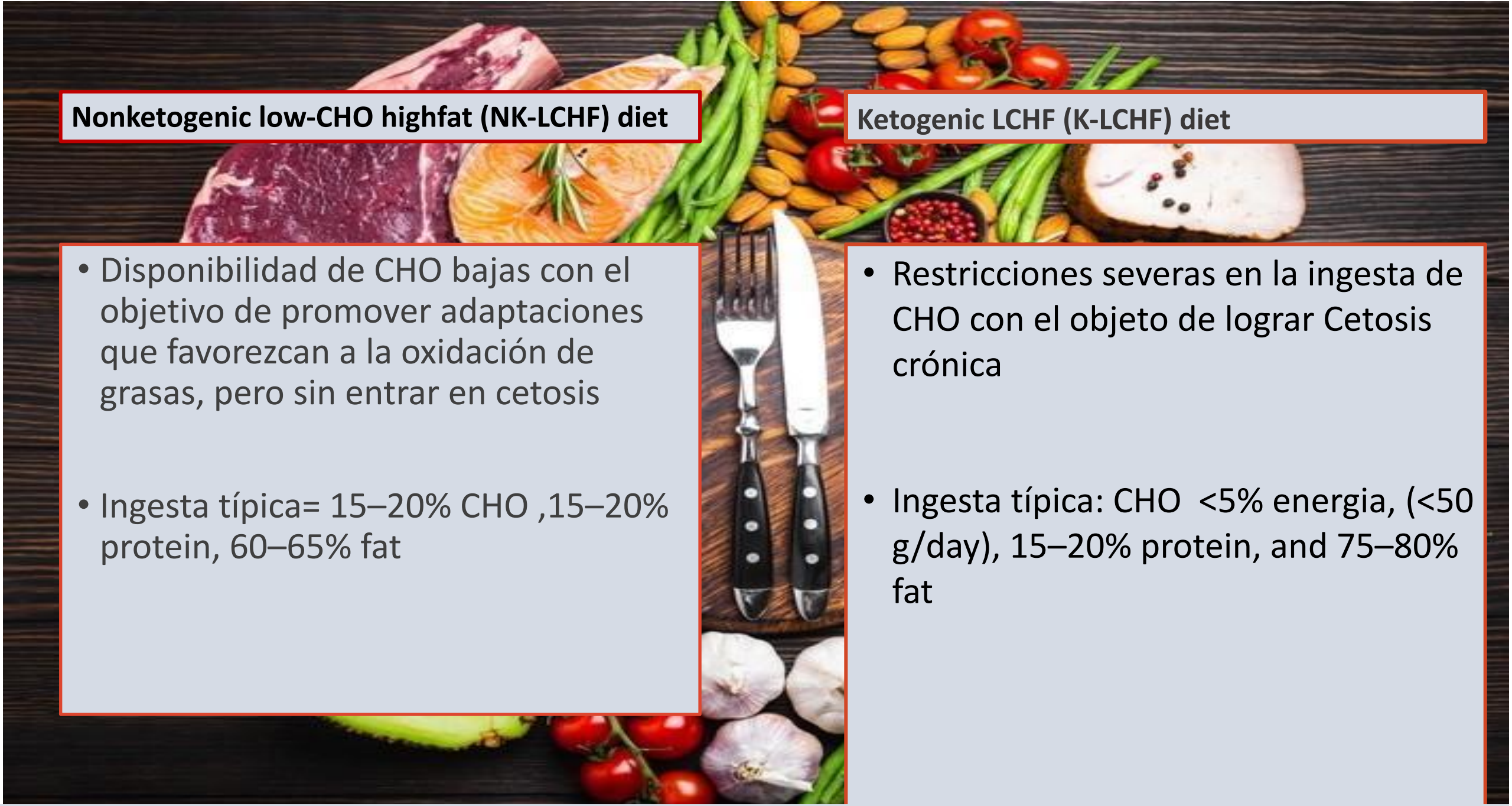


MITOS SOBRE LAS DIETAS CETOGÉNICAS EN LA SALUD Y EL RENDIMIENTO

Lic. Prof. Fernando Luna

@nutricionlp



Nonketogenic low-CHO highfat (NK-LCHF) diet

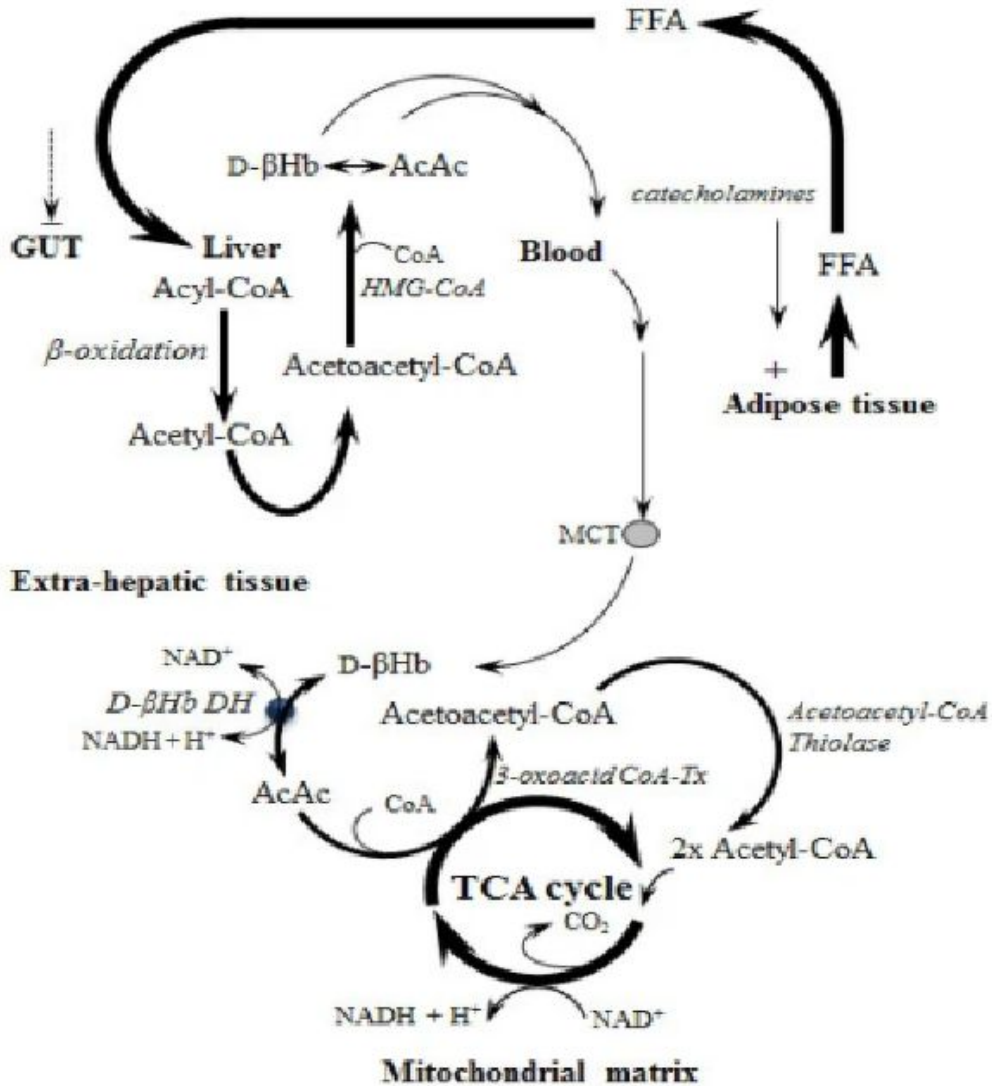
- Disponibilidad de CHO bajas con el objetivo de promover adaptaciones que favorezcan a la oxidación de grasas, pero sin entrar en cetosis
- Ingesta típica= 15–20% CHO ,15–20% protein, 60–65% fat

Ketogenic LCHF (K-LCHF) diet

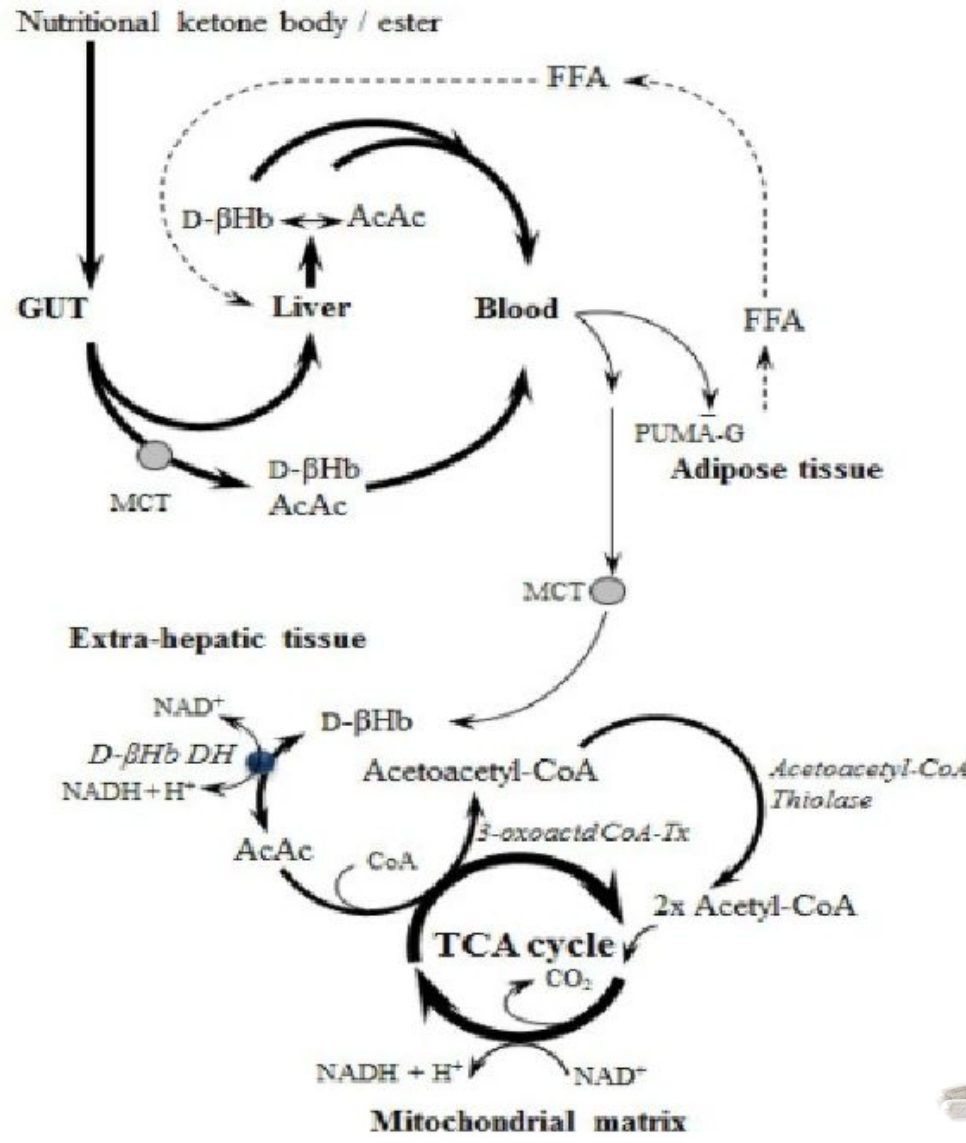
- Restricciones severas en la ingesta de CHO con el objeto de lograr Cetosis crónica
- Ingesta típica: CHO <5% energia, (<50 g/day), 15–20% protein, and 75–80% fat

Burke & col:Toward a Common Understanding of Diet–Exercise Strategies to Manipulate Fuel Availability for Training and Competition Preparation in Endurance Sport (2018)

