Non-alcoholic beer and respiratory tract health: incidence and inflammation reduction

7th European Beer and Health Symposium

Ass. Prof. Johannes Scherr, MD

Beer and Health

THE 7TH EUROPEAN

BEER AND HEALTH SYMPOSIUM

Topics

- Effects of prolonged & strenuous exercise (as a model for inflammation-associated illnesses)
    - Inflammation & infection
    - Cardiovascular system
- Effects of the polyphenols in (non-alcoholic) beer
    - Inflammation & infection of the respiratory tract system
    - Cardiovascular & rheological effects

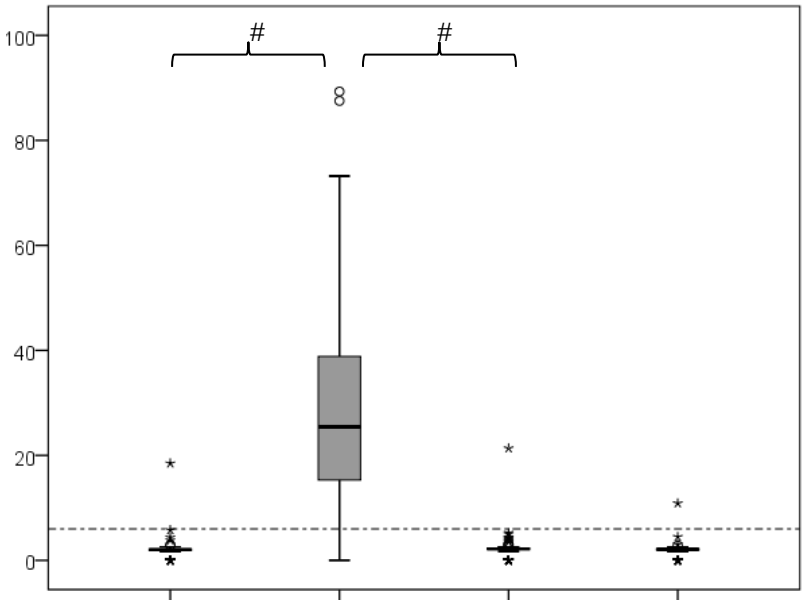
Background inflammation / infection

❖ Prolonged and strenuous exercise results in

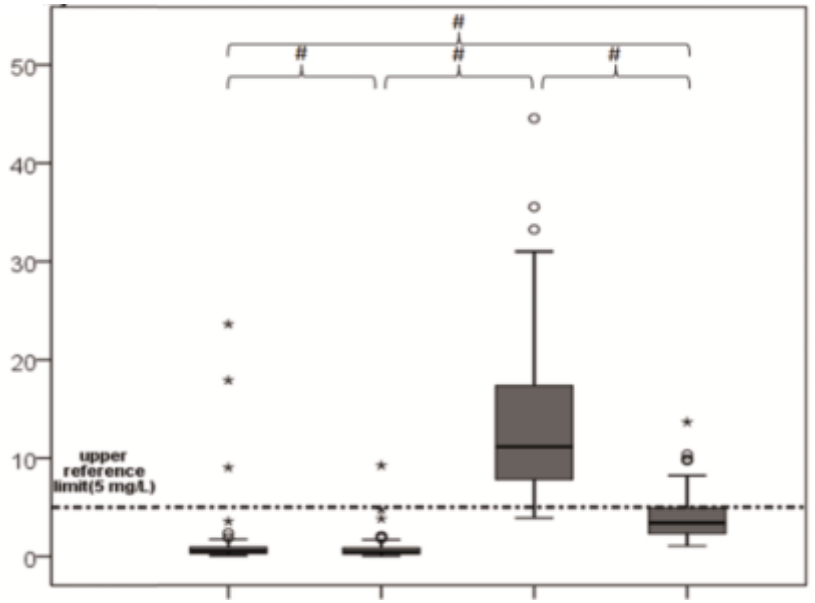
a) an increase in biomarkers representing pro-inflammatory activity

- n = 102 healthy male marathon runners
- Age = 42 ± 9 J.

IL-6 concentration [ng/L]



hs-CRP concentration [mg/L]



# p < 0,001

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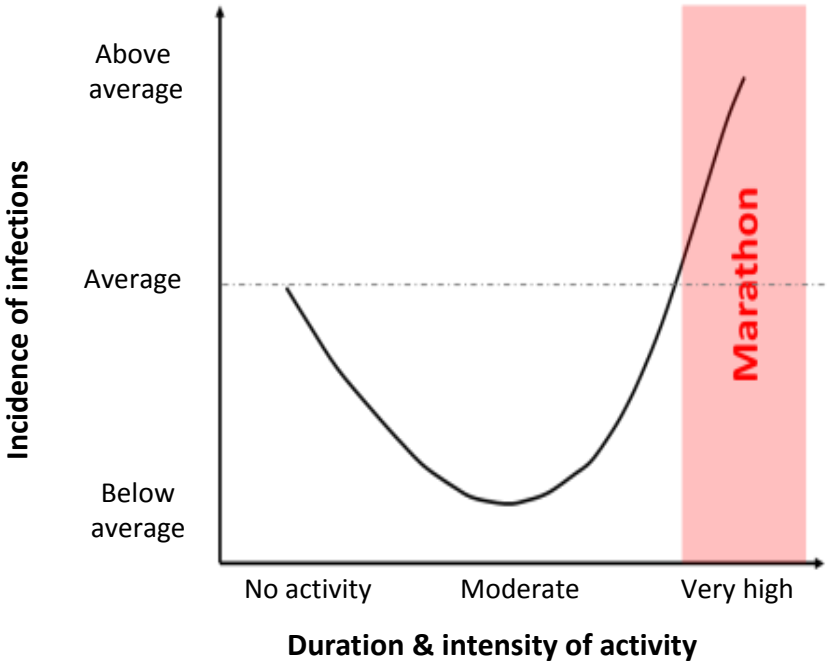
Scherr et al., Med. Sci. Sports Exerc. 2011, 1819–1827

