

# DGEpi2020 Abstract Booklet

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# Program

# Final Accepted Contributions

## A-01 | Epidemiology of infectious diseases

**A-01-01****Auswirkung der Corona-Pandemie auf Fallzahlen und Patientencharakteristika in deutschen Notaufnahmen – erste Ergebnisse aus tagesaktuellen Datenübermittlungen an das Robert Koch-Institut (#48)**

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**Introduction**

Im Zusammenhang mit der SARS-CoV-2-Pandemie wird in Notaufnahmen aktuell ein Rückgang der Gesamtfallzahlen beobachtet. Es ist unklar, inwiefern sich das reduzierte Inanspruchnahmeverhalten auf die Zusammensetzung der Patientenkollektive auswirkt. Zur aktuellen Lage des Versorgungsgeschehens in deutschen Notaufnahmen gibt es bisher keine Statistik.

**Methods**

AKTIN ist eine IT-Infrastruktur, die datenschutzkonform und systemunabhängig medizinische Routinedaten aus Notaufnahmen abfragen kann. Im März 2020 wurde eine tagesaktuelle Datenübermittlung aus dem AKTIN-Notaufnahmeregister an das Robert Koch-Institut etabliert. Anhand tagesaktueller sowie retrospektiv abgefragter Daten erfolgt eine Betrachtung der zeitlichen Verläufe für 2020 und im Vergleich mit 2019. Neben den Fallzahlen pro epidemiologischer Woche (W) wird der Anteil der dringlichen Fälle (Stufe der Ersteinschätzung: rot, orange, gelb) analysiert.

**Results**

Nach ca. 10 Tagen Anlaufzeit erfolgte eine stabile tägliche Datenübermittlung aus 9 deutschlandweit verteilten Notaufnahmen aller Versorgungstufen. Die Fallzahlen lagen bis W 09/2020 bei ca. 4.900/Woche, fielen ab W 12 steil ab und erreichten in W 14/2020 ein vorläufiges Minimum mit 2.871 Fällen (Datenstand 19.04.2020). Im Vergleich zur W 14/2019 ist das ein Minus von 43,7 %. In Notaufnahmen mit konstanter Ersteinschätzungsrate (n = 8) war der Anteil dringlicher Fälle 2020 höher (53,9 % vs. 45,3 %), deren absolute Häufigkeit aber niedriger (1160 vs. 1961 Fälle).

**Conclusions/Outlook**

Die AKTIN-Infrastruktur ermöglicht einen tagesaktuellen Einblick in die klinische Notfallversorgung. Seit Mitte März 2020 werden Notaufnahmen deutlich seltener aufgesucht, dabei ändern sich auch die Patientencharakteristika. Bei der Interpretation der Daten sind die dynamisch sich verändernden Rahmenbedingungen zu berücksichtigen, z. B. dass ein Teil der Versorgung zurzeit in neu aufgebauten Strukturen („Fieber-Ambulanzen“) ohne Anbindung an das Notaufnahmeregister erfolgt.

## A-01-02

## Long-term Association of Periodontitis with Decreased Kidney Function (#121)

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### Introduction

Previous studies have yielded inconclusive findings regarding the relationship between periodontitis and kidney function. We sought to investigate whether periodontitis is associated with subsequent decreases in kidney function (reductions in estimated glomerular filtration rate [eGFR] and increased urinary albumin-creatinine ratio [UACR]) in the general population.

### Methods

Population-based cohort study. Setting & Participants: We used baseline and 11-year follow-up data from 2,297 and 1,512 adult participants, respectively, in the Study of Health in Pomerania (SHIP). Age range was limited to 20 to 59 years to avoid the potential influence of tooth loss. Periodontal status defined by periodontal pocket probing depth (PPD) and clinical attachment level. Mean levels and the percentage of sites  $\geq 3$  mm was determined for either all sites (PPD) or interproximal sites (clinical attachment level). All PPDs  $\geq 4$  mm were summed to calculate the total PPD. GFR estimated from serum creatinine and serum cystatin C (eGFRcr-cys). Moderately increased albuminuria defined as UACR  $> 30$  mg/g. Adjusted linear and logistic mixed regression models.

### Results

At baseline and follow-up, average eGFRcr-cys was 118.3 and 105.0 mL/min/ 1.73 m<sup>2</sup>, respectively. Using mixed models, no consistently significant associations between periodontitis variables and eGFRcr-cys were detected. Long-term changes in UACR were inconsistently associated with periodontitis measures. After imputation of missing data, associations were either attenuated or no longer detectable.

### Conclusions/Outlook

We found no consistent evidence for an association between periodontitis and decreased kidney function. In contrast to previous studies, these results do not support the hypothesis that periodontitis is an important risk factor for chronic kidney disease.

**A-01-03****Official recommendations and regulations in the time of COVID-19 from the perspective of social media users: a qualitative study (#126)**

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**Introduction**

To slow down the spread of SARS-CoV-2 and to limit the pressure on the health care systems caused by cases of COVID-19, different regulations and recommendations have been implemented by authorities, comprising amongst others the closure of all entertainment venues and social distancing. These measures have received mixed reactions, particularly from young individuals, with many not following available advice. Drawing on the information in social media discussion forums, the present study explores the reasons why people ignore the orders and recommendations of the authorities and why the authorities are unable to produce a shared sense of inclusion concerning protective measures against the coronavirus outbreak.

**Methods**

Three open-access social media forums (Reddit, Twitter, and YouTube comments) were systematically searched with respect to coronavirus/COVID-19-related beliefs, attitudes, and behaviours of individuals. The data was retrieved in the first three weeks of March 2020. Qualitative document analysis and qualitative content analysis were used as the methodical approach. The data was reviewed by all authors and jointly interpreted to minimise inconsistencies.

**Results**

In the analysis, 22 threads were used from the aforementioned websites. Six main themes were identified: information pollution on social media, the need to know the unusual threat that spreads rapidly, the impacts of the social environment, the role of government's representatives and politicians, aids without concrete economic steps to satisfy them, and self-criticism by parents related to the behaviours and attitudes of their children.

**Conclusions/Outlook**

In uncertain crises, transparency in the presentation of information and government policies emerge as influential determinants in creating social susceptibility and solidarity. The results further reveal the potential advantages and opportunities of using social media data in scientific investigations.

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**A-01-04****Availability of symptom diaries for respiratory infections in early childhood –a scoping review of birth cohort studies (#167)**

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**Introduction**

Respiratory infections are the most frequent health problem in childhood leading to morbidity and socioeconomic burden. Study of symptom evolution during respiratory infections in home based settings requires dedicated prospective cohort studies using diaries. We aimed to conduct a scoping review of birth cohort studies collecting symptom diary information for respiratory infections starting at birth.

**Methods**

A scoping review was conducted using the PRISMA Extension. We searched electronic databases such as Pubmed, Embase, Web of science and CINAHL (last search between January 2019 - June 2019) resulting in 5799 title and abstracts eligible to further screening. We examined 657 articles as full text and finally included 53 articles based on reference search according to predefined inclusion criteria.

**Results**

We identified 21 birth cohort studies that collect(ed) data on respiratory symptoms using a symptom diary starting at birth. Numbers of participants ranged from 129 to 8677. Six studies collected symptom diary information only for the first year of life or less, nine for the first two years or less and six between three and seven years. Most of the studies collected also biomaterials, which can be used to detect the involved pathogens.

**Conclusions/Outlook**

There are numerous birth cohort studies worldwide, but only few that record a detailed history of respiratory infections by symptom diary, which can be used for detailed analysis of the burden of infections in early childhood.

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**A-01-05****Changes In Early Life Exposure To Antibiotics: A Comparison Of Birth Cohorts Based On German Claims Data (#177)**

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**Introduction**

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To avoid inappropriate antibiotic prescribing, antimicrobial stewardship programs have been implemented. However, detailed information on potential changes is lacking. This study aimed to describe the time span between birth and first antibiotic prescription as well as the type of the first prescribed antibiotic agent in different birth cohorts in Germany (2004–2015).

### Methods

Using the German Pharmacoepidemiological Research Database (GePaRD) we identified children born between 2004 and 2015. Each newborn was followed until 2016 or end of enrolment in the database. Prescriptions of systemic antibiotics were identified based on outpatient drug dispensations. We estimated Kaplan–Meier curves to determine time to first antibiotic prescription in life and assessed the type of the first prescribed antibiotic agent.

### Results

Among ~1.5 million newborns included overall, 55% received an antibiotic prescription before the age of two years. Children in more recent birth cohorts received the first antibiotic prescription later than those in less recent birth cohorts: The median age at first antibiotic prescription was 18 months for children born in 2004 and 24 months for those born in 2014. Across all birth cohorts, amoxicillin and the broad-spectrum antibiotic cefaclor were the most frequently prescribed first-in-life antibiotics, and their proportions rose between 2004 and 2014 (amoxicillin: from 31% to 37%; cefaclor: from 20% to 29%). An increasing proportion was also observed for the broad-spectrum antibiotic cefuroxime (2% in 2004 and 6% in 2014), whereas it decreased for the narrow-spectrum antibiotics erythromycin (13% in 2004 and 6% in 2014) and phenoxymethylpenicillin (7% in 2004 and 4% in 2014).

### Conclusions/Outlook

Our study showed that the age at first antibiotic prescription has increased over the years, but the proportion of broad-spectrum antibiotics prescribed as first-in-life antibiotic agents continues to be at a high and further increasing level.

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## A-01-06

### Syndromic surveillance in the time of COVID-19 epidemics – preliminary results of the online tool CovidSurv (#187)

**PhD/MD student Saskia Glasauer<sup>1</sup>**, PhD/MD student Bianca Klee<sup>1</sup>, Dr. Stefan Moritz<sup>2</sup>, Prof. Rafael Mikolajczyk<sup>1</sup>

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### Introduction

Previous research demonstrated that syndromic surveillance can help to assess activity of respiratory infections in the general population. Along with explicit testing of symptomatic patients, syndromic surveillance can provide insights into local dynamics of epidemics and, thus, support decision making if control measures have to be changed. CovidSurv is a tool to collect real-time data on the presence of respiratory infection-related symptoms in the local population and allows to describe symptom evolution among those who report symptoms. We aimed to describe the daily occurrence of symptoms reported through CovidSurv.

### Methods

CovidSurv is a prospective web-based symptom diary available to the general population since April 11, 2020. Start of CovidSurv was announced through local media and all interested were invited to participation. Participants are

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asked daily if they have symptoms and, if yes, which symptoms. Reminders are sent weekly and those, who did not fill out the diary in the last seven days, are asked to complete the information. Additional information is collected on medication intake, doctor visits and corona-test results, if applicable.

### Results

Until April 28<sup>th</sup>, 898 participants registered for CovidSurv, among which 845 (94.1%) were from Saxony-Anhalt. 201 participants (23.8%) reported symptoms on any of the recorded days. Figure 1 shows the proportion reporting any symptoms by day. Running or stuffy nose, sore throat and increased need to sleep were most often reported. Out of 17 participants tested for SARS-CoV-2, 11 were negative and 6 were still pending.

### Conclusions/Outlook

CovidSurv offers the possibility for the timely collection of data on respiratory symptoms. However, the large proportion of participants reporting symptoms might not only be attributed to respiratory infections, but also to the start of the allergy season in spring. In addition, people having symptoms are more likely to be interested in such a study, and a longer run-in phase is necessary for unbiased results.

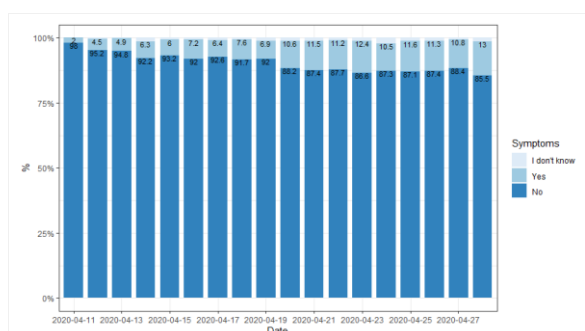


Figure 1. Proportion of participants reporting any symptoms in CovidSurv, by day.

## A-02 | Pediatric epidemiology

**A-02-01****Association between social-emotional developmental risks and linguistic, cognitive, and motor developmental risks in 3 year olds in day care centers in Mecklenburg-Western Pomerania (#25)**

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**Introduction**

Social-emotional competencies are relevant for a successful school start and the school career. Hence, an early promotion is needed. Since 2011, day care centers in socially deprived regions in MWP qualify for additional funds to promote children with developmental risks in the domains fine motor, gross motor, language and cognition, and social development. This is based on an annual application of the “Dortmund Developmental Screening for Preschools (DESK 3-6 R)”. Research question: To which degree are social-emotional developmental risks predicted by risks in the remaining DESK domains?

**Methods**

Multilevel models were calculated with cross-sectional data stratified by age and sex ( $n = 8,030$ ). Predictors: other DESK- domains (fine motor, gross motor, language and cognition). Coding of dichotomized DESK stanine scores: 1 = reasonable grounds to suspect a developmental risk/inconclusive screening result, i.e. stanine scores 1 and 2; 0 = no reason to suspect a developmental risk, i.e. stanine scores 3-9.

**Results**

Risks in the DESK domain language/cognition are the main risk factor for social-emotional risks (boys:  $B = 0.44$ ,  $SE B = 0.02$ ;  $95\% CI = 0.4 - 0.49$ ; girls:  $B = 0.44$ ,  $SE B = 0.02$ ;  $95\% CI = 0.4 - 0.48$ ). Second highest risk factor for boys are fine motor risks ( $B = 0.12$ ,  $SE B = 0.02$ ;  $95\% CI = 0.07 - 0.17$ ). Second highest risk factor for girls are gross motor risks ( $B = 0.12$ ,  $SE B = 0.03$ ;  $95\% CI = 0.06 - 0.18$ ).

**Conclusions/Outlook**

In 3-year-olds, the domains fine motor, gross motor, language and cognition, and social development are not independent of each other. Therefore, intervention measures to prevent developmental risks should be based on a multidimensional perspective. Yet, most of the interventions focusses on one domain. Therefore, the effectiveness of a multidimensional promotion of children's competencies in daily routines will be evaluated in our project “GIF-PLUS”.

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**A-02-02****Assessing the prevalence of malocclusions in Germany – rationale and design of an orthodontic module within the Sixth German Oral Health Study (#81)**

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**Introduction**

In 1989 the First German Oral Health Study (DMS I) gathered oral-epidemiological data on dental and facial irregularities among children in West Germany. That was the first and last time these data have been collected on a national level. Currently, preparations for the Sixth German Oral Health Study (DMS 6) are underway which will include an orthodontic module. It will provide an updated database to estimate the prevalence of orthodontic treatment needs taking into account the various demographical changes that have taken place in Germany in the last three decades.

**Methods**

For the orthodontic module, two waves have been planned: A baseline examination in 2021 and a follow-up examination in 2030. The primary aim of the baseline examination is to assess the prevalence of malocclusion in 8- to 9-year olds in Germany. Necessary data will be collected by means of an intraoral scan, clinical investigations and an interview. Based on these data we will calculate orthodontic indices: the German KIG system (Orthodontic Indication Groups) as our primary index; and in addition the Index of Complexity Outcome and Need (ICON) and the Index of Orthodontic Treatment Need (IOTN). A disproportionately stratified random sample will be drawn from local residents' registration offices (one per federal state of Germany). Beside orthodontic data, the survey will further gather information on additional clinical oral outcomes as well as on psychosocial characteristics. Thus, we will be able to analyse associations of interest using baseline data and potential risk factors using follow-up data. The baseline examination is funded by the German Orthodontic Society (DGKFO).

**Results**

Data collection is planned for the first quarter of 2021, results will be available at the end of 2021.

**Conclusions/Outlook**

Our study will help to generate the missing evidence on the current spread of disease and supply situation in orthodontics.

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**A-02-03****Distribution and determinants of glycosylated hemoglobin (HbA1c) in adolescents in Germany - Results from KiGGS2 (#134)**

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**Introduction**

The distribution and role of HbA1c in youth is largely unclear. The aim of this study was to investigate the HbA1c distribution and sociodemographic, anthropometric and lifestyle factors as potential determinants of HbA1c among a representative sample of adolescents in Germany.

**Methods**

The cross-sectional part of the second follow-up to the German Health Interview and Examination Survey for Children and Adolescents (KiGGS Wave 2, 2014-17) is a nationwide representative study with 15.023 participants aged 0-17 years. For this evaluation, data from a randomly selected subgroup with physical examinations and laboratory analyses, who were aged 14-17 years and had no reported diabetes diagnosis or antidiabetic medication were included (n=857). Percentile-based HbA1c values were calculated to examine HbA1c distribution. Multivariable linear regression analyses were performed to investigate factors (i.e. age, sex, parental socioeconomic status, body-mass-index, birth weight, smoking, alcohol consumption, healthy food diversity index, sport activity, oral contraceptive use) associated with HbA1c.

