



VI CONVEGNO NAZIONALE  
CENTRO STUDI E RICERCHE - FONDAZIONE AMD  
NAPOLI, 18-20 OTTOBRE 2012



CENTRO CONGRESSI  
STAZIONE MARITTIMA



# Alimentazione, flora batterica intestinale e rischio cardiovascolare



*Rosalba Giacco*

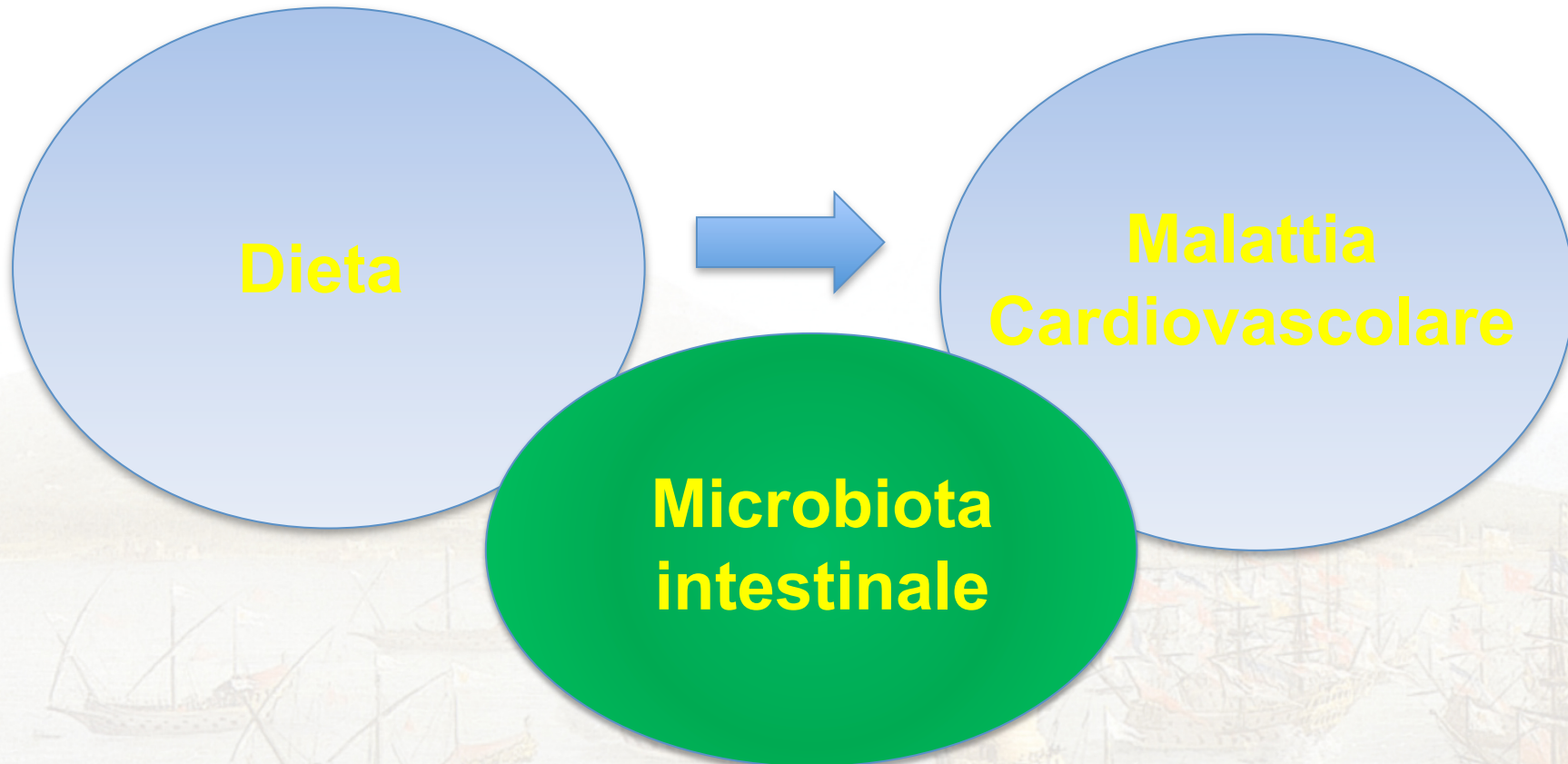
*Istituto di Scienze dell'Alimentazione, CNR -  
Avellino*



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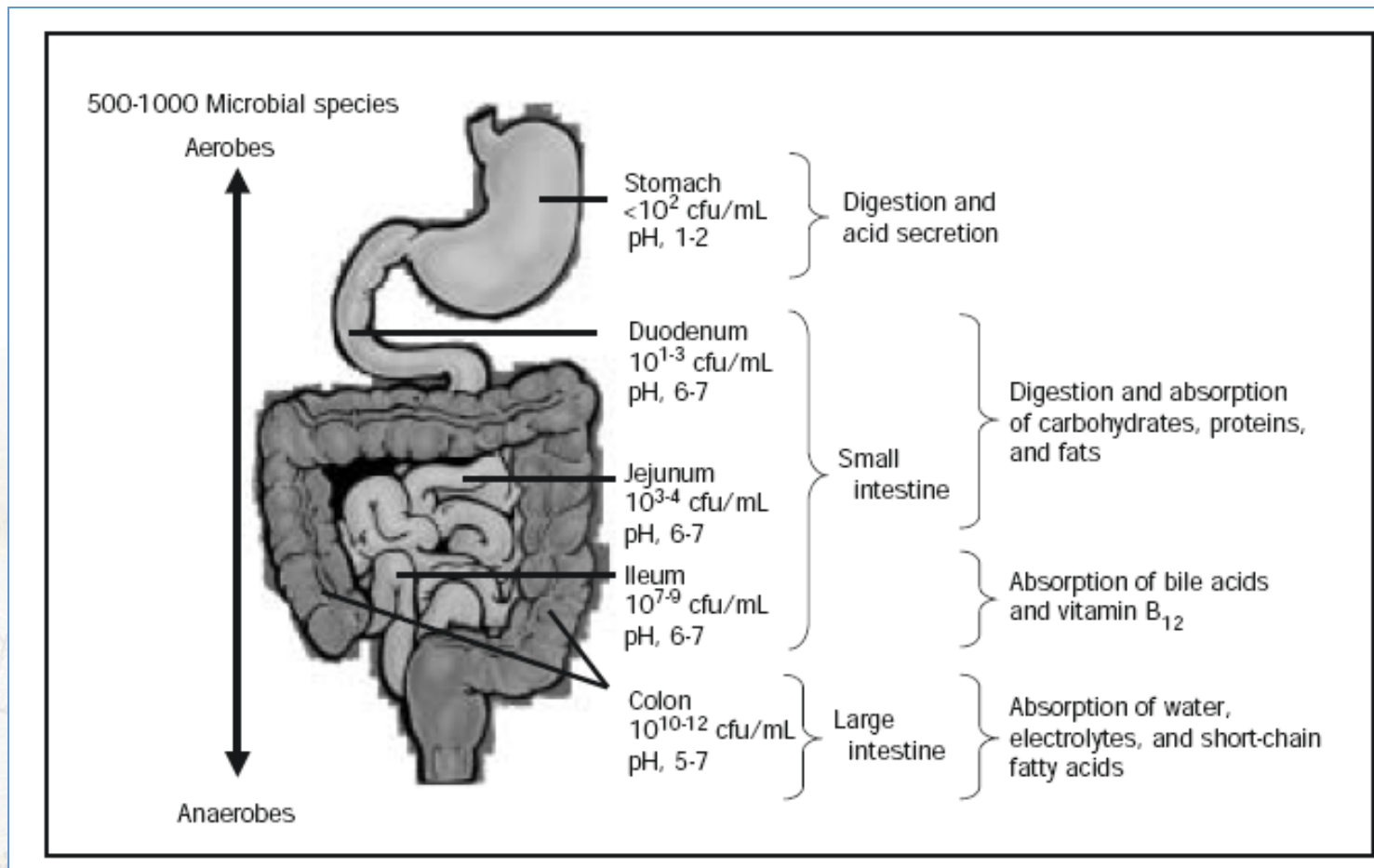


