to the intake of food in coordination with the body's daily rhythms.

This concept reflects the basic idea that, in addition to the quantity and content of food, the **timing of ingestion** is also crucial to an organism's well-being.



Circadian clock system and chrononutrition



Chrono-nutrition

- (1) Clock regulation
ex. High-fat diet (HFD), Caffeine
- (2) Meal-time effects
ex. Skipping breakfast (SB)
Nocturnal eating (NE)

Regular/Time-restricted Feeding



Synchronization



Amplified rhythms



Healthy

Irregular/Unusual Feeding



Desynchronization



Attenuated rhythms



Metabolic disorders

Chronodisruption

CAUSES

Inputs

- Weak zeitgebers (low day-night contrast)
- Conflicting zeitgebers (light at night, nocturnal feeding)
- Zeitgeber shift (shift work, jet-lag)

Oscillators

- Uncoupling SCN oscillators
- Uncoupling SCN peripheral oscillators
- Clock gene alterations

Outputs

- Melatonin
- Cortisol

CONSEQUENCES

**Obesity
Metabolic
syndrome**

Cancer
Sleep disorders
Cardiovascular
diseases
Mood disorders
Cognitive
impairment
Premature aging

Chronodisruption is a major disturbance of the internal temporal order of physiological, biochemical and behavioural circadian rhythms.

High Caloric Intake at Breakfast vs. Dinner Differentially Influences Weight Loss of Overweight and Obese Women

Daniela Jakubowicz,¹ Maayan Barnea,² Julio Wainstein¹ and Oren Froy²



V
S



Objective: Few studies examined the association between time-of-day of nutrient intake and the metabolic syndrome. Our goal was to compare a weight loss diet with high caloric intake during breakfast to an isocaloric diet with high caloric intake at dinner.

Design and Methods: Overweight and obese women (BMI 32.4 ± 1.8 kg/m²) with metabolic syndrome were randomized into two isocaloric (~ 1400 kcal) weight loss groups, a breakfast (BF) (700 kcal breakfast, 500 kcal lunch, 200 kcal dinner) or a dinner (D) group (200 kcal breakfast, 500 kcal lunch, 700 kcal dinner) for 12 weeks.

Results: The BF group showed greater weight loss and waist circumference reduction. Although fasting glucose, insulin, and ghrelin were reduced in both groups, fasting glucose, insulin, and HOMA-IR decreased significantly to a greater extent in the BF group. Mean triglyceride levels decreased by 33.6% in the BF group, but increased by 14.6% in the D group. Oral glucose tolerance test led to a greater decrease of glucose and insulin in the BF group. In response to meal challenges, the overall daily glucose, insulin, ghrelin, and mean hunger scores were significantly lower, whereas mean satiety scores were significantly higher in the BF group.

Conclusions: High-calorie breakfast with reduced intake at dinner is beneficial and might be a useful alternative for the management of obesity and metabolic syndrome.

High Caloric Intake at Breakfast vs. Dinner Differentially Influences Weight Loss of Overweight and Obese Women