ENDOGENOUS KETOSIS



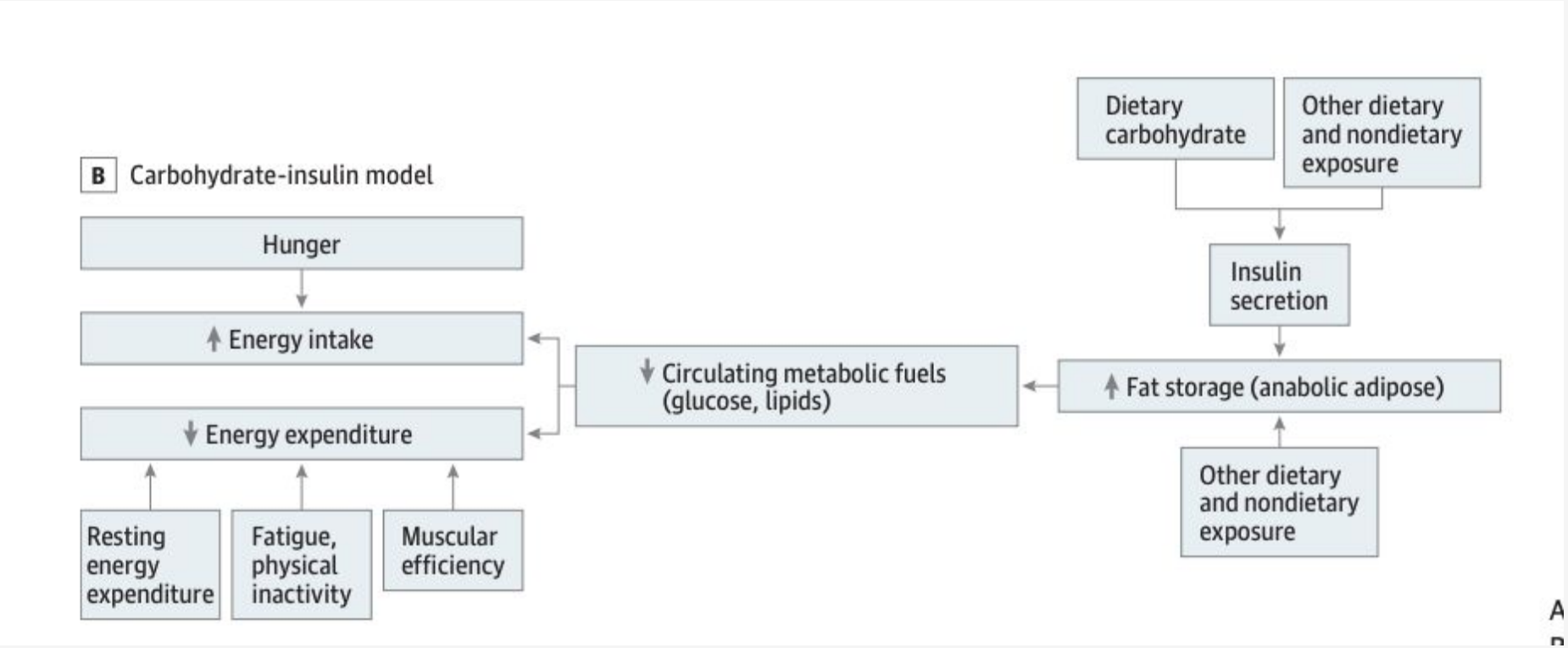
EXOGENOUS KETOSIS







EL MODELO CIM



Ludwig and Ebbeling, 2018

Postulados CIM

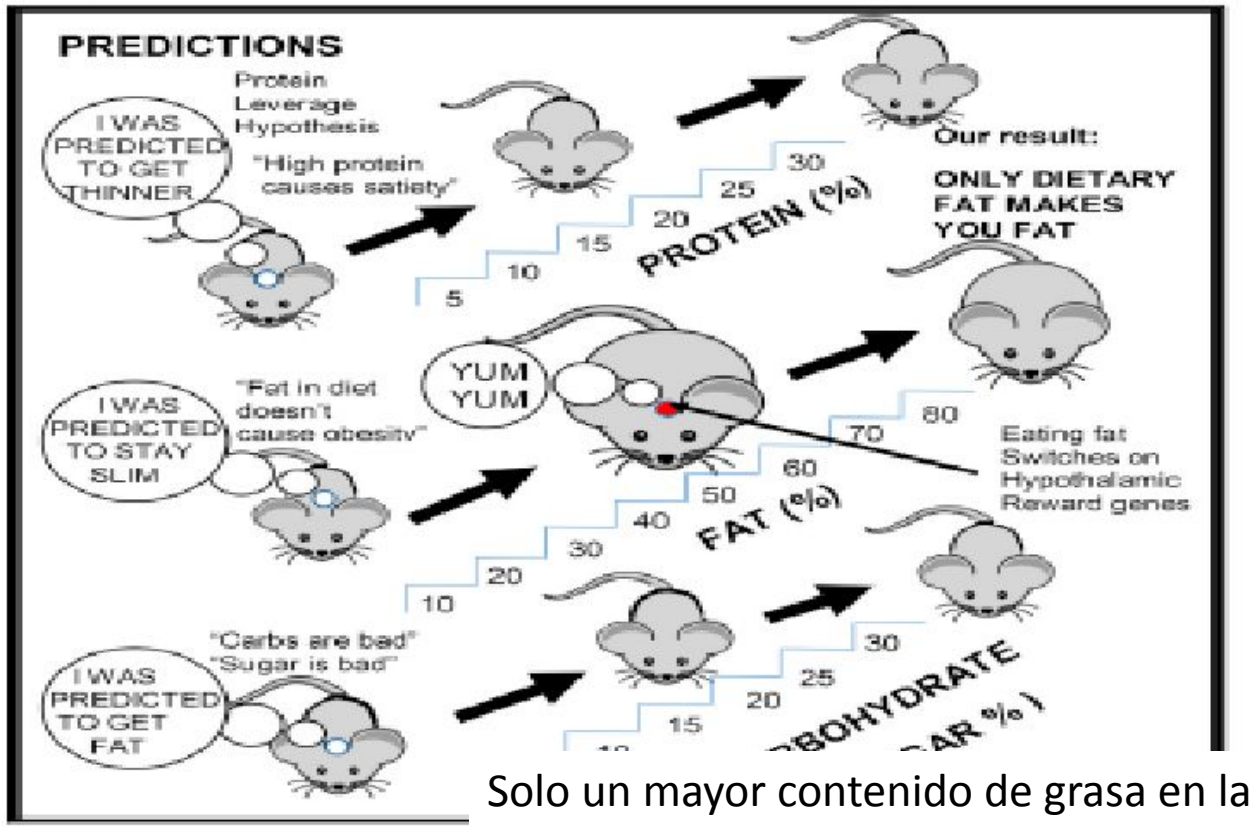
LA OBESIDAD ENTONCES SE EXPLICA POR UN CONSUMO ALTO DE CARBOHIDRATOS

LA SOLUCION ESTARIA EN DIETAS LOW CARB Y CETOGÉNICAS

Cell Metabolism

Dietary Fat, but Not Protein or Carbohydrate, Regulates Energy Intake and Causes Adiposity in Mice

Graphical Abstract



Authors

Sumei Hu, Lu Wang, Dengbao Yang, ..., Shengnan Wang, Alex Douglas, John R. Speakman

Correspondence

j.speakman@abdn.ac.uk

In Brief

Hu et al. look at how macronutrient composition affects body weight regulation by exposing mice to 29 different diets varying from 8.3% to 80% fat, 10% to 80% carbohydrate, 5% to 30% protein, and 5% to 30% sucrose. Only intake of dietary fat, rather than protein or sucrose, increased adiposity.

Solo un mayor contenido de grasa en la dieta se asoció con una mayor ingesta de energía y adiposidad. Esta respuesta se asoció con un aumento de la expresión génica en los receptores 5-HT y la dopamina

frontiers in Nutrition

ORIGINAL RESEARCH
published: 24 March 2021
doi: 10.3389/fnut.2021.618520

The Effects of a 6-Week Controlled, Hypocaloric Ketogenic Diet, With and Without Exogenous Ketone Salts, on Body Composition Responses

*Alex Buga[1], Madison L. Kackley[1], Christopher D. Crabtree[1], Teryn N. Sapper[1], Lauren Mccabe[1], Brandon Fell[1], Rich A. LaFountain[1], Parker N. Hyde[1], Emily R. Martini[1], Jessica Bowman[1], Yue Pan[2,3,4], Debbie Scandling[2,3,4], Milene L. Brownlow[5], Annalouise O'Connor[5], Orlando P. Simonetti[2,3,4], William J. Kraemer[1] and Jeff S. Volek[1]**