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## Concentrazione di batteri a vari livelli dell'apparato gastrointestinale in un individuo adulto





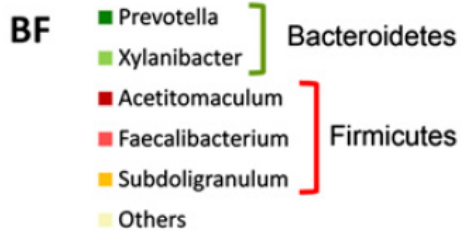
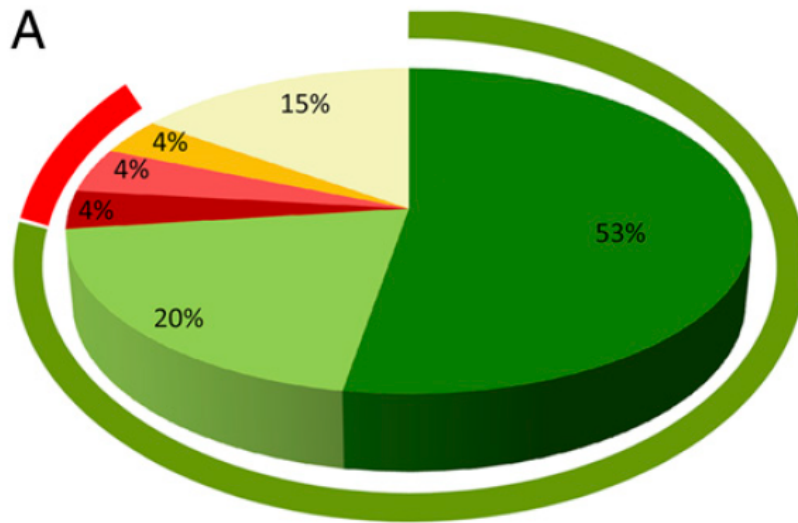
## GRUPPI PREDOMINANTI DI BATTERI COLICI

Phyla	Archea
<b>Firmicutes</b> : Ruminococcus, Clostridium, Lactobacillus (alcuni ceppi probiotici), e produttori di butirrato (Eubacterium, Fecalibacterium e Roseburia).	<b>Euryarchaeota:</b> Methanobrevibacter (coinvolto nella metanogenesi intestinale)
<b>Bacteroidetes:</b> Bacteroides, Prevotella e Xylanibacter (degradano una varietà di glicani a struttura complessa).	
<b>Actinobacteria:</b> Collinsella e Bifidobatteri (contengono ceppi probiotici).	
<b>Proteobacteria:</b> Escherichia, Desulfovibrio.	
<b>Verrucomicrobia:</b> Akkermansia (degradano muco).	

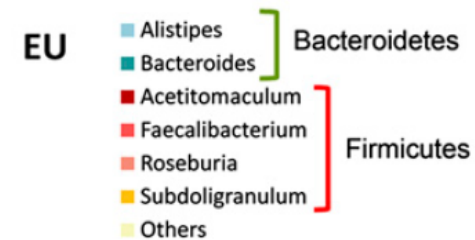
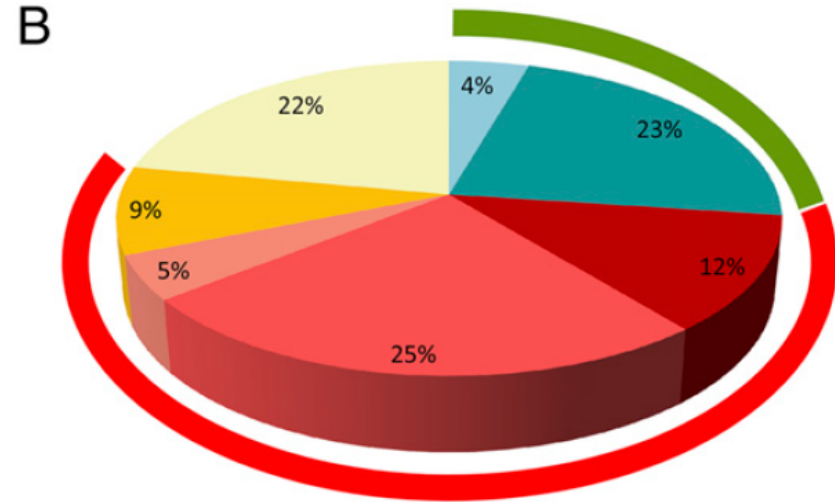


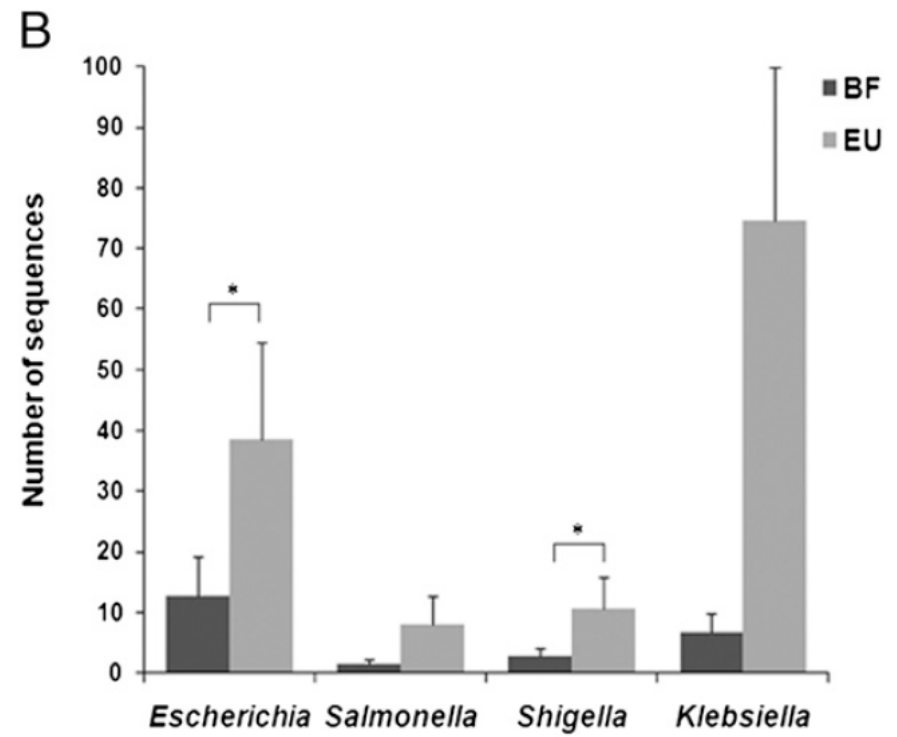
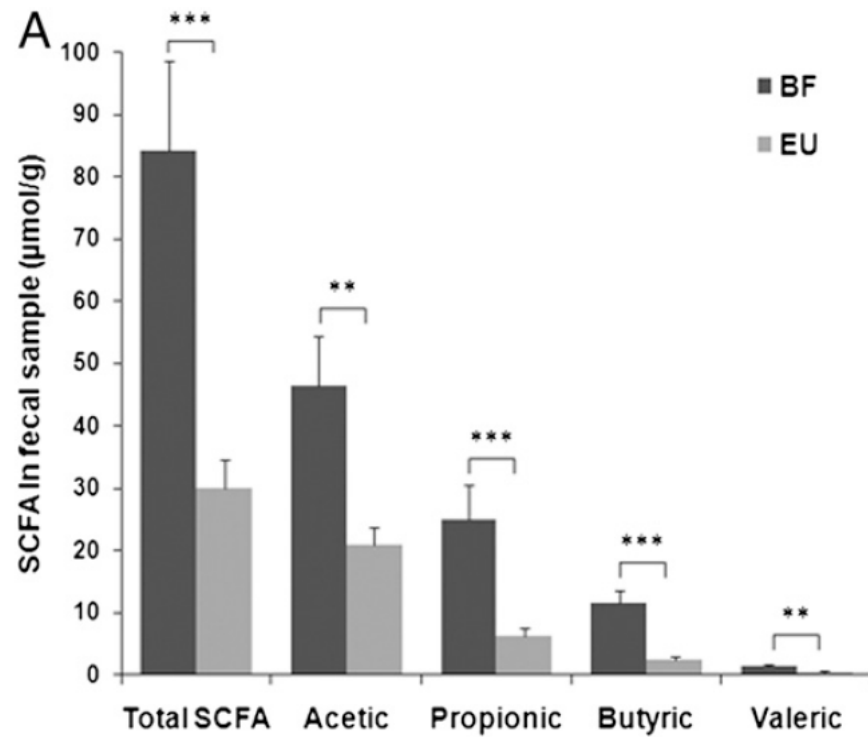
## Impact of diet in shaping gut microbiota in European children and children of rural African village