Daniela Jakubowicz,¹ Maayan Barnea,² Julio Wainstein¹ and Oren Froy²

TABLE 2 Participants anthropometric and blood measurements

TREATMENT	Week 0		Week 12		Change %	
	BF group	D group	BF group	D group	BF group	D group
N	46	47	38	36		
Age (yr)	45.1±1.1	46.5±1	45.6±1.2	46.2±1.2	NS	NS
Anthropometric measurements						
Height (cm)	163.6±0.5	164.5±0.5	163.4±0.6	164.4±0.6	NS	NS
Weight (kg)	86.5±0.7 ^{ab}	87.1±0.7 ^a	77.8±0.7 ^c	83.5±0.8 ^b	-11%	-4%
BMI (kg/m ²)	32.3±0.2 ^a	32.2±0.2 ^a	29.2±0.2 ^c	30.9±0.2 ^b	-10%	-5%
Waist circumference (cm)	110.1±0.40	111.2±0.41	101.4±0.43	107.6±0.51	-7.9%	-3.2
Blood pressure						
Systolic (mmHg)	133.9±0.6 ^a	132.1±0.7 ^a	125.1±0.7 ^b	127.6±0.7 ^b	-6.5%	-3.4%
Diastolic (mmHg)	88.4±0.5 ^a	87.3±0.4 ^a	82.4±0.5 ^b	84.1±0.4 ^b	-6.7%	-3.6%
Lipids						
Triglycerides (mg/dl)	179.7±2.6 ^b	178.1±3.6 ^b	119.4±2 ^c	204.1±3.7 ^a	-33.6%	+14.6%
Total cholesterol (mg/dl)	215.7±2.4 ^a	220.2±2.5 ^a	203.9±2.5 ^a	217.6±2.1 ^a	-5.40%	NS
LDL (mg/dl)	133.3±2.4	137.0±2.5	130.8±2.4	129.7±2.3	NS	NS
HDL (mg/dl)	46.5±0.6 ^b	47.6±0.7 ^{ab}	49.2±0.8 ^a	47.1±0.8 ^{ab}	5.8%	NS
Fasting glucose, insulin and ghrelin						
Glucose (mg/dl)	94.6±0.9 ^a	92.9±0.7 ^a	83.7±0.7 ^c	89±0.9 ^b	-11.5%	-4.2%
Insulin (μIU/ml)	20.2±0.4 ^a	18.6±0.5 ^b	9.9±0.2 ^d	13.2±0.2 ^c	-51%	-29%
Ghrelin (pg/ml)	569±6 ^a	565±6 ^a	518±7 ^b	537±10 ^b	-9%	-4.9%
Insulin sensitivity indices						
HOMA-IR	4.7±0.1 ^a	4.3±0.1 ^b	2.0±0.0 ^d	2.9±0.1 ^c	-57%	-32.5%
HOMA-B	239±8 ^a	229±8 ^a	180±7 ^b	190±7 ^b	-25%	-17%
ISI	2.33±0.03 ^c	2.49±0.04 ^c	6.13±0.09 ^a	3.90±0.06 ^b	+163%	+56%

Different letters denote significant difference; BF, breakfast; D, dinner, NS, nonsignificant

Results

Weight loss, fasting blood glucose, insulin and HOMA-IR decreased significantly more in the 'breakfast' group. Mean triglyceride levels decreased by 33.6% in the breakfast group but increased by 14.6% in the dinner group.



➤ [Am J Clin Nutr.](#) 2020 Oct 6;113(1):154-161. doi: 10.1093/ajcn/nqaa264. Online ahead of print.

Late eating is associated with cardiometabolic risk traits, obesogenic behaviors, and impaired weight loss

Hassan S Dashti^{1 2 3}, Puri Gómez-Abellán⁴, Jingyi Qian^{5 6}, Alberto Esteban⁴, Eva Morales⁷, Frank A J L Scheer^{5 6}, Marta Garaulet^{4 5}

Background: There is a paucity of evidence regarding the role of food timing on cardiometabolic health and weight loss in adults.

Objectives: To determine whether late eating is cross-sectionally associated with obesity and cardiometabolic risk factors at baseline; and whether late eating is associated with weight loss rate and success following a weight loss intervention protocol. Also, to identify obesogenic behaviors and weight loss barriers associated with late eating.

Methods: Participants were recruited from a weight-loss program in Spain. Upon recruitment, the midpoint of meal intake was determined by calculating the midway point between breakfast and dinner times, and dietary composition was determined from diet recall. Population median for the midpoint of meal intake was used to stratify participants into early (before 14:54) and late (after 14:54) eaters. Cardiometabolic and satiety hormonal profiles were determined from fasting blood samples collected prior to intervention. Weekly weight loss and barriers were evaluated during the ~19-wk program. Linear and logistic regression models were used to assess differences between late and early eaters in cardiometabolic traits, satiety hormones, obesogenic behaviors, and weight loss, adjusted for age, sex, clinic site, year of recruitment, and baseline BMI.

