

(Preventive health care cohort in Vorarlberg)

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(Preventive health care cohort in Vorarlberg)

Datasets of health care programmes in Vorarlberg documented and managed by the Agency of Preventive and Social Medicine (Arbeitskreis für Vorsorge- und Sozialmedizin, aks gesundheit GmbH)

Basic idea:

Merge data of these programmes into one cohort containing information of at least the largest and most comprehensive programme for any member of the cohort. This largest programme accounting for the <u>base dataset</u> of the cohort is the <u>General Health Examination</u> (<u>Allgemeine Gesundenuntersuchung</u>) in Vorarlberg 1985-2005 (appr. 185,000 participants corresponding to 50-60% of the adult population, appr. 716,000 examinations)

Subcohorts (other, smaller programmes) add further examinations and variables

- <u>"real" subcohorts</u>: 100% participants of the General Health Examination (additive programmes dependent on the General Health Examination)
- <u>intersecting subcohorts</u>: <100% participating also in the General Health Examination (programmes independent from the General Health Examination, but participation rate usually high)

Objective of the cohort:

Reveal risk factors for diseases, in particular cardiovascular and malignant diseases, for efficient and targeted public health-related planning and decision-making



Overview

(cf. Stöhr S. & Klenk J. Systematische Aufarbeitung und Dokumentation der aks Daten. Kommentar zur Datenqualität. Master Thesis, Ulm University, 2004)





General Health Examination: the base dataset

- Documentation by aks Jan. 1st 1985 June 30th 2005 (thereafter by Federation of Social Insurances = Dachverband der Sozialversicherungsträger)
- > 716,679 examinations
- ▶ 185,397 participants aged ≥19 years, 53.9% female; 50-60% of adult population
- Socio-demographic data: age, sex, marital status, occupational status (blue collar, white collar, self-employed)
- Body height, body weight, blood pressure (sys, dia), smoking status, blood glucose, serum uric acid, triglycerides, total cholesterol, gamma-GT, fecal occult blood
- > only 1985-1986: dementia, alcohol abuse, status of stress, lack of physical activity
- Closed dataset, however, permanently updated for survival and causes of death -> very long follow-up!



Subcohorts: additive programmes

Preventive programme	n	period	Age profile	% female
for ageing people				= 00 (
("Demenz 2000", "VHM&PP 65+")	3453	June 2000 - July 2001	≥ 65 years	58%

- Variables (by questionnaire):

Pre-existing diseases, medications, allergies, smoking, alcohol consumption, nutrition, bone fractures, various ailments (dyspnoea, insomnia, rheumatism, reduction of hearing and vision, vertigo); gynecological information asked from women (intake of hormones, pain and swellings of the breast, number of births, operations of the abdomen and breast); information on living situation and everyday life

Preventive programme for	n	period	Age profile
<u>postmenopausal women ("Frauen Plus")</u>	5297	Jan. 1991 – Dec.	
- HDI-cholesterol	women	2000	≥ 35 years

- Bone mineral density by DXA or QCT (n=4750)
- Questionnaire covering various topics: climacteric period, general satisfaction, vitality, cardiovascular risk, osteoporotic risk



Intersecting subcohorts (1)

Preventive gynaecological examination

n	period Age profi	
117,400 women,	Jan. 1985 – June	
650,171 examinations	2005	≥ 15 years

- Various examinations documented (breast, uterus, vagina, vulva, ...), *e. g.* cervical swabs, inspection and palpation of the breast, inspection of the vulva, colposcopy, cytology

Mammography screening programme	n	period	Age profile
	53,223 women,	Jan. 1989 – Dec.	
	136,254 examination	2005	≥ 18 years

- Offered to all (female) participants of the General Health Examination and the Preventive gynaecological examination
- Mammography results; acquistion of breast cancer family history, operations of the breast, use of contraceptives, and breastfeeding



Intersecting subcohorts (2)

Skin cancer prevention

n	period	Age profile	% female
9382 participants,	Aug. 1989 –		
12,069 examinations	Dec. 1994	≥ 13 years	61%