Background inflammation / infection

❖ Prolonged and strenuous exercise results in

a) an increase in biomarkers representing pro-inflammatory activity

b) an immune dysfunction and an elevated incidence/susceptibility of infections (especially upper respiratory tract infections (URTI))



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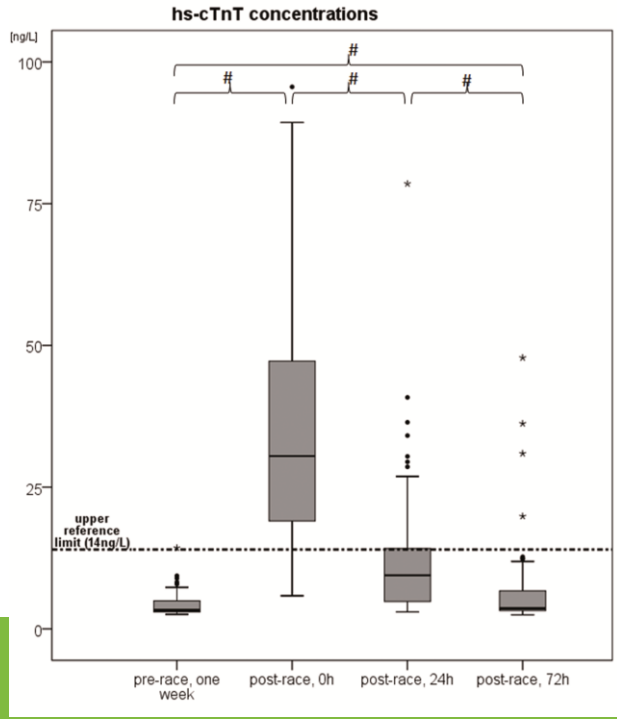
Scherr et al., Med. Sci. Sports Exerc. 2011, 1819–1827
Scherr J et al., Med. Sci. Sports Exerc., 2012: 18–26
Nieman DC et al., Med Sci Sports Exerc., 1994: 128-139

Background cardiovascular alterations

❖ Prolonged and strenuous exercise results in

a) an increase in biomarkers representing pro-inflammatory activity
b) an immune dysfunction and an elevated incidence/susceptibility of infections (especially upper respiratory tract infections (URTI))
c) an increase in biomarkers representing myocardial damage/injury



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Scherr et al., Med. Sci. Sports Exerc. 2011, 1819–1827

Background cardiovascular alterations

❖ Prolonged and strenuous exercise results in

a) an increase in biomarkers representing pro-inflammatory activity
b) an immune dysfunction and an elevated incidence/susceptibility of infections (especially upper respiratory tract infections (URTI))
c) an increase in biomarkers representing myocardial damage/injury
d) discussed underlying mechanisms resulting in an increase in elevated myocardial biomarkers:
    1. oxidative stress or inflammation (in the meaning of inflammatory cardiomyopathy)
    2. Injury of myocytes caused by ischemia
        I. reversible
        II. Irreversible (leading to necrosis)
    3. Impaired renal clearance
    4. Stretch-mediated liberation (due to enhanced wall stress)

Scherr et al, Med. Sci. Sports Exerc., 2011: 1819–1827

Background cardiovascular alterations

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1. **oxidative stress or inflammation** (in the meaning of inflammatory cardiomyopathy)
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Scherr et al, Med. Sci. Sports Exerc., 2011: 1819–1827

Background cardiovascular alterations

❖ P

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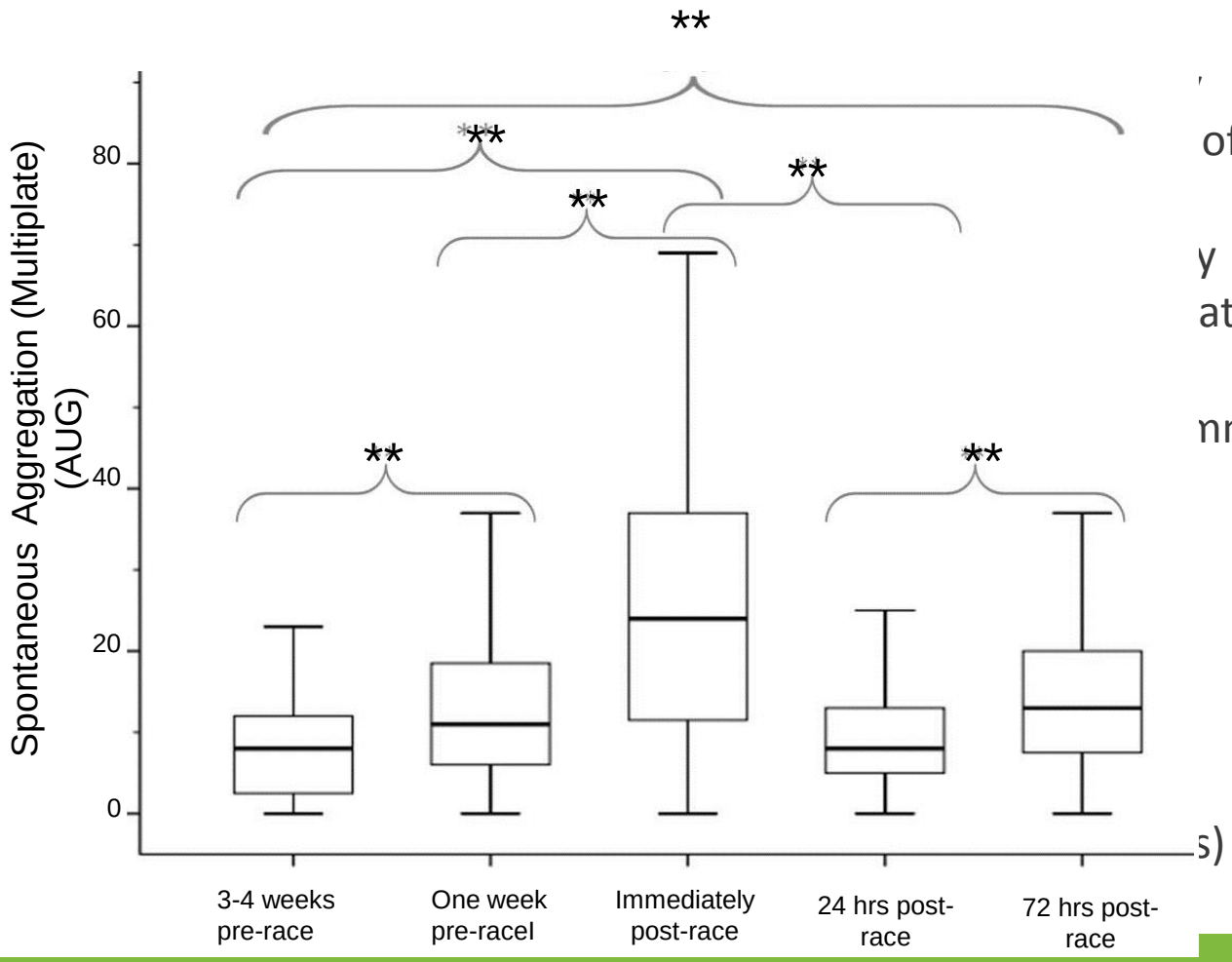

