DEMETRIOS KOURETAS

PROFESSOR

DEPARTMENT OF BIOCHEMISTRY & BIOTECHNOLOGY

UNIVERSITY OF THESSALY, GREECE

Eatwalk is a company that collaborates with the University of Thessaly

Eatwalk specialices on the research and the production of specific functional food from raw materials from Greece and other countries globally. The company, in collaboration with leading universities in Greece and abroad, has done specialized research for the following products.

The main ingredient of functional foods is HWHPRO, a whey cheese product, originating from traditional Greek farms.

The new research reveals the nutritional and healthy value of this raw material for the human metabolism. Comparing whey from different animals (for example cow, etc.) there are a lot of benefits.

On the compositional level, HWPRO was compared to the representative and commercially available bovine WPC with human milk as a benchmark. WHEYPRO IS 100-1000 times richer in the bioactive nutrients nucleotides (very important factor for promoting intestinal growth and maturation, enhancing intestinal healing after injury (e.g. diarrhea) and immune stimulating effects) and human-like oligosaccharides compared to the bovine WPC.

Human milk oligosaccharides are important bioactive nutrients demonstrated to have numerous health effects including prebiotic and immune-stimulating activity (Espinosa et al 2007). On the compositional level human milk oligosaccharides are unique, containing >130 different oligosaccharides. In addition, the level as present in human milk is on average 10 – 100 fold higher than in milk of any other species. From a commercial point of view, human-like oligosaccharide-rich sources are possible important ingredients for functional foods like clinical and infant foods. General profiling of the oligosaccharide profile revealed that the WHEYPRO snacks have a profile that is more similar to human milk than the bovine WPC80.

In conclusion, the HWHEYPRO snacks have several unique characteristics, both functional and compositional, creating marketing possibilities in various sectors.

FETA BAR
Orange Chocolate & Strawberry white chocolate

A functional food with Greek sheep-goat protein and a unique taste of either black chocolate – orange or white chocolate – strawberry!

FETA BAR ORANGE & FETA BAR STRAWBERRY

Type: Functional Food

CE marking (Regulation 1924/2006)
High protein content
High fiber content

High protein levels help maintain bone and muscle mass. (EFSA Ref. 2010: 8 (10): 1811.2011; 9 (6): 2203)

It contributes to the reduction of postprandial rise in blood sugar (EFSA Ref. 2011: 9 (4): 2024)

Clinical Studies:

Rating GI: GI 5,18 (very low) (*Nutrients* **2014**, *6*(6), 2240-2250; doi:10.3390/nu6062240)

This product contains a specific ratio of carbohydrates and whey proteins from ewe-goat milk (1/1) prepared using cheese industry by-products as starting material, which reduces oxidative stress and promotes endothelial function (http://www.ncbi.nlm.nih.gov/pubmed/24705018)

Consumer information

Contains specific amount of protein, which can help to maintain and develop muscle mass. It also helps in proper bowel function.

Suitable for athletes.

Suitable for diabetics type I & II

Scientific information

The composition of the product can help resynthesis ability of muscle glycogen after exercise. The low glycemic index ensures low insulin stimulation of pancreas and high stimulation of glucagon.

May be administered in case of a hypoglycaemic episode as due to its polyol and maltodextrin content, it achieves direct linear stimulation of the pancreas (diabetes type II) or management of the excess insulin (diabetes type I). In clinical studies the product promotes the total antioxidant capacity, reduces lipid peroxidation, and activates the regulating of endothelial function.

Suitable for:

Diabetic type I & II
Athletes
Postoperative heart patients
Endothelial oxidations small and large vessels
Weariness
Vatabolism
Poor feeding
Pregnant women - gestational diabetes - extracorporeal