- Acquisition of risk for skin cancer, skin type

Colorectal cancer prevention

n	period	Age profile	% female
13,379 participants	1992 - 2007	>= 7 Jahre	41%

- Family history of colorectal cancer, fecal occult blood, colorectal cancer risk (adenomas, colorectal cancer syndroms, ulcerative colitis, cancer familiy history)



Intersecting subcohorts (3)

Chronic diseases intervention

programme ("CINDI" of the WHO)

n	period	Age profile	% female
2401 (CINDI 1986),	1986,		
2400 (CINDI 1991),	1991,	25 – 64 years	50%
2794 (CINDI 1998)	1998		

- **CINDI** (Countrywide Integrated Non-communicable Diseases Intervention) programme of the WHO with the purpose of prevention of chronic diseases in 1986, 1991, and 1998
- Inquiries, additional acquisition of laboratory parameters
- Randomly selected participants aged 25-64 years with residency in Vorarlberg, same proportion females/males (representative random sample)
- <u>All years</u>: Socio-demographic variables (age, sex, marital status, occupation), physical activity, nutrition, smoking, alcohol consumption, information sources for health-related topics
- <u>CINDI 1986</u>: blood pressure (sys, dia), pulse, body height, body weight; serum uric acid, total cholesterol, gamma-GT, blood glucose, HDL-cholesterol, triglycerides
- <u>CINDI 1991</u>: blood glucose, HDL-cholesterol, triglycerides; disease history (in particular, hypertension, cardiovascular disease, pulmonary disease, diabetes, malignant disease, urinary tract infection), medication history (analgesics, hypnotics, contraceptives, and other drugs)
- <u>CINDI 1998</u>: blood glucose, serum uric acid, triglycerides, total cholesterol, HDL-cholesterol, gamma-GT



Scientific publications

- >150 scientific publications in peer-reviewed journals since 2003 (up to April 2023) (cf. <u>https://www.i-med.ac.at/msig/mitarbeiter/ulmer/vhmpp.html.de)</u>
- Often combination with other datasets, registries, and cohorts, and part of multi-center studies (MCS):
 - > National Mortality Registry (Statistik Austria) (follow-up, causes of death)
 - Cancer Registry Vorarlberg
 - > Coronary Angiography Cohort Vorarlberg (VIVIT [Vorarlberg Institute of Vascular Investigation and Treatment])
 - Hip fracture dataset Vorarlberg (2003-2013)
 - > Austrian Dialysis and Transplant Registry (ÖDTR)
 - > Me-Can (Metabolic Syndrome and Cancer) (MCS)
 - **ESCAPE** (European Study of Cohorts for Air Pollution Effects) (MCS)
 - > **ELAPSE** (Effects of Low-Level Air Pollution: A Study in Europe) (MCS)
 - > **NCD RisC** (non-communicable diseases risk factor collaboration) (MCS)
 - **ERFC** (emerging risk factors collaboration) (MCS)



Scientific publications_examples (1)

European Heart Journal (2003) 24, 1004-1013





Long-term tracking of cardiovascular risk factors among men and women in a large population-based health system

The Vorarlberg Health Monitoring & Promotion Programme

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Received 14 October 2002; revised 10 January 2003; accepted 5 February 2003

KEYWORDS Cardiovascular risk factors; Longitudinal studie: Aims To document tracking patterns, if any, over time, of classical cardiovascular risk factors in men and women participants in the Vorarlberg Health Monitoring and Promotion Programme (VHM&PP) Methods and Results 67 413 men and 82 237 women underwent a total of 454 448 Ulmer H, Kelleher C, Diem G, Concin H. Long-term tracking of cardiovascular risk factors among men and women in a large population-based health system: The Vorarlberg Health Monitoring & Promotion Programme. *Eur. Heart J.* 2003;24:1004–13.