**Results**

The mean level of HbA1c was 5.2 % (minimum: 3.9%, P10: 4.8%, P50: 5.1%, P90: 5.5%, maximum: 6.7%). Overall, 2.7% of adolescents had an HbA1c value in the prediabetic range (5.7-6.4%) and one person had an unknown diabetes ( $\geq 6.5\%$ ) according to ADA criteria. No significant difference in the level of HbA1c was observed between girls and boys. There were an inverse association of age and a direct association of body-mass-index with HbA1c in sex- and age-adjusted analysis, which also remained significant after mutual controlling for all considered factors. The further investigated factors showed no significant association with HbA1c.

**Conclusions/Outlook**

Among adolescents without diagnosed diabetes in Germany, HbA1c values ranged from 3.9% to 6.7%. The underlying factors for the observed association of age and BMI with HbA1c deserve further investigation.

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**A-02-04****Clinical characteristics of first Respiratory Syncytial Virus infection compared with first Human Rhinovirus infection reported through parent symptom diaries – findings from the birth cohort study****LoewenKIDS (#139)**

**PhD/MD student Bianca Klee**<sup>1</sup>, Prof. Thomas Pietschmann<sup>2</sup>, Dr. Sibylle Haid<sup>2</sup>, Prof. Carlos Guzman<sup>3</sup>, Prof. Johannes Hübner<sup>4</sup>, Dr. Peggy Riese<sup>3</sup>, Dr. Stephanie Tittel<sup>3</sup>, Dr. Cornelia Gottschick<sup>1</sup>, PhD/MD student Susan Langer<sup>1</sup>, Prof. Rafael Mikolajczyk<sup>1</sup>

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**Introduction**

The severity of the first respiratory infection with a specific pathogen in a child's untrained immune system might play an important role in the development of further respiratory diseases. Respiratory syncytial virus (RSV) and human rhinovirus (HRV) are two of the most common viral pathogens causing respiratory infections in children. We investigated and compared the clinical characteristics of children's first RSV and HRV infections within the community.

**Methods**

251 symptomatic nasal swabs, taken between October and April 2015-2018, from 133 children of the LoewenKIDS study were analysed. Swabs were screened for 14 viruses using Multiplex PCR. Screening started with the nasal swab taken during the first infection ever of each child and continued with swabs taken during subsequent infections until each child was tested RSV positive or remained RSV negative. Clinical characteristics were assessed using daily symptom diaries provided by parents. Severity of illness was expressed by a severity score (SS) based on the described symptoms.

**Results**

29 and 70 of 133 infants tested positive for first RSV and HRV infection, respectively. The mean duration of an RSV episode was 11 days (95%CI: 9-13 days) and was much longer compared to HRV infection (Mean: 7 days 95%CI: 6-8 days;  $p<0.05$ ). Most common symptoms during RSV episodes were runny nose (93%) and cough with sputum (75%), whereby HRV episodes were dominated by runny nose (97%) and increased attachment to parents (69%). The severity of illness was higher among the first RSV infection (Mean SS: 5.4 95%CI: 4.2-6.6) compared to first HRV infections (Mean SS: 4.1 95%CI: 3.7-4.6;  $p<0.05$ ), which is also reflected by higher medical attendance rates of children infected with RSV (55%), compared to children infected with HRV (16%).

**Conclusions/Outlook**

The first RSV infection of an infant reported by parents appears more severe compared to the first HRV infection and might modify the developing immune system depending on the severity or host response to the virus.

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**A-02-05****Prevalence Of Chronic Drug Use In Pediatrics: Comprehensive Overview Based On German Claims Data (#145)**

**PhD/MD student Oliver Scholle<sup>1</sup>**, Prof. Antje Neubert<sup>2</sup>, Priv.-Doz. Oliver Riedel<sup>1</sup>, PhD/MD student Irmgard Toni<sup>2</sup>, Prof. Ulrike Haug<sup>1,3</sup>

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**Introduction**

Existing drug utilization studies in pediatrics focused on any drug use (i.e., at least one prescription of a certain drug) while recurrent drug use may even be more relevant for monitoring. This study aimed to provide a comprehensive overview of frequencies and types of recurrent drug prescriptions in children and adolescents in Germany in 2016.

**Methods**

We used the German Pharmacoepidemiological Research Database (GePaRD) to identify children and adolescents aged 0–17 years with continuous insurance coverage in 2016 and assessed the prevalence of recurrent prescriptions ( $\geq 3$  prescriptions of the same drug/therapeutic subgroup in 2016) based on ATC codes.

**Results**

Among 2.5 million children and adolescents included overall, the prevalence of recurrent drug prescriptions was 102 per 1,000 in girls and 87 per 1,000 in boys. In 2–12-year-old girls, systemic antibiotics (ATC subgroup J01) had the highest prevalence of recurrent use (2–5 years: 66 per 1,000; 6–12 years: 31 per 1,000). In girls aged 13–17 years, sex hormones (ATC subgroup G03) had the highest prevalence of recurrent use (146 per 1,000). Furthermore, unlike other age and sex groups, this subgroup showed a prevalence above 10 per 1,000 for levothyroxine. In 2–5-year-old boys, systemic antibiotics had the highest prevalence of recurrent use (73 per 1,000). In older boys (6–17 years), psychoanaleptics (ATC subgroup N06) showed a higher prevalence than antibiotics. Methylphenidate was the most frequently prescribed recurrent drug among boys aged six years and older (6–12 years: 23 per 1,000; 13–17 years: 26 per 1,000).

**Conclusions/Outlook**

This description of recurrent drug prescriptions provides important insights on chronic drug exposure in children and adolescents and highlights marked differences between age and sex groups. The high prevalence of three or more antibiotic prescriptions in preschoolers and of levothyroxine in girls aged 13–17 years are striking and require further consideration.

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**A-02-06****Frequency of all-cause pneumonia, otitis media and antibiotics prescription in children after the introduction of pneumococcal conjugate vaccines in Germany: A population based study on outpatient claims data (#178)****Dr. Katharina Schley**<sup>1</sup>, Dr. Maren Laurenz<sup>2</sup>, Prof. Christof von Eiff<sup>2</sup><sup>1</sup> Pfizer Deutschland GmbH, Berlin, Germany; <sup>2</sup> Pfizer Pharma GmbH, Berlin, Germany**Introduction**

*Streptococcus pneumoniae* (*S. pneumoniae* - Pneumococcus) is one of the most frequent pathogens of invasive and non-invasive infections worldwide. Especially infants and elderly are at an increased risk of *S. pneumoniae* infections. Since the introduction of a pneumococcal conjugate vaccine (PCV) in 2000 protecting against seven serotypes and two higher valent PCVs protecting against 10 and 13 serotypes, respectively, in 2009, the burden of disease from vaccine preventable pneumococcal diseases decreased. While the population effect on invasive infections is principally well analyzed, the impact of PCVs on non-invasive diseases has not been very extensively investigated. In this study, we aim to evaluate the relationship between the introduction of a PCV and the burden of disease of otitis media (OM) and all-cause pneumonia.

**Methods**

We analyze the trend of all-cause pneumonia and OM and associated antibiotic prescriptions in children in Germany between 2000 and 2018 by means of an interrupted time series analysis. Monthly incidence rates of all-cause pneumonia and OM are based on data from the IMS® Disease Analyzer. For the time series analysis, we define three time periods: pre-PCV7 (1 January 2000 – 30 June 2008), post-PCV7 (1 July 2008 – 30 November 2010) and post-PCV10/13 (1 December 2010 – 31 December 2018).

**Results**

The project is currently ongoing. Preliminary results hint at a negative relationship between the introduction of the higher-valent PCVs (PCV10/13) and the incidence rate of OM in children under 2 years hinting at a decline in the monthly incidence rate after the introduction of the vaccines.

**Conclusions/Outlook**

Preliminary results show that the introduction of PCV10/13 is likely linked with a decline in incidence rates in OM in children under 2 years. Understanding how disease patterns of non-invasive infections caused among others by pneumococcal bacteria may change by the introduction of vaccines is crucial for the public health, especially considering antimicrobial resistance.

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**A-02-07****Barriers and Facilitators in the Implementation of the Kindergarten-based Health Promotion Programme "Join The Healthy Boat" (#205)**

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**Introduction**

Even in young children, inactivity and unhealthy diet play a substantial role in an increased prevalence of overweight and obesity. "Join the Healthy Boat" is a kindergarten-based health promotion programme focussing on increased physical activity, avoiding sugar-sweetened beverages, and encouraging a higher intake of fruits and vegetables. Due to insufficient evidence on factors that support or hinder the implementation process of such interventions, stakeholder involvement received increased attention in recent years. The aim of this study was to identify key factors, barriers and facilitators that affect the implementation process of "Join the Healthy Boat".

**Methods**

"Join the Healthy Boat" started in 2012 as a state policy kindergarten programme and is to date implemented in 1,188 kindergartens, disseminated using a train-the-trainer concept. In February 2020, a Theory of Change (ToC) Workshop with 9 kindergarten teachers and 2 trainers was conducted as part of a continuous training in the district of Ulm. The ToC concept is a qualitative, theory-based approach to identify conditions for successful implementation in a backward mapping process. Identified key factors were summarised in a so-called ToC-map.

**Results**

The participants stated the following key implementation processes and corresponding numbers of barriers and facilitators: Ensuring resources (material, n=12; temporal, n=6; personnel, n=5; infrastructural, n=9), awareness raising/public relations, n=5; adoption and implementation, n=8; and cooperation with parents, n=17. For example, unavailable play equipment and peer support were mentioned as a barrier and facilitator, respectively.

**Conclusions/Outlook**

By engaging stakeholders in the implementation evaluation of "Join the Healthy Boat", new insights of challenges by implementing the programme in daily praxis could be gained. In order to verify the results, further workshops in other districts and follow-ups using quantitative methods are planned.

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**A-02-08****Social participation of children with special health care needs and its association with health-related quality of life: Results of the PART-CHILD study (#246)**

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**Introduction**

Children with special health care needs (CSHCN) are at risk of reduced levels of social participation (SP) and health related quality of life (HRQOL). Hitherto only a limited number of studies focusing on homogenous groups of CSHCN (e.g. cerebral palsy) have investigated correlates of SP and the association between SP and HRQOL. The objectives of this study therefore were (1) to identify correlates of SP and (2) to investigate the association between SP and HRQOL in a diverse sample of CSHCN (e.g., muscular disorders, ADHD).

**Methods**

The study is based on baseline data of the cluster randomized PART-CHILD trial. Parents of children aged 3 years and older were recruited in 15 German Social Pediatric Centers. SP and HRQOL were assessed with the parent-report versions of CASP (range: 25 – 100) and DISABKIDS (range: 0 – 40), respectively. Furthermore, the following potential correlates were investigated: age and gender of children, socioeconomic status, migration background and type of condition. Linear mixed models were used to assess multivariable associations.

**Results**

In total, 294 children were included in the analyses. They showed a median CASP score of 71 (IQR: 53 – 86). Children with mental ( $\beta=-9$  [-15; -4]) and combined physical and mental conditions ( $\beta=-26$  [-31; -21]; Likelihood ratio  $p<0,001$ ) showed lower levels of SP compared to children with physical conditions. None of the other covariates were associated with SP. SP was positively associated with HRQOL ( $\beta=0,16$  [0,1; 0,2]  $p<0,001$ ).

**Conclusions/Outlook**

While a substantial share of CSHCN showed moderate to high levels of SP, we observed large differences between children with different types of health conditions. Children with combined physical and mental conditions showed particularly low levels of SP. In line with the literature, SP was positively associated with HRQOL, but only weakly. Future studies should characterize CSHCN particularly at risk of limited SP and develop effective programs to narrow the substantial participation gap.

## A-03 | Epidemiology of work environment

**A-03-01****The Relationship of Workplace Bullying with Health Outcomes, the Intention to Leave the Profession and Medical Errors: A Cross-sectional Study among Medical Assistants in Germany (#2)**

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**Introduction**

Research has shown that workplace bullying (WB) is associated with adverse health outcomes, career choices (i.e. intention to leave the profession [ITL]) and with poorer patient care (e.g. medical errors), though evidence for the latter remains inconsistent. We examined those associations for the first time among medical assistants (MAs). MAs represent the largest professional group in outpatient care in Germany carrying out various tasks relevant to patient care.

**Methods**

We surveyed 994 MAs (09/2016-04/2017) who were recruited through various pathways. A description of WB was provided followed by an item inquiring whether the respondent felt (s)he had been exposed. We also inquired after the perpetrator (i.e. supervisor, colleagues, patients). The dichotomized health outcomes comprised poor self-rated health ([very] poor health vs better), depressive symptoms (Patient Health Questionnaire-2) and anxiety (Generalized Anxiety Disorder-2). ITL was captured by the frequency of thoughts about leaving the profession (a few times per year or more often vs never). We measured self-reported concerns about having made a major medical error in the last three months (yes/no). Associations were estimated by multivariable logistic regression.

**Results**

In total, 26% of the MAs reported exposure to WB, mostly due to supervisors (62%), followed by colleagues (47%) and patients (35%). WB was associated with poorer health (all odds ratios [OR]  $\geq 3.2$ ), increased odds of ITL (OR=2.0, 95% confidence interval [CI]=1.4-2.9) and elevated odds of major medical errors (OR=2.1, 95% CI=1.1-4.0). Associations were strongest and most consistent when supervisors were perpetrators.

**Conclusions/Outlook**

If corroborated by prospective evidence, our findings suggest that prevention of workplace bullying may be conducive to better health, improved career prospects and better patient care among medical assistants. Addressing bullying when supervisors are the perpetrators may be particularly promising.

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**A-03-02****Schweißen und Lungenkrebs - Kumulative Gefahrstoffexpositionen an Schweißarbeitsplätzen und dessen Auswirkungen auf die Gesundheit der Beschäftigten (#38)**

**Benjamin Kendzia**<sup>1</sup>, Beate Pesch<sup>1</sup>, Hermann Pohlabein<sup>2</sup>, Wolfgang Ahrens<sup>2</sup>, Heinz Erich Wichmann<sup>3</sup>, Dirk Taeger<sup>1</sup>, Wolfgang Zschiesche<sup>1</sup>, Thomas Behrens<sup>1</sup>, Karl-Heinz Jöckel<sup>4</sup>, Thomas Brüning<sup>1</sup>

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**Introduction**

Die Internationale Agentur für Krebsforschung (IARC) hat Schweißrauch, hexavalentes Chrom (Cr(VI)) und bestimmte Verbindungen von Nickel (Ni) als krebserzeugend eingestuft. Bisher wurden diese Expositionen bei Schweißern nicht gemeinsam anhand von Messwerten quantifiziert und untersucht. Wir ermittelten Lungenkrebsrisiken von Schweißern in Abhängigkeit von der kumulativen Exposition gegenüber Schweißrauch, Cr(VI) und Ni.

**Methods**

Der Datensatz umfasste 3418 Lungenkrebsfälle und 3488 Kontrollen aus zwei deutschen Fall-Kontroll-Studien. Wir entwickelten eine *welding exposure matrix* (WEM) basierend auf Messwerten aus der MEGA-Datenbank, die mit den Berufsbiographien verknüpft wurde, um die lebenslange Belastung zu berechnen. Odds Ratios (OR) und 95% Konfidenzintervalle (KI) wurden mittels logistischer Regression geschätzt, adjustiert für Alter, Rauchverhalten und einer Beschäftigung in anderen Berufen mit bekanntem Lungenkrebsrisiko. Das Risiko eines Gefahrstoffs wurde zusätzlich nach den beiden anderen Gefahrstoffen adjustiert.

**Results**

Insgesamt waren 800 Lungenkrebsfälle und 645 Kontrollen gelegentlich (OR 1,19; KI 1,00-1,42) oder regelmäßig (OR 1,37; KI 1,14-1,65) exponiert. Gegenüber Männern, die nie geschweißt hatten, war das Lungenkrebsrisiko bei kumulativer Exposition oberhalb des Medians der Kontrollen erhöht: Schweißrauch  $\geq 1,8$  mg/m<sup>3</sup>-Jahre: OR 1,55; KI 1,17-2,05; Cr(VI)  $\geq 1,4$  µg/m<sup>3</sup>-Jahre: OR 1,85; KI 1,35-2,54; Ni  $\geq 9$  µg/m<sup>3</sup>-Jahre: OR 1,60; KI 1,21-2,12. Zu nicht-exponierten Rauchern waren die Risiken bei leichten Rauchern (1-10 Packungsjahre (Pj)); OR 2,79; KI 1,27-6,13) durch Schweißrauchexpositionen oberhalb des Medians relativ höher als bei starken Rauchern ( $\geq 35$  Pj; OR 1,30; KI 0,77-2,19).

