

EJERCICIO FÍSICO Y DIETA EN PERSONAS CON HIPERTENSIÓN PRIMARIA Y RIESGO CV

ESTUDIO EXERDIET-HTA



GRUPO ELIKOS

IPY PRINCIPALES: SARA MALDONADO-MARTÍN & IDOIA LABAYEN

INVESTIGADORES COLABORADORES: JAVIER PÉREZ ASENJO, RODRIGO AISPURU

ESTUDIANTES DOCTORADO: BORJA JURIO-IRIARTE, ILARGI GOROSTEGI-ANDUAGA

ESTUDIANTES DE MÁSTER Y GRADO

Riesgo cardiovascular

Factores de riesgo

HTA

TTO

EF

DIETA

EF MOD
CONT

EF INTENSO
HIIT

DIETA DASH
HIPOCAL

eman ta zabal zazu



Universidad
del País Vasco

Euskal Herriko
Unibertsitatea



Jarduera Fisikoaren eta
Kirolaren Zientzien Fakultatea
Facultad de Ciencias de la
Actividad Física y del Deporte



Departamento de
Educación Física y Deportiva
Gorpuz eta Kirol
Hezkuntzako Saila



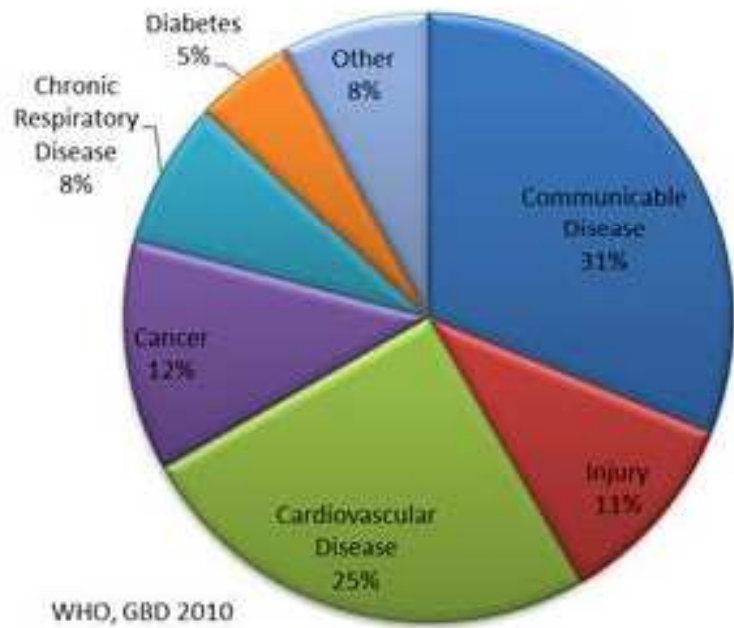
IMQ
Tu seguro médico



EXERDIET-HTA

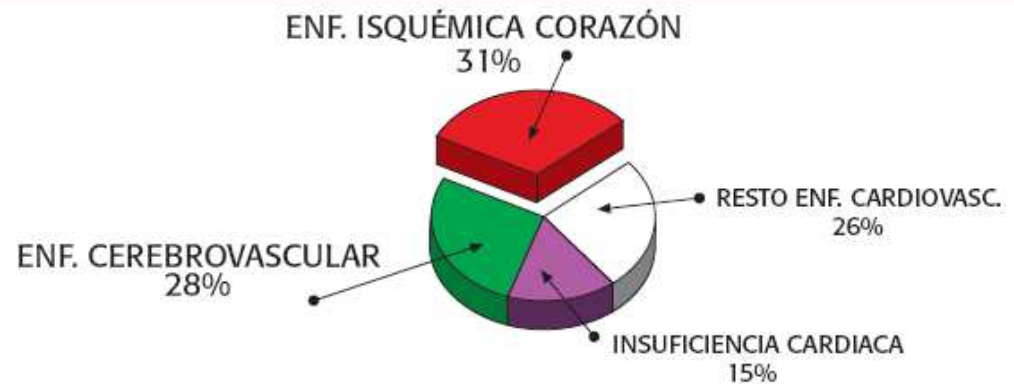
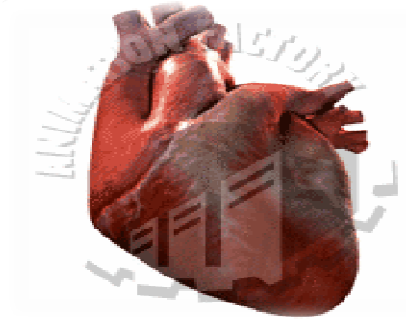
RIESGO CARDIOVASCULAR

Causes of Deaths in Developing Countries

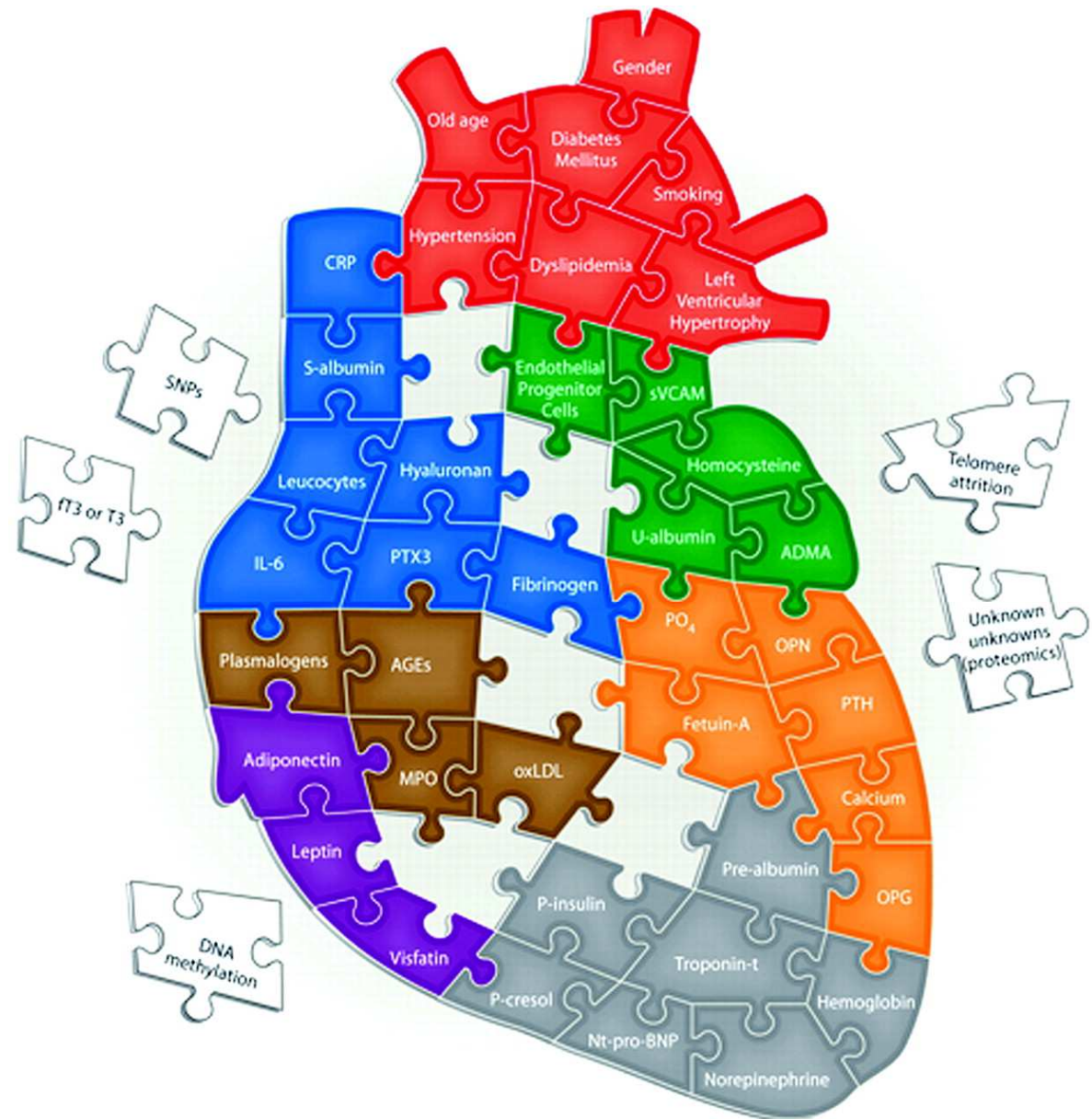
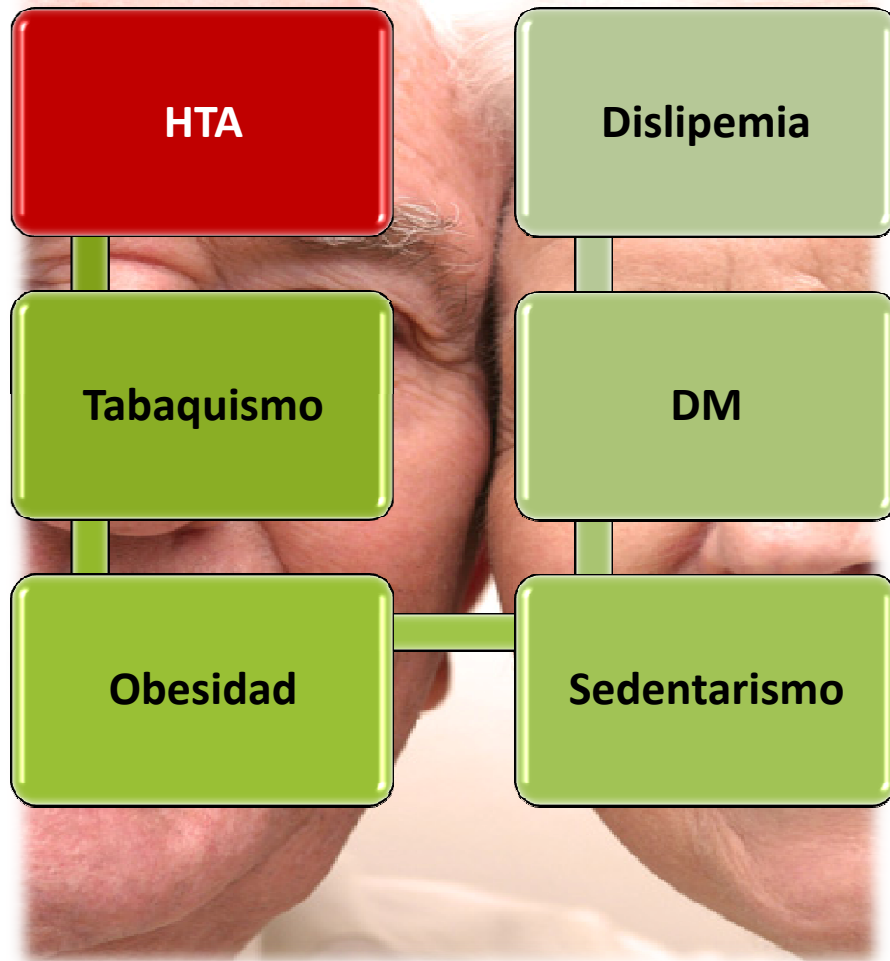