- → Stability (tracking) of cardiovascular risk factors during a max. of 15 years:
- \rightarrow BMI (body mass index) very stable
- → Triglycerides and gamma-GT not very stable, blood pressure fluctuating
- → Stable (vs. fluctuating) triglycerides and gamma-GT associated with higher total mortality, more stable systolic blood pressure with lower total mortality, both in women; no such effects in men

Research Article

Association of $\gamma\text{-}Glutamyltransferase$ and Risk of Cancer Incidence in Men: A Prospective Study

Alexander M. Strasak,¹ Kilian Rapp,⁵ Larry J. Brant,⁶ Wolfgang Hilbe,² Martin Gregory,⁷ Willi Oberaigner,⁴ Elfriede Ruttmann,³ Hans Concin,⁶ Günter Diem,⁸ Karl P. Pfeiffer,¹ Hanno Ulmer^{1,8} and the VHM&PP Study Group

Departments of Medical Statistics, Informatics and Health Economics, 'Haematology and Oncology, and Cardiac Sargery, Innsbruck Medical University, 'Cancer Hegistry of Tyroi. Department of Clinical Fjudemiology of the Tyroican State Hospitals Ltd., Insbruck, Atarix: Department of Epidemiology, University of Uka, UKa, Germany, 'Genetalogy Besarch Center, National Institute on Aging, Baltimore, Maryland', SiSi Institute, Inc., Heidelberg, Germany, and 'Agency for Preventive and Social Medicine. Respert, Austria

Abstract

Although several epidemiologic studies have shown that γ -glutamyltransferase (GGT) is independently associated with cardiovascular disease and all-cause mortality, its relationship with cancer incidence remains widely unexplored. In several experimental models, the ability of cellular GGT to modulate crucial redox-sensitive functions has been established, and it thus may play a role in tumor progression, as has been repeatedly suggested. We prospectively investigated the association between GGT and risk of overall and site-specific cancer incidence in a large population-based cohort of 79.279

excessive alcohol intake (1–5). However, in recent years, several epidemiologic studies have sparked further interest in elevated GGT as an independent predictor for morbidity and mortality from causes other than liver disease. Particularly, it was reported that GGT is independently associated with cardiovascular disease (6–11) and most cardiovascular risk factors (12–15), and more recently, an association with chronic kidney disease was found (16). In addition, several large-scale studies indicate an independent role of GGT for premature death from all causes (9, 12, 17). The association of GGT with cancer rincidence, however, remains

The association of GGT with cancer incidence, however, remains largely unexplored to date. Several experimental models have eluxidated the ability of cellular CGT to modulate enuried reder Strasak AM, Rapp K, Brant LJ, Hilbe W, Gregory M, Oberaigner W, Ruttmann E, Concin H, Diem G, Pfeiffer KP, Ulmer H. Association of γ-glutamyltransferase and risk of cancer incidence in men: a prospective study. *Cancer Res.* 2008;68:3970–7.

- \rightarrow Elevated gamma-GT associated with increased cancer risk in men
- \rightarrow In particular cancer of digestive, respiratory, and urinary organs
- \rightarrow Marked dose-response effect



Scientific publications_examples (2)



IJC

Metabolic risk factors and primary liver cancer in a prospective study of 578,700 adults

Wegene Borena¹, Susanne Strohmaler¹, Annekatrin Lukanova², Tone Bjørge^{1,4}, Björn Lindkvist⁵, Goran Hallmans⁶, Michael Edlinge¹, Tanja Stocks⁷, Gabriele Nagel¹, Jonas Manje⁴, Anders Engeland⁴⁻³, Randi Selmer¹, Christel Häggström⁷, Steinar Trett¹¹, Hans Concin¹¹, Håkan Jonsson¹², Pår Stattin² and Hanno Ulmer¹

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Initial studies have indicated diabetes and obesity to be risk factors for hepatocellular carcinoma; but the association between other metabolic risk factors and primary liver cancer (PLC) has not been investigated. The metabolic syndrome and cancer project (Me-Can) includes cohorts from Norway, Austria and Sweden with data on 578,700 subjects. We used Cox proportional hazard models to calculate relative risks (RRs) of PLC by body mass index (BMI), blood pressure and plasma levels of glucose, cholesterol and triglycerides as continuous standardized variables (z-score with mean = 0 and standard