Late eating is associated with cardiometabolic risk traits, obesogenic behaviors, and impaired weight loss

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TABLE 2 Cross-sectional associations between late eating and baseline adiposity traits, cardiometabolic traits, and satiety hormones in 3362 participants¹

Characteristic	Early eaters	Late eaters	Late versus early eaters	
			β^2 (95% CI)	<i>P</i> value
Adiposity traits				
BMI, kg/m ²	30.7 ± 5.3	31.4 ± 5.9	0.80 (0.44, 1.16)	<0.001
Body fat, %	36.4 ± 6.7	37.1 ± 6.9	0.47 (0.04, 0.80)	0.03
Waist circumference, cm	101.2 ± 14.8	102.3 ± 15.3	1.62 (0.73, 2.50)	<0.001
Cardiometabolic traits				
Fasting glucose, mg/dL	87.3 ± 15.5	87.1 ± 17.2	0.72 (−0.46, 1.90)	0.23
Fasting insulin, ³ mIU/L	7.3 ± 6.4	7.8 ± 7.0	0.03 (0.01, 0.05)	0.005
HOMA IR, ³	1.66 ± 1.71	1.75 ± 1.87	0.03 (0.01, 0.06)	0.003
Triglycerides, mg/dL	99.6 ± 52.7	103.1 ± 52.2	5.60 (1.67, 9.52)	0.005
Total cholesterol, mg/dL	193.5 ± 37.9	190.0 ± 35.7	−1.03 (−3.88, 1.83)	0.48
LDL-C, mg/dL	116.2 ± 32.6	113.6 ± 31.2	−1.40 (−3.90, 1.09)	0.27
HDL-C, mg/dL	57.7 ± 15.1	56.1 ± 14.6	−0.71 (−1.77, 0.35)	0.19
Systolic blood pressure, mmHg	117.1 ± 14.6	116.9 ± 14.8	0.002 (−0.10, 0.11)	0.97
Diastolic blood pressure, mmHg	72.8 ± 9.96	72.3 ± 10.3	−0.02 (−0.10, 0.04)	0.53
Satiety hormone				
Leptin, ^{3,4} ng/mL	18.1 ± 13.7	20.2 ± 14.1	0.06 (0.03, 0.10)	0.001
Ghrelin, ^{3,4} ng/mL	1084.0 ± 1033.9	1077.5 ± 1008.5	−0.02 (−0.06, 0.01)	0.23

¹ Values are mean ± SD.

² Data are presented as mean difference (95% CI) for late eaters compared with early eaters derived from linear regression models. Significant values are represented in bold. Models are adjusted for age, sex, clinic site, year of recruitment, and BMI (except for adiposity outcomes).

³ Trait log transformed in analytical model.

