

*II Jornada de actualización en Nutrición y Alimentos UCM - 2019*  
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# Nuevas estrategias para el tratamiento de ECNT

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**Nut. M Sc.**

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gasto energético en condiciones de  
hipoxia hipobárica.

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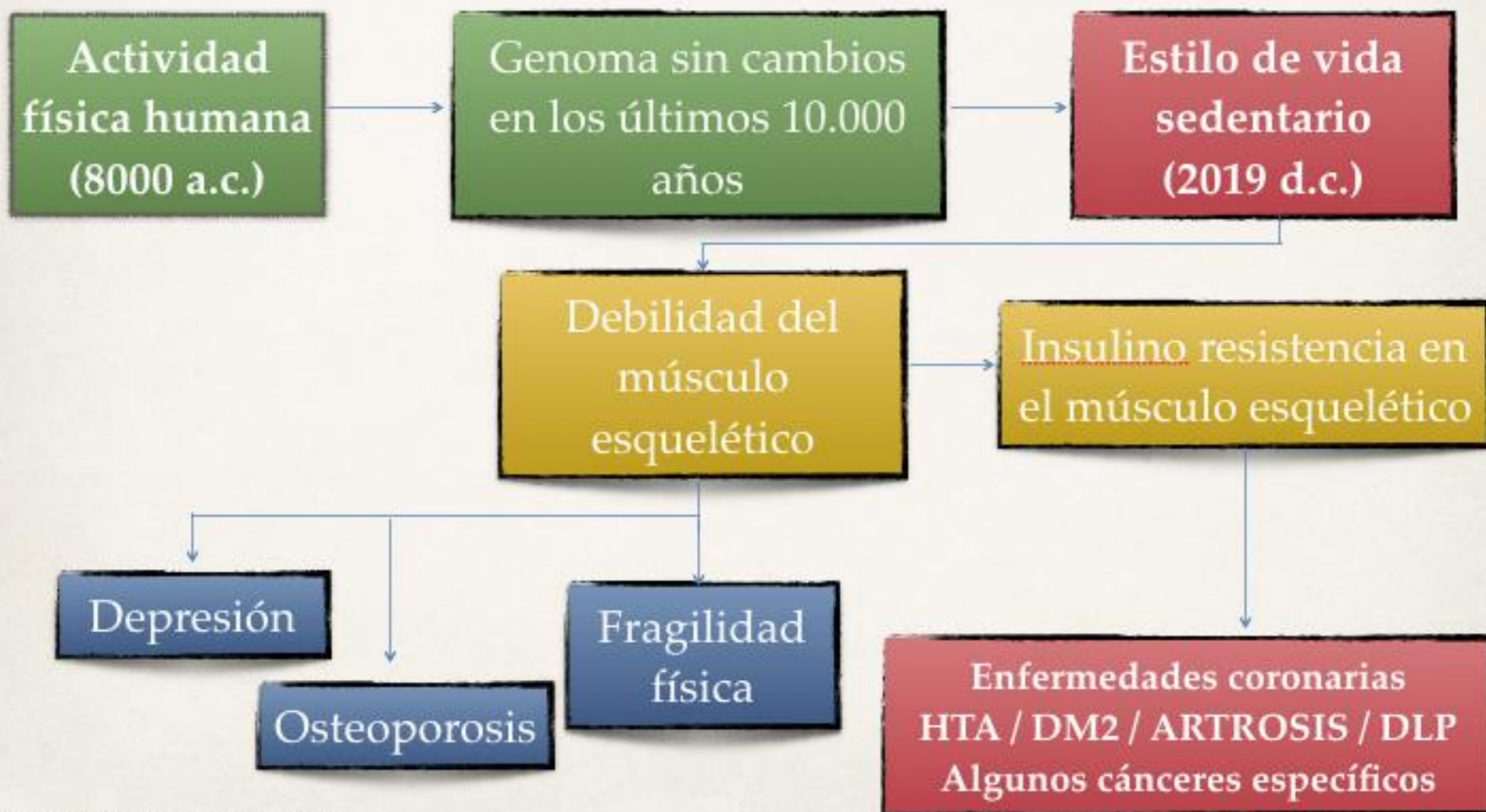
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# Objetivo:

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- ❖ Reconocer nuevas estrategias, tanto físicas, nutricionales y ambientales, para el tratamiento de las ECNT.