CLINICAL STUDIES OF FETA BAR

Nutrients **2014**, *6*, 2240-2250; doi:10.3390/nu6062240

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Article

Glycemic Response of a Carbohydrate-Protein Bar with Ewe-Goat Whey

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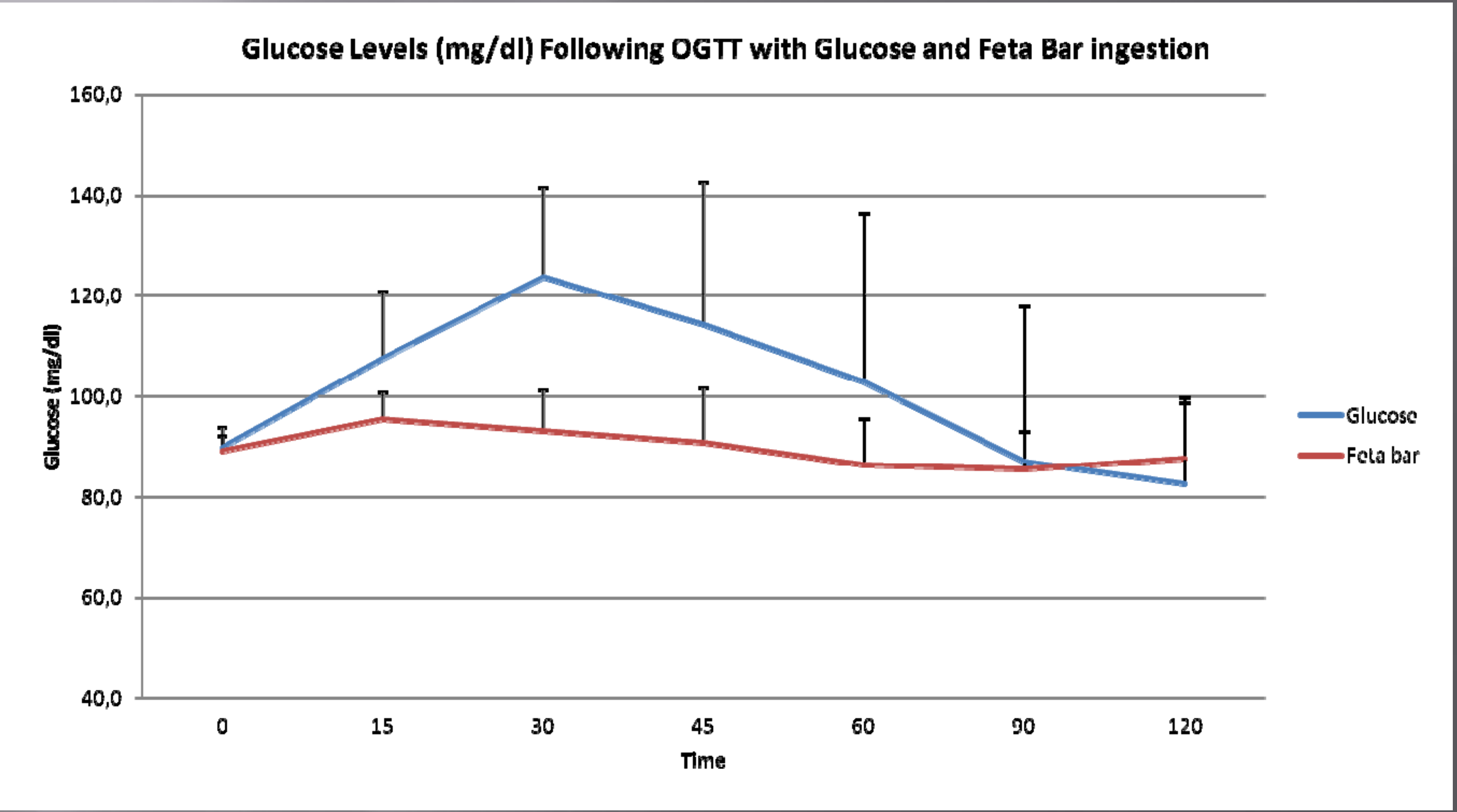
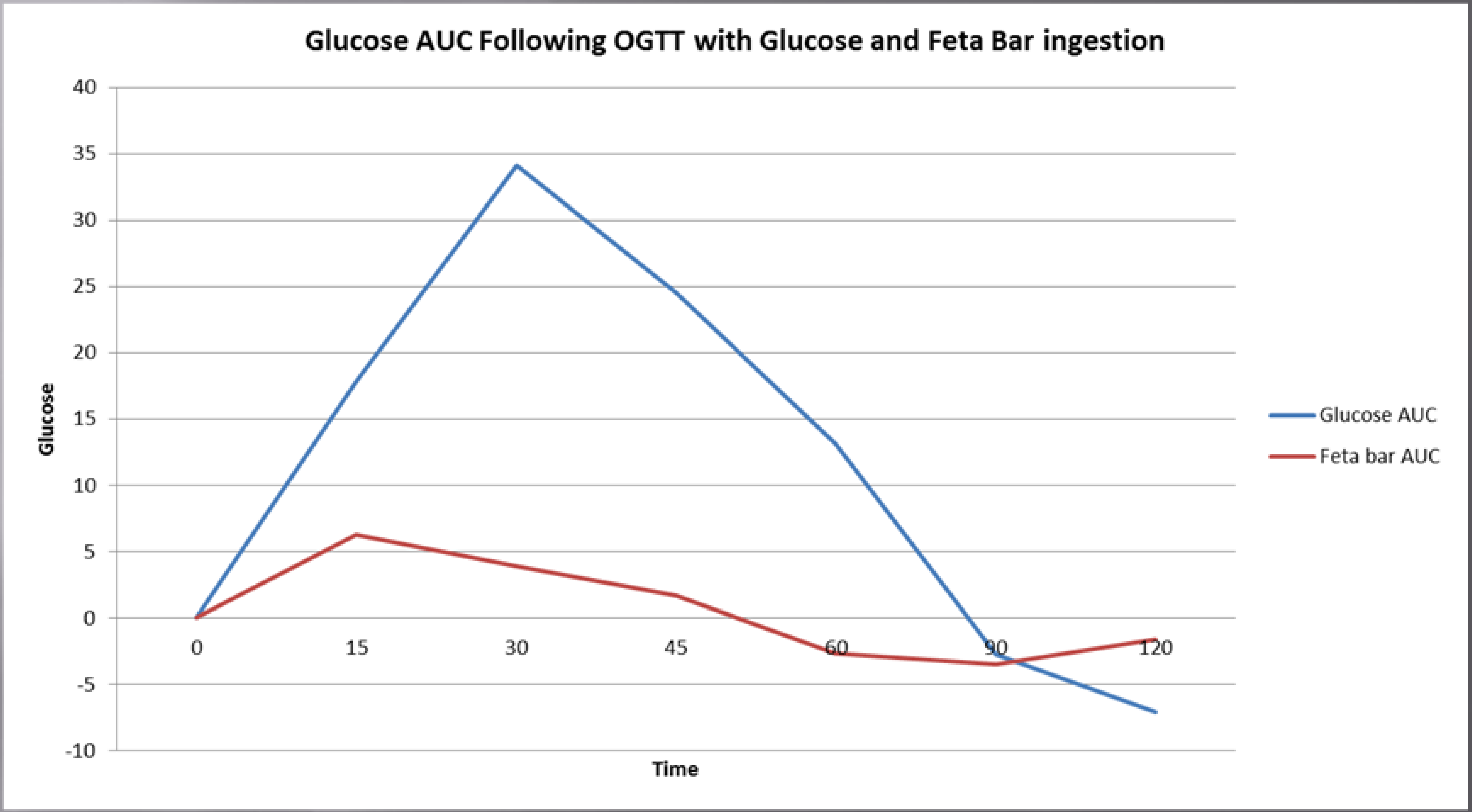
Abstract

- In this study we examined the glycaemic index (GI) and glycaemic load (GL) of a functional food product, which contains ewe-goat whey protein and carbohydrates in a 1:1 ratio. Nine healthy volunteers, (age, 23.3 ± 3.9 years; body mass index, 24.2 ± 4.1 kg·m2; body fat %, 18.6 ± 10.0) randomly consumed either a reference food or amount of the test food both with equal carbohydrate content in two visits. In each visit, seven blood samples were collected; the first sample after an overnight fast and the remaining six at 15, 30, 45, 60, 90 and 120 min after the beginning of food consumption. Plasma glucose concentration was measured and the GI was determined by calculation of the incremental area under the curve. The GL was calculated using the equation: test food GI/100 g available carbohydrates per test food serving. The GI of the test food was found to be 5.18 ± 3.27, while the GL of one test food serving was 1.09 ± 0.68. These results indicate that the tested product can be classified as a low GI (<55) and low GL (<10) food. Given the health benefits of low glycaemic response foods and whey protein consumption, the tested food could potentially promote health beyond basic nutrition.

