HelmholtzZentrum münchen
German Research Center for Environmental Health

Scientific Highlight October 2011

☒ co-ordinated with the Director of the Institute / Research Unit

Institute / Research Unit / Clinical Co-operation Group / Junior Research Group:
Institute of Epidemiology II, Research Group: Diabetes Epidemiology

PSP-Element:
G-504000-002

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Title of the Highlight:
Effect of serum 25-hydroxyvitamin D on risk for type 2 diabetes may be partially mediated by subclinical inflammation: Results from the MONICA/KORA Augsburg Study

Keywords:
type 2 diabetes, vitamin D, 25(OH)D, epidemiology

Central statement of the Highlight in one sentence:
Vitamin D status is inversely related to type 2 diabetes risk and our data suggest that this association may be partially mediated by subclinical inflammation.

Text of the Highlight:
Objective: To assess the association between serum 25-hydroxyvitamin D (25-OHD) and incident type 2 diabetes and to determine whether the association is mediated by subclinical inflammation.
Research design and methods: Using a case-cohort design, baseline levels of 25-OHD were measured in 416 cases with incident type 2 diabetes and 1267 non-cases selected from a source population of 7,936 middle-aged participants in the population-based MONICA/KORA Augsburg studies.
Results: A significant inverse association was observed between serum 25-OHD and incident type 2 diabetes after adjustment for diabetes risk factors and season. The hazard ratio (HR) and 95% confidence interval (CI) comparing tertile extremes was 0.63 (0.44-0.90) (Ptrend=0.010). Further adjustment for C-reactive protein, interleukin-6, soluble intercellular adhesion molecule-1 and interferon-γ-inducible protein-10 attenuated this association by 16% (HR [95% CI] 0.73 [0.50-1.05], p=0.090).

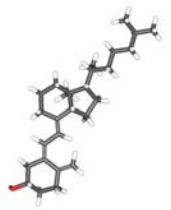
Conclusions: Vitamin D status is inversely related to type 2 diabetes risk and our data suggest that this association may be partially mediated by subclinical inflammation.

Publication:
Effect of serum 25-hydroxyvitamin D on risk for type 2 diabetes may be partially mediated by subclinical inflammation: results from the MONICA/KORA Augsburg study.
Thorand B, Zierer A, Huth C, Linseisen J, Meisinger C, Roden M, Peters A, Koenig W, Herder C. Diabetes Care. 2011 Oct;34(10):2320-2. Epub 2011 Aug 26.

Taking account of the HMGU mission:
Our data help to understand the pathophysiologic processes involved in the development of type 2 diabetes. Furthermore they suggest that improvement of vitamin D status may help to reduce the risk for the development of type 2 diabetes.

The internal HMGU co-operation partners with whom the Highlight was compiled, if appropriate:
Institute of Epidemiology II: Zierer A, Huth C, Meisinger C, Peters A;
Institute of Epidemiology I: Linseisen J