# Hipótesis de la teoría del genoma humano y la actividad física

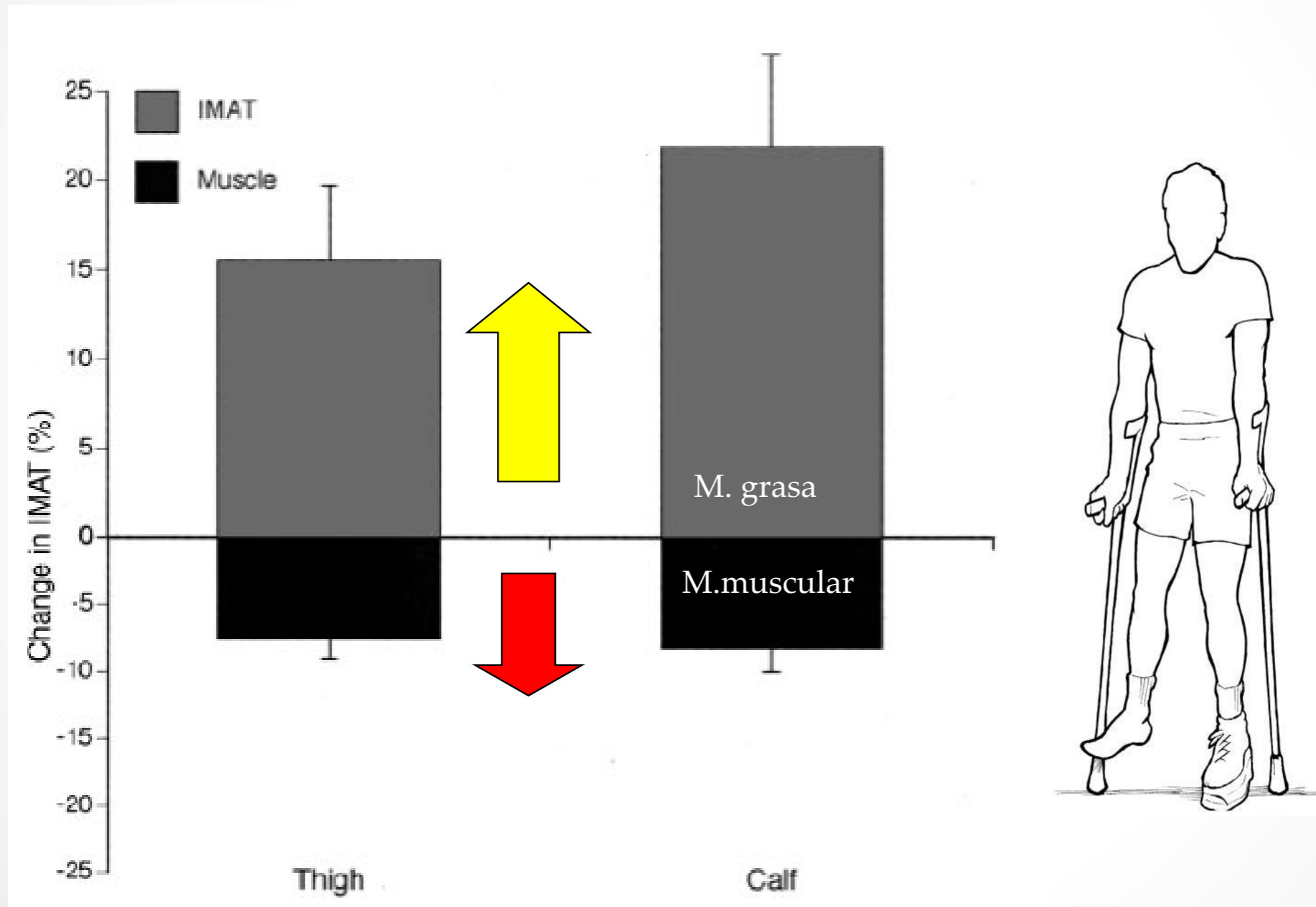


# Sedentarismo

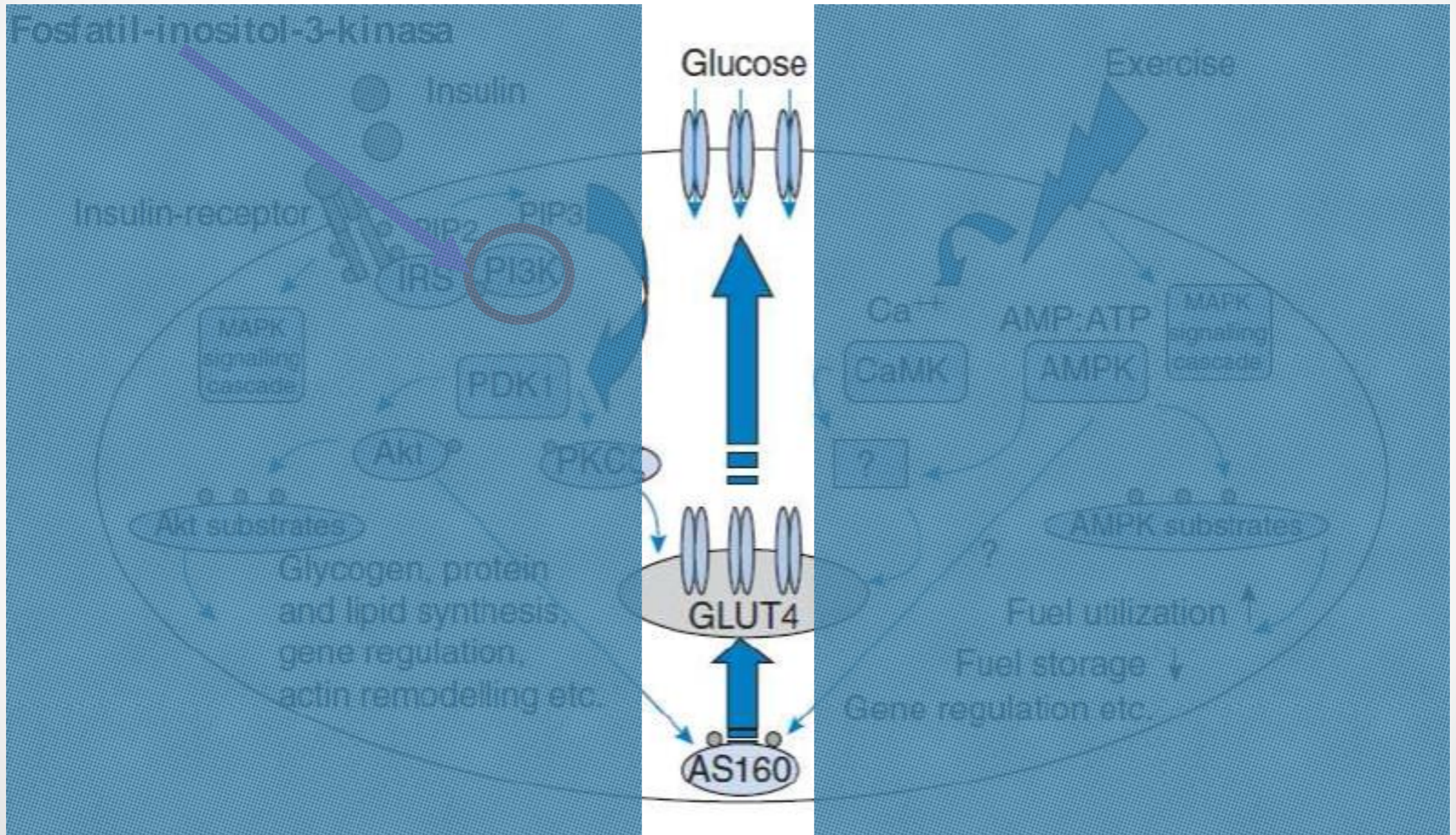
- Pérdida del tono y fuerza muscular
- Disminución de la masa mitocondrial
- Incremento en grasa intramuscular
- Disminución de la capacidad física



# Infiltración de lípidos en los miocitos



# Normal metabolización de Hidratos de Carbono.



(ref: Hawley, J. Hargreaves, M. Zierath, J. Essays of Biochem 42:1-12, 2006).