Mean Glucose responses following an Oral Glucose Tolerance Test after Glucose (50 gr) or Feta bar (50 gr) Ingestion

Time (min)	Glucose (Mean ± SD)	Feta bar (Mean ± SD)
0	89,7 ± 2,4	89,2 ± 4,7
15	107,5 ± 13,3	95,5 ± 5,4
30	123,8 ± 17,6	93,1 ± 8,2
45	114,2 ± 28,4	90,9 ± 10,8
60	102,8 ± 33,4	86,5 ± 9,0
90	87,0 ± 30,9	85,6 ± 7,3
120	82,7 ± 17,0	87,6 ± 11,2


Glucose Levels (mg/dl) Following OGTT with Glucose and Feta Bar ingestion
160,0
140,0
120,0
100,0
80,0
60,0
40,0
Glucose (mg/dl)
0
15
30
45
60
90
120
Time
Glucose
Feta bar


Glucose AUC Following OGTT with Glucose and Feta Bar ingestion
40
35
30
25
20
15
10
5
0
-5
-10
Glucose
0
15
30
45
60
90
120
Time
Glucose AUC
Feta bar AUC

Glycemic Index calculation

- GI = (Mean Feta bar AUC/Mean Glucose AUC) * 100
- GI = (0,69/13,27) * 100
- GI = 0,0518 * 100
- GI = 5,18

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Food and Chemical Toxicology

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Effect of a special carbohydrate–protein bar and tomato juice supplementation on oxidative stress markers and vascular endothelial dynamics in ultra-marathon runners

Antonios Samaras[a], Konstantinos Tsarouhas[b], Eleftherios Paschalidis[a], Grigorios Giamouzis[e], Filippos Triposkiadis[e], Christina Tsitsimpikou[c], Aphrodite Tousia Becker[d], Nikolaos Goutzourelas[d], Demetrios Kouretas[d,*]

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Abstract

- It is well established that exercise causes excessive production of reactive oxygen species, leading to oxidative stress. The latter is involved in oxidative damage to macromolecules, immune dysfunction, muscle damage and fatigue. The present study examined the effect of consuming a special bar containing whey protein and carbohydrates in a specific ratio (1: 1) in ultra marathon runners for a two month period. The bar consisted of either whey (N = 16), or a commercially available tomato juice (N = 15).
- Active substances that react with thiobarbituric acid and protein carbonyls decreased significantly in these two groups, while an increase in reduced glutathione levels was observed only in the group receiving the protein bar.The total antioxidant activity remained unchanged in both groups. The Flow-mediated dilatation was used to assess endothelial function and was increased in both groups. However, only the tomato juice group exhibited a significant increase.
- To conclude, the administration of these two products in ultra marathon runners for a two month period, improved their oxidation state, while the tomato juice improved their vascular endothelial function too.

Table 2
Average nutritional value per 100 g of tomato juice and protein bar used in the present study (canned, salt added) and the carbohydrate supplementation beverage, both commercially available, as provided by the manufacturer.

	Tomato juice (data provided by the manufacturer)	Protein bar (data provided by the manufacturer)	Carbohydrate supplementation beverage (average values calculated from manufacturers data)
Energy	17.00 kcal	409.10 kcal	20.80 ± 10.6 kcal
Carbohydrates	4.24 g	30.20 g (19.7 g sugars)	4.80 ± 0.79 g
Dietary fibers	0.41 g	5.20 g	0.56 ± 0.32 g
Fat	0.05 g	15.60 g	0.00 g
Protein	0.76 g	30.80 g (14.3 g whey protein)	0.00 g
Vitamin C	18.30 mg (22%)		
Na	Data not available	0.05 g	0.05 g
Water	93.90 g		

Table 4
Effects of the special bar supplementation on the endothelial function and on oxidative stress markers after 2 months of use.

Parameter	Average	*P*
$FMD_{baseline}$	21.5 ± 11.0	0.557
$FMD_{supplem}$	23.6 ± 10.3	
$Glucose_{baseline}$ (mg/dL)	96.4 ± 15.7	0.205
$Glucose_{supplem}$ (mg/dL)	90.7 ± 11.0	
$Cholesterole_{baseline}$ (mg/dL)	168.0 ± 41.2	0.982
$Cholesterole_{supplem}$ (mg/dL)	168.0 ± 57.8	
$Triglycerides_{baseline}$ (mg/dL)	86.5 ± 46.9	0.426
$Triglycerides_{supplem}$ (mg/dL)	95.2 ± 57.0	
$LDL_{baseline}$ (mg/dL)	88.0 ± 40.5	0.053
$LDL_{supplem}$ (mg/dL)	96.7 ± 39.4	
$HDL_{baseline}$ (mg/dL)	62.6 ± 13.6	0.296
$HDL_{supplem}$ (mg/dL)	64.2 ± 13.5	
$GSH_{baseline}$ (μmol/L)	26.2 ± 4.27	**<0.001**
$GSH_{supplem}$ (μmol/L)	47.5 ± 10.3	
$Carbonyls_{baseline}$ (nmol/gr protein)	0.597 ± 0.156	**0.003**
$Carbonyls_{supplem}$ (nmol/gr protein)	0.440 ± 0.107	
$TBARS_{baseline}$ (μmol/L)	7.1 ± 1.48	**0.004**
$TBARS_{supplem}$ (μmol/L)	5.3 ± 2.20	
$TAC_{baseline}$ (mmol DPPH/L)	0.978 ± 0.124	0.063
$TAC_{supplem}$ (mmol DPPH/L)	1.030 ± 0.0927	

The bold values are statistical significant, $p < 0.05$.