**Conclusions/Outlook**

Kumulative Expositionen gegenüber Schweißrauch, Cr(VI) und Ni sind mit einem erhöhten Lungenkrebsrisiko verbunden. Schweißarbeiten erhöht das Risiko unter leichten Rauchern vergleichsweise stärker als bei starken Rauchern. Die Ergebnisse unterstützen die Einstufung der IARC.

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**A-03-03****Manual lifting of heavy loads in Germany and its association to knee pain and pain in the hip – results of BIBB/BAuA Employment Survey 2018 (#61)**

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**Introduction**

Manual lifting of heavy loads (HL) is a common work exposure. It is one of many risk factors for muscular disorders such as pain in the hip and knee pain. The aim of the work is to describe the frequency of HL as well as the association between HL and the prevalence of pain in the hip and knee pain in the working population.

**Methods**

The data is taken from BIBB/BAuA Employment Survey 2018 and is restricted to full-time workers (>35 h/week) under the age of 67. It is analysed descriptively. The association between HL and the prevalence of pain in the hip and knee pain from the last 12 months is calculated using a log-linear Poisson-regression resulting in prevalence ratios (PR). It uses robust estimates, adjusted for sex, age, working hours and working conditions.

Based on regression analyses adjusted estimates for the prevalence of musculoskeletal complaints were calculated for four categories of HL (frequent, sometimes, rare, never).

**Results**

The sample consists of n = 14.414 subjects (61,6 % men, 38,4 % women, median age 49 years). Of these 52,8 % state, that they are exposed to HL. In the fully-adjusted regression model the prevalence of pain in the hip (PR = 1,82 KI: [1,57; 2,11]) and knee pain (PR = 1,58 KI: [1,41; 1,77]) was increasingly reported by subjects who stated “frequent” lifting of heavy loads during working hours compared to subjects who reported no heavy lifting. Adjusted prevalences for pain in the hip were 12,7 % for subjects who chose the category of “never” HL and increased up to 23,2 % for subjects who chose the category “frequent” HL. Also, the estimated prevalences for knee pain increased with growing frequency of HL (“never” HL: 20,1 %, “frequent” HL: 31,8 %).

**Conclusions/Outlook**

Manual lifting of heavy loads is still a common work exposure in Germany’s working population. Self-indicated reports of HL demonstrate an association with prevalences of pain in the hip and knee pain. Prevention policies for avoiding HL during working hours continue to be important.

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**A-03-04****Neurodegenerative disease mortality among german aircrew – retrospective cohort study (#73)**

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**Introduction**

Aircrew work under challenging conditions including cosmic radiation exposure, shift work, changing working hours, and numerous other potential occupational hazards. In particular, questions related to the exposure to engine fumes containing hazardous chemicals have been raised, with chronic neurological effects as outcome of concern. So far, there are very few epidemiological reports on this topic, with one cohort analysis indicating an elevated number of ALS deaths among US flight attendants (Pinkerton et al. 2016).

**Methods**

We used our retrospective cohort study of German aircrew to investigate mortality from neurodegenerative diseases (ALS, Parkinson's disease, dementia, and Alzheimer's disease). The cohort comprises some 27,000 persons (6000 cockpit, 21,000 cabin crew) spanning the follow-up period 1960-2014, with a total of 492,000 person years (Dreger et al. 2020). We calculated standardized mortality ratios (SMR) and 95% confidence intervals using a correction factor for missing causes of death and also investigated whether incomplete cause-specific registration strongly affected results.

**Results**

Overall 1,592 deaths were observed, of which 13 were due to neurodegenerative diseases. Among male cockpit crew and female cabin crew, the SMR for all neurodegenerative diseases combined was 0.30 (n=5, 95%CI 0.08-0.80) and 0.55 (n=3, 95%CI 0.08-1.86), respectively. For male cabin crew we found an SMR of 1.40 (n=5, 0.26-3.79). Cases were somewhat concentrated in groups with higher duration of employment, but small numbers had to be taken into account. Adding potential further cases from a manual review of death certificates did not substantially alter results.

**Conclusions/Outlook**

Our analysis has limitations as mortality from some neurodegenerative diseases may not be well represented on death certificates, but this is also a problem for the comparator. Overall, we saw very little indication of increased neurodegenerative mortality in the occupational group, but numbers were very small.

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**A-03-05****Dynamics of sleep in shift workers with different shift length (#80)**

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**Introduction**

In the EU about 20% of the workforce engages in shift work. Especially working night shifts disrupts the circadian rhythm, leading to shorter sleep and sleep problems. Extended working hours (12h) might also affect sleep characteristics and have been linked to doubled risks of accidents compared to 8h-shifts. Here, we compare the impact of fast-forward rotating shift systems with 8h-shifts as recommended by the German Working Hours Act and 12h-shifts on sleep duration (SD), mid-sleeps (MS), and sleep quality (SQ) analyzed with actimetry-derived measures.

**Methods**

In 2018, 43 shift workers with 8h-shifts and 47 with 12h-shifts, each including night work, were recruited from a German manufacturing company. Wrist-activity was monitored over 28 days revealing sleep on- and offsets as well as Locomotor Inactivity During Sleep (LIDS) as proxy for SQ. Age-adjusted SD and MS were evaluated with mixed models. Shift workers were chronotyped by the MS between two free days following an evening respectively night shift. Circadian misalignment was quantified by social jetlag (SJL) describing the difference between MS on work and free days.

**Results**

Mean daily sleep duration over 28 days was similar between groups. Members of the 12h-shifts slept less than 8h-shift members on work days (300 vs. 340 min,  $p < 0.001$ ). Sleep debt on work days was compensated with longer sleep on free days (485 vs. 437 min,  $p = 0.002$ ). Additionally, 12h-shift workers suffered from stronger SJL (223 vs. 108 min,  $p < 0.001$ ). The mean age-adjusted chronotype distribution was 4:11 (95% CI 4:01–4:22) and did not differ between groups. SQ was not affected by shift system but by other factors, such as night and day sleep.

**Conclusions/Outlook**

This study supports former findings of acute but not chronic sleep differences among shift workers of different rosters. Partial sleep deprivation is a common consequence of rotating shift work whereas especially workers with long working hours (12h-shifts) might be affected.

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## A-03-06

## Are fine-motor skills in welders impaired due to manganese exposure? Results from the WELDOX II study (#97)

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### Introduction

Manganese (Mn) is a component of welding fumes and can have neurotoxic effects. The WELDOX II study investigated welders and non-exposed men without occupational Mn exposure and studied the accumulation of Mn in the brain using T1-weighted magnetic resonance imaging (MRI) and correlated these with the results of fine motor tests.

### Methods

From 2013-2015, 48 welders and 30 men without Mn exposure participated in the study. All subjects were tested with the motor part III of the Movement Disorder Society - Unified Parkinson Disease Rating Scale (MDS-UPDRS3). The fine motor skills of the subjects were assessed with the Motor Performance Series (MLS, Schuhfried, Mödling, Austria) and a spiralometry test. To determine Mn deposits in the brain, MRI was used to measure the R1 (=1/T1) relaxation rate in regions of interest in the globus pallidus and substantia nigra. During a working shift Mn was measured in the respirable particle fraction of the welding fumes (MnA). The association between Mn exposure and fine motor skills was modelled with multiple linear regression models adjusted for age and education.

### Results

The welders showed normal motor functions according to MDS-UPDRS3. In steadiness tests (part of MLS), welders achieved better results than non-exposed men ( $p \leq 0.05$ ). For tests on arm-hand movements (part of MLS), welders with higher Mn exposure ( $\text{MnA} \geq 20 \mu\text{g}/\text{m}^3$ ,  $N=23$ ) were slightly slower than non-exposed men ( $p=0.056$ ). There was no correlation between the results of fine motor skills and MRI measurements. A lower level of education and higher age were associated with poorer fine motor performance.

### Conclusions/Outlook

In the WELDOX II study, which included also high-exposed welders, no association was found between Mn exposure measured with R1 relaxation rates in MRI and fine motor skills. The good performance in steadiness of welders may be due to training or selection effects in the sense of a healthy worker effect caused by job requirements.

## A-03-07

**Associations between shift work and risk of colorectal cancer in two German cohort studies (#107)**

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**Introduction**

The International Agency for Research on Cancer classified shift work that involves circadian disruption as possible carcinogen to humans (group 2A). However, the evidence on the effect of shift work on colorectal cancer (CRC) is still limited. Here, we used two German population-based prospective cohort studies, the Heinz Nixdorf Recall Study (HNR) in the Ruhr area and the Study of Health in Pomerania (SHIP) in the Northeast of Germany, to analyze associations between exposure to shift or night work and incident CRC.

**Methods**

We estimated adjusted incidence rate ratios (IRRs) with log-linear Poisson regression models with the natural logarithm of person-years as offset on the individual-data level to analyze the associations between exposure to shift or night work and CRC in both cohorts together (N=6,903) and separately. Additionally, we performed subgroup analyses by sex and by tumor localization in HNR.

**Results**

We observed no increased risks for men who were ever employed in night work in the pooled analysis (IRR: 1.03, 95% CI: 0.62; 1.71) and in HNR. The study-specific analyses revealed slightly elevated IRR estimates for men that ever worked in rotating shifts including night work (IRR: 1.45, 95% CI: 0.72; 2.92) and for long-term exposure (IRR: 1.79, 95% CI: 0.81; 3.92) in SHIP. In the HNR subgroup analysis, we found an increased IRR estimate for cancer of the distal colon in male shift workers who did not perform night work (IRR: 3.93, 95% CI: 0.98; 15.70), but not in night workers.

**Conclusions/Outlook**

Overall, night-shift work was not associated with CRC, but we found increased IRR estimates for rotating shift work including night work in SHIP. In future investigations, the different types of shift-work jobs and patterns as well as their related lifestyle factors should be considered to better understand a possible relationship between shift work and CRC.

**A-03-08****Unterschiede im Nahrungs- und Genussmittelkonsum in Phasen mit Tag- und Nachtschichten (#193)**

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**Introduction**

Tätigkeiten in Wechselschicht werden mit einem erhöhten Risiko für Stoffwechselerkrankungen und erhöhtem Body-Mass-Index in Verbindung gebracht. Eine Ursache für diesen Zusammenhang könnten weniger gesunde Ernährungsgewohnheiten im Schichtdienst oder veränderter Stoffwechsellaage aufgrund circadianer Störungen sein. Im Rahmen einer Querschnittsstudie wurde der Nahrungs- und Genussmittelkonsum von weiblichem Krankenhauspersonal in Nachtschichtphasen mit dem Konsum in Frühschichtphasen verglichen werden.

**Methods**

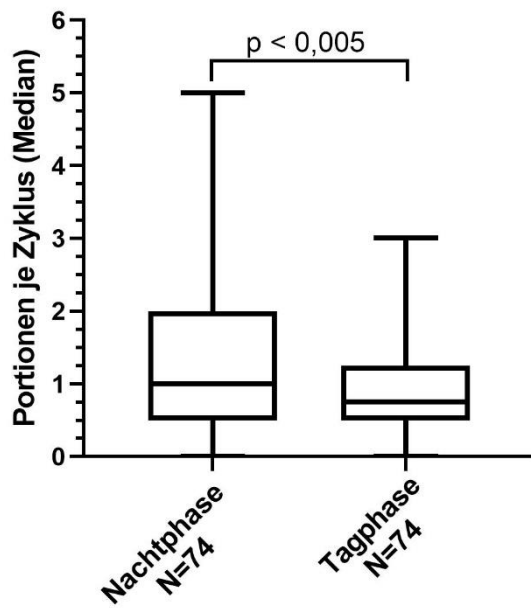
Vierundsiebzig Probandinnen dokumentierten Informationen zu konsumierten Nahrungsmitteln, Zigaretten und Koffein in Phasen von drei bis vier aufeinanderfolgenden Nacht- und Frühschichten via Tagebuch. Inhalt und Frequenz der konsumierten „Portionen“ je 24h-Zyklus wurden mittels deskriptiver Methoden und t-Tests analysiert. Als Einflüsse wurden die Arbeitszeit (Nacht- vs. Frühschichtphase) und der individuelle Chronotyp (Früh-, Intermediate-, Spättyp) untersucht.

**Results**

Dieselben Probandinnen verzehrten in der Nachtschichtphase mehr Süßigkeiten und Snacks (+25%) als in der Frühschichtphase ( $p < 0.005$ ). Die mittlere Anzahl von Portionen an Kohlenhydraten und Obst war in beiden Tätigkeitsphasen gleich. In der Tagschichtphase wurden mehr koffeinhaltige Getränke (+23%) verzehrt als in der Nachtschichtphase. Raucherinnen konsumierten sowohl in der Nachtschichtphase als auch in der Frühschichtphase durchschnittlich jeweils 11 Zigaretten in 24h. Der Chronotyp hatte keinen signifikanten Einfluss auf die Ernährung, jedoch zeigten die Frühtypen insgesamt einen geringeren Verzehr von Süßigkeiten.

**Conclusions/Outlook**

Der gesteigerte Konsum von Süßigkeiten und Snackmahlzeiten in Nachtschichtepisoden trägt am ehesten zu einem ungesünderen Ernährungsprofil von in Schichtarbeit Tätigen bei. Als Präventionsmaßnahme wäre die Erweiterung des Angebots ernährungsphysiologisch hochwertiger Nahrungsmittel insbesondere bei Nachtschichten denkbar.



Verzehr von Süssigkeiten in Phasen von Nacht- und Tagarbeit

## A-04 | Epidemiological methods

## A-04-01

**The potential of overtesting and overdiagnosis after disclosure of incidental findings from whole-body MRI in an observational cohort study. (#66)**

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**Introduction**

Magnetic resonance imaging (MRI) produces a large number of tumor-related incidental findings (IFs). These may lead to invasive diagnostic interventions such as biopsies; however, not much is known about this effect. We investigated how whole-body MRI IF disclosure in a population-based cohort affected biopsy frequency and the detection of new malignancies. Due to the potential to trigger biopsies we also took laboratory disclosures into account.

**Methods**

We utilized data from 6,753 participants in the Study of Health in Pomerania (SHIP) who were examined between 2008 and 2012. All participants underwent laboratory examinations and 3,371 (49.9%) underwent whole-body MRI. Electronic biopsy reports dated from 2002 to 2017 were linked to participants and assigned to outcome categories. The frequency of biopsies 2 years before and after SHIP was examined using generalized estimating equation models with a negative binomial distribution.

**Results**

In total, 4,707 participants received disclosure of 8,208 IFs (laboratory: 6,839; MRI: 1,369) and 1,200 participants (17.8%) were linked to 2,271 biopsy reports. Of these, 938 biopsies were conducted before SHIP and 1,333 afterward (event rate/100 observation years = 6.9 [95% CI: 6.5; 7.4]; 9.9 [9.3; 10.4]). Participants with disclosures had a higher rate of nonmalignant biopsy results (post-/pre-SHIP rate ratio 1.39 [95% CI: 1.22; 1.58]) than without (1.09 [95% CI: 0.85; 1.38]). Biopsies diagnosing malignancies were more frequent in the 2 years after SHIP (rate ratio = 1.74 [95% CI: 1.27; 2.42]).

**Conclusions/Outlook**

We observed an increase in biopsy rate after participation in a population-based cohort study with disclosure of IF from whole-body MRI and laboratory examinations. Most biopsies resulted in no malignancy or tumor and a minimal number of malignancies were diagnosed, suggesting potential overtesting and overdiagnosis. Our results support recommendations for restrictive disclosure policies for research MRI IF.



**A-04-02****Results of a systematic review on recruitment rates and research questions of stepped-wedge cluster randomized trials (#90)**

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**Introduction**

The stepped-wedge cluster randomized trial (RCT) design is a novel study design that was introduced in 1987. We present the update of a recently published review on how often stepped-wedge cluster RCTs reach their planned sample size as well as details on the specific research settings in the identified papers.

**Methods**

We originally conducted a structured search in PubMed from January 1, 2012 til January 1, 2017 published in 2019<sup>1</sup>. References of identified studies and previously published reviews were screened. Articles were eligible if they used cluster randomization, a stepped-wedge roll-out, and were original studies. The PubMed search was repeated with the same search term in March 2020 from January 2, 2017 til March 19, 2020. Only a subset from the original search was extracted from these papers.

**Results**

In the original search, 280 articles were identified, 46 individual studies were eligible. Most of the studies (39%) were conducted in Europe, the most common intervention was a health care intervention (26%), and infectious diseases were studied most often (24%). For 36 studies, recruitment rates could be calculated. Reported recruitment rates ranged from 48%-902%, 12 studies (33%) did not reach the planned sample size, and five studies (12%) did not reach the planned cluster size. The repeated search revealed 274 articles, of which 64 were eligible. Again, most studies were conducted in Europe (41%) and the most common intervention was a health care intervention (52%) with a strong focus on infectious diseases (19%). An increasing trend towards studies including pre-, peri- or postnatal women was observed (19%).