# Contracción muscular

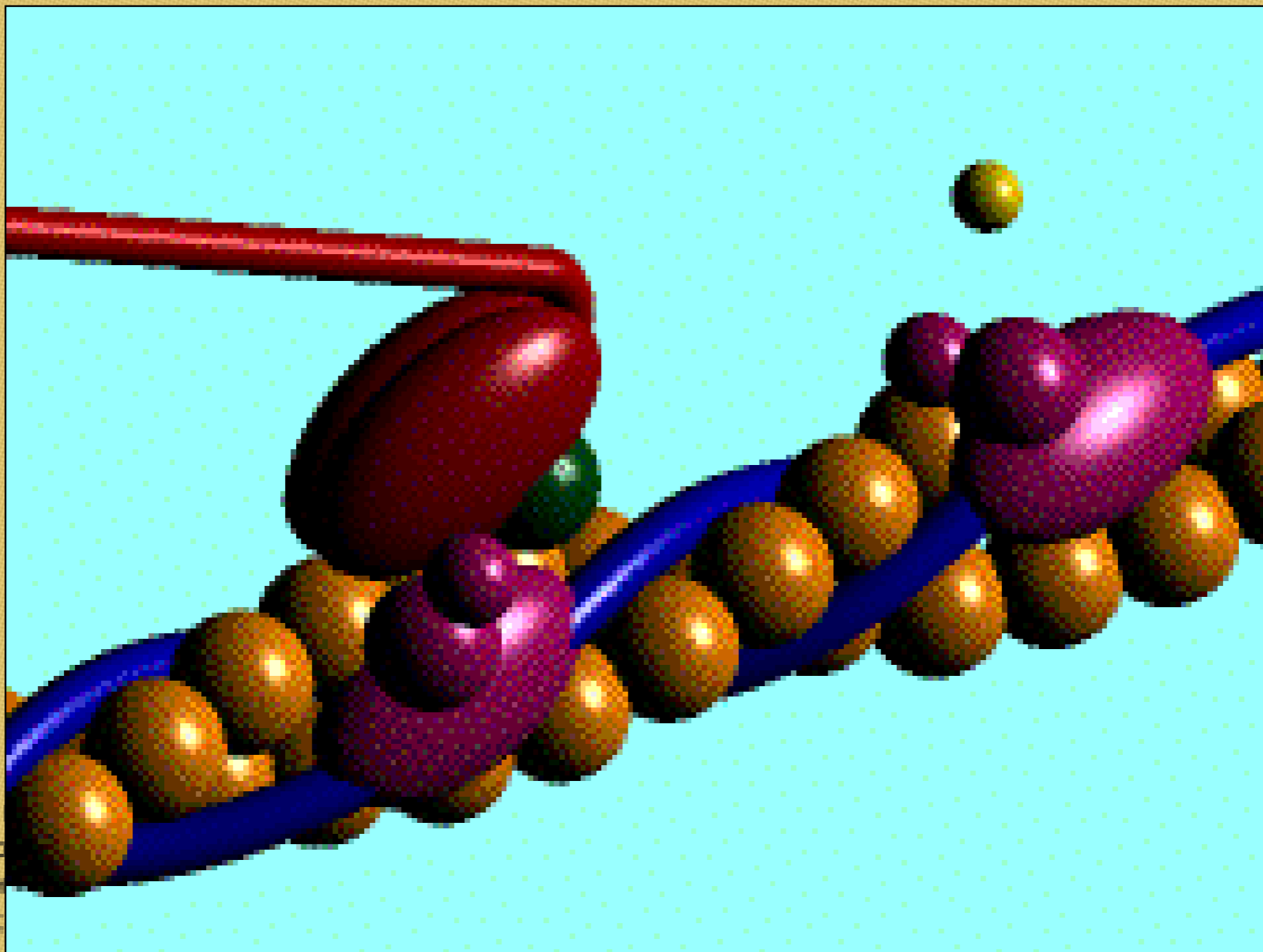
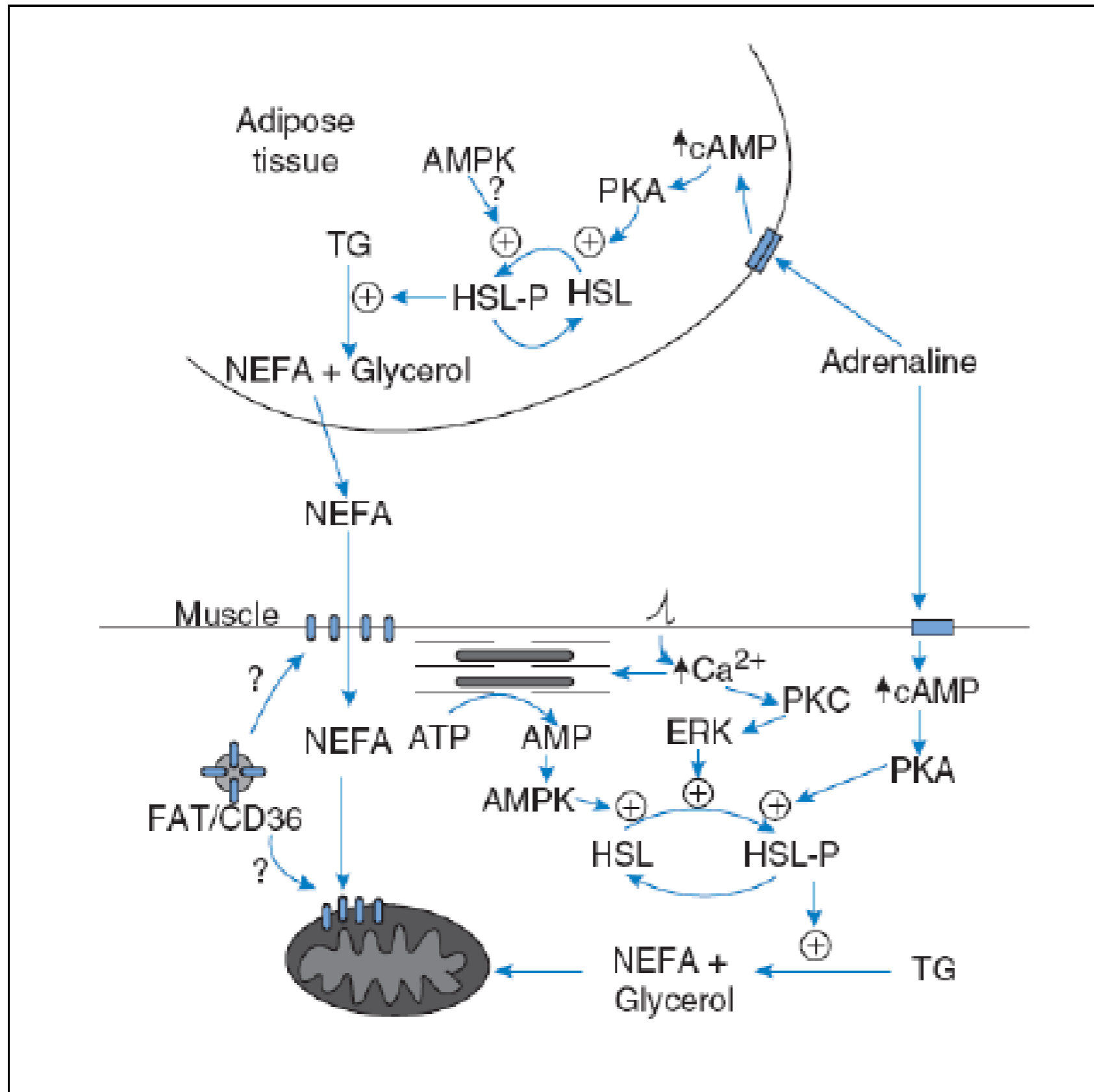


Fig. 1. Metabolic and  
(2)  $\text{Ca}^{2+}$  flux; (3) red  
Wilkins). ADP = ade  
adenine dinucleotide;

mechanical stretch;  
Scott, Williams &  
= nicotinamide

**Fig. 3 Integración de las vías de metabolización de los AG en el tejido adiposo y muscular en respuesta al ejercicio** (Hawley J et al. Essays in Biochem 2006; 42: 1-12)



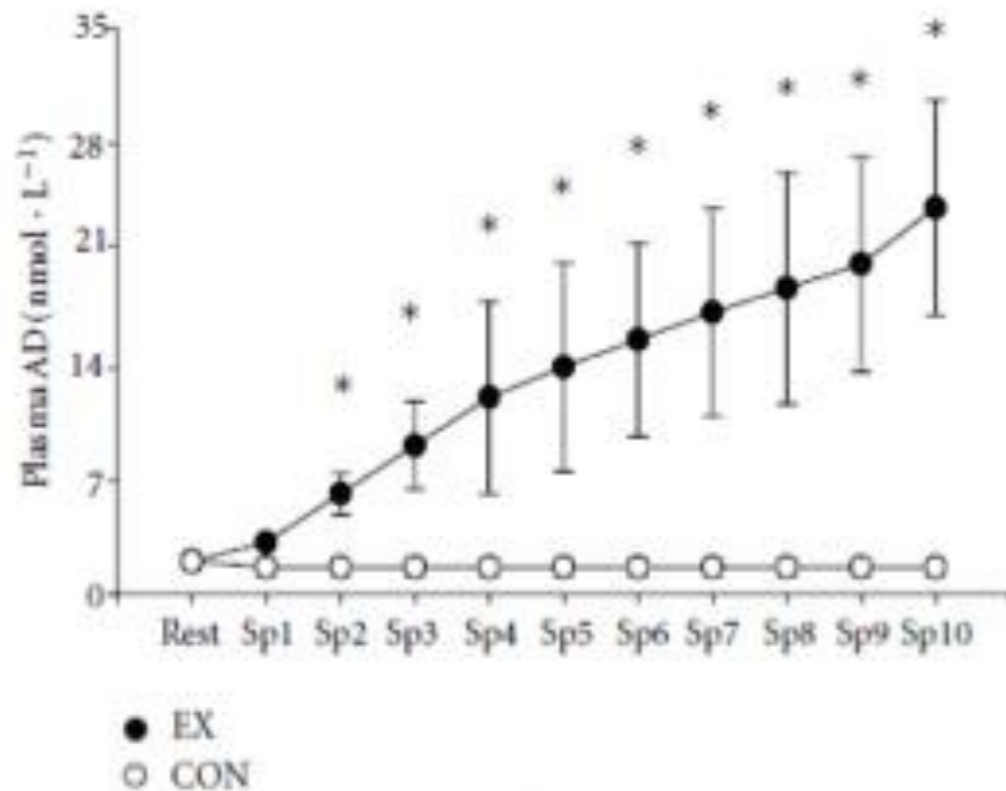
Funcionalidad del adiposito y miocito frente a estímulos



