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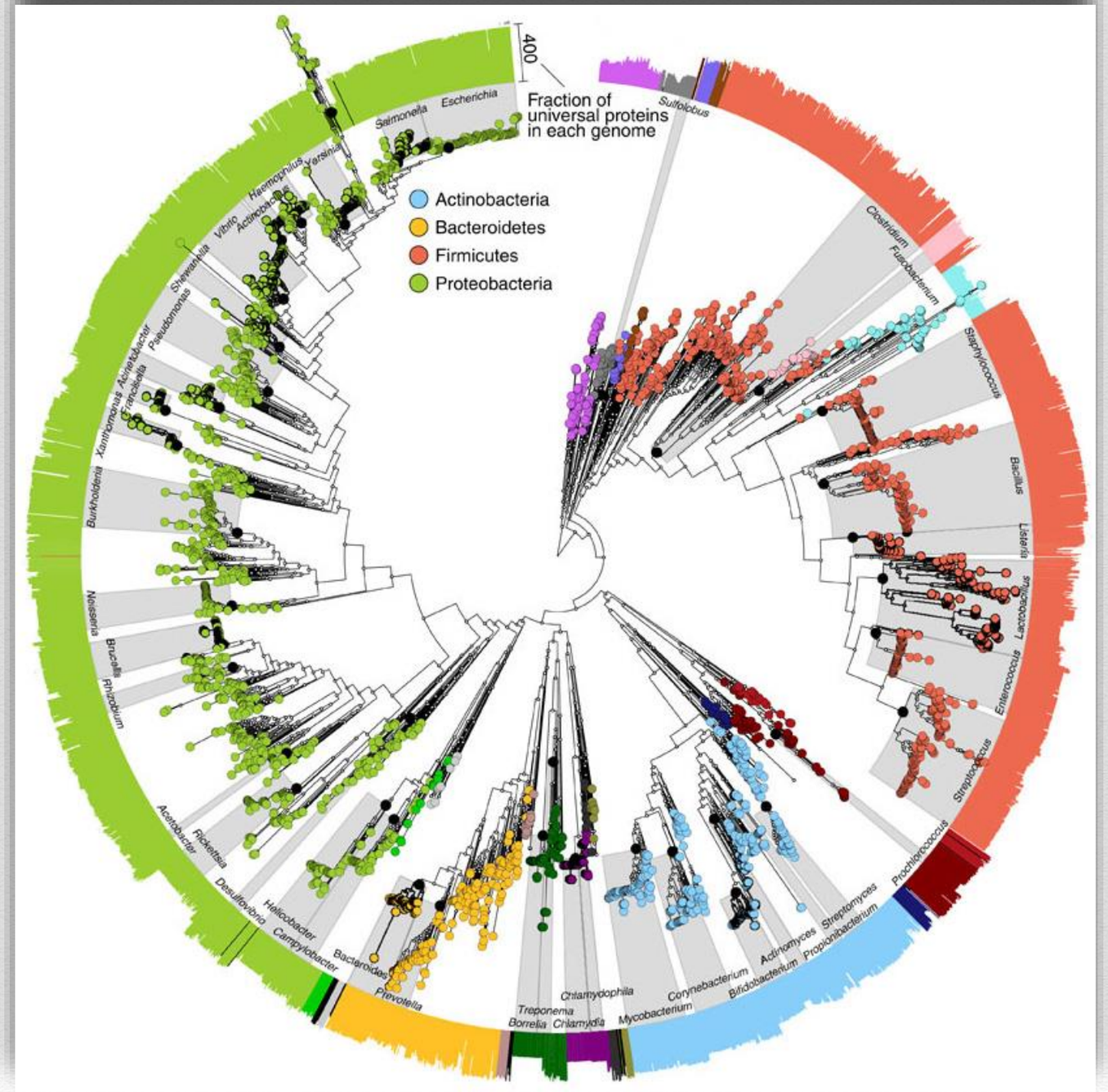
Dieta chetogenica e microbiota:
i miti e la realtà

Proteobacteria
- Campylobacter
- Neisseria
- Brucella
- Actinobacter
- Pseudomonas
- Yersinia



Bacteriodetes
- Bacteroides
- Prevotella

Firmicutes
- Clostridium
- Staphylococcus
- Bacillus
- Listeria
- Lactobacillus
- Streptococcus

Actinobacteria
- Streptomyces
- Propionibacterium
- Corynebacterium
- Mycobacterium

adapted from Segata N, Börnigen D, et al. Nat Commun. 2013

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Gut Microbes 6:2, 131–136; March/April 2015; © 2015 Taylor & Francis Group, LLC

ARTICLE ADDENDUM

Exercise and the microbiota

Orla O'Sullivan[1], Owen Cronin[2], Siobhan F Clarke[1,3], Eileen F Murphy[4], Micheal G Molloy[2], Fergus Shanahan[2,3,*], and Paul D Cotter[1,3]

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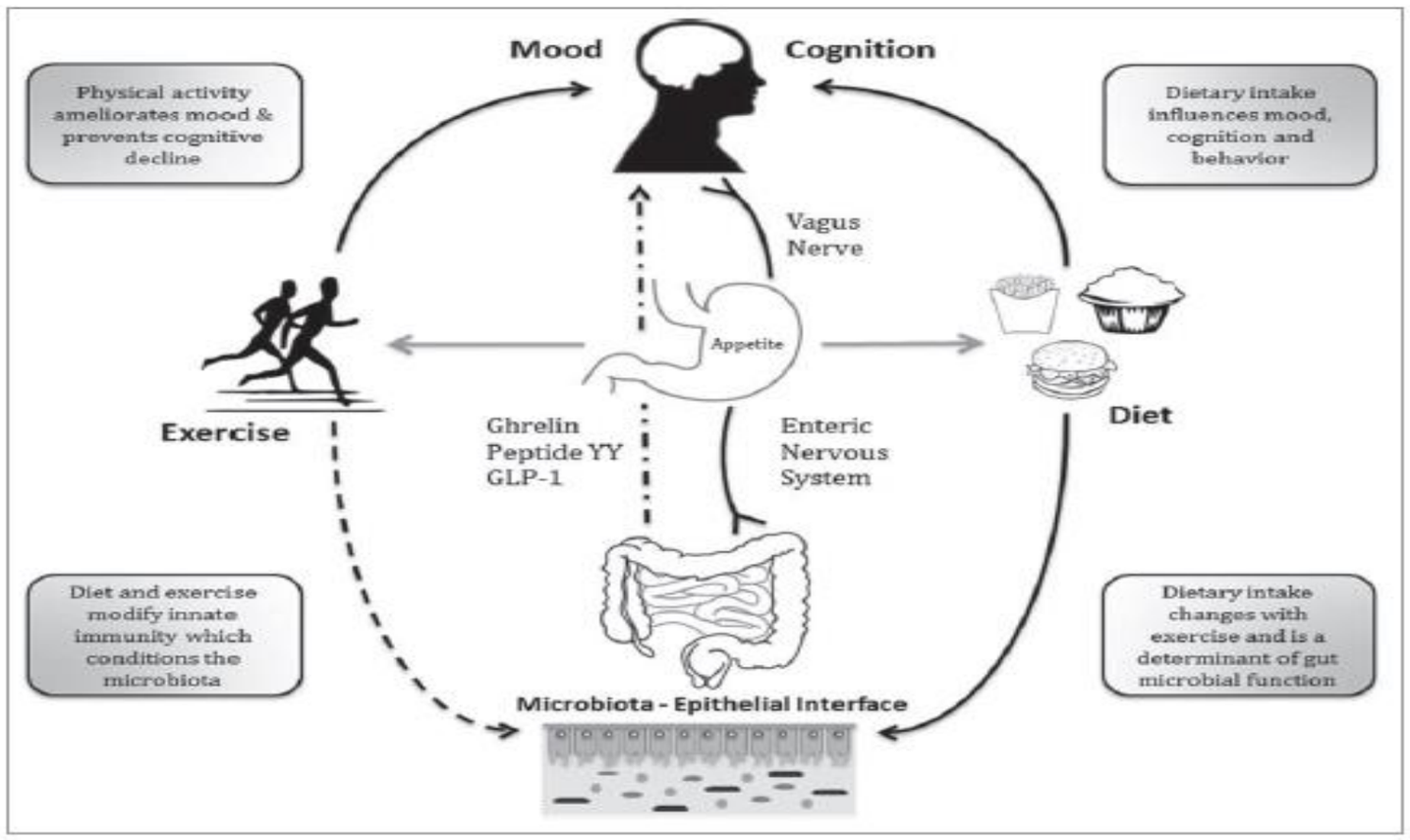
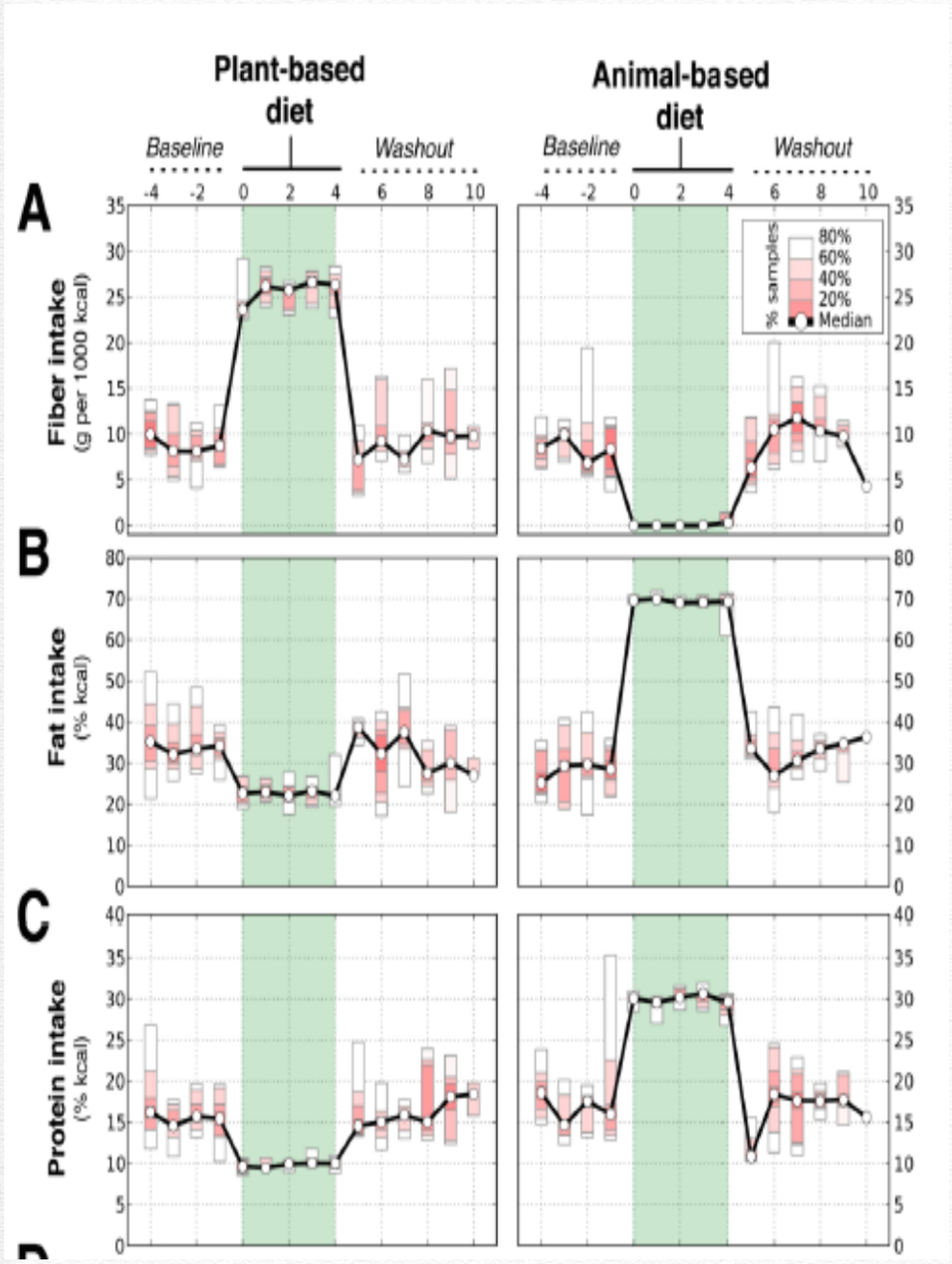