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Scherr et al, Med. Sci. Sports Exerc., 2011: 1819–1827

Daily total polyphenol intake

- Measured in gallic acid equivalent (GAE)
- 48.3mg GAE/d in Brazil [1] (??)
- 783.9 ± 31.7 mg GAE /d in Portugal [2]
- 1 g GAE/d [3]
- → ∿ 800-900 mg GAE/d

- Total phenol content in beer of 500-1000 mg GAE/L [4]

Foodstuff		**Total phenols [5] Folin-Ciocalteu assay (GAE [mg])**
Vegetables	Potato, 200 g	57
	Tomato, 100 g	37
	Onion, 20 g	18
Fruits	Apple, 200 g	440
	Cherry, 50 g	276
Other foods	Dark chocolate, 20g	168
Beverages	Red wine, 125 ml	225
	Coffee, 200ml	179
	Black tea, 200 ml	200

[1] Faller et al, Rev Saúde Pública 2009
[2] Pinto P, Int J Food Sci Nutr, 2013: 1022-1029
[3] Kuhnau J. World Rev Nutr Diet. 1976:117–91
[4] Leupold, G., Brauwissenschaft 1981: 205–210
[5] Scalbert A, J. Nutr. 2000: 2073S—2085S

Polyphenols & infections (URTI)

Contents lists available at ScienceDirect

Pharmacological Research

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

Quercetin supplementation and upper respiratory tract infection: A randomized community clinical trial

Serena A. Heinz[a], Dru A. Henson[a], Melanie D. Austin[b], Fuxia Jin[b], David C. Nieman[b,*]

Aim:

Investigation of the influence of two quercetin doses (500 and 1000 mg/day) compared to placebo on upper respiratory tract infection (URTI) rates in a community group (N= 1002) of subjects varying widely in age (18–85 years)

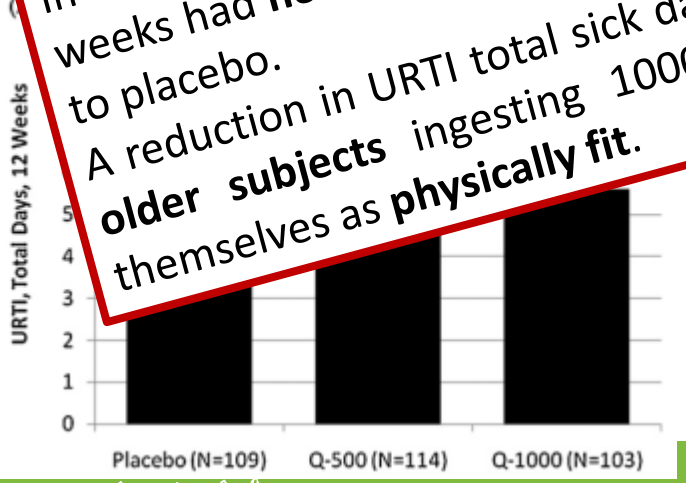
Heinz et al., Pharmacological Research 2010: 237–242

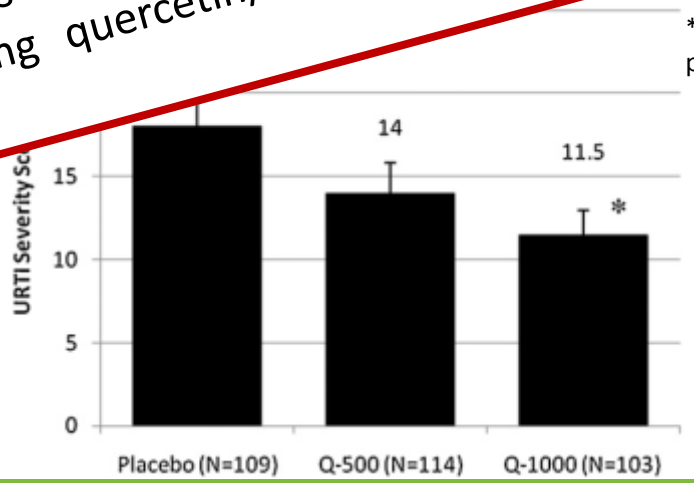
Polyphenols & infections (URTI)

	Placebo (N =317)	Q-500 (N = 315)	Q-1000 (N= 315)	1-Way ANOVA F-
All subjects				
URTI, # days	8,4 ± 0,5	8,5 ± 0,5	8,5	
URTI severity	19,3 ± 1,3	18,3 ± 1,3		
URTI symptom	108 ± 8,0			

In summary, for all subjects combined, quercetin supplementation over 12 weeks had **no** significant influence on URTI rates or symptomatology compared to placebo.
A reduction in URTI total sick days and severity was noted in **middle aged and older subjects** ingesting 1000mg quercetin/day for 12 weeks who rated themselves as **physically fit**.