**Conclusions/Outlook**

While providing ethical and logistical advantages, achieving the planned recruitment rate seems to be challenging in stepped-wedge cluster RCTs. Publications using this design have gradually increased over time. Further experience with this design might improve study planning and thus successful recruitment into these trials.

<sup>1</sup> Eichner et al. J Clin Epi. 2019;107:89-100

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## A-04-03

**Development of evidence-based indicators to assess the quality of care in home mechanical ventilated patients (#115)**

**M.Sc./M.A. Martha Schutzmeier<sup>1</sup>**, M.Sc./M.A. Lilly Brandstetter<sup>1</sup>, Dr. Jutta Ahnert<sup>1</sup>, M.Sc./M.A. Stephanie Stangl<sup>1</sup>, Anna Grau<sup>1</sup>, M.Sc./M.A. Laura Gerken<sup>2</sup>, M.Sc./M.A. Hanna Klingshirn<sup>2</sup>, Prof. Bernd Reuschenbach<sup>2,3</sup>, PhD/MD Maximilian Kippnich<sup>4</sup>, Prof. Thomas Wurmb<sup>4</sup>, Prof. Peter Heuschmann<sup>1,5</sup>, PhD/MD Kirsten Haas<sup>1</sup>

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**Introduction**

The number of patients in need of home mechanical ventilation (HMV) in Germany is increasing enormously. These patients receive outpatient care either at specialized assisted living communities, or at home. However, there are limited data available on the quality of care of HMV patients. Within the project OVER-BEAS (funding by G-BA, Grant 01VSF17008) quality indicators (QI) for measuring the quality of HMV care were developed using an evidence-based approach.

**Methods**

A multidisciplinary board including healthcare professionals of different disciplines developed a set of QI between March and September 2019. In a structured, transparent process QI were proposed and evaluated considering the best available evidence. The chosen QI should be a relevant, reliable and valid measurement for the quality of care, as well as comprehensible and applicable in practice.

**Results**

The experts proposed 40 QI and consented a final set of 26 QI. Based on the final set, questionnaires to assess the QI in daily practice were developed: (1) to assess the quality and describe the structure of the nursing home; and (2) to gather information on patient-related processes and outcomes. The feasibility of the questionnaires was tested in 4 nursing homes treating HMV patients. Mainly they evaluated it positively, remarks were categorized in three groups: (1) term missing accuracy, (2) problem of comprehension, and (3) not documented or documented elsewhere. Documentation time for 1 patient was 15 minutes. Based on the feedback, the questionnaires were finalized.

**Conclusions/Outlook**

It is feasible to develop evidence-based QI to assess the quality of this complex care situation by means of a structured and transparent process. The implementation in the care setting is practicable and appears to reflect the reality of the care situation among HMV patients. This is important to improve the long-term quality of care and a step towards implementing a standardized quality assurance program for HMV.

**A-04-04****The effect of a video-supported assessment to improve the accuracy of self-reported physical activity (#123)**

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**Introduction**

Studies have shown an over-estimation of self-reported compared to accelerometer-based moderate-to-vigorous physical activity (MVPA). The effect of a video that visualises the intensity levels of PA to reduce this bias in self-reports was tested within a randomised controlled study.

**Methods**

Participants ( $n=378$ , 40-75 years) were instructed to wear an accelerometer for seven consecutive days. Afterwards, and prior to the assessment of self-reported PA by the International Physical Activity Questionnaire-Short Form, participants were randomly assigned to a control group (CG) or video group (VG). The outcome was the absolute difference between self-reported and accelerometer-based time spent in MVPA. The video effect was explored using Spearman correlation coefficients, Bland-Altman analysis, Wilcoxon rank-sum test, Bayes factors, and simultaneous-quantile regression analysis.

**Results**

In total, 302 participants fulfilled the accelerometer wear time criteria ( $\geq 10$  hours/day;  $\geq 6$  days) and received the self-report assessment within three days after the wearing period. The absolute difference was *Median*=-9.0 min/day (*IQR*: -32.0; 66.6) for CG and *Median*=-11.5 min/day (*IQR*: -29.9; 14.3) for VG. Wilcoxon rank-sum test revealed no difference in the absolute differences between study groups whereas Bayes factors indicated insensitivity. Simultaneous-quantile regression revealed no significant relationship between video presentation and the absolute differences in the 25<sup>th</sup> percentile. In the 50<sup>th</sup> ( $b=-12.4$  [ $CI=-23.2$ ; -1.5]) and 75<sup>th</sup> percentile ( $b=-43.7$  [ $CI=-70.5$ ; -16.8]) video presentation was negatively associated with the absolute differences.

**Conclusions/Outlook**

Video-supported assessment, which exemplifies intensity levels, may increase the accuracy of self-reported MVPA, especially among individuals who overestimated or slightly underestimated their MVPA. Therefore, a combination of video and questionnaire seems to be useful to reduce over-estimation of self-reported MVPA.

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## A-04-05

**PictoQOL: Ein bildbasierter Fragebogen zur Erfassung gesundheitsbezogener Lebensqualität. Entwicklung und Pilotierung**  
(#175)

**Prof. Patrick Brzoska**<sup>1</sup>, M.Sc./M.A. Fabian Erdsiek<sup>1</sup>, M.Sc./M.A. Tugba Aksakal<sup>1,2</sup>, M.Sc./M.A. Maria Dyck<sup>1,2</sup>, PhD/MD student Dennis Padberg<sup>1</sup>, PhD/MD Sabahat Ölcer<sup>1</sup>, M.Sc./M.A. student Munzir Idris<sup>1</sup>, PhD/MD Yüce Yilmaz-ASlan<sup>2</sup>

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**Introduction**

Die Erhebung gesundheitsbezogener Lebensqualität als zentraler patientenberichteter Endpunkt („patient-reported outcomes“) spielt in der Gesundheitsforschung ebenso wie in der Versorgungspraxis eine wichtige Rolle. Die Erfassung erfolgt in der Regel mittels standardisierter Fragebogeninstrumente, z.B. dem SF36, die Befragte selbstständig oder in Form standardisierter Interviews beantworten. Zur Befragung mancher Bevölkerungsgruppen wie Menschen mit Migrationshintergrund müssen solche Instrumente oft readaptiert werden, was in bevölkerungsbasierten Studien aus Ressourcengründen nur schwer umsetzbar ist. Sprachunabhängige, bildbasierte Instrumente könnten diesen Herausforderungen begegnen. Ziel der vorliegenden Studie war es, ein solches Instrument (PictoQOL) zu entwickeln und zu pilotieren.

**Methods**

Die Studie nutzte einen Mixed-Method-Ansatz. Auf Basis eines Scoping Reviews bestehender Ansätze nonverbaler Erfassung psychologischer Konstrukte und 6 Fokusgruppendifkussionen mit je 9 Versorgungsnutzer/innen wurden bildbasierte Items entlang der Dimensionen des SF36 und des WHOQOL entworfen und in kognitiven Interviews mit 23 Versorgungsnutzer/innen pilotiert. Es wurden Personen ohne, mit türkischem und syrisch-arabischem Migrationshintergrund befragt.

**Results**

Der PictoQOL besteht aus der bildlichen Darstellung von insgesamt 22 unterschiedlichen Situationen. Mittels einer graphischen Likert-Skala geben Befragte an, wie sehr die jeweilige Situation auf sie zutrifft. Einige Darstellungen erwiesen sich als kultursensitiv und wurden angepasst. Die Befragten erachteten die Verwendung einer zusätzlichen graphischen Ebene in Form von Symbolen zusätzlich zu Bildern als hilfreich für die Interpretation.

**Conclusions/Outlook**

Der PictoQOL besitzt das Potenzial einer barriereärmeren Erhebung der Lebensqualität über unterschiedliche Bevölkerungsgruppen hinweg unabhängig von sprachlichen Kenntnissen sowie Lese- und Schreibkompetenzen. Seine konvergente und faktorielle Validität sollen in einer Folgestudie überprüft werden.

**A-04-06****Perspektivische Einbindung von Menschen mit Migrationshintergrund im Rahmen des RKI-Gesundheitsmonitorings: Das Projekt IMIRA II**

(#208)

**Carmen Koschollek**, Marie-Luise Zeisler, Robin Houben, Katja Kajikhina, Julia Geerlings, Patrick Schmich, Antje Gößwald, Claudia Santos-Hövenner

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**Introduction**

Etwa ein Viertel der Bevölkerung in Deutschland – Menschen mit Migrationshintergrund (MMH) – wird im Rahmen des Gesundheitsmonitorings am Robert Koch-Institut (RKI) bisher kaum bevölkerungsanteilig erreicht. Perspektivisch soll dies im nächsten Untersuchungssurvey (gern-Studie) sowie einer separaten Befragungsstudie (GEDA Fokus) mit dem in diesem Beitrag dargestellten Studiendesign des Projektes IMIRA II besser gelingen.

**Methods**

2016 bis 2019 wurde am RKI das Projekt „*Improving Health Monitoring in Migrant Populations*“ (IMIRA) umgesetzt. Es wurden zwei Machbarkeitsstudien mit dem Fokus auf Untersuchung und Befragung durchgeführt, in denen neue Strategien und Maßnahmen eingesetzt wurden, um Teilnahmebarrieren für MMH insgesamt sowie für MMH mit weniger guten Deutschkenntnissen abzubauen. Die Ergebnisse werden im Rahmen von IMIRA II implementiert.

**Results**

In der gern-Studie werden Studienmaterialien sowie Erläuterungsvideos in sieben Sprachen, neben Deutsch, zur Verfügung stehen. Zusätzlich wird ein Videodolmetscherdienst eingesetzt, um die informierte Einwilligung zu gewährleisten, Kontraindikationen auszuschließen und Fragen der Teilnehmenden zu beantworten. Basierend auf der Ausländerstatistik 2015 bis 2017 werden Zielgruppe von GEDA Fokus Personen mit italienischer, kroatischer, polnischer, syrischer und türkischer Staatsangehörigkeit (StaAng) sein, die auf Deutsch oder ihrer Sprache gemäß StaAng sequentiell in mehreren Modi an der Befragung teilnehmen können. Es werden Hausbesuche zur Durchführung persönlicher Interviews für ein Subsample angeboten.

**Conclusions/Outlook**

Mit den beschriebenen Maßnahmen sollen alle zur Teilnahme Eingeladenen auch teilnehmen können. Letztlich sollen so migrationsbezogene Datenauswertungen ermöglicht werden, die über den bloßen Migrationshintergrund hinausgehen, da mit diesem statistischen Konzept die Heterogenität unter MMH und damit zusammenhängende gesundheitliche Ungleichheiten nicht ausreichend abgebildet werden können.

## A-05 | Nutritional epidemiology

**A-05-01****Application of the German Nutrition Society's Quality Standard for company catering – a controlled pre-post-study regarding the food consumption (#56)**

**M.Sc./M.A. Melanie Schneider**<sup>1</sup>, M.Sc./M.A. Carolin Nössler<sup>1</sup>, Prof. Anja Carlsohn<sup>2</sup>, Prof. Petra Lührmann<sup>1</sup>

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**Introduction**

Changes in the food environment are a promising strategy in nutrition related health promotion. Therefore the German Nutrition Society's (DGE) Quality Standard for company catering (DGE 2013) was applied in the canteen of the University of Education in Schwäbisch Gmünd. The aim of the present study was to evaluate whether the food consumption of the canteen users (intervention group = IG) changes compared to the non-canteen users (control group = CG).

**Methods**

Food consumption in the IG (n = 46, 76,1 % female, 58,7 % students, 31,8 ± 12,8 years) and CG (n = 49, 95,9 % female, 79,6 % students, 27,5 ± 9,4 years) was assessed by a 3-day estimated dietary record (Lührmann et al. 1999) before (t0) and at least 10 weeks after (t1) applying the DGE's Quality Standard.

**Results**

At t0 the mean consumption in the IG and CG was 310 ± 112 g/d and 312 ± 148 g/d for grain products, 260 ± 170 g/d and 220 ± 156 g/d for vegetables, 191 ± 109 g/d and 186 ± 141 g/d for fruits, 234 ± 123 g/d and 230 ± 110 g/d for dairy products, 64 ± 56 g/d and 68 ± 68 g/d for meat, respectively.

In the course of time meat consumption increased in the IG ( $\Delta t1$ : 10 ± 81 g/d) while it decreased in the CG ( $\Delta t1$ : -19 ± 55 g/d) (interaction: p < 0.05, ANOVA for repeated measurements). Otherwise no significant changes in food consumption occurred, which were attributable to the intervention. The canteen was visited on average of 2.3 ± 1,2 times/week (IG) and 0.2 ± 0.2 times/week (CG), respectively.

**Conclusions/Outlook**

Applying the DGE's Quality Standard led to improvements regarding the nutrient profiles of the offered canteen food (Schneider et al. 2016), but the consumption did not change favourably. Possibly the usage of the optimised food was to less or effects of compensation occurred during the daily consumption.

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**A-05-02****Is a vegan or a vegetarian diet associated with the microbiota composition in the gut? Results of a new cross-sectional study and systematic review (#71)**

**Iris Trefflich**, Afraa Jabakhanji, Dr. Juliane Menzel, Dr. Klaus Abraham, Prof. Cornelia Weikert

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**Introduction**

The interest in a vegan diet has been increasing in recent years. It is assumed that diet influences the composition of gut microbiota, which in turn may affect human health status. So far, the associations between a vegan or vegetarian diet and the composition of the microbiota have not been reviewed systematically in literature.

**Methods**

A literature search was conducted in PubMed and Embase for eligible human studies with vegan or vegetarian diets as an exposure and microbiota composition as an outcome. Participants should be healthy and older than 18 years. Furthermore, data from our cross-sectional study with 36 vegan and 36 omnivorous participants were included.

**Results**

Out of sixteen included studies, six investigated the association between gut microbiota composition in both vegans and in vegetarians, six in vegans and four studies in vegetarians compared to omnivores, respectively. 5 different phyla, 28 families, 96 genera and 177 species were reported in this systematic review. *Prevotella* was one of the most reported genus, and had a significant higher abundance in 6 studies with vegan or vegetarian populations compared to omnivores, however 6 further studies revealed no difference. Another five studies presented data of *Faecalibacterium prausnitzii*, but no difference was found in the abundance of this species in vegans or vegetarians compared to omnivores. No consistent association between a vegan diet or vegetarian diet and microbiota composition compared to omnivores could be identified in this review. Moreover, some studies revealed even contradictory results

**Conclusions/Outlook**

The results of this systematic review could be due to the high individuality of the microbiota composition, and/or differences in the applied approaches for analyzing the microbiota. Standardized methods with high taxonomical and functional resolutions are needed to clarify this issue.

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**A-05-03****Systematic review and meta-analysis of the associations of a vegan and vegetarian diets with inflammatory biomarkers (#96)**

**Dr. Juliane Menzel**<sup>1</sup>, Dr. Afraa Jabakhanji<sup>1</sup>, Dr. Ronald Biemann<sup>2</sup>, Prof. Knut Mai<sup>3</sup>, Priv.-Doz. Klaus Abraham<sup>1</sup>, Prof. Cornelia Weikert<sup>1</sup>

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**Introduction**

Vegetarian or vegan nutrition might influence circulating levels of inflammatory biomarkers, thereby reducing the risk of chronic diseases. This systematic review and meta-analysis aimed to investigate the associations of veganism and vegetarianism with inflammatory biomarkers compared to omnivores.

**Methods**

Literature search was conducted in Pubmed and EMBASE until April 2020 and mean differences of biomarkers were assessed for: C-reactive protein (CRP), interleukin-6 (IL-6), interleukin-18 (IL-18), interleukin-1 receptor antagonist (IL-1 RA), tumor necrosis factor-alpha (TNF-α), E-selectin, intercellular adhesion molecule-1 (ICAM-1), monocyte chemoattractant protein-1 (MCP-1), adiponectin, omentin-1 and resistin. Of initially identified 1073 publications, 21 studies met the inclusion criteria (aged ≥18 years, vegan or vegetarian diet in comparison to omnivorous control group) and were included in the systematic review and meta-analysis.

**Results**

Based on results of three studies a vegan diet was associated with lower levels of CRP compared to omnivores [effect size -0.54 mg/l, 95%-CI:-0.79 to -0.28, p<0.0001], in vegetarians (14 studies) this association was less pronounced [effect size -0.25 mg/l, 95%-CI:-0.49 to 0.00, p=0.05]. In vegetarian pre-diseased participants with impaired kidney function (4 studies) the association was stronger with -3.91 mg/l (95%-CI:-5.23 to -2.60; p<0.00001). No substantial effects were observed for all other inflammatory biomarkers.