Table 5
Effects of the tomato juice supplementation on the endothelial function and on oxidative stress markers after 2 months of use.

Parameter	Average	*P*
$FMD_{baseline}$	20.2 ± 9.9	**0.028**
$FMD_{supplem}$	25.7 ± 10.2	
$Glucose_{baseline}$ (mg/dL)	92.3 ± 10.8	**0.046**
$Glucose_{supplem}$ (mg/dL)	82.5 ± 13.1	
$Cholesterole_{baseline}$ (mg/dL)	207 ± 55.2	**0.048**
$Cholesterole_{supplem}$ (mg/dL)	181 ± 23.1	
$Triglycerides_{baseline}$ (mg/dL)	84.9 ± 41.3	0.823
$Triglycerides_{supplem}$ (mg/dL)	87.1 ± 29.4	
$LDL_{baseline}$ (mg/dL)	110.0 ± 41.20	**0.011**
$LDL_{supplem}$ (mg/dL)	82.8 ± 22.00	
$HDL_{baseline}$ (mg/dL)	80.7 ± 18.70	0.954
$HDL_{supplem}$ (mg/dL)	80.5 ± 9.81	
$GSH_{baseline}$ (μmol/L)	35.4 ± 15.8	0.902
$GSH_{supplem}$ (μmol/L)	34.9 ± 6.08	
$Carbonyls_{baseline}$ (nmol/gr protein)	0.683 ± 0.208	**0.004**
$Carbonyls_{supplem}$ (nmol/gr protein)	0.513 ± 0.126	
$TBARS_{baseline}$ (μmol/L)	7.11 ± 1.44	**0.001**
$TBARS_{supplem}$ (μmol/L)	4.94 ± 1.26	
$TAC_{baseline}$ (mmol DPPH/L)	0.961 ± 0.126	0.065
$TAC_{supplem}$ (mmol DPPH/L)	1.020 ± 0.092	

The bold values are statistical significant, $p < 0.05$.

OLYMPUS CAKE

- ✓“Assists in the decrease of post-prandial rise of sugar levels”
- ✓“Good source of protein and Medium Chain Triglycerides (MCT)"

OLYMPUS CAKE

Type: Bioactive food

CE marking (Regulation 1924/2006)
Protein source
High fiber content

Health claims

High protein levels contribute in the maintenance of bone and muscle mass. (EFSA Reference Nr 2010:8 (10): 1811,2011;9(6):2203)

Contributes to the decrease of postprandial rise of blood sugar levels (EFSA Reference Nr 2011: 9(4):2024)

Clinical trials with Olympus Cake

Food and Chemical Toxicology 50 (2012) 2805–2810

Contents lists available at SciVerse ScienceDirect

Food and Chemical Toxicology

journal homepage: www.elsevier.com/locate/foodchemtox

Effect of a special carbohydrate–protein cake on oxidative stress markers after exhaustive cycling in humans

Efthalia Kerasioti [a], Alexandra Kiskini [a], Aristidis Veskoukis [a], Athanasios Jamurtas [d], Christina Tsitsimpikou [b], Aristidis M. Tsatsakis [c,*], Yiannis Koutedakis [d,e,f], Dimitrios Stagos [a], Demetrios Kouretas [a,*], Vaios Karathanos [g]

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Abstract

- Exercise is linked to oxidative stress, which is related to muscle fatigue and reduced exercise performance
- The purpose of this study was to examine the consequences of administering a special cake (consisting of carbohydrates and whey protein at a 3.5:1 ratio) compared with an isocaloric placebo (carbohydrate only) cake in oxidative stress biomarkers on 9 men after exhaustive cycling.
- The subjects initially carried out 2 hours of cycling in an ergometric bicycle, at 60-65% VO_2max, followed by 4 hours of recovery and another hour of cycling at 60-65% VO_2max which gradually increased to 95% (personal time-keeping).
- The volunteers consumed the special or placebo cake 4 times after the first round took place (after the work out and every hour for the next 3 hours).
- Blood samples were kept at 8 different time points: pre-work out, 30 minutes, 1.5 h, 4 h post-work out (first round) and post-work out (second round), 1 hour, 24 hours and 48 hours after the second trial.
- Thiobarbituric acid reactive species (TBARS), protein carbonyls, total antioxidant capacity (TAC), catalase and glutathione (GSH) were determined spectrophotometrically.
- The average time to exhaustion was not affected by the cake consumption. However, the consumption of the special cake reduced the TBARS significantly, but had no effect on the other biomarkers.

