



Pasta's Contribution to Reducing Obesity in a Clinical Setting.

Marta Garaulet Aza
Professor of Physiology
University of Murcia
Spain



Obesity

- **Multifactorial** disease
- Despite the many benefits associated with weight loss, the **success of dietetic treatment** is still being questioned
- Indeed, in the long run, professional and commercial programs are often considered **ineffective**



Type of Diet:

- High in proteins
- High in carbohydrates
- High in fat
- Etc.

1960s



Nutritional and Health

Weight loss

No differences

-5,1 Kg

12 weeks

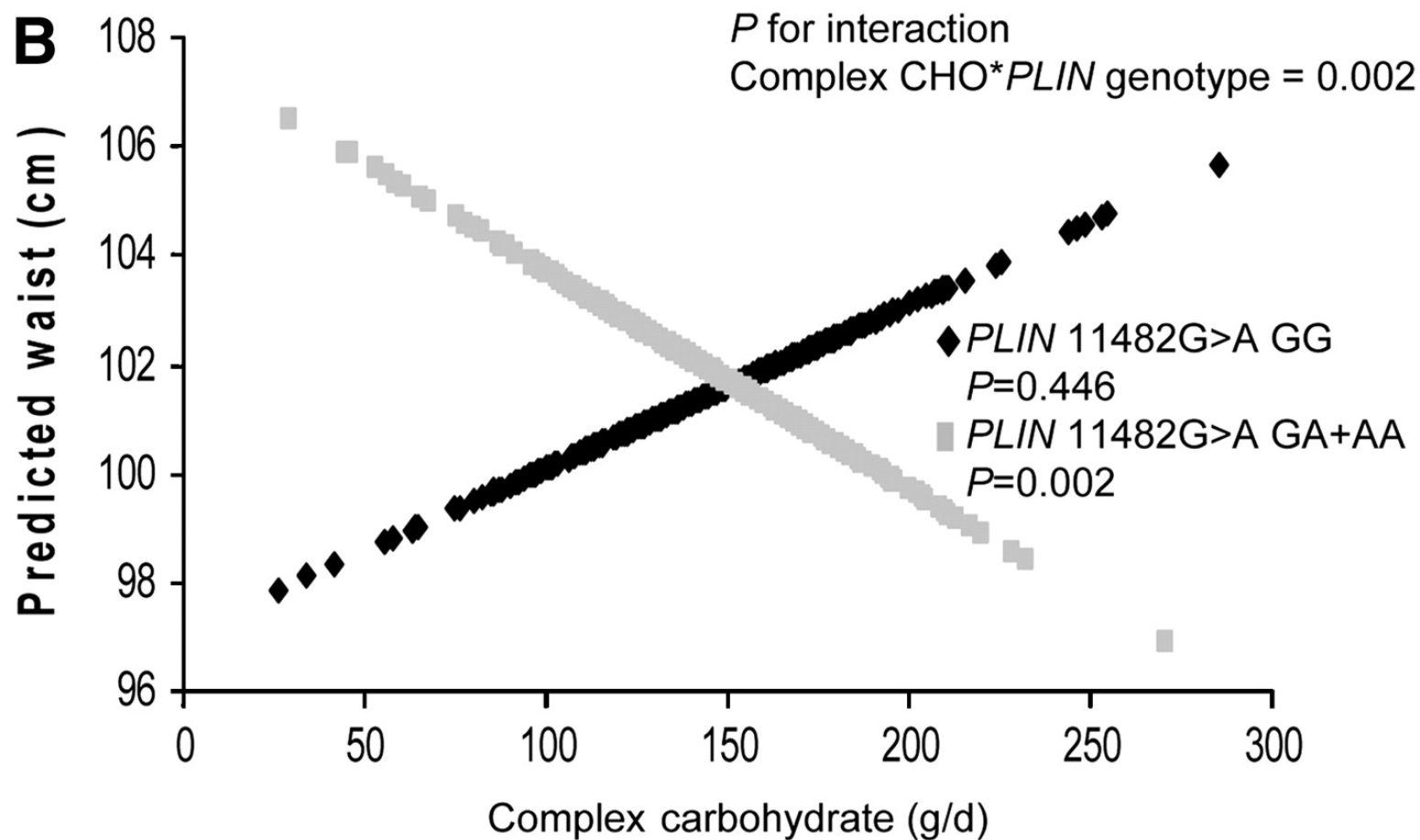
Landers *et al.*, 2002,
J Okla State Med Assoc


Ann Intern Med. 2010

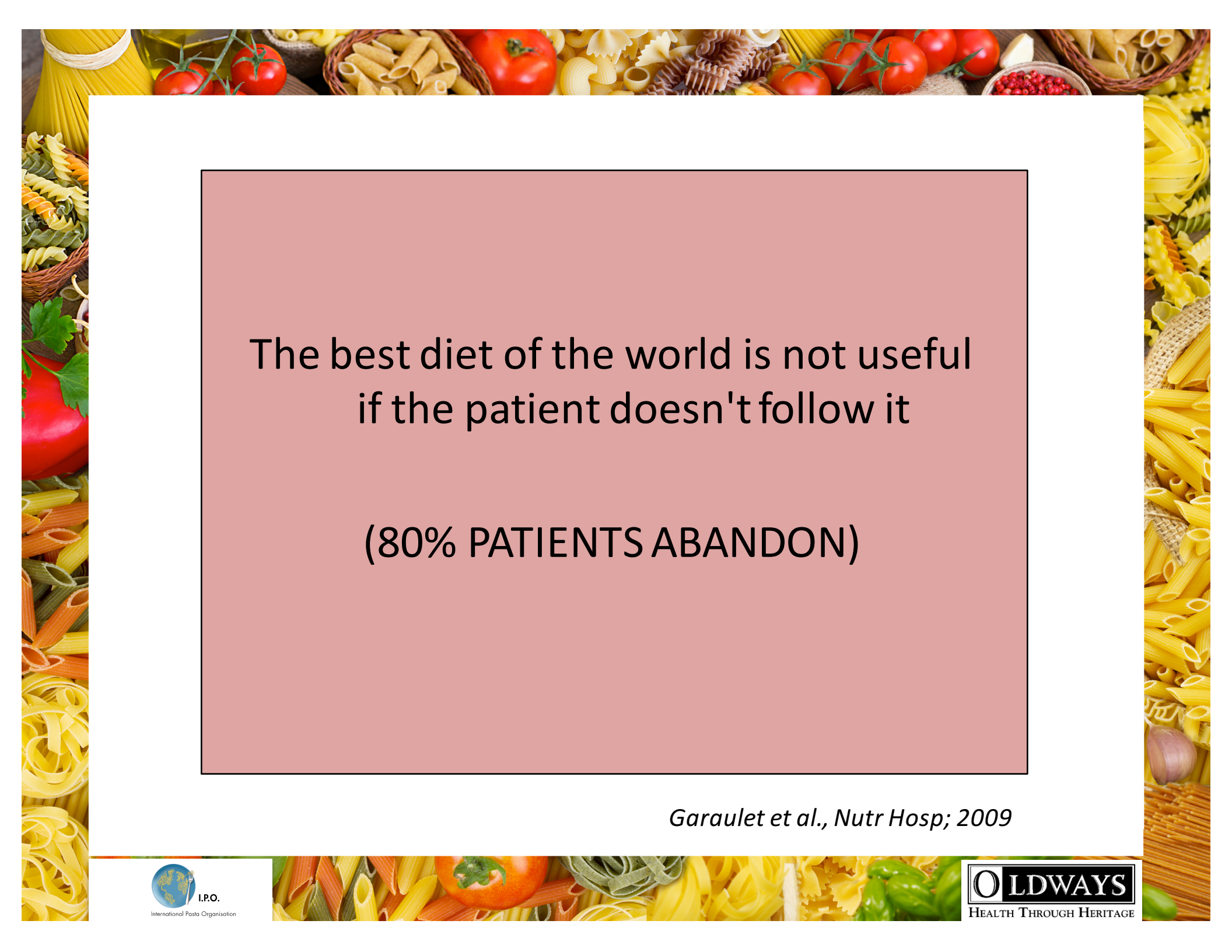
Perilipins

Obesity and Carbohydrates

Smith C, et al., J.Nutr.2008



- 
- The goal is to design a diet that may be followed our whole life
 - Macronutrient composition may not be decisive in weight loss effectiveness
 - There are inter-individual responses