### Burkina Faso



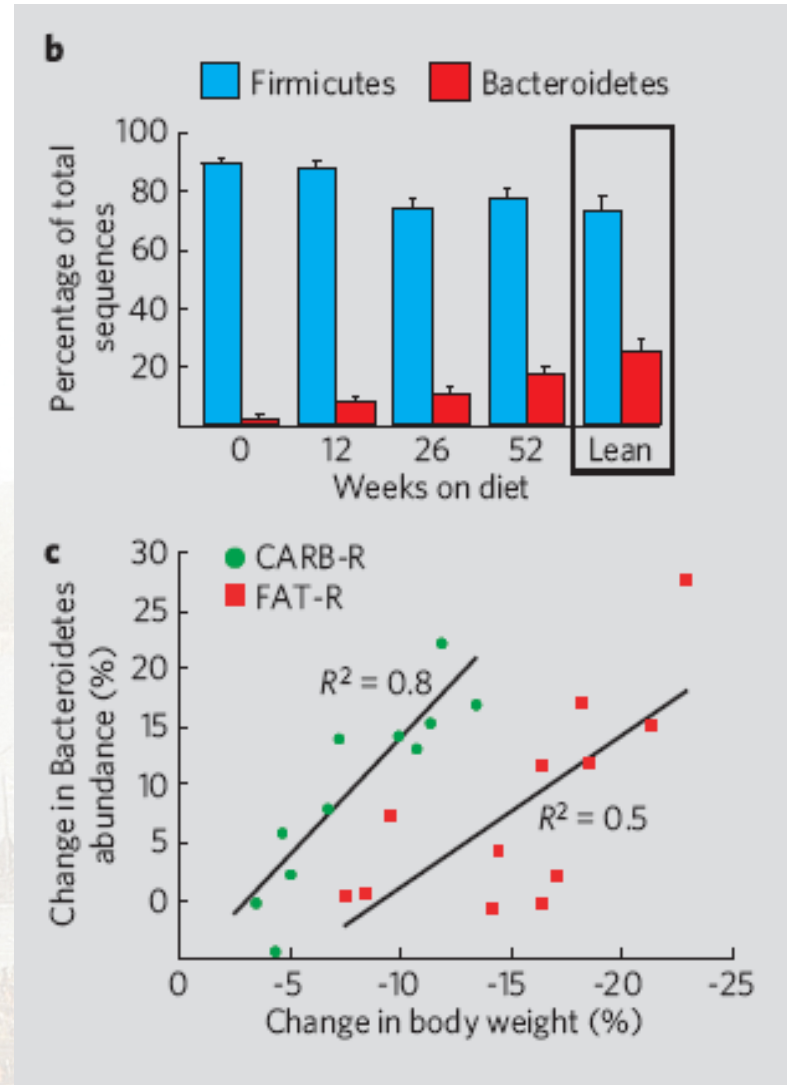
### Florence







## Percentuale di Firmicutes e Bacteroidetes in individui magri e in soggetti obesi prima e dopo il calo ponderale



**b.** Composizione della flora batterica intestinale in soggetti normopeso ed obesi prima e dopo 52 settimane di una dieta ipocalorica ristretta in carboidrati ● CARB-R o Ristretta in Grassi ■ FAT-R .

**c.** Correlazione tra l' incremento dei Bacteroidetes e la percentuale di decremento ponderale nelle due diete ipocaloriche.