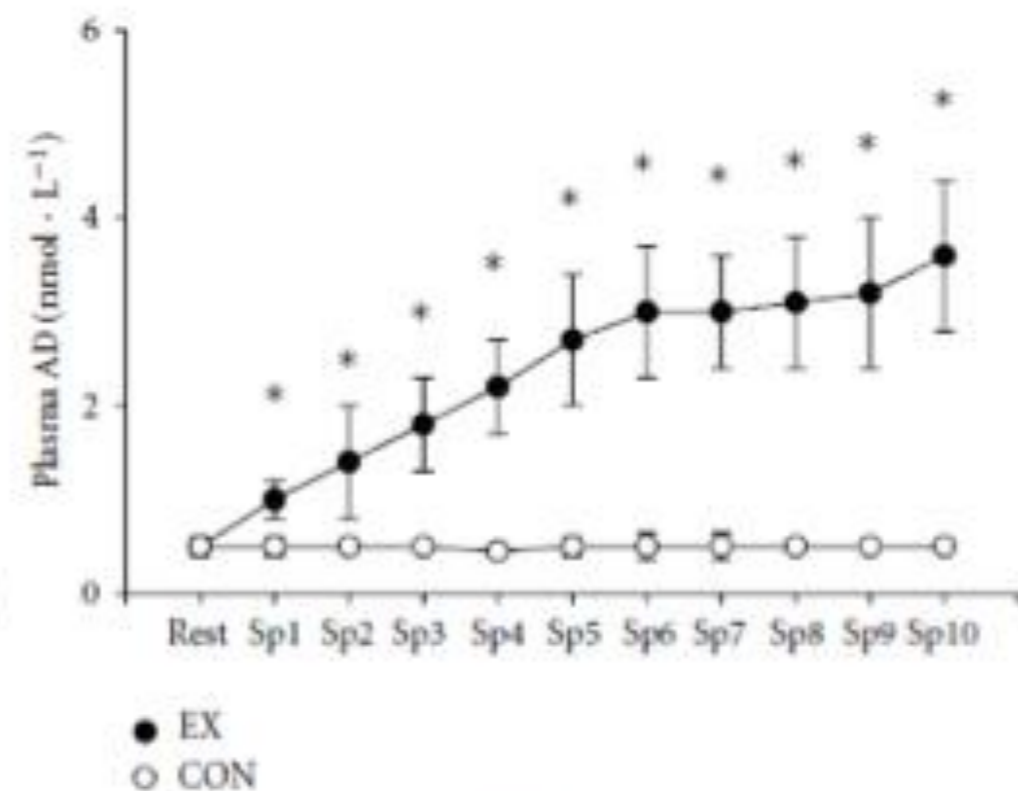
# Efecto de catecolaminas

Noradrenalina

Adrenalina



(a)



(b)

FIGURE 1: Plasma noradrenaline (NA) and adrenaline (AD) concentration of subjects at rest (CON) and following each 6-second sprint (EX) (mean  $\pm$  SD,  $n = 12$ ). \* Indicates a significant difference from equivalent CON value ( $P < .05$ ). (Adapted from Bracken et al. [16]).

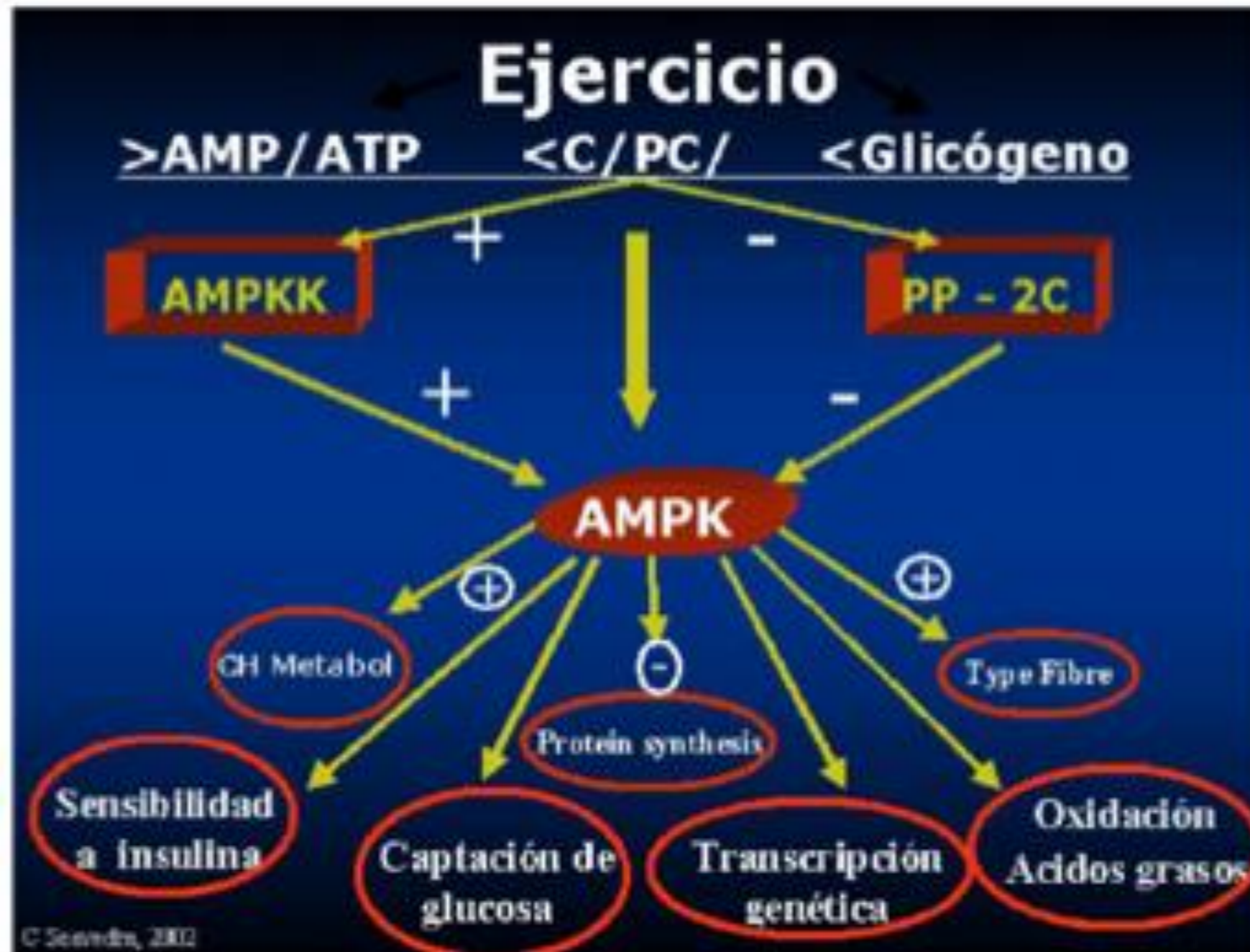
Review Article

High-Intensity Intermittent Exercise and Fat Loss

Stephen H. Boutcher

Journal of Obesity 2011, Article ID 868305, doi:10.1155/2011/868305

# Proteína clave del Met. celular



Carlos Saavedra, 2002.

# Otros resultados gracias al ejercicio

Pathophysiology/Complications

ORIGINAL ARTICLE

## Independent and Combined Effects of Exercise Training and Metformin on Insulin Sensitivity in Individuals With Prediabetes

Nutrition Research and Practice 2016;10(2):161-166

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<http://e-nrp.org>

The effects of exercise training and acute exercise duration on plasma folate and vitamin B<sub>12</sub>

Young-Nam Kim, Ji Hyeon Hwang and Youn-Ok Cho<sup>5</sup>

Department of Food and Nutrition, Doksung Women's University, 33 Samyangro 144-gil, Dong-gu, Seoul 01309, Korea