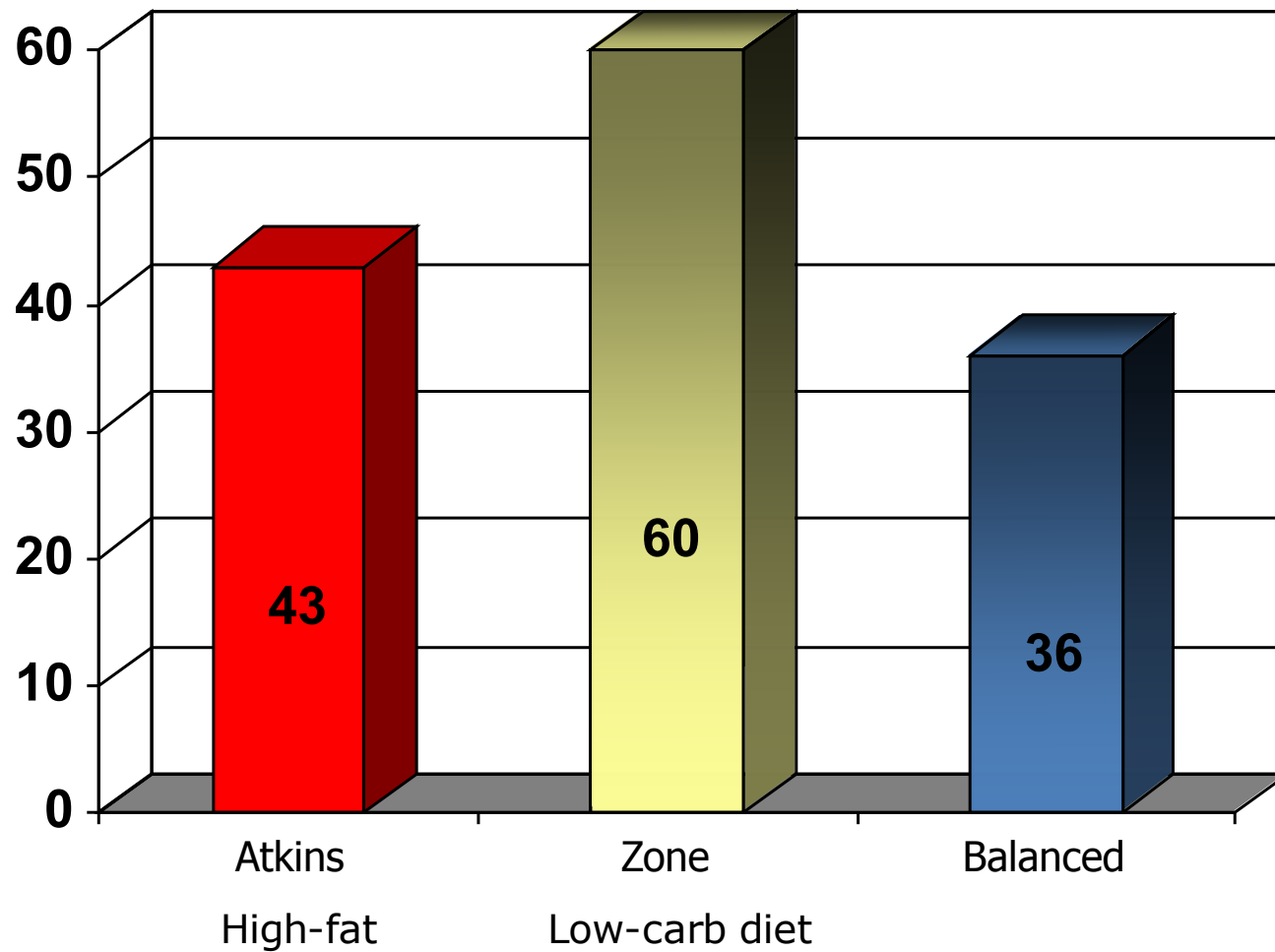


The best diet of the world is not useful
if the patient doesn't follow it

(80% PATIENTS ABANDON)

Garaulet et al., Nutr Hosp; 2009

Attrition (%)



Landers *et al.*, 2002, *J Okla State Med Assoc*

Specific Hunger for Carbohydrates



- Women, especially, are vulnerable to how carbohydrates affect their moods.
- **Women normally have one third less serotonin than men.** Diets that severely restrict carbohydrates will result in even lower serotonin levels.
- Women on high protein/very low carbohydrate diets are at greater risk for depression, seasonal affective disorder (SAD), carbohydrate crave/binge disorder and severe premenstrual syndrome.

Dr. Judith Wurtman from Massachusetts Institute of Technology (MIT)



Serotonin and Depression

Science. 1971. 174(13):1023-5.

Brain Serotonin Content: Increase Following Ingestion of Carbohydrate Diet.

John D. Fernstrom and Richard J. Wurtman

Laboratory of Neuroendocrine Regulation,
Department of Nutrition and Food Science,
Massachusetts Institute of Technology, Cambridge

In the rat, the injection of insulin or the consumption of **carbohydrate causes sequential increases in the concentrations of tryptophan in the plasma and the brain and of serotonin in the brain.**

Serotonin-containing neurons may thus participate in systems whereby the rat brain integrates information about the metabolic state in its relation to control of homeostasis and behavior.

Science 27 1972:178 (4059): 414 - 6

Brain Serotonin Content: Physiological Regulation by Plasma Neutral Amino Acids

John D. Fernstrom and Richard J. Wurtman

Laboratory of Neuroendocrine Regulation,
Department of Nutrition and Food Science,
Massachusetts Institute of Technology, Cambridge

When plasma tryptophan is elevated by the injection of tryptophan or insulin, or by the consumption of carbohydrates, brain tryptophan and serotonin also rise;

However, when even larger elevations of plasma tryptophan are produced by the ingestion of protein-containing diets, brain tryptophan and serotonin do not change. **The main determinant of brain tryptophan and serotonin concentrations does not appear to be plasma tryptophan alone, but the ratio of this amino acid to other plasma neutral amino acids.**