Riesgo vascular
Vascular risk
J.I. Cuende

Servicio de Medicina Interna, Complejo Asistencial de Palencia, Palencia, España



FACTORES DE RIESGO CARDIOVASCULAR





ABSTRACT

Cardiorespiratory fitness (CRF) is one of the most important health metrics in apparently healthy individuals, those at increased risk for cardiovascular (CV) disease and virtually all patient populations. In addition to CRF, a host of other variables obtained from aerobic exercise testing provides clinically valuable information. Individuals classified as obese (i.e. a body mass index $\geq 30 \text{ kg/m}^2$) have varying degrees of CV, pulmonary and skeletal muscle dysfunction that impact CRF and other key aerobic exercise testing variables. Moreover, there is now evidence indicating inspiratory and expiratory respiratory muscle function, even in the absence of interstitial lung disease, is potentially compromised as a result of obesity. When obesity-induced respiratory muscle dysfunction is present, it has the potential to contribute to the limitations in CRF. The current review will discuss aerobic exercise testing and the assessment of respiratory muscle function in the obese population.



Capacidad cardiorespiratoria



Riesgo cardiovascular

Review Article
**Emerging Risk Biomarkers in Cardiovascular
Diseases and Disorders**
Ravi Kant Upadhyay

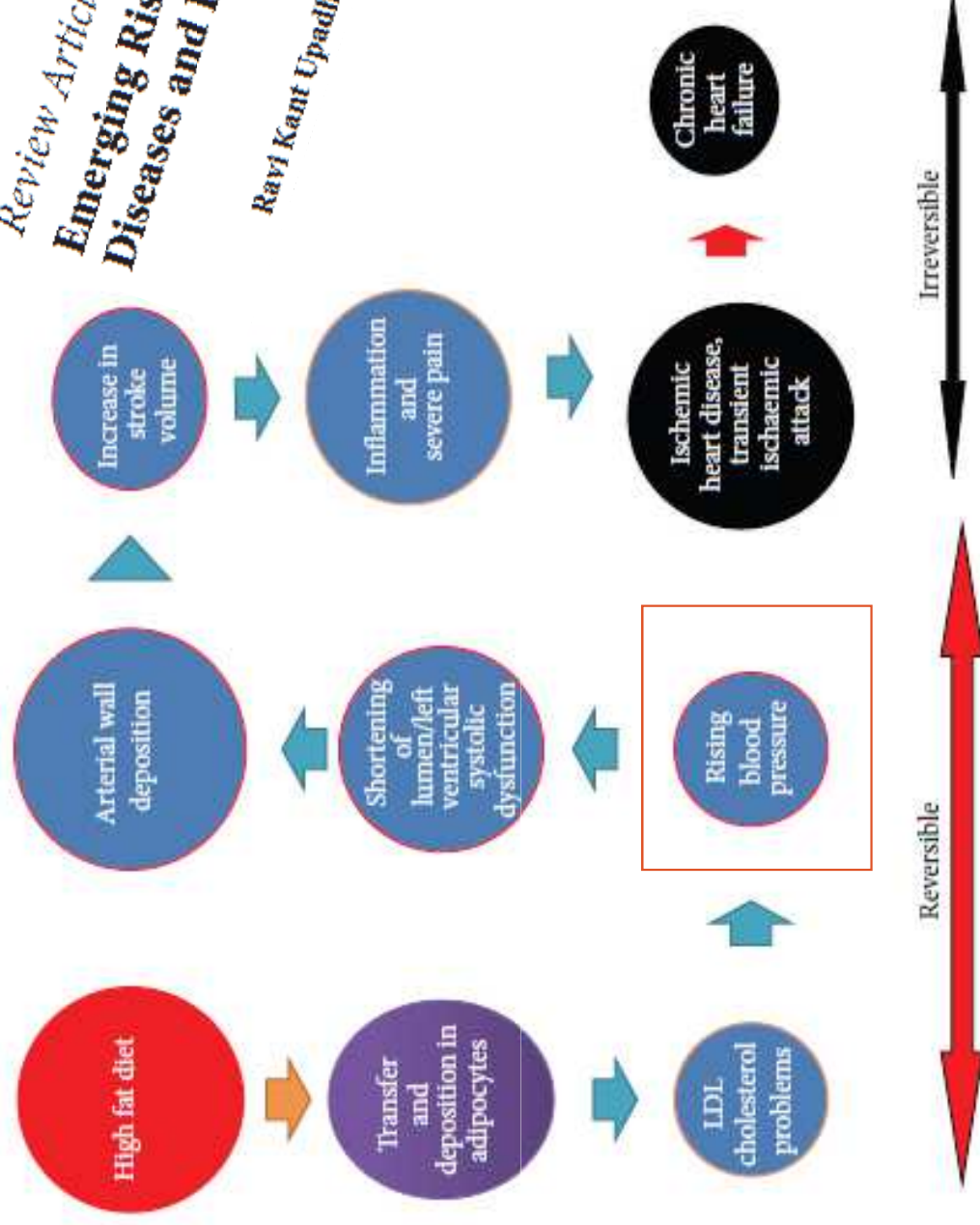
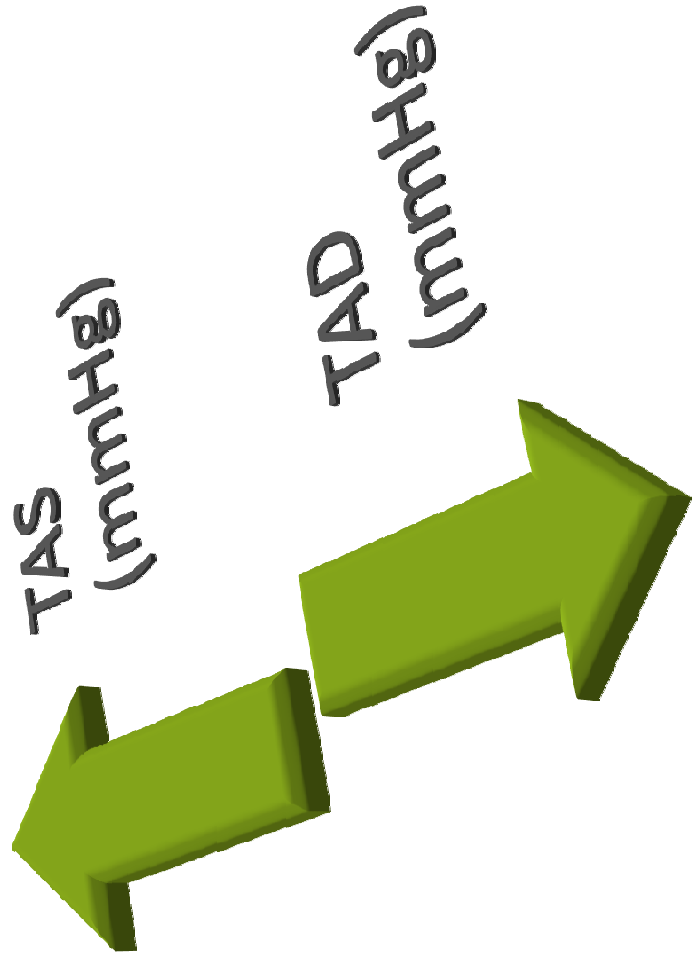


FIGURE 4: Showing successive progression of transient ischemic attack and chronic heart failure in man.



glycine BP values in the ranges indicated.

*The blood pressure (BP) category is defined by the highest level of BP, whether systolic or diastolic. Isolated systolic hypertension should be graded 1, 2, or 3 according to systolic BP values in the ranges indicated.

HTA – ECV

- Primera causa de mortalidad a nivel mundial
- Predispone a sufrir eventos CV

ECV

>30%

- Riesgo de desarrollar evento CV

RCV

10
años

- Accidente cerebro vascular
- Infarto de miocardio
- Insuficiencia

Eventos CV



- Factor principal de RCV y lesiones derivadas.

HTA

HIPERTENSIÓN

- **Hipertensión primaria** (esencial, idiopática): 90-95% de los casos.
- **Hipertensión secundaria:** 5 al 10%
 - Problemas renales.
 - Estrechamiento de ciertas arterias.
 - Tumores.
 - Problemas en las glándulas adrenales.
 - Embarazo.