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# ***DIETA RICCA IN FIBRE E RISCHIO CARDIOVASCOLARE***

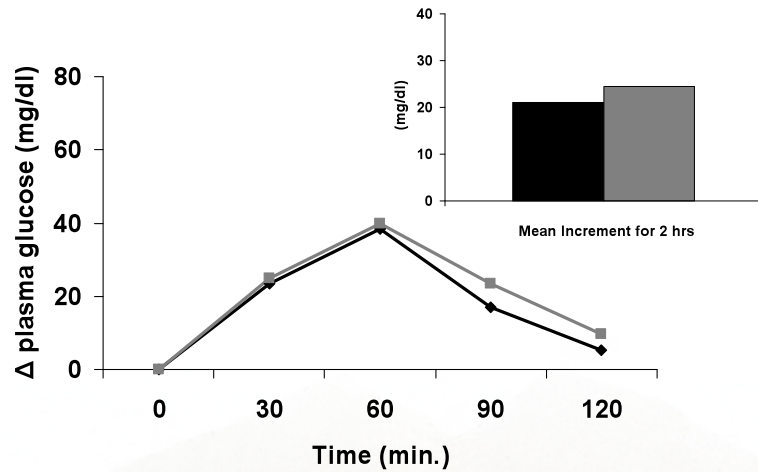




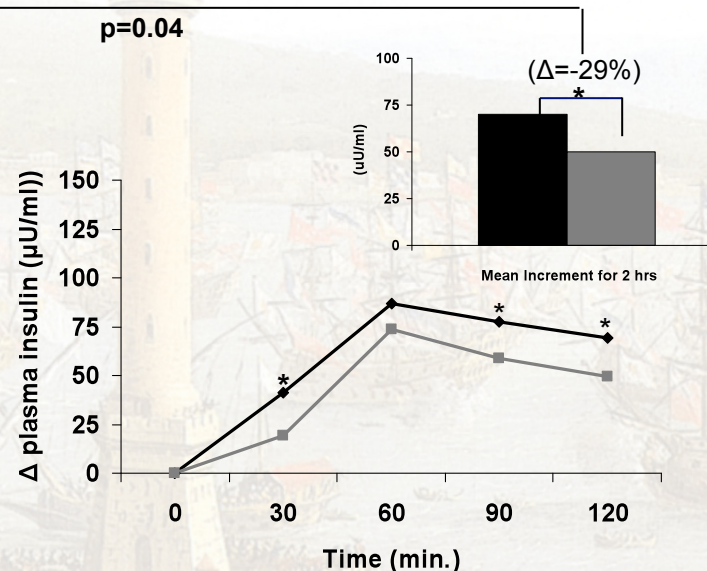
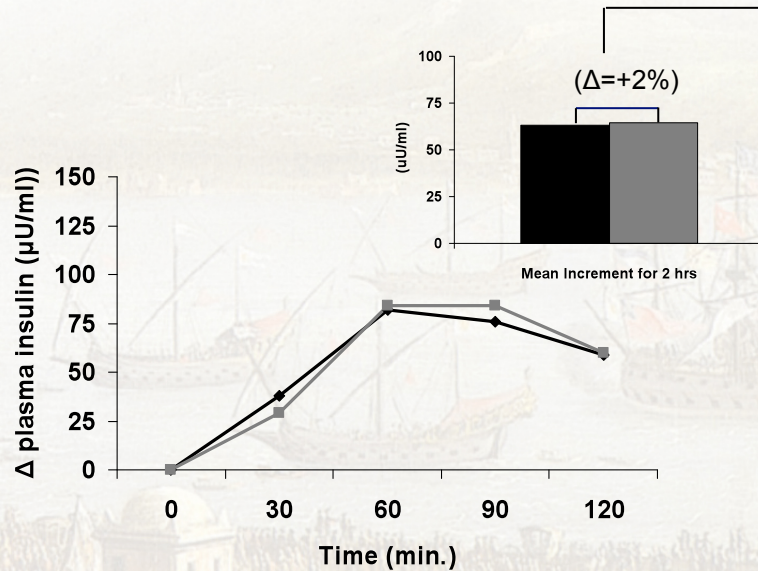
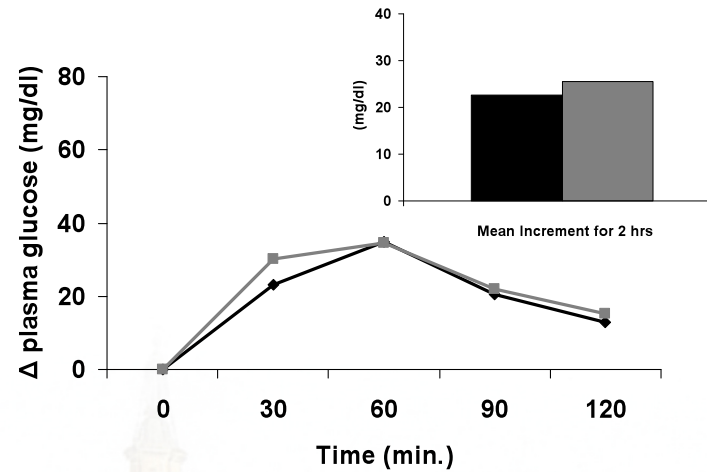


# Postprandial plasma glucose and insulin concentrations in the two groups

## Control Group



## Whole Grain Group

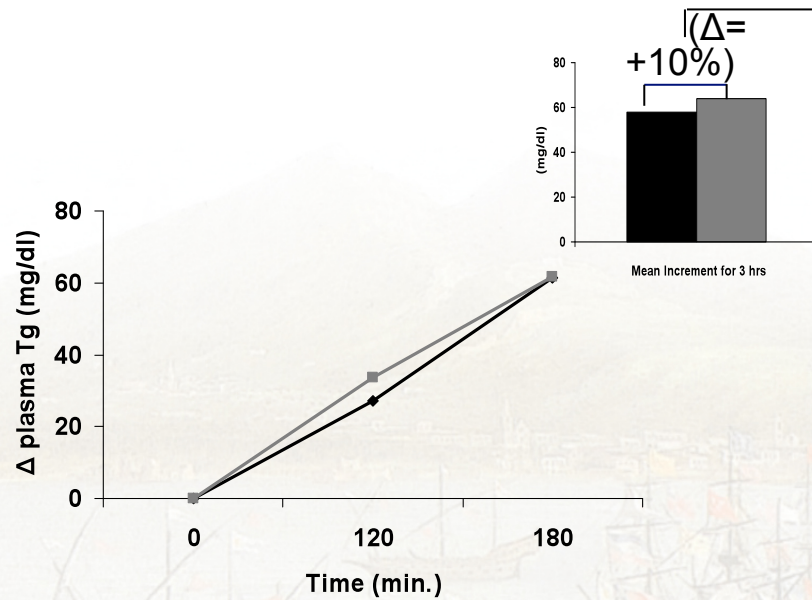


◆ baseline ■ 12 week

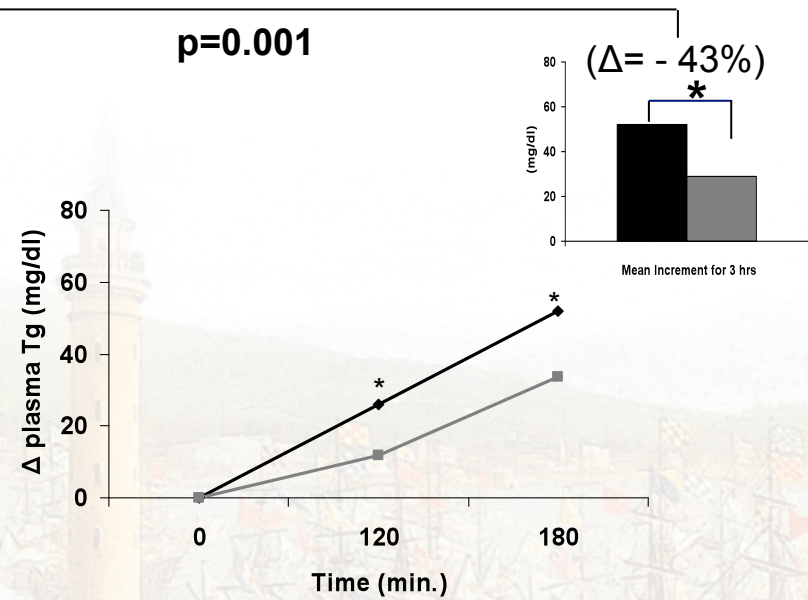


## Postprandial plasma triglyceride concentrations in the two groups

### Control Group



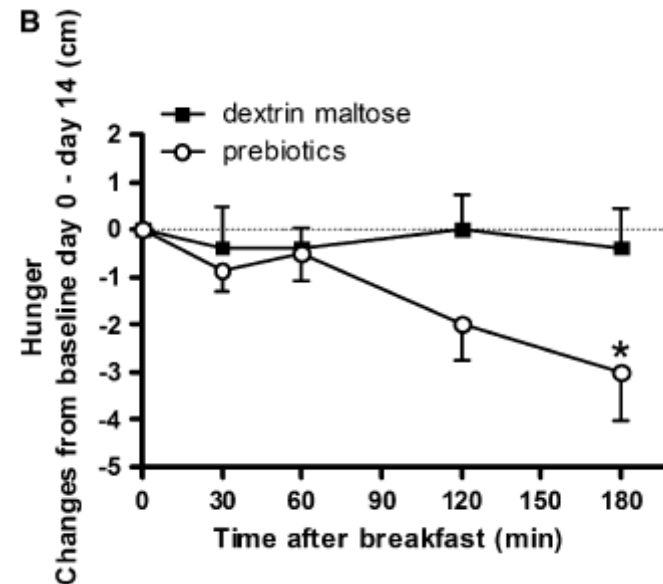
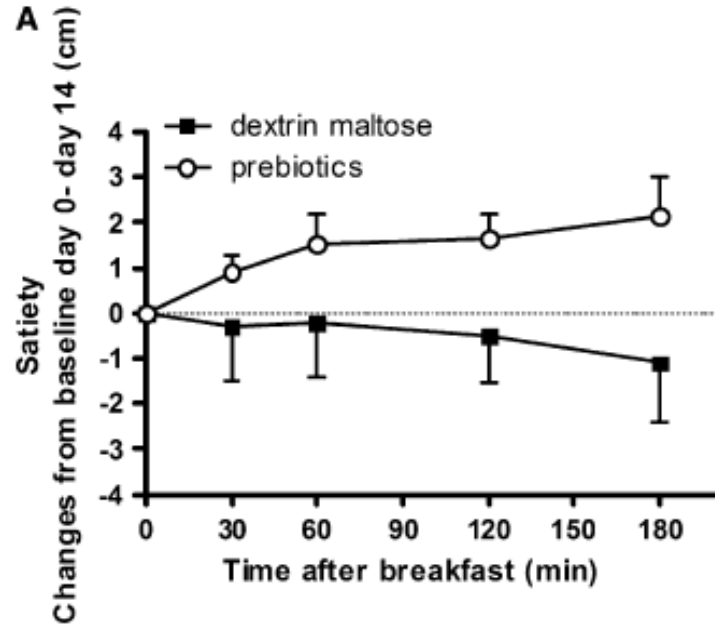
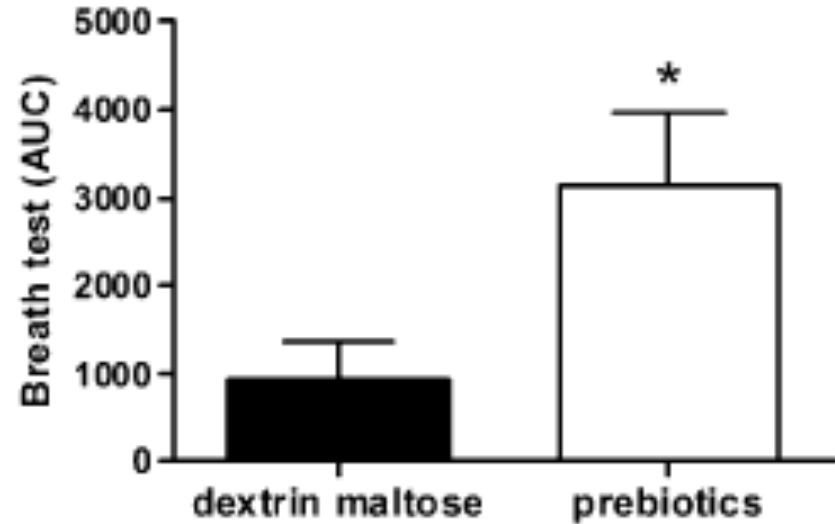
### Whole Grain Group