MEDITERRANEAN DIET: a good alternative

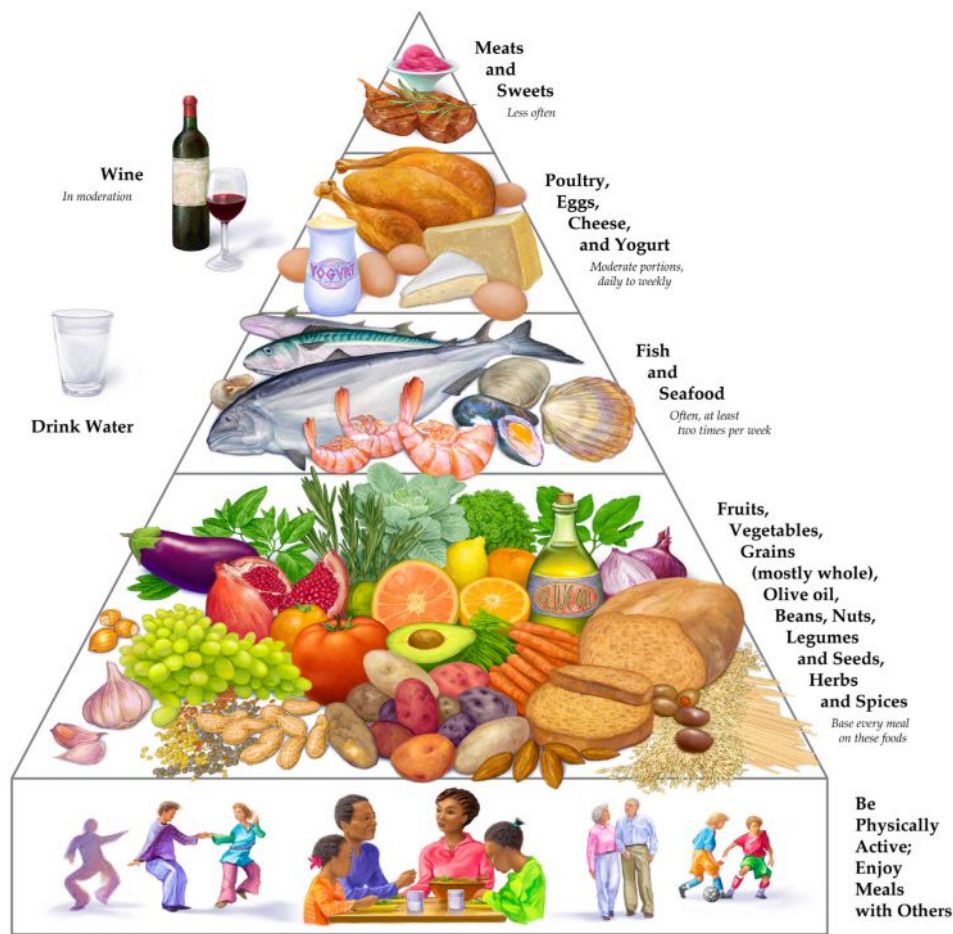


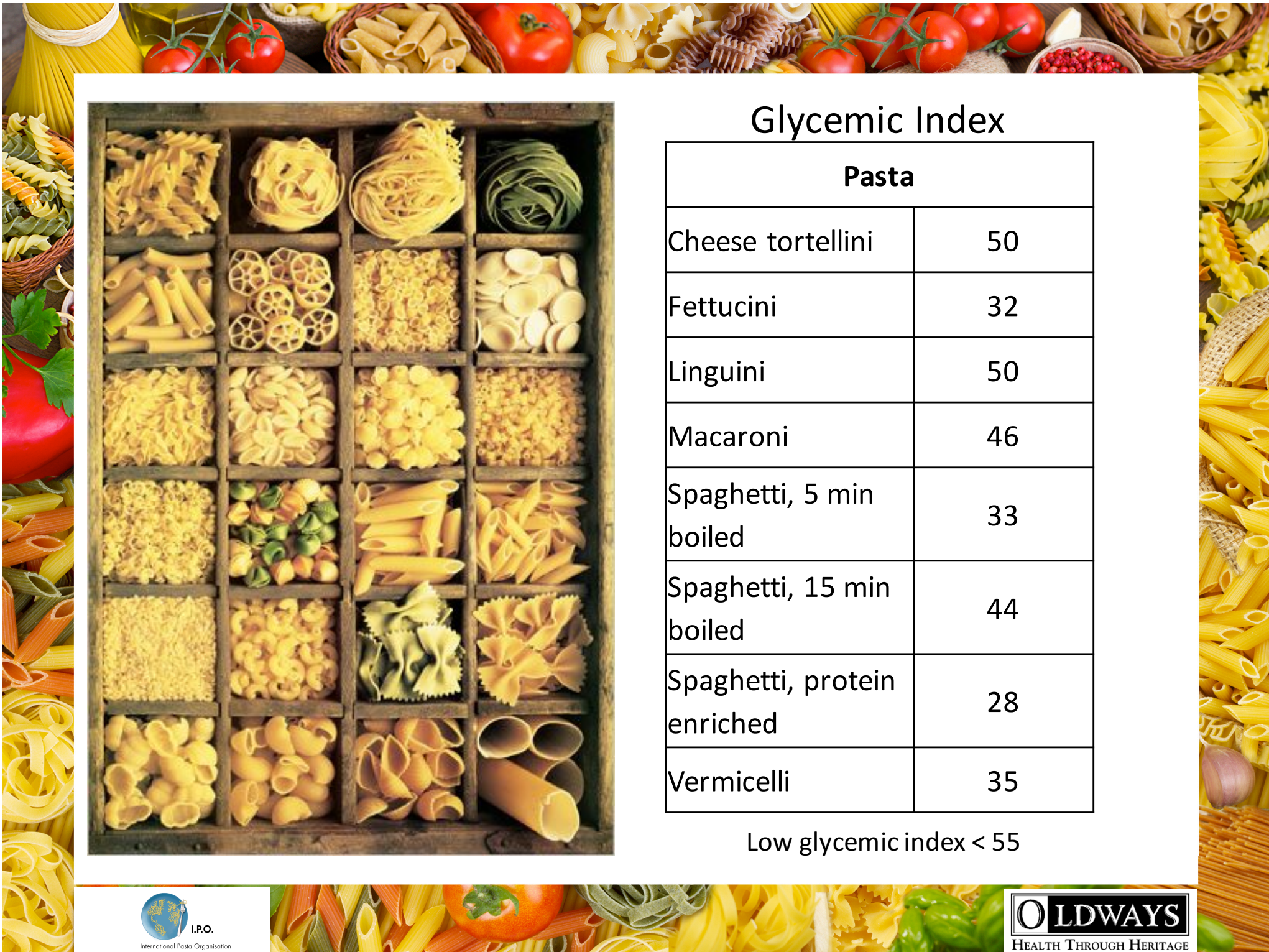
Illustration by George Middleton

© 2009 Oldways Preservation and Exchange Trust

www.oldwayspt.org

- New evidence points towards a possible role of the Mediterranean diet in **preventing** overweight/obesity
- Different Mediterranean-style diets have been shown as a safe strategy for the **treatment** of obesity
- A greater adherence to the Mediterranean diet has been associated with a **lower prevalence of abdominal obesity**
- Recently it has been proposed that the Mediterranean diet is particularly effective on **glycemic control**

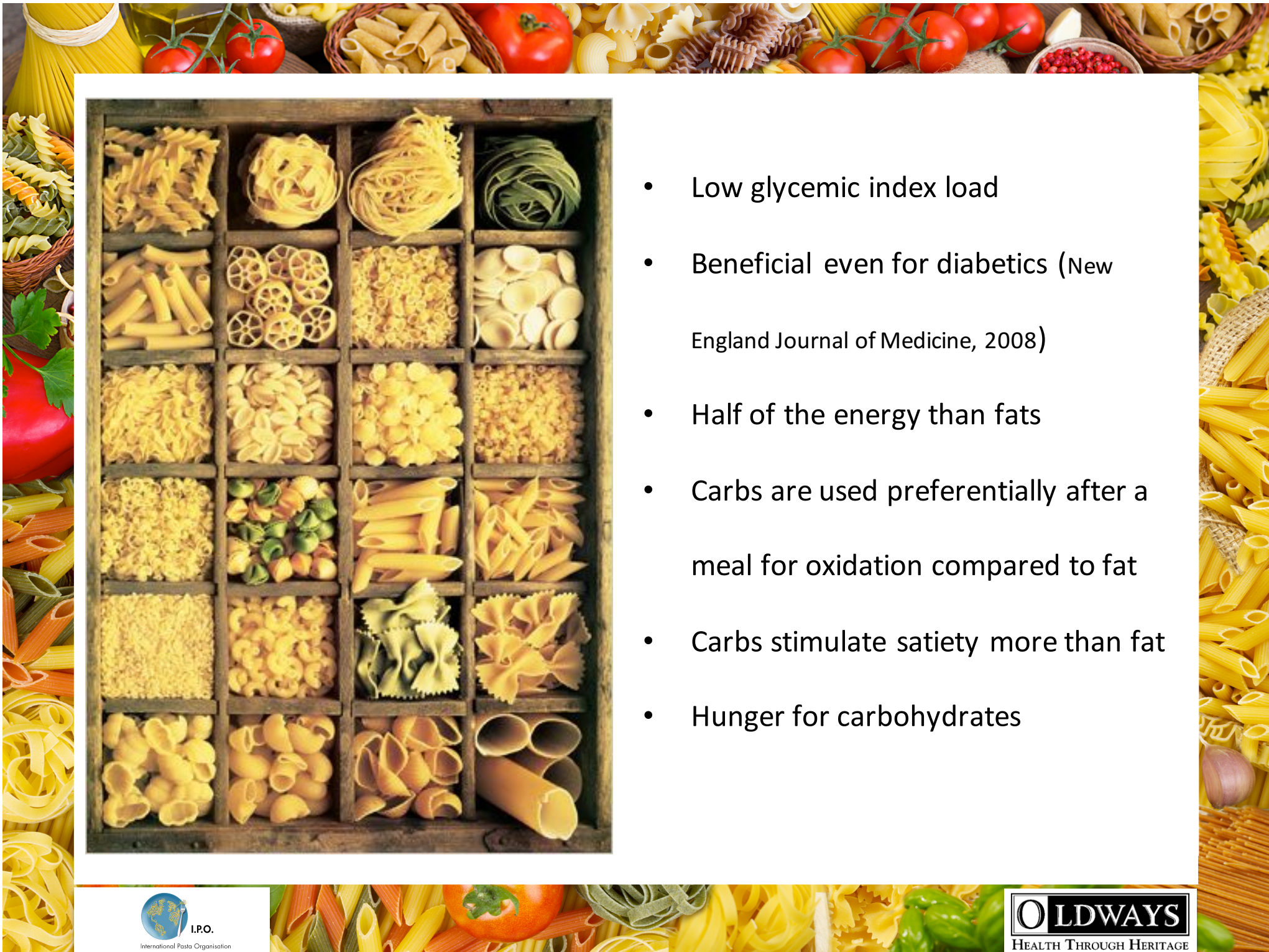
To avoid all these problems




Glycemic Index

Pasta	
Cheese tortellini	50
Fettucini	32
Linguini	50
Macaroni	46
Spaghetti, 5 min boiled	33
Spaghetti, 15 min boiled	44
Spaghetti, protein enriched	28
Vermicelli	35

Low glycemic index < 55



- Low glycemic index load
- Beneficial even for diabetics (New England Journal of Medicine, 2008)
- Half of the energy than fats
- Carbs are used preferentially after a meal for oxidation compared to fat
- Carbs stimulate satiety more than fat
- Hunger for carbohydrates



The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812

JULY 17, 2008

VOL. 359 NO. 3

Weight Loss with a Low-Carbohydrate, Mediterranean, or Low-Fat Diet

Iris Shai, R.D., Ph.D., Dan Schwarzfuchs, M.D., Yaakov Henkin, M.D., Danit R. Shahar, R.D., Ph.D.,

METHODS

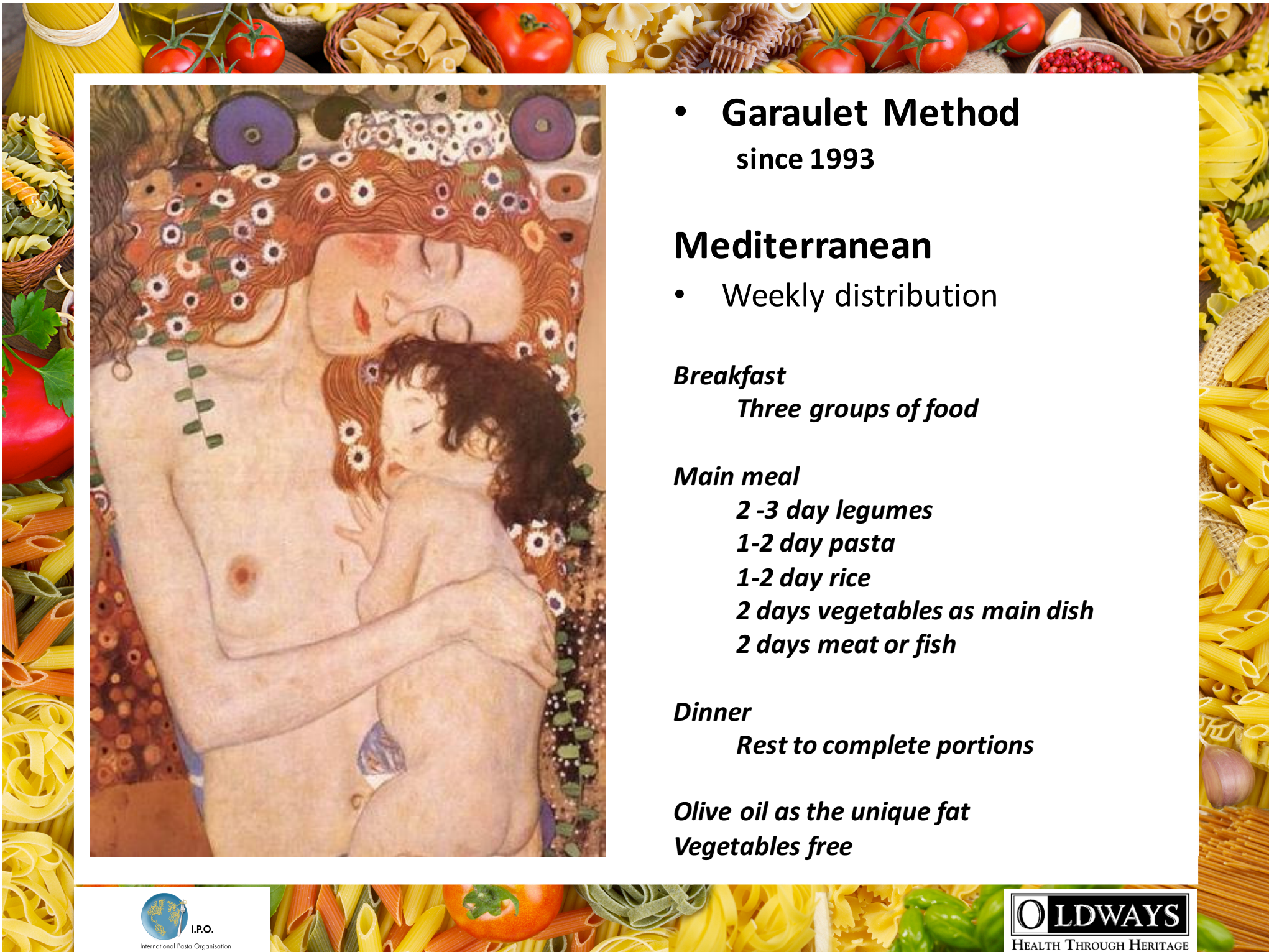
In this 2-year trial, we randomly assigned 322 moderately obese subjects (mean age, 52 years; mean body-mass index [the weight in kilograms divided by the square of the height in meters], 31; male sex, 86%) to one of three diets: low-fat, restricted-calorie; Mediterranean, restricted-calorie; or low-carbohydrate, non-restricted-calorie.