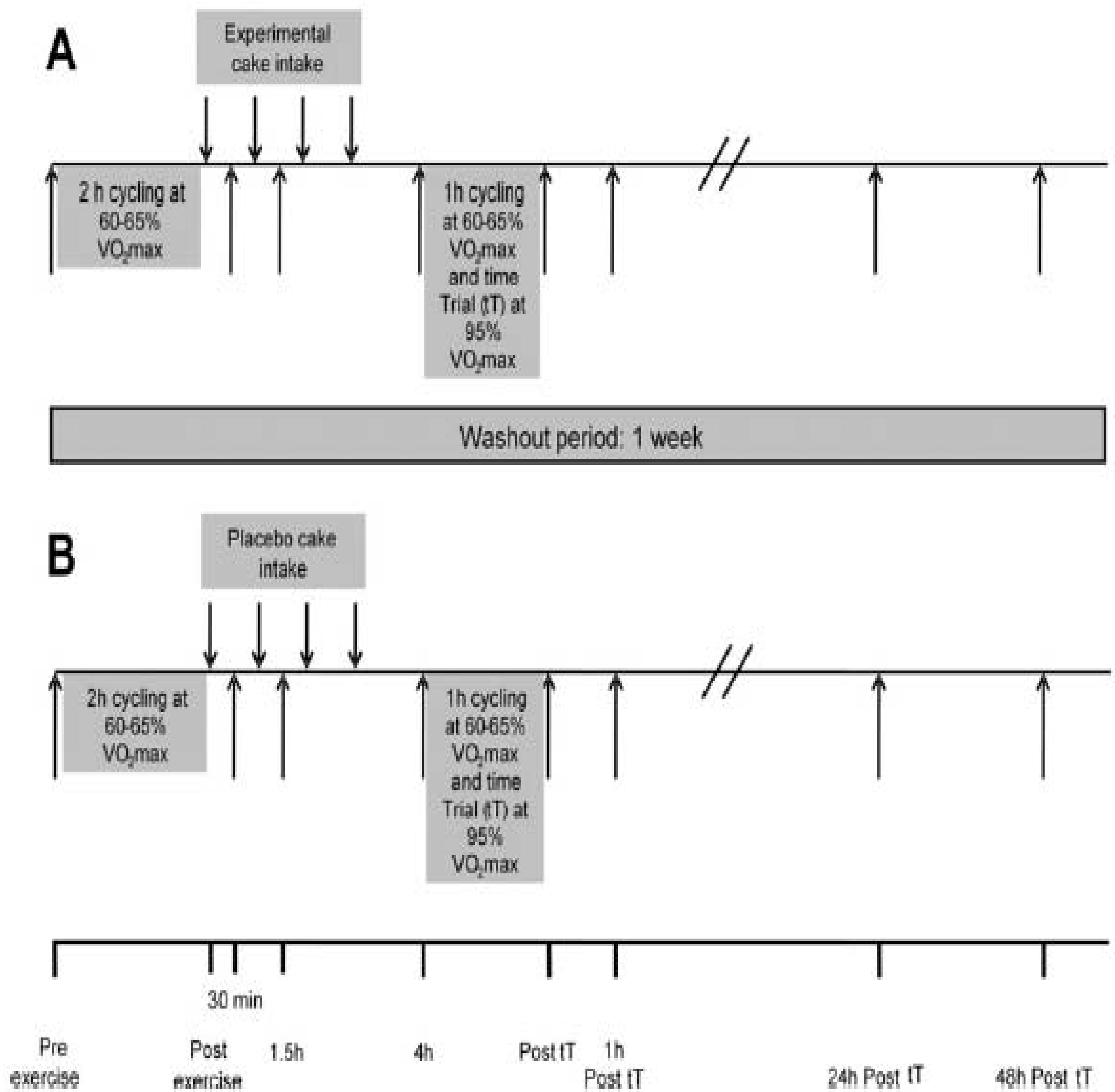

Fig. 1. Experimental Design. Downward arrows indicate time of experimental (A) or placebo (B) cake intake. Upward arrows indicate time of blood sampling.

Table 1
Hematological variables in the subjects of experimental and placebo groups at the 8 time points of the experiment (mean ± SEM).

	Experimental Groups							
	T1	T2	T3	T4	T5	T6	T7	T8
Hct[a] (%)	39.8 ± 0.9	40.9 ± 1.0*	39.5 ± 0.9	39.1 ± 1.1	41.8 ± 0.8*	39.1 ± 1.0	39.2 ± 0.8	37.5 ± 0.6**
Hb[b] ($g\ dL^{-1}$)	14.1 ± 0.2	14.4 ± 0.2	14.0 ± 0.2	13.8 ± 0.2	14.7 ± 0.2*	13.8 ± 0.2	13.8 ± 0.2	13.3 ± 0.2
RBC[c] ($10^{12}\ L^{-1}$)	5.1 ± 0.1	5.3 ± 0.1*	5.1 ± 0.1	5.0 ± 0.1	6.2 ± 0.9	5.1 ± 0.1	5.0 ± 0.1	4.8 ± 0.1
MCV[d] (fL)	77.6 ± 2.0	77.8 ± 2.0	77.8 ± 2.0	77.7 ± 2.0	77.7 ± 1.9	77.4 ± 2.1	77.9 ± 1.6	78.0 ± 1.7
MCH[e] (pg per cell)	27.4 ± 0.6	27.4 ± 0.6	27.4 ± 0.6	27.4 ± 0.5	27.3 ± 0.5	27.3 ± 0.7	27.4 ± 0.6	27.3 ± 0.5
MCHC[f] ($g\ dL^{-1}$)	35.5 ± 0.6	35.4 ± 0.6	35.3 ± 0.5	35.3 ± 0.6	35.2 ± 0.5	35.4 ± 0.5	35.3 ± 0.4	35.6 ± 0.4
WBC[g] ($10^9\ L^{-1}$)	6.3 ± 0.3	8.9 ± 0.9	11.0 ± 0.9*	10.0 ± 0.6*	14.0 ± 0.7*	9.2 ± 0.5*	6.7 ± 1.0	5.5 ± 0.4
Plt[h] ($10^9\ L^{-1}$)	249.6 ± 18.4	294.9 ± 20.9*	260.1 ± 20.4	257.3 ± 19.2	325.9 ± 22.3*	266.7 ± 21.6	232.9 ± 14.9	229.1 ± 18.0
	Placebo Groups							
	T1	T2	T3	T4	T5	T6	T7	T8
Hct[a] (%)	39.2 ± 0.8	41.2 ± 0.7	39.6 ± 0.8	40.0 ± 0.7	41.8 ± 0.7*	39.8 ± 0.8	40.0 ± 0.5	40.0 ± 0.5**
Hb[b] ($g\ dL^{-1}$)	13.9 ± 0.3	14.5 ± 0.3	13.9 ± 0.3	13.0 ± 1.1	14.6 ± 0.3	14.0 ± 0.2	13.9 ± 0.2	13.5 ± 0.2
RBC[c] ($10^{12}\ L^{-1}$)	5.0 ± 0.1	5.3 ± 0.1	5.1 ± 0.1	5.1 ± 0.1	5.3 ± 0.1*	5.1 ± 0.1	5.1 ± 0.1	4.9 ± 0.1
MCV[d] (fL)	77.8 ± 2.0	78.1 ± 1.2	77.9 ± 1.2	77.9 ± 1.1	78.2 ± 1.2	78.3 ± 1.2	78.0 ± 1.3	77.8 ± 1.4
MCH[e] (pg per cell)	27.6 ± 0.5	27.5 ± 0.5	27.4 ± 0.5	27.4 ± 0.4	27.3 ± 0.5	27.5 ± 0.5	27.1 ± 0.5	27.3 ± 0.5
MCHC[f] ($g\ dL^{-1}$)	35.4 ± 0.5	35.2 ± 0.5	35.2 ± 0.5	34.6 ± 0.9	34.9 ± 0.4	35.2 ± 0.5	34.8 ± 0.5	35.1 ± 0.5
WBC[g] ($10^9\ L^{-1}$)	6.2 ± 0.3	8.4 ± 0.6	10.3 ± 0.7*	9.9 ± 0.6*	12.9 ± 0.7*	8.6 ± 0.4*	6.0 ± 0.3	5.8 ± 0.2
Plt[h] ($10^9\ L^{-1}$)	232.1 ± 12.2	279.1 ± 13.4	238.8 ± 13.7	251.9 ± 14.7	302.9 ± 15.1*	254.8 ± 11.4	233.9 ± 14.3	220.9 ± 15.2