**Conclusions/Outlook**

This systematic review and meta-analysis provide evidence that as well vegan as vegetarian diet is associated with lower CRP concentrations compared to omnivores in apparently healthy participants and metabolically afflicted patients. Further research is highly warranted, as several biomarkers of interest were only investigated in individual studies so far.

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A-05-04**Verzehrgewohnheiten zwischen Jugend- und jungem Erwachsenenalter: Ergebnisse der KiGGS-Kohorte (#179)****Dr. Almut Richter<sup>1</sup>**, Dr. Anja Schienkiewitz<sup>1</sup>, Dr. Gert B. M. Mensink<sup>1</sup>

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**Introduction**

Beim Übergang vom Jugendalter ins junge Erwachsenenalter ändern sich häufig Lebensumstände und Verhaltensweisen. Untersucht wird, wie stabil das individuelle Verzehrverhalten vom Jugend- ins junge Erwachsenenalter ist.

**Methods**

Grundlage bilden Daten der KiGGS-Kohorte. Die 12-17-Jährigen aus der KiGGS Basiserhebung (2003-2006) wurden 2014-2017 in KiGGS Welle 2 erneut befragt (22-31 Jahre). Für 1.125 männliche und 1.506 weibliche Teilnehmende lagen entsprechende Daten vor. Das Ernährungsverhalten wurde mittels eines semi-quantitativen Verzehrhäufigkeitsfragebogens erfragt. Für 12 Lebensmittelgruppen wurden die Verzehrmenen in g/Tag zu beiden Zeitpunkten bestimmt und in Quartile eingeteilt. Es wurde der Anteil berechnet, der zu beiden Zeitpunkten im obersten bzw. untersten Quartil der Verzehrmenen zu finden war. Als weiteres Maß wurde der gewichtete Kappawert berechnet. Um die Repräsentativität der Aussagen zu erhöhen, wurden alle Analysen mit einem Gewichtungsfaktor erstellt.

**Results**

Folgende Lebensmittelgruppen wurden analysiert: Wasser, Limonade, Saft, Fast Food, frittierte/gebratene Kartoffeln, rohes Gemüse, gegartes Gemüse, Obst, Backwaren, Süßigkeiten, Knabbersachen, Wurst/Schinken. Vom Jugend- ins junge Erwachsenenalter wird besonders häufig eine hohe Verzehrmenge an Limonade (51 %), frittierten/gebratenen Kartoffeln (43 %), Süßigkeiten (40 %) und Wurst/Schinken (40 %) beibehalten. Auch niedrige Verzehrmenen von Wasser (42 %), rohem Gemüse (47 %) und Obst (41 %) werden häufig beibehalten. Die höchste Übereinstimmung (Kappawert  $\geq 0,2$ ) weisen Limonade (0,21), rohes Gemüse und Wurst/Schinken (jeweils 0,2) auf. Die anderen Lebensmittelgruppen weisen niedrigere Kappawerte ( $\geq 0,13$ ) auf.

**Conclusions/Outlook**

In der KiGGS-Kohorte zeigt sich, dass insbesondere der Verzehr von eher weniger wünschenswerten Lebensmittelgruppen eine höhere Stabilität über die Zeit aufweist.

## A-06 | Genetic epidemiology

## A-06-01

**Comparison of time and dose dependent gene expression and affected pathways in primary human fibroblasts after exposure to ionizing radiation (#51)**

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**Introduction**

Exposure to ionizing radiation induces complex stress responses in cells, which can lead to adverse health effects (e.g. cancer). Although studies investigated gene expression and affected pathways in human fibroblasts after exposure to ionizing radiation, the understanding of underlying mechanisms and biological effects is still incomplete due to different experimental settings and small sample sizes. Therefore, this study aims to identify the time point with the highest amount of differentially expressed genes (DEGs) and corresponding pathways in primary human fibroblasts after exposure to ionizing radiation at different time points and with different doses.

**Methods**

Fibroblasts from skin biopsies of 15 donors were exposed to a high (2Gy) and a low (0.05Gy) dose of X-rays. RNA was extracted and sequenced 2h and 4h after exposure. DEGs with an adjusted p-value <0.05 were flagged and used for pathway analyses.

**Results**

More DEGs were found 4h after exposure to low (4h: 757 genes, 2h: 202 genes) and high doses of radiation (4h: 4472 genes, 2h: 2774 genes) than after 2h (Figure 1). In experiments with high dose irradiation and RNA sequencing after 4h, downregulation of the *FAT10 cancer signaling pathway* and activation of *gluconeogenesis I*, *glycolysis I* and *prostanoid biosynthesis* was observed taking p-value (<0.05) and activating z-score ( $\geq 2$  or  $\leq -2$ ) into account. Two hours after high dose irradiation, downregulation of *small cell lung cancer signaling* was observed. For low dose irradiation experiments we did not detect any statistically significant activated or downregulated pathways for both time points (Figure 1+2).

**Conclusions/Outlook**

Compared to 2h after irradiation, a higher number of DEGs were found 4h after exposure to low and high dose ionizing radiation. Differences in gene expression were related to signal transduction pathways of the DNA damage response after 2h and to metabolic pathways after 4h, which might implicate cellular senescence.

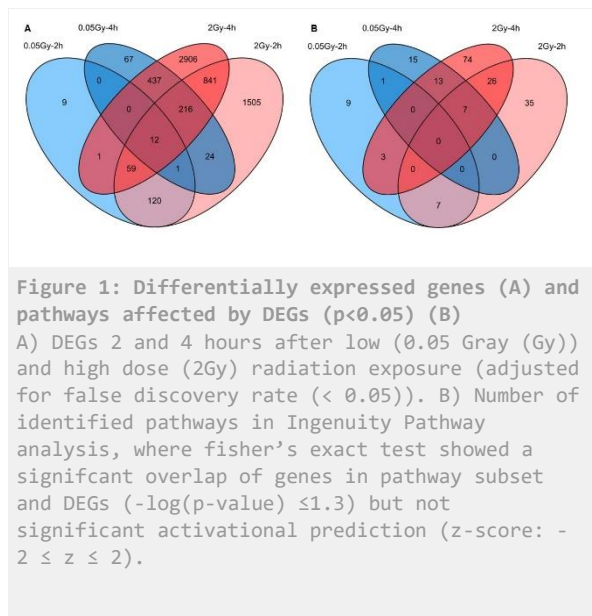


Figure 1: Differentially expressed genes (A) and pathways affected by DEGs ( $p < 0.05$ ) (B)

A) DEGs 2 and 4 hours after low (0.05 Gray (Gy)) and high dose (2Gy) radiation exposure (adjusted for false discovery rate ( $< 0.05$ )). B) Number of identified pathways in Ingenuity Pathway analysis, where fisher's exact test showed a significant overlap of genes in pathway subset and DEGs ( $-\log(p\text{-value}) \leq 1.3$ ) but not significant activation prediction (z-score:  $-2 \leq z \leq 2$ ).

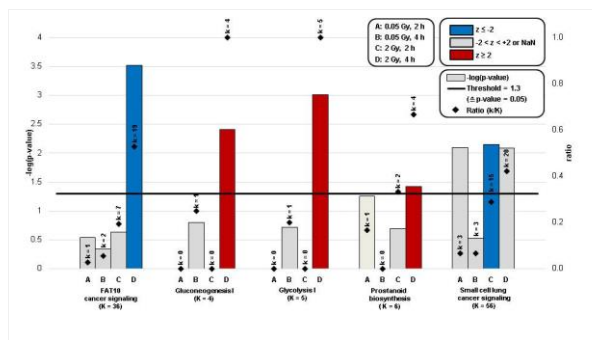


Figure 2: Pathways affected by differentially expressed genes after high or low dose irradiation.

Abbreviations: not a number (NaN), Gray (Gy), hours (h), Gq protein alpha subunit (Gaq), phosphoinositide 3-kinase (PI3K), v-akt murine thymoma viral oncogene (AKT), z-score (z), number of differential expressed genes (k), number of total genes in pathway (K).

## A-06-02

## The Association between ABO Blood Types and Major Depressive Disorder (#104)

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### Introduction

ABO blood types and their corresponding antigens have long been assumed to be related to different human diseases. Previous studies have reported associations between ABO blood types and physical conditions such as vascular diseases, cancer, metabolic diseases and cognitive impairment (Ewald & Sumner, 2016). Some smaller studies also analyzed the relationship between ABO blood types and depression (Pisk et al., 2019; Song et al., 2018). However, their research yielded contradicting results. Therefore, we want to analyze the association between ABO blood types and Major Depressive Disorder (MDD) on a large dataset to further the understanding of the blood type – depression relationship.

### Methods

We performed a pooled analysis with data from 28 cohorts that are part of the MDD working group of the Psychiatric Genomics Consortium. The dataset included 40,280 individuals of which 42.8% were diagnosed with MDD. ABO blood types were identified using the three single nucleotide polymorphisms rs505922, rs8176746 and rs8176747. We performed regression analyses to assess associations between the individual ABO Blood types and the MDD diagnosis. We adjusted for sex, cohort and the first three genetic principal components.

### Results

Of all individuals 42.6% had blood type A, 10.1% B, 4.1% AB and 43.2% O. This is in accordance with the expected distribution in a population of mainly European descent (Daniels, 2013). The percentage of blood type A was slightly lower in cases than controls (42.1% vs. 43.1%) while blood type O was more prominent in cases (43.7% vs. 42.7%). However, these differences were not significant and no blood type showed a statistically significant association with MDD.

### Conclusions/Outlook

Our analyses do not support an association between ABO blood types and major depressive disorder as found in previous studies. For a more detailed biological understanding, future research should consider additional potential risk factors such as the H antigens, secretor status or Lewis phenotypes.

## **A-07 | Epidemiology of cardiovascular and metabolic diseases**

## A-07-01

**Circulating brain-derived neurotrophic factor (BDNF) is related to asymptomatic vascular diseases in men but not in women. (#18)**

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**Introduction**

Brain-derived neurotrophic factor (BDNF) is not only synthesized by neurons but also by endothelial cells. BDNF is recognized as an emerging biomarker for cardiovascular diseases.

We explored the relation between peripheral BDNF levels and several parameters of asymptomatic vascular diseases-like the ankle-brachial index (ABI), carotid intima-media thickness (cIMT), presence of carotid atherosclerotic plaques/ stenosis as well as brachial artery flow-mediated dilation (FMD).

**Methods**

We used data from the population-based *Study of Health in Pomerania* (SHIP-TREND) (n=3,808, 48% male, median age 51, 25<sup>th</sup> and 75<sup>th</sup> percentile 39 and 63 years). ABI was calculated as the ratio of systolic blood pressure in arms and ankles. For cIMT, the distance between the lumen-intima and media-adventitia interfaces in longitudinal scans were measured. Carotid plaques were defined as a focal protrusion of the carotid vessel wall. Carotid stenosis > 20% according to NASCET criteria were assessed with Doppler ultrasonography. FMD was evaluated by measuring the increase in brachial artery diameter after transient forearm ischemia. BDNF was measured by ELISA. Subjects with cancer, severe renal insufficiency and previous MI were excluded. Linear regression models adjusted for age, smoking, waist-to-hip ratio and depression were used to assess the relation between BDNF and parameters for asymptomatic vascular disease.

**Results**

One standard deviation (SD) higher BDNF was associated with a 0.009 lower ABI (95% confidence interval [CI]: -0.015 to -0.0029; p = 0.004) yet a 53% increased risk of carotid stenosis (95%-CI: 1.017 to 2.328; p = 0.04) in men but not in women. BDNF was not associated with cIMT, presence of carotid plaques or brachial FMD in both sexes.

**Conclusions/Outlook**

We found a positive relation between BDNF and asymptomatic vascular disease in men but not women. Further research is needed to understand the sex-specific role of BDNF in subclinical vascular diseases.



## A-07-02

## Productivity adjusted life years associated with type 2 diabetes in Germany in 2020 (#26)

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### Introduction

Type 2 diabetes (T2D) is associated with increased mortality and reduction of productivity among people of working age. This study aims to estimate the productivity adjusted life years (PALY) in Germany on the individual and population level.

### Methods

We considered the working age (20 to 69 years) population in Germany in 2020. Based on an illness-death model and available data on the incidence rate as well as the mortality rates of people with and without T2D, we calculated years of life lost associated with T2D (YLL) and years of productivity lost (YPL). YLLs were calculated as the difference in remaining life expectancy between people with and without T2D. For the calculation of YPL, each year lived with T2D until age 69 was multiplied with a productivity index of 0.079. This quantity indicates that a person with T2D loses 7.9% of his/her productivity compared to a same-aged person without T2D. PALYs were defined as the sum of YLL and YPL.

### Results

On the individual level, YLL for women and men at age 20 was 0.5 years and 1.0 year, respectively. Corresponding YPLs were 3.9 and 3.8 years, resulting in PALYs of 4.4 years and 4.7 years. All three measures decreased with age (fig 1). Summing up individual PALYs among all people with prevalent T2D in 2020 resulted in 5.06 million PALYs on the population level (table 1). Compared to a situation in which no one has T2D, 5.06 million PALYs correspond to 9.9% of productive life years lost among the population with T2D in 2020.

### Conclusions/Outlook

Compared to same-aged people without T2D, women and men with T2D at age 20 in the year 2020 are expected to lose roughly 4.5 productive life years until they reach age 69 years. All prevalent cases of T2D in the year 2020 combined are expected to lose 5.06 million years of productivity until they reach age 69. Prevention of incident T2D and prevention of negative impacts on productivity associated with T2D may substantially increase the productivity of the population.

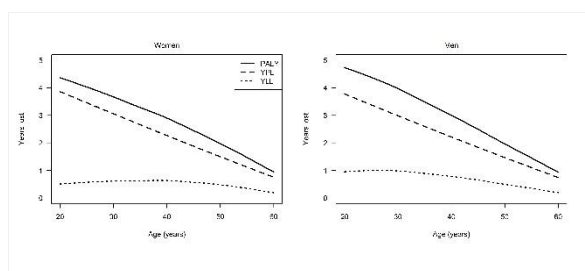


Fig 1. Age-specific productivity adjusted life years associated with type 2 diabetes

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Age-specific years of life lost (YLL), years of productivity lost (YPL) and productivity adjusted life years (PALY) associated with type 2 diabetes in Germany in the year 2020.

	YLL (in million)	YPL (in million)	PALY (in million)
Women	0.39	1.50	1.89
Men	0.72	2.45	3.17
Overall	1.11	3.95	5.06

Table 1. Population-wide productivity adjusted life years among people with type 2 diabetes  
Population-wide years of life lost (YLL), years of productivity lost (YPL) and productivity adjusted life years (PALY) among people with prevalent type 2 diabetes in Germany in the year 2020.

## A-07-03

## The Metabolic Syndrome and Lipoprotein (a) (#45)

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## Introduction

Cardiovascular diseases represent the main cause of death in western countries. High levels of Lp(a) increase the atherothrombotic risk by various mechanisms. An inverse association between Lipoprotein (a) [Lp(a)] and type 2 diabetes mellitus (T2DM) is well known. Metabolic Syndrome (MetS) is highly prevalent in subjects with T2DM, thus an inverse association might be assumed. We investigated the association between MetS and Lp(a) in two German population-based cohorts, BASE-II and SHIP-0.

## Methods

## Final Accepted Contributions

Overall, cross-sectional data were available for 5,743 subjects (48.7% men; mean age 58 [20-85] years). MetS was defined according to NECP/ ATP III criteria modified with AHA/NHLBI and IDF criteria. In SHIP-0, a modified definition was used because of non fasting blood values. In the pooled analyses, MetS and its components were associated with Lp(a) by median regression adjusted for age and sex.

**Results**

Overall, 27.6% (n=1,573) subjects had MetS (29.8% in BASE-II, 26.4% in SHIP-0). Subjects in BASE-II had lower values of LDL-C, triglycerides, CRP, creatinine and glucose, but higher values of HDL-C and HbA1c, compared to SHIP-0 subjects. We found an inverse association between MetS and Lp(a) in the whole study sample ( $\beta = -11.9$  [95%CI -21.3 to -2.6]). Likewise, an inverse association between triglyceride levels and Lp(a) was observed ( $\beta = -6.5$  [95%CI -10.5 to 2.5]) and for glucose values with Lp(a) ( $\beta = -4.6$  [95%CI -7.6 to 1.7]). We found a positive association between total cholesterol with Lp(a) ( $\beta = 15.0$  [95% CI 11.2 to 18.8]) and LDL cholesterol with Lp(a) ( $\beta = 19.0$  [95%CI 14.4 to 23.6]).

**Conclusions/Outlook**

We observed an inverse association between MetS and Lp(a). With respect to the single components, an inverse association was only found between triglyceride and glucose levels with Lp(a). However, more insights into the pathophysiology of the metabolism of lipoproteins and triglycerides, as well as the glucose homeostasis is necessary, which seems to play a central role in the association found in our analysis.