RESULTS

The rate of adherence to a study diet was 95.4% at 1 year and 84.6% at 2 years. The Mediterranean-diet group consumed the largest amounts of dietary fiber and had the highest ratio of monounsaturated to saturated fat ($P < 0.05$ for all comparisons among treatment groups). The low-carbohydrate group consumed the smallest amount of carbohydrates and the largest amounts of fat, protein, and cholesterol and had the highest percentage of participants with detectable urinary ketones ($P < 0.05$ for all comparisons among treatment groups). The mean weight loss was 2.9 kg for the low-fat group, 4.4 kg for the Mediterranean-diet group, and 4.7 kg for the low-carbohydrate group ($P < 0.001$ for the interaction between diet group and time); among the 272 participants who completed the intervention, the mean weight losses were 3.3 kg, 4.6 kg, and 5.5 kg, respectively. The relative reduction in the ratio of total cholesterol to high-density lipoprotein cholesterol was 20% in the low-carbohydrate group and 12% in the low-fat group ($P = 0.01$). Among the 36 subjects with diabetes, changes in fasting plasma glucose and insulin levels were more favorable among those assigned to the Mediterranean diet than among those assigned to the low-fat diet ($P < 0.001$ for the interaction among diabetes and Mediterranean diet and time with respect to fasting glucose levels).

CONCLUSIONS

Mediterranean and low-carbohydrate diets may be effective alternatives to low-fat diets. The more favorable effects on lipids (with the low-carbohydrate diet) and on glycemic control (with the Mediterranean diet) suggest that personal preferences and metabolic considerations might inform individualized tailoring of dietary interventions. (ClinicalTrials.gov number, NCT00160108.)



