

Supplementary file 3

Vitamin C may alleviate exercise-induced bronchoconstriction: a meta-analysis

R-program printouts (3 March 2013)

Harri Hemilä
Department of Public Health
University of Helsinki
Helsinki
Finland
harri.hemila@helsinki.fi
<http://www.mv.helsinki.fi/home/hemila/>

Contents

Page

- 2 **Schachter**
Data and the linear model with only the intercept (t-test)
Calculation of the variables is shown in supplementary file 2
- 3 **Schachter**
Linear model with placebo-day FEV1 decline as the added explanatory variable
Log likelihood test for comparing the two models for the Schachter data
- 4 **Cohen**
Data and the linear model
Calculation of the variables is shown in supplementary file 2
- 5 **Fig 1** meta-analysis and sensitivity analysis in which Cohen is excluded
- 6 **Fig 4** meta-analysis

```
> Schachter
  PL_FEV1_Diff VitC_Effect
1      -10.71         3.57
2      -25.00        11.67
3      -36.36        16.36
4      -37.50        32.74
5         0.00         0.00
6         0.00       -11.11
7         0.00        -4.35
8        -4.76         4.76
9       -14.81         6.81
10         2.38        -2.38
11       -51.85        18.52
12       -32.00        12.00
```

```
> LinearModel.10 <- lm(VitC_Effect ~ 1, data=Schachter)
```

```
> summary(LinearModel.10)
```

```
Call:
lm(formula = VitC_Effect ~ 1, data = Schachter)
```

```
Residuals:
    Min       1Q   Median       3Q      Max
-18.492  -7.978  -1.597   5.707  25.358
```

```
Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)    7.383     3.414   2.162  0.0535
---
```

```
Residual standard error: 11.83 on 11 degrees of freedom
```

```
> confint(LinearModel.10)
                2.5 %    97.5 %
(Intercept) -0.1316784 14.89668
```

```
> LinearModel.11 <- lm(VitC_Effect ~ 1 + PL_FEV1_Diff, data=Schachter)
```

```
> summary(LinearModel.11)
```

```
Call:
```

```
lm(formula = VitC_Effect ~ 1 + PL_FEV1_Diff, data = Schachter)
```

```
Residuals:
```

| Min | 1Q | Median | 3Q | Max |
|---------|---------|--------|--------|---------|
| -8.7513 | -2.3440 | 0.0687 | 1.5644 | 14.2852 |

```
Coefficients:
```

| | Estimate | Std. Error | t value | Pr(> t) |
|--------------|----------|------------|---------|----------|
| (Intercept) | -2.3587 | 2.5400 | -0.929 | 0.374966 |
| PL_FEV1_Diff | -0.5550 | 0.1021 | -5.437 | 0.000286 |

Residual standard error: 6.237 on 10 degrees of freedom
Multiple R-squared: 0.7472, Adjusted R-squared: 0.7219
F-statistic: 29.56 on 1 and 10 DF, p-value: 0.0002862

```
> confint(LinearModel.11)
```

| | 2.5 % | 97.5 % |
|--------------|------------|------------|
| (Intercept) | -8.0182460 | 3.3008733 |
| PL_FEV1_Diff | -0.7825026 | -0.3275514 |

```
> lrtest(LinearModel.10,LinearModel.11)
```

```
Likelihood ratio test
```

```
Model 1: VitC_Effect ~ 1
```

```
Model 2: VitC_Effect ~ 1 + PL_FEV1_Diff
```

| | #Df | LogLik | Df | Chisq | Pr(>Chisq) |
|---|-----|---------|----|--------|------------|
| 1 | 2 | -46.149 | | | |
| 2 | 3 | -37.899 | 1 | 16.502 | 4.861e-05 |

```

> CohenPubImp
  PL_FEV1_Diff VitC_Effect
1      -26.45      16.39
2      -50.00      44.90
3      -33.33      28.12
4      -27.18      18.51
5      -21.31      17.91
6      -14.58       8.29
7      -19.22      19.22
8      -21.90      38.21
9      -20.00      15.83
10     -25.13      10.32
11     -18.67       6.49
12     -40.60       0.00
13     -36.30       0.00
14     -33.30       0.00
15     -30.70       0.00
16     -28.20       0.00
17     -25.80       0.00
18     -23.20       0.00
19     -20.10       0.00
20     -15.90       0.00