- Subjects





*P < 0.05 compared to placebo

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Heinz et al., Pharmacological Research 2010: 237–242

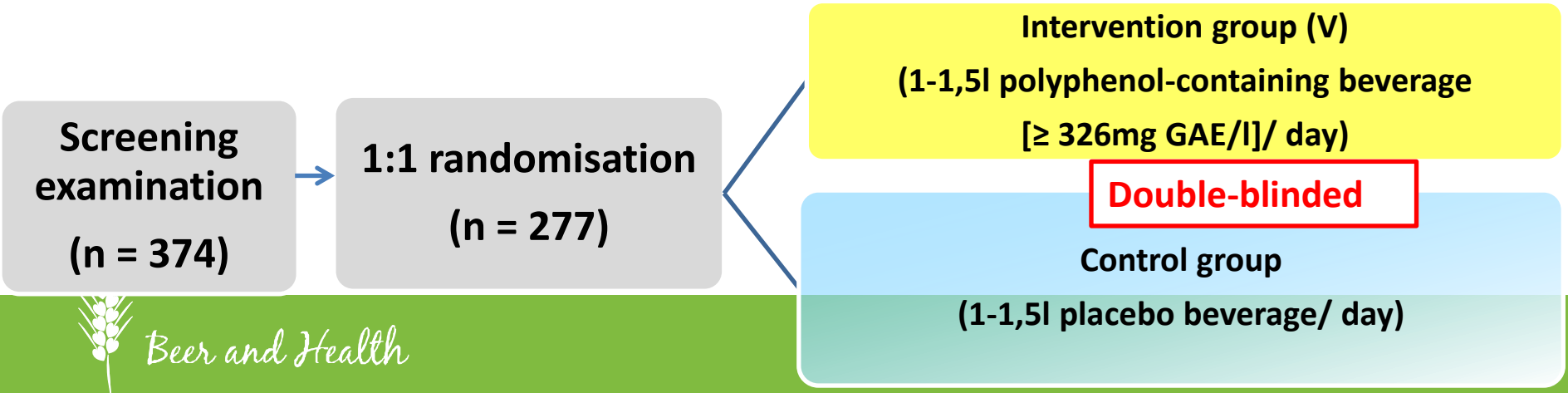
Be-MaGIC: Beer, Marathon, Genetics, Inflammation and the Cardiovascular System

Be-MaGIC-Trial: Material & Methods

- n = 277 marathon (MT) runners (♂, age 42±9J., BMI 23,7±2,1kg/m², finishing time 3h 51min ± 30min)

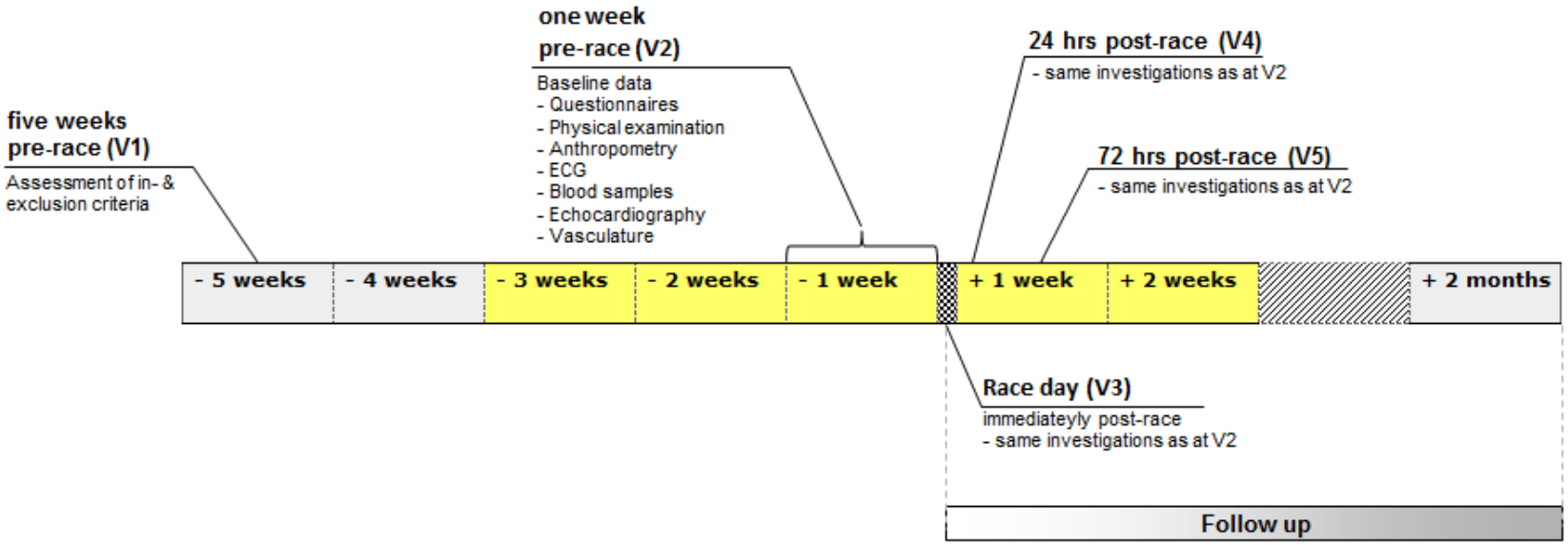
➢ supplementation with a mixture of polyphenols (= non-alcoholic beer= verum (V), 32,6±0,1 mg Gallic acid equivalents (GAE)/100 g)) compared to placebo (except for polyphenols identical composition; also taste, color and foaming)