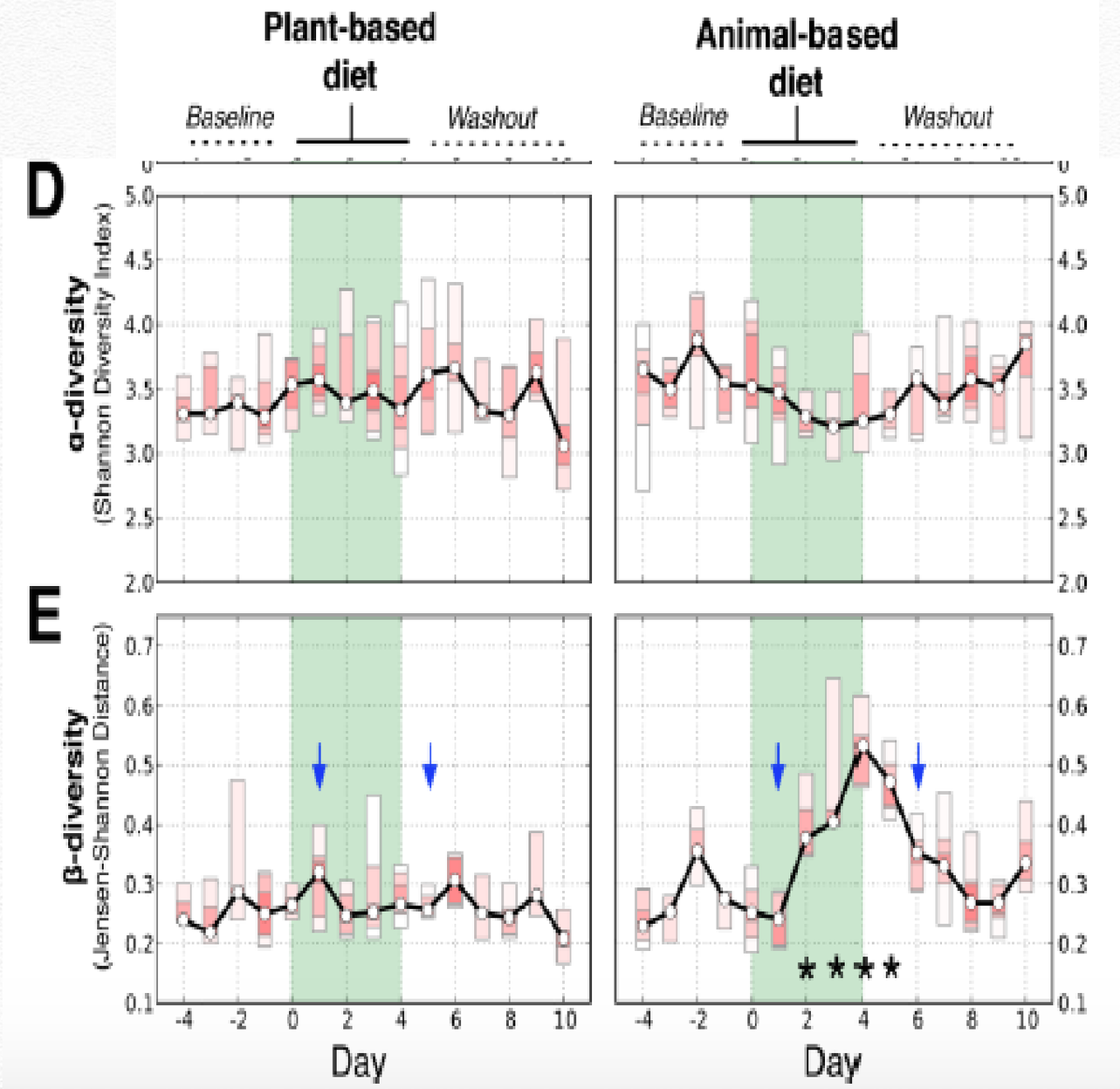
Figure 1. Schematic overview of potential sites of interaction between the biological adaptations to exercise and the microbiota. This is intended to be representative not comprehensive. Exercise is linked with a diversity of biological responses including a modifying influence on the brain-gut-microbe axis, diet-microbe-host metabolic interactions, neuro-endocrine and neuro-immune interactions. For example, exercise is long known to increase vagal tone - the hard wiring of the gut - which is anti-inflammatory and immune-modulatory. The latter might represent an indirect means by which exercise conditions gut microbiota composition.

Diet rapidly and reproducibly alters the human gut microbiome

Lawrence A. David[1,2,#], Corinne F. Maurice[1], Rachel N. Carmody[1], David B. Gootenberg[1], Julie E. Button[1], Benjamin E. Wolfe[1], Alisha V. Ling[3], A. Sloan Devlin[4], Yug Varma[4], Michael A. Fischbach[4], Sudha B. Biddinger[3], Rachel J. Dutton[1], and Peter J. Turnbaugh[1,*]

Nature. 2014 January 23; 505(7484): 559–563. doi:10.1038/nature12820.





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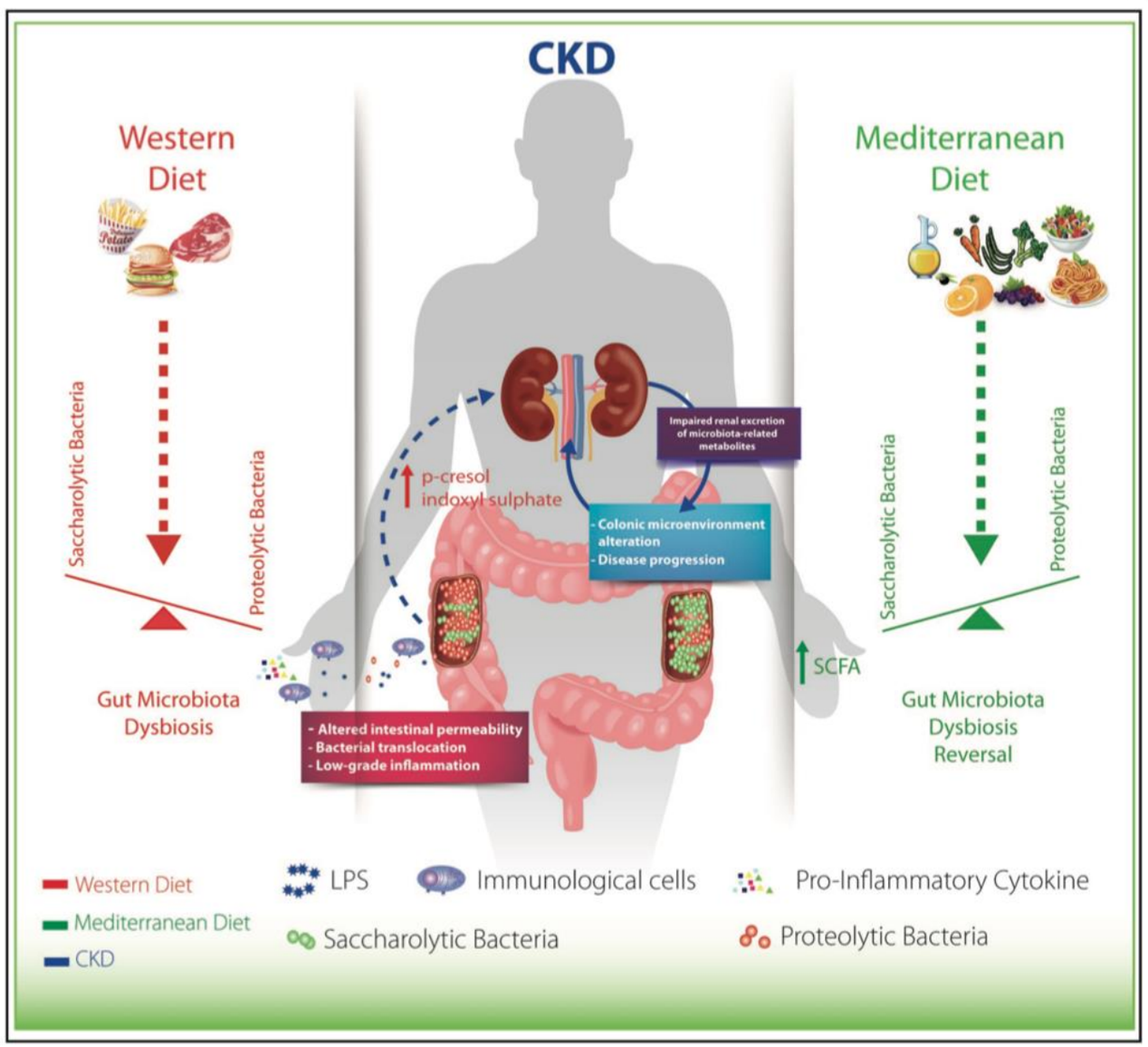