Vitamin D and Incident Type 2 Diabetes

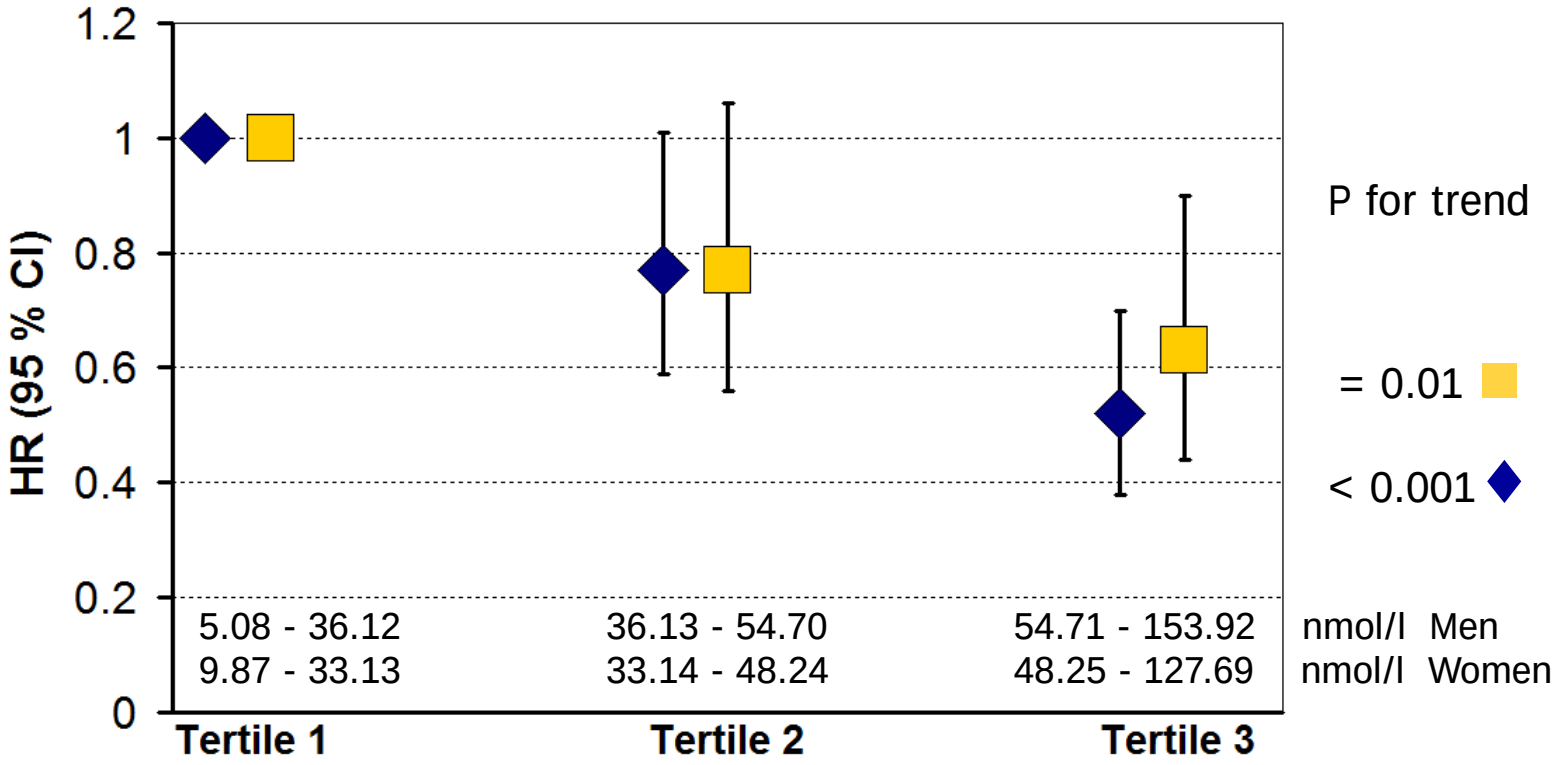


Background: Prospective studies demonstrated an inverse relationship between vitamin D status and incident type 2 diabetes, however, results have not always been consistent, especially regarding associations in women. Furthermore, the mechanisms explaining this link are still under discussion.

Research questions of the current project:

- Are serum levels of 25(OH)D associated with the risk of type 2 diabetes in the general population?
- Are there sex and age differences in the association of 25(OH)D with incident type 2 diabetes?
- Is the association between serum 25(OH)D and type 2 diabetes mediated by subclinical inflammation?

Research Question 1: 25(OH)D → Incident Type 2 Diabetes



♦ adj. for age, sex, survey + season

■ adj. for variables in model 1 + BMI, smoking, phys. act., alcohol intake, syst. BP, TC/HDL-C, PH