◆ baseline ■ 12 week

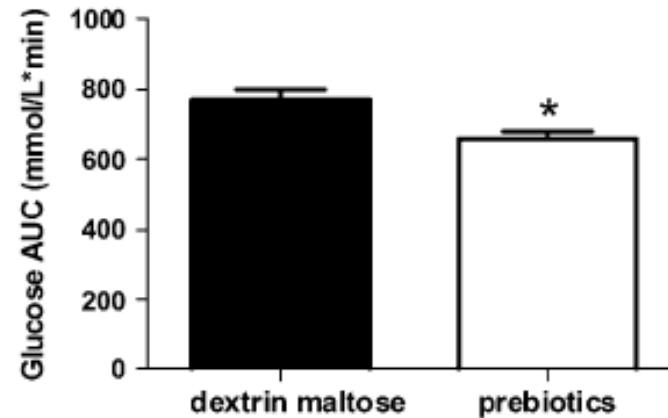
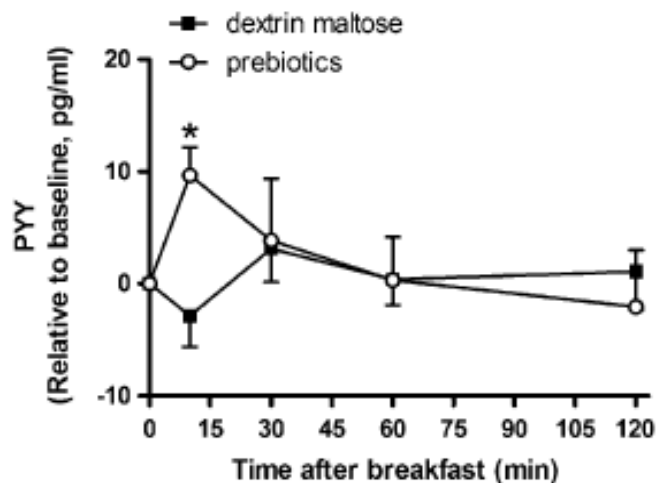
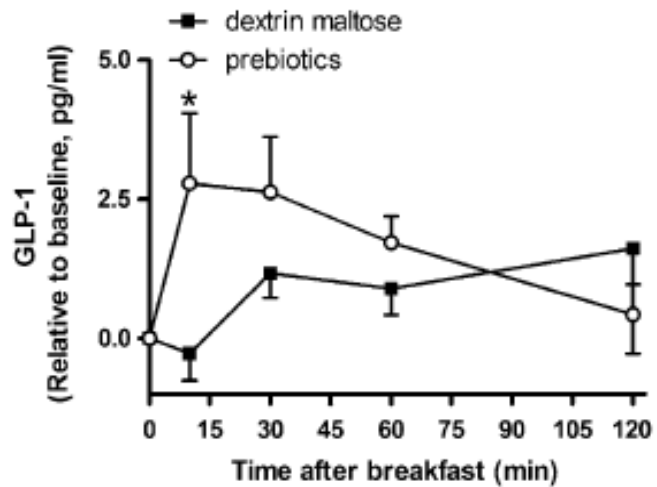


## Oligofruztosio (16g/die) vs placebo (maltodestrine 16g/die) sulla fermentazione intestinale e sul senso di sazietà e fame





## Effetto del consumo di prebiotici sulla risposta degli ormoni gastrointestinali e del glucosio in individui sani dopo 2 settimane d'intervento