Fig. 1. The social network between diet, gut microbiota and kidney in CKD. In CKD, gut microbiota dysbiosis is present, leading to a prevalence of proteolytic species and to an increase in microbial uremic toxins (p-cresol and indoxyl sulphate). The impaired renal function, in turn, worsens the dysbiosis status and leads to an altered intestinal permeability and to low-grade inflammation. All this factors contribute to disease progression. In this context, a Western-style Diet contributes to the worsening of the dysbiosis, promoting the selective proliferation of proteolytic species. The Mediterranean Diet, by leading gut microbial metabolism towards a saccharolytic profile, can restore gut microbiota balance, ameliorating CKD conditions and slowing down disease progression.

What Would You Like to Eat, Mr CKD Microbiota? A Mediterranean Diet, please!

Eustacchio Montemurno[a] Carmela Cosola[b] Giuseppe Dalfino[b]
Giuseppe Daidone[c] Maria De Angelis[d] Marco Gobbetti[d] Loreto Gesualdo[a]

Table 1. Main findings of the effects of Ketogenic diet (KD) on gut microbiome.

	Subjects	Subjects Characteristics	Duration	Type of KD	Measured KBs (Y/N)	KBs' Level	Genome Analysis Technique	Main Findings of Bacteria Changes
Tagliabue et al. (2017) [50]	6 patients (3 females 3 males) pre-post	Glucose Transporter 1 Deficiency Syndrome	3 months	First 1:1 ratio with gradual increase of 2:1, 3:1 and or 4:1 KD ratio	Ketonuria	Not mentioned	DNA extraction RT-qPCR analysis	INCREASE *Desulfovibrio* spp.
Swidsinki et al. (2017) [52]	25 MS patients and 14 controls	Auto Immune Multiple Sclerosis	6 months	>50 g carbohydrate, >160 g fat, <100 g protein	Ketonemia and ketonuria	β-hydroxybutyric acid ≥ 500 µmol/L; acetoacetate ≥ 500 µmol/L	FISH with ribosomial RNA derived probes	DECREASE β-diversity, DECREASE substantial bacteria groups after two weeks, after six months completely recover the concentration to baseline
Newell et al. (2017) [67]	25 juvenile male C57BL/6 (B6) and 21 BTBR mice	Autism Spectrum Disorder	10–14 days	75% kcal fat	Ketonemia	β-hydroxybutyric acid 5.1 ± 0.8 mmol/L	DNA extraction RT-qPCR analysis	DECREASE in total bacterial content both in cecal and fecal analysis, DECREASE *A. muciniphila* both in cecal and fecal matter, INCREASE Enterobacteriaceae in fecal matter
Burke et al. (2019) [47]	10 LCHF, 10 PCHO, 9 HCHO pre-post	Elite race walkers	3 weeks	78% fat, 2.2 g/kg BM/day protein, <50 g carbohydrate	Ketonemia	β-hydroxybutyric acid ≥ 1.0 mmol/L	16S rRNA-gene amplicon sequencing	INCREASE in *Bacteroides* and *Dorea* spp. DECREASE in *Faecalibacterium* spp.
Lindefeldt et al. (2019) [70]	12 children (parents as controls) pre-post	Therapy-resistant epilepsy	3 months	4:1 in 7 children, 3.5:1 in 2, and 3:1 in 3 KD ratio	Ketonemia	β-hydroxybutyric acid 0.3 ± 0.2 mmol/L	Shotgun metagenomic DNA sequencing	DECREASE in abundance of bifidobacterium, *E. rectale*, *E. dialister*, INCREASE in *E. coli*, changes in 29 SEED subsystem: reduction of seven pathways of carbohydrate metabolism
Olson et al. (2018) [53]	Juvenile SPF wild-type Swiss Webster mice, GF wild type SW mice, SPF C3HeB/FeJ KCNA1 KO mice	6 Hz induced seizure model of refractory epilepsy	3 weeks	6:1 KD ratio	Ketonemia (liver, colon, intestine) and normalized to SPF (specific-pathogen free)	β-hydroxybutyric acid (different levels accepted)	16S rRNA-gene amplicon sequencing	DECREASE in α diversity, INCREASE *A. muciniphila*, Parabacteroides, Suttarella and Erysipelotrichaceae
Zhang et al. (2018) [69]	20 patients (14 males 6 females) pre-post	Refractory epilepsy	6 months	4:1 KD ratio (plant fat 70%, 1 g/kg BM/day from animal source	Ketonemia	β-hydroxybutyric acid 2.85 ± 0.246 and 3.01 ± 0.238 mmol/L (effective and ineffective group)	16S rRNA-gene amplicon sequencing	DECREASE in α diversity, Firmicutes, Actinobacteria, INCREASE in Bacteroidetes
Ma et al. (2017) [51]	C57BL/6 male mice	Healthy mice	4 months	75% fat (saturated, monounsaturated, polyunsaturated), 8.6% protein, 3.2% carbohydrates	Ketonemia	β-hydroxybutyric acid around 1.5 mmol/L	16S rRNA-gene amplicon sequencing	DECREASE in diversity, INCREASE *A. muciniphila*, *Lactobacillus*, DECREASE *Desulfovibrio*, *Turicinabacter*
Xie et al. (2017) [68]	14 patients and 30 healthy infants	Refractory epilepsy	1 week	lipid-to-non-lipid ratio of 4:1 (40% medium chain, 60% long chain), 60–80 kcal/kg per day, 1–1.5 g/kg protein	Not mentioned	Not mentioned	16S rRNA-gene amplicon sequencing	DECREASE Proteobacteria (*Cronobacter*), INCREASE Bacteroidetes (*Bacteroides*, *Prevotella*), *Bifidobacterium*

KD: Ketogenic diet; RT-qPCR: Real-time quantitative polymerase chain reaction; MS: Multiple Sclerosis; FISH: Fluorescent in situ hybridization; rRNA: ribosomial ribonucleic acid; SPF: specific-pathogen-free; SW: Swiss Webster.

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Review

Ketogenic Diet and Microbiota: Friends or Enemies?

Antonio Paoli [1,2,*], Laura Mancin [3], Antonino Bianco [4], Ewan Thomas [4], João Felipe Mota [5] and Fabio Piccini [3]

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Più chetosi: quale scegliere?

- Lo stato di chetosi dipende dall'apporto di glucosio e **prescinde dall'apporto proteico\lipidico**

- L'apporto proteico è fondamentale per sostenere la **FFM**

- Il **profilo aminoacidico** deve essere scelto con cura

- Tra i grassi è **doveroso** utilizzare oli di altissima qualità

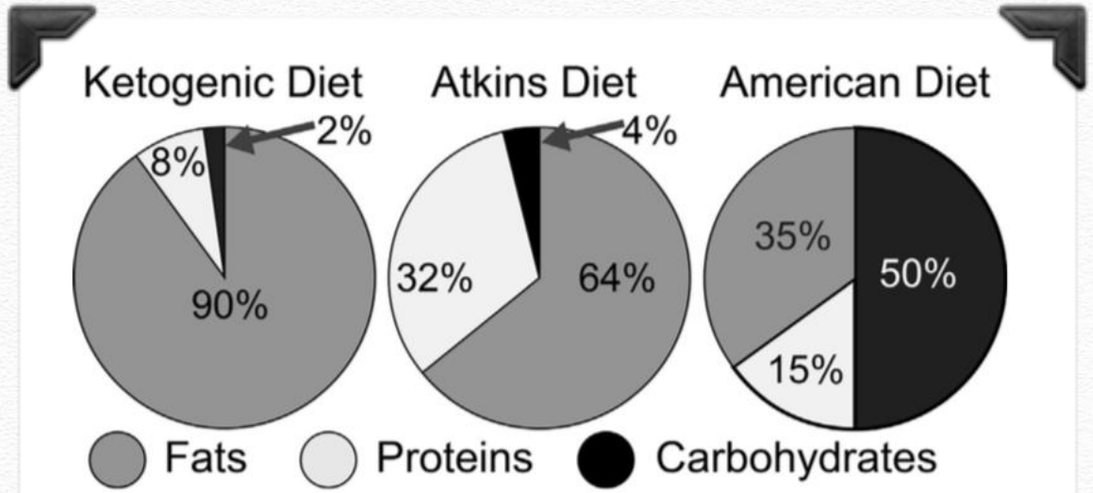

Fig. 1. Comparison of the caloric composition of the ketogenic diet, Atkins diet, and American diet. On any given day Americans consume an average of 265 g of carbohydrates (50% of total calories), 78.3 g of total fat (35% of total calories), and 78.1 g of protein (15% of total calories). Using percentage of total calories, these values are consistent with current 2010 United States Department of Agriculture recommendations that call for 45–65% of total calories from carbohydrate, 20–35% of total calories from fat, and 10–15% of total calories from protein (80).