[a] Hct = hematocrit.
[b] Hb = hemoglobin.
[c] RBC = red blood cells.
[d] MCV = mean cell volume.
[e] MCH = mean cell hemoglobin.
[f] MCHC = mean cell hemoglobin concentration.
[g] WBC = white blood cells.
[h] Plt = platelets.
* Significantly different from the baseline value (T1) in the same group ($P < 0.05$).
** Significantly different from the respective value between the groups ($P < 0.05$).

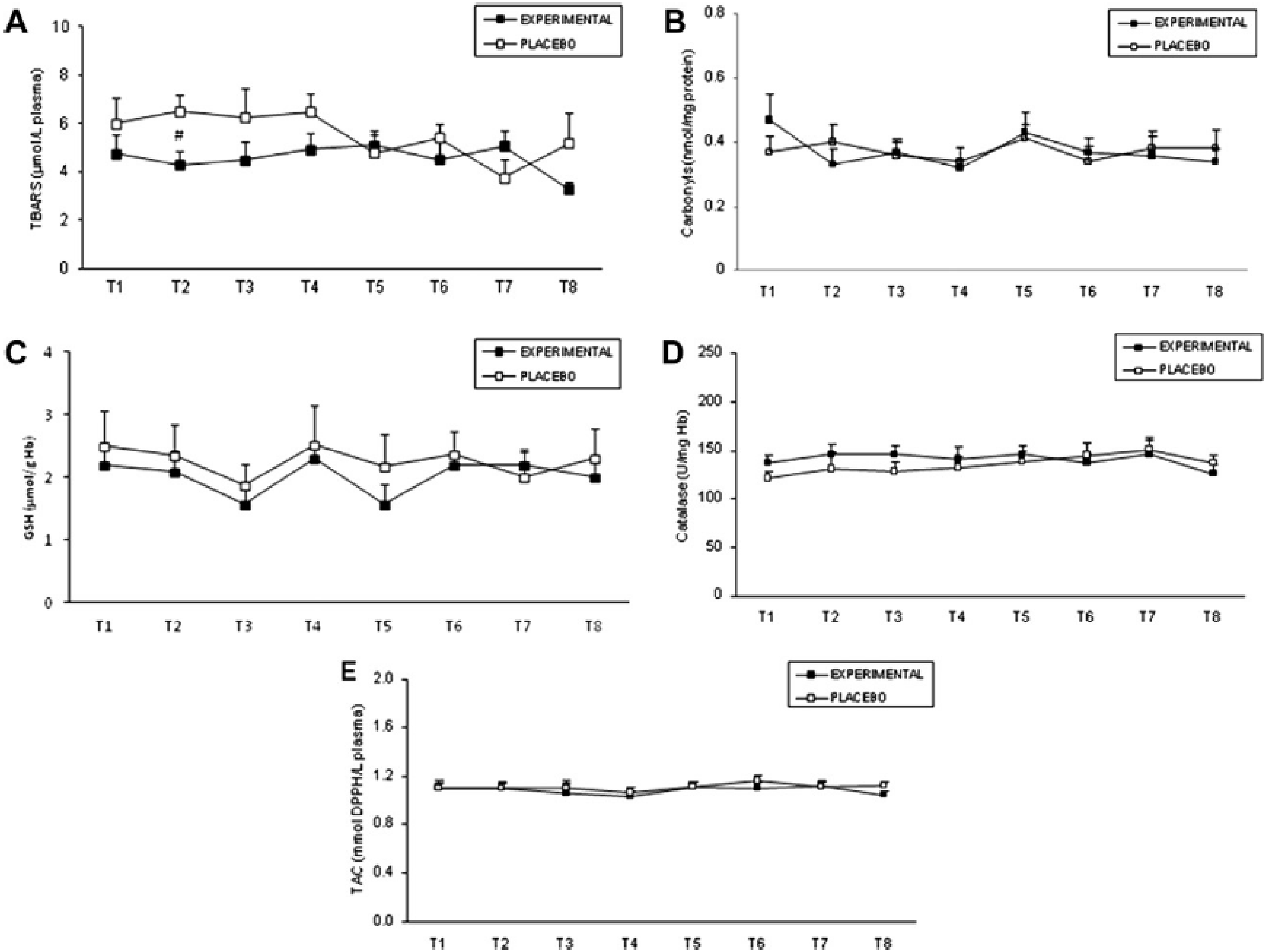

Fig. 3. The effects of experimental and placebo cake administration on plasma thiobarbituric acid reactive substances (TBARS) (A), plasma protein carbonyls (B), erythrocyte glutathione (GSH) (C), erythrocyte catalase (D) and plasma total antioxidant capacity (TAC) (E). # Significantly different between experimental and placebo groups at the same time point ($P < 0.05$).