*Canis P et al, Am J Clin Nutr 2009*



## Possible mechanisms of action of dietary fiber and low glycemic index foods

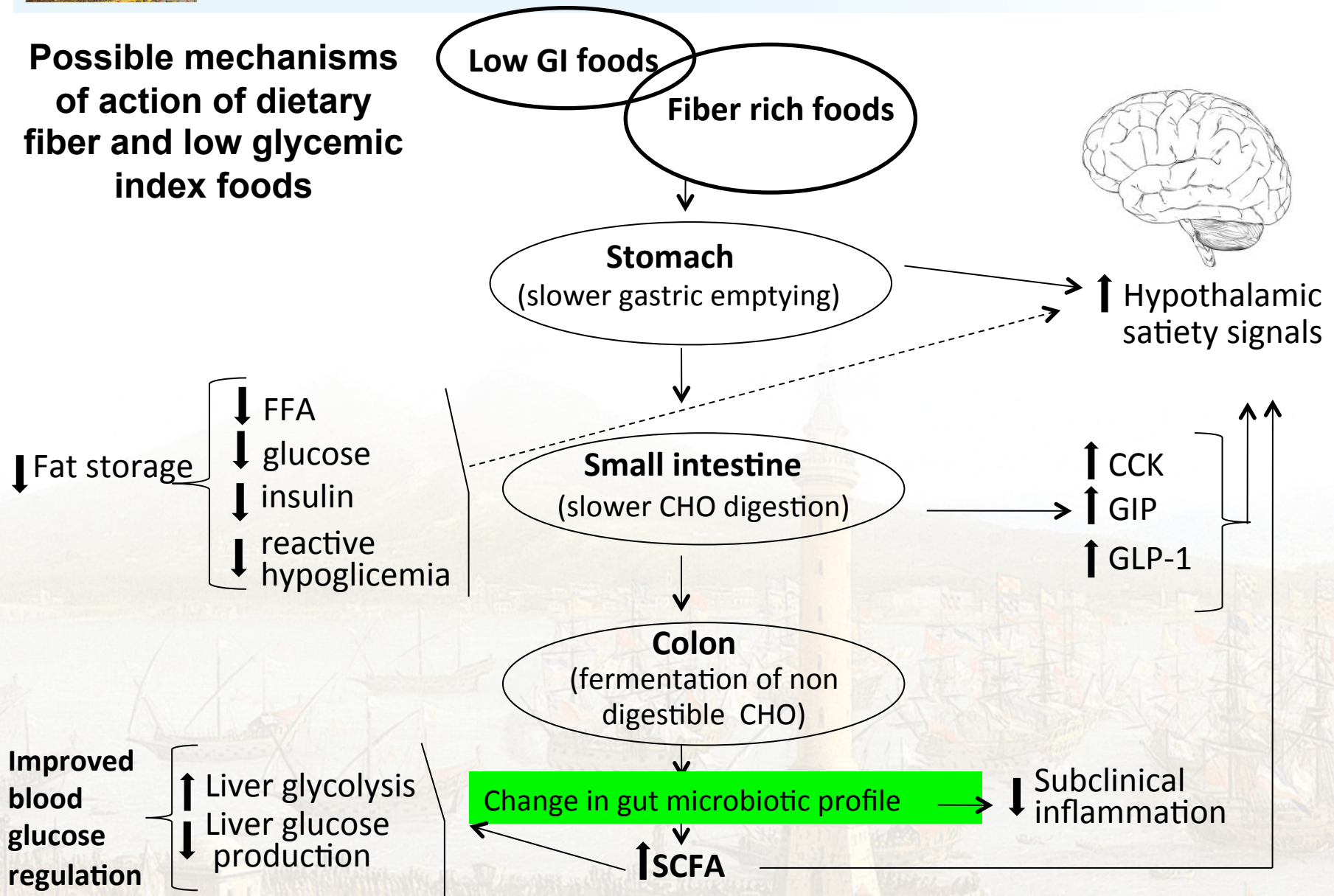


Figure 1



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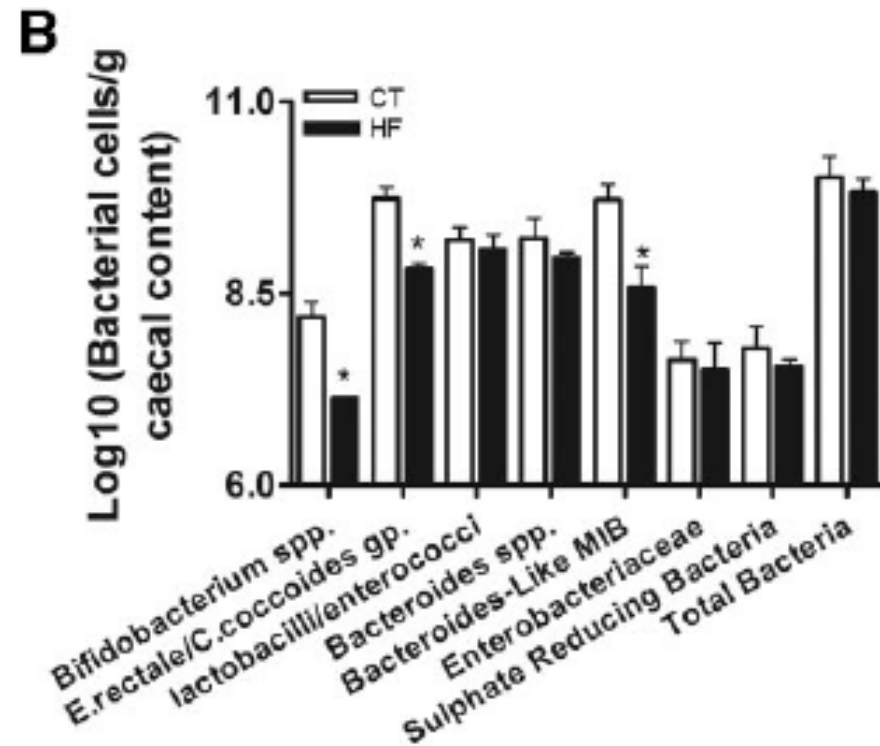
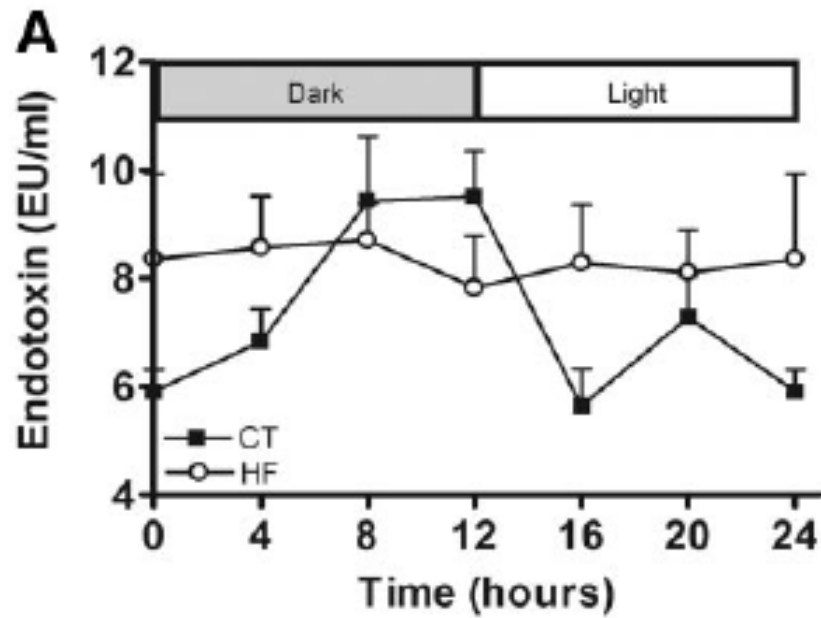


# ***DIETA RICCA IN GRASSI E RISCHIO CARDIOVASCOLARE***



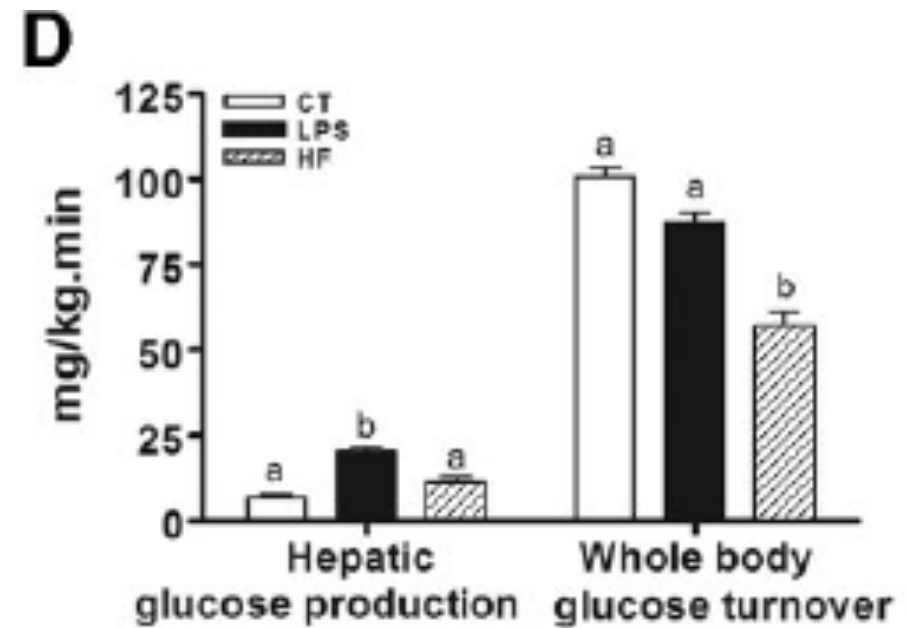
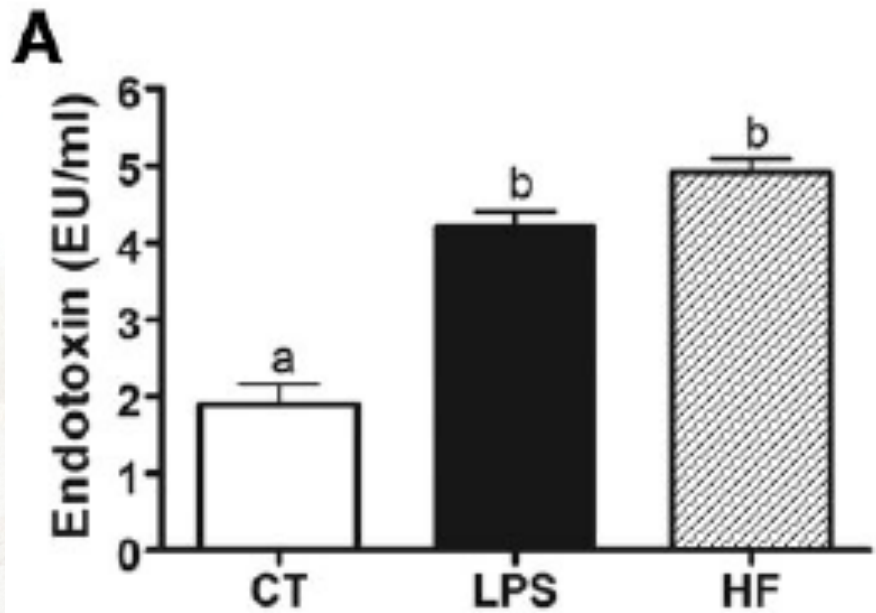