Dieta hipocalórica (75 % RE) baja en grasas

Dieta hipocalórica (75% RE) keto

Dietas hipocalórica keto(75% RE) + sales cetonas

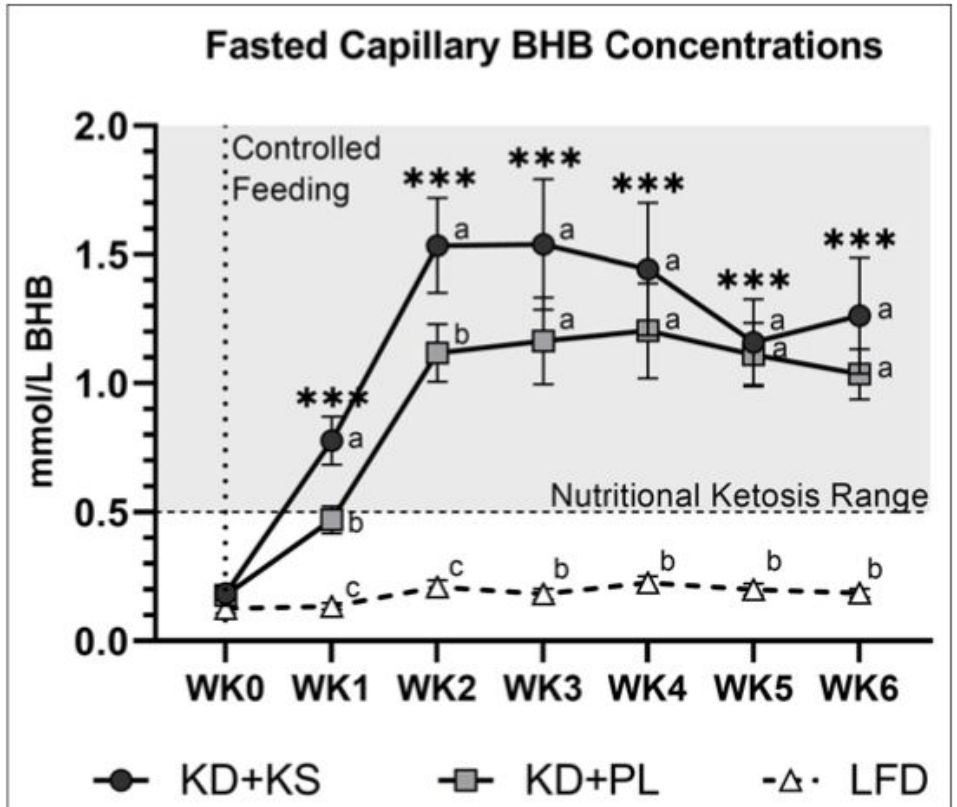
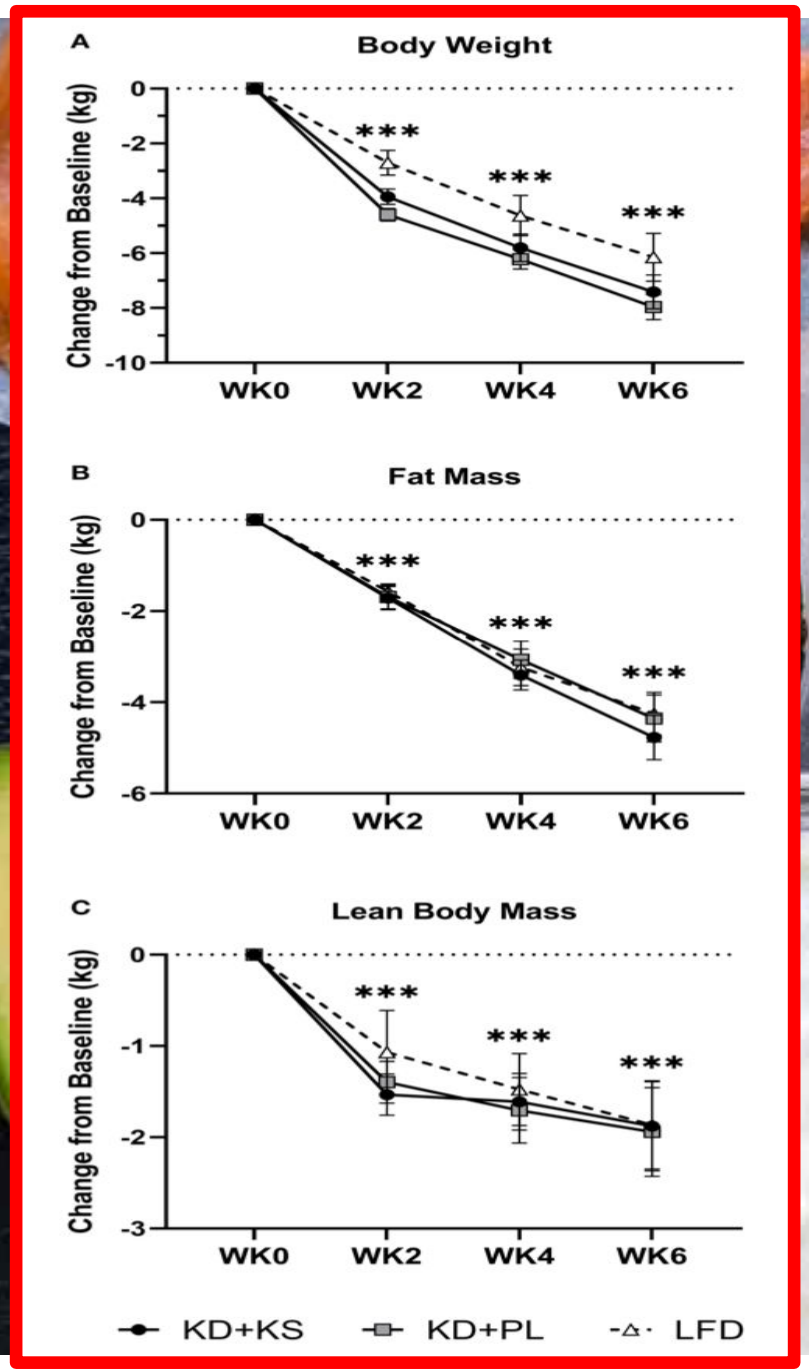
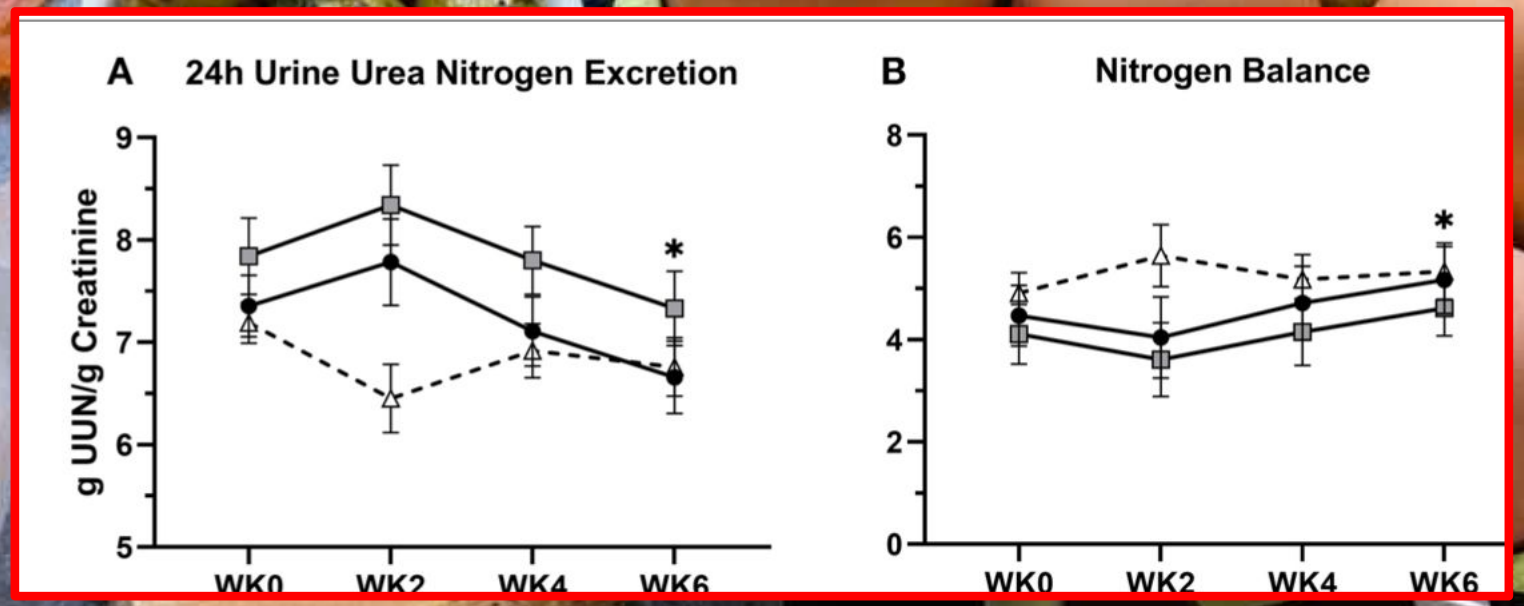


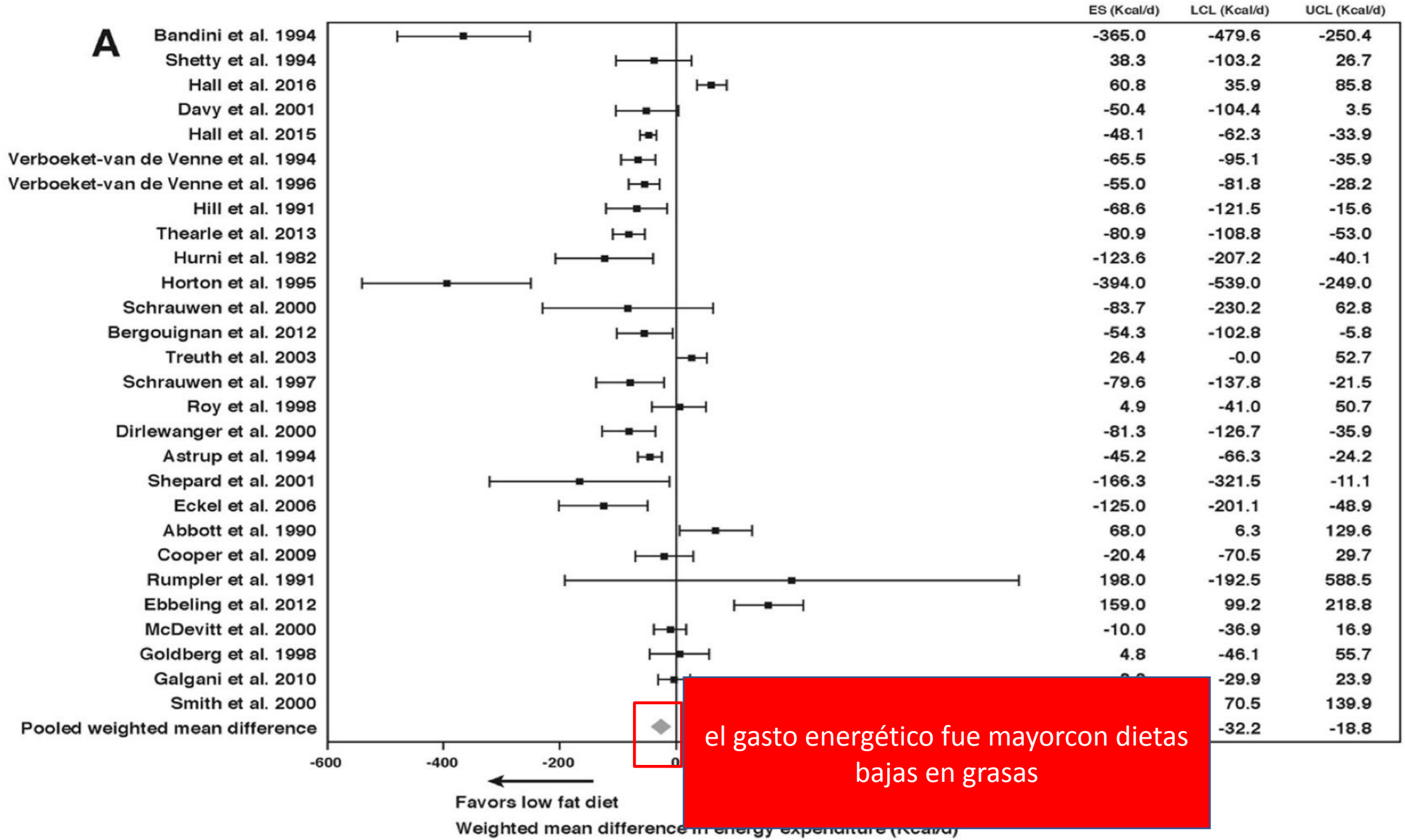
FIGURE 1 | Fasting capillary BHB responses to a ketogenic diet plus ketone salt (KD + KS) vs. placebo (KD + PL). Values at each week represent mean (± SEM) of 7-day BHB values. Primary Statistics: 2 (group) × 7 (time point) ANOVA followed by secondary 3×7 ANOVA that included a third low-fat diet (LFD) group (dashed line). Time effects: ***$p < 0.001$ from WK0 for primary statistics only. Interaction effects: distinct letters at each time point denote between group differences ($p < 0.05$).





(...)short-term changes in body composition during caloric restriction are driven by caloric restriction more so than level of ketosis or macronutrient distribution.