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Impostazione di una corretta dietoterapia chetogenica

- Calcolo dell'apporto proteico
- Scelta della fonte proteica (biodisponibilità)
- Scelta dell'apporto calorico
- Scelta delle fonti lipidiche
- Calcolo del M.A.I. e degli altri indici di qualità nutrizionale

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APPORTO PROTEICO

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Article

Effects of a Personalized VLCKD on Body Composition and Resting Energy Expenditure in the Reversal of Diabetes to Prevent Complications

Lorenzo Romano [1], Marco Marchetti [1,2], Paola Gualtieri [2,*], Laura Di Renzo [2], Meriann Belcastro [3], Gemma Lou De Santis [1], Marco Alfonso Perrone [4] and Antonino De Lorenzo [2,3]

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Abstract: The reversion of diabetes and the treatment of long-term obesity are difficult challenges. The failure mechanisms of rapid weight loss are mainly related to the wasting of lean mass. This single-arm study aims to evaluate the effects of a very low-calorie ketogenic diet (VLCKD) on body composition and resting energy expenditure in the short term reversal of diabetes mellitus Type 2. For eight weeks, subjects were administered a personalized VLCKD with protein intake based on lean mass and synthetic amino acidic protein supplementation. Each subject was assessed by anthropometry, Dual-energy X-ray Absorptiometry(DXA), bioimpedentiometric analysis (BIA), indirect calorimetry, and biochemical analysis. The main findings were the saving of lean mass, the reduction of abdominal fat mass, restored metabolic flexibility, the maintenance of resting energy expenditure, and the reversion of diabetes. These results highlight how the application of preventive, predictive, personalized, and participative medicine to nutrition may be promising for the prevention of diabetes and enhancement of obesity treatment.

2.6. Experimental Protocol

The included subjects undertook a dietary treatment: VLCKD. This treatment provided a synthetic amino acid powder supplementation of 8 grams per bag as the source of protein; it contained whey protein (6.71 g/bag), carbohydrates (0.015 g/bag), fats (0.075 g/bag), isoleucine (0.155 g/bag), ornithine alpha-ketoglutarate (0.125 g/bag), L-citrulline (0.125 g/bag), taurine (0.125 g/bag), L-arginine (0.100 g/bag), L-tryptophan (0.0375 g/bag), potassium citrate (0.100 g/bag), and pantothenic acid (0.0015 g/bag) for a total of 29 kcal (122 kJ) (Macresces, Italfarmacia s.r.l., Rome, Italy). The powder was dissolved in water and taken in daily meals. The amount of synthetic amino acid powder supplementation administered to each patient was calculated considering a supply of 2 g of proteins per kg of whole lean mass, measured by DXA, at baseline and after four weeks [25].

In addition, a quantity of vegetables equal to 600 g/day was administered, exclusively from non-starchy cooked and raw vegetables, subdivided into 2 or 3 portions during the day and a quantity of 20 mL of extra virgin olive oil per day, preferably raw. Finally, a minimum water intake of 2 L of mineral water per day was indicated. The average caloric content of the VLCKD was between 450–600 kcal/day for women and 650–800 kcal/day for men.

In summary, the average daily distribution of macronutrients and micronutrients was as follows: 5–10% of carbohydrates (<25 g/day), derived mainly from vegetables; 60–70% of proteins, mainly from the protein supplement and minimally from vegetables; 25–30% of lipids, exclusively from extra-virgin olive oil of which polyunsaturated fatty acids (PUFA) was <10 %; Monounsaturated Fatty Acids (MUFA) was 10–20 %, saturated fat was <5 %; and sodium < 2000 mg/day. All patients were informed about the VLCKD protocol and were asked to maintain their daily physical activity levels. To improve compliance, operators contacted patients during the treatment on a weekly basis.

Partiamo dai risultati

Table 3. Parameter changes during dietetic treatment (baseline, 8 weeks).

Parameters	Basal Mean ± SD	Eight Weeks Mean ± SD	*p*	Δ
Glycemia (mg/dL)	170.06 ± 11.18	99.67 ± 9.4	0.000 *	−39.70
HbA1c (%)	7.33 ± 0.35	6.16 ± 0.07	0.000 *	−15.73
HbA1c (mmol/L)	57.06 ± 3.2	44.06 ± 2.(	0.000 *	−21.83
Insulin (uU/mL)	17.89 ± 4.71	8.66 ± 3.64	0.000 *	−51.54
Homa Index	7.47 ± 2.07	2.13 ± 0.88	0.000 *	−71.39
AST (U/L)	36.75 ± 5.06	21.21 ± 4.49	0.030 *	−29.37
ALT (U/L)	45.08 ± 6.97	24.07 ± 5.69	0.000 *	−41.09
Creatinine (mg/dl)	0.81 ± 0.16	0.77 ± 0.14	0.040	−4.50

All values are presented as mean ± standard deviation. * $p < 0.05$. HbA1c: Hemoglobin A1c; AST: aspartate transaminase; ALT: alanine aminotransferase.

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Effects of a Personalized VLCKD on Body Composition and Resting Energy Expenditure in the Reversal of Diabetes to Prevent Complications

To

Table 1. Characteristics and pharmacological treatment at baseline.

Subjects	20
Men	10
Women	10
Age (years)	56.13 ± 9.27
Diabetes Duration (years)	5.85 ± 1.73
Diabetes Treatment	
Diet (n)	8
Metformin (n)	15
Sulphonylurea (n)	5
Insulin (n)	10
Anti-Hypertensives (n)	15
Statins (n)	18

Data are expressed as mean ± standard deviation.

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Body composition

Table 2. Parameter changes during dietetic treatment (baseline, four weeks, eight weeks).

Parameters	Basal Mean ± SD	Four Weeks Mean ± SD	Eight Weeks Mean ± SD	Δ Base–Four Weeks	Δ Four Weeks–Eight Weeks	Δ Base–Eight Weeks	*p* Base–Four Weeks	*p* Four Weeks–Eight Weeks	*p* Base–Eight Weeks
ANTHROPOMETRY									
Weight (kg)	104.43 ± 18.85	92.85 ± 27.61	89.07 ± 26.17	−11.07	−4.04	−15.77			0.000 *
BMI (kg/m^2)	37.09 ± 6.83	34.75 ± 6.50	33.25 ± 5.99	−6.42	−4.12	−10.27		0.000 *	0.000 *
Neck circumference (cm)	43.08 ± 3.36	41.59 ± 3.22	40.92 ± 3.0′	−3.99	−1.35	−4.92	0.000 *	0.070	0.000 *
Waist circumference (cm)	113.56± 12.71	109.33 ± 9.86	101.65 ± 11.23	−4.87	−5.98	−10.37	0.000 *	0.000 *	0.000 *
Abdomen circumference (cm)	123.79 ± 12.96	119.21 ± 13.14	110.99 ± 12.52	−4.82	−6.12	−10.31	0.000 *	0.000 *	0.000 *
Hip circumference (cm)	118.65 ± 14.5	114.09 ± 12.58	108.32 ± 11.57	−3.38	−5.15	−8.38	0.000 *	0.000 *	0.000 *
Handgrip (dominant hand) (kg)	26.81 ± 8.03	27.34 ± 7.73	29.00 ± 7.32	1.60	2.23	3.39	0.640	0.070	0.050
DXA									
Arm FM (kg)	4.74 ± 1.30	4.36 ± 1.14	4.16 ± 1.17	−7.58	−7.39	−10.26	0.070	0.230	0.010 *
Leg FM (kg)	11.6 ± 4.18	10.97 ± 4.16	10.05 ± 3.75	−4.52	−8.21	−12.37	0.010 *	0.000 *	0.000 *
Trunk FM (kg)	28.35 ± 9.47	24.33 ± 6.68	21.33 ± 6.04	−9.64	−12.28	−20.72	0.000 *	0.000 *	0.000 *
Android FM (kg)	5.12 ± 1.87	4.28 ± 1.29	3.66 ± 1.23	−11.46	−14.96	−24.80	0.000 *	0.000 *	0.000 *
Gynoid FM (kg)	6.53 ± 2.05	5.97 ± 1.92	5.34 ± 1.63	−6.86	−10.13	−16.33	0.000 *	0.000 *	0.000 *
Whole FM (kg)	46.15 ± 13.22	42.35 ± 11.96	38.04 ± 11.18	−8.20	−10.36	−17.75	0.000 *	0.000 *	0.000 *
Arm FM (%)	43.26 ± 9.9	42.55 ± 9.24	42.22 ± 9.11	−2.41	−3.74	−6.36	0.010 *	0.000 *	0.000 *
Leg FM (%)	36.39 ± 9.56	36.64 ± 10.22	35.94 ± 10.41	−0.34	−4.87	−4.98	0.980	0.000 *	0.000 *
Trunk FM (%)	49.92 ± 6.6	48.32 ± 6.68	46.3 ± 7.18	−2.52	−6.13	−8.31	0.000 *	0.000 *	0.000 *
Android FM (%)	53.15 ± 6.34	51.48 ± 6.66	49.29 ± 7.52	−2.57	−6.10	−8.22	0.010 *	0.000 *	0.000 *
Gynoid FM (%)	42.51 ± 8.69	42.27 ± 9.24	41.19 ± 9.09	−1.13	−5.33	−6.38	0.200	0.000 *	0.000 *
Whole FM (%)	43.87 ± 7.38	42.89 ± 7.42	40.67 ± 7.59	−2.29	−6.13	−8.10	0.000 *	0.000 *	0.000 *
Arm LM (kg)	5.96 ± 1.84	5.74 ± 1.49	5.74 ± 1.69	−5.77	−1.78	−1.71	0.130	0.780	0.260
Leg LM (kg)	18.95 ± 4.26	17.97 ± 4.22	17.79 ± 4.46	−5.17	−1.37	−6.53	0.000 *	0.120	0.000 *
Trunk LM (kg)	26.56 ± 4.81	24.85 ± 4.69	24.54 ± 4.90	−5.30	−0.54	−6.09	0.000 *	0.490	0.000 *
Android LM (kg)	4.28 ± 0.89	3.91 ± 0.83	3.84 ± 0.85	−6.76	−1.59	−8.36	0.000 *	0.340	0.050
Gynoid LM (kg)	8.37 ± 1.63	7.85 ± 1.63	7.72 ± 1.71	−5.70	−1.54	−7.28	0.000 *	0.110	0.000 *
Whole LM (kg)	55.39 ± 10.52	52.9 ± 10.37	52.94 ± 10.46	−4.58	0.25	−4.49	0.000 *	0.790	0.000 *
Bone Mass (kg)	2.78 ± 0.59	2.80 ± 0.58	2.77 ± 0.59	−0.45	−1.02	−1.45	0.240	0.050	0.060
BIA									
Rz (Ohm)	471.89 ± 69.35	516.71 ± 75.68	508.00 ± 62.24	8.88	−0.75	8.56	0.000 *	0.730	0.040
Xc (Ohm)	47.84 ± 13.45	52.94 ± 10.38	51.86 ± 7.44	15.51	0.57	14.89	0.010 *	0.690	0.110
TBW (kg)	44.98 ± 7.88	41.65 ± 7.43	41.08 ± 7.03	−5.71	−1.57	−6.43	0.000 *	0.280	0.000 *
ECW (kg)	21.28 ± 4.37	19.33 ± 3.22	19.01 ± 2.87	−8.05	−2.11	−7.99	0.000 *	0.110	0.010 *
BCM (kg)	31.37 ± 8.42	30.2 ± 7.14	29.69 ± 6.77	0.67	1.36	−0.11	0.900	0.600	0.570
PA (°)	5.81 ± 1.58	5.89 ± 1.06	5.89 ± 0.90	6.09	1.43	6.26	0.180	0.940	0.730
CALORIMETRY									
VO_2 (mL/min)	251.88 ± 42.7	214.92 ± 33.56	235.03 ± 88.42	−14.85	0.56	−6.27	0.040 *	0.970	0.410
VCO_2 (mL/min)	208.88 ± 36.52	160.67 ± 34.26	160.81 ± 35.50	−20.49	−2.08	−23.80	0.040 *	0.510	0.000 *
RQ	0.83 ± 0.03	0.73 ± 0.04	0.73 ± 0.04	−12.37	0.07	−12.01	0.000 *	1.000	0.000 *
REE (kcal)	1784.50 ± 313.18	1435.33 ± 223.71	1498.00 ± 316.65	−16.83	1.94	−16.59	0.010 *	0.810	0.000 *