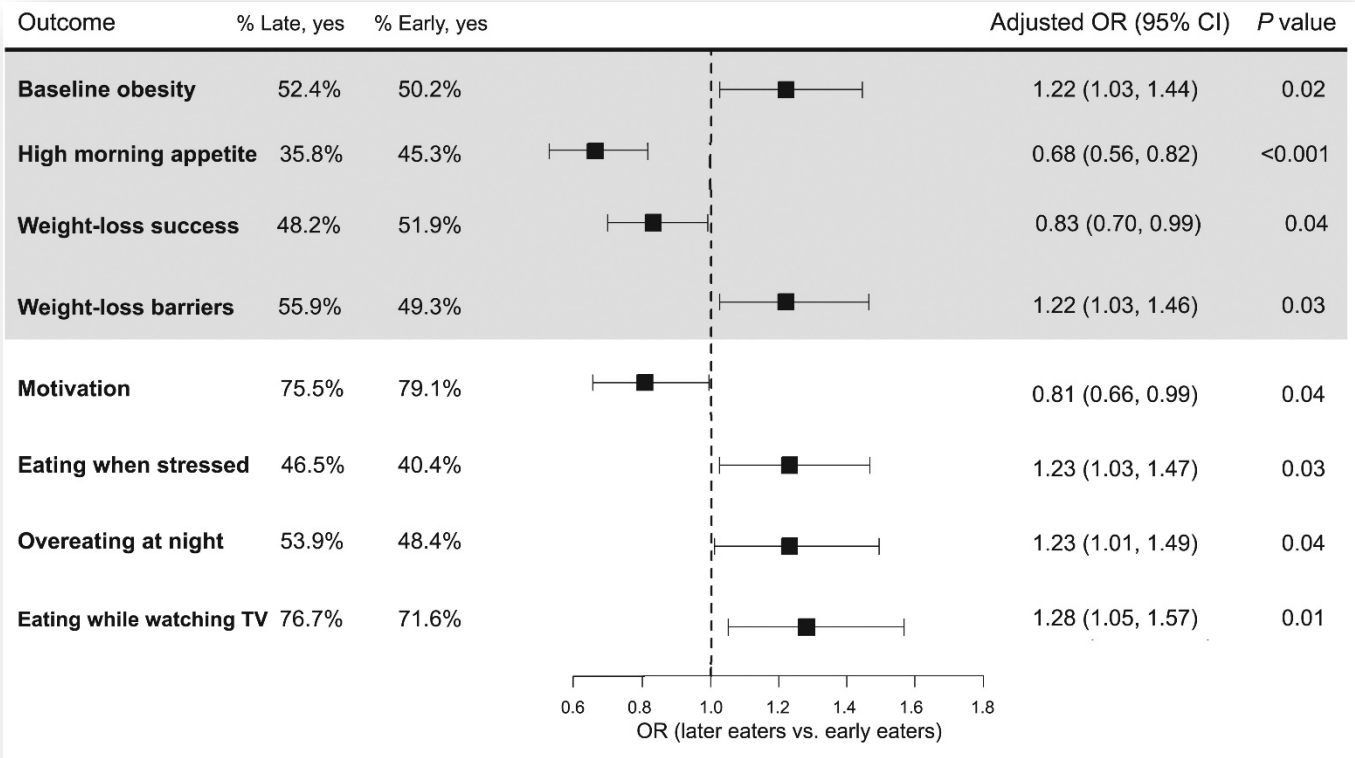
⁴ n = 685.

Results

Late eaters had a higher BMI, higher triglyceride concentrations and lower insulin sensitivity than early eaters before the intervention. In addition, late eaters had higher concentrations of the satiety hormone leptin in the morning.

Late eating is associated with cardiometabolic risk traits, obesogenic behaviors, and impaired weight loss