```

```

> LinearModel.21 <- lm(VitC_Effect ~ 0 + PL_FEV1_Diff, data=CohenPubImp)

```

```

> summary(LinearModel.21)

```

Call:

```
lm(formula = VitC_Effect ~ 0 + PL_FEV1_Diff, data = CohenPubImp)
```

Residuals:

| | Min | 1Q | Median | 3Q | Max |
|--|----------|----------|---------|--------|---------|
| | -16.9609 | -11.0288 | -0.7439 | 7.8580 | 29.0611 |

Coefficients:

| | Estimate | Std. Error | t value | Pr(> t) |
|--------------|----------|------------|---------|----------|
| PL_FEV1_Diff | -0.4178 | 0.1056 | -3.955 | 0.000849 |
| --- | | | | |

Residual standard error: 13.2 on 19 degrees of freedom

Multiple R-squared: 0.4516, Adjusted R-squared: 0.4227

F-statistic: 15.64 on 1 and 19 DF, p-value: 0.0008485

```

> confint(LinearModel.21)

```

| | 2.5 % | 97.5 % |
|--------------|------------|------------|
| PL_FEV1_Diff | -0.6388209 | -0.1966937 |

```

> Fig_1
  Mean  SE      Study
1  6.50 3.16 Tecklenburg 2007
2  7.38 3.83  Schachter 1982
3 11.20 3.24      Cohen 1997

> meta1<-metagen(Fig_1$Mean, Fig_1$SE, Fig_1$Study)

> meta1
                                95%-CI %W(fixed)
Tecklenburg 2007  6.50  [ 0.3065; 12.6935]      37.99
Schachter 1982   7.38  [-0.1267; 14.8867]      25.86
Cohen 1997      11.20  [ 4.8497; 17.5503]      36.14

Number of studies combined: k=3
                                95%-CI      z  p.value
Fixed effect model  8.4262  [4.6086; 12.2439] 4.326 < 0.0001

Quantifying heterogeneity:
tau^2 < 0.0001; H = 1 [1; 2.38]; I^2 = 0% [0%; 82.4%]

Test of heterogeneity:
  Q d.f.  p.value
  1.18   2    0.5546

Details on meta-analytical method:
- Inverse variance method
- DerSimonian-Laird estimator for tau^2

> Fig_1_Sens
  Mean  SE      Study
1  6.50 3.16 Tecklenburg 2007
2  7.38 3.83  Schachter 1982

> meta1S<-metagen(Fig_1_Sens$Mean, Fig_1_Sens$SE, Fig_1_Sens$Study)

> meta1S
                                95%-CI %W(fixed)
Tecklenburg 2007  6.50  [ 0.3065; 12.6935]      59.5
Schachter 1982   7.38  [-0.1267; 14.8867]      40.5

Number of studies combined: k=2
                                95%-CI      z  p.value
Fixed effect model  6.8564  [2.0791; 11.6338] 2.8129  0.0049

Quantifying heterogeneity:
tau^2 < 0.0001; H = 1; I^2 = 0%

Test of heterogeneity:
  Q d.f.  p.value
  0.03   1    0.8593

Details on meta-analytical method:
- Inverse variance method
- DerSimonian-Laird estimator for tau^2

```

```

> Fig_4
  Mean    SE      Study
1 50.40 24.48 Tecklenburg 2007
2 55.50 11.61   Schachter 1982
3 41.78 11.28      Cohen 1997

> meta4<-metagen(Fig_4$Mean, Fig_4$SE, Fig_4$Study)

> meta4
                                95%-CI %W(fixed)
Tecklenburg 2007 50.40 [ 2.4201; 98.3799]      9.85
Schachter 1982  55.50 [32.7448; 78.2552]     43.78
Cohen 1997      41.78 [19.6716; 63.8884]     46.38

Number of studies combined: k=3

                                95%-CI      z  p.value
Fixed effect model  48.635 [33.5792; 63.6908] 6.3313 < 0.0001

Quantifying heterogeneity:
tau^2 < 0.0001; H = 1 [1; 1.87]; I^2 = 0% [0%; 71.3%]

Test of heterogeneity:
  Q d.f.  p.value
0.72   2   0.6962

Details on meta-analytical method:
- Inverse variance method
- DerSimonian-Laird estimator for tau^2

```