BMI: Body Mass Index; DXA: Dual-energy X-ray Absorptiometry; FM: Fat Mass; LM: Lean Mass; BIA: Bioimpedentiometry; Rz: Resistance; Xc: Reactance; TBW: Total Body Water; ECW: Extra Cellular Water; BCM: Body Cell Mass; PA: Phase Angle; VO_2: Volume of Oxygen; VCO_2: Volume of Carbon Dioxide; RQ: Respiratory Quotient; REE: Resting Energy Expenditure. All values are presented as mean ± standard deviation. * $p < 0.05$.

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Article

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Body composition

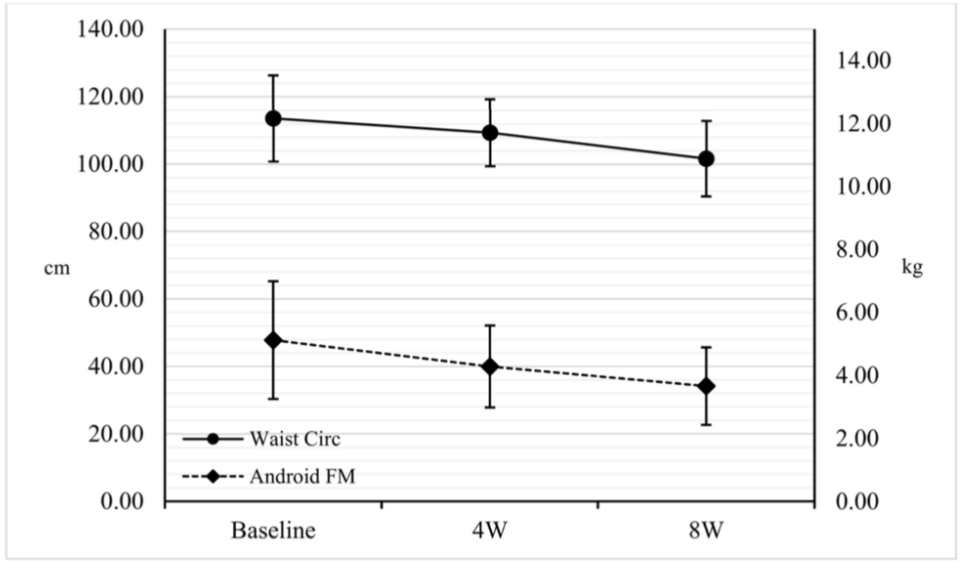

Figure 1. Comparison among baseline, four weeks, and eight weeks for waist circumference (cm) and android fat mass (kg). Points sharing the same superscript letter are not significantly different from each other. Statistical significance attributed to results with $p < 0.05$. Circ: Circumference. FM: Fat Mass; 4W: four weeks; 8W: eight weeks.

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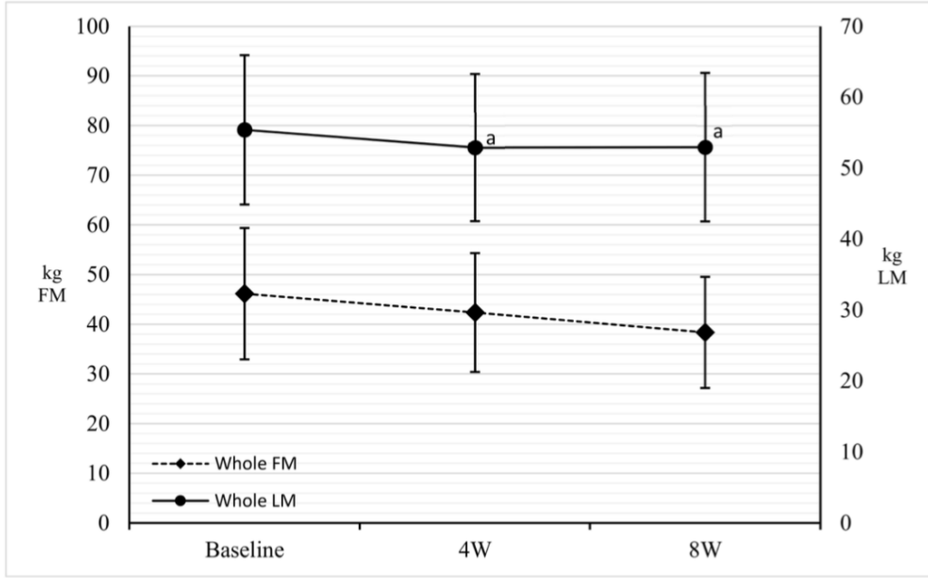

Figure 2. Comparison among baseline, four weeks, and eight weeks for whole FM and whole LM. Points sharing the same superscript letter are not significantly different from each other. Statistical significance attributed to results with $p < 0.05$. FM: Fat Mass; LM: Lean Mass; ECW: Extra Cellular Water; BCM: Body Cell Mass; 4W: 4 weeks; 8W: 8 weeks.