## A-07-04

**Liver fat is not associated with markers of subclinical vascular disease burden: the KORA-MRI study (#49)**

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**Introduction**

Whether excessive liver fat is associated with an increased subclinical vascular disease burden remains unclear. We aimed to assess the associations between liver fat and a wide range of subclinical vascular disease parameters quantified by MRI, accounting for cardiometabolic and lifestyle risk factors.

**Methods**

We included cross-sectional data from an MRI substudy of the population-based KORA FF4 study. The substudy was enriched with prediabetic and diabetic participants without cardiovascular event history. All 386 participants (aged 39 to 73 years; 163 women) underwent a 3-T whole-body MRI examination. Liver fat was quantified by MRI proton-density fat fraction (PDFF). A list of subclinical vascular disease burden is shown in Table 2. We used

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(ordered) logistic regression to assess the associations between liver fat and categorical outcomes, and linear regression for continuous outcomes.

## Results

Among 386 participants, 166 (43%) were identified with hepatic steatosis (PDFF > 5.6%). Persons with hepatic steatosis were mainly men, older, had less favourable lifestyle and cardiometabolic profiles (Table 1). Plaque was identified in 54 (21%) participants. Participants with higher liver fat had larger carotid artery wall thickness, lumen area, and wall area as well as larger aortic diameters. Regression analyses yielded no significant association between liver fat and subclinical vascular diseases after adjustment for age, sex and lifestyle and metabolic risk factors (Table 2). There was a significant interaction between liver fat and diabetes status for plaque presence ( $P_{\text{PDFF} \times \text{diabetes}} = 0.04$ ) and plaque type ( $P_{\text{PDFF} \times \text{diabetes}} = 0.02$ ). However, in the subsequent stratified analyses, no significant association was found.

## Conclusions/Outlook

We found no association between liver fat content and subclinical vascular disease burden after adjusting for age, sex and cardiometabolic and lifestyle risk factors. We plan to replicate the investigation in another population-based study - SHIP.

Table 1. Demographic and cardiometabolic risk profiles of study participants.

	Total (n=386)	Without hepatic steatosis (n=220)	Hepatic steatosis (n=166)	P value
Age (years)	56.2 (9.1)	54.3 (9.2)	58.3 (8.6)	< 0.001
Women, n (%)	163 (42.2)	117 (53.2)	46 (27.7)	< 0.001
BMI (kg/m <sup>2</sup> )	28.1 (4.9)	26.0 (4.0)	30.8 (4.7)	< 0.001
Waist Circumference (cm)	98.5 (14.3)	91.5 (11.7)	107.9 (11.9)	< 0.001
Physically active, n (%)	250 (59.6)	147 (66.8)	83 (50.0)	< 0.001
Smoking, n (%)				< 0.001
smoker	77 (19.9)	56 (25.5)	21 (12.7)	
ex-smoker	169 (43.8)	78 (35.5)	91 (54.8)	
never smoker	140 (36.3)	86 (39.1)	54 (32.5)	
Alcohol consumption (g/day)	8.6 (0.9, 26.7)	5.7 (0.2, 23.8)	17.0 (2.9, 34.3)	0.002
Systolic blood pressure (mmHg)	120.6 (16.6)	115.7 (15.1)	127.2 (16.8)	< 0.001
Diastolic blood pressure (mmHg)	75.3 (10.0)	73.0 (9.0)	78.3 (10.4)	< 0.001
Hypertension, n (%)	132 (34.2)	47 (21.4)	85 (51.2)	< 0.001
Total cholesterol (mg/dl)	218.0 (36.5)	216.8 (35.5)	219.7 (37.9)	0.428
HDL (mg/dl)	62.0 (17.7)	66.2 (18.2)	56.3 (15.3)	< 0.001
LDL (mg/dl)	139.7 (33.1)	137.5 (32.2)	142.7 (34.1)	0.130
Triglycerides (mg/dl)	107.5 (77.0, 154.5)	92.0 (67.0, 122.2)	138.5 (103.2, 194.5)	< 0.001
ALT (µkat/l)	0.5 (0.3, 0.6)	0.4 (0.3, 0.5)	0.6 (0.5, 0.8)	< 0.001
AST (µkat/l)	0.4 (0.3, 0.5)	0.3 (0.3, 0.4)	0.4 (0.4, 0.6)	< 0.001
GGT (µkat/l)	0.5 (0.3, 0.7)	0.4 (0.2, 0.5)	0.7 (0.4, 1.1)	< 0.001
Glucose tolerance status, n (%)				< 0.001
normoglycemic	239 (61.9)	178 (80.9)	61 (36.7)	
prediabetes	95 (24.6)	30 (13.6)	65 (39.2)	
diabetes	52 (13.5)	12 (5.5)	40 (24.1)	
Antihypertensive medication, n (%)	98 (25.4)	35 (15.9)	63 (38.0)	< 0.001
Antidiabetic medication, n (%)	21 (5.4)	7 (3.2)	14 (8.4)	0.024
Lipid lowering medication, n (%)	41 (10.6)	16 (7.3)	25 (15.1)	0.014

Values are expressed as the mean (SD) for normally distributed continuous variables or median (interquartile range) for non-normally distributed continuous variables, or n (%) for categorical variables. Results with p value < 0.05 are shown in bold. Liver fat was quantified on the level of portal vein by MRI proton density fat fraction (PDFF). Hepatic steatosis (PDFF > 6%) is defined according to the EASL-EASD-EASO Clinical Practice Guidelines for the management of non-alcoholic fatty liver disease.

Abbreviations: MRI, Magnetic Resonance Imaging; BMI, body mass index; HDL, high-density lipoprotein; LDL, low-density lipoprotein; ALT, Alanine Aminotransferase; AST, Aspartate Aminotransferase; GGT, Gamma-Glutamyl Transaminase; SD, standard deviation.

Table 1

Demographic and cardiometabolic risk profiles of study participants.

## Final Accepted Contributions

Table 2. Associations of liver fat content with subclinical vascular disease parameters in the KORA FF4 MRI study.

	N	Crude model	P value	Model 1	P value	Model 2	P value
<b>Carotid Plaque</b>							
		OR, 95% CI		OR, 95% CI		OR, 95% CI	
Plaque Presence (n cases = 44)	262	1.04 (0.77, 1.41)	0.803	0.93 (0.66, 1.32)	0.676	0.79 (0.49, 1.27)	0.333
Plaque type	262	1.05 (0.77, 1.41)	0.771	0.93 (0.66, 1.31)	0.692	0.73 (0.45, 1.18)	0.197
<b>Arterial Diameters</b>							
		$\beta$ , 95% CI		$\beta$ , 95% CI		$\beta$ , 95% CI	
Wall thickness, LCA (mm)	251	0.02 (0.002, 0.03)	0.025	0.01 (-0.01, 0.02)	0.508	-0.02 (-0.04, 0.001)	0.062
Wall thickness, RCA (mm)	257	0.02 (0.003, 0.03)	0.017	0.004 (-0.01, 0.02)	0.579	-0.01 (-0.03, 0.01)	0.179
Lumen area, LCA (mm <sup>2</sup> )	255	0.97 (0.83, 1.09)	0.646	0.19 (-0.84, 1.21)	0.719	-0.30 (-1.64, 1.04)	0.659
Lumen area, RCA (mm <sup>2</sup> )	262	1.01 (0.14, 1.88)	0.025	0.26 (-0.69, 1.22)	0.590	0.37 (-0.89, 1.62)	0.567
Wall area, LCA (mm <sup>2</sup> )	251	0.61 (0.16, 1.06)	0.011	0.16 (-0.35, 0.66)	0.540	-0.45 (-1.09, 0.20)	0.176
Wall area, RCA (mm <sup>2</sup> )	257	0.67 (0.23, 1.11)	0.003	0.22 (-0.25, 0.70)	0.361	-0.13 (-0.74, 0.48)	0.675
NWI, LCA	251	-0.0002 (-0.01, 0.01)	0.933	0.001 (-0.01, 0.01)	0.675	-0.003 (-0.01, 0.01)	0.434
NWI, RCA	257	-0.003 (-0.01, 0.003)	0.314	-0.002 (-0.01, 0.004)	0.454	-0.01 (-0.02, 0.001)	0.077
<b>Ascending Aorta</b>							
		$\beta$ , 95% CI		$\beta$ , 95% CI		$\beta$ , 95% CI	
Ascending aorta (cm)	367	0.11 (0.07, 0.15)	<0.001	0.03 (-0.01, 0.07)	0.166	-0.03 (-0.09, 0.02)	0.206
Descending aorta (cm)	367	0.08 (0.05, 0.11)	<0.001	0.01 (-0.02, 0.04)	0.385	-0.03 (-0.06, 0.01)	0.129
Inferior vena cava (cm)	367	0.07 (0.05, 0.09)	<0.001	0.02 (-0.004, 0.03)	0.115	-0.01 (-0.04, 0.03)	0.331

Model 1: Crude model + age, sex

Model 2: Model 1 + BMI, smoking, physical activity, systolic blood pressure, HDL, LDL, triglycerides, glucose tolerance status,

antihypertensive medication, lipid lowering medication.

Results with p value &lt; 0.05 are shown in bold. Liver fat was quantified by MRI proton density fat fraction and represents a continuous

measurement of liver fat. Plaque presence (yes/no) is a binary variable. Plaque type was defined according to the criteria from the American

Heart Association.

Abbreviations: MRI, Magnetic Resonance Imaging; LCA, left carotid artery; RCA, right carotid artery; NWI, normalized wall index,

calculated as wall area (lumen area + wall area); BMI, body mass index; HDL, high-density lipoprotein; LDL, low-density lipoprotein; OR,

odds ratio;  $\beta$ ,  $\beta$ -estimate from linear regression; CI, confidence interval.

Table 2

Associations of liver fat content with subclinical vascular disease parameters in the KORA FF4 MRI study.

## A-07-05

**A multivariable model for improved prediction of kidney failure requiring kidney replacement therapy based on routine laboratory parameters (#89)**

**Dr. Helena U. Zacharias**<sup>1,2</sup>, Dr. Michael Altenbuchinger<sup>3</sup>, Dr. Ulla T. Schultheiß<sup>4,5</sup>, Dr. Johannes Raffler<sup>6</sup>, Dr. Fruszina Kotsis<sup>4</sup>, Sahar Ghasemi<sup>1</sup>, Ibrahim Ali<sup>7</sup>, Dr. Barbara Kollerits<sup>8</sup>, PhD/MD Marie Metzger<sup>9</sup>, Inga Steinbrenner<sup>4</sup>, Dr. Peggy Sekula<sup>4</sup>, Prof. Ziad A. Massy<sup>9,10</sup>, Prof. Christian Combe<sup>11,12</sup>, Prof. Philip A. Kalra<sup>7</sup>, Prof. Florian Kronenberg<sup>8</sup>, Prof. Bénédicte Stengel<sup>9</sup>, Prof. Kai-Uwe Eckardt<sup>13,14</sup>, Prof. Anna Köttgen<sup>4</sup>, Prof. Matthias Schmid<sup>15</sup>, Prof. Wolfram Gronwald<sup>2</sup>, Prof. Peter J. Oefner<sup>2</sup>

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**Introduction**

Identification of chronic kidney disease (CKD) patients, who are at risk of progressing to kidney failure requiring kidney replacement therapy (KRT), frequently also designated as end-stage kidney disease (ESKD), is important for clinical decision-making and clinical trial design and enrollment. We report a new 6-variable risk model based on routine laboratory parameters that predicts progression to ESKD requiring KRT initiation in CKD patients.

**Methods**

To develop this model, we analyzed data from 4,915 patients of the prospective observational German Chronic Kidney Disease (GCKD) cohort study. During an observation period of  $3.71 \pm 0.88$  years, 200 of the 4,915 patients (4.07%) progressed to initiation of KRT, defined as long-term dialysis or kidney transplantation.

**Results**

A Least Absolute Shrinkage and Selection Operator (LASSO) Cox proportional hazards model was trained and tested in a subsampling approach and achieved a median concordance (C) index of 0.899 (95% CI, 0.871-0.920). Comprising the variables serum creatinine, albumin, cystatin C, and urea, as well as hemoglobin and the urine albumin-to-creatinine ratio, the new risk model outperformed the 4-variable Tangri risk equation, currently the golden standard to predict ESKD events in CKD patients, which achieved a median C index of 0.866 (95% CI, 0.830-0.897) in the subsampling approach. Likewise, the novel 6-variable risk equation always yielded positive net reclassification improvements in comparison to the Tangri risk equation evaluated one, two, three, and four years after the baseline

## Final Accepted Contributions

visit. This 6-variable risk score further outperformed the Tangri risk score in three independent, international validation cohorts comprising, in total, 3,064 CKD patients, with improvements in C statistics ranging from 0.010 to 0.018.

**Conclusions/Outlook**

In conclusion, the proposed risk model based on easily accessible routine laboratory parameters led to a marked improvement in the distinction of CKD patients likely to progress to ESKD requiring KRT.

## A-07-06

**Success of a high-protein and high-unsaturated fat dietary intervention: The NutriAct Trial (#95)**

**M.Sc./M.A. Laura Pletsch-Borba**<sup>1</sup>, Dr. Konstantina Apostolopoulou<sup>1</sup>, Charlotte Wernicke<sup>1</sup>, Silke Hornemann<sup>2</sup>, Christiana Gerbracht<sup>2</sup>, Andreas F. Pfeiffer<sup>1,3</sup>, Prof. Joachim Spranger<sup>1</sup>, Prof. Knut Mai<sup>1</sup>

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**Introduction**

NutriAct is a randomized controlled trial designed to assess the effects of a food pattern focusing on a high-protein and high-unsaturated fat intake in prevention and progress of age-related diseases. The present project investigates the success of the dietary intervention.

**Methods**

NutriAct is a 36-month randomized controlled multi-center trial ongoing since 2016 in Berlin and Potsdam. At baseline, 502 participants were randomized into two study arms; control: usual care and dietary recommendations of the German Nutrition Society, and intervention: intense advice to follow the NutriAct diet. The intervention includes high intake of predominantly plant proteins, unsaturated fatty acids (UFAs) and increased fiber intake, which were supported by regular nutritional sessions. The present analyzes include data collected at months 0, 3, 6 and 12. Linear mixed models were used to assess dietary intervention success and linear and logistic regression models were used to investigate determinants of food intake and intervention success.

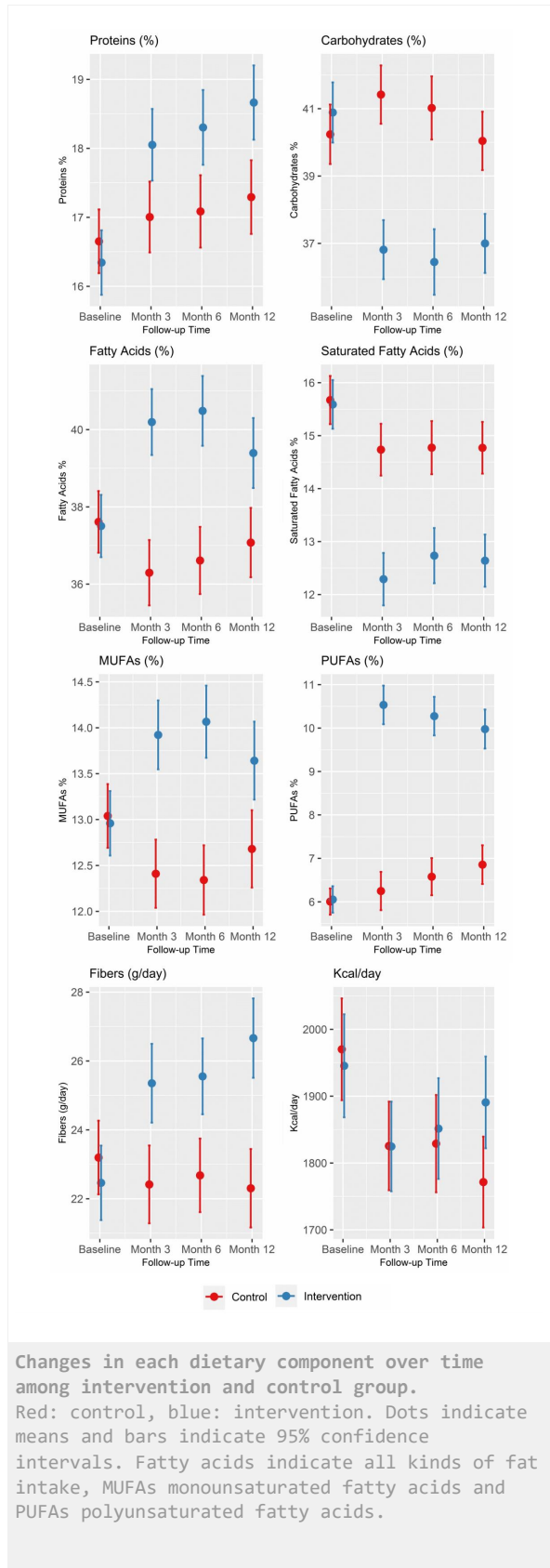
**Results**

241 intervention and 246 controls with baseline dietary data available were included in these analyzes, median age 66y (IQR 7.2y), 306 (62%) women. Waist circumference, BMI, alcohol intake and civil status at baseline were associated to baseline dietary pattern. Higher protein, fatty acids, UFAs and fiber intake; and lower carbohydrate and saturated fatty acids intake was observed in the intervention group during the 12 months ( $p < 0.001$ ). In “per-protocol” analyses, 64% of intervention participants reached  $\geq 18\%$  proteins/d or  $\geq 25\%$  UFAs/d. Baseline diet but no other baseline characteristics determined intervention success.