Article

Repositioning of the global epicentre of non-optimal cholesterol

ttps://doi.org/10.1038/s41586-020-2338-1 NCD Risk Factor Collaboration (NCD-RisC Received: 18 October 2019 Accepted: 2 April 2020 High blood cholesterol is typically considered a feature of wealthy wester countries¹². However, dietary and behavioural determinants of blood cholesterol are Published online: 3 June 2020 changing rapidly throughout the world3 and countries are using lipid-lowering Open access medications at varying rates. These changes can have distinct effects on the levels of Check for updates high-density lipoprotein (HDL) cholesterol and non-HDL cholesterol, which have different effects on human health⁴⁵. However, the trends of HDL and non-HDL cholesterol levels over time have not been previously reported in a global analysis Here we pooled 1.127 population-based studies that measured blood lipids in 102.6 million individuals aged 18 years and older to estimate trends from 1980 to 2013 in mean total, non-HDL and HDL cholesterol levels for 200 countries. Globally, there was little change in total or non-HDL cholesterol from 1980 to 2018. This was a net effect of increases in low- and middle-income countries, especially in east and southeast Asia, and decreases in high-income western countries, especially those in northwestern Europe, and in central and eastern Europe. As a result, countries with the highest level of non-HDL cholesterol-which is a marker of cardiovascular riskchanged from those in western Europe such as Belgium, Finland, Greenland, Iceland Norway, Sweden, Switzerland and Malta in 1980 to those in Asia and the Pacific. such as Tokelau, Malaysia. The Philippines and Thailand, In 2017, high non-HDL cholesterol was responsible for an estimated 3.9 million (95% credible interva 3.7 million-4.2 million) worldwide deaths, half of which occurred in east, southeast and south Asia. The global repositioning of lipid-related risk, with non-optimal

throughout the world.

Blood cholesterol is one of the most important risk factors for ischaemic countries have adopted lipid lowering medications⁰. These changes the substantially in the heart disease (HD) and ischaemic stroke⁺⁺. Consistent and comparable are likely to have influenced cholesterol levels substantially in the

cholesterol shifting from a distinct feature of high-income countries in northwestern Europe, north America and Australasia to one that affects countries in east and

southeast Asia and Oceania should motivate the use of population-based policies and personal interventions to improve nutrition and enhance access to treatment Borena W, Strohmaier S, Lukanova A, Bjørge T, Lindkvist B, Hallmans G, Edlinger M, Stocks T, Nagel G, Manjer J, Engeland A, Selmer R, Häggström C, Tretli S, Concin H, Jonsson H, Stattin P, Ulmer H. Metabolic risk factors and primary liver cancer in a prospective study of 578,700 adults. *Int. J. Cancer* 2012;131:193–200.

→ Me-Can MCS

- → Primary hepatic tumors (liver cancer) as endpoint
- → BMI, blood glucose, and MetS Index: positively associated with primary hepatic tumors
- \rightarrow Total cholesterol inversely associated

NCD Risk Factor Collaboration. Repositioning of the global epicentre of non-optimal cholesterol. *Nature* **2020**;582:73-77.

→ NCD-RisC MCS

- → Total and non-HDL cholesterol decreasing since 1980 in Western industrialized countries, also in Austria
- → Increasing in newly industrialized and low-income countries of South-East Asia and Oceania (changing nutritional habits, restricted availability of statins)
- → Data for Austria in large part from VHM&PP cohort



Scientific publications_examples (3)

RESEARCH

OPEN ACCESS

Long term exposure to low level air pollution and mortality in eight European cohorts within the ELAPSE project: pooled Check for updates analysis