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Results

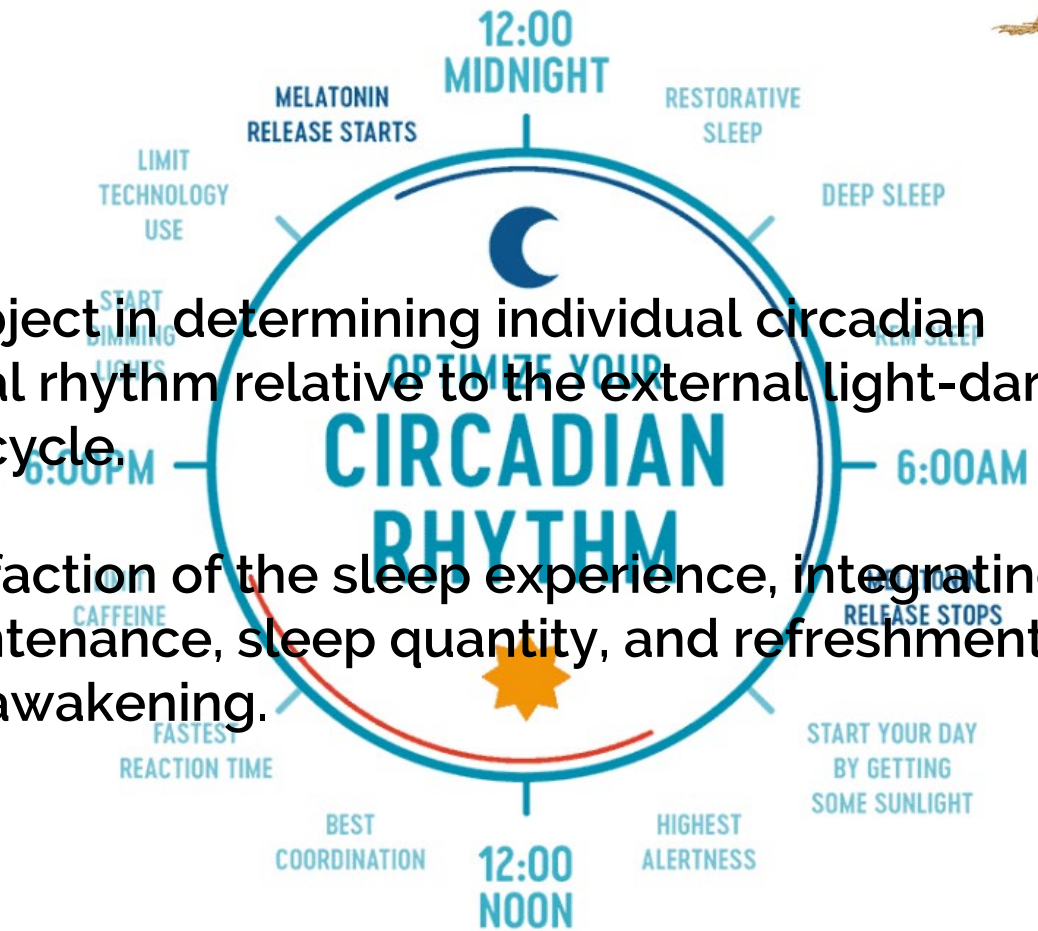
Late eaters had an average of 80 g lower weekly rate of weight loss, higher likelihood of having barriers to weight loss and lower likelihood of motivation for weight loss than early eaters.

Chronotype



- **Chronotype** is the attitude of a subject in determining individual circadian preference in behavioral and biological rhythm relative to the external light-dark cycle.

- **Sleep Quality** is defined as one's satisfaction of the sleep experience, integrating aspects of sleep initiation, sleep maintenance, sleep quantity, and refreshment upon awakening.



> [Nutrients](#). 2023 Mar 16;15(6):1427. doi: 10.3390/nu15061427.

Type 2 Diabetes: Also a "Clock Matter"?

Annamaria Docimo ¹, Ludovica Verde ², Luigi Barrea ³, Claudia Vetrani ³, Pasqualina Memoli ⁴, Giacomo Accardo ⁵, Caterina Colella ⁶, Gabriella Nosso ⁷, Marcello Orio ⁴, Andrea Renzullo ⁷, Silvia Savastano ¹, Annamaria Colao ^{1 8}, Giovanna Muscogiuri ^{1 8}

Background: We investigated whether chronotype is associated with glycemic control, antidiabetic treatment, and risk of developing complications in patients with type 2 diabetes (T2DM).

Methods: The diabetologists filled out an online questionnaire on the Google Form platform to collect the following parameters of subjects with T2DM: body mass index (BMI), fasting plasma glucose (FPG), glycosylated hemoglobin (HbA1c), diabetes history, antidiabetic treatment, diabetic complications, and chronotype categories.