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Body composition

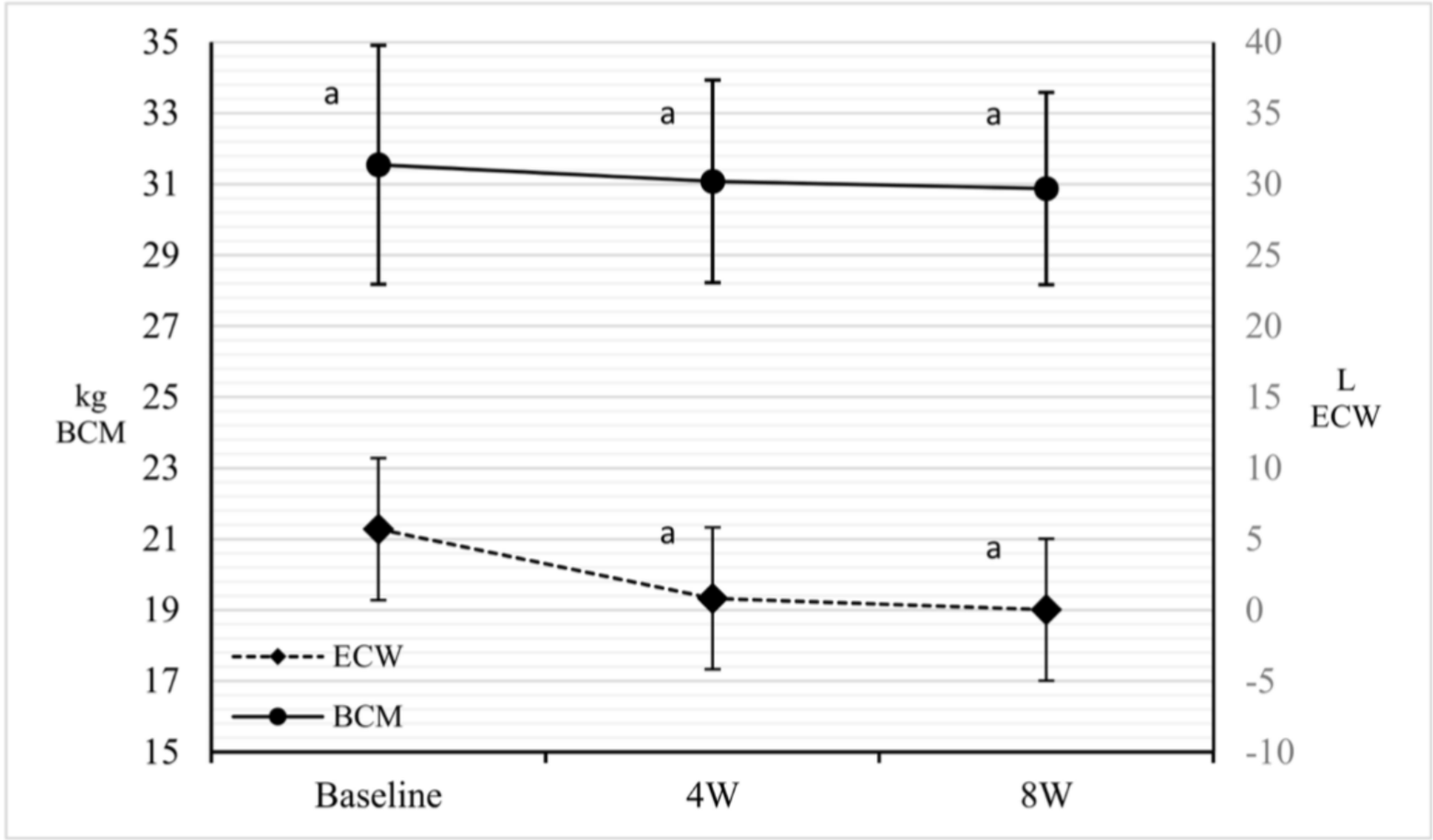

Figure 3. Comparison among baseline, four weeks, and eight weeks for ECW (L) and BCM (kg). Points sharing the same superscript letter are not significantly different from each other. Statistical significance attributed to results with $p < 0.05$. ECW: Extra Cellular Water; BCM: Body Cell Mass; 4W: 4 weeks; 8W: 8 weeks.

nutrients

MDPI

Article

Effects of a Personalized VLCKD on Body Composition and Resting Energy Expenditure in the Reversal of Diabetes to Prevent Complications

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Indicatori di qualità nutrizionale

INDICE DI ATEROGENICITÀ (IA)

L'IA prende in considerazione i grassi monoinsaturi e distingue anche tra differenti tipi di acidi grassi nel calcolare il potenziale aterogenico della dieta.
Di seguito riportiamo la formula utilizzata per il calcolo dell'indice di aterogenicità.

FIG. 2 Formula per il calcolo dell'IA

$$AI = \frac{1(C\,12) + 4(C\,14) + 1(C\,16)}{1\,(\omega 6 + \omega\,3\ PUFA) + 1\ (oleico\ C\ 18{:}1) + 1\ (somma\ altri\ MUFA)}$$

Grassi saturi:	Grassi insaturi inibitori dell'aggregazione piastrinica:
C 12 = acido laurico C 14 = acido miristico	ω-6, ω-3 = acidi polinsaturi della famiglia ω-6, ω-3
C 16 = acido palmitico	C 18:1 = acido oleico
	MUFA = acidi monoinsaturi PUFA = acidi polinsaturi

I valori di riferimento da considerare nella scelta dei piatti per tale indice sono compresi tra 0,01 e 0,31.

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Indicatori di qualità nutrizionale

INDICE DI TROMBOGENICITÀ (IT)

L' IT attribuisce differente peso ai diversi acidi grassi ω-3 e ω-6 in accordo con il loro potere anti-trombogenico e include anche acidi grassi monoinsaturi.
I valori di riferimento da considerare nella scelta dei piatti per tale indice sono compresi tra 0,20 e 0,57.

FIG 3 Formula per il calcolo dell'IT

$$x = \frac{1\,S(C14 + C16 + C18)}{0{,}5\,(C\,18{:}1) + 0{,}5\,(somma\,MUFA) + 0{,}5\,(\omega 6) + 3\,(\omega 3) + \frac{\omega 3}{\omega 6}}$$

Grassi saturi:	Grassi insaturi inibitori dell'aggregazione piastrinica:
C 12 = acido laurico C 14 = acido miristico	ω-6, ω-3 = acidi polinsaturi della famiglia ω-6, ω-3
C 16 = acido palmitico	C 18:1 = acido oleico
	MUFA = acidi monoinsaturi PUFA = acidi polinsaturi

Indicatori di qualità nutrizionale

CHOLESTEROL/SATURATED FAT INDEX (CSI)

Esso esprime la qualità lipidica degli alimenti o dei menù e fornisce nel contempo un valido indicatore per l'individuazione del rischio aterogenico.
Il valore del CSI viene espresso in scala da 1 a 100.

FIG 4 Formula per il calcolo del CSI

$$CSI = (1,01 * g\ Acidi\ Grassi\ Saturi) + (0,05 * mg\ colesterolo)$$

I valori di riferimento da considerare nella scelta dei piatti per tale indice variano in base alla quantità di kcal che fornisce il piatto. E quindi quando scegliamo piatti che apportano dalle 150 alle 300 kcal l'indice adeguato deve essere compreso tra 0,1 e 3,0;per piatti che apportano dalle 300 kcal in poi e fino ad arrivare alle 590 kcal il punteggio ottimale per la ricetta sarà compreso tra 0,1 a 4,0;per pietanze che contengono dalle 590 kcal a 1000 il punteggio va da 5 a 10. Non andiamo oltre, perché difficilmente troviamo piatti che superino le 1000 kcal.

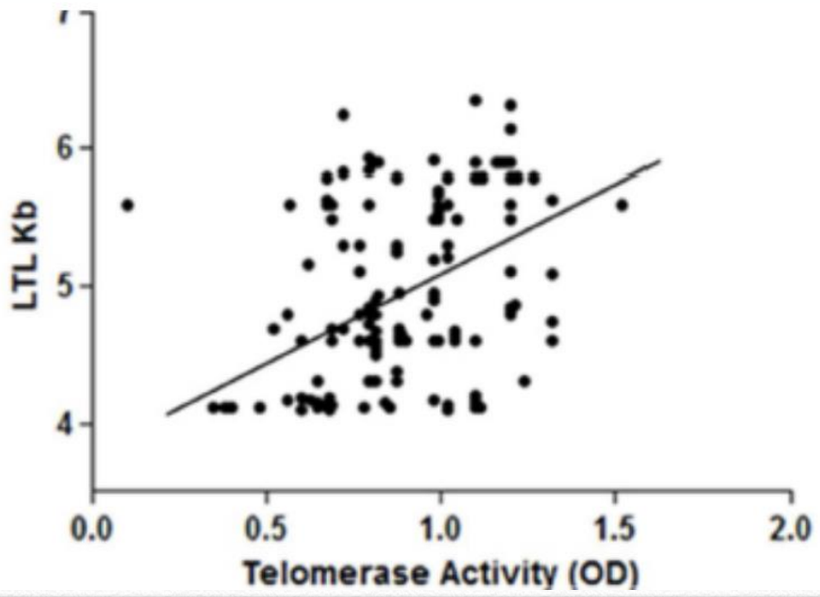
Mediterranean Diet, Telomere Maintenance and Health Status among Elderly

April 2013 | Volume 8 | Issue 4 | e62781

Virginia Boccardi, Antonietta Esposito, Maria Rosaria Rizzo, Raffaele Marfella, Michelangela Barbieri, Giuseppe Paolisso*