Maciej Strak,^{1,2} Gudrun Weinmayr,³ Sophia Rodopoulou,⁴ Jie Chen,¹ Kees de Hoogh,^{5,6} Zorana J Andersen,⁷ Richard Atkinson,⁸ Mariska Bauwelinck,⁹ Terese Bekkevold,¹ ¹ Tom Bellander^{11,12} Marie-Christine Boutron-Ruault,¹³ Jørgen Brandt,¹⁴ Giulia Cesaroni,¹⁵ Hans Concin,¹⁶ Daniela Fecht,¹⁷ Francesco Forastiere,^{15,18} John Gulliver,^{17,19} Ole Hertel,²⁰ Barbara Hoffmann,²¹ Ulla Arthur Hvidtfeldt,²² Nicole A H Janssen,² Karl-Heinz Jöckel,² Jeanette T Jørgensen,⁷ Matthias Ketzel, 14.24 Jochem O Klompmaker, 2.25 Anton Lager,² Karin Leander, 11 Shuo Liu, 7 Petter Ljungman, 11,27 Patrik K E Magnusson, 28 Amar J Mehta, 29 Gabriele Nagel, ³ Bente Oftedal, ³⁰ Göran Pershagen, ^{11,12} Annette Peters, ^{31,32} Ole Raaschou-Nielsen, 22 Matteo Renzi, 15 Debora Rizzuto, 33,34 Yvonne T van der Schouw, 3 Sara Schramm,²³ Gianluca Severi,^{13,36} Torben Sigsgaard,³⁷ Mette Sørensen,^{22,38} Massimo Stafoggia, 11,15 Anne Tjønneland, 22 W M Monique Verschuren, 2,35 Danielle Vienneau, 5,6 Kathrin Wolf, 31 Klea Katsouyanni, 4,18 Bert Brunekreef, 1 Gerard Hoek, 1 Evangelia Samoli⁴

For numbered affiliations see end of the article	ABSTRACT
Correspondence to: G Hoek shoek@uu.nl (or @elapse_project on Twitter DRCID 0000-0003-3687-217X)	To investigate the associations between air pollution and mortality, focusing on associations below current European Union, United States, and World Health
Additional material is published online only. To view please visit the journal online	Organization standards and guidelines.
	DESIGN
The this as: RM/2021-374-01904	Pooled analysis of eight cohorts.
http://dx.doi.org/10.1136/bmj.n1904	SETTING
Accepted: 27 July 2021	Multicentre project Effects of Low-Level Air Pollution: A Study in Europe (ELAPSE) in six European countries.
	PARTICIPANTS
	335 367 adults from the seneral non-dation resulted

residential air pollution concentrations of ambient fine particulate matter (PM, .), nitrogen dioxide, ozone, and black carbon.

MAIN OUTCOME MEASURES Deaths due to natural causes and cause specific mortality

Of 325 367 adults followed-up for an average of 19.5 years, 47 131 deaths were observed. Higher fects of Low-Level Air Pollution: A exposure to PM, a nitrogen dioxide, and black PSE) in six European countries. carbon was associated with significantly increased risk of almost all outcomes. An increase of 5 µg/m³ in PM., was associated with 13% (95% confidence he senses resulting received

RESULTS

BioMedicine 67 (2021) 10337



Research paper

Value of total cholesterol readings earlier versus later in life to predict cardiovascular risk

Andreas Leiherer^{a,e.g.*}, Hanno Ulmer^{b,c}, Axel Muendlein^{a,c}, Christoph H. Saely^{a,d,c} Alexander Vonbankad, Peter Fraunberger 8,8, Bernhard Foegerb, Eva Maria Brandtnera, Wolfgang Brozek^b, Gabriele Nagel^{b,f}, Emanuel Zitt^{b,h}, Heinz Drexel^{a,c,i,j,±}, Hans Concin^{b,d}