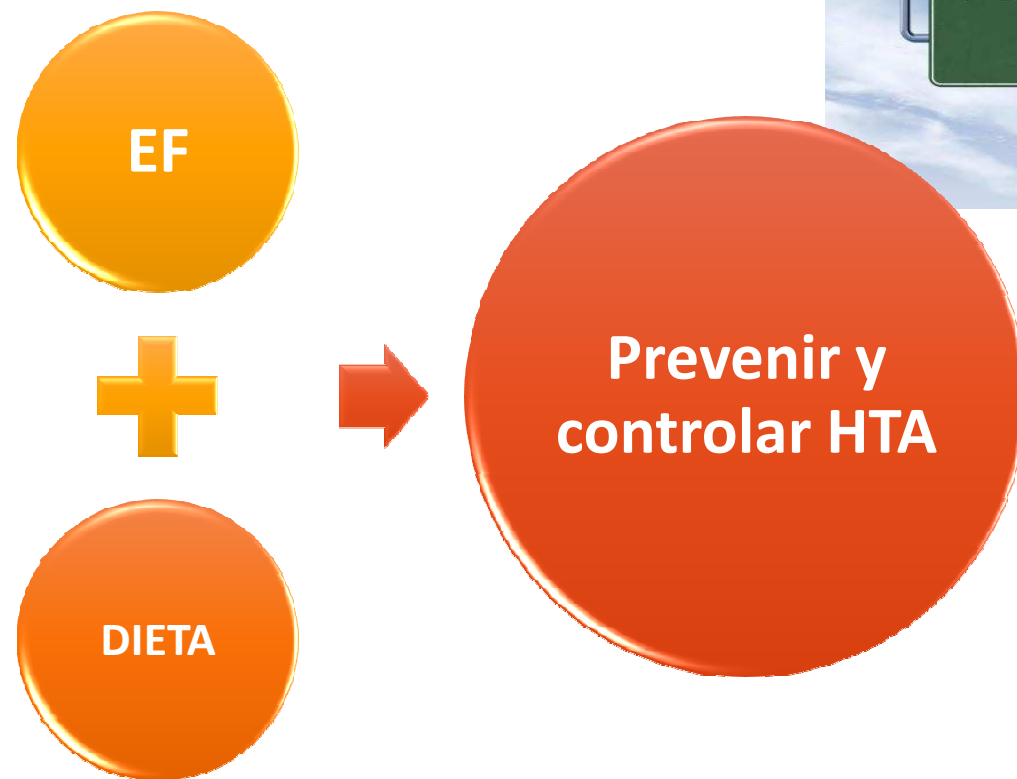


Other risk factors, asymptomatic organ damage or disease	Blood pressure (mmHg)			
	High normal SBP 130–139 or DBP 85–89	Grade 1 HT SBP 140–159 or DBP 90–99	Grade 2 HT SBP 160–179 or DBP 100–109	Grade 3 HT SBP ≥180 or DBP ≥110
No other RF		Low risk	Moderate risk	High risk
1–2 RF	Low risk	Moderate risk	Moderate to high risk	High risk
≥3 RF	Low to moderate risk	Moderate to high risk	High risk	High risk
OD, CKD stage 3 or diabetes	Moderate to high risk	High risk	High risk	High to very high risk
Symptomatic CVD, CKD stage ≥ 4 or diabetes with OD/RFs	Very high risk	Very high risk	Very high risk	Very high risk

BP = blood pressure; CKD = chronic kidney disease; CV = cardiovascular; CVD = cardiovascular disease; DBP = diastolic blood pressure; HT = hypertension; OD = organ damage; RF = risk factor; SBP = systolic blood pressure.

FIGURE 1 Stratification of total CV risk in categories of low, moderate, high and very high risk according to SBP and DBP and prevalence of RFs, asymptomatic OD, diabetes, CKD stage or symptomatic CVD. Subjects with a high normal office but a raised out-of-office BP (masked hypertension) have a CV risk in the hypertension range. Subjects with a high office BP but normal out-of-office BP (white-coat hypertension), particularly if there is no diabetes, OD, CVD or CKD, have lower risk than sustained hypertension for the same office BP.

2013 ESH/ESC Guidelines for the management of arterial hypertension



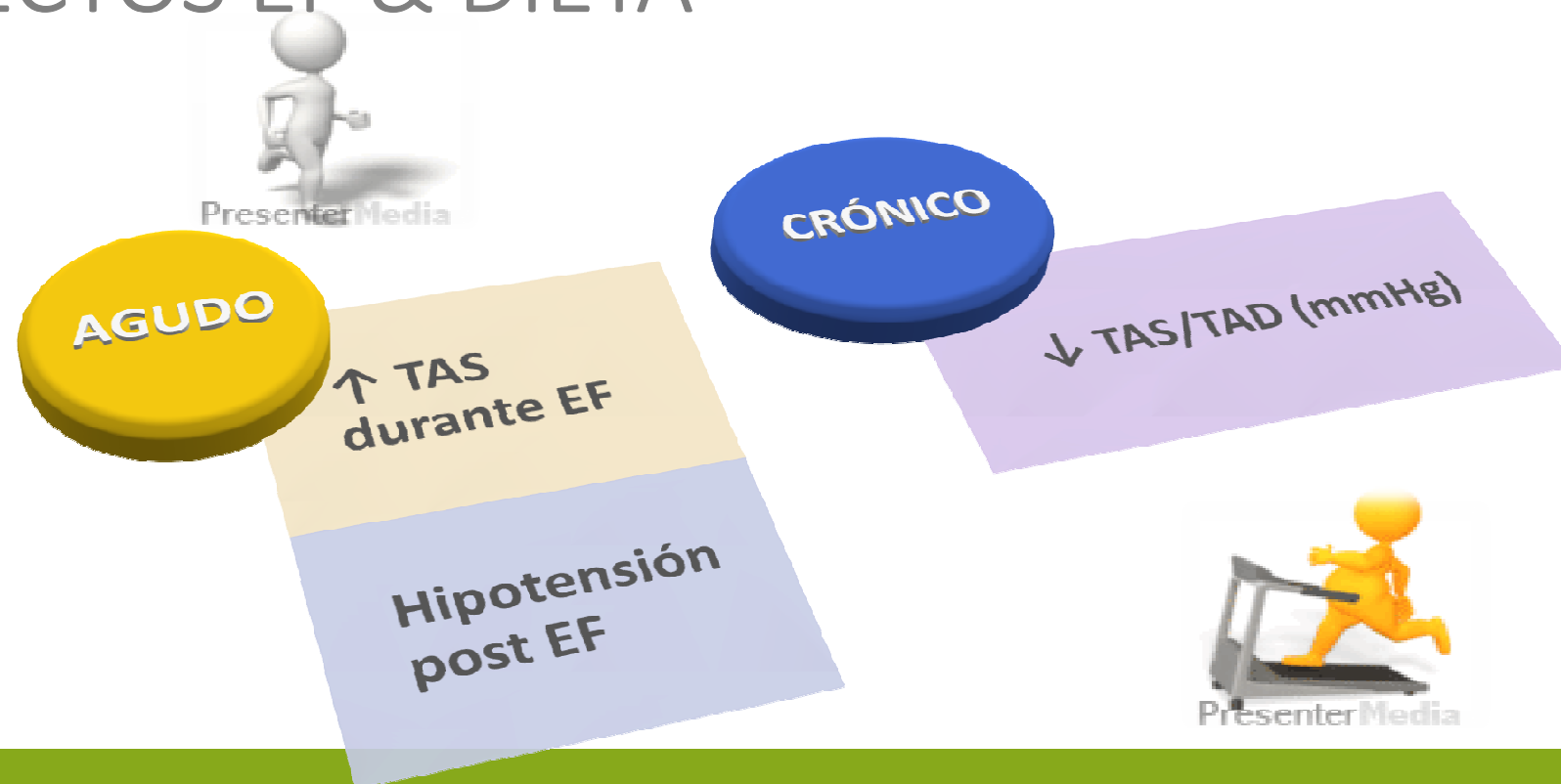
Adoption of lifestyle changes

Recommendations	Class ^a	Level ^{b,d}
Salt restriction to 5–6 g per day is recommended.	I	A
Moderation of alcohol consumption to no more than 20–30 g of ethanol per day in men and to no more than 10–20 g of ethanol per day in women is recommended.	I	A
Increased consumption of vegetables, fruits, and low-fat dairy products is recommended.	I	A
Reduction of weight to BMI of 25 kg/m ² and of waist circumference to <102 cm in men and <88 cm in women is recommended, unless contraindicated.	I	A
Regular exercise, i.e. at least 30 min of moderate dynamic exercise on 5 to 7 days per week is recommended.	I	A
It is recommended to give all smokers advice to quit smoking and to offer assistance.	I	A

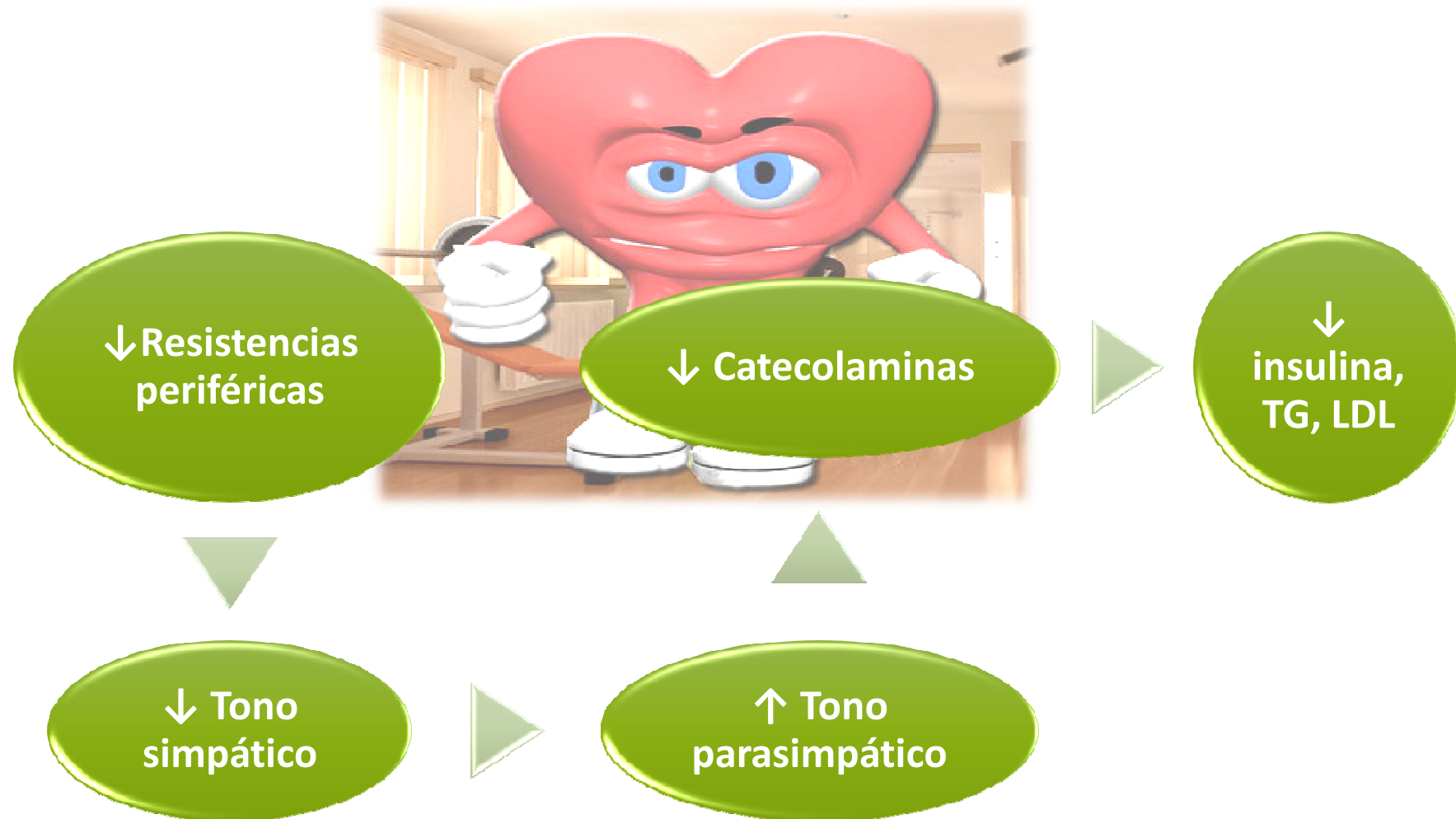
2013 ESH/ESC Guidelines for the management of arterial hypertension