## Effetto della dieta ricca in grassi sui livelli plasmatici di LPS e sul microbiota intestinale





## Effetto della dieta ricca in grassi sulla sensibilità insulinica





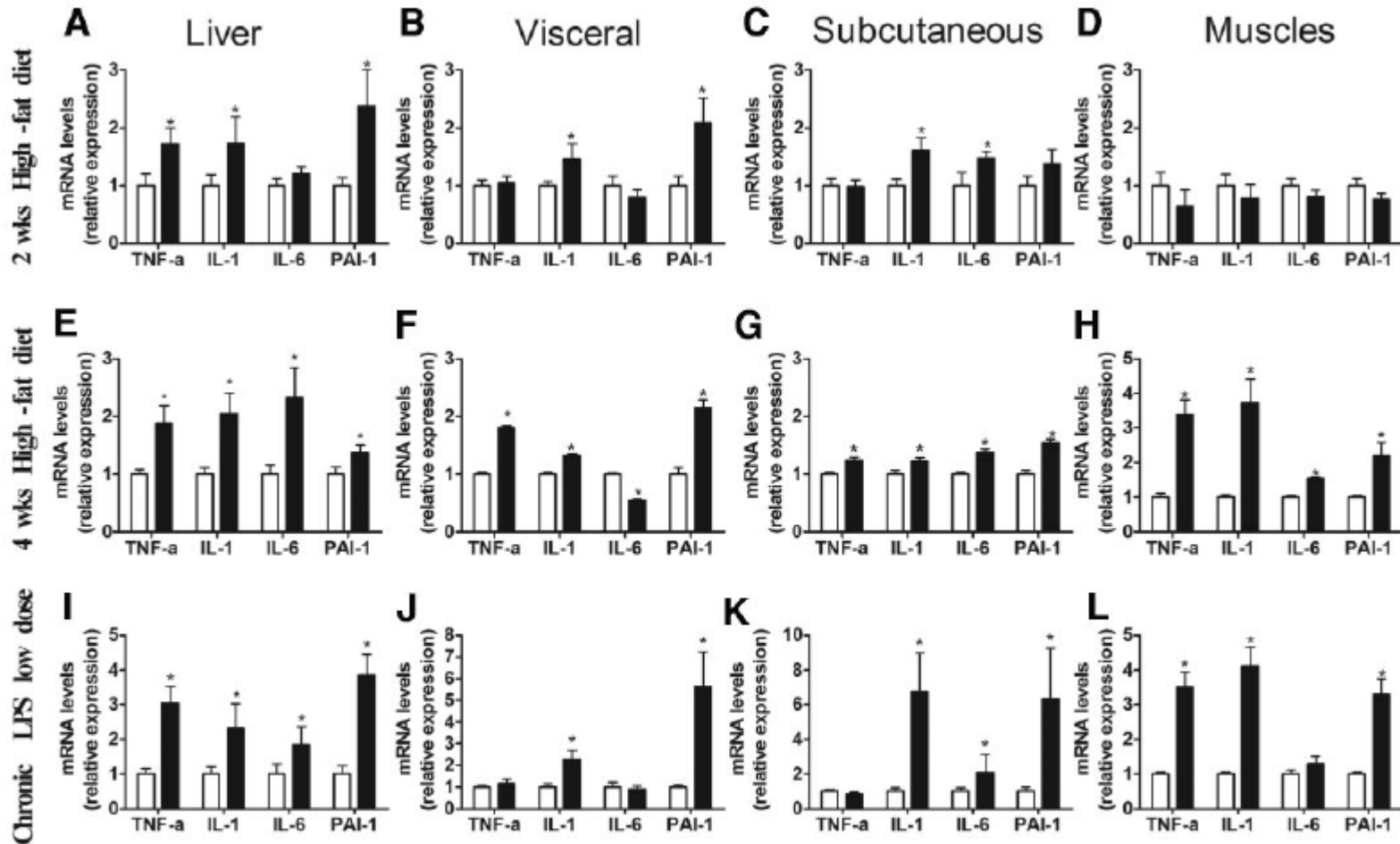


FIG. 3. Metabolic endotoxemia triggers the expression of inflammatory factors similarly to high-fat feeding. TNF- $\alpha$ , IL-1, IL-6, and PAI-1 mRNA concentrations (A, E, and I) in liver (B, F, and J), visceral adipose tissue (C, G, and K), subcutaneous adipose tissue (D, H, and L), and muscle in normal diet-fed ( $n = 8$ ) (□) or high-fat diet-fed ( $n = 8$ ) (■) mice for 2 weeks (A-D) and 4 weeks ( $n = 8$ ) (E-H) and in LPS-infused mice ( $n = 5$ ) (I-L). Data are means  $\pm$  SE. \* $P < 0.05$  vs. normal chow-fed mice.



## Livelli plasmatici d'insulina, endotossine (LPS) e molecole dell'infiammazione in soggetti diabetici tipo 2 (T2DM) e non diabetici (ND)

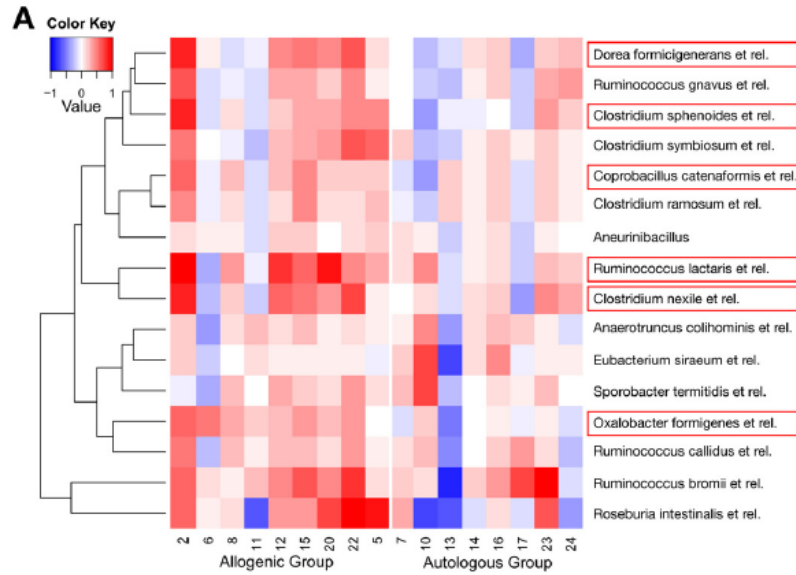
	T2DM (n = 25)	ND (n = 25)	P Value
BMI, kg/m <sup>2</sup>	31.8±4.5	29.5±4.3	NS
Sex (M/F)	20:5	20:5	NS
Age, yr	52.2±11.7	48.1±19.2	NS
Glucose, mmol/l	8.6±2.5	5.6±0.9	<0.0001
Insulin, inv log IU/ml (geometric mean)	12.0 (1.8)	8.9 (1.9)	0.08
Endotoxin, inv log EU/ml (geometric mean)	5.5 (1.6)	3.1 (1.7)	<0.0001
TNF-α, pg/ml	16.8±7.0	6.61±4.3	0.00685
sCD14, million IU/ml	2.81±1.2	1.39±0.5	<0.0001
IL-6, pg/ml	4.95±2.7	4.24±2.0	NS
Leptin, pg/ml	24.2±21.1	28.2±22.5	NS