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ARTICLE INFO ABSTRACT

Article History: Received 15 February 2021 Revised 15 April 2021 Accepted 16 April 2021 Available online xxx

levente

Cholesterol Aging Advanced age Cardiovascular risk facto Background: Prognostic implications of blood cholesterol may differ at different stages of life. This cohort study compares the value of total cholesterol (TC) readings earlier versus later in life for the prediction of coronary atherosclerosis, cardiovascular events, and cardiovascular death. Methods: In a cardiovascular observation study (CVOS) we performed coronary angiography and prospec

tively recorded cardiovascular events in 1090 patients over up to 19 years. These patients had participated in a health survey (HS) 15 years prior to the CVOS baseline. TC was measured twice, first at the earlier HS and then later at CVOS recruiting Findings: Patients in the highest versus the lowest TC-category of the HS had an O8 of 4.30 [2,41-7,65] for

significant CAD at angiography, a HR of 1.74 [1.10-2.76] for cardiovascular events, and a HR of 7.55 [1.05-54.49] for cardiovascular death after multivariate adjustment. In contrast, TC as measured at the base

Strak M, et al. Long-term exposure to low level air pollution and mortality in eight European cohorts within the ELAPSE project: pooled analysis. **BMJ 2021**;374:n1904.

- \rightarrow ELAPSE MCS (various European cohorts)
- \rightarrow Long-term exposure to air pollution (PM_{2.5}, NO₂, black carbon) associated with increased mortality, even below current threshold values
- \rightarrow Increase in mortality risk due to cardiovascular and respiratory diseases
- \rightarrow O₃ (probably) no risk factor

Leiherer A, Ulmer H, Muendlein A, Säly C, Vonbank A, Fraunberger P, Föger B, Brandtner EM, Brozek W, Nagel G, Zitt E, Drexel H, Concin H. Value of total cholesterol readings earlier versus later in life to predict cardiovascular risk. *EBioMed.* 2021;67.

 \rightarrow Total cholesterol measured at 50 years of age on average vs. 15 years later is significantly more accurate to predict cardiovascular risk at an advanced age

Scientific publications examples (4)



CLINICAL EPIDEMIOLOGY www.jasn.org

The Association of Excess Body Weight with Risk of ESKD Is Mediated Through Insulin Resistance, Hypertension, and Hyperuricemia

Josef Fritz,¹ Wolfgang Brozek,² Hans Concin,² Gabriele Nagel,^{2,3} Julia Kerschbaum,^{4,5} Karl Lhotta,^{6,7} Hanno Ulmer,¹ and Emanuel Zitt^{2,6,7}

Due to the number of contributing authors, the affiliations are listed at the end of this article.

ABSTRACT

Background Insulin resistance, hypertension, hyperuricemia, and hypercholesterolemia are hypothesized to be important intermediates in the relationship between excess body weight and CKD risk. However, the magnitude of the total effect of excess body weight on ESKD mediated through these four pathways remains to be quantified.

Methods We applied a model for analysis of correlated mediators to population-based data from 100,269 Austrian individuals (mean age 64 of years). Association of body mass index (BMI) was coalesced with ESCO risk into direct association. Indirect associations were mediated through the triglyceride-glucose (TyG) index (as an indicator of insulin resistance), mean arterial pressure (MAP), uric acid (UA), and total cholesterol (TQ).

Results Mean follow-up was 2.3.1 years with 463 (0.5%) incident ESKD cases. An unhealthy metabolic profile (prevalence 2.4%) was associated with a markedy increased ESKD risk (multivariably adjusted hazard ratio (aHR), 3.57; 95% CI, 2.89 to 4.40), independent of BML A 5kg/m² higher BMI was associated with a 57% increased ESKD risk (aHR_{Cott} amoticitum, 1.57; 1.38 to 1.77). Of this association, 9% (7% to 1.40%) arose from all mediators jointly; 3% (22% to 4%) through TyG index; 3% (24% to 55%) through MAP; 30% (21% to 45%) through UA; and 2% (-1% to 4%) through TC. The remaining direct association was nonsignificant (MHR_{med} association, 1.14).

Conclusions TyG index, MAP, and UA, but not TC, mediate the association of BMI with ESKD in middleaged adults. Our findings highlight that in addition to weight reduction, the control of metabolic risk factors might be seemtial in mitigating the adverse effects of BMI on kidney function.