## Ejercicio en pacientes en hemodiálisis: revisión sistemática de la literatura

E. Segura-Ortí

Departamento de Fisioterapia. Universidad CE

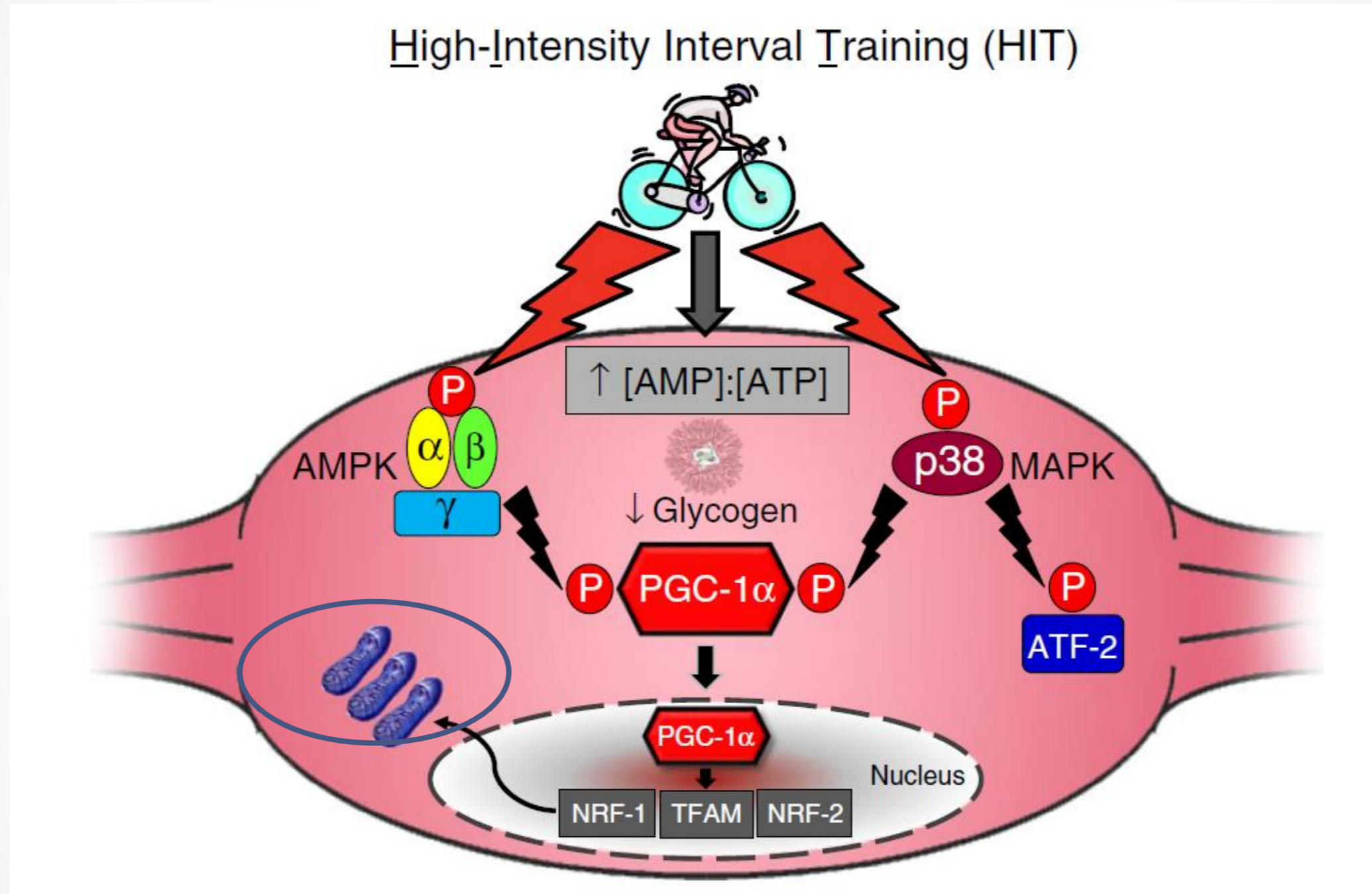
Nefrología 2010;30(2):236-46

## Etiology and Pathophysiology/Obesity Treatment

## Hypoxia, energy balance and obesity: from pathophysiological mechanisms to new treatment strategies

B. Kayser<sup>1</sup> and S. Verges<sup>2</sup>

# Ejercicios por intervalos de alta intensidad (HIIT)



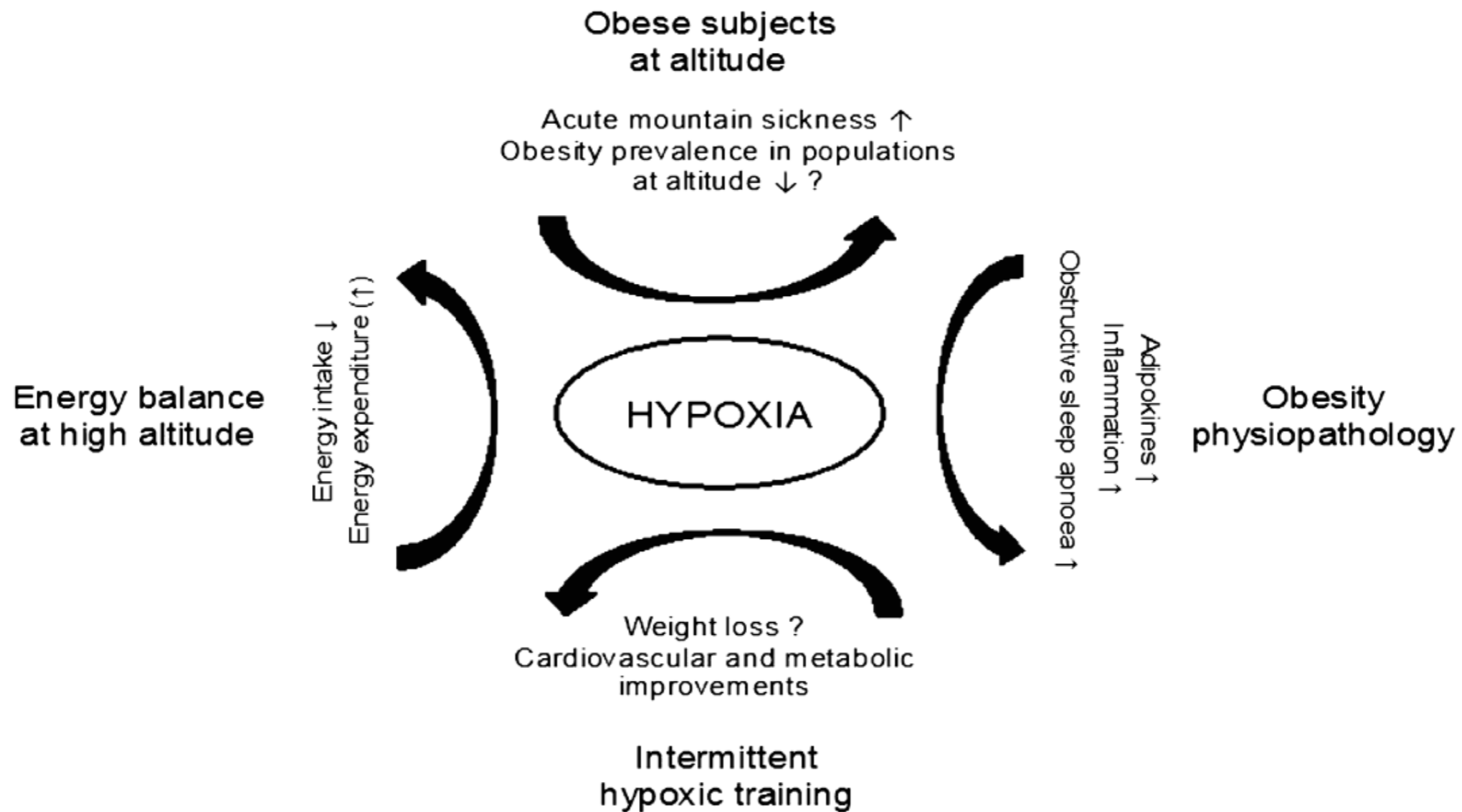
# Ejemplos de ejercicios HIIT

Effect of high-intensity intermittent exercise on subcutaneous fat, body mass and insulin sensitivity. (Boutcher, Int J Obesity 2011)

Autor	Grasa Subcutanea	Peso (kg)	Ejercicio	Sensibilidad insulínica
Boudou 2003 DM2	-18%	-1.9kg	5v * 2 min Ex 3min Descanso 8sem	+58%
Mourier 1997 DM2	-18%	-1.5kg	5v * 2 min Ex 3min Descanso 8sem	+46%
Whyte 2010 Sob/Ob hombres	-15%	-0.1kg	5v * 30 seg Ex 4.5min Descanso 2 sem	+25%
Tjonna 2008 Síndrome Metab	?	-2.3kg	4v * 4 min Ex 3min Descanso 16 sem	+19%
Tjonna 2009 Sob adolescentes	-2.4kg	-0.1kg	4v * 4 min Ex 3min Descanso 12 sem	+29%
Dunn 2009 Mujeres PreMen	-2.6kg	-1.9kg	60v * 8seg Ex 12seg Descanso 12 sem	+36%
Trapp 2008 Mujeres jóvenes	-2.5kg	-1.5kg	60v * 8seg Ex 12seg Descanso 15 sem	+33%