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Food and Chemical Toxicology

journal homepage: www.elsevier.com/locate/foodchemtox

Anti-inflammatory effects of a special carbohydrate–whey protein cake after exhaustive cycling in humans

Efthalia Kerasioti[a], Dimitrios Stagos[a], Athanasios Jamurtas[b], Alexandra Kiskini[a], Yiannis Koutedakis[b,c,d], Nikos Goutzourelas[a], Spyros Pournaras[e], Aristidis M. Tsatsakis[f], Dimitrios Kouretas[a,*]

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[b] Department of Exercise and Sport Sciences, University of Thessaly, Trikala 42100, Greece
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Abstract

- Intense exercise stimulates an increase of pro- and anti-inflammatory cytokines.
- The current study's aim was to examine the effect of administering a special cake (with a 3.5:1 carbohydrate:protein ratio) compared with an isocaloric carbohydrate-only cake, in inflammation markers, after exhaustive cycling in humans
- Nine volunteers consumed either the special or the placebo cake and then performed 2 hours of cycling at 60-65% VO_2max in an ergonomic bicycle, followed by 4 hours of recovery. Then, another hour of cycling took place, at 60-65% VO_2max that increased up to 95% VO_2max. Blood samples were taken at several time points: pre-work out, 30 minutes, 4 hours and 48 hours post-work out. The cake was consumed right after the work out but also every hour for the next 3 hours.
- According to the results, cake consumption had affected the pro-inflammatory IL-6 and CRP levels, as a decrease was noted after 4 hours (50% and 46% respectively).
- Finally, anti-inflammatory IL-10 was 118% higher 4 hours after the work out, but the difference was not statistically important.

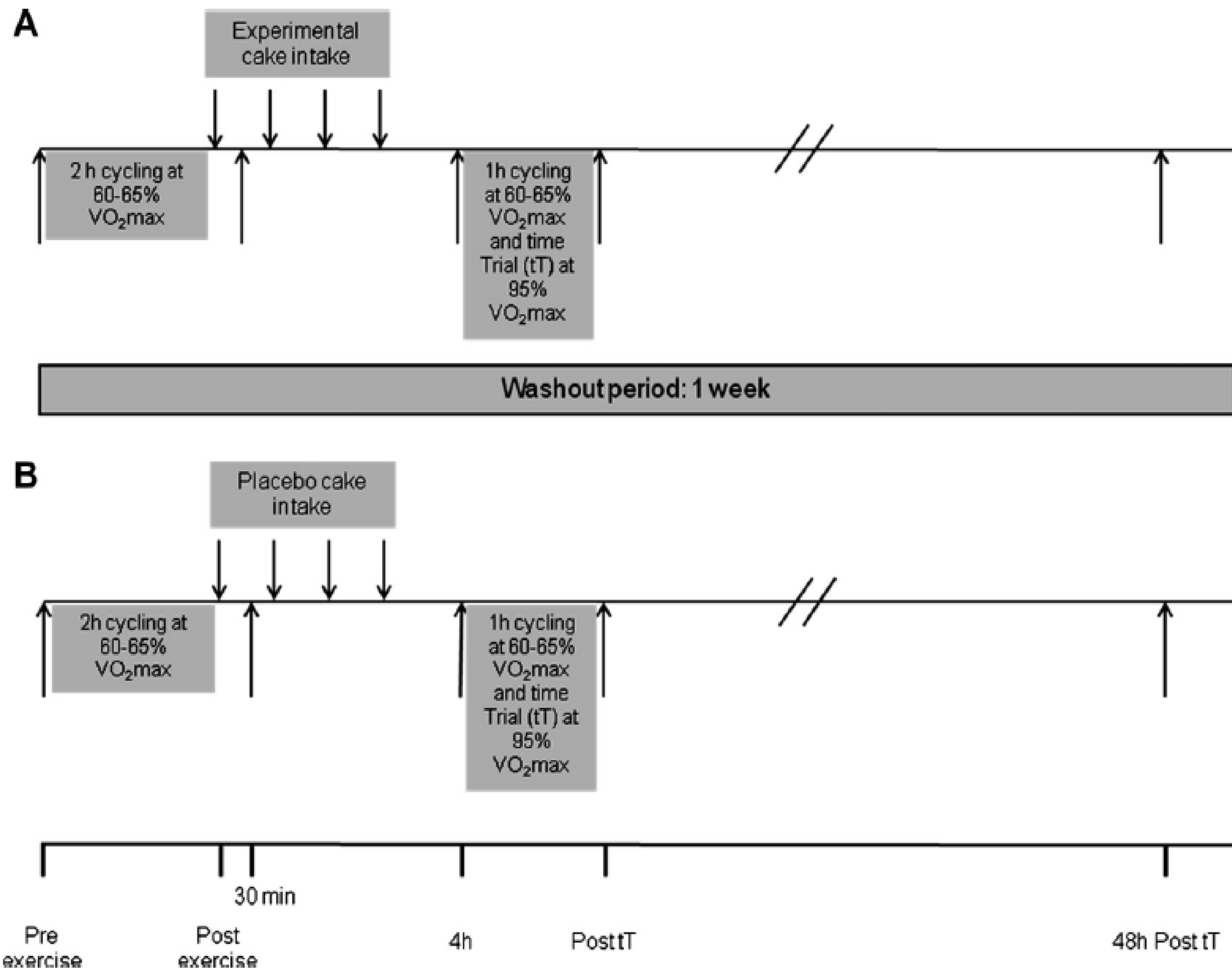

Fig. 1. Experimental design. Downward arrows indicate time of experimental (A) or placebo and (B) cake intake. Upward arrows indicate time of blood sampling.