(M±SD or geometric means)

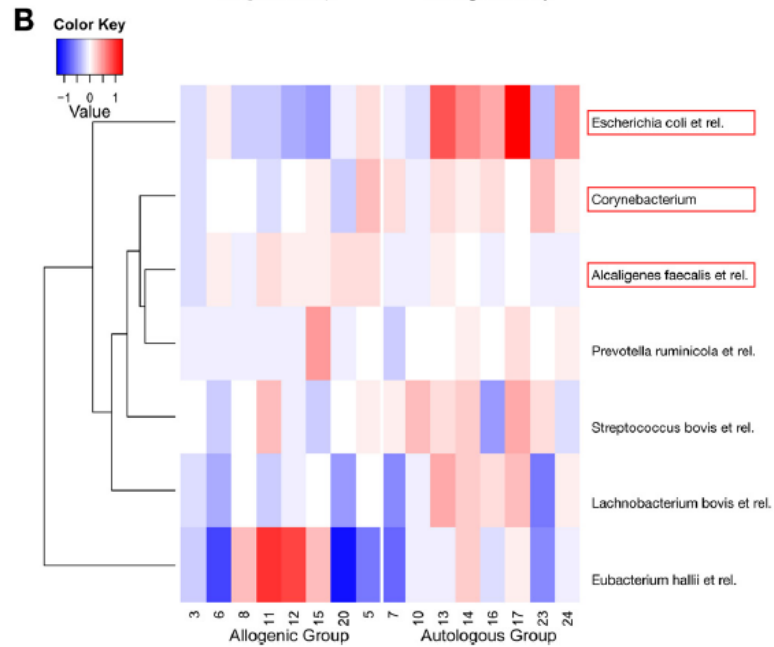
Creely SJ et al, *Am J Physiol Endocrinol Metab.* 2007



## Mapa del Microbiota fecale



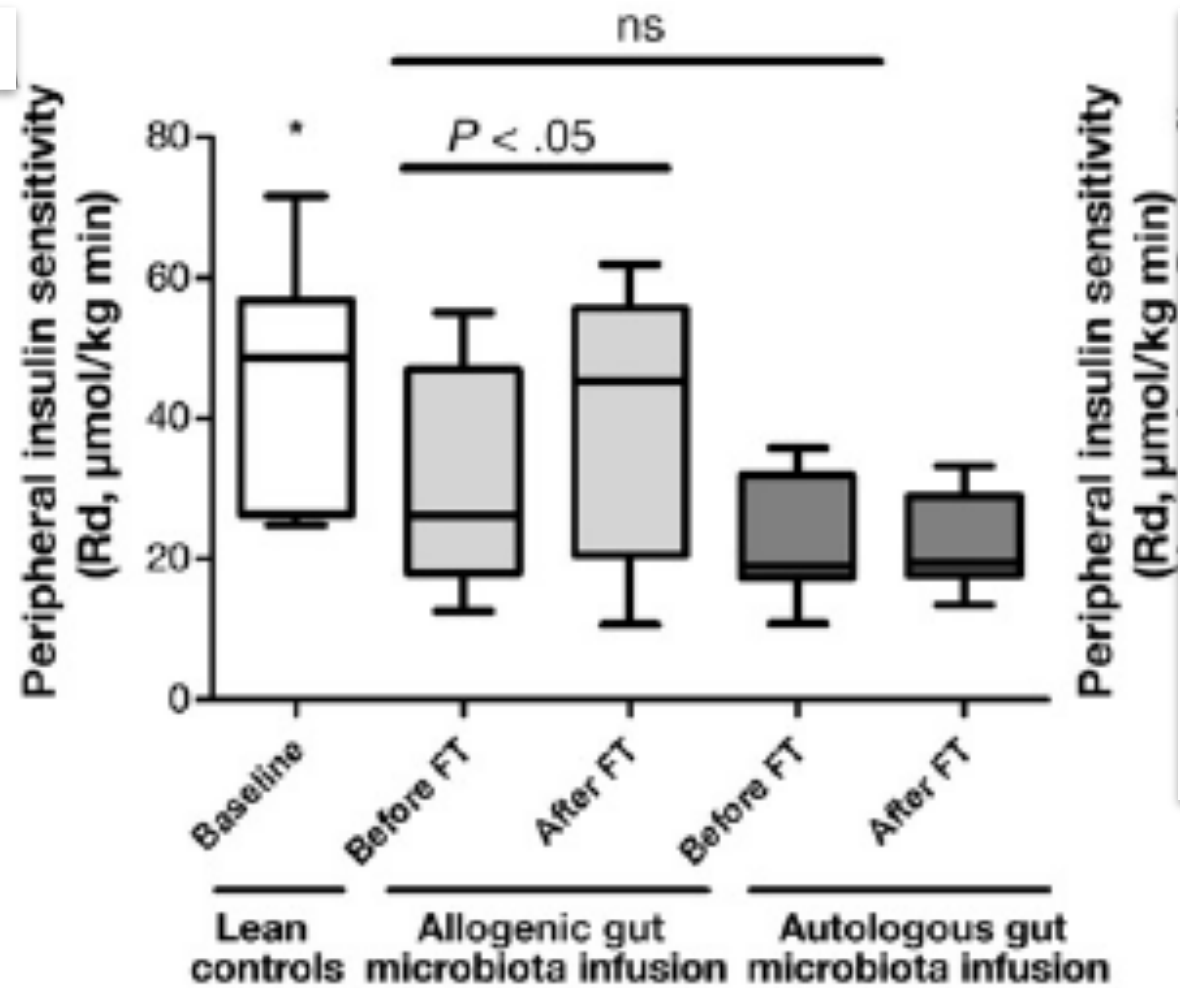
## Mapa del Microbiota del piccolo intestino



**Figure 2.** Heat maps of (A) fecal and (B) small intestinal gut microbiota with significant differences between both treatment groups depicted as a red box. The color value shows  $\log_{10}$  fold changes.



## Transfer of Intestinal Microbiota From Lean Donors Increases Insulin Sensitivity in Individuals With Metabolic Syndrome





## Conclusioni

- La composizione della dieta influenza il rapporto Firmicutes/Bacteroidetes che sembra avere un ruolo nello sviluppo dell'obesità e delle anomalie metaboliche ad esse associate.
- Gli effetti positivi della dieta ricca in fibre sui fattori di rischio cardiovascolare sono in parte mediati dalla flora batterica intestinale attraverso l'incremento della produzione degli SCFA e la modulazione degli ormoni gastrointestinali.
- Sono necessari ulteriori studi d'intervento che confermino la relazione causa effetto che lega la composizione della flora batterica intestinale alle anomalie metaboliche nell'uomo.



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# Grazie per l'attenzione!