Buga et al, 2021


A
ES (Kcal/d)
LCL (Kcal/d)
UCL (Kcal/d)
Bandini et al. 1994 -365.0 -479.6 -250.4
Shetty et al. 1994 38.3 -103.2 26.7
Hall et al. 2016 60.8 35.9 85.8
Davy et al. 2001 -50.4 -104.4 3.5
Hall et al. 2015 -48.1 -62.3 -33.9
Verboeket-van de Venne et al. 1994 -65.5 -95.1 -35.9
Verboeket-van de Venne et al. 1996 -55.0 -81.8 -28.2
Hill et al. 1991 -68.6 -121.5 -15.6
Thearle et al. 2013 -80.9 -108.8 -53.0
Hurni et al. 1982 -123.6 -207.2 -40.1
Horton et al. 1995 -394.0 -539.0 -249.0
Schrauwen et al. 2000 -83.7 -230.2 62.8
Bergouignan et al. 2012 -54.3 -102.8 -5.8
Treuth et al. 2003 26.4 -0.0 52.7
Schrauwen et al. 1997 -79.6 -137.8 -21.5
Roy et al. 1998 4.9 -41.0 50.7
Dirlewanger et al. 2000 -81.3 -126.7 -35.9
Astrup et al. 1994 -45.2 -66.3 -24.2
Shepard et al. 2001 -166.3 -321.5 -11.1
Eckel et al. 2006 -125.0 -201.1 -48.9
Abbott et al. 1990 68.0 6.3 129.6
Cooper et al. 2009 -20.4 -70.5 29.7
Rumpler et al. 1991 198.0 -192.5 588.5
Ebbeling et al. 2012 159.0 99.2 218.8
McDevitt et al. 2000 -10.0 -36.9 16.9
Goldberg et al. 1998 4.8 -46.1 55.7
Galgani et al. 2010 -29.9 23.9
Smith et al. 2000 70.5 139.9
Pooled weighted mean difference -32.2 -18.8
-600
-400
-200
0
Favors low fat diet
Weighted mean difference in energy expenditure (Kcal/d)
el gasto energético fue mayorcon dietas bajas en grasas

Y QUÉ SUCEDE EN CONDICIONES AD LIBITUM



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Article | Published: 21 January 2021

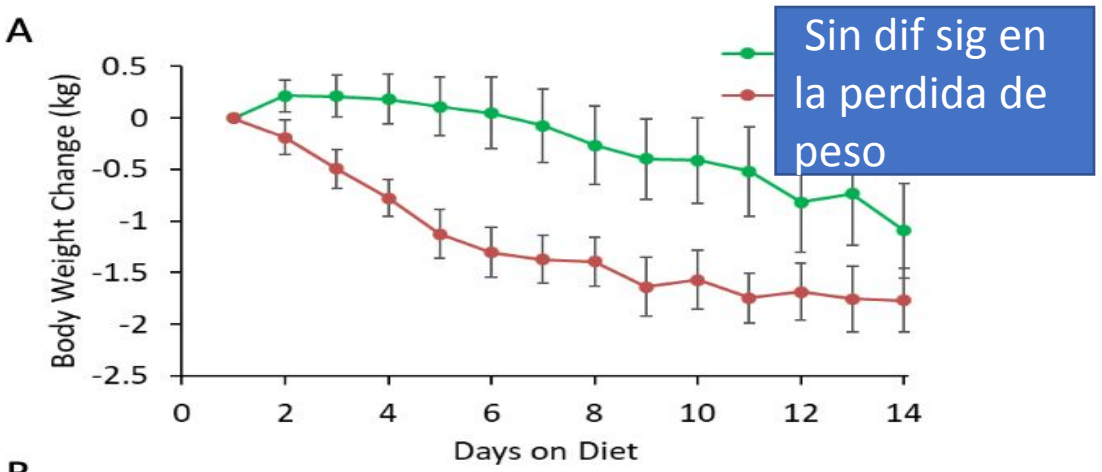
Effect of a plant-based, low-fat diet versus an animal-based, ketogenic diet on ad libitum energy intake

Kevin D. Hall, Juen Guo, Amber B. Courville, James Boring, Robert Brychta, Kong Y. Chen, Valerie Darcey, Ciaran G. Forde, Ahmed M. Gharib, Isabelle Gallagher, Rebecca Howard, Paule V. Joseph, Lauren Milley, Ronald Ouwerkerk, Klaudia Raisinger, Irene Rozga, Alex Schick, Michael Stagliano, Stephan Torres, Mary Walter, Peter Walter, Shanna Yang & Stephanie T. Chung

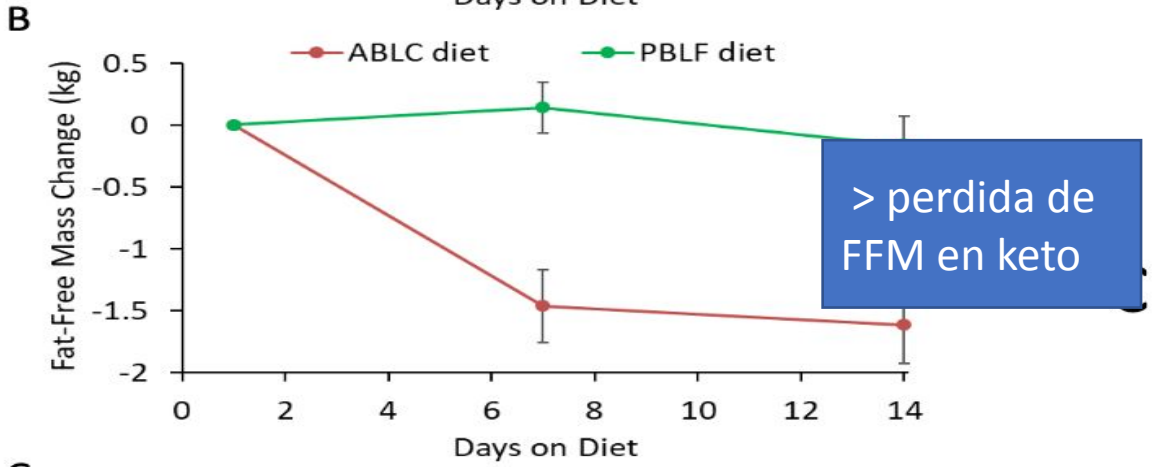


Metodologia

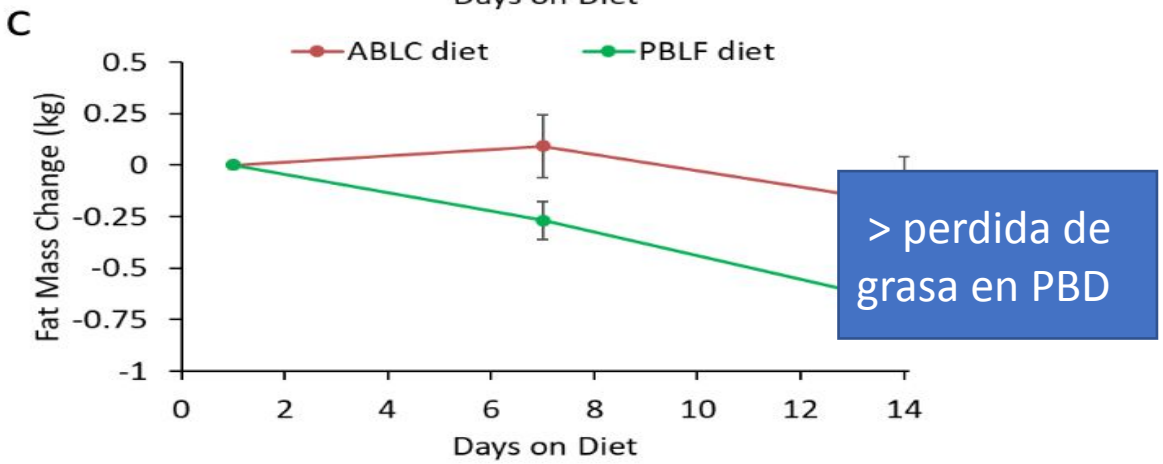
- Ensayo clínico con 20 adultos no diabéticos con sobrepeso
- Asignación al azar de o una **dieta base de plantas baja en grasas (75,2% de carbohidratos, 10,3% de grasas)** o una **dieta cetogénica,(75,8% de grasas, 10,0% de carbohidratos)**. Ad libitum