  ➢ Composition of the polyphenol: catechin (4.7 mg GAE /100g), epicatechin (0.8 mg GAE /100g), procyanidin B-3 (3.3 mg GAE /100g), other proanthocyanidins acid (0.5 mg GAE /100g), vanillic acid (1.5 mg GAE /100g), syringa acid (4.2 mg GAE /100g), p-cumaracid (1.5 mg GAE /100g), ferulic acid (5.2 mg GAE /100g), sinapinic acid (0.4 mg GAE /100g), other hydroxycinnamic acids (0.9 mg GAE /100g), isoxanthohumol (3.9 mg GAE /100g), and other flavonols (5.4 mg GAE /100g)



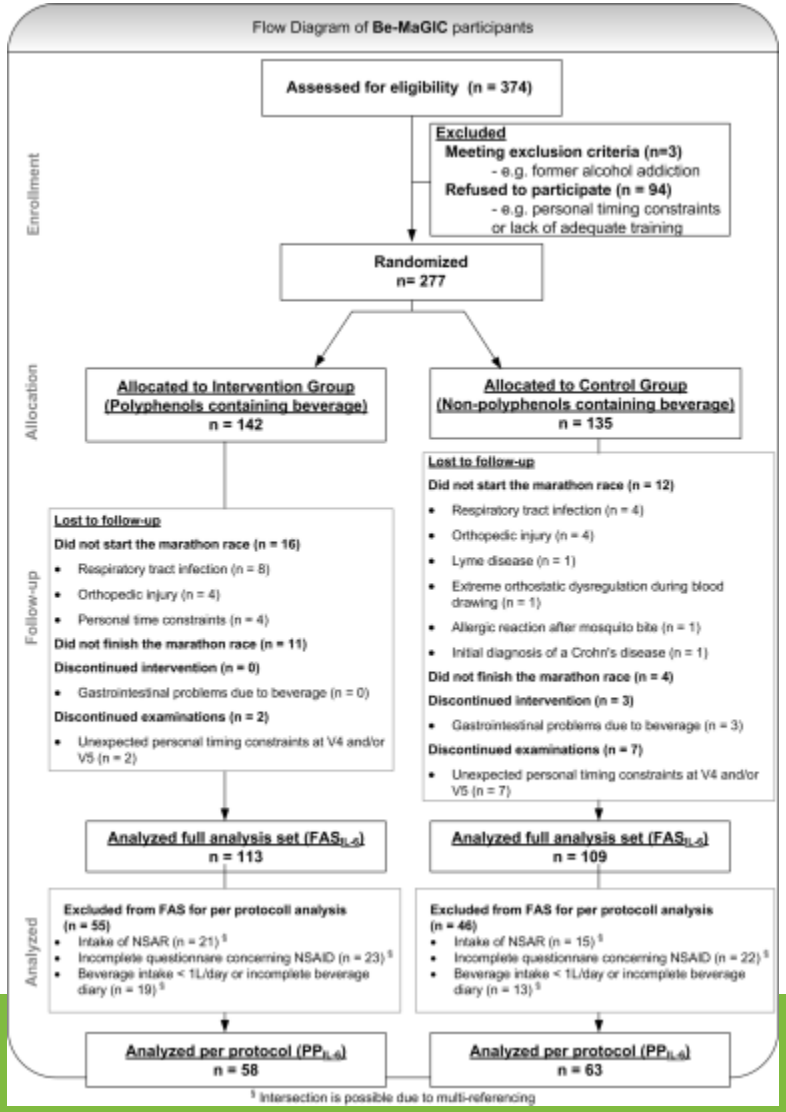
Study design

- n = 277 marathon (MT) runners (♂, age 42±9J., BMI 23,7±2,1kg/m², finishing time 3h 51min ± 30min)



- Statistical analysis of a Full-Analysis-Set (FAS; participants, who finished the marathon successfully) & Per-Protocol (PP)-Gruppe (FAS criteria & ingestion of **≥ 1L** study beverage /d (≙ at least 326 mg GAE)).

Flow chart particpants Be-MaGIC trial



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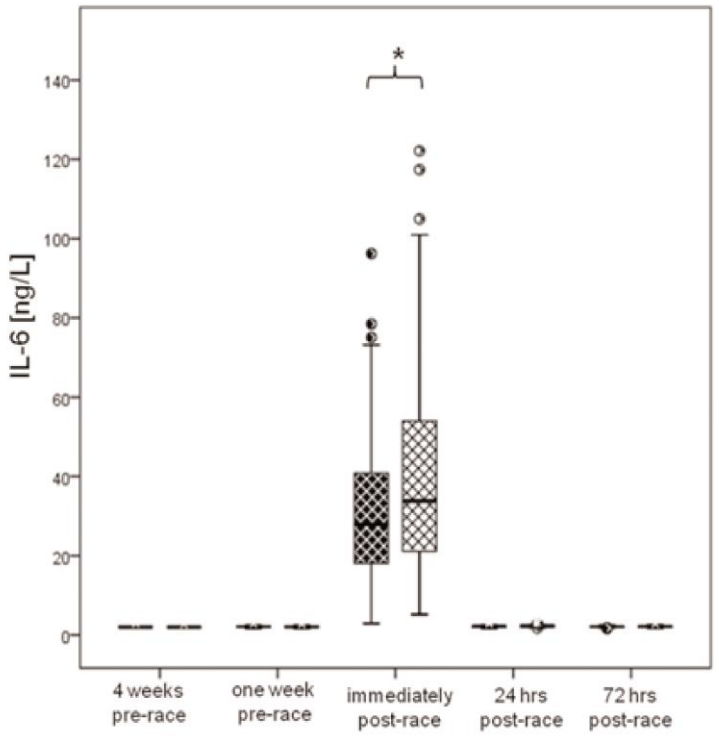
Study cohort – baseline (PP)