EFFECTOS EF & DIETA

lower BP when compared with skimmed cows' milk.³⁵⁹ Diet adjustment should be accompanied by other lifestyle changes. In patients with elevated BP, compared with the Dietary Approaches to Stop Hypertension (DASH) diet alone, the combination of the DASH diet with exercise and weight loss resulted in greater reductions in BP and LVM.³⁶⁰ With regard to coffee consumption, a recent systematic review found that most of the available studies



MECANISMOS ANTIHIPERTENSIVOS DEL EF





5.1.5 Regular physical exercise

Epidemiological studies suggest that regular aerobic physical activity may be beneficial for both prevention and treatment of hypertension and to lower CV risk and mortality. A meta-analysis of randomized controlled trials has shown that aerobic endurance training reduces resting SBP and DBP by 3.0/2.4 mmHg overall and even by 6.9/4.9 mmHg in hypertensive participants [369]. Even regular physical activity of lower intensity and duration has been shown to be associated with about a 20% decrease in mortality in cohort studies [370,371], and this is also the case for measured physical fitness [372]. Hypertensive patients should be advised to participate in at least 30 min of moderate-intensity dynamic aerobic exercise (walking, jogging, cycling or swimming) on 5–7 days per week [373]. Aerobic interval training has also been shown to reduce BP [374]. The impact on BP values of other forms of exercise, such as isometric resistance training (muscular force development without movement) and dynamic resistance exercise (force development associated with movement) has been reviewed recently [375,376]. Dynamic resistance training was followed by significant BP reduction, as well as improvements in other metabolic parameters, and performance of resistance exercises on 2–3 days per week can be advised. Isometric exercises are not recommended, since data from only a few studies are available.

High-intensity interval training for health and fitness: can less be more?

Glenn A. Gaesser and Siddhartha S. Angadi

Comparison of Cardioprotective Benefits of Vigorous Versus Moderate Intensity Aerobic Exercise

David P. Swain, PhD^{a,*} and Barry A. Franklin, PhD^b

Aerobic fitness, not merely physical activity, is associated with a reduced risk of cardiovascular disease. Vigorous intensity exercise has been shown to increase aerobic fitness more effectively than moderate intensity exercise, suggesting that the former may confer greater cardioprotective benefits. An electronic search of published studies using PubMed was conducted for 2 types of investigations, epidemiologic studies that evaluated the benefits of physical activity of varying intensity levels and clinical trials that trained individuals at different intensities of exercise while controlling for the total energy expenditure. A secondary search was conducted using the references from these studies. The epidemiologic studies consistently found a greater reduction in risk of cardiovascular disease with vigorous (typically ≥ 6 METs) than with moderate intensity physical activity and reported more favorable risk profiles for individuals engaged in vigorous, as opposed to moderate, intensity physical activity. Clinical trials generally reported greater improvements after vigorous (typically $\geq 60\%$ aerobic capacity) compared with moderate intensity exercise for diastolic blood pressure, glucose control, and aerobic capacity, but reported no intensity effect on improvements in systolic blood pressure, lipid profile, or body fat loss. In conclusion, if the total energy expenditure of exercise is held constant, exercise performed at a vigorous intensity appears to convey greater cardioprotective benefits than exercise of a moderate intensity. © 2006 Elsevier Inc. All rights reserved. (*Am J Cardiol* 2006;97:141–147)

No acuerdo: frecuencia, intensidad, duración o tipo.

Physiological and Health-Related Adaptations to Low-Volume Interval Training: Influences of Nutrition and Sex

Martin J. Gibala · Jenna B. Gillen ·
Michael E. Percival

Abstract Interval training refers to the basic concept of alternating periods of relatively intense exercise with periods of lower-intensity effort or complete rest for recovery. Low-volume interval training refers to sessions that involve a relatively small total amount of exercise (i.e., ≤ 10 min of intense exercise), compared with traditional moderate-intensity continuous training (MICT) protocols that are generally reflected in public health guidelines. In an effort to standardize terminology, a classification scheme was recently proposed in which the term ‘high-intensity interval training’ (HIIT) be used to describe protocols in which the training stimulus is ‘near maximal’ or the target intensity is between 80 and 100 % of maximal heart rate, and ‘sprint interval training’ (SIT) be used for

- MODERADO CONTINUO.
- ALTO VOLUMEN HIIT
- BAJO VOLUMEN HIIT

EXERCISE+DIET+HTA

CRONOLOGÍA INTERVENCIÓN

2010-11 (UPV/EHU + USP HOSPITAL-Cardiología)

- 8 sem intervención EF (n=18)



2011-12 (UPV/EHU + USP HOSPITAL-Cardiología)

- 12 sem intervención EF (n=26)

2012-13 (UPV/EHU + QUIRÓN HOSPITAL-Cardiología)

- 16 sem intervención EF (n=28)



2013-14 (UPV/EHU + IMQ-Cardiología)

- 16 sem intervención EF+DIETA (n=40)



2014-15 (UPV/EHU + IMQ-Cardiología+Hospital Santiago Apostol)

- 16 sem intervención EF+DIETA (n=64)



BUENOS HÁBITOS >



A la izquierda, un voluntario se somete a las pruebas de esfuerzo polígrafo en una de las salas de un laboratorio de salud que colabora en el proyecto. A la derecha, Maldonado supervisa los ejercicios de este voluntario sobre el bicicleta estática. Los ejercicios previos al estudio se realizan en la Facultad de Ciencias de la Actividad Física y el Deporte de Vitoria. El proyecto, tanto en este emplazamiento como en el BACH, sede de USP Araba Sport Clinic, IRT de UBA.



Corazón saludable

LA UPV Y LA ESPERANZA BUSCAN VOLUNTARIOS PARA COMPLETAR UN ESTUDIO SOBRE LOS EFECTOS DEL EJERCICIO FÍSICO EN EL CONTROL DE LA HIPERTENSIÓN