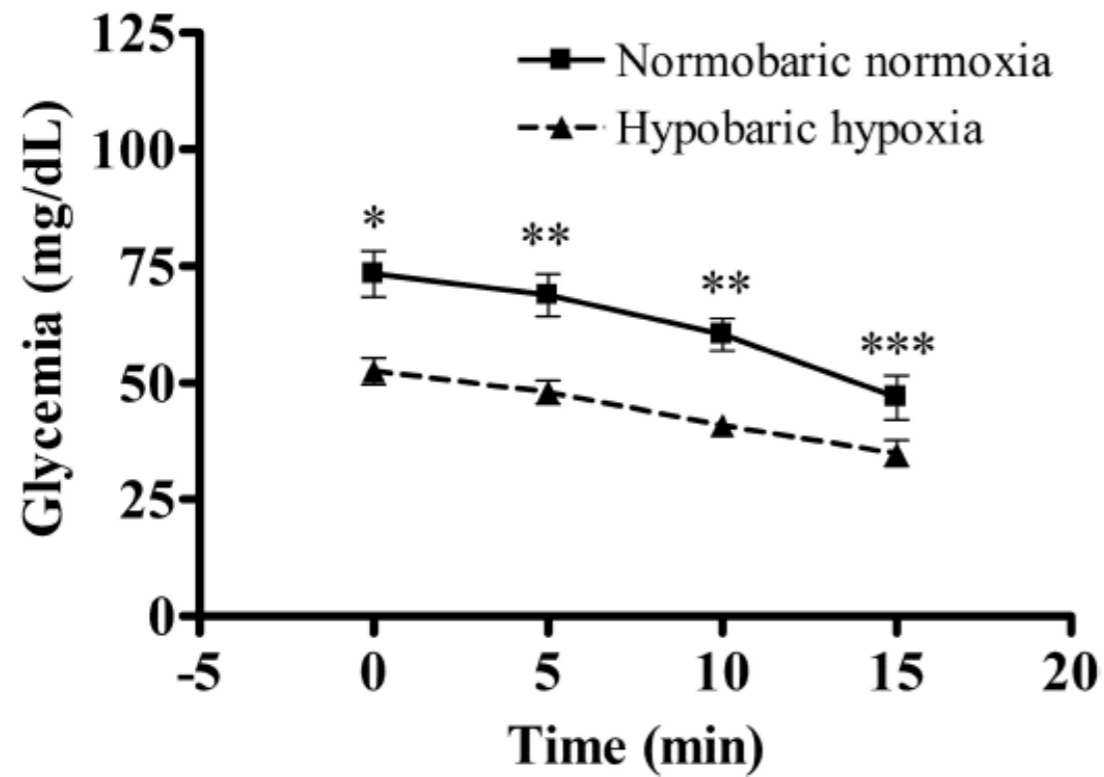
# Hypoxia, energy balance and obesity: from pathophysiological mechanisms to new treatment strategies

B. Kayser<sup>1</sup> and S. Verges<sup>2</sup>



**Figure 5** Overview of the relationships between hypoxia, energy balance and obesity.

Figure 2.

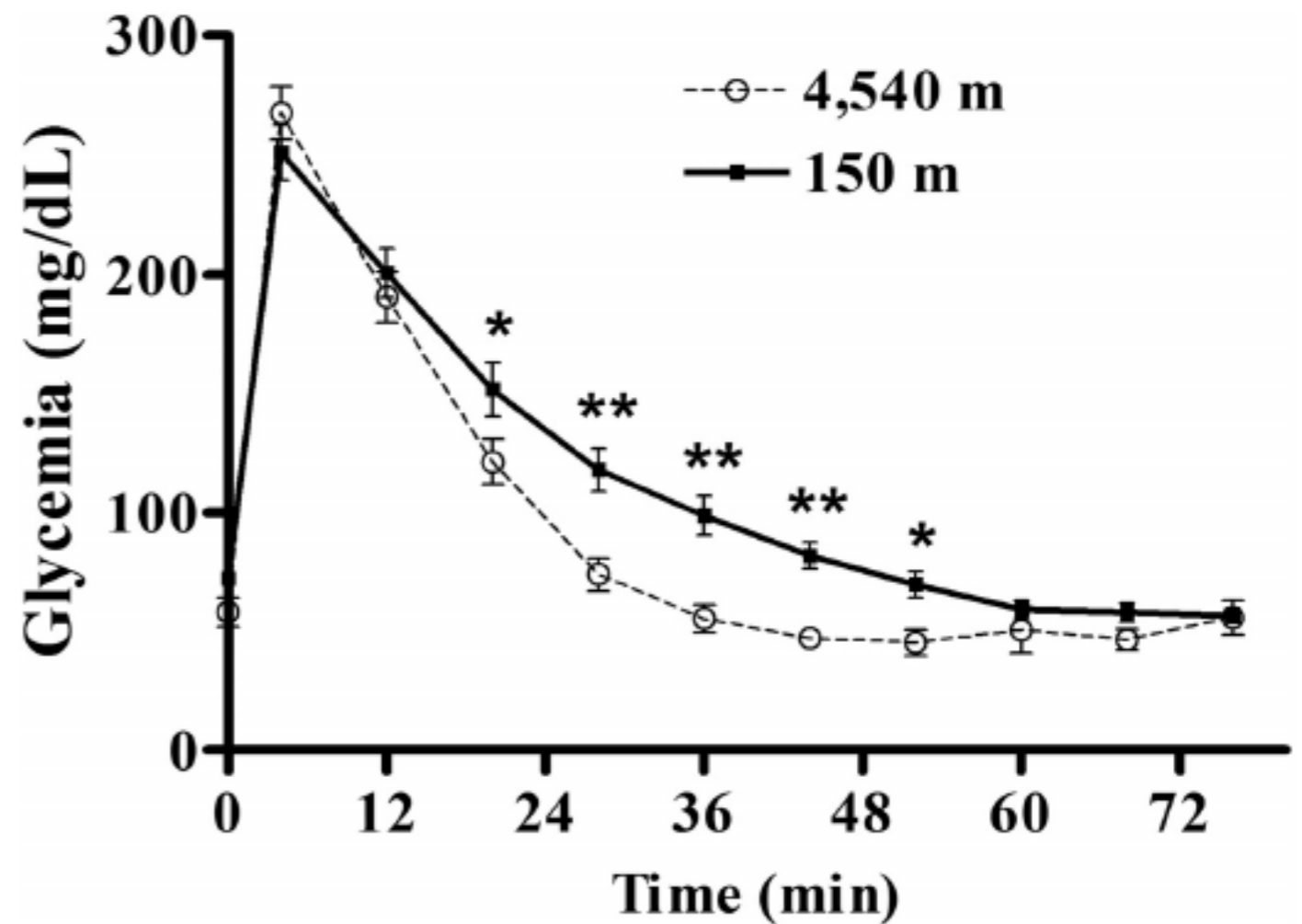


Glycemia profile during an IV insulin tolerance test performed at 150 m (normobaric normoxia) and after acute exposure to simulated altitude (hypobaric hypoxia) at 3200 m. Male subjects (BMI:  $26 \pm 3.53$  kg/m<sup>2</sup>, SD) were in a ~15-hour fasting state prior to the commencement of the test (Orison Woolcott, unpublished data). \* $P < .01$ , \*\* $P < .001$ , \*\*\* $P < .05$ , hypobaric hypoxia vs normobaric normoxia.