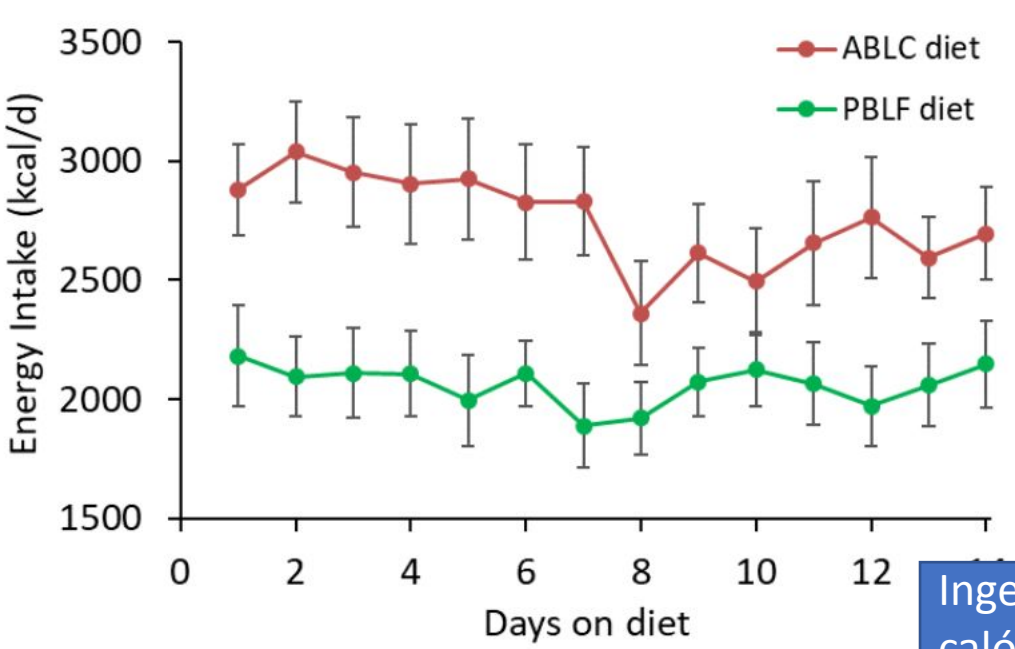
Sin dif sig en la perdida de peso

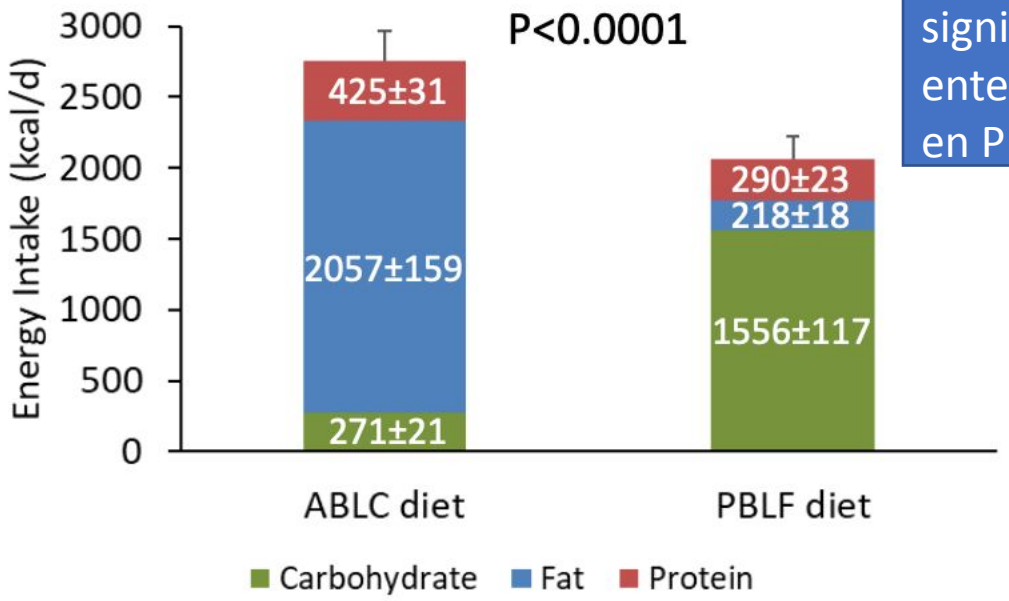


> perdida de FFM en keto



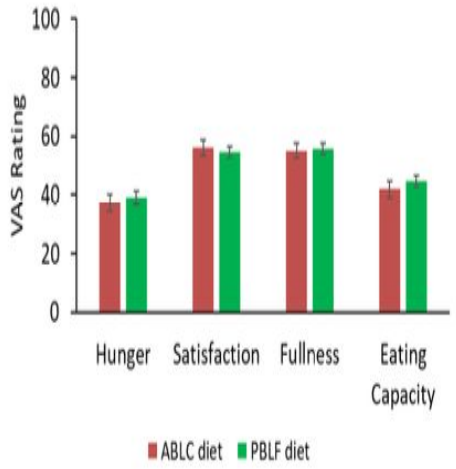
> perdida de grasa en PBD



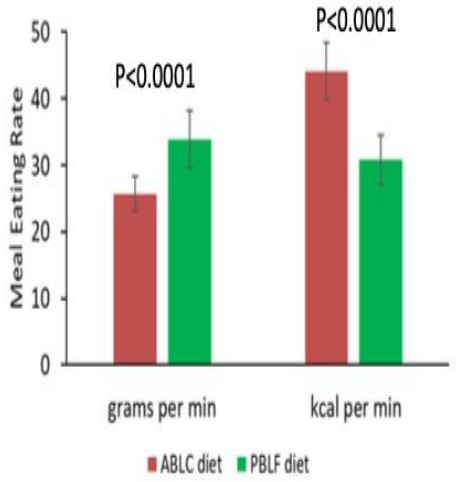


Ingesta calórica significativamente menor en PBD

E



F



Scores de apetito similares entre ambos grupos

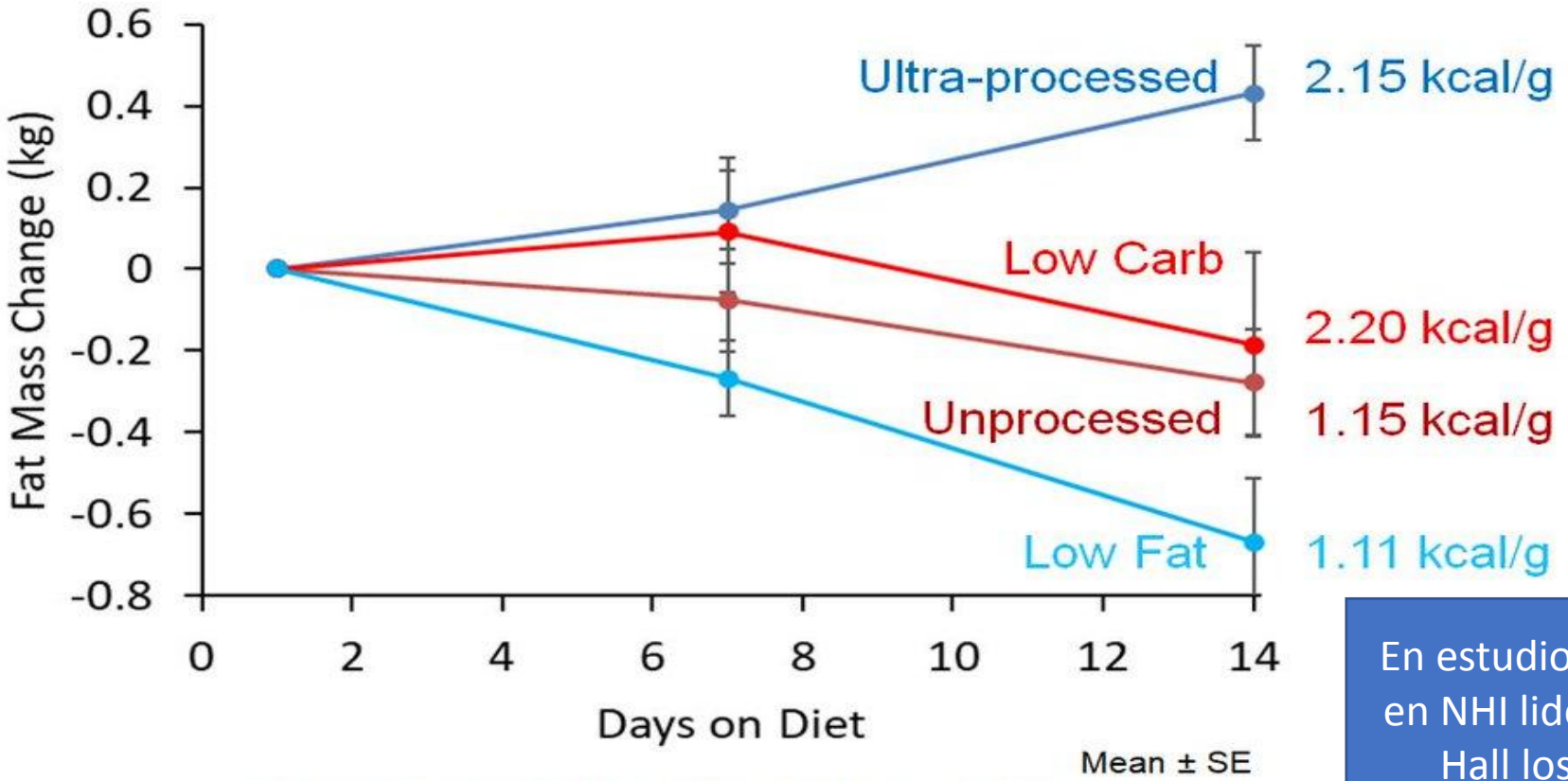
Menu 1 – 3800 kcal

Breakfast

Veggie Scramble (Egg, shredded cheddar/Monterey jack cheese, heavy cream, butter, onions, broccoli, spinach, salt)



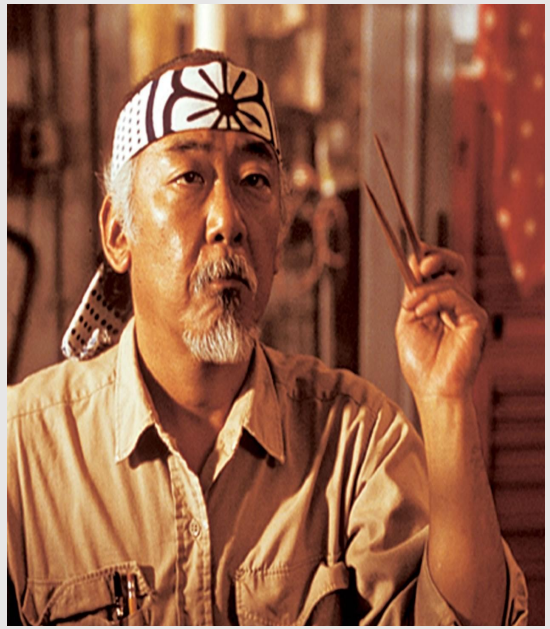
Body Fat Changes During *Ad Libitum* Feeding



KD Hall et al. *Cell Metabolism* 30:1-11 (2019).

KD Hall et al. *Nature Medicine* 27:344-353 (2021).

En estudios Ad Libitum en NHI liderados por K Hall los mayores cambios en grasa corporal se observaron con PBD