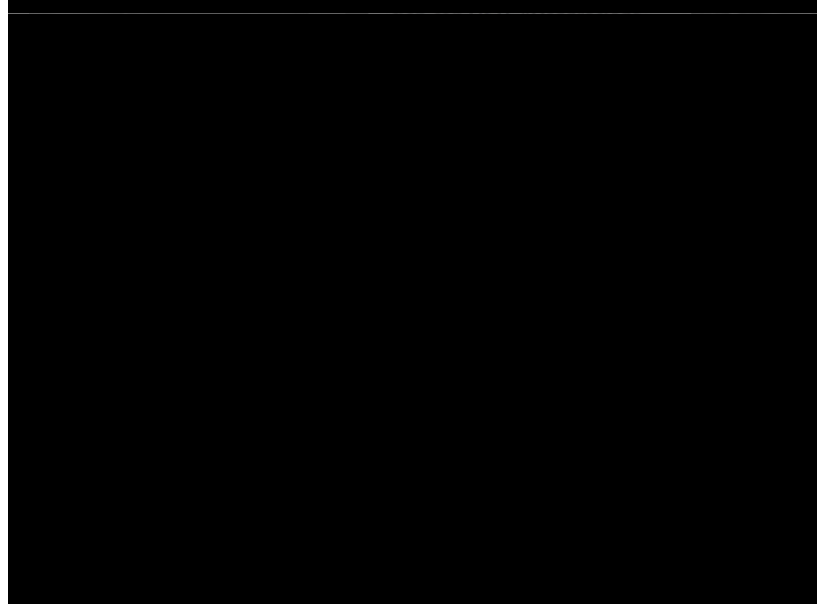
BUENOS HÁBITOS

SARA MALDONADO

DIRECTORA DEL PROYECTO

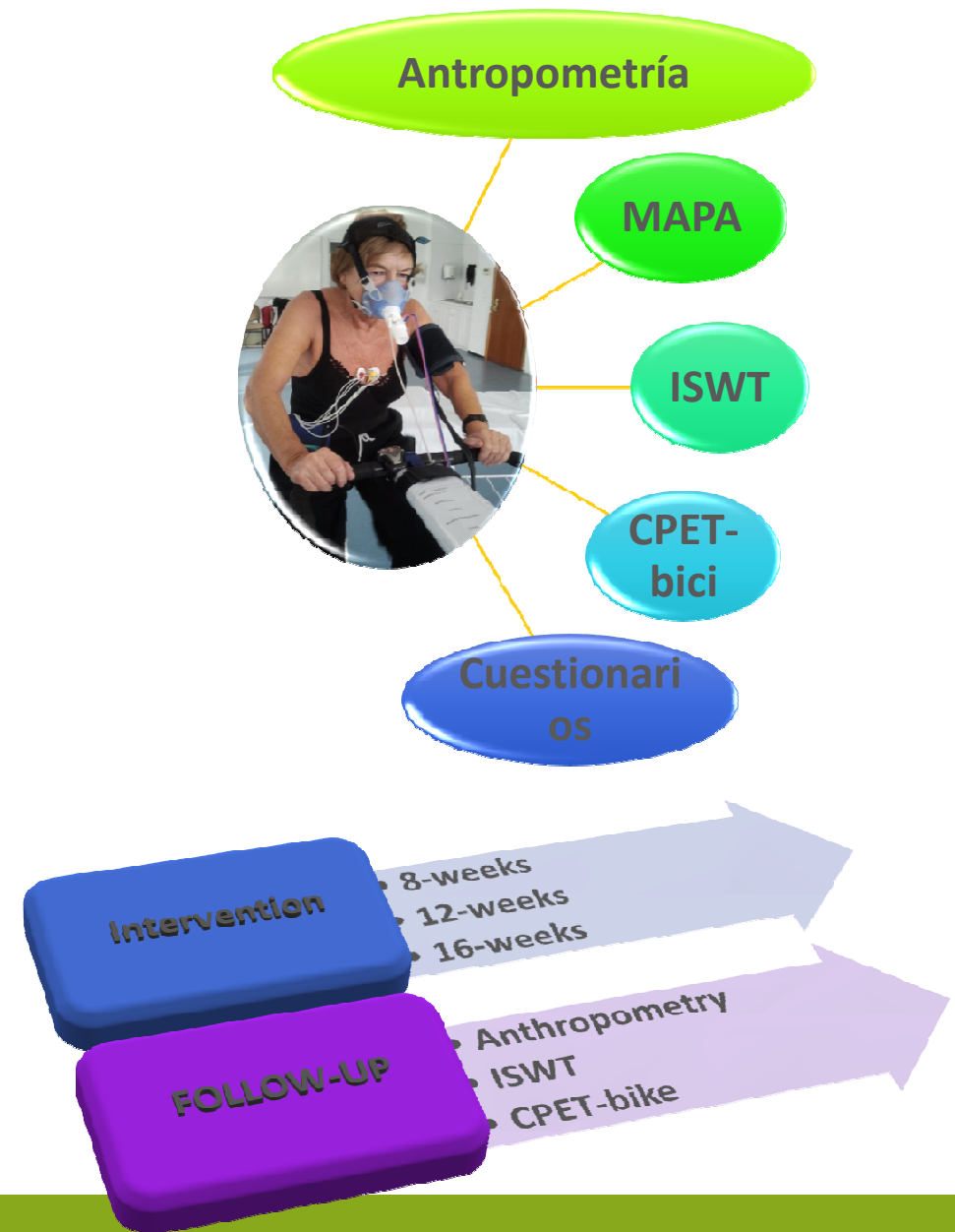
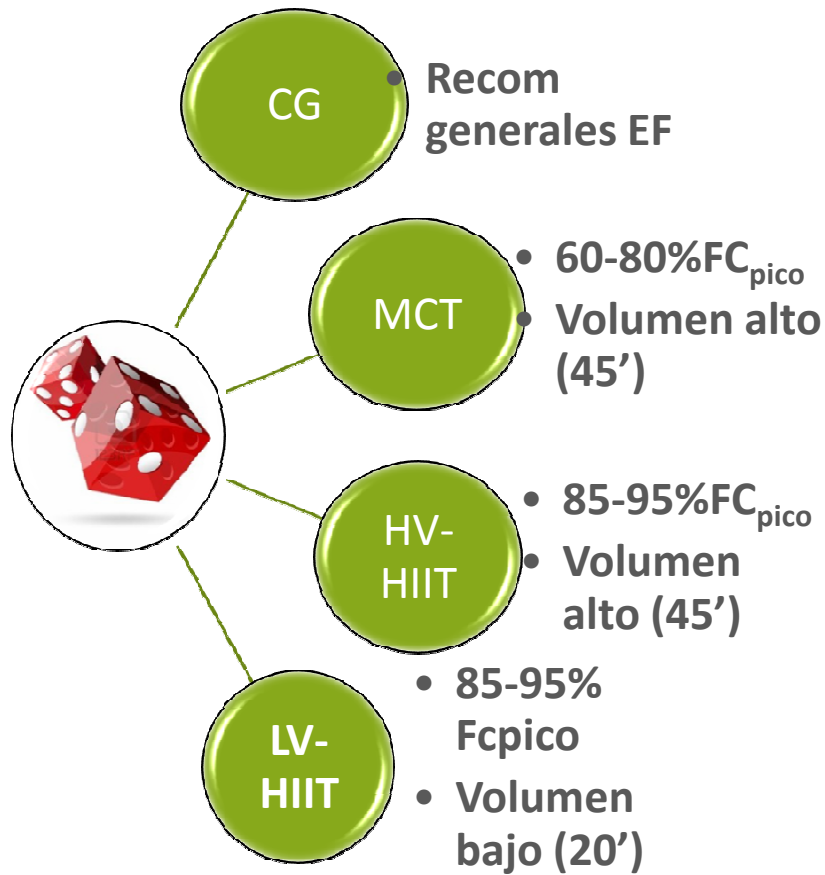
“El que no hace ejercicio en Vitoria es porque no quiere”

Maldonado comenzó a interesarse sobre los efectos que la actividad física tiene sobre la salud de los hipertensos gracias a un programa de rehabilitación cardíaca en el que



DISEÑO ESTUDIO

INCLUSIÓN ESPECIALISTAS MÉDICOS



OBJECTIVES

- ✓ To compare high-intensity aerobic interval training (HIT) and moderate-intensity continuous exercise training (MCT) on body mass, blood pressure (BP) and cardiorespiratory variables after:
 - 8- 12- and 16 week intervention periods, in patients with primary HTA,
 - With hypocaloric diet vs. no hypocaloric diet intervention.

INTERVENCIÓN EF

eman ta zabal zazu



Universidad
del País Vasco

Euskal Herriko
Unibertsitatea

- 2d/sem
 - 10-min calentamiento
 - Cinta rodante (día 1) y bicicleta (día 2), monitorización FC y escala Borg.
 - Protocolo interval: bici (30''/1'), cinta rodante (4'/3').
 - 15-min vuelta a la calma (escuela de espalda + estiramientos).

WEEK 1	DATA		BASAL HR	BASAL BP
BIKE	28/11/2013		96	125/77
MONARK				
TIME	GOAL-HR	INTENSITY	HR	BORG
WARMING UP-10'	103	30/58rpm	109	7
4(30''+1')				
1. 10'-10'30''	135	70	130	12
10'30''-11'30''	103	30	118	9
2. 11'30''-12'	135	90/116rpm	141	13
12'-13'	103	30w	125	7
3. 13'-13'30''	135	90w	136	14
13'30''-14'30''	103	30w	128	9
4. 14'30''-15'	135	90/88	135	14
1 MIN REC RESTING				
RECOVERY-5'	103	30w/55rpm	110	7
WARMING-UP AND				FINAL BP
				92/70

WARMING-UP AND
 RECOVERY: 65-
 75%HR_{peak}
 HIT: 85-95%HR_{peak}

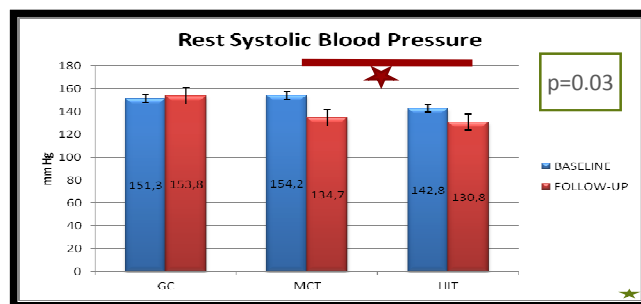
WEEK 1 TREADMILL	DATE		BASAL HR		BASAL BP
	25-11-13		84		108/73
TIME	GOAL HR	INTENSITY (km/h)	RAMP (%)	WORK HR	BORG
WARMING UP- 5'	107	3 km/h	2%	105	7
5-9'-INT	141	7,3 km/h	6,5%	152	15
9-12'-MOD	107	3 km/h	2%	113	7
12-16'-INT	141	6,5km/h	8,2%	141	12
16-20'-MOD	107	3 km/h	2%	111	6
					FINAL HR
					108/74

EFFECTS ON BLOOD PRESSURE AND CARDIORESPIRATORY CONDITION OF AN 8-WEEK EXERCISE PROGRAMME OF DIFFERING INTENSITIES IN HYPERTENSIVE PATIENTS: PILOT STUDY

SARA MALDONADO-MARTÍN, PHD.¹; BORJA JURIO-IRIARTE¹; IGNACIO CAMACHO-AZKARGORTA²

¹DEPARTMENT OF PHYSICAL EDUCATION AND SPORTS. FACULTY OF PHYSICAL ACTIVITY AND SPORT SCIENCES. UNIVERSITY OF THE BASQUE COUNTRY (UPV/EHU). VITORIA-GASTEIZ. BASQUE COUNTRY, SPAIN

²QUIRON ARABA SPORT CLINIC. BASQUE COUNTRY. SPAIN



RESULTS:

VARIABLES	CONTROL GROUP		CONTINUOUS GROUP (MCT)		INTERVAL GROUP (HIT)	
	T1	T2	T1	T2	T1	T2
VO _{2peak} (L·min ⁻¹)	2,2 ± 0,6	2,4 ± 0,7	2,2 ± 0,6	2,2 ± 0,6	1,9 ± 0,8	2,2 ± 0,9*
VO _{2peak} (mL·kg ⁻¹ ·min ⁻¹)	29,5 ± 10,5	30,3 ± 8,5	25,0 ± 7,4	25,3 ± 6,6	24,3 ± 7,5	28,2 ± 8,8*
VCO _{2peak} (L·min ⁻¹)	2,5 ± 0,7	2,7 ± 0,8	2,5 ± 0,6	2,6 ± 6,6*	2,3 ± 0,9	2,8 ± 0,9*
VT2 (L·min ⁻¹)	1,9 ± 0,5	2,3 ± 0,8	1,7 ± 0,5	1,9 ± 0,5	1,7 ± 0,7	2,2 ± 0,7*
VT2 (mL·kg ⁻¹ ·min ⁻¹)	25,5 ± 8,2	29 ± 11,3	20,3 ± 6,4	22,0 ± 6,4	21,4 ± 7,3	26,6 ± 7,0*
Workload (W)	162,5 ± 49,5	167,7 ± 56,1	158,0 ± 45,8	168,7 ± 40,2	140,7 ± 58,1	165,5 ± 58,9*
Time (min)	14,2 ± 4,9	14,5 ± 5,5	13,4 ± 4,6	14,8 ± 4,1	12,0 ± 5,7	14,3 ± 5,7*