Osteoporosis International (2022) 33:1295-1307 https://doi.org/10.1007/s00198-022-06307-z

ORIGINAL ARTICLE

Check for

Gamma-glutamyl-transferase is associated with incident hip fractures in women and men \geq 50 years: a large population-based cohort study

W. Brozek¹ · H. Ulmer^{1,2} · A. Pompella³ · G. Nagel^{1,4} · A. Leiherer^{5,6,7} · O. Preyer¹ · H. Concin¹ · E. Zitt^{1,5,8}

Received: 30 June 2021 / Accepted: 8 January 2022 / Published online: 20 January 2022 © International Osteoporosis Foundation and National Osteoporosis Foundation 2022

Abstract

Summary The association of serum gamma-glutamyl-transferase (GGT) with hip fracture risk has not been examined in women and men \geq 50 years. We show that elevated GGT was associated with increased hip fracture risk, particularly in men. GGT could be a candidate serum marker of long-term hip fracture risk in the elderly.

Introduction We herein examined a possible relation between serum levels of GGT and hip fracture risk in women and men aged \geq 50 years, which has not been investigated before.

Methods In this population-based prospective cohort study, approximately 41,000 women and nearly 33,000 men≥50 years participating in a medical prevention program 1985–2005 in western Austria were followed up for the occurrence of osteoporotic hig fractures during 2003–2013. ICD-10 based discharge diagnoses for high fracture included S72.0, S72.1, and S72.2 available from all regional hospitals. GGT-related high fracture risk was ascertained at each participant's first and last examination during the prevention program. In a subset of 5445 participants, alcohol consumption could be included as a covariate. **Results** In men, high fracture risk ross esignificantly by 75% and 86% for every tenfold increase of GGT measured at the first and last examination, respectively, and in women, hig fracture risk rose by 22% from the last examination. Elevated GGT (≥ 36 Ul in women.≥ 56 Ul/ in men) at the first examination was associated with increased high fracture risk now and men (HR 1.14, 95% CI 1.02–1.28) and men (HR 1.61, 95% CI 1.33–1.95). Alcohol consumption had no significant influence on GGT-mediated high fracture risk in women and men. **2**50 years and suggest GGT as a candidate serum marker of long-term high fracture risk in an elderly population.

Keywords Alcohol · Gamma-glutamyl-transferase · Hip fracture · Osteoporosis · Vorarlberg Health Monitoring and

Fritz J, Brozek W, Concin H, Nagel G, Kerschbaum J, Lhotta K, Ulmer H, Zitt E. The association of excess body weight with risk of ESKD is mediated through insulin resistance, hypertension, and hyperuricemia. *J. Am. Soc. Nephrol.* **2022**;33:1377-89.

→ Hypertension, insulin resistance, and hyperuricemia but not elevated total cholesterol mediate the risk association of excess body weight and end-stage kidney disease

Brozek W, Ulmer H, Pompella A, Nagel G, Leiherer A, Preyer O, Concin H, Zitt E. Gammaglutamyl-transferase is associated with incident hip fractures in women and men \geq 50 years: a large population-based cohort study. *Osteoporos. Int.* 2022;33:1295-1307.

→ Gamma-GT as risk factor for hip fractures at age ≥ 50 independent from alcohol consumption, particularly in men



Summary

Strengths & limitations:

- Population-based cohort, but arguably selection for more health-conscious participants (healthy volunteer effect)
- Prospective and standardized data acquisition, long follow-up times
- Vorarlberg as "epidemiologic model region": relatively isolated because of high mountains (east and south) and borders with non-EU countries (Switzerland, Liechtenstein) with a distinct social insurance system
- Repeated examinations, in particular in the base data set (General Health Examination)
- No new participants because dataset is closed since July 1st, 2005 (as of then, documentation by the Austrian Federation of Social Insurances)

Desired cooperation with other databases and cohorts, concerning:

- Data of the General Health Examination for Vorarlberg since July 1st, 2005
- Information on medication
- Biosamples, biological material