Pro198Leu polymorphism in GPX1 modifies association between serum selenium concentration and erythrocyte GPX1 activity

Tine H Malling[1], Øyvind Omland[2,3], Yoji Deguchi[4], and the RAV group.
[1]Department of Occupational Medicine, Aarhus Hospital, Aarhus, Denmark; [2]Department of Occupational Medicine, Aalborg Hospital, Århus University Hospital, Aalborg, Denmark; [3]Institute of Public Health, University of Århus, Århus, Denmark; and [4]School of Nursing, Faculty of Medical Sciences, University of Fukui, Japan.

Aim:
To investigate whether Pro198Leu polymorphism in the GPX1 gene have an influence on the association between serum selenium concentration and erythrocyte GPX1 activity.

Methods:

Study population:
In a cross-sectional Danish multicenter-study of asthma (RAV, using ECRHS protocol) 1,191 subjects aged 20-44 years were enrolled, 760 were invited as randomly selected control group. Analysis of GPX1-activity was performed in a subgroup selected by GPX1 Pro198Leu genotypes, but otherwise randomly selected. 179 subjects were eligible for analysis of associations between selenium and GPX1activity.

GPX1-genotype: The enzyme was genotyped (pro198leu) by real-time PCR.

GPX1-activity: Activity was analyzed spectrophotometrically in erythrocytes with T-Butyl Hydroperoxide as substrate.

Selenium:
Analyses of selenium in serum used the AOAC (Association of Official Analytical Chemists) modified fluometric method validated for investigations of selenium in organic material.

Table 1. Characteristics of study population

	Heterozygote wild type Pro/Pro (n=60)	Heterozygote Pro/Leu (n=58)	Heterozygote variant type Leu/Leu (n=61)
Selenium, ng/ml (SD)	86.4 (13.4)	83.1 (13.0)	84.2 (13.9)
GPX1-activity, U/g protein (SD)*	56.9 (8.7)	53.1 (8.8)	52.7 (6.8)
Age, year (SD)	34.6 (6.7)	35.1 (7.5)	35.7 (6.7)
Smoking habits, n			
Never smoker	32	31	32
Former smoker	14	9	13
Current smoker	13	18	16

Demographic data en subjects eligible for analysis between selenium and GPX-activity.
* trend test p = 0.006

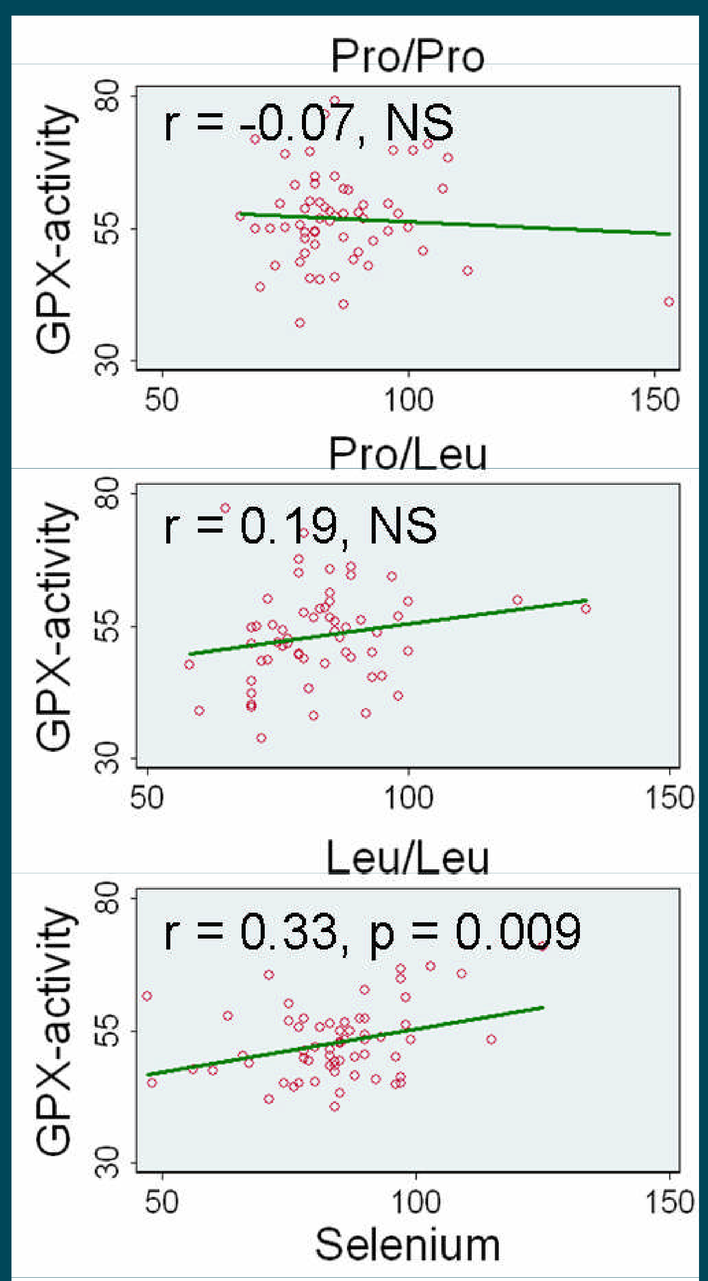

Figure 1 Correlation between GPX1-activity in erythrocytes and serum selenium concentration

Results:

Serum selenium concentration correlates with erythrocyte GPX1-activity (r=0.16, p=0.04). Figure 1 shows how this correlation differs according to genotype. The differences with the strongest correlation in homozygote for variant alleles is contrary to previously published results in a polish population (Jablonska et al. Eur J Nutr (2009) 48:383–386). We found no interaction between the polymorphism and selenium on the GPX1 activity.

Conclusion:

In a randomly selected population of young Danes low activity genotype in GPX1 has highest impact on the association between serum selenium concentration and erythrocyte GPX1 activity

Acknowledgement:
T Sigsgaard, LR Skadhauge, D Sherson, J Baelum, G Thomsen, L Kjøller
Fund providers:
Danish Lung Association, West Danish Research Forum for Health Science, Spar Nord Foundation, and Herta Christensens Foundation.

Risikofaktorer for Astma hos Voksne

AALBORG HOSPITAL
AARHUS UNIVERSITY HOSPITAL

Danish Ramazzini Center

Aarhus University Hospital

NORTH DENMARK REGION