* p ≤ 0.05
• between T1 & T2

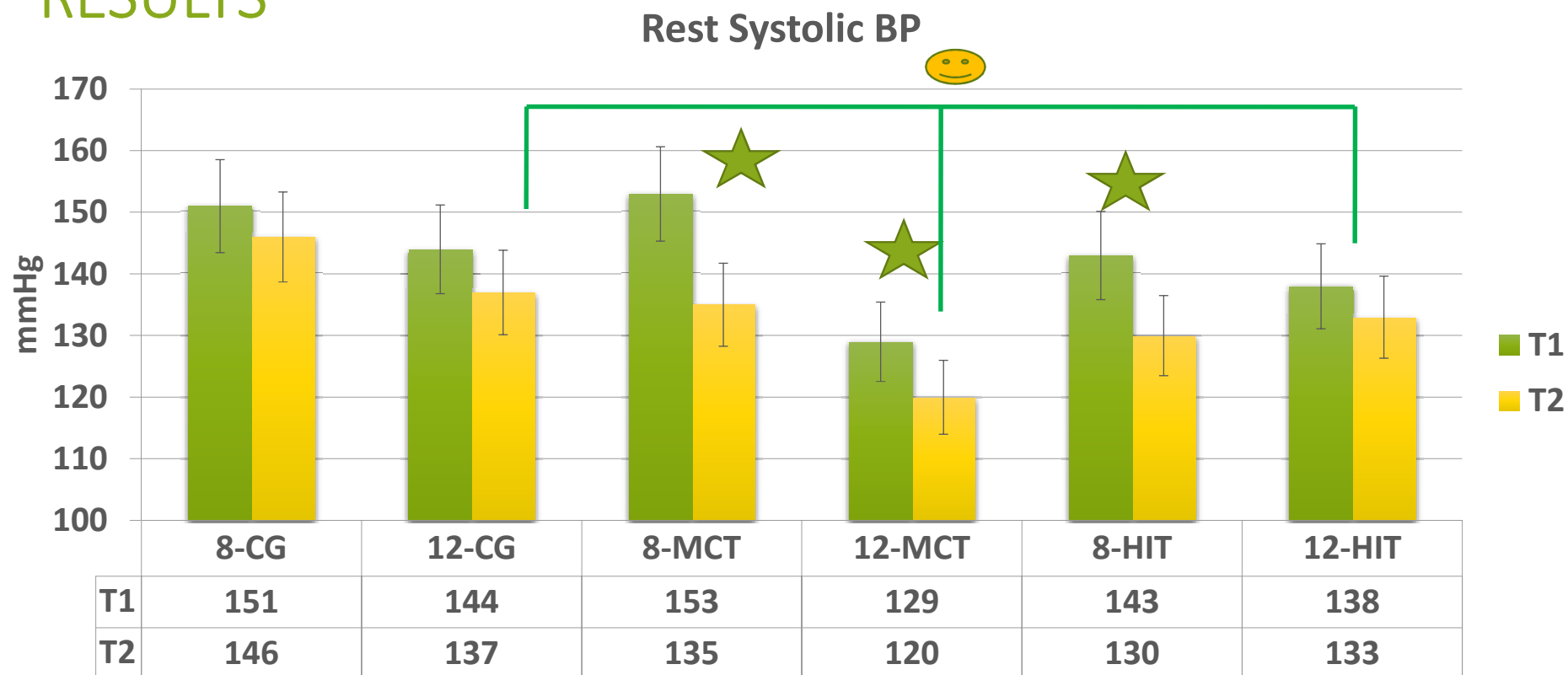
CONCLUSIONS. This study indicates that:

- ✓ both MCT and HIT exert effects on reducing rest BP in hypertensive patients.
- ✓ Nevertheless, high intensity interval training could offer better short-term cardioprotector effect than moderate intensity continuous training, due to a more effective reduction of rest systolic BP and higher cardiorespiratory capacity values.
- ✓ A complete lifestyle treatment is required to have a better control of BP.



EFFECTS OF 8 AND 12 WEEKS OF HIGH-INTENSITY AEROBIC INTERVAL TRAINING VS. MODERATE EXERCISE ON BLOOD PRESSURE AND CARDIORESPIRATORY CONDITION IN HYPERTENSIVE PATIENTS: A RANDOMISED CONTROLLED TRIAL.

RESULTS



Difference between T1 and T2 ($p<0.05$)



Inter-groups difference ($p<0.05$)

* Difference between T1 and T2 (p<0.05)

RESULTS

VARIABLES	CG		MCT		HIT	
	8 weeks 12 weeks		8 weeks 12 weeks		8 weeks 12 weeks	
	T1	T2	T1	T2	T1	T2
VO_{2peak} (L·min⁻¹)	2.4 ± 0.7	2.6 ± 0.8	2.2 ± 0.6	2.3 ± 0.6	2.1 ± 0.9	2.3 ± 0.9
	2.1 ± 0.5	2.0 ± 0.4	1.8 ± 0.4	2.2 ± 0.5*	2.1 ± 0.4	2.5 ± 0.6*
VO_{2peak} (mL·kg⁻¹·min⁻¹)	31.2 ± 11.2	32.5 ± 11.2	25.0 ± 7.3	26.3 ± 7.1	27.0 ± 10.2	28.2 ± 8.8
	27.6 ± 7.9	25.6 ± 5.5	22.1 ± 5.8	26.7 ± 6.0*	25.4 ± 2.7	29.6 ± 6.7*
VT (L·min⁻¹)	1.9 ± 0.5	2.3 ± 0.3	1.7 ± 0.5	1.9 ± 0.5	1.6 ± 0.7	1.9 ± 0.8*
	1.8 ± 0.3	1.8 ± 0.3	1.5 ± 0.3	1.9 ± 0.5*	1.7 ± 0.3	2.1 ± 0.5*
VT (mL·kg⁻¹·min⁻¹)	24.1 ± 7.3	29.1 ± 10.9	20.4 ± 6.6	22.2 ± 5.3	19.9 ± 7.8	24.5 ± 8.3*
	22.5 ± 4.9	22.9 ± 4.5	18.3 ± 4.0	23.7 ± 7.1*	20.7 ± 3.1	24.5 ± 3.8*
Workload (W)	160.8 ± 47.4	167.7 ± 56.1	155.2 ± 46.3	167.7 ± 40.2	138.3 ± 57.1	165.3 ± 58.7*
	142.7 ± 28.9	146.7 ± 36.4	118.6 ± 33.9	141.3 ± 31.8*	130.9 ± 22.0	161.0 ± 29.9*
Exercise Time (min)	14.2 ± 4.9	14.7 ± 5.6	13.7 ± 4.6	15.0 ± 4.0	12.1 ± 5.7	14.4 ± 5.9*
	12.9 ± 2.8	13.1 ± 3.2	10.5 ± 3.4	12.9 ± 3.1*	11.9 ± 1.6	14.6 ± 3.1*

CONCLUSIONS

- Both exercise programmes (MCT and HIT) exert effects on reducing rest systolic BP in hypertensive patients.
 - HIT could offer better short-term cardioprotective effect than MCT due to a higher cardiorespiratory capacity values.
 - Longer MCT and HIT interventions appear to have greater positive cardioprotective effect in all the variables.
- 



Jardueria Fisikoaren eta
Kirolaren Zientzien Fakultatea
Facultad de Ciencias de la
Actividad Física y del Deporte

Unibertsitatea Euzkoan
Universidad del País Vasco

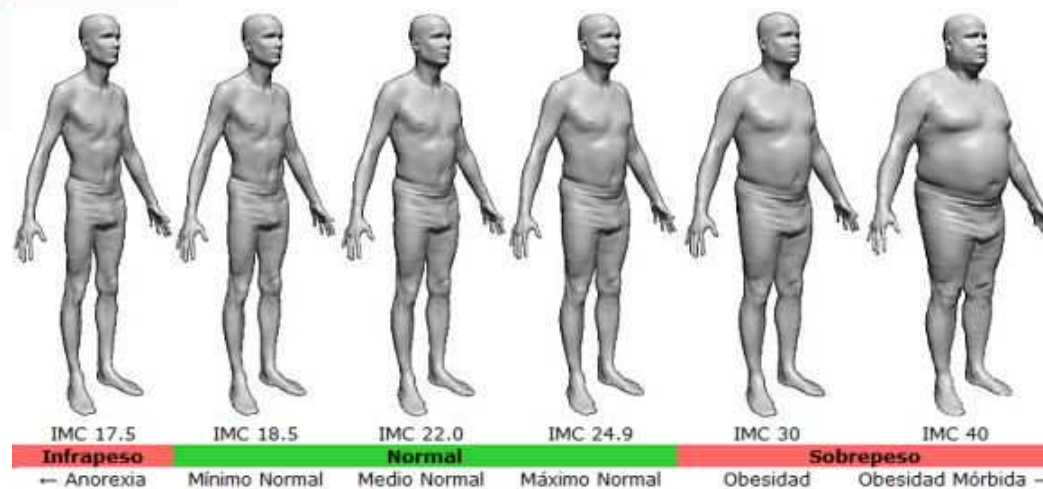


Facultad de Ciencias
de la Actividad Física y
del Deporte



TRATAMIENTO NUTRICIONAL

Dash
Diet



RESEARCH

Impact of long-term lifestyle programmes on weight loss and cardiovascular risk factors in overweight/obese participants: a systematic review and network meta-analysis

Lukas Schwingshackl^{1*}, Sofia Diaz² and Georg Hoffmann¹

DIETA + EF: mejor efecto a largo plazo para el tto de la obesidad.
DIETA: resultados antropométricos

- DIETA+EF vs. DIETA
- DIETA+EF vs. EF
- DIETA vs. EF

Abstract

Background: The aim of this meta-analysis was to compare the long-term efficacy of diet plus exercise (D + E) vs. diet (D), D + E vs. exercise (E) and D vs. E on anthropometric outcomes and cardiovascular risk factors in overweight and obese participants.

Methods: Electronic searches were performed in MEDLINE and the Cochrane Central Register of controlled trials. Inclusion criteria were as follows: body mass index ≥ 25 kg/m² and a minimum intervention period including follow-up of ≥ 12 months. Outcomes of interest were as follows: anthropometric parameters, blood lipids, blood pressure and cardiorespiratory fitness. Pooled effects were calculated using pairwise random effects and Bayesian random effects network meta-analysis. Results of the corresponding fixed effects models were compared in sensitivity analyses.