- **Garaulet Method**
since 1993

Mediterranean

- Weekly distribution

Breakfast

Three groups of food

Main meal

2 -3 day legumes

1-2 day pasta

1-2 day rice

2 days vegetables as main dish

2 days meat or fish

Dinner

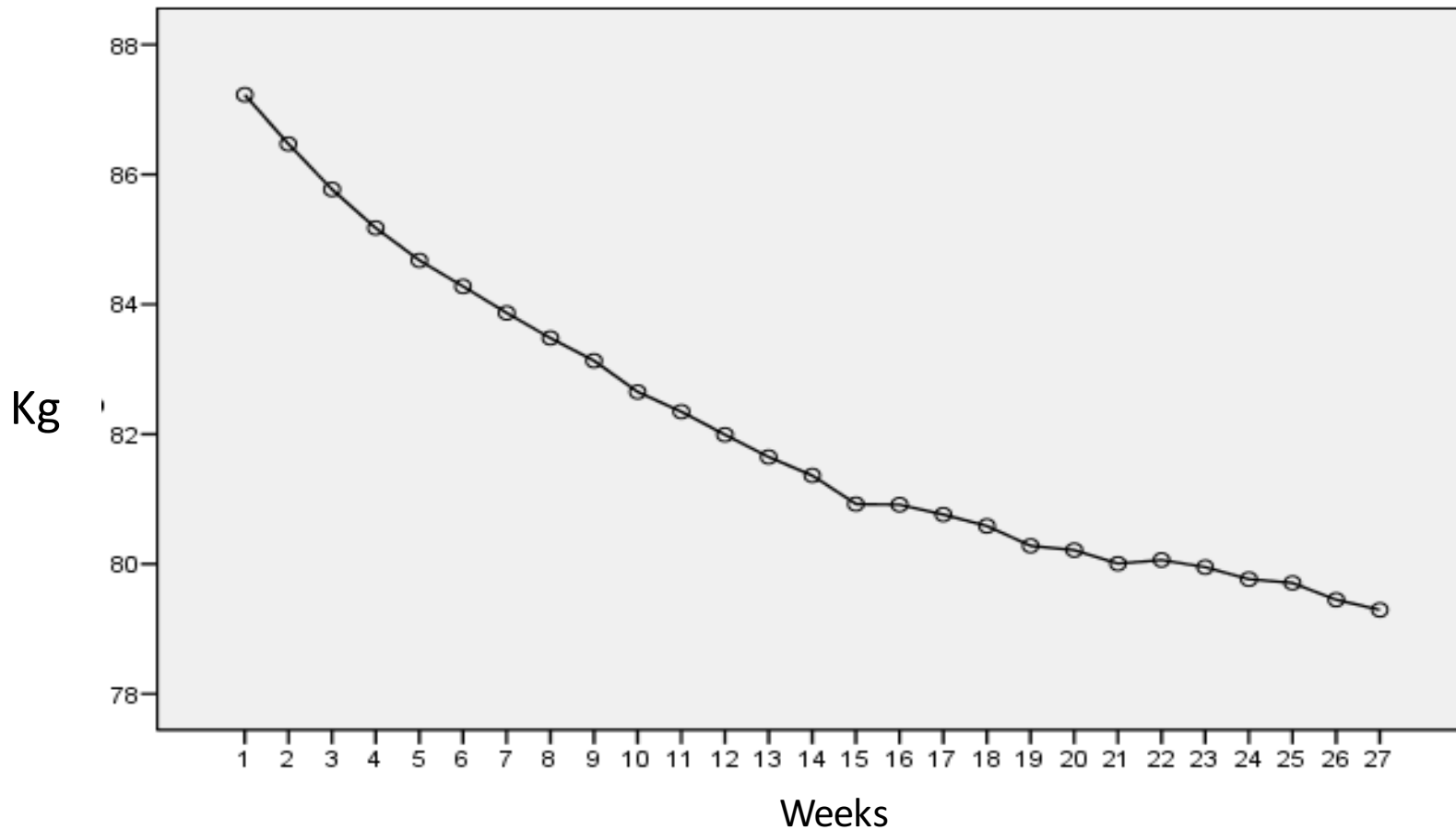
Rest to complete portions

Olive oil as the unique fat

Vegetables free

Weekly Weight Loss

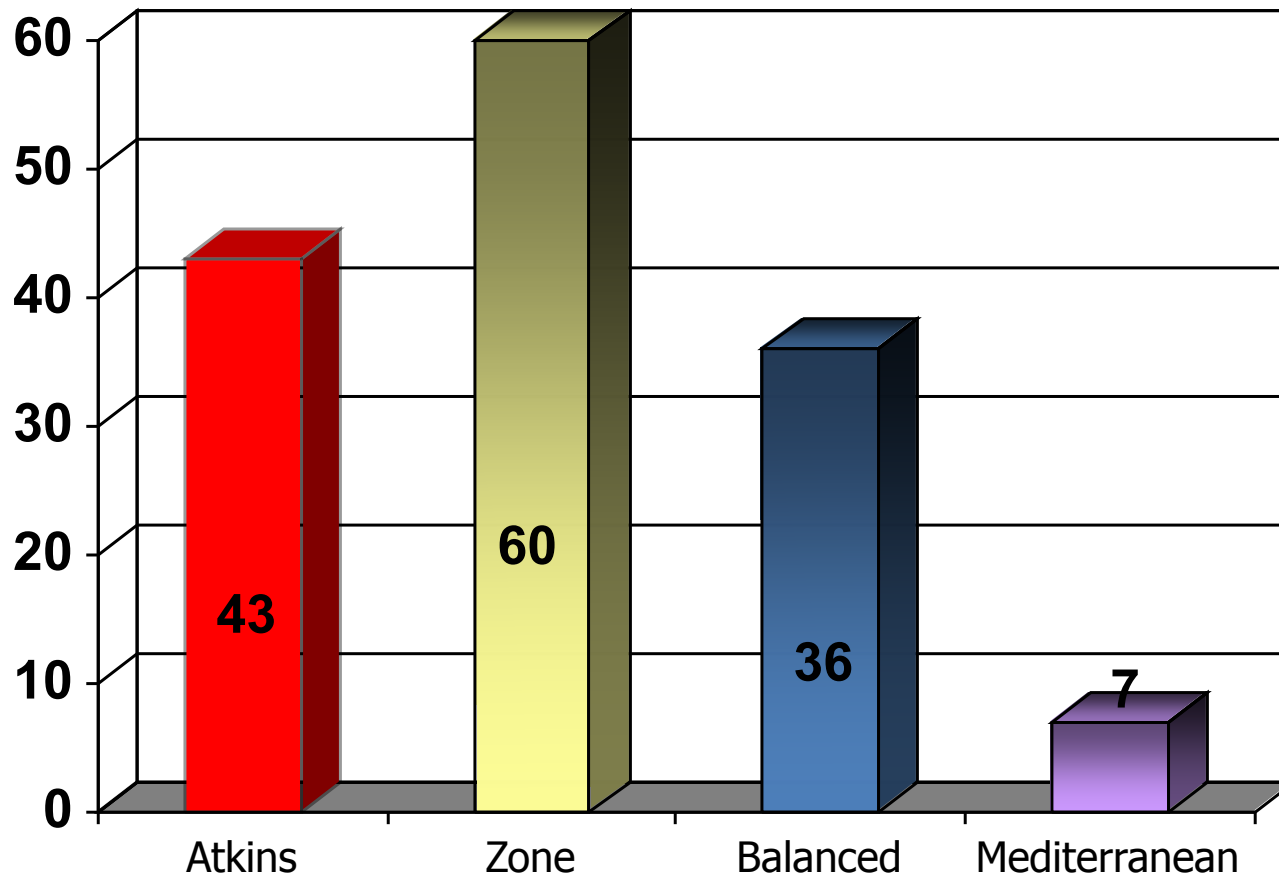
N= 1450



10% initial weight (9 kg) 650g per week

- ✓ Garaulet M et al., Journal of Human Nutrition and Dietetics, 1999,
- ✓ Corbalán-Tutau MD, Morales EM, Baraza JC, Canteras M, Garaulet M, Nutrition, 2009,

Attrition (%)



Corbalán-Tutau, et al (from Garaulet) 2009, Nutrition



PAPER

A randomized controlled trial of a moderate-fat, low-energy diet compared with a low fat, low-energy diet for weight loss in overweight adults

K McManus^{1*}, L Antinoro¹ and F Sacks^{2,3}

¹Department of Nutrition, Brigham and Women's Hospital and Harvard Medical School, Boston, Massachusetts, USA; ²Channing Laboratory, Department of Medicine, Brigham and Women's Hospital and Harvard Medical School, Boston, Massachusetts, USA; and ³Department of Nutrition, Harvard School of Public Health, Boston, Massachusetts, USA

CONTEXT: Long-term success in weight loss with dietary treatment has been elusive.

OBJECTIVE: To evaluate a diet moderate in fat based on the Mediterranean diet compared to a standard low-fat diet for weight loss when both were controlled for energy.

DESIGN: A randomized, prospective 18 month trial in a free-living population.

PATIENTS: A total of 101 overweight men and women (26.5–46 kg/m²).

INTERVENTION: (1) Moderate-fat diet (35% of energy); (2) low-fat diet (20% of energy).

MAIN OUTCOME MEASUREMENTS: Change in body weight.

RESULTS: After 18 months, 31/50 subjects in the moderate-fat group, and 30/51 in the low fat group were available for measurements. In the moderate-fat group, there were mean decreases in body weight of 4.1 kg, body mass index of 1.6 kg/m², and waist circumference of 6.9 cm, compared to increases in the low-fat group of 2.9 kg, 1.4 kg/m² and 2.6 cm, respectively; $P \leq 0.001$ between the groups. The difference in weight change between the groups was 7.0 kg. (95% CI 5.3, 8.7). Only 20% (10/51) of those in the low-fat group were actively participating in the weight loss program after 18 months compared to 54% (27/50) in the moderate-fat group, ($P < 0.002$). The moderate-fat diet group was continued for an additional year. The mean weight loss after 30 months compared to baseline was 3.5 kg ($n = 19$, $P = 0.03$).

CONCLUSIONS: A moderate-fat, Mediterranean-style diet, controlled in energy, offers an alternative to a low-fat diet with superior long-term participation and adherence, with consequent improvements in weight loss.

International Journal of Obesity (2001) 25, 1503–1511

Keywords: diets; weight reduction; unsaturated fat; low fat



The Good Results in Adherence

- **Mediterranean style diet approach**
 - Subjects find this diet tastier than the low-fat regimens tried before
 - Olive oil enhances the flavor of certain foods and may contribute to increasing vegetable intake
 - Pasta is also related to a higher intake of vegetables
 - Increase of legumes such as lentils, beans and chickpeas, improved the fiber intake, which increased satiety contributing to control of calorie intake



Timing of food intake is important

Glycemic Index

Grains	Glycemic Index
Whole grain barley	25
Wheat berries, farro	30
Fettucini	32
Spaghetti, whole wheat	42
Spaghetti, white	46
Brown rice, Bulgur	48
Quinoa	53
Oatmeal	55

Vegetables, Fruits, Nuts, Legumes	Glycemic Index
Hummus	6
Peanuts	7
Chickpeas	10
Lentils	29
Carrots	35
Orange	40
Peach	42
Green peas	51



The Mediterranean diet as a complex carbohydrate-rich diet





Food Timing and Obesity

ORIGINAL ARTICLE

Timing of food intake predicts weight loss effectiveness

This article has been corrected since online publication and a corrigendum is also printed in this issue

M Garaulet¹, P Gómez-Abellán¹, JJ Alburquerque-Béjar¹, Y-C Lee², JM Ordovás^{2,3,4} and FAJL Scheer^{5,6}

BACKGROUND: There is emerging literature demonstrating a relationship between the timing of feeding and weight regulation in animals. However, whether the timing of food intake influences the success of a weight-loss diet in humans is unknown.

OBJECTIVE: To evaluate the role of food timing in weight-loss effectiveness in a sample of 420 individuals who followed a 20-week weight-loss treatment.

METHODS: Participants (49.5% female subjects; age (mean \pm s.d.): 42 ± 11 years; BMI: $31.4 \pm 5.4 \text{ kg m}^{-2}$) were grouped in early eaters and late eaters, according to the timing of the main meal (lunch in this Mediterranean population). 51% of the subjects were early eaters and 49% were late eaters (lunch time before and after 1500 hours, respectively), energy intake and expenditure, appetite hormones, *CLOCK* genotype, sleep duration and chronotype were studied.

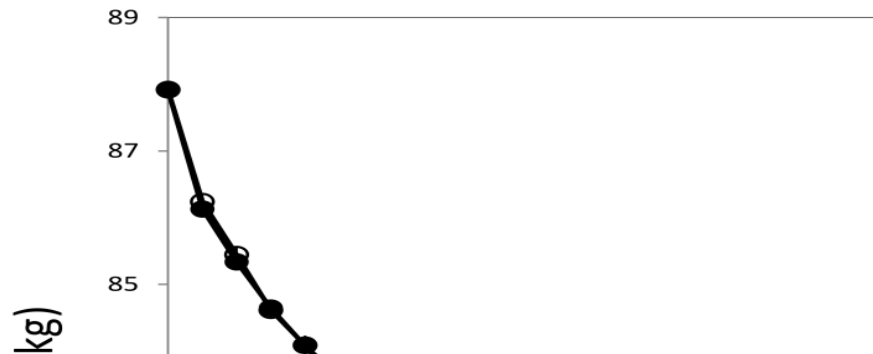
RESULTS: Late lunch eaters lost less weight and displayed a slower weight-loss rate during the 20 weeks of treatment than early eaters ($P = 0.002$). Surprisingly, energy intake, dietary composition, estimated energy expenditure, appetite hormones and sleep duration was similar between both groups. Nevertheless, late eaters were more evening types, had less energetic breakfasts and skipped breakfast more frequently than early eaters (all; $P < 0.05$). *CLOCK* rs4580704 single nucleotide polymorphism (SNP) associated with the timing of the main meal ($P = 0.015$) with a higher frequency of minor allele (C) carriers among the late eaters ($P = 0.041$). Neither sleep duration, nor *CLOCK* SNPs or morning/evening chronotype was independently associated with weight loss (all; $P > 0.05$).

CONCLUSIONS: Eating late may influence the success of weight-loss therapy. Novel therapeutic strategies should incorporate not only the caloric intake and macronutrient distribution—as is classically done—but also the timing of food.

International Journal of Obesity advance online publication, 29 January 2013; doi:10.1038/ijo.2012.229

Keywords: timing of food intake; weight loss; dietary treatment; circadian

Timing of food intake and weight loss



- Surprisingly, energy intake, dietary composition, estimated energy expenditure, appetite hormones and sleep duration was similar between both groups.