OKINAWA
85%



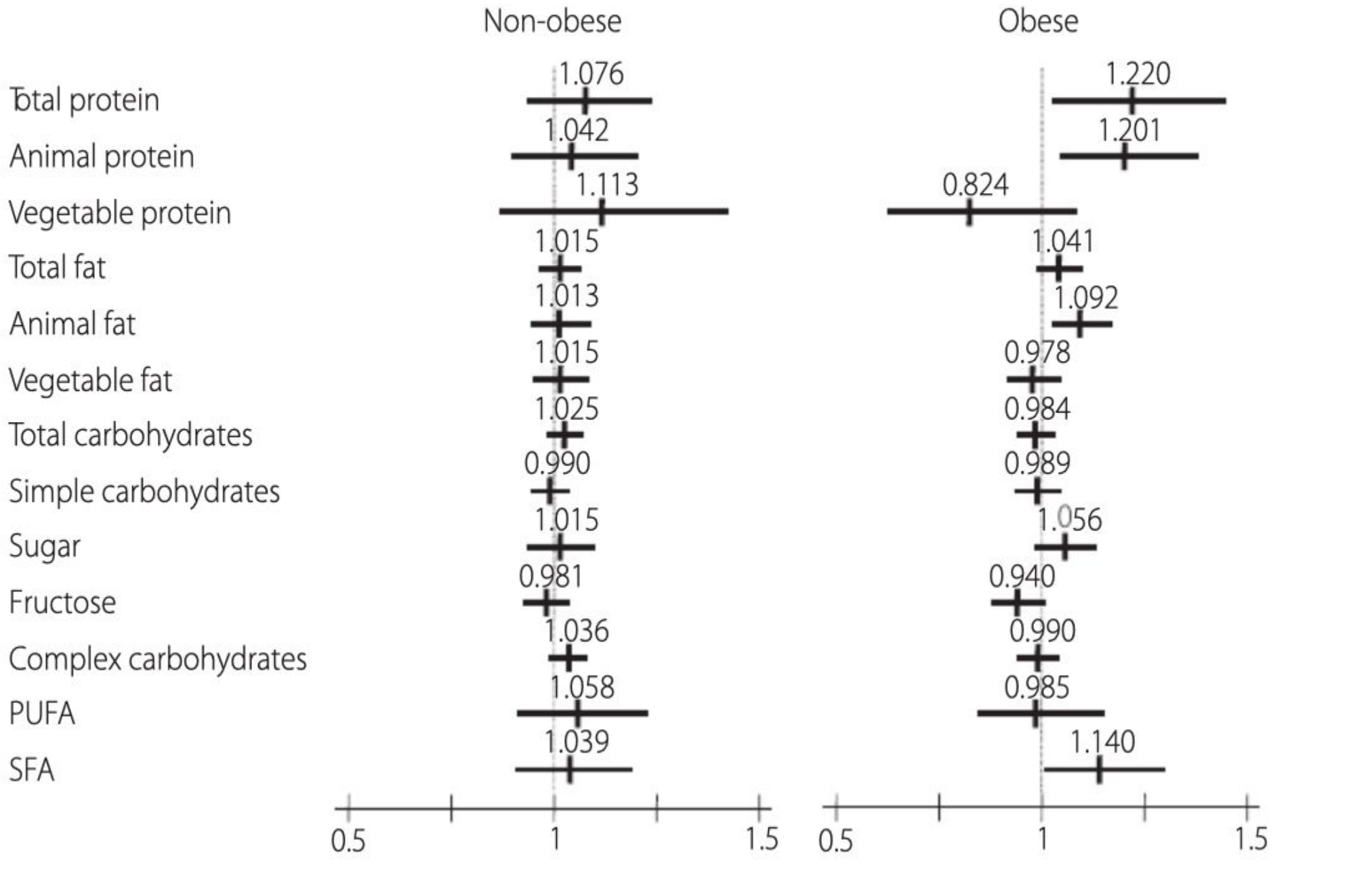
QUECHUAS
Más del 80%%



KITAVA
75 %



TARAHUMARAS
80%

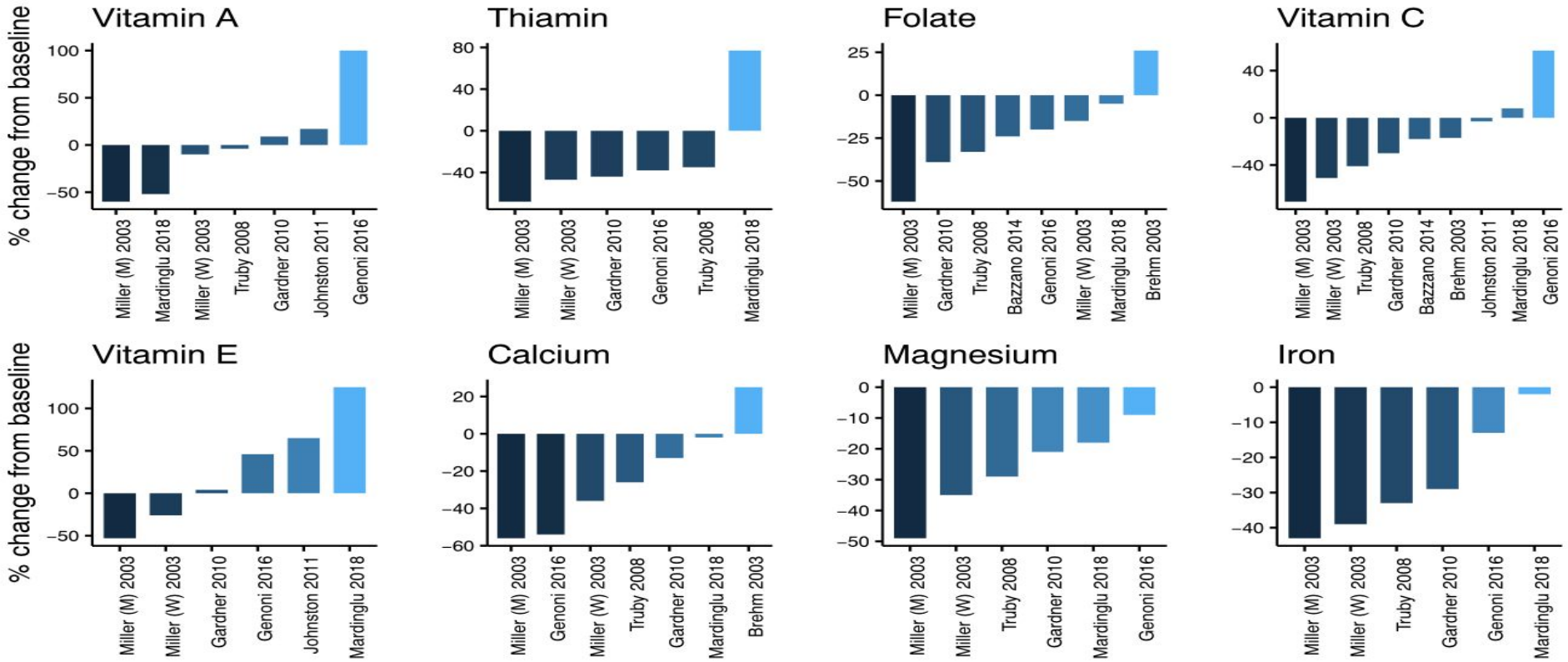

Non-obese
Obese
Total protein
Animal protein
Vegetable protein
Total fat
Animal fat
Vegetable fat
Total carbohydrates
Simple carbohydrates
Sugar
Fructose
Complex carbohydrates
PUFA
SFA
1.076
1.042
1.113
1.015
1.013
1.015
1.025
0.990
1.015
0.981
1.036
1.058
1.039
1.220
1.201
0.824
1.041
1.092
0.978
0.984
0.989
1.056
0.940
0.990
0.985
1.140
0.5
1
1.5
0.5
1
1.5



Más allá de ser una propuesta reduccionista para explicar a la obesidad, la evidencia científica actual hace que los postulados del modelo CIM sean muy difíciles de sostener

DIETAS KETO MÁS ALLÁ DE LA OBESIDAD …





utrients [Colour figure can be viewed at

Todos estos micronutrientes también fueron inferiores a las ingestas recomendadas específicas del país y representaron entre el 35% y el 80% de la ingesta recomendada.

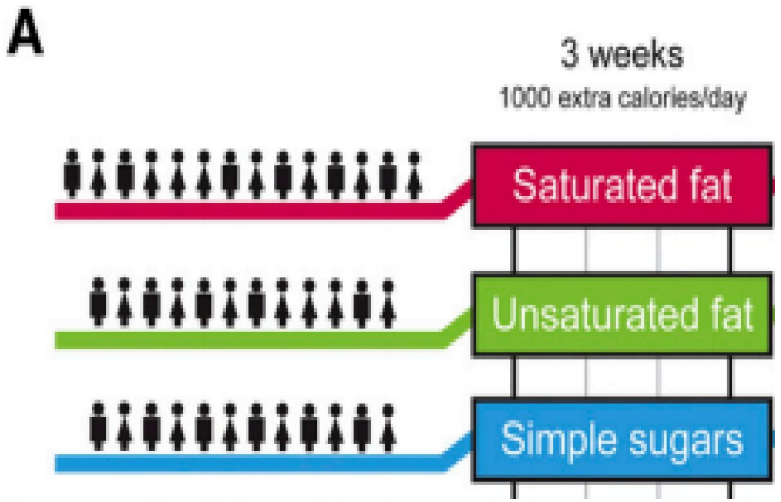
TABLE 4 Mineral intakes, percentage of recommended intakes, and changes from baseline[a]

					Calcium			Magnesium			Iron		
	Time Points	BW Loss, kg	EI Change, kcal	EI Change, MJ	Intake, mg	%RI	Baseline Change, %	Intake, mg	%RI	Baseline Change, %	Intake, mg	%RI	Baseline Change, %
Miller (M) 2003 US	Baseline				1139 (458)	114		350 (149)	83		21 (12)	263	
	2 wk	−3.8	−1081	−4.5	420 (180)	42	−63	163 (61)	39	−53	9 (4)	113	−57
	4 wk	−5.3	−923	−3.9	503 (153)	50	−56	180 (41)	43	−49	12 (3)	150	−43
Miller (W) 2003 US	Baseline				801 (309)	80		280 (72)	88		13 (3)	72	
	2 wk	−3.8	−1081	−4.5	513 (223)	51	−36	129 (42)	40	−54	8 (2)	44	−39
	4 wk	−5.3	−923	−3.9	517 (268)	52	−36	182 (163)	57	−35	8 (4)	44	−39
Brehm 2003 US	Baseline				591	59		-	-	-	-	-	-
	3 mo	−7.6	−452	−1.9	444	44	−25	-	-	-	-	-	-
	6 mo	−8.5	−306	−1.3	739	74	+25	-	-	-	-	-	-
Truby 2008 UK	Baseline					125 (44)		-	106 (33)		-	136 (60)	
	2 mo	−5.2	−656	−2.7		92 (38)	−26	-	75 (38)	−29	-	91 (49)	−33
Gardner 2010 US	Baseline				851 (314)	85		291 (88)	91		14.8 (4.8)	82	
	2 mo	−4.3	−556	−2.3	742 (273)	74	−13	231(86)	72	−21	10.5 (4.1)	58	−29
Genoni 2016	Baseline				771 (204)	77		359 (85)	112		12.7 (2.6)	71	
Australia	4 wk	−3.2	−450	−1.9	355 (91)	36	−54	328 (97)	103	−9	11.1 (2.7)	62	−13
Mardinoglu 2018	Baseline				1187 (342)	148		414 (74)	118		15.7 (3.3)	175	
Sweden	2 wk	−1.9	+880	+3.7	1160 (472)	145	−2	338 (49)	97	−18	15.7 (1.6)	171	−2
Elidottir[b,c] 2016	Men	-	-	-	770 (564)	96	-	245 (148)	70	-	11 (7)	122	-
Iceland	Women	-	-	-	774 (566)	97	-	254 (114)	91	-	9 (6)	60	-

Saturated Fat Is More Metabolically Harmful for the Human Liver Than Unsaturated Fat or Simple Sugars

https://doi.org/10.2337/dc18-0071

Panu K. Luukkonen,[1,2] Sanja Sädevirta,[1,2] You Zhou,[1,3] Brandon Kayser,[4] Ashfaq Ali,[5] Linda Ahonen,[5] Susanna Lallukka,[1,2] Véronique Pelloux,[4] Melania Gaggini,[6] Ching Jian,[7] Antti Hakkarainen,[8] Nina Lundbom,[8] Helena Gylling,[2] Anne Salonen,[7] Matej Orešič,[5,9,10] Tuulia Hyötyläinen,[5,11] Marju Orho-Melander,[12] Aila Rissanen,[13] Amalia Gastaldelli,[6] Karine Clément,[4,14] Leanne Hodson,[15] and Hannele Yki-Järvinen[1,2]



3 tipos de intervenciones en sujetos con sobrepeso.

- Grupo 1 : 1000 kcal extras/día en forma de grasas saturadas(aceite de coco, manteca, y queso con 40% de grasa)
- Grupo 2: 1000 kcal extras en forma de azúcares simples(a base de caramelos y bebidas azucaradas)
- Grupo 3: 1000 kcal extras en forma de grasas insaturadas (aceite de oliva y nueces de pecan) .
- Duración: 3 semanas
- Resultados: el grupo grasas saturadas(grupo 1) incremento en un 55% los triglicéridos intrahepáticos y el grupo rico en azucares simples en un 33 %. Por otro lado las grasas saturadas indujeron insulino resistencia, endotoxemia y aumentaron significativamente las ceramidas plasmáticas.

Original Article
OBESITY BIOLOGY AND INTEGRATED PHYSIOLOGY

Obesity

Glucose and Lipid Homeostasis and Inflammation in Humans Following an Isocaloric Ketogenic Diet

Michael Rosenbaum [1], Kevin D. Hall[2], Juen Guo[2], Eric Ravussin[3], Laurel S. Mayer[4], Marc L. Reitman [2], Steven R. Smith[5], B. Timothy Walsh[4], and Rudolph L. Leibel[1]

Objective: The objective of this study was to measure changes in glucose, lipid, and inflammation parameters after transitioning from a baseline diet (BD) to an isocaloric ketogenic diet (KD).

Methods: Glucose homeostasis, lipid homeostasis, and inflammation were studied in 17 men (BMI: 25-35 kg/m^2) during 4 weeks of a BD (15% protein, 50% carbohydrate, 35% fat) followed by 4 weeks of an isocaloric KD (15% protein, 5% carbohydrate, 80% fat). Postprandial responses were assessed following mixed-meal tests matched to compositions of the BD (control meal [CM]) and KD (ketogenic meal).

Results: Fasting ketones, glycerol, free fatty acids, glucagon, adiponectin, gastric inhibitory peptide, total and low-density lipoprotein cholesterol, and C-reactive protein were significantly increased on the KD. Fasting insulin, C-peptides, triglycerides, and fibroblast growth factor 21 were significantly decreased. During the KD, the glucose area under the curve was significantly higher with both test meals, and the insulin area under the curve was significantly higher only for the CM. Analyses of glucose homeostasis suggested that the KD insulin sensitivity decreased during the CM but increased during the ketogenic meal. Insulin-mediated antilipolysis was decreased on the KD regardless of meal type.

Conclusions: Switching to the KD was associated with increased cholesterol and inflammatory markers, decreased triglycerides, and decreased insulin-mediated antilipolysis. Glucose homeostasis parameters

- Estudio donde dos grupos de sujetos se incorporaron por 4 semanas a dieta isocalóricas de control (15% protein, 50% carbohydrate, 35% fat) o dieta cetogenica (15% protein, 5% carbohydrate, 80% fat)y posteriormente se evaluaron cambios en parámetros referidos a la glucémicos, lipídicos e inflamatorios
- Conclusiones: Cambiar a dieta cetogenica se asoció a aumentos en colesterol total y LDL ,aumento en PCR.