Abstract

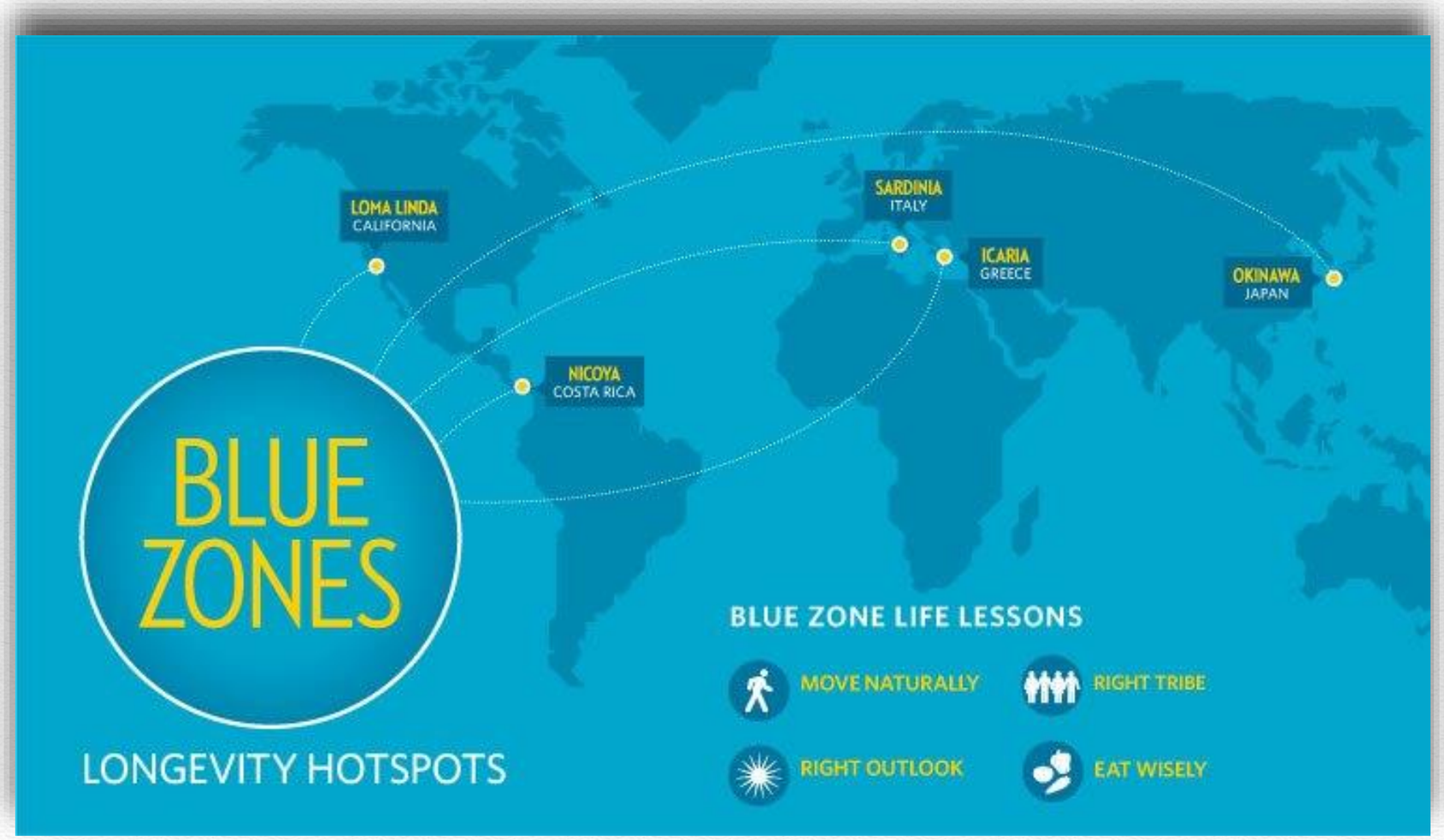
Leukocyte telomere length (LTL) and rate of telomere shortening are known biomarkers of aging while, numerous studies showed that Mediterranean diet (MD) may boost longevity. We studied association between telomere length, telomerase activity and different adherence to MD and its effects on healthy status. The study was conducted in 217 elderly subjects stratified according Mediterranean diet score (MDS) in low adherence (MDS≤3), medium adherence (MDS 4–5) and high adherence (MDS≥6) groups. LTL was measured by quantitative polymerase chain reaction and telomerase activity by a PCR-ELISA protocol. High adherence group showed longer LTL ($p = 0.003$) and higher telomerase activity ($p = 0.013$) compared to others. Linear regression analysis including age, gender, smoking habit and MDS showed that MDS was independently associated with LTL ($p = 0.024$) and telomerase activity levels ($p = 0.006$). Telomerase activity was independently associated with LTL ($p = 0.007$) and negatively modulated by inflammation and oxidative stress. Indeed, telomerase levels were associated with healthy status independently of multiple covariates ($p = 0.048$). These results support a novel role of MD in promoting health-span suggesting that telomere maintenance, rather than LTL variability is the major determinant of healthy status among elderly.



La Dieta Mediterranea è in grado di **mantenere** la lunghezza del **telomero**

Figure 1. Correlation between LTL and telomerase activity in all population study. Partial correlations ($r = 0.208$; $p = 0.002$) between Leukocyte Telomere Length (LTL) and PBMC telomerase activity in all study population ($n = 217$), adjusted by gender, age and smoking habit.
doi:10.1371/journal.pone.0062781.g001

Dieta mediterranea e longevità



I centenari
sono sparsi nel mondo…

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Indice di Adeguatezza Mediterraneo (MAI):

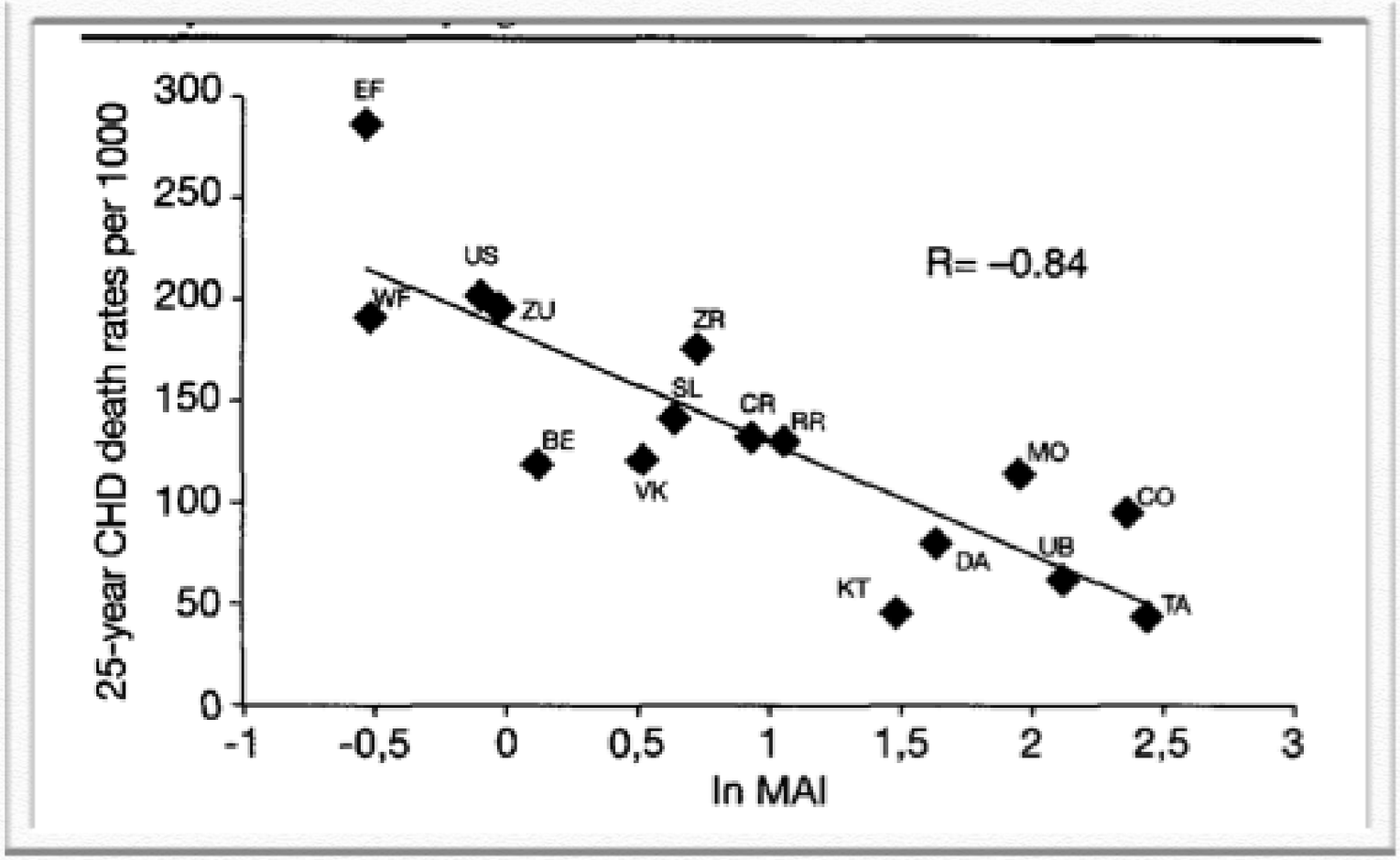
$$MAI = \frac{\%\ \text{energia da CARBOIDRATI (gr. 1)+PROTETTIVI (gr. 2)}}{\%\ \text{energia da DERIVATI ANIMALI (gr. 3)+DOLCI (gr. 4)}}$$

Carboidrati (gruppo1): ***pane, cereali, legumi, patate***
Protettivi (gruppo 2): ***vegetali, frutta, pesce, vino rosso, EVO***
(Gruppi di alimenti appartenenti alla dieta mediterranea)

Derivati animali (gruppo 3): ***latte, formaggio, carne, uova, margarina*, grassi animali**
Dolci (gruppo 4): ***bevande dolci, biscotti/torte, zucchero***
(Gruppi di alimenti non appartenenti alla dieta mediterranea)

Alberti et all. Eur J Clin Nutr 1999

INDICE MAI E MORTALITÀ CARDIOVASCOLARE



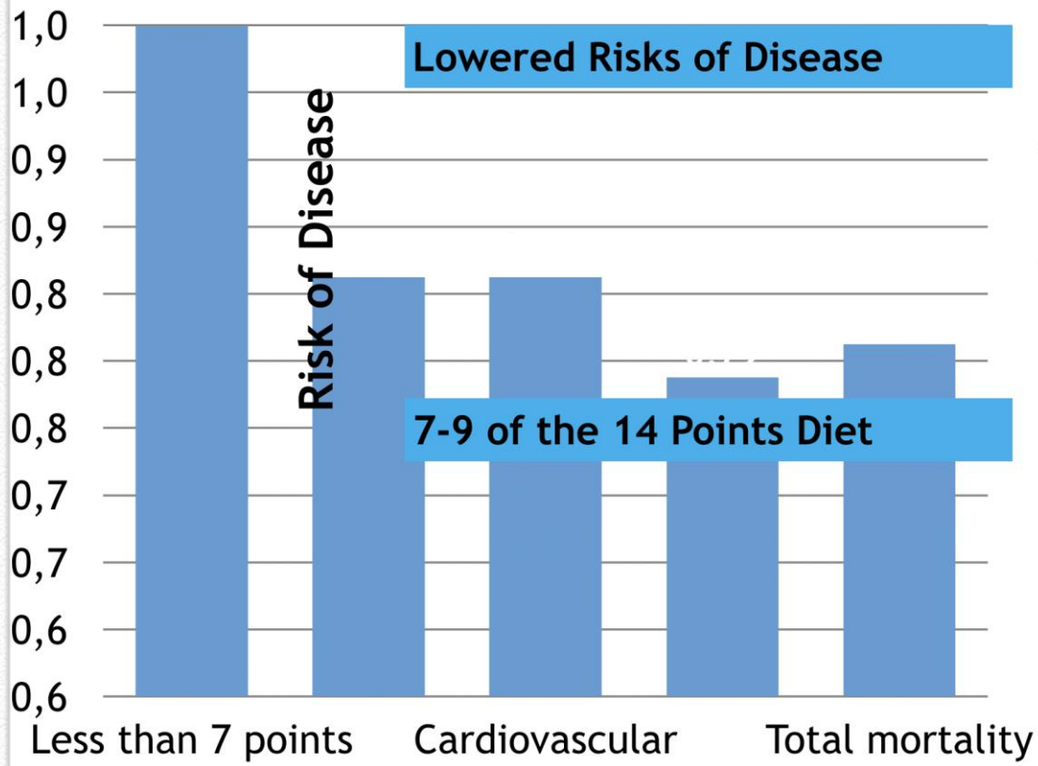
Mediterranean Adequacy Index: correlation with 25-year mortality from coronary heart disease in the Seven Countries Study

F. Fidanza[1], A. Alberti[1], M. Lanti[2], and A. Menotti[2]

[1]Human Nutrition Section, Department of Neurosciences, Rome, Tor Vergata University, and [2]Associazione per la Ricerca Cardiologica, Rome, Italy

Esiste una correlazione inversa tra il valore dell'indice MAI e la mortalità cardiovascolare in popolazioni di culture differenti.