I have 700 Calories
for breakfast and
300 for dinner



I have 300 Calories
for breakfast and
700 for dinner

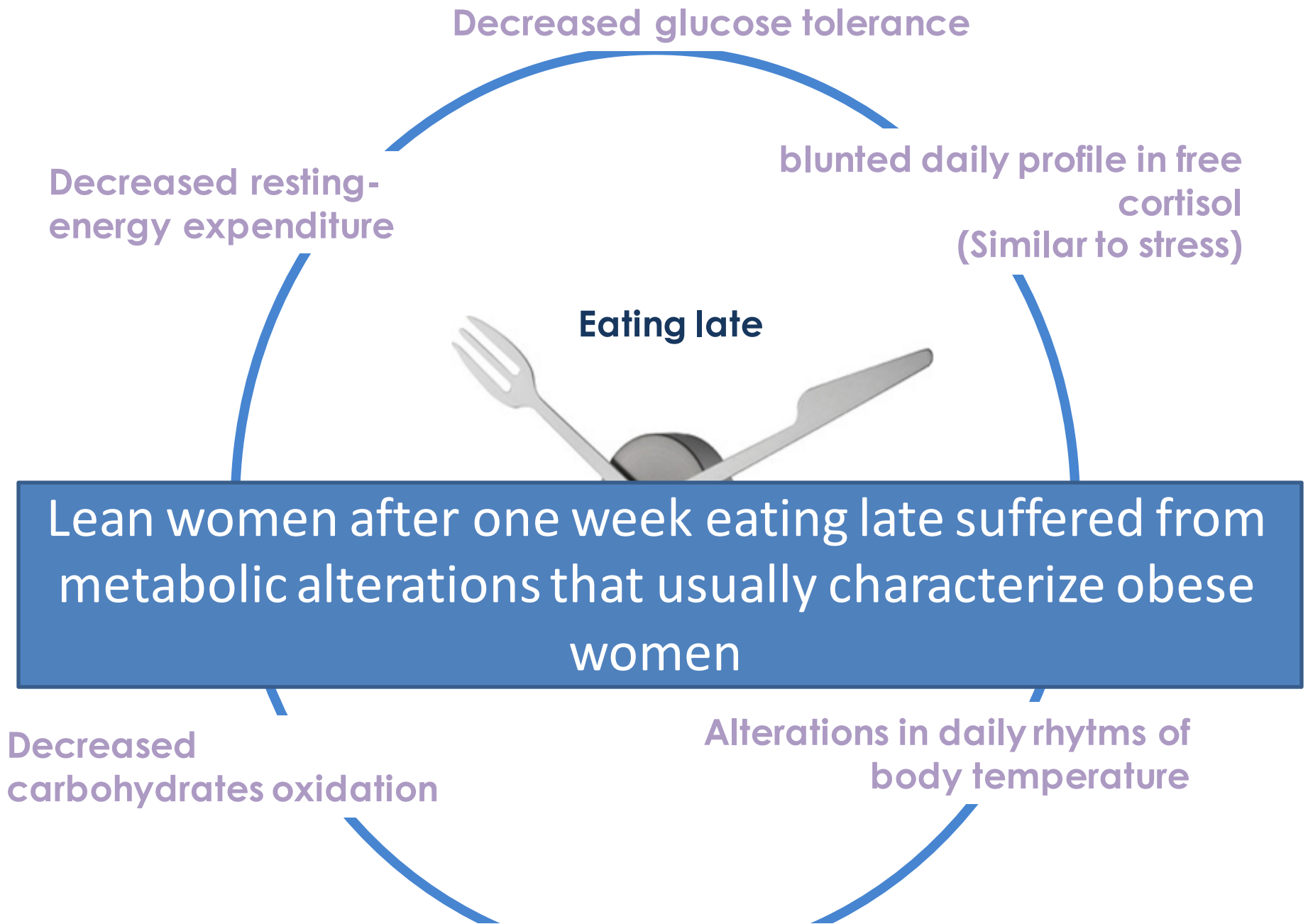


Jakubowicz D, et al., Obesity 2013.



Meal timing effects
on glucose
tolerance, substrate
oxidation and
circadian-related
variables: A
randomized,
crossover trial.

Same women ($n=32$) had the same standardized meals during
two weeks but differed in the food timing (13:00 h) EE and at (16:30 h) LE.

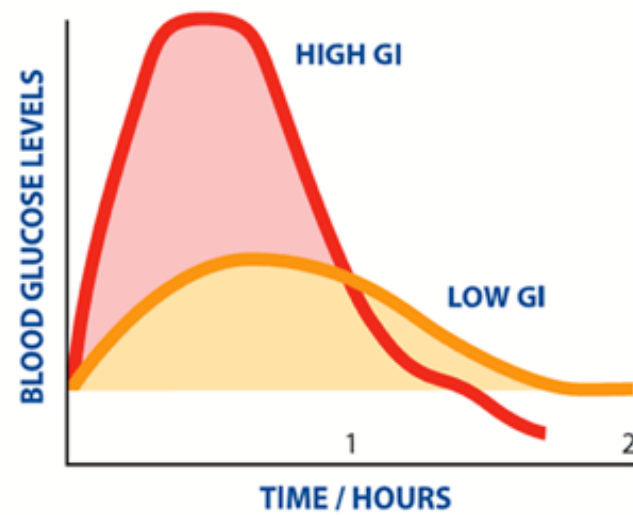


Bandin et al., (Garaulet) International Journal of Obesity, 2014



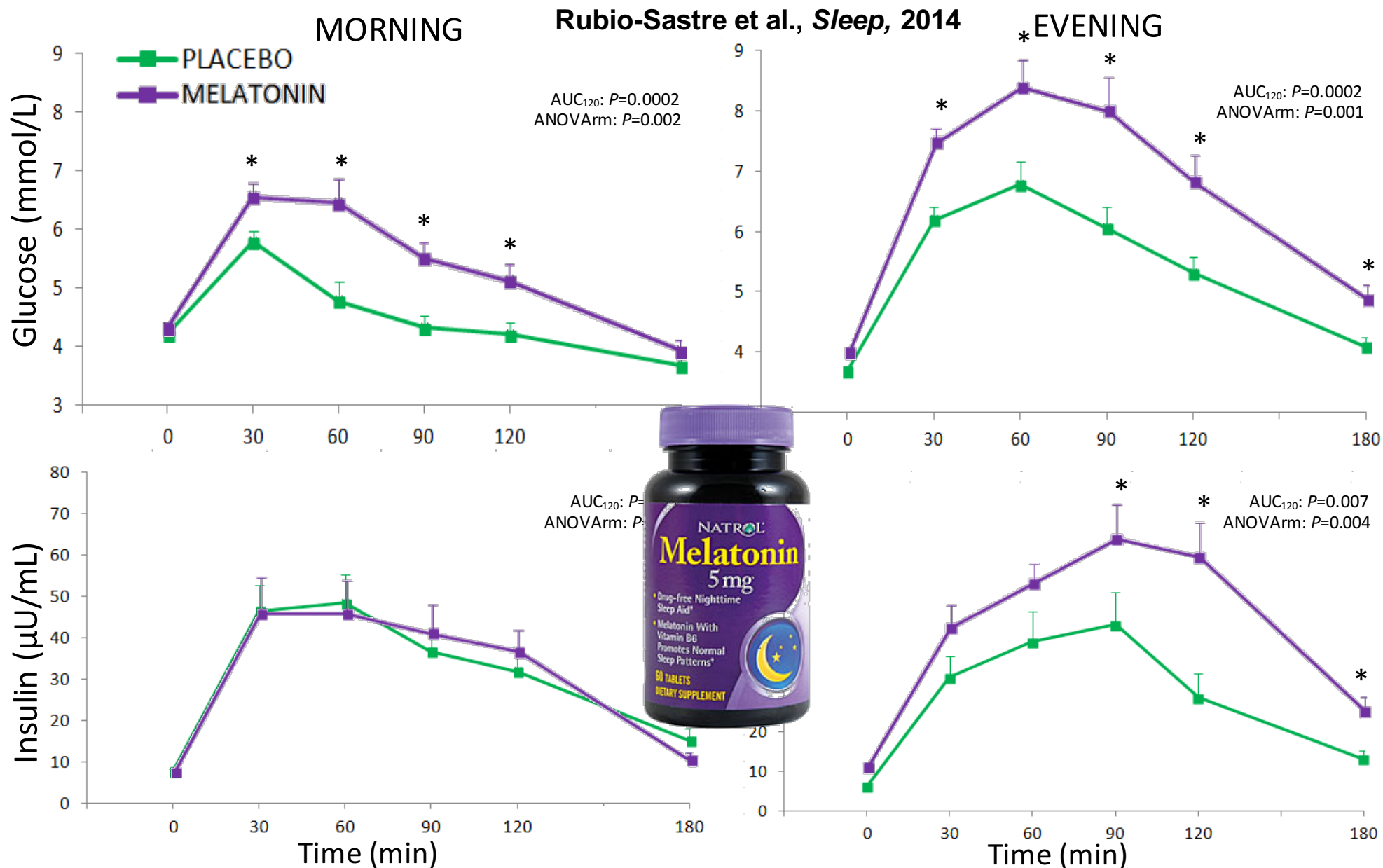
The Glycemic
Index changes
with the time
of the day