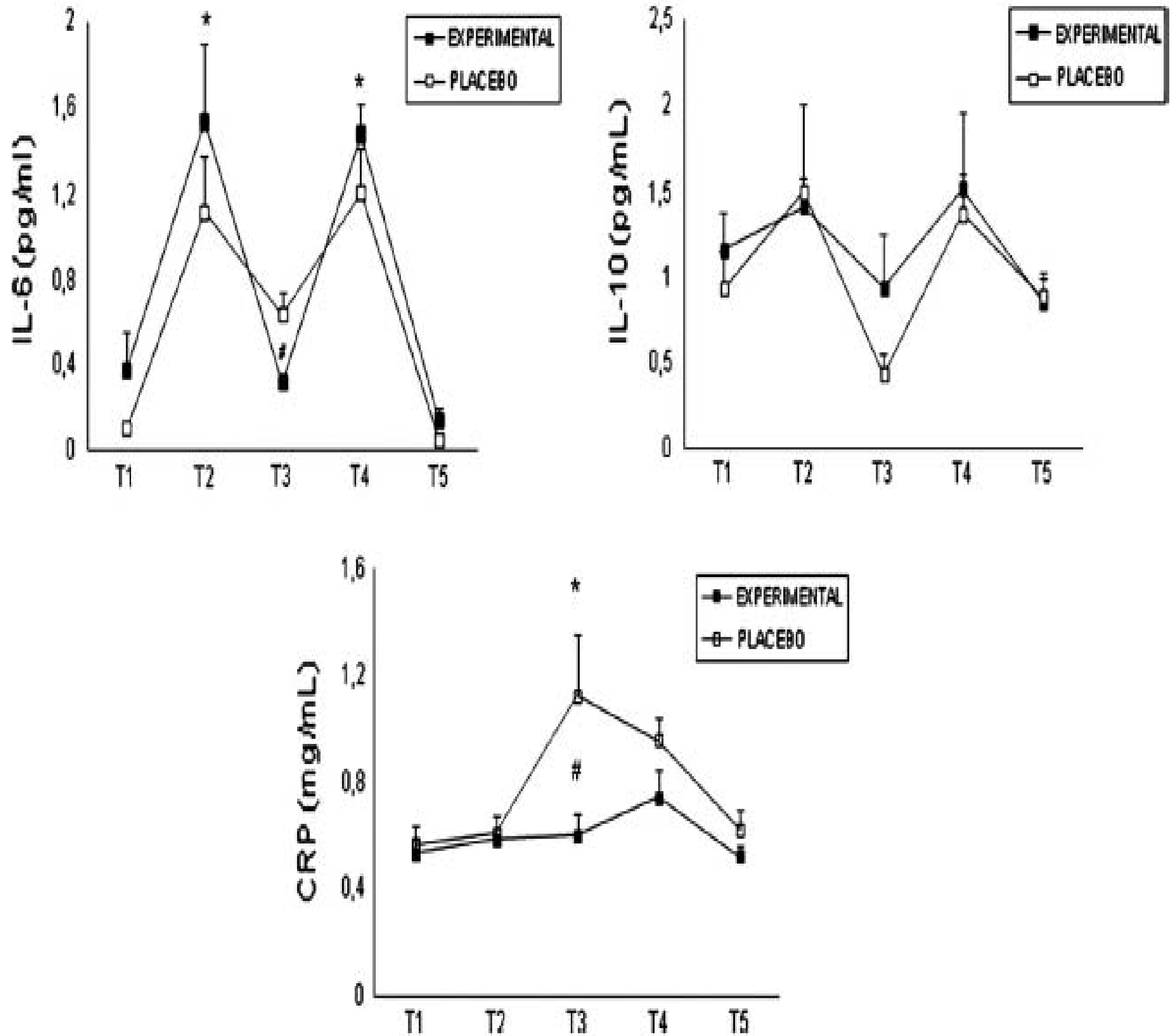

Fig. 2. The effects of experimental and placebo cake administration on (A) plasma interleukin (IL)-6, (B) plasma interleukin (IL)-10 and (C) plasma C-reactive protein (CRP). T1 = pre-exercise, T2 = 30 min post-exercise, T3 = 4 h post-exercise, T4 = immediately post-time Trial, T5 = 48 h post-time Trial. #Significantly different between experimental and placebo groups at the same time point ($p < 0.05$). *Significantly different compared to pre-exercise ($p < 0.05$).

PASTELI: Greek traditional sweet

Product with health claim

Pasteli is a greek traditional homemade sweet. It comprises natural Greek honey and sesame seeds.

Eatwalk's research group developed a novel pasteli version, by adding a whey extract.

This resulted in a natural, tasty, bioactive, protein-rich product, useful for lowering total cholesterol blood levels.

The product is already marketed, with an assigned health claim.

__Type: Bioactive food__

CE marking (Regulation 1924/2006)

High protein content

High unsaturated fatty acid content

High protein levels contribute in the maintenance of bone and muscle mass. (EFSA Reference Nr. 2010:8 (10): 1811,2011;9(6):2203)

Substituting saturated with unsaturated fatty acids helps in preserving normal blood cholesterol levels. (EFSA Reference Nr. 2011:9 (4): 2069, 2011;9(6):2203)

__Consumer Information__

The product contains an adequate amount of unprocessed sesame seeds, which when combined with whey and natural honey generate a delicious bioactive food.

Suitable for long-distance runners and aerobic athletes

Suitable for hypercholesterolemic patients

Suitable for hikers