## Glucose homeostasis during short-term and prolonged exposure to high altitudes

Orison O. Woolcott, Marilyn Ader, Richard N. Bergman

Diabetes and Obesity Research Institute, Cedars-Sinai Medical Center, Los Angeles, CA



Review

## Altitude Training Improves Glycemic Control

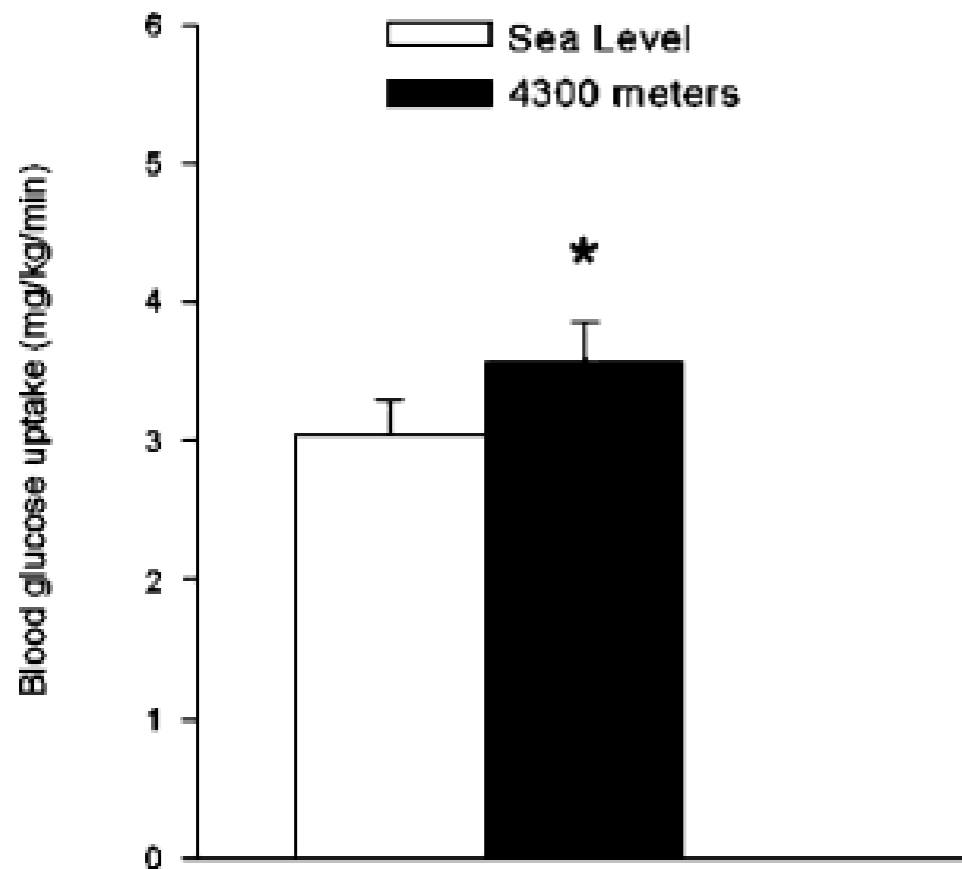
Shu-Man Chen<sup>1</sup>, Hsueh-Yi Lin<sup>2</sup>, and Chia-Hua Kuo<sup>3</sup>

<sup>1</sup>Committee for General Education, Shih Hsin University, Taipei 11604

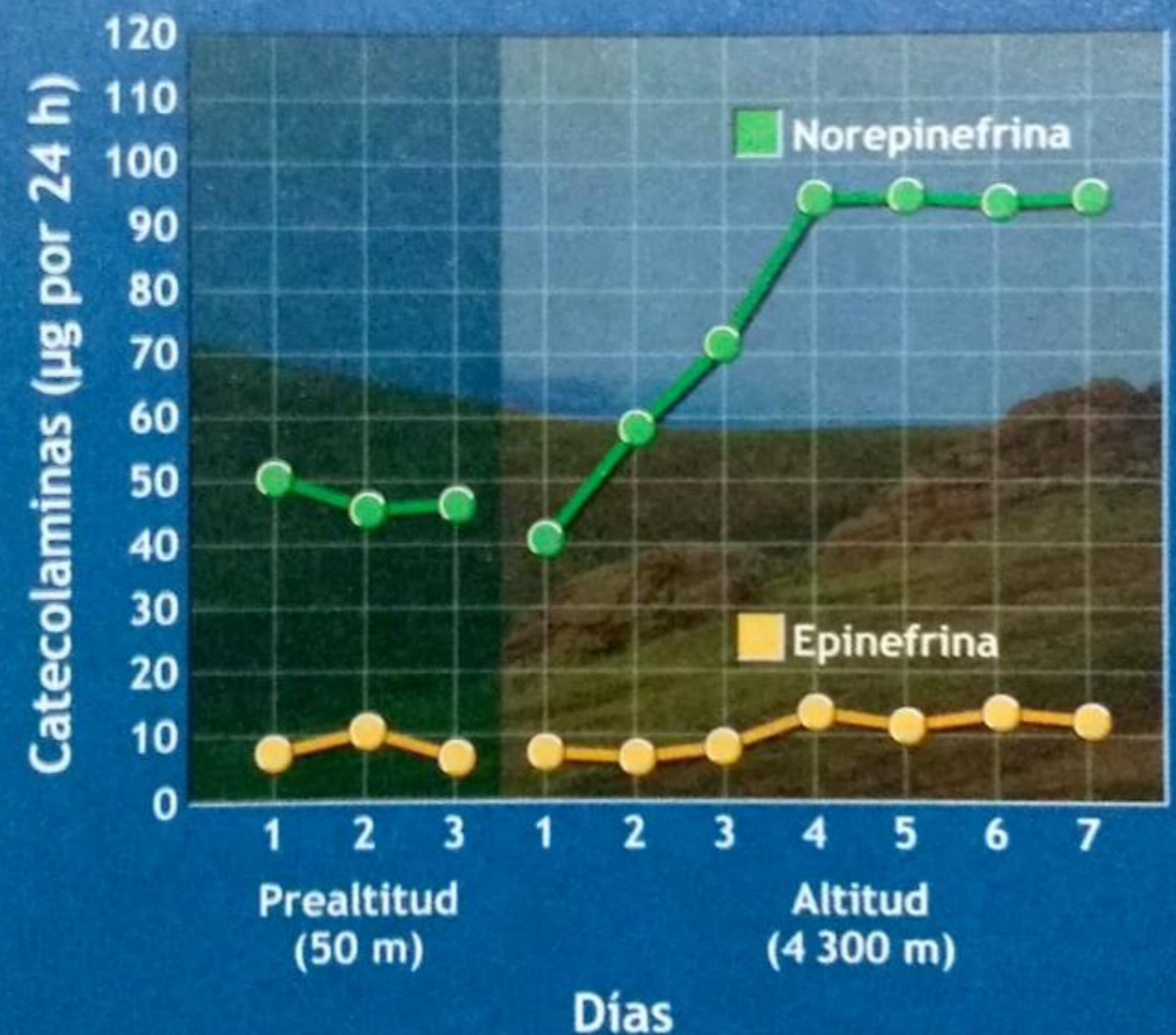
<sup>2</sup>Physical Education Office, National I-Lan University, I-Lan 26047

and

<sup>3</sup>Laboratory of Exercise Biochemistry, Taipei Physical Education College  
Taipei 11153, Taiwan, Republic of China



**FIGURE 1**—Glucose uptake during submaximal exercise (50% of sea level  $\dot{V}O_{2peak}$ ) in men after 18 d at 4300 m and at sea level. Asterisk (\*) indicates that sea level and 4300 m were significantly different. Adapted from Roberts et al. (35).