	Intervention Group ($n = 58$)	Control Group ($n = 63$)	P
Fluid intake			
Study beverage ($L \cdot d^{-1}$)	1.22 ± 0.16	1.28 ± 0.26	0.18
Other beverage ($L \cdot d^{-1}$)	1.49 ± 0.83	1.72 ± 0.93	0.20
Anthropometry			
Age (yr) (median (IQR))	44 (36–51)	42 (35–49)	0.37
Body mass index ($kg \cdot m^{-2}$)	23.4 ± 2.1	23.8 ± 2.1	0.24
Total body fat (%)	15.5 ± 4.0	14.6 ± 4.5	0.22
Mean blood pressure, systolic/diastolic (mm Hg)	126 ± 11/82 ± 7	127 ± 12/83 ± 7	0.91
Marathon run			
Marathon time (h:min)	3:43:19 ± 0:24:20	3:49:18 ± 0:32:24	0.41
Minimum/maximum race time (h:min:s)	2:53:50/4:42:34	2:51:01/5:25:40	—
Mean HR during race (bpm)	156 ± 11	156 ± 11	0.97
HR_M/calculated HR_{max} (%)	89.1 ± 4.5	89.6 ± 4.7	0.41
Training history			
Training distance per week during the last 10 wk before race (km)	49.7 ± 18.2	53.6 ± 22.4	0.43
Previous marathon races finished (median (IQR))	4 (1–7)	3 (1–7)	0.69
Cardiovascular risk factors (%)			
Diabetes mellitus (type 1 or 2)	0%	0%	1.00
Family history of cardiovascular disease	57%	46%	0.22
Hypercholesterolemia (total cholesterol ≥ 240 $mg \cdot dL^{-1}$)	12%	14%	0.72
Hypertension (RRsys > 140 mm Hg or RRdia > 90 mm Hg)	9%	16%	0.21
Smoker/ex-smoker	4%/0%	4%/2%	1.00

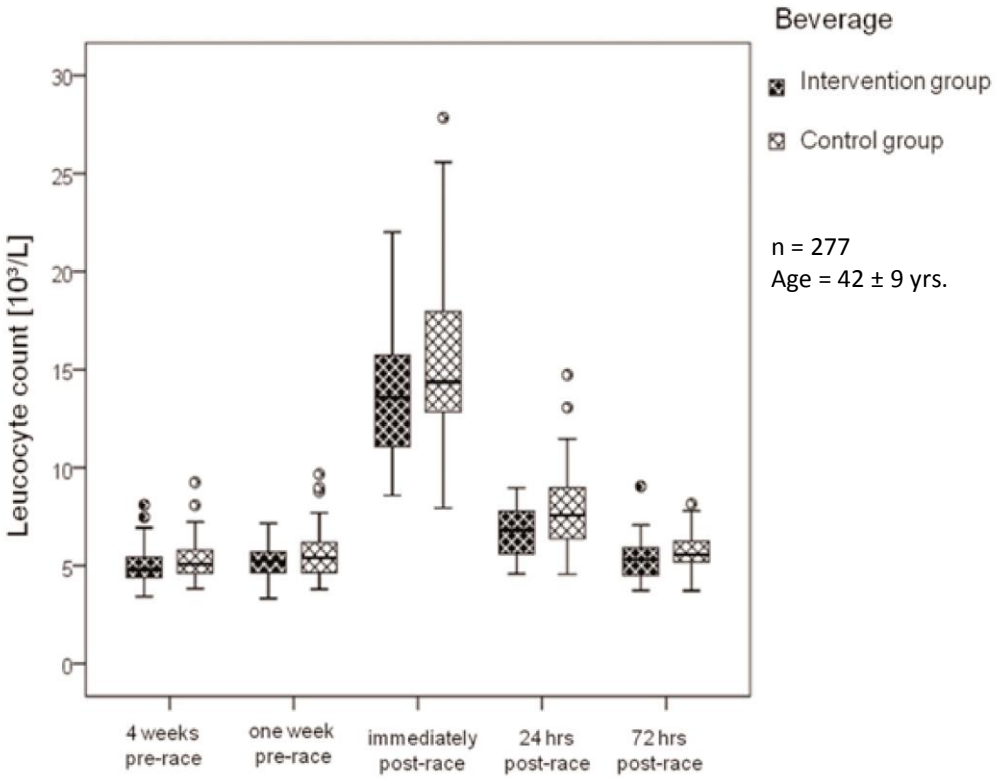
Data are presented as mean ± SD or median (IQR).
HR_M, mean HR during marathon race; RRdia, diastolic blood pressure; RRsys, systolic blood pressure.

Scherr et al., Med. Sci. Sports Exerc., 2012: 18–26.

Polyphenols & Inflammation (PP)



p = 0.03



GEE analysis: difference in leukocyte levels at V3 (immediately post-race) and V4 (24-hrs post-race): overall comparison: mean difference ± SE = 1.2 ± 0.65 * 10^9/L, p = 0.02