Results: Overall, 22 trials (24 reports) met the inclusion criteria and 21 (including 3,521 participants) of them were included in the quantitative analysis. As compared with D, D + E resulted in a significantly more pronounced reduction in body weight [mean differences (MD): -1.38 kg, 95% confidence interval (CI) -1.98 to -0.79], and fat mass (MD: -1.65 kg, 95% CI -2.81 to -0.49), respectively. When comparing D + E with E, MD in change of body weight (-4.13 kg, 95% CI -5.62 to -2.64), waist circumference (-3.00 cm, 95% CI -5.81 to -0.20), and fat mass (-3.60 kg, 95% CI -6.15 to -1.05) was in favour of combined diet and exercise, respectively. Comparing E vs. D, diet resulted in a significantly more pronounced decrease in body weight (MD: -2.93 kg, 95% CI -4.18 to -1.68), and fat mass (MD: -2.20 kg, 95% CI -3.75 to -0.66). D + E yielded also the greatest reductions with respect to blood lipids and blood pressure when compared to single applications of D and E, respectively. Results from the network meta-analyses confirmed these findings.

Conclusions: Moderate-quality evidence from the present network meta-analysis suggests that D + E can be highly recommended for long-term obesity management. Furthermore, the evidence suggests a moderate superiority of D over E with respect to anthropometric outcomes.

Systematic review registration: PROSPERO CRD42013003906

Keywords: Lifestyle, Obesity, Network meta-analysis, Systematic review, Diet, Exercise

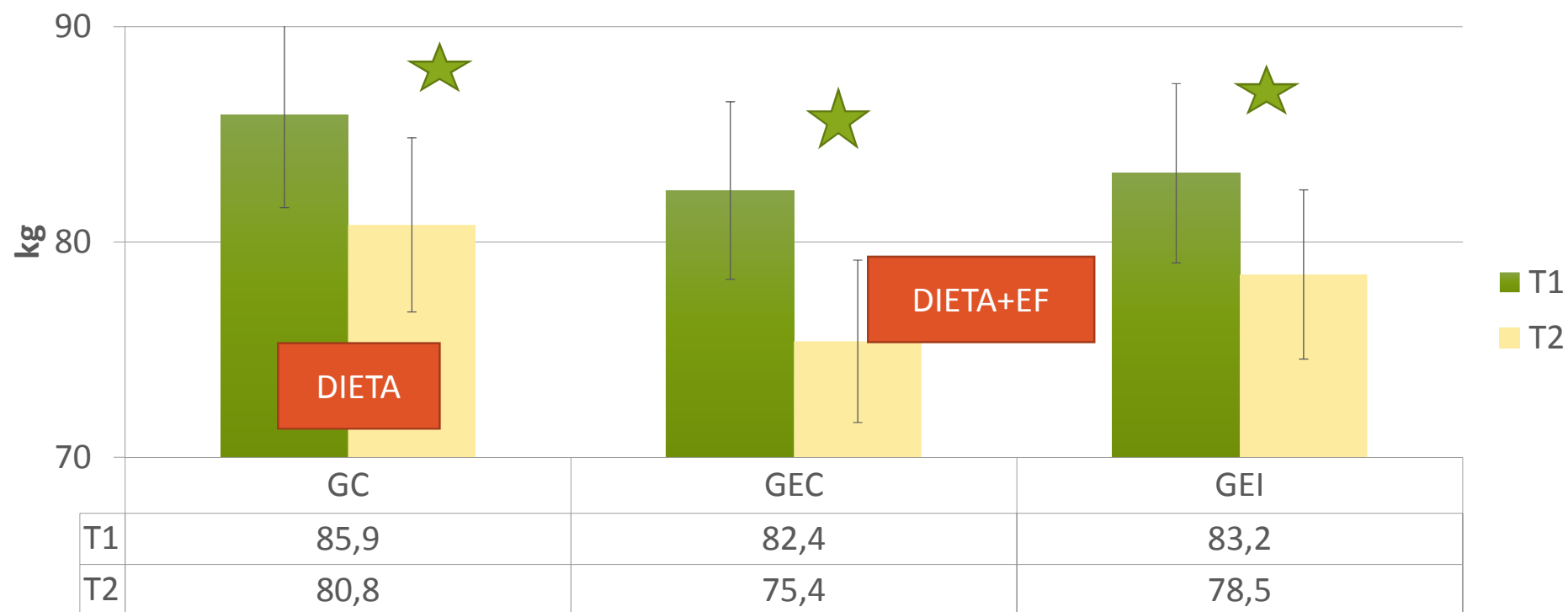
OBJETIVOS

- **Comparar** los efectos de dos programas de **EF aeróbico** (**continuo** de intensidad moderada y alto volumen vs. **interválico** de alta intensidad y bajo volumen) en la masa y composición corporal, presión arterial y condición cardiorespiratoria en pacientes adultos con **sobrepeso** u obesidad e **hipertensión** primaria tratados con **dieta** hipocalórica; con los efectos mediante tratamiento único con dieta hipocalórica (16 semanas de intervención).

★ Diferencias entre T1 y T2 ($p < 0.05$)

RESULTADOS: COMPOSICIÓN CORPORAL

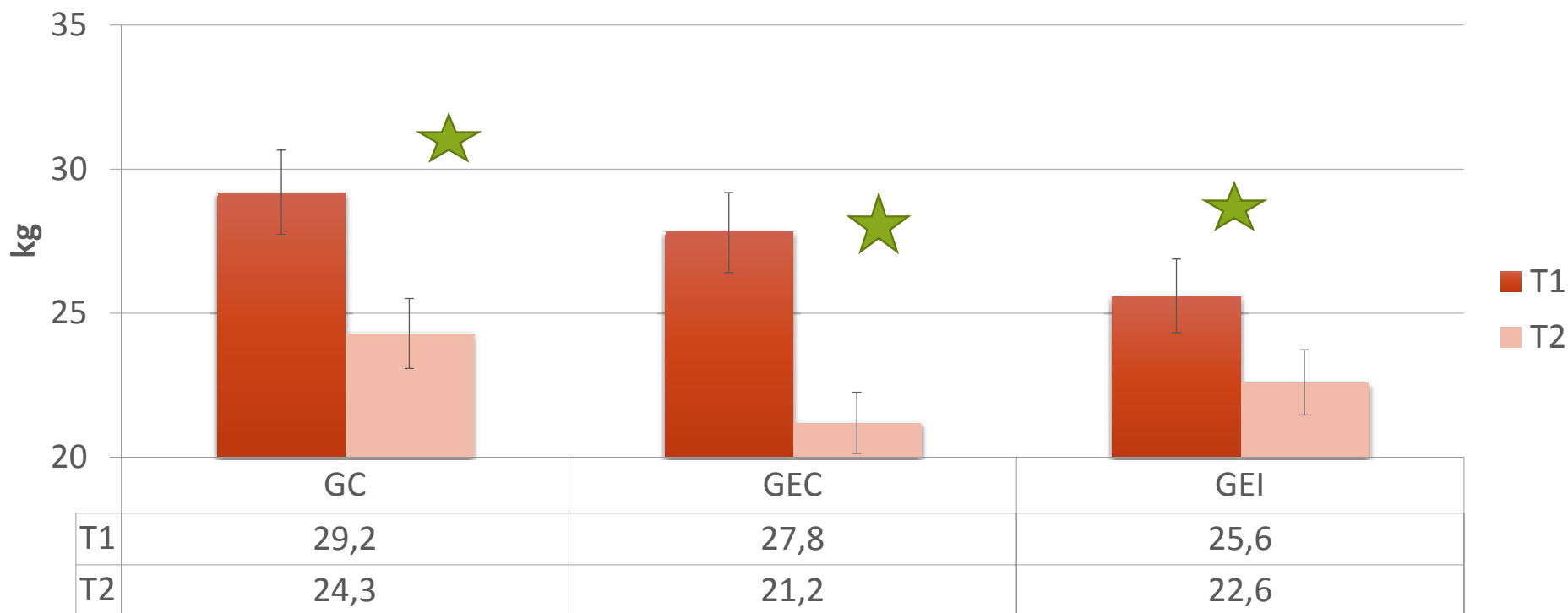
Masa Corporal



★ Diferencias entre T1 y T2 ($p < 0.05$)

RESULTADOS: COMPOSICIÓN CORPORAL

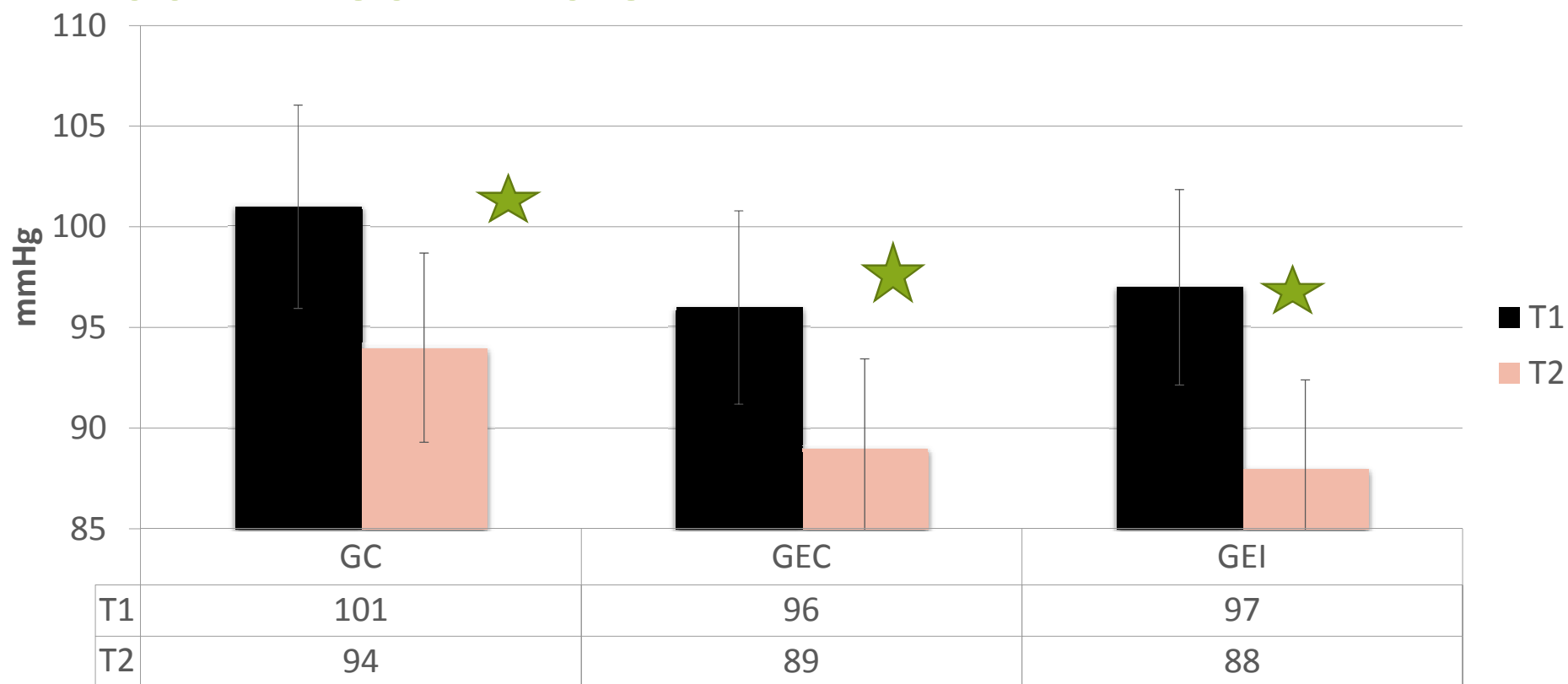
Grasa Corporal



★ Diferencias entre T1 y T2 ($p < 0.05$)