Mediterranean Diet Score AND Mortality



- Getting 7 to 9 points of the Predimed diet means lowered risk of disease.
- Compare those with 7-9 points to those with fewer than 7 points. More points means decreased risk of these diseases:
  - 15% ↓ risk of cancer
  - 15% ↓ risk of cardiovascular disease
  - 21% ↓ risk of death from other causes
  - 19% ↓ risk of death from all causes

Harvard Study: 6-7 years of follow-up: 6,137 men; 11,278 women
American Journal Clinical Nutrition. 2014;99:172-180.

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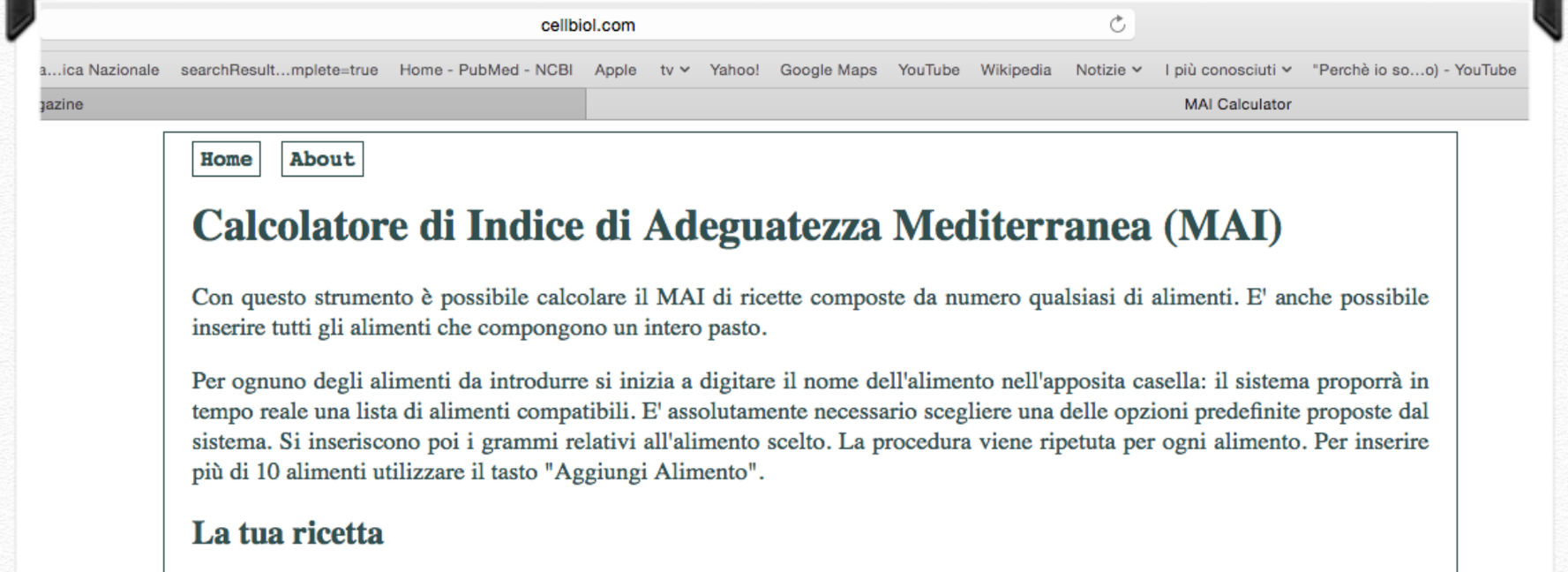
In chetosi:

- Indice adeguatezza mediterraneo IAM

$$\text{IAM} = \frac{\%\text{ energia da CARBOIDRATI (gr. 1)+PROTETTIVI (gr. 2)}}{\%\text{ energia da DERIVATI ANIMALI (gr. 3)+DOLCI (gr. 4)}}$$

Carboidrati (gruppo1): *pane, cereali, legumi, patate*
Protettivi (gruppo 2): *vegetali, frutta, pesce, vino rosso, olio d'oliva*
(Gruppi di alimenti appartenenti alla dieta mediterranea)

Derivati animali (gruppo 3): *latte, formaggio, carne, uova* grassi animali, dolci (gruppo 4): *bevande dolci, biscotti/torte, zucchero*
(Gruppi di alimenti non appartenenti alla dieta mediterranea)



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ItalianKetogenicDiet

- Meno di 50g di CHO\die **(KD)**
- 2g di proteine **ogni kg di LM misurato DXA**
- Introito di grassi basato su **mono/poli insaturi**
- 20/30g di fibra/die da **vegetali freschi**

- Adeguata integrazione **proteica/vitaminica**

Un migliore approccio alla dietoterapia chetogenica

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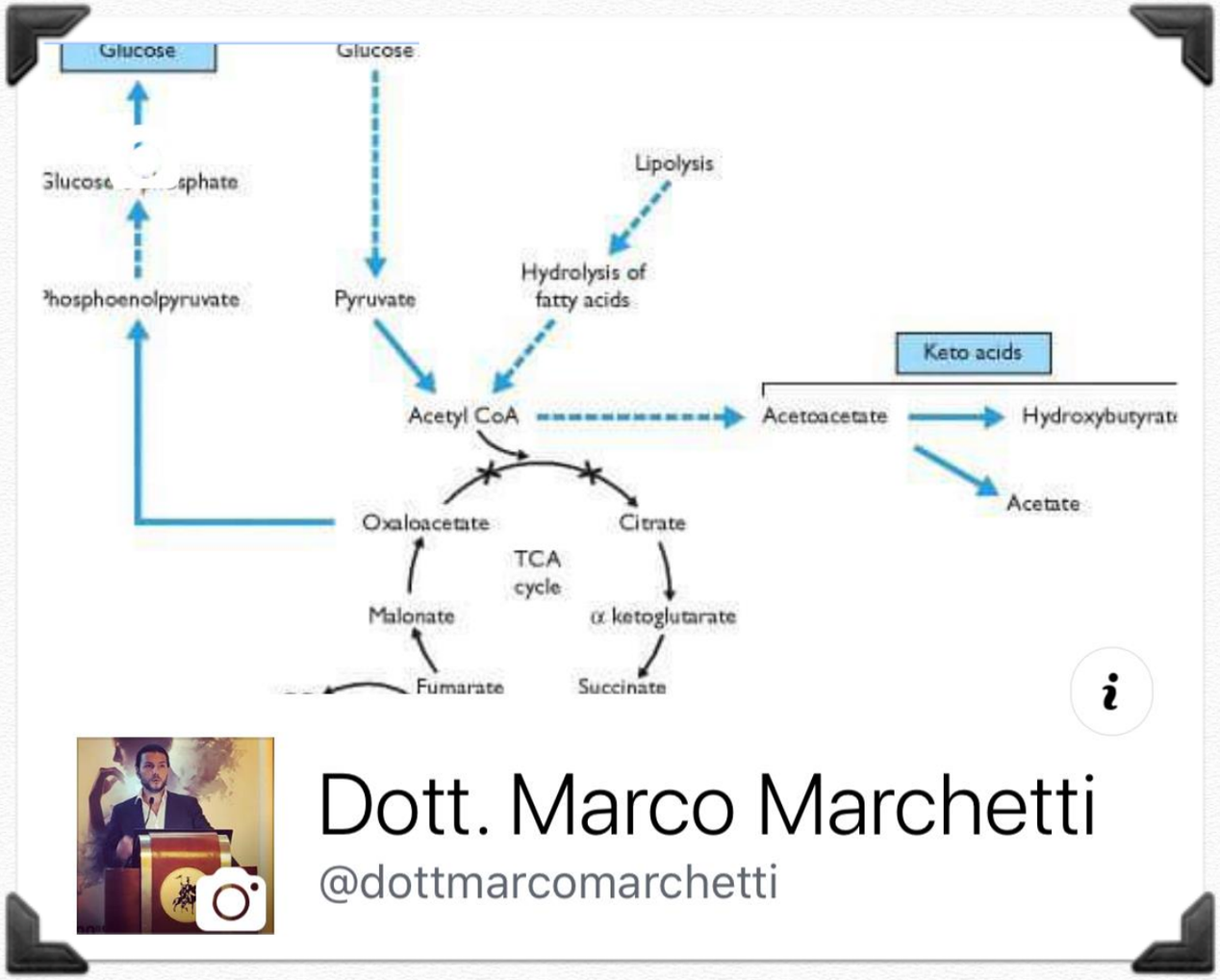
Per approfondire:



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