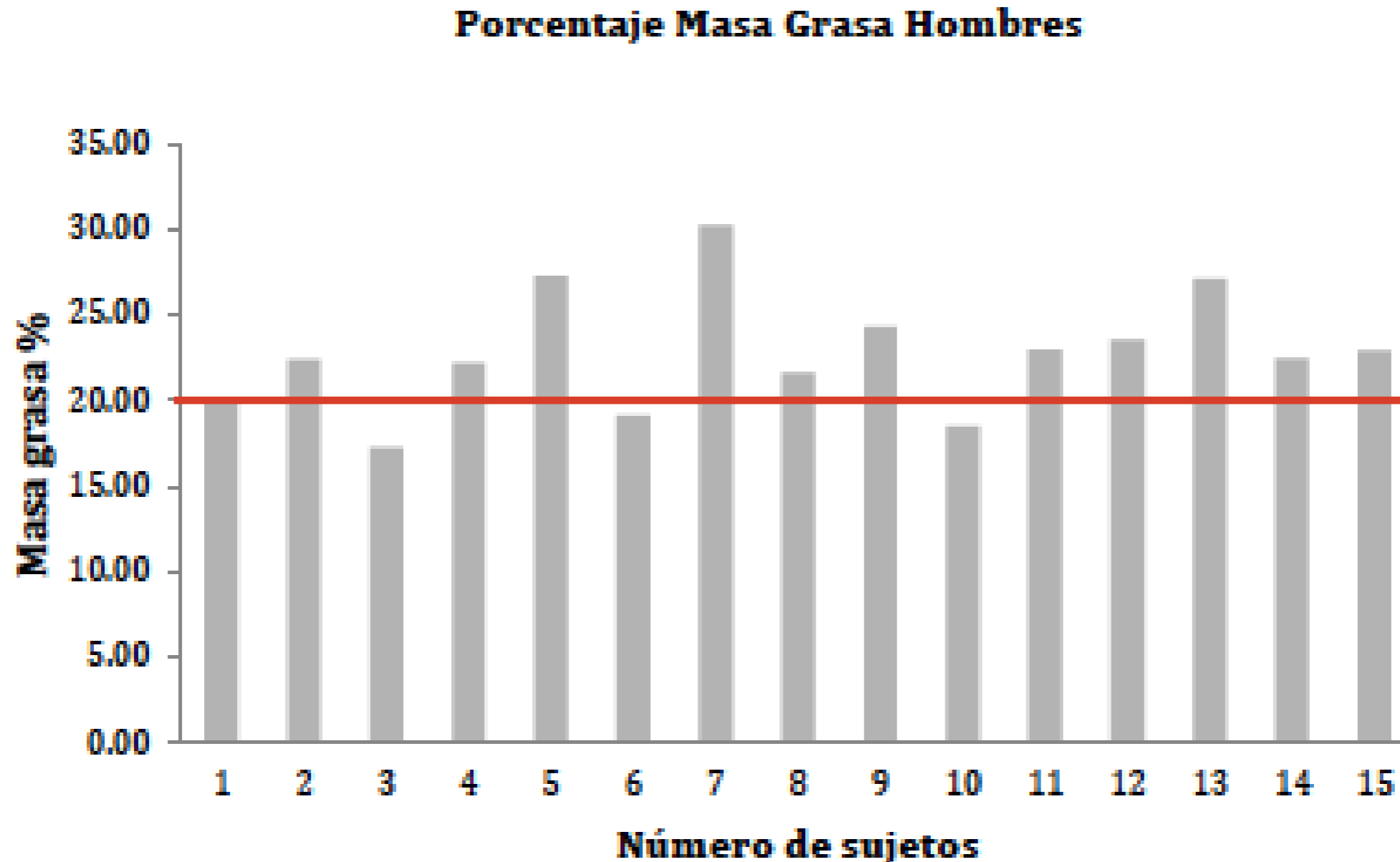




## SOMATOTIPO Y COMPOSICIÓN CORPORAL DE PORTEADORES Y GUÍAS DEL MONTE ACONCAGUA, ARGENTINA

*J Torres Mejía, E Rivarola, M Lopez Espinosa, J Loyola, Gonzalez, V Vargas, R Luna, E Diaz Bustos*

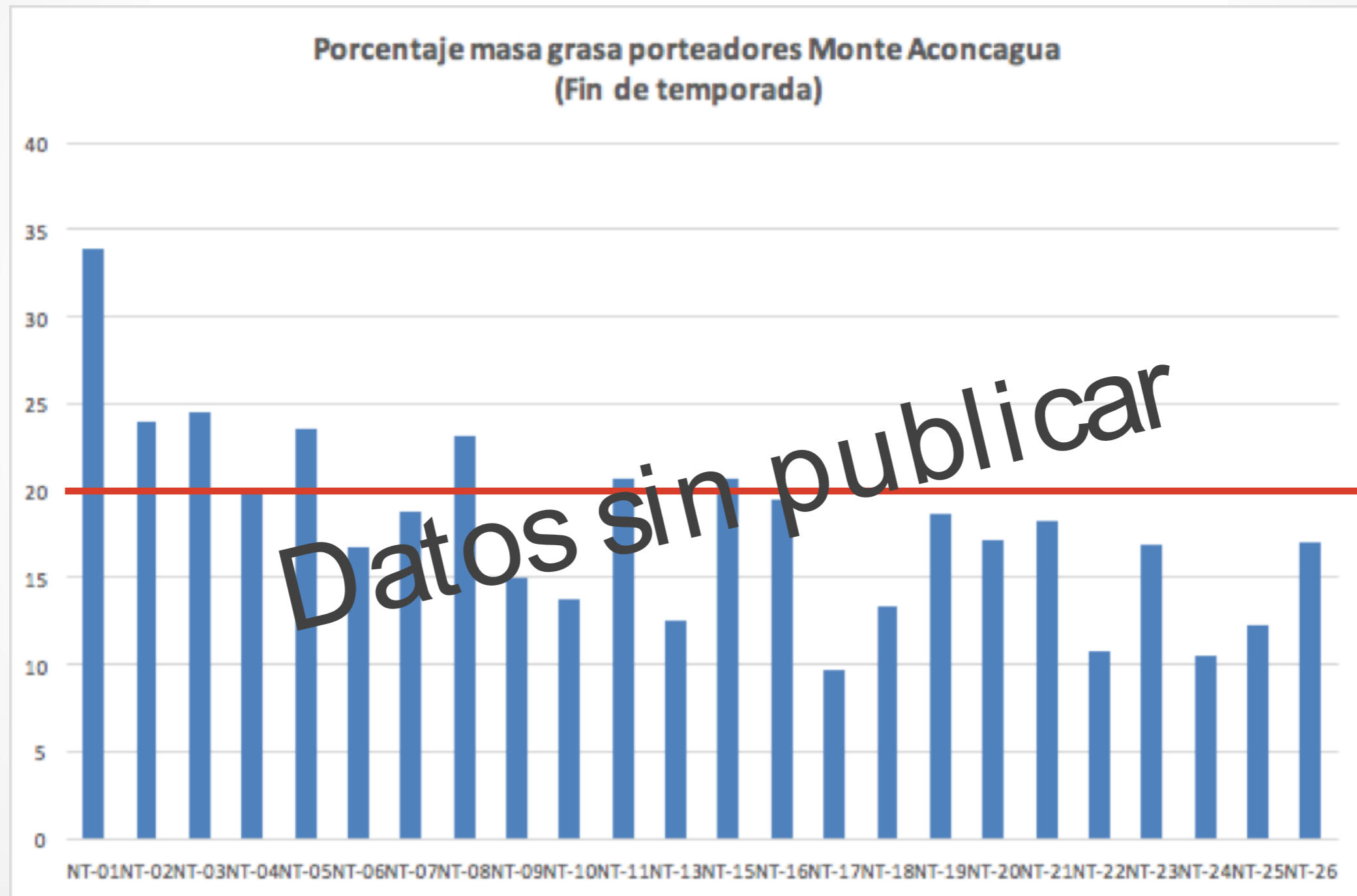
**Figure 3: Percentage of fat mass for men (n = 15)**



## BODY COMPOSITION AND FOOD INTAKE TO HIGH ALTITUDE

Key words: Body Composition, High Altitude, Deuterium Óxide.

<sup>1,3</sup>Torres M. Jorge, <sup>2</sup>Rivarola Evangelina, <sup>3</sup>Salazar Gabriela, <sup>3</sup>Alyerina Anziani, <sup>1</sup>Meza Juan, <sup>3</sup>Diaz Erick.



# Resumen:

- El sedentarismo mata.
- El sedentarismo perjudica el normal funcionamiento de la masa muscular esquelética.
- La activación de la proteína AMPK es vital para el funcionamiento celular.
- La utilización de condiciones de hipoxia hipobárica, puede ser una herramienta efectiva para el tratamiento de la obesidad y algunas ECNT.

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Tenemos mas de 4.000 kilómetros de montañas..  
¿y no las aprovechamos??...



Gracias por su atención...

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