Glycemic control in «owls» with T2DM

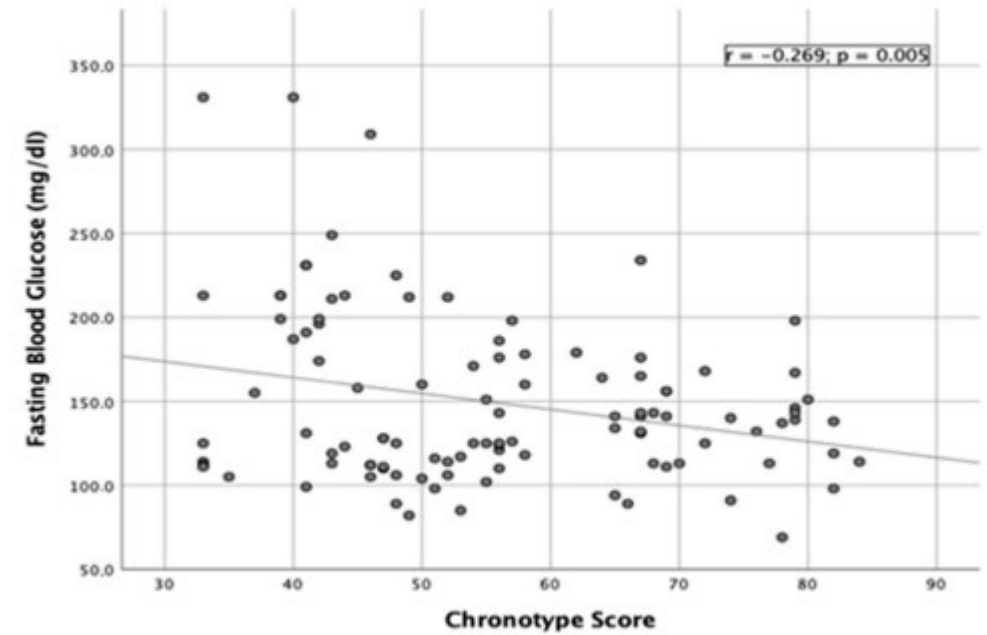
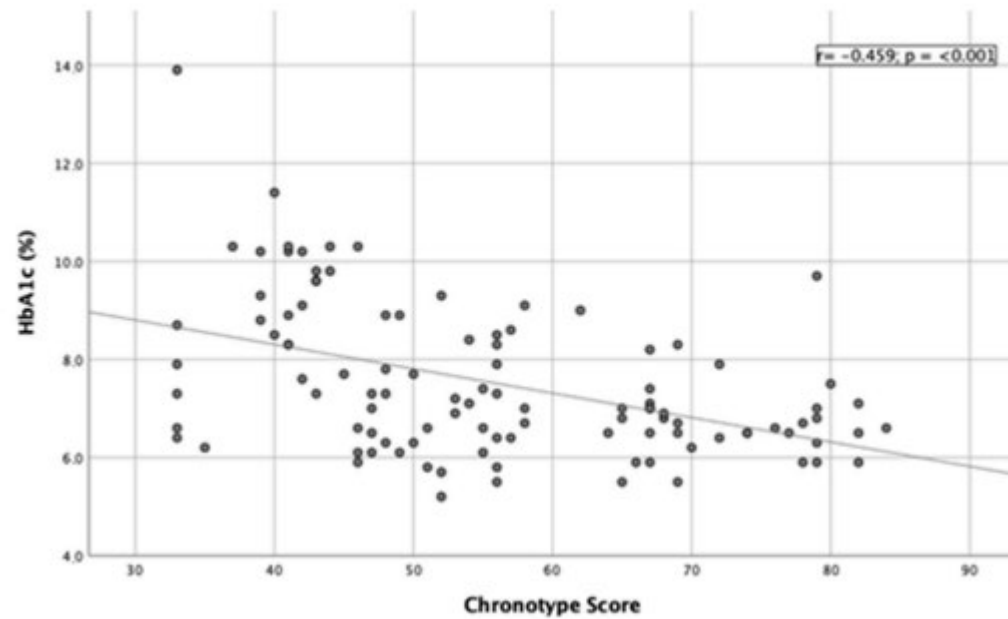
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106 subjects with T2DM

(M/F: 58/48; age: 63.3 ± 10.4 years; BMI: 28.8 ± 4.9 kg/m²)



An **inverse association** was found **between chronotype score, HbA1c** ($r = -0.459$; $p < 0.001$), and **FPG** ($r = -0.269$; $p = 0.05$), remaining significant also after adjustment for BMI, age, and disease duration.

Health impacts of sleep duration, quality, and timing