Glycemic index

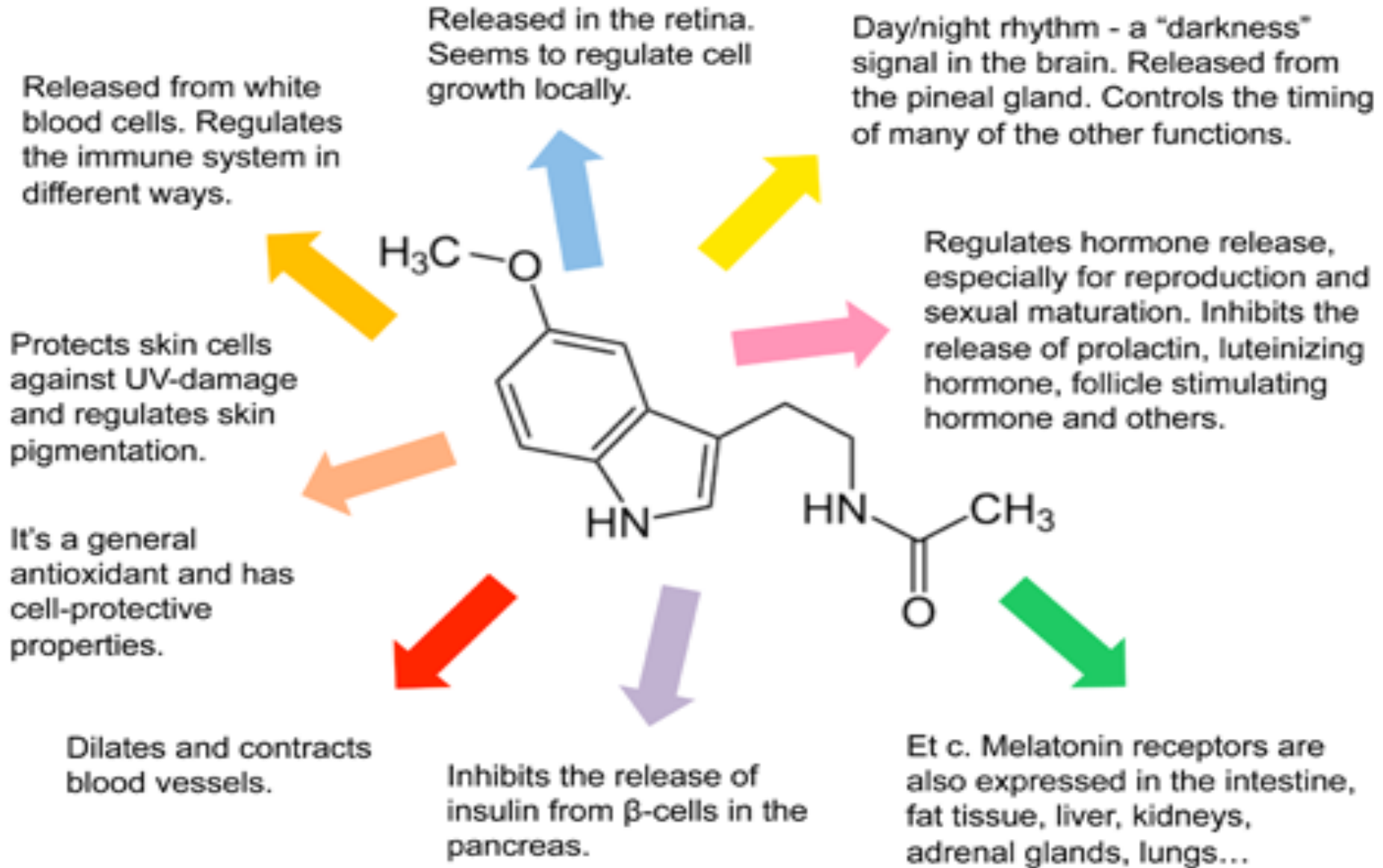


“Melatonin misalignment”

Daytime melatonin administration impairs glucose tolerance in humans (OGTT)

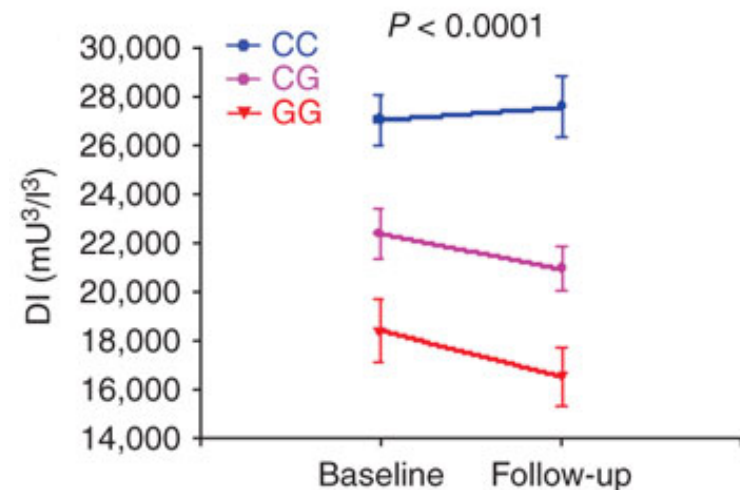
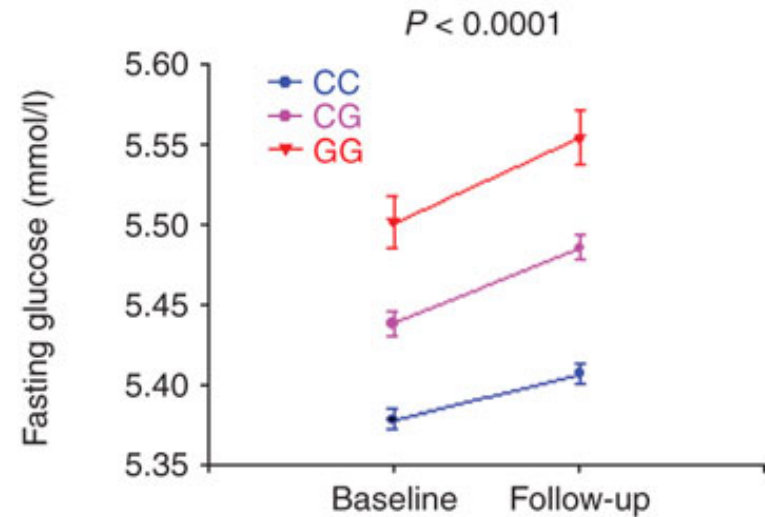


Melatonin: conductor of a large orchestra



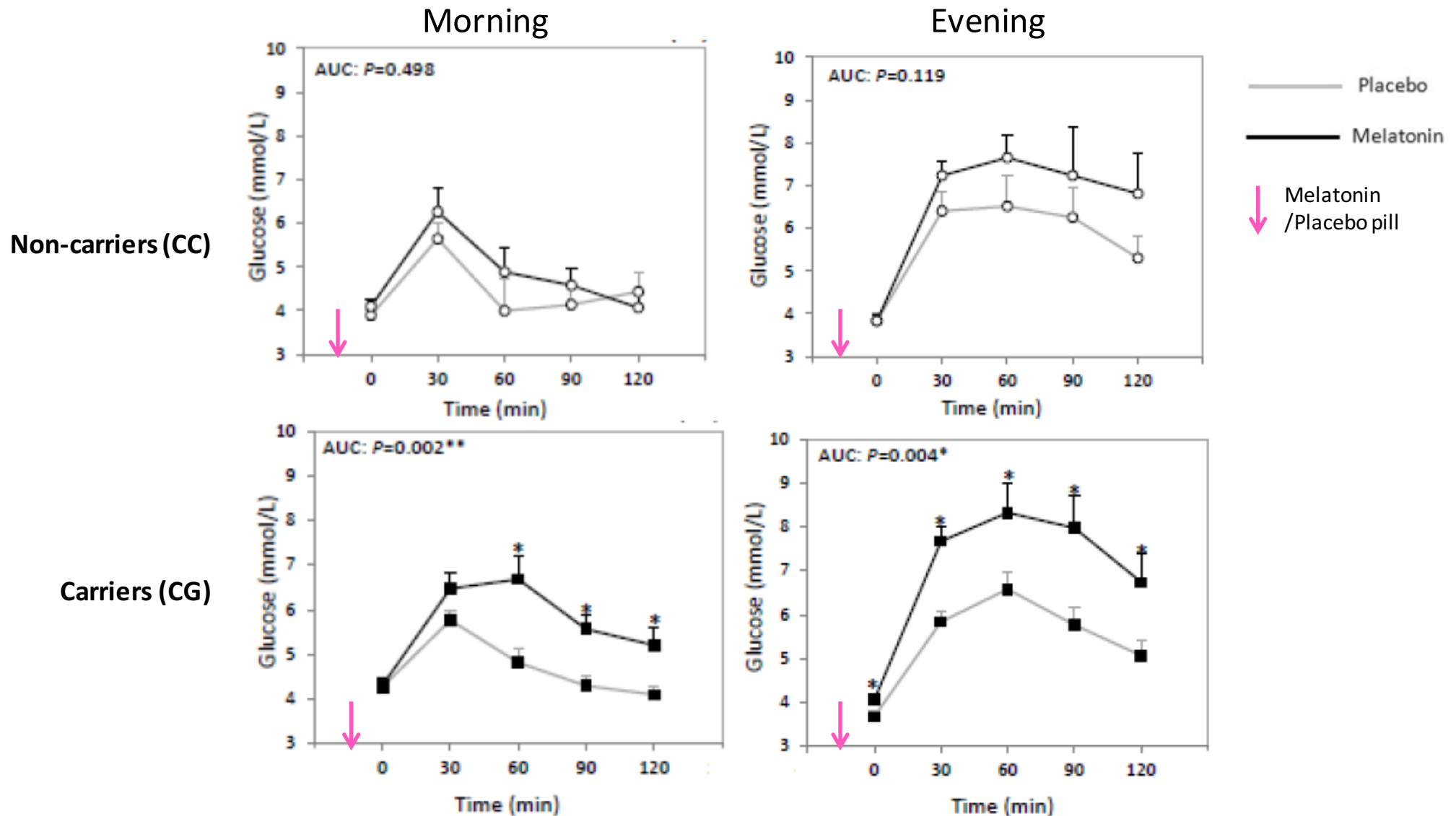
Common variant in MTNR1B is associated with increased risk of type 2 diabetes

- *MTNR1B* encodes melatonin receptor 1B, MT2.
- G-allele of intronic rs10830963 is a common variant in *MTNR1B* (39% in Europeans).
- Among more than 60 variants associated with T2D and/or glycemic traits, rs10830963 had the most significant adverse influence on the disposition index.