Original Research

Low Carbohydrate, High Fat Diet Increases C-Reactive Protein during Weight Loss

Janet W. Rankin, PhD, Abigail D. Turpyn

Department of Human Nutrition, Foods, and Exercise, Virginia Tech, Blacksburg, Virginia

Key words: inflammation, oxidative stress, obesity, weight loss, diet composition

Table 2. Body Weight, Serum and Urinary Metabolites at Baseline and Each Week of the Intervention

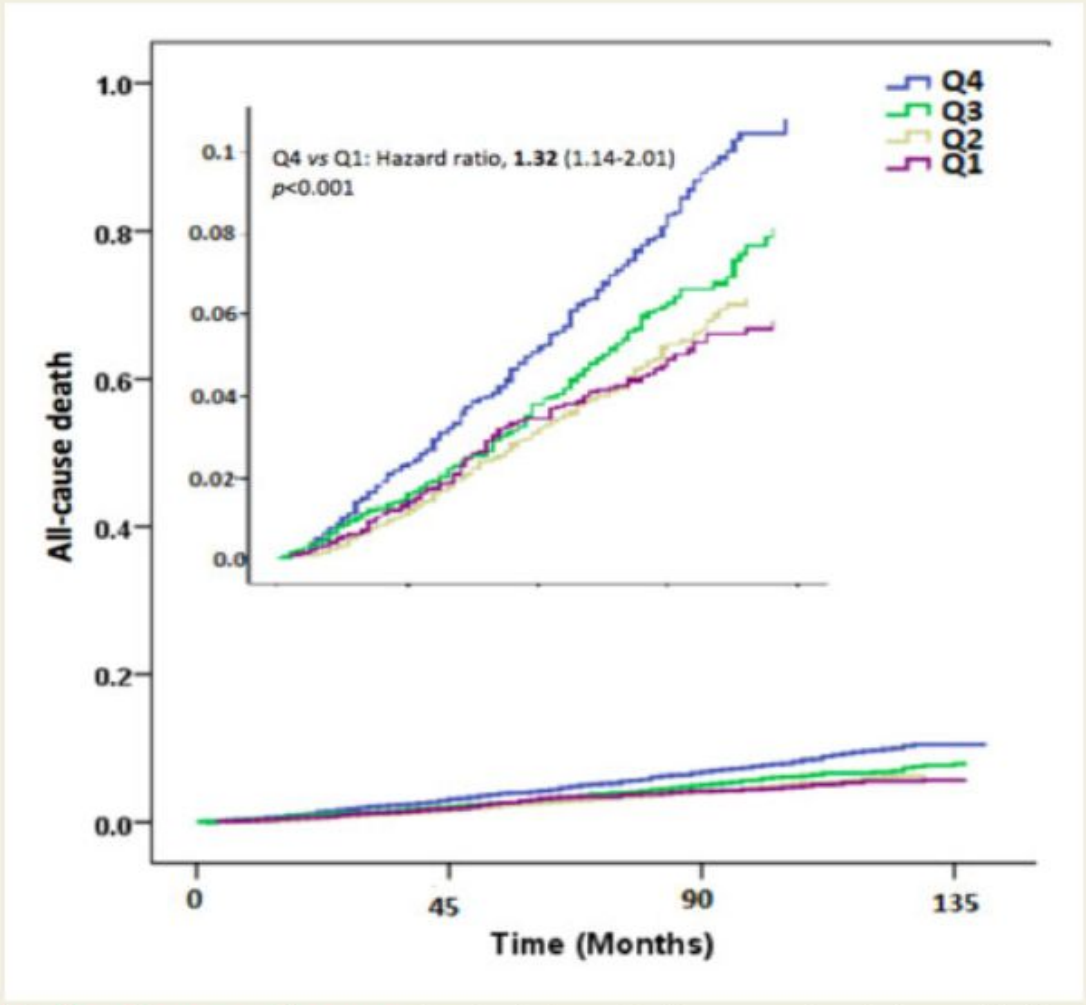
Measure	Group	Week 0	Week 1	Week 2	Week 3	Week 4
Body Weight (kg)[1]	LC	87.3 ± 15.2	85.0 ± 15.0**	84.4 ± 15.1**	83.8 ± 14.9**	83.5 ± 14.8**
	HC	79.2 ± 16.0	78.3 ± 16.0**	78.0 ± 15.7**	77.1 ± 15.9**	76.6 ± 15.7**
CRP (mg/L)[2]	LC	5.7 ± 5.5	7.5 ± 4.4*	6.1 ± 4.9	6.1 ± 5.8	7.1 ± 6.1*
	HC	4.8 ± 4.2	4.2 ± 3.8†	4.3 ± 4.4	4.1 ± 4.5	2.7 ± 2.9†**
IL-6 (pg/mL)[3]	LC	1.60 ± 0.78	1.55 ± 0.77	1.55 ± 0.75	1.25 ± 0.44	1.78 ± 0.73
	HC	1.20 ± 0.76	1.23 ± 0.74	1.11 ± 0.67	1.18 ± 0.75	1.47 ± 1.03
8-Epi (pg/mg creatinine)[1]	LC	1576 ± 511	1182 ± 661*	1365 ± 921	1124 ± 538*	1495 ± 797
	HC	1246 ± 543	1541 ± 1094	1227 ± 736	1323 ± 693	1064 ± 624
Glucose[4] (mg/dL)	LC	85.6 ± 5.5	79.7 ± 8.3	78.7 ± 5.7	81.6 ± 7.3	81.6 ± 7.5
	HC	84.7 ± 10.7	83.6 ± 6.9	79.0 ± 6.3	81.7 ± 6.0	83.3 ± 4.7
NEFA[5] (mEq/L)	LC	0.32 ± 0.13	0.58 ± 0.21	0.57 ± 0.13	0.54 ± 0.20	0.56 ± 0.24
	HC	0.27 ± 0.10	0.39 ± 0.11	0.37 ± 0.16	0.41 ± 0.10	0.36 ± 0.14

PCR AUMENTÓ 25 % EN DC Y BAJO UN 45 % EN DIETA ALTA CHO

Table 2 Multivariable-adjusted hazard ratios (95% CIs) for mortality across quarters of low carbohydrate diet score and low carbohydrate-high protein diet score

		Quartiles of low carbohydrate diet				Quartiles of low carbohydrate-high protein diet			
		Q2 (n = 6109)	Q3 (n = 6118)	Q4 (n = 6124)	P-trend	Q2 (n = 6275)	Q3 (n = 6277)	Q4 (n = 6279)	P-trend
Macronutrient amount (g/day; calories/day)		Carbohydrates: 245 (980), Protein: 69 (276), Fat: 65 (585)	Carbohydrates: 205 (820), Protein: 72 (288), Fat: 70 (630)	Carbohydrates: 214 (856), Protein: 103 (412), Fat: 105 (945)		Carbohydrates: 273 (1092), Protein: 69 (276), Fat: 73 (657)	Carbohydrates: 238 (952), Protein: 91 (364), Fat: 81 (729)	Carbohydrates: 217 (868), Protein: 111 (444), Fat: 67 (603)	
No of deaths		749	831	1096		847	901	1048	
Total mortality	Model 1	1.11 (1.02–1.96)	1.23 (1.11–1.43)	1.42 (1.27–1.96)	<0.001	1.18 (1.09–1.30)	1.25 (1.12–1.43)	1.34 (1.28–1.56)	<0.001
	Model 2	1.09 (1.02–1.64)	1.19 (1.09–1.82)	1.32 (1.14–2.01)	32%	1.11 (1.02–1.33)	1.16 (1.08–1.46)	1.21 (1.04–1.39)	<0.001
Cancer mortality	Model 1	1.12 (1.08–1.16)	1.19 (1.04–1.42)	1.52 (1.23–1.51)	<0.001	1.18 (1.09–1.24)	1.26 (1.19–1.32)	1.37 (1.27–1.43)	<0.001
	Model 2	1.09 (0.99–1.16)	1.13 (1.00–1.28)	1.35 (1.06–1.69)	35%	1.11 (0.98–1.42)	1.19 (0.99–1.33)	1.22 (1.02–1.48)	<0.001
Coronary heart disease mortality	Model 1	1.22 (1.13–1.43)	1.39 (1.25–1.62)	1.65 (1.53–1.95)	<0.001	1.15 (1.04–1.26)	1.30 (1.20–1.39)	1.55 (1.50–1.61)	<0.001
	Model 2	1.19 (0.98–1.36)	1.30 (1.02–1.92)	1.51 (1.19–1.91)	51%	1.14 (0.97–1.22)	1.22 (0.94–1.36)	1.44 (1.02–2.09)	<0.001
Cerebrovascular disease mortality	Model 1	1.22 (1.14–1.34)	1.36 (1.19–1.73)	1.68 (1.38–1.95)	<0.001	1.30 (1.21–1.40)	1.42 (1.38–1.46)	1.56 (1.42–1.60)	<0.001
	Model 2	1.18 (1.00–1.64)	1.22 (1.04–2.10)	1.50 (1.12–2.31)	50%	1.18 (0.99–1.42)	1.25 (1.00–1.51)	1.41 (1.09–1.72)	<0.001

Model 1: Adjusted for age, gender, race, education, marital status, poverty to income ratio, total energy intake, physical activity, smoking, and alcohol consumption; *Model 2*: Adjusted for age, sex, gender, education, marital status, poverty to income ratio, total energy intake, physical activity, smoking, alcohol consumption, body mass index and waist circumference, hypertension, serum total cholesterol and diabetes. Q1, considered as reference.



Take home figure Probability of all-cause death by carbohydrate intake.

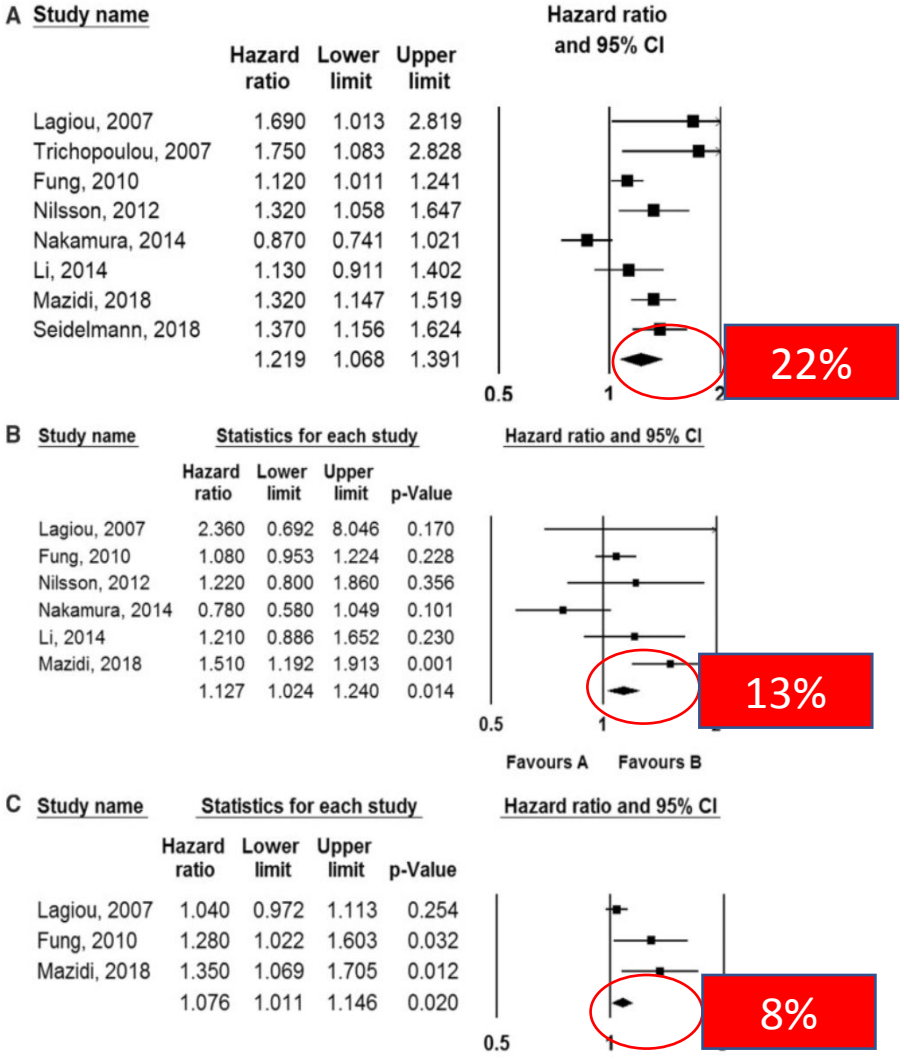


Figure 2 Forest plot of low-carbohydrate diet and risk of overall (A) and cause-specific [cardiovascular disease (B) and cancer (C)] mortality.