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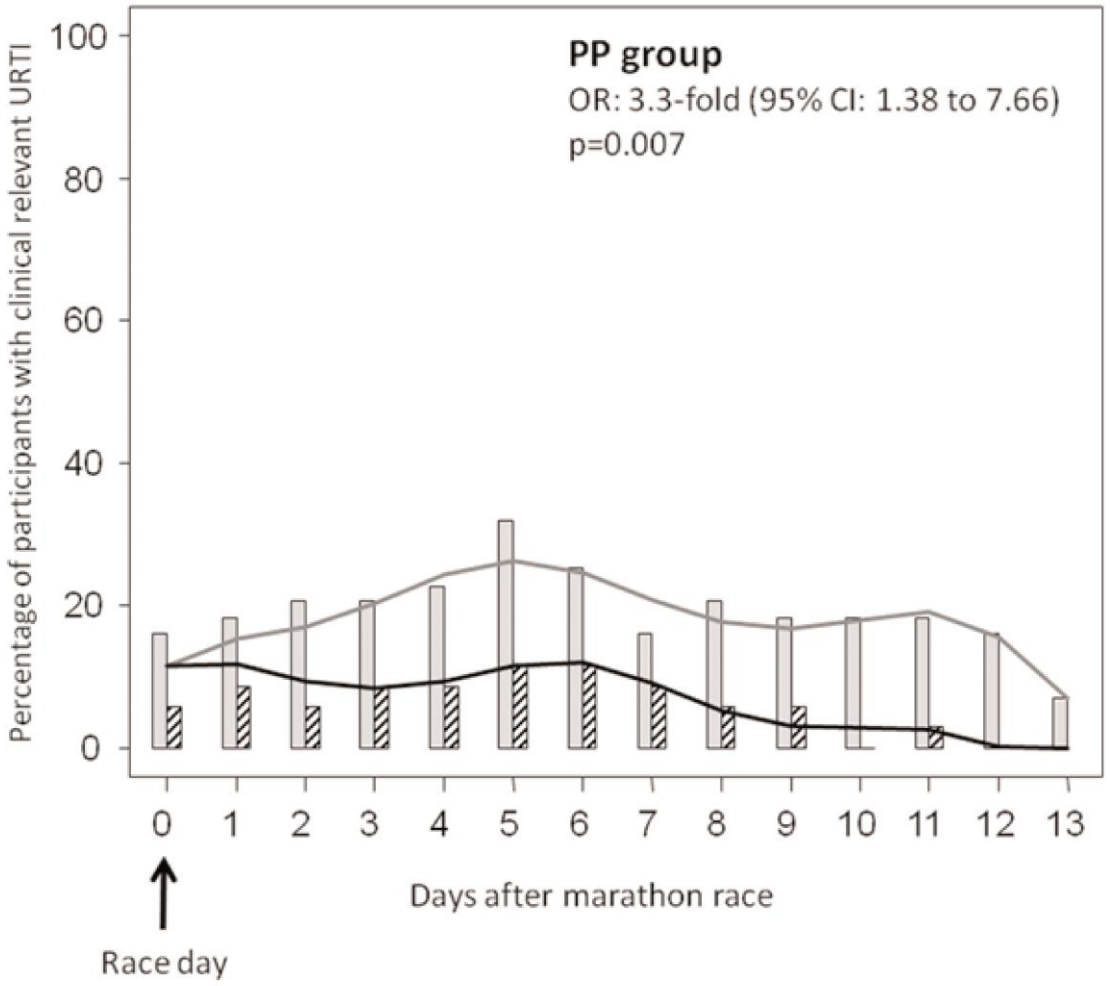
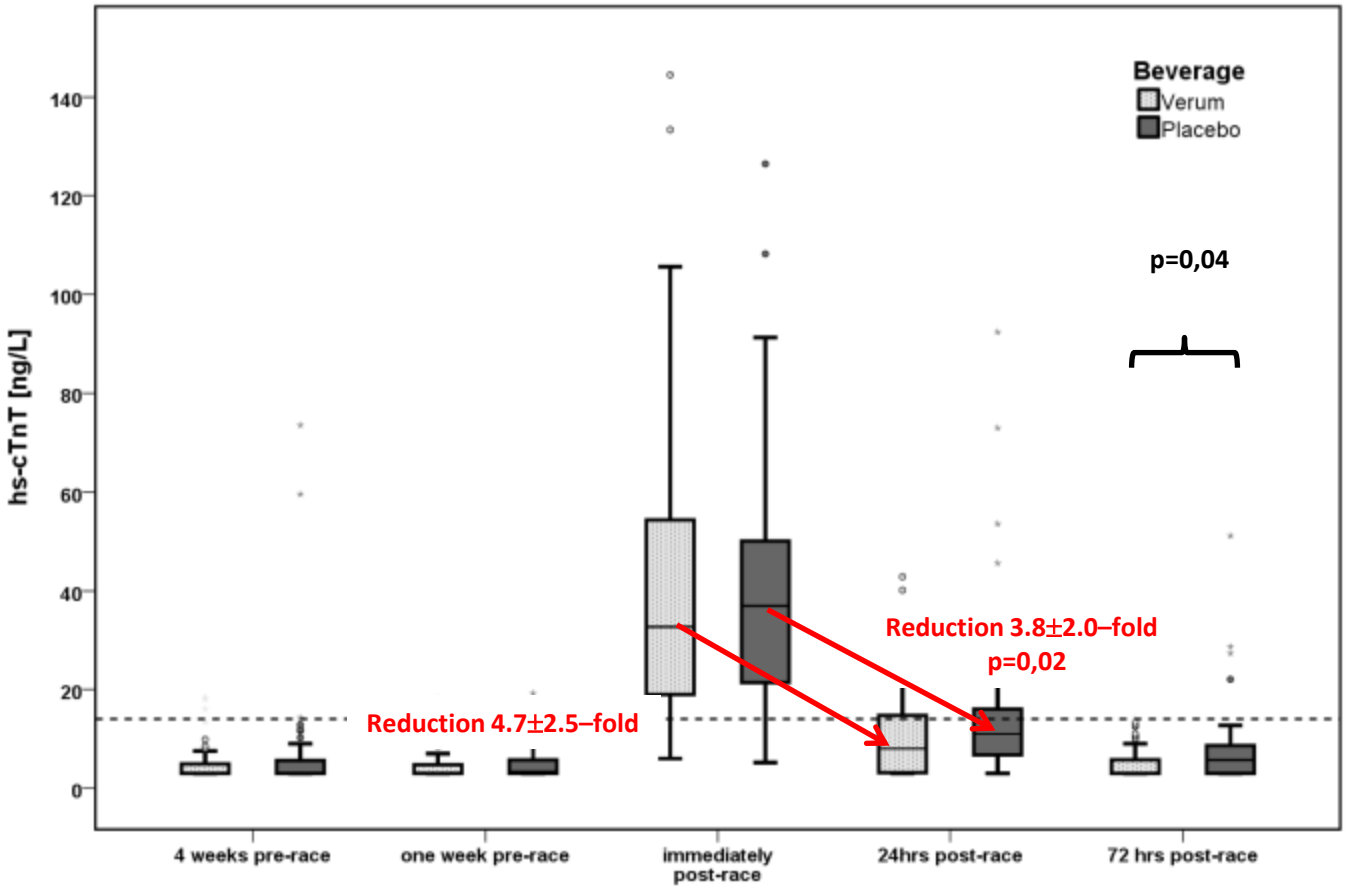
Scherr et al., Med. Sci. Sports Exerc., 2012: 18–26.