Exogenous melatonin leads to worse glucose tolerance in carriers compared to non-carriers

MTNR1B

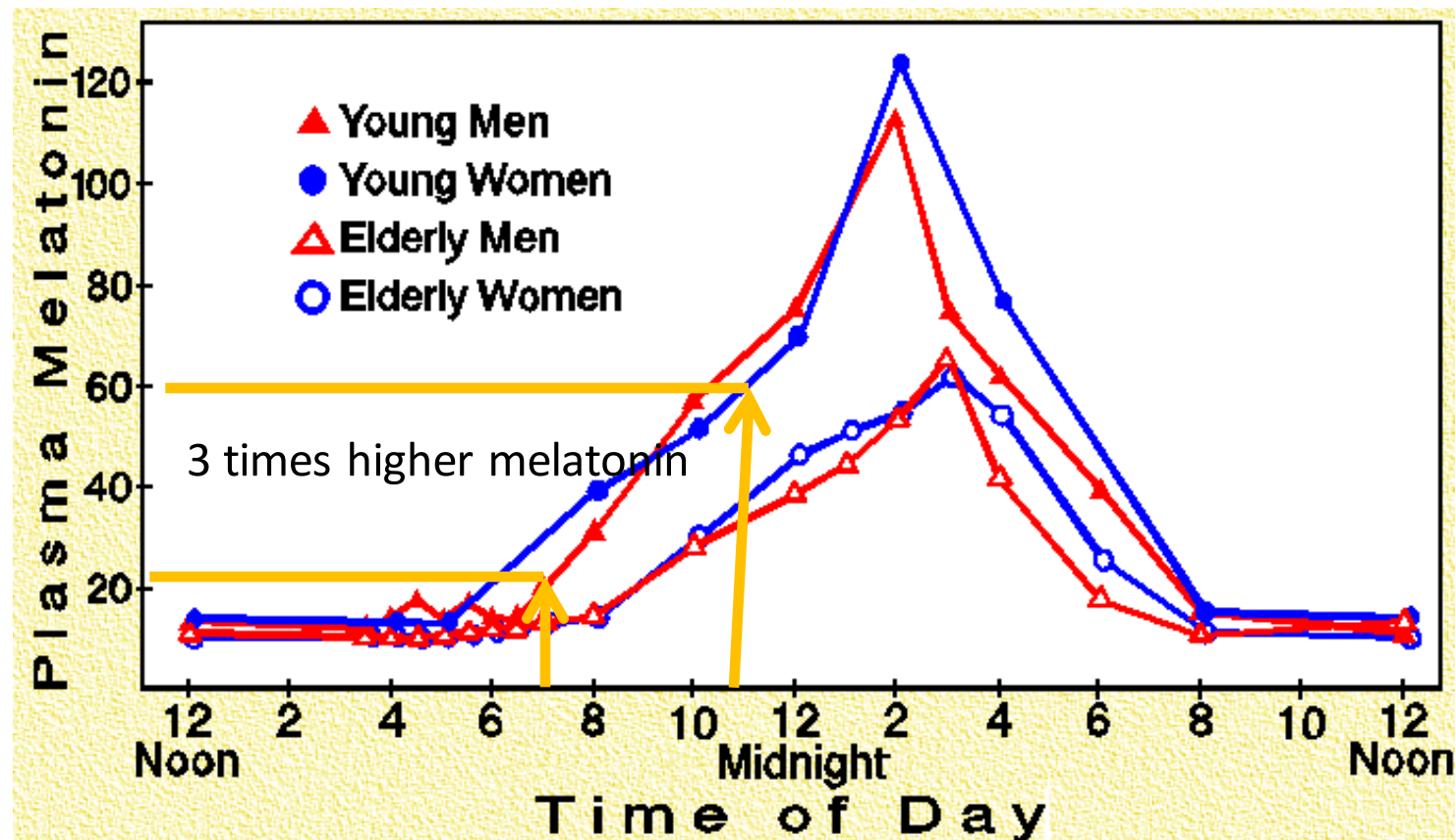


- OGTT in nondiabetic, nonobese, young healthy women.

We should have
dinner at least 2
hours and a half
before going to
bed



Plasma concentrations Melatonin



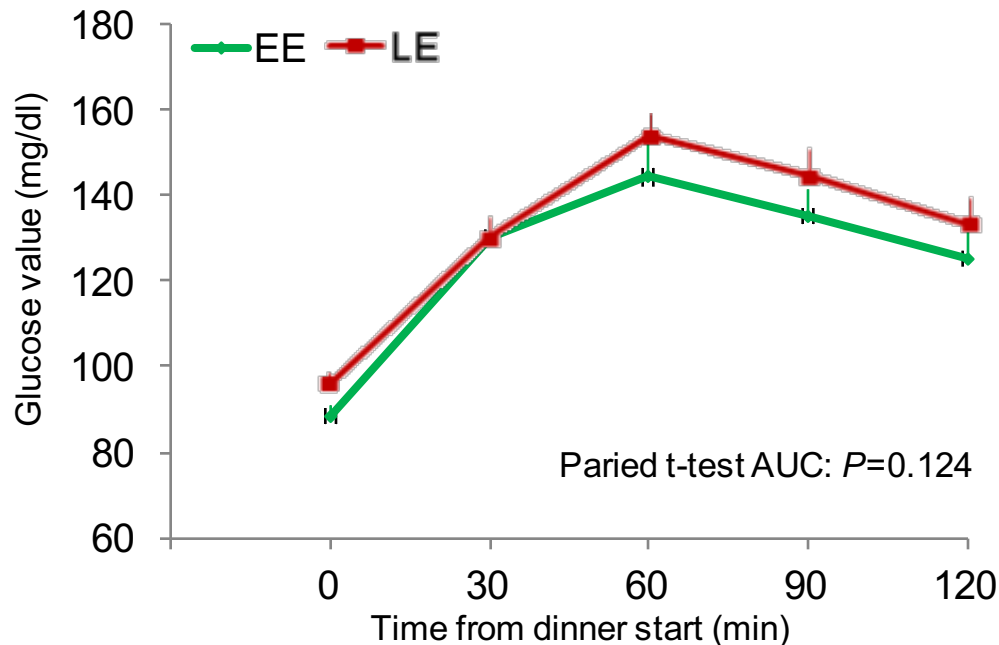
To have dinner late diminish the tolerance to carbohydrates

GG de MTNR1B

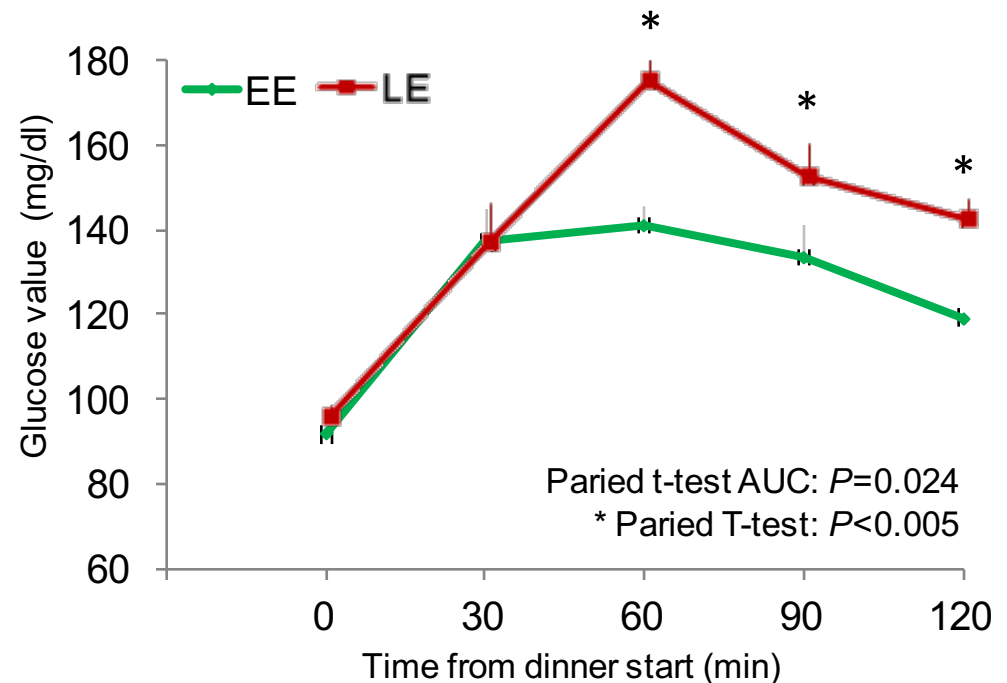
(51% población)

Endogenous Melatonin

Non Carriers (CC)



Carriers (GG)



Ravioli with tomato

EE=19:30 h (4h and a half before going to bed)

LE=22:30 to 23:00 h (1h before going to bed)



Summary

- **Carbofobia has no sense in a weight control**
 - The goal is to design a diet that may be followed our whole life
 - Macronutrient composition may not be decisive in weight loss effectiveness
 - There are inter-individual responses
- The Mediterranean Diet (including pasta) is a **great choice if we want to lose weight.**
- **Restrict carbohydrates** will result in **lower serotonin levels** (less hapiness).
- Mediterranean diet is particularly effective on **glycemic control**
- The Glycemic Index **changes with the time of the day**
- We should have **dinner at least 2 hours and a half before going to bed** to avoid concurrence of melatonin and food