**Conclusions/Outlook**

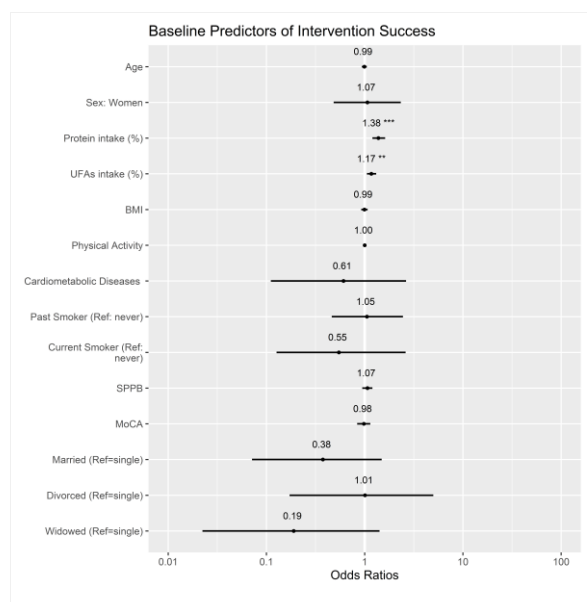
Changes in dietary patterns of the NutriAct participants were significantly different between the two intervention arms. Baseline dietary habits but no other baseline participants' characteristics were determinants of intervention success. This trial was registered at the German Clinical Trials Register as DRKS00010049.







## Final Accepted Contributions

**Baseline predictors of intervention success**

Odds Ratios and 95% confidence intervals of a multivariable adjusted model assessing baseline predictors of diet success. Intervention success defined as daily  $\geq 18\%$  protein intake or  $\geq 25\%$  unsaturated fatty acids intake (UFAs). From 241 intervention participants at baseline, at month 12, 154 (64%) consumed  $\geq 18\%$  proteins/d or  $\geq 25\%$  UFAs/d, 49 (20%) did not consume  $\geq 18\%$  proteins/d or  $\geq 25\%$  UFAs/d, and 47 participants dropped out of the intervention group. \*\*p-value $<0.01$ , \*\*\*p-value  $<0.001$ . Cardiometabolic diseases: cardiovascular diseases, hypertension, heart failure and diabetes mellitus.

## A-07-07

## Exercise Training in Pregnancy for women with overweight/obesity: A randomised controlled trial (#98)

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### Introduction

Maternal overweight/obesity is a risk factor for adverse outcomes during pregnancy, at delivery, and in the postpartum period for both mother and child. The primary aim of the “Exercise Training in Pregnancy” (ETIP) trial was to determine the effects of supervised exercise training during pregnancy on gestational weight gain in women with pre-pregnancy overweight/obesity.

## Final Accepted Contributions

**Methods**

ETIP was a single-centre randomised controlled trial. We included 91 healthy pregnant women with a body mass index  $\geq 28$  kg/m<sup>2</sup> and allocated them randomly to an exercise training group or a control group. The exercise training group was offered three weekly 60-min training sessions (35 min moderate-intensity endurance training followed by 25 min strength training). We examined the effects of exercise training on several maternal and offspring health outcomes; maternal body mass, body composition, blood pressure, circulating metabolic markers, neonatal body mass and cardiac function. The participants came for assessments at baseline (in gestational week 12-18), in gestational week 34-37 and 3 months postpartum. Our primary analyses were based on the intention to treat principle, with secondary “per protocol” analyses including only the women who exercised as prescribed.

**Results**

Women in the exercise group had lower incidence of gestational diabetes, lower blood pressure in late pregnancy and lower circulating insulin levels postpartum. There was no effect of offering overweight and obese pregnant women supervised exercise training during pregnancy on gestational weight gain, neonatal birth weight or postpartum weight retention. Only 50% of the women in the exercise group adhered to the exercise protocol.

**Conclusions/Outlook**

Our overall conclusion is that providing a supervised exercise program to overweight and obese pregnant women did not limit gestational weight gain, but reduced the risk of cardiometabolic disorders during pregnancy and in the postpartum period.

**A-07-08****Age-specific associations of serum TSH levels with markers of body composition in two population-based studies (#147)**

**Priv.-Doz. Till Ittermann**<sup>1,4</sup>, Dr. Marcello R. P. Markus<sup>2,4</sup>, Dr. Martin Bahl<sup>2,4</sup>, Prof. Stephan Felix<sup>2,4</sup>, Prof. Matthias Nauck<sup>3,4</sup>, Prof. Henry Völzke<sup>1,4</sup>, Prof. Marcus Dörr<sup>2,4</sup>

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**Introduction**

Previous studies on the association between thyroid function and body composition are conflicting and showed especially strong differences for different age groups. Our aim was to clarify age-specific associations of serum TSH levels with markers of body composition including body mass index (BMI), waist circumference, fat mass (FM), fat-free mass (FFM) and body cell mass (BCM).

**Methods**

We used data from two independent population-based cohorts within the framework of the Study of Health in Pomerania (SHIP). The study population included 5,656 individuals aged 20 to 90 years. Markers of body composition were measured by bioelectrical impedance analysis. Linear regression models adjusted for age, sex, smoking status, and study were used to associate serum TSH levels with parameters of body composition.

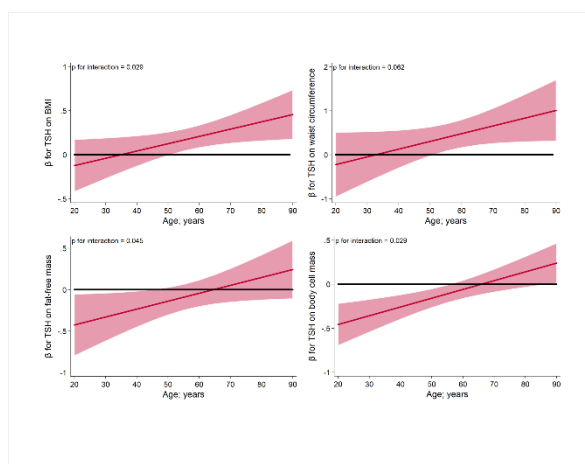
**Results**

## Final Accepted Contributions

Serum TSH levels were significantly positively associated with BMI ( $\beta=0.16$ ; 95% confidence interval [CI]: 0.06 to 0.27), waist circumference ( $\beta=0.35$ ; 95% CI: 0.08 to 0.62) and FM ( $\beta=0.32$ ; 95% CI: 0.12 to 0.52), but not with FFM ( $\beta=0.11$ ; 95% CI: -0.06 to 0.28) and BCM ( $\beta=0.02$ ; 95% CI: 0.08 to 0.12). Interaction analysis revealed positive associations of serum TSH levels with BMI, waist circumference, FM, FFM and BCM in individuals older than 60 years, while no such associations were observed in younger individuals (see attached Figure).

**Conclusions/Outlook**

We demonstrated that lower serum TSH levels were accompanied with lower values of BMI, waist circumference, FM, FFM, and BCM in the elderly, while no such associations were observed in younger individuals. Thus, our results may indicate that treatment of older individuals with low TSH levels could prevent harmful effects of sarcopenia.



#### Age-specific associations of serum TSH levels with markers of body composition

The Figure shows age-specific  $\beta$  coefficients for serum TSH levels on markers of body composition together with their 95% confidence intervals for based on interaction models.

## A-07-09

**Time Trends and Determinants of Glucose Control in Coronary Heart Disease Patients. Insights from the German subsets of the EUROASPIRE IV and V Surveys of the European Society of Cardiology.**

(#180)

**Kathrin Ungethüm**<sup>1</sup>, Dr. Silke Wiedmann<sup>1</sup>, Dr. Martin Wagner<sup>1,2,3</sup>, Prof. Georg Ertl<sup>2,4</sup>, Prof. Rainer Leyh<sup>2,4</sup>, Prof. Stefan Frantz<sup>2,4,5</sup>, Prof. Tobias Geisler<sup>6</sup>, Dr. Wolfgang Karmann<sup>7</sup>, Dr. Roland Prondzinsky<sup>8</sup>, Dr. Christian Herdeg<sup>9</sup>, Timo Ludwig<sup>1</sup>, Johannes Käs<sup>1</sup>, Benedikt Klocke<sup>1</sup>, Julia Feldheim<sup>1</sup>, Prof. David Wood<sup>10,11</sup>, Prof. Kornelia Kotseva<sup>10,11</sup>, Prof. Stefan Störk<sup>2,4</sup>, Prof. Peter U. Heuschmann<sup>1,4,12</sup>

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**Introduction**

Diabetes increases the risk for a major cardiovascular event in the high-risk population of coronary heart disease (CHD) patients. We describe prevalence and determinants of prediabetes (PDM) and unrecognized diabetes (UDM) in the German subsets of the fourth (IV) and fifth (V) European Action on Secondary and Primary Prevention by Intervention to Reduce Events (EUROASPIRE, EA).

**Methods**

EAIV (2012-13) and EAV (2016-17), initiated by the European Society of Cardiology, are European multicentre studies, evaluating secondary prevention in CHD patients (18-79 years (y)), who had been hospitalized for CHD within 6-36 months (EAIV)/ 6-24 months (EAV) prior study inclusion. German surveys were funded by the German Ministry of Education and Research within the Comprehensive Heart Failure Center Würzburg (EAIV) and the German Heart Foundation (EAV). Baseline examination comprised interview, physical measurements, oral glucose tolerance test, and blood draw in 1 of 6 German study centres in 3 regions (Halle (EAV), Tübingen (EAV), Würzburg (EAIV, EAV)). After exclusion of patients with known diabetes or missing glucose levels, UDM and PDM were defined by blood glucose and HbA1c. Determinants of UDM, reported as OR [95% CI], were identified by pooled logistic regression.

**Results**

342 EAIV participants (median 67y, 82% male) and 243 EAV participants (median 69y, 78% male) were included. UDM prevalence was lower in EAV (12% vs. 21%,  $p=0.005$ ), while PDM did not differ in the remaining study populations (80% vs. 79%,  $p=0.8$ ). After adjusting for sex, family history, smoking, physical activity, diet, time from index event and hypertension, UDM was statistically significant associated with age (1.05 [1.01, 1.08]), LDL (0.59 [0.42, 0.82]), BMI (1.06 [1.00, 1.12]), index event (acute vs. elective) (2.17 [1.23, 3.82]), and study affiliation (EAV vs. EAIV) (0.26 [0.14, 0.48]).

**Conclusions/Outlook**

Although prevalence of UDM decreased, risk factor control and glucose monitoring remain crucial in, mostly prediabetic, CHD patients.

## A-07-10

### **Associations of anthropometrics with cardiorespiratory fitness *The Study of Health in Pomerania (SHIP)***(#199)

**Dr. Armin Köhler**<sup>1</sup>, PhD/MD student Berit Filges<sup>2</sup>, Priv.-Doz. Martin Bahls<sup>1,3</sup>, PhD/MD Marcello R. P. Markus<sup>1,3</sup>, Priv.-Doz. Till Ittermann<sup>2</sup>, Priv.-Doz. Stefan Gross<sup>1,3</sup>, Prof. Henry Völzke<sup>2</sup>, Prof. Stefan B. Felix<sup>1,3</sup>, Prof. Marcus Dörr<sup>1,3</sup>

<sup>1</sup> University of Greifswald, Department of Internal Medicine B – Cardiology, Intensive Care, Pulmonary Medicine and Infectious Diseases, Greifswald, Germany; <sup>2</sup> University of Greifswald, Institute for Community Medicine, Greifswald, Germany; <sup>3</sup> German Centre for Cardiovascular Research (DZHK), Partner site Greifswald, Greifswald, Germany

#### **Introduction**

Cardiovascular disease (CVD) is responsible for one-third of all deaths in the adult population. Low cardiorespiratory fitness (CRF) is an independent risk factor for cardiovascular and all-cause disease and mortality in the general population. Hereafter, there is great potential for further lowering the burden of CVD by early risk detection and preventive strategies. The determination of CRF is an important tool for prognosis evaluation of cardiovascular events.

#### **Methods**

We used data from 1,035 individuals, (529 women; 51.12%), aged 36-93, who participated in the third follow-up of the Study of Health in Pomerania. Eighty-seven anthropometric markers were measured with a 3D body scanner. VO<sub>2</sub>peak was assessed through cardiopulmonary exercise testing. Anthropometric measurements were standardized and associated with VO<sub>2</sub>peak by sex-stratified linear regression models adjusted for age and height. Anthropometric markers were ranked according to the –log-p-values derived from these regression models.

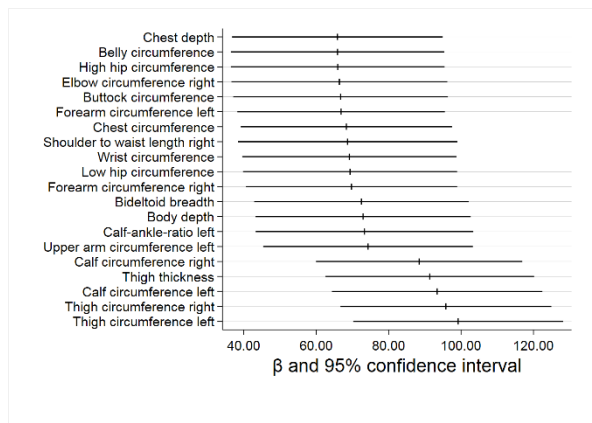
#### **Results**

The strongest associations of VO<sub>2</sub>peak with anthropometrical markers for men were found for thigh-knee-ratio left & right (–log-p-value; Mean[SD] in cm: 12.3; 1.4[0.1] & 10.4; 1.4[0.1]), forearm-fingertip length (5.3; 48.3 [2.2]), thigh circumference left (7.3; 55.3 [4.6]) and upper arm circumference left (7.7; 31.0 [2.5]). In women, the strongest VO<sub>2</sub>peak related anthropometrical markers were thigh circumference left & right (23.7; 57.4 [5.6] & 22.1; 57.7 [5.5]), calf circumference left (21.2; 37.5 [3.5]), thigh thickness (20.7; 15.0 [1.7]) and calf circumference right (19.9; 37.7 [3.5]).

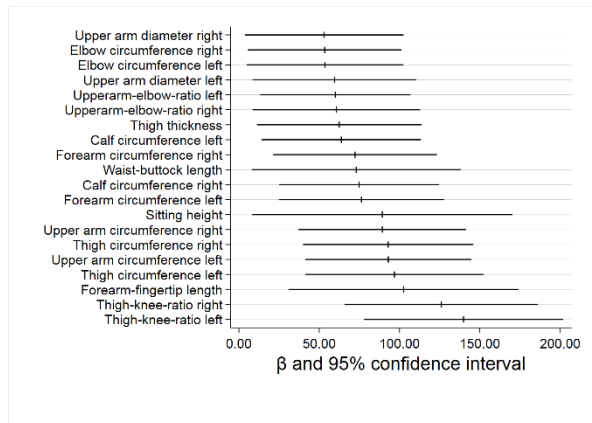
#### **Conclusions/Outlook**

The anthropometric markers detected in this study might be used to establish a prediction model for VO<sub>2</sub>peak. These anthropometric markers offer a simplified assessment of CRF in clinical routine. Such a prediction model may improve early detection of patients with high cardiovascular risk.

Final Accepted Contributions



Graph 2  
Associations of anthropometric markers with VO2peak adjusted for age and height (Females)



Graph 1  
Associations of anthropometric markers with VO2peak adjusted for age and height (Males)

## A-07-11

**Ceramides are related to cardiorespiratory fitness in the general population (#222)**

**Dr. Stefan Gross**<sup>1,2</sup>, Dr. Marcello R. Markus<sup>1,2</sup>, Prof. Ralf Ewert<sup>1</sup>, Prof. Sven Gläser<sup>3</sup>, Priv.-Doz. Nele Friedrich<sup>4,2</sup>, Prof. Henry Völzke<sup>5,2</sup>, Prof. Stephan B. Felix<sup>1,2</sup>, Prof. Marcus Dörr<sup>1,2</sup>, Dr. Martin Bahls<sup>1,2</sup>

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**Introduction**

Ceramides are sphingolipids which are important parts of cell membranes and participate in cell signalling and are involved in several biological pathways strongly related cardiovascular diseases. Higher cardiorespiratory fitness (CRF), on the other hand has cardio- and atheroprotective effects. Whether the beneficial effects of higher CRF are mediated by lower ceramide concentrations is currently unclear. We explored the association of three specific ceramides (i.e. C16:0, C22:0 and C24:0) and their ratios with different parameters of CRF in the general population.