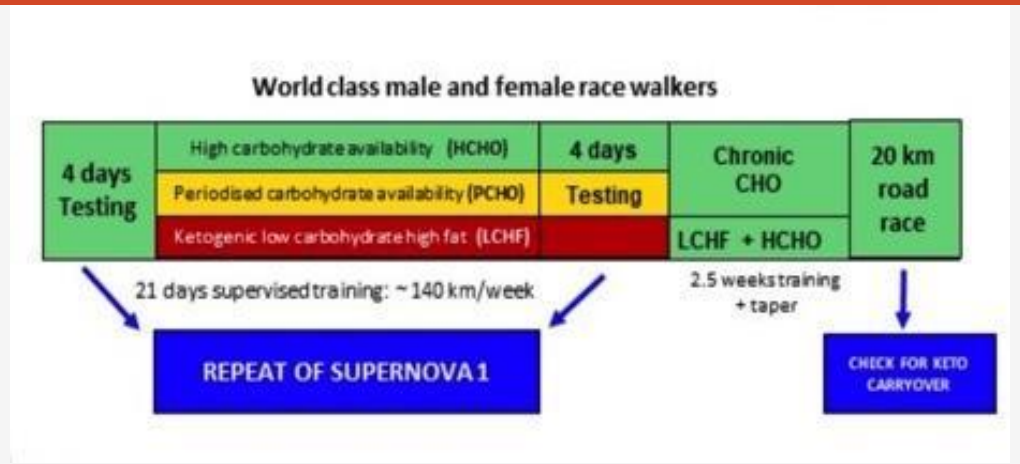


DIETAS KETOS Y PERFORMANCE DEPORTIVA

Supernova

En contraste con dietas que proporcionan alta disponibilidad crónica o periodizada de CHO, la dieta LCHF anuló los beneficios de rendimiento en los atletas de resistencia de élite.

Supernova 2



En supernova 2 se replicaron resultados de Supernova 1, observándose que las dietas LCHF desmejoraron el rendimiento en atletas de élite







Ketone drinks used among WorldTour teams to boost performance

Rumours have circulated in the last five years but a provider confirms use in the WorldTour

Michelle Arthurs-Brennan




NATURE'S
NUTRITION
HIGH PERFORMANCE COMPLEX
KETO
BHB SALTS
Exogenous Ketones 1200mg
Supports Fat Burning & Weightloss*
Improves Physical Performance*
Fights Oxidative Stress*
BHB
120
CAPSULES
DIETARY SUPPLEMENT


HVMN
25g
20g
15g
0g
25g
Ketone Ester
Ketone
Human Performance Fuel
2.2 fl oz (65 mL)

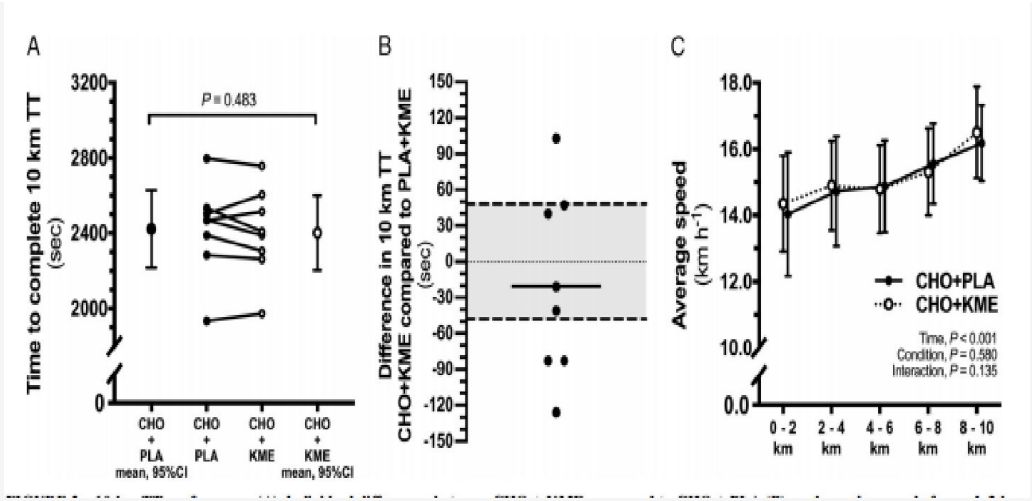
APPLIED SCIENCES

No Benefit of Ingestion of a Ketone Monoester Supplement on 10-km Running Performance

MARK EVANS[1], FIONN T. MCSWINEY[2], AIDAN J. BRADY[1], and BRENDAN EGAN[1,3]

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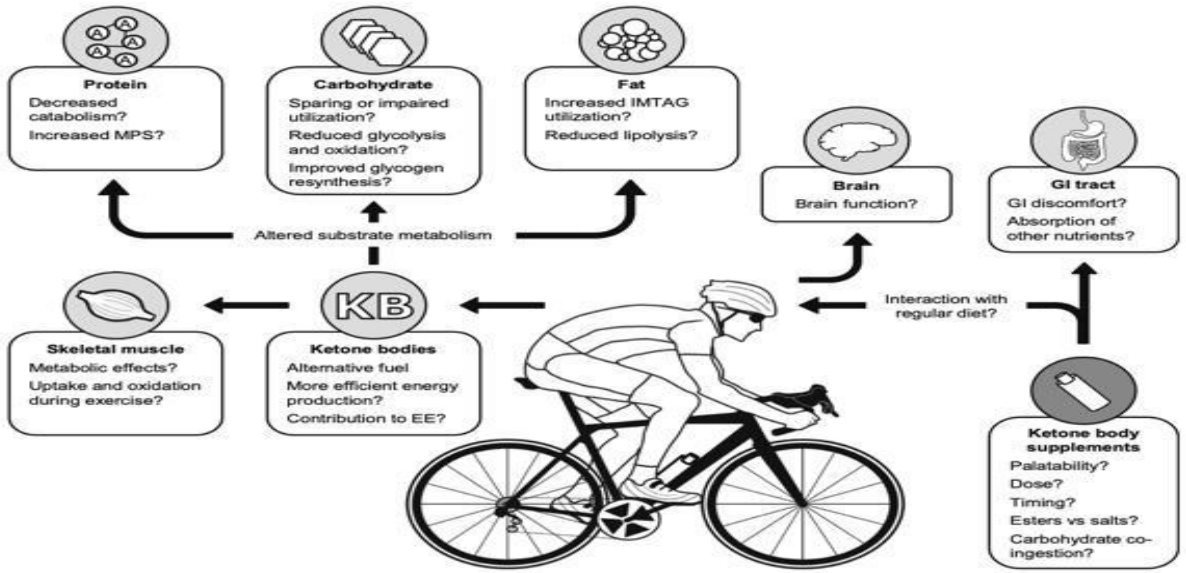
Sports Med (2017) 47:383–391
DOI 10.1007/s40279-016-0577-y

CrossMark

CURRENT OPINION

Ketone Bodies and Exercise Performance: The Next Magic Bullet or Merely Hype?

Philippe J. M. Pinckaers[1] · Tyler A. Churchward-Venne[1] · David Bailey[2] · Luc J. C. van Loon[1]





En conclusión, sobre la base de los pocos datos disponibles y nuestra comprensión actual del metabolismo de los cuerpos cetónicos durante el ejercicio en un entorno deportivo específico, concluimos que actualmente no hay evidencia que respalde el uso de cuerpos cetónicos como una ayuda ergogénica.

AIS

THE AIS SPORTS SUPPLEMENT FRAMEWORK

Group B

Overview of category	Sub-categories	Examples
Evidence Level: **Deserving of further research and could be considered for provision to athletes under a research protocol or case-managed monitoring situation** **Use within Supplement Programs:** **Provided to athletes within research or clinical monitoring situations.** **Note that some of the products currently listed in Group B have been included due to their interest by Key Stakeholders.** **Our new Evidence Map approach will aim to better define the scientific support for these products**	**Food polyphenols** Food compounds which may have bioactivity including antioxidant and anti-inflammatory properties. May be consumed in food forms or as isolated chemicals.	Cherries, berries and black currants
		Quercitin, ecgc, epicatechins & others
	Other Compounds which attract interest for potential benefits to body metabolism and function	Collagen support products
		Carnitine
		HMB
		Ketone supplements
		Fish oils
		Phosphate
		Circumin
	Sick Pack Multi-supplement approach to address an issue or health or well-being Best used with advice from an appropriate medical/nutrition practitioner	Zinc lozenges and Vitamin C
	Amino Acids Constituents of protein which may have effects when taken in isolation, or may be consumed individually by the athlete to fortify an existing food/supplement that is lacking in this amino acid.	BCAA/Leucine
		Tyrosine
	Antioxidants Compounds often found in foods which protect against oxidation or reactions with free-radical chemicals. May be consumed in food forms or as isolated chemicals	Vitamin C & E
		N-acetyl cysteine

UEFA expert group statement on nutrition in elite football. Current evidence to inform practical recommendations and guide future research

James Collins,[1,2] Ronald John Maughan,[3] Michael Gleeson,[4] Johann Bilsborough,[5,6] Asker Jeukendrup,[4,7] James P Morton,[8] S M Phillips,[9] Lawrence Armstrong,[10] Louise M Burke,[11] Graeme L Close,[8] Rob Duffield,[5,12] Enette Larson-Meyer,[13] Julien Louis,[8] Daniel Medina,[14] Flavia Meyer,[15] Ian Rollo,[4,16] Jorunn Sundgot-Borgen,[17] Benjamin T Wall,[18] Beatriz Boullosa,[19] Gregory Dupont,[8] Antonia Lizarraga,[20] Peter Res,[21] Mario Bizzini,[22] Carlo Castagna,[23,24,25] Charlotte M Cowie,[26,27] Michel D'Hooghe,[27,28] Hans Geyer,[29] Tim Meyer,[27,30] Niki Papadimitriou,[31] Marc Vouillamoz,[31] Alan McCall[2,12,32]

Existe un interés renovado en la adaptación crónica a una dieta cetogénica baja en CHO y alta en grasas (LCHF)

Aunque hay informes anecdóticos, no se dispone de estudios de observación o de intervención que incluyan deportes de equipo y dietas bajas en carbohidratos.

Aunque los músculos entrenados pueden utilizar grandes cantidades de grasa a intensidades de ejercicio relativamente altas (p. Ej., Hasta un 75% del VO2máx) **cuando la disponibilidad de CHO es limitada, esto se asocia con un mayor costo de oxígeno / menor economía de ejercicio lo que puede explicar el deterioro del rendimiento a intensidades de ejercicio más altas.**

Debido a la falta de evidencia, no se recomienda una dieta baja en carbohidratos para los futbolistas

© picture-alliance/dpa/J.-C. Bott

Dietas Bajas en CHO y rendimiento

	Short-term	Long-term
Fat loss	Keto is as effective as other diets when calories are matched.	Keto is as effective as other diets when calories are matched.
Lean body mass	More lean mass *(water, glycogen, protein)* is lost with keto.	More lean mass *(water, glycogen, protein)* is lost with keto.
Anaerobic performance	Overall, keto seems to be slightly outperformed by other diets. Performance is typically lowered in studies without control groups.	Not enough data. More research is needed.
Aerobic performance	Keto seems to be outperformed by other diets, yet the data is inconclusive. Performance is maintained or lost in studies without control groups.	Not enough data. More research is needed.
Strength performance	Strength can be increased similarly to other diets. However, several studies suggest keto might be inferior.	Not enough data. More research is needed.

https://sci-fit.net/ketogenic-diet-fat-muscle-performance

CONCLUSIONES

- LAS LCD Y KD PODRÍAN TENER EFECTO SOBRE LA PÉRDIDA DE PESO AL PARECER POR SU CONTENIDO PROTEICO A VECES COMBINADO CON DÉFICIT CALÓRICO
- CUANDO SE EMPAREJAN LAS PROTEÍNAS Y LAS CALORÍAS DE LAS LCD CON HCD NO PARECEN OBSERVARSE DIFERENCIAS EN LOS EFECTOS SOBRE LA PÉRDIDA DE GRASA CORPORAL NI EL GASTO ENERGÉTICO
- EN CONDICIONES AD LIBITUM
- NI LAS KD NI LOS SUPLEMENTOS DE CETONAS PROMOVERÁN MEJORAS EN EL RENDIMIENTO EN DISCIPLINAS DE ENDURANCE
- EN LO QUE REFIERE A DEPORTES SE NECESITAN MÁS ESTUDIOS PARA ABORDAR A UNA CONCLUSIÓN DEFINITIVA SOBRE EL IMPACTO DE ESTE TIPO DE INTERVENCIÓN



Muchas gracias