Research Question 2: 25(OH)D → Incident Type 2 Diabetes

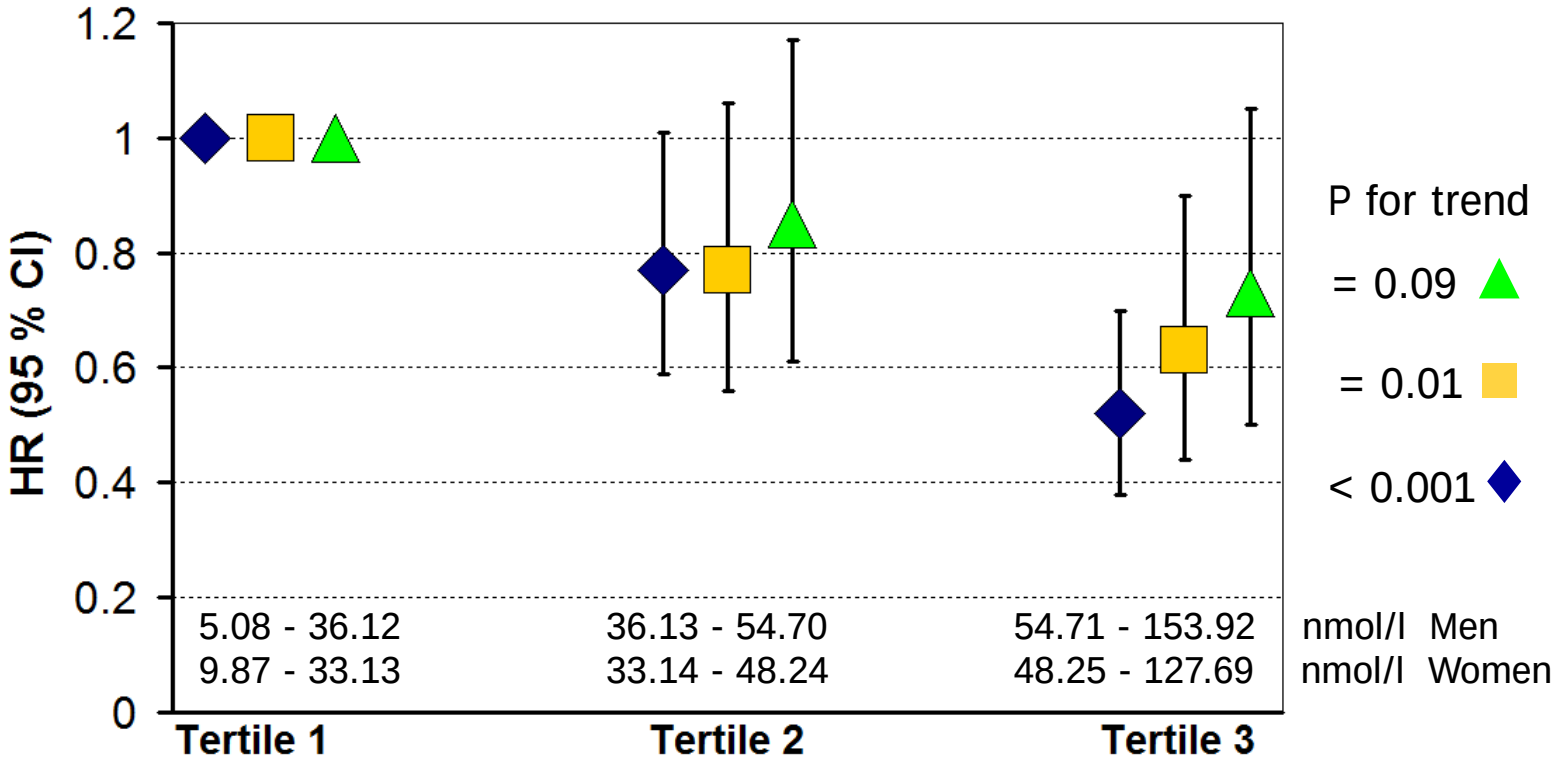
Sex and Age Specific Effects

			Tertiles of serum 25-OHD			*P for trend*	*P for interaction*
		N	T1	T2	T3		
HR (95% CI)		Cases / non-cases					
Men		231 / 657	1.0	0.87 (0.56-1.34)	0.60 (0.38-0.96)	0.031	0.659
Women		185 / 610	1.0	0.72 (0.43-1.20)	0.72 (0.41-1.28)	0.263	
< 52 years		127 / 663	1.0	0.42 (0.22-0.78)	0.46 (0.25-0.86)	0.038	0.036
≥ 52 years		289 / 604	1.0	1.03 (0.69-1.53)	0.74 (0.48-1.14)	0.098	
Men	< 52 years	81 / 342	1.0	0.54 (0.24-1.21)	0.70 (0.32-1.50)	0.414	0.046
	≥ 52 years	150 / 315	1.0	1.21 (0.69-2.15)	0.58 (0.32-1.07)	0.053	
Women	< 52 years	46 / 321	1.0	0.27 (0.10-0.77)	0.23 (0.06-0.93)	0.037	0.016
	≥ 52 years	139 / 289	1.0	0.94 (0.47-1.87)	0.94 (0.48-1.85)	0.867	

Results are from model 2

Research Question 3: 25(OH)D → Incident Type 2 Diabetes

Mediating Role of Markers of Inflammation



♦ adj. for age, sex, survey + season

■ adj. for variables in model 1 + BMI, smoking, phys. act., alcohol intake, syst. BP, TC/HDL-C, PH

▲ adj. for variables in model 2 + CRP, IL-6, sICAM-1, IP-10

Conclusions

- High 25(OH)D → reduced risk of type 2 diabetes risk
- No sign. sex interaction, but tendency for stronger association in men
- Analyses stratified by sex and age: strong effect in „premenopausal“ but not in „postmenopausal“ women
- Associaton between 25(OH)D and incident type 2 diabetes is (only) partially mediated by subclinical inflammation