$$\text{PAM} = \text{PAD} + 0.333 \times (\text{PAS} - \text{PAD})$$

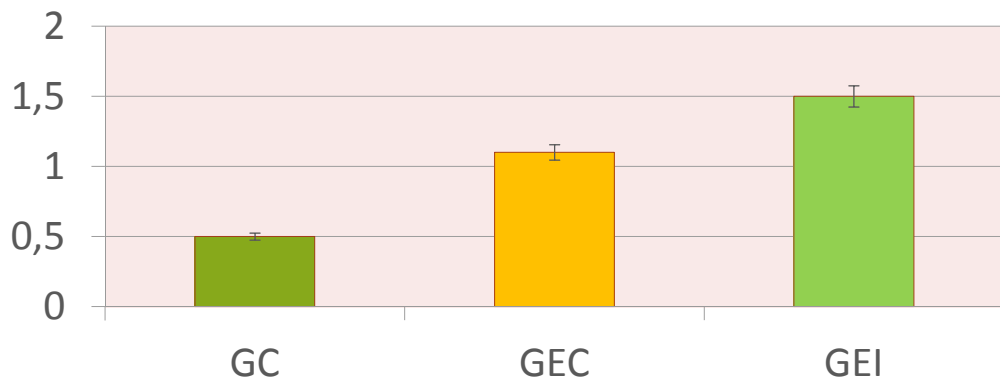
RESULTADOS: PRESIÓN ARTERIAL MEDIA



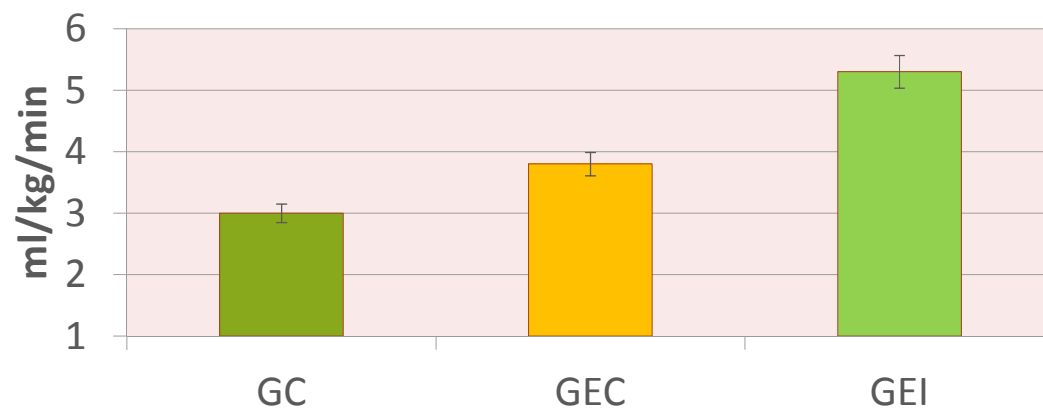
Variables	GC	P _{T1-T2}	GEC	P _{T1-T2}	GEI	P _{T1-T2}
VO_{2pico} (L/min)						
T1	1,9(0,6)		2,1(0,6)		1,8(0,5)	
T2	2,0(0,6)	0,703	2,2(0,5)	0,158	2,1(0,4)	0,047*
VO_{2pico} (mL/kg/min)						
T1	22,1(6,2)		25,6(4,3)		21,6(5,9)	
T2	25,1(9,1)	0,116	29,4(3,9)	0,005*	27,0(5,5)	0,009*
MET						
T1	6,7(2,1)		7,3(1,5)		6,2(1,7)	
T2	7,2(2,6)	0,191	8,4(1,1)	0,026*	7,7(1,5)	0,016*

RESULTADOS:
CONDICIÓN
CARDIORESPIRATORIA

MET



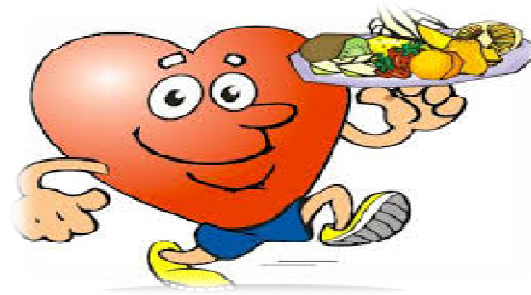
VO_{2max}



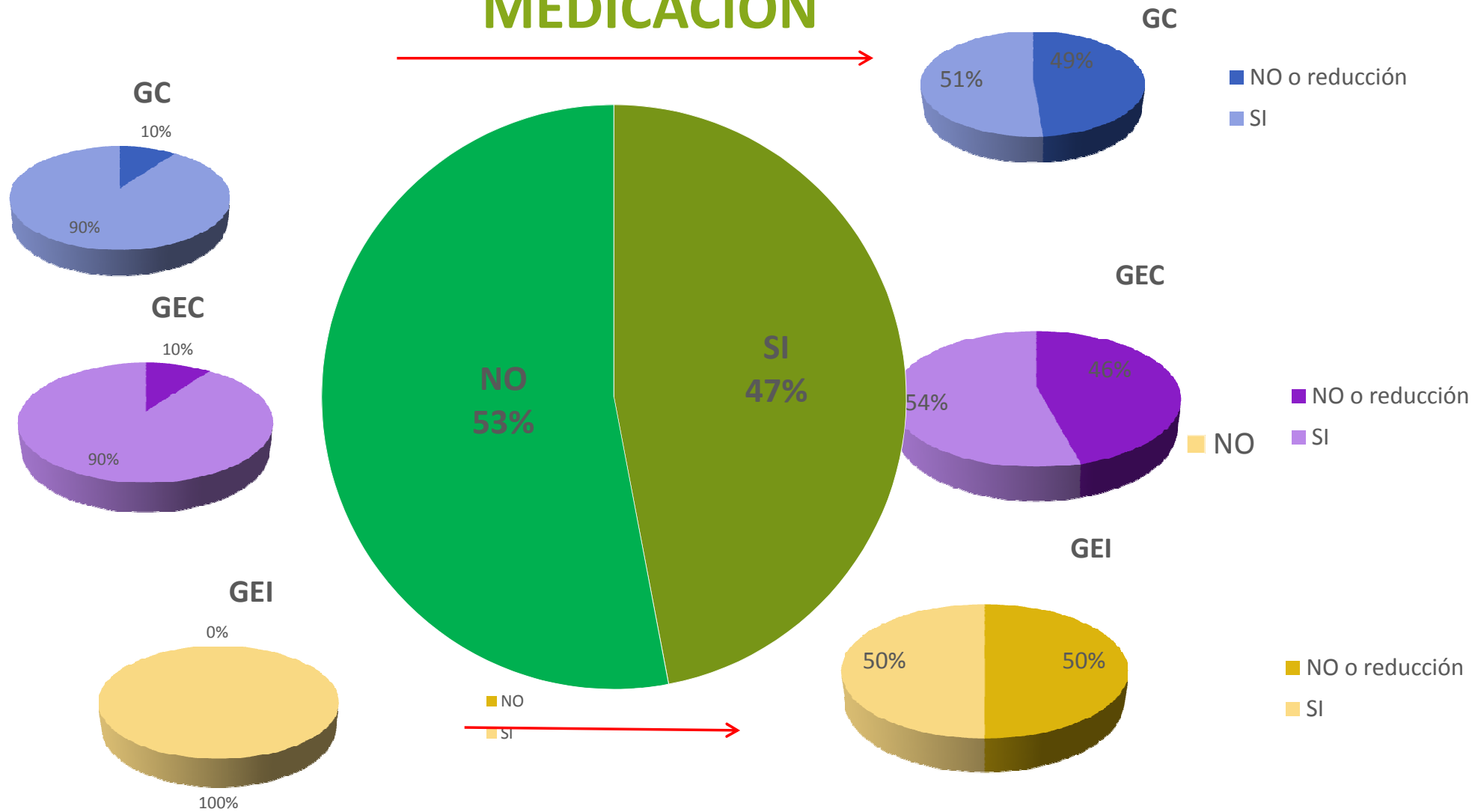
CONCLUSIONES

- Tanto un tratamiento único con dieta hipocalórica como combinado con EF aeróbico (moderado & interválico) consiguen reducir la masa y grasa corporal y PA en reposo en pacientes con hipertensión y sobrepeso.
- Solamente el tratamiento combinado (dieta+EF) consigue mejoras añadidas en la condición cardiorespiratoria, lo que se asocia a una reducción del riesgo de enfermedad cardiovascular.
- El protocolo de EF aeróbico de alta intensidad y bajo volumen podría resultar más efectivo con incrementos superiores de las variables cardiorespiratorias, concluyendo que “menos” puede ser “más”.

DATOS PRELIMINARES!!



MEDICACIÓN



ESKERRIK ASKO ZURE ARRETAGATIK!