Polyphenols & URTI



Scherr et al., Med. Sci. Sports Exerc., 2012: 18–26.

Cardiovascular effects of NAB



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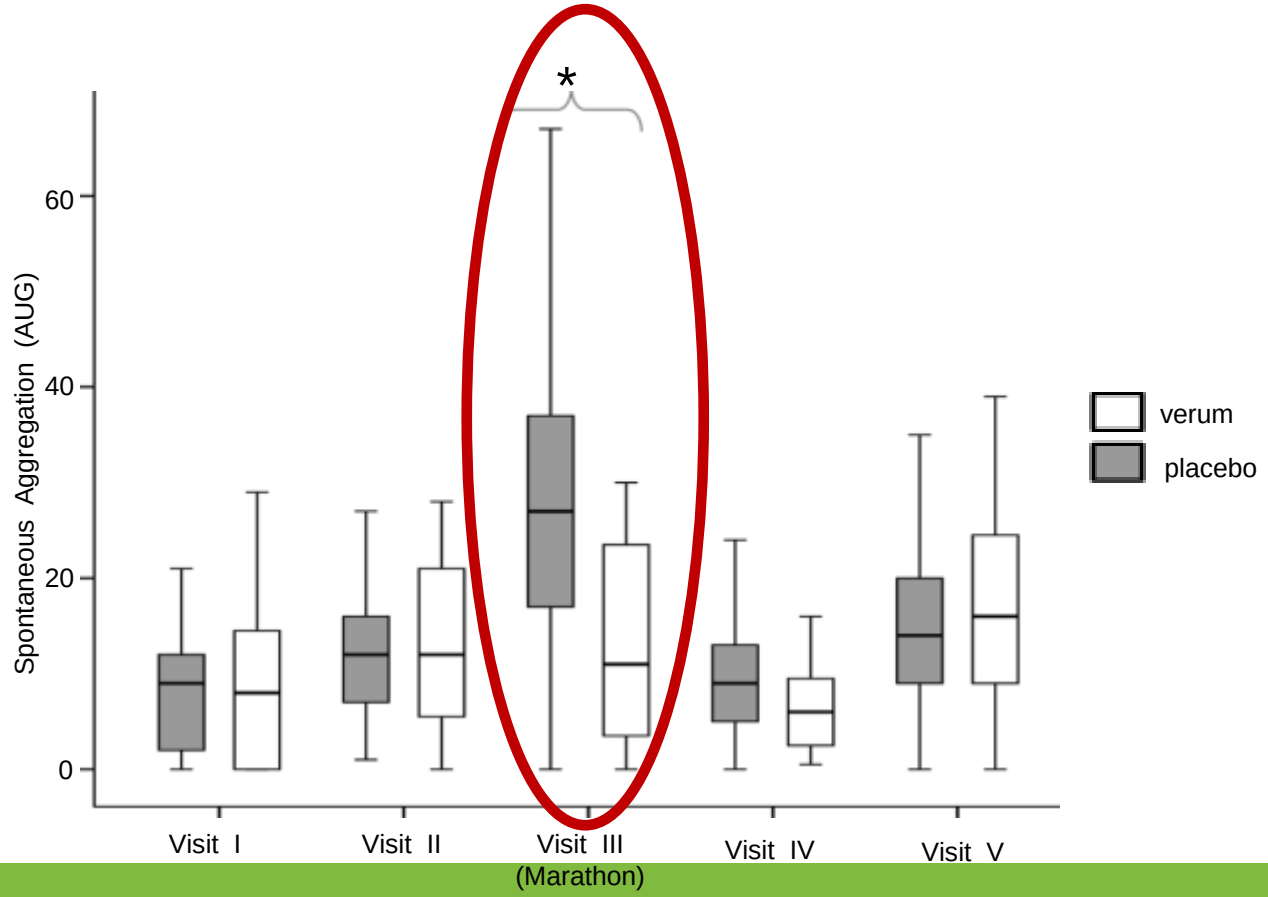
Scherr et al., in revision

Rheologic effects of NAB

Within the group with upper quartile intake of study beverage (>1.28 L/d)



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Scherr et al., submitted

Synopsis

- Polyphenols (in **non**-alcoholic beer) seems to
  - have anti-inflammatory effects
  - reduce strain-induced incidence of upper respiratory tract infections
  - be linked to enhanced cardiomyocyte recovery after prolonged and strenuous exercise
  - have possible rheological effects with respect to exercise-induced thrombocyte aggregation


Bier ist gut ... sagt der Arzt !
BIER
Überarbeitet? Bier hilft entspannen!
Nervös? Bier beruhigt die Nerven!
Verkrampft? Bier lockert die Glieder!
Mit dem Bier im Bunde - Natur und Gesundheit!

Contact

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