**Methods**

We used data of the population-based Study of Health in Pomerania (SHIP-1) from North-East Germany (n= 1,419). Ceramides were quantified by LC/MS assay. CRF was assessed during symptom-limited cardiopulmonary exercise testing on a bicycle ergometer. Sex-stratified linear regression models adjusted for age, smoking, body mass index and waist circumference were used.

**Results**

In males, a one unit higher C24:0/C16:0 ratio was associated with higher VO<sub>2</sub>peak/kg, greater Wmax and greater Wmax/kg. In addition, in men a 1 µg/ml higher C24:0 concentration was related with greater Wmax/kg (see table 1). In women, a one unit greater C24:0/C16:0 ratio was associated with greater VO<sub>2</sub>peak/kg, greater VO<sub>2</sub>@AT and greater Wmax/kg. In addition, in women a 1 µg/ml greater C16:0 was related to smaller Wmax/kg. We found no relationships for the measured ceramides with crude VO<sub>2</sub>peak or VO<sub>2</sub>peak@AT (see table 1).

**Conclusions/Outlook**

We report significant associations between ceramides and some parameters of CRF. Our findings suggest potential sex specific relationships between the measured ceramides and CRF. Specifically, the finding that C24:0 was positively related to CRF in men only and C16:0 inversely sole in women suggests that the significant findings with regards to the C24:0/C16:0 ratio may be driven by different mechanisms. Future studies should explore whether ceramides contribute to the beneficial effects of high CRF.

## Final Accepted Contributions

CRF parameter	estimate	95% confidence interval	p-value
<b>Males</b>			
<b>C24:0/C16:0</b>			
VO <sub>2</sub> peak/kg	0.17 ml/min/kg	0.01, 0.33	0.039
Wmax	1.18 W	0.14, 2.21	0.026
Wmax/kg	0.014 W/kg	0.003, 0.025	0.012
<b>C24:0</b>			
Wmax/kg	0.05 W/kg	0.00, 0.09	0.045
<b>Women</b>			
<b>C24:0/C16:0</b>			
VO <sub>2</sub> peak/kg	0.17 ml/min/kg	0.04, 0.31	0.011
VO <sub>2</sub> @AT/kg	0.126 ml/min/kg	0.030, 0.230	0.014
Wmax/kg	0.014 W/kg	0.003, 0.025	0.014
<b>C16:0</b>			
Wmax/kg	-0.62 W/kg	-1.20, -0.05	0.033

Table 1: Results of linear regression analyses  
Significant effect estimates (with 95% confidence intervals) for associations of plasma ceramides (1 unit change) with CRF parameters

## A-07-12

## Stents versus Bypass Surgery – 3-Years Mortality Risk of Patients With Coronary Interventions Aged 50+ in Germany (#228)

**M.Sc./M.A. Sophia Nestler**, Dr. Daniel Kreft, Prof. Gabriele Doblhammer, On behalf of RESPONSE - Collaboration

*University of Rostock, Institute of Sociology and Demography / Chair of Empirical Methods in Social Science and Demography, Rostock, Germany*

### Introduction

Due to demographic aging and increasing multimorbidity in the population, a gain in the prevalence of coronary artery disease (CAD) and therefore a growing demand of high-risk stent and bypass interventions can be expected in the future. This study aims to investigate the mortality risk of patients following a conventional coronary artery bypass grafting (CABG) or a more recently introduced minimal invasive and more-expensive procedure by the implantation of bare-metal stents (BMS) or drug-eluting stents (DES).

### Methods

Based on a random sample of 250,000 members of Germany's largest health insurance 'Allgemeine Ortskrankenkassen' (AOK) from 2004 to 2015, incident patients with CAD were analyzed by using Cox Proportional-Hazard models. Risk adjustment was made for gender, age, other cardiac diseases, non-cardiovascular comorbidities and years since the intervention. Due to the later admission of DES and thus a shorter observation time, mortality was examined for 3 years since the intervention.

### Results

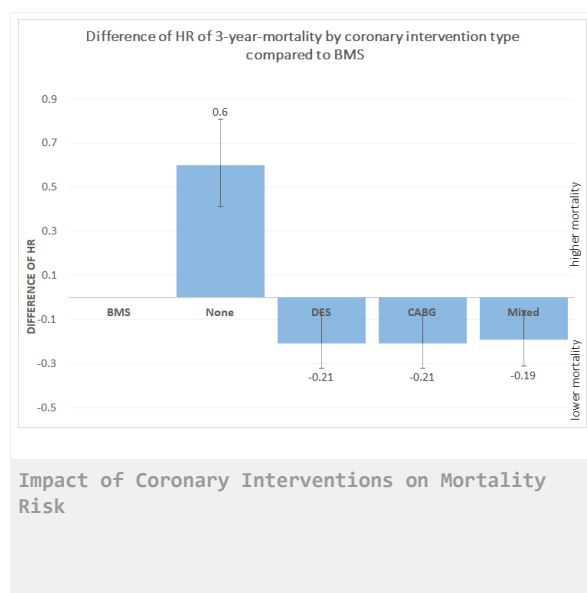
BMS represented the most common intervention strategy (48%), while there was a similar proportion of CABG (19%) and DES interventions (23%). After adjusting for various factors, the models showed a 21% ( $p=0.004$ ) lower mortality risk of DES patients with DES and also a 21% ( $p=0.002$ ) lower mortality risk of CABG-patients compared to persons with BMS.

### Conclusions/Outlook



## Final Accepted Contributions

Based on a large-scale dataset over a period of ten years, our study stated an increased mortality risk of BMS, but a survival advantage of conventional CABG and innovative DES interventions. The results help to evaluate the risks of coronary interventions; however aspects of quality of life, severity of post-operative physical limitations, duration of rehabilitation, risks of non-mortal complications combined with the patients' risk profiles and preferences as well as aspects of cost-efficacy for the hospitals and the society should be further considered.



## A-07-13

## Association of blood pressure and BMI in childhood and adolescence for subclinical atherosclerosis one decade later (#250)

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### Introduction

Highly improved sonographic measurement and complex centile modelling methods recently created the opportunity to evaluate more validly the predictive value of blood pressure and BMI in childhood and adolescence for subclinical arteriosclerosis (increased carotid intima media thickness, cIMT) in large population samples.

### Methods

The KiGGS cohort included cIMT measurements by high resolution B-mode sonography of the distal common carotid artery in 4,716 participants aged 14 to 29 in its 11-year follow-up. Semi-automated contour detection and ECG-gated real-time quality control software was used. Hypertensive blood pressure was defined according to German guidelines ( $\geq$  P95 systolic or diastolic for age, height and sex according to KiGGS percentiles and  $\geq$ 140/90 mmHg

## Final Accepted Contributions

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from age 18). Obesity was defined as BMI  $\geq$  P97 for age and sex according to Kromeyer-Hauschild percentiles and BMI  $\geq 30$  kg/m<sup>2</sup> from age 18). cIMT centiles were estimated by age and height separately for male and female participants, using the novel generalized additive model for location, scale and shape. Relative risks from log-binomial regression and predictive values were estimated using STATA.

### Results

Both hypertensive blood pressure and obesity were associated with a higher risk of elevated cIMT ( $\geq$ P90 for age, height and sex) individually, when mutually adjusted for, in combination and as trajectories. The highest relative risk was found for the combination of obesity and hypertensive blood pressure at baseline (RR 2.36, 95% CI 1.12-4.97), which however had low sensitivity (2.98%, 1.50-5.27% and low positive predictive value (23.40%, 12.30-38.0%).

### Conclusions/Outlook

After reports from high-risk and from convenience samples we could now show in a large general population sample that hypertensive blood pressure and obesity in children and adolescents aged 3-17 years are significantly, however only moderately associated with elevated cIMT one decade later.

## A-08 | Cancer epidemiology

**A-08-01****Increasing indications for neoadjuvant chemotherapy in breast cancer: Implications for quality assurance of the German mammography screening program (#63)**

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**Introduction**

The proportion of screen-detected advanced breast cancer stages is part of the medical quality assurance. Within the last decade neoadjuvant chemotherapy was introduced in addition to the treatment of large tumors with respect to the biological aggressiveness to monitor the treatment response *in vivo*. Evaluation of UICC stages is historically based solely on histopathological tumor size (pT), pretreated cancers (ypT) were excluded. In 2016 documentation was upgraded and neoadjuvant treated tumors should be documented using their clinical pretreatment tumor size (cT). We aimed to compare the frequency of neoadjuvant chemotherapy and the number of screen-detected advanced stage tumors in the periods 2010-2011 vs. 2017-2018.

**Methods**

Routine documentation data sets from 22 screening units in North Rhine-Westphalia were analyzed. Regular subsequent screening rounds were included. We identified neoadjuvant treated carcinomas by the prefix “yp”. Percentage of tumors in UICC stage II+ was calculated as proportion of all tumors staged either as 0-I or II+. Comparisons were made by the chi-square test.

**Results**

In 2010-2011 0.4% (n=14) of 3,495 screen-detected invasive carcinomas were treated with neoadjuvant chemotherapy. This was more frequent in 2017-2018 with 14.1% (n=590) of 4,187 invasive carcinomas (+13.7 percentage points;  $p<0.001$ ). Proportion of carcinomas diagnosed in stage II+ was 23.6% (n=1,028) of 4,351 staged tumors in 2010-2011. This was 4.2 percentage points lower in 2017-2018 (19.4%; n=1,004 of 5,163 staged tumors;  $p<0.001$ ). The number of advanced tumors per 1,000 examined women decreased from 1.32 in 2010-2011 to 0.98 in 2017-2018.

**Conclusions/Outlook**

Neoadjuvant chemotherapy of screen-detected invasive breast cancer clearly became more common. The frequency of advanced screen-detected stages decreased parallel. Possible underestimation of the stage due to approximation of pretreatment tumor size and lymph node status by imaging parameters prior neoadjuvant treatment needs to be further assessed.

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## A-08-02

**Association between cardiorespiratory fitness and colorectal cancer risk: results from the UK Biobank (#142)**

**Andrea Hillreiner**<sup>1</sup>, Priv.-Doz. Sebastian E. Baumeister<sup>2,3</sup>, Anja M. Sedlmeier<sup>1</sup>, Dr. Jonas D. Finger<sup>4</sup>, Prof. Hans J. Schlitt<sup>5</sup>, Prof. Michael F. Leitzmann<sup>1</sup>

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**Introduction**

Research indicates that cardiorespiratory fitness is inversely associated with the risk of various chronic conditions such as type 2 diabetes, cardiovascular disease and cancer. However, evidence on fitness in relation to risk of site-specific cancers, e.g., colorectal cancer, has been less consistent.

**Methods**

We examined the association between cardiorespiratory fitness and incidence of colorectal cancer in 59,191 UK Biobank participants aged 39–70 years without prevalent cancer at baseline.

Using data on heart rate and work load from a submaximal bicycle ergometry conducted at baseline, we derived physical work capacity at 75 % of the maximum heart rate, standardised to body mass (PWC<sub>75%</sub>), as a measure of cardiorespiratory fitness. Cancer endpoints were obtained via linkage to routine health care data. Potential confounding variables were identified a priori with the disjunctive cause criterion. We performed multivariable Cox proportional hazards regression to obtain hazard ratios (HR) and corresponding 95 % confidence intervals (CI).

**Results**

Participants were followed on average for 4.6 years, during which time 232 participants developed colorectal cancer (151 colon cancers and 79 rectal cancers). The multivariable adjusted HR of colorectal cancer per interquartile range increase in cardiorespiratory fitness was 0.78 (95 % CI 0.62–0.97). The inverse association between cardiorespiratory fitness and colorectal cancer was more evident in men (HR 0.72, 95 % CI 0.55–0.94) than women (HR 0.99, 95 % CI 0.71–1.38). The relation appeared to be most pronounced for proximal colon cancer and less so for distal colon cancer and rectal cancer.

**Conclusions/Outlook**

Increasing level of cardiorespiratory fitness is associated with decreasing risk of colorectal cancer. Further studies should investigate heterogeneity in anatomic subsites and differences by gender.

**A-08-03****The impact of comorbidities on survival of women with breast cancer compared to population controls – A long-term follow-up of the MARIE-study (#162)**

**PhD/MD student Annika Möhl**<sup>1</sup>, Dr. Nadia Obi<sup>1</sup>, Dr. Ester Orban<sup>2</sup>, Dr. Sabine Behrens<sup>3</sup>, Dr. Audrey Jung<sup>3</sup>, Prof. Jenny Chang-Claude<sup>3,2</sup>, Prof. Heiko Becher<sup>1</sup>

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**Introduction**

Breast cancer survival can be affected by many factors that include the tumor itself, side effects of treatment or underlying diseases. We aimed to examine whether comorbidities affect long-term overall survival in women with breast cancer and whether the influence of comorbidities on survival differs in women without breast cancer.

**Methods**

We used data from a German breast cancer case-control study, including 3813 women diagnosed 2002-2005 (age 50-74 years), and 7341 age-matched population controls. Study participants were followed up until 2015/2016. Cox-regression models were applied to estimate hazard ratios (HR) for the associations of comorbidity burden at baseline (Charlson Comorbidity Index (CCI)), case-control status, and their interaction with overall mortality and non-breast cancer mortality after 12 years. Estimates were adjusted for baseline sociodemographic and lifestyle factors.

**Results**

Baseline CCI was distributed equally in both groups (mean 0.52; range 0-7). Cases had a threefold higher mortality compared to controls (HR 2.98, 95%-CI 2.70-3.31) at mean CCI, whereas the association of CCI per unit increase with mortality was lower in cases (HR 1.18, 95%-CI 1.11-1.26) than in controls (HR 1.49, 95%-CI 1.40-1.58, interaction  $p < 0.0001$ ). When considering breast cancer deaths as censored observations, CCI was significantly associated with non-breast cancer mortality in both cases and controls (HR 1.36 vs. 1.46) with no indication for heterogeneity ( $p = 0.20$ ).

**Conclusions/Outlook**

Women with a breast cancer diagnosis had a higher risk of mortality during 12-year follow-up compared to unaffected women. Baseline comorbidities were significantly associated with increased mortality, and more so in controls than in cases. However, the association of CCI with non-breast cancer mortality did not differ between cases and controls. Further analyses will focus on competing risk models for cause-specific mortality and CCI as a time-dependent variable.

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**A-08-04****Incidence and survival of patients with chronic lymphocytic Leukemia: A population-based study of the epidemiological cancer registry of Lower Saxony (#168)**

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**Introduction**

Emerging new drugs in the last decade to treat chronic lymphocytic leukemia (CLL) have led to improvements in survival. We examined the incidence and survival of CLL patients in Lower Saxony (LS). Results were compared to data from the Surveillance Epidemiology and End Results (SEER) 18 database in the US.

**Methods**

Age-standardized (Europe) incidence rates per 100 000 persons were estimated in 2003-2016; trends were assessed using the joinpoint regression analysis. Period analysis was employed to compute age-standardized 5- and 10-year relative survival (RS) in 2015 for patients diagnosed in 2005-2015.

**Results**

The incidence rates in LS and the US were the same with an overall annual average of 4.9 cases/100 000. Rates in LS significantly increased in males from 2003-2014 (annual percentage change (APC)=1,  $p<0.01$ ), but decreased in 2014-2016 (APC=-9,  $p=0.2$ ). In the US, rates increased in 2008-2011 (males APC=7.9,  $p<0.01$ , females APC=8.4,  $p=0.2$ ), but decreased in 2011-2016 for both genders similarly (APC=-2.2,  $p<0.01$ ). Strong age gradients in incidence for the age groups 0-54, 55-74, 75+ (LS 1.1, 16.4, 36.4; US 0.8, 15.4, 37.1) combined for both genders were observed. The overall 5- and 10-year RS of 80.3%, 66.5% in LS and of 86.4%, 73.0% in the US were estimated. Survival decreased with increasing age, but the age-related differences were smaller for patients younger than 75 years. Five-year RS was greater than 85% (LS) and 90% (US) for patients less than 75 years, but <65% and 75% for those aged 75+ year. Females survived longer than males in LS (5-year RS: 81.4% vs. 74.7%) and in the US (87.7% vs. 86.4%). Overall, 5-year RS increased in LS and in the US between 2010 and 2015 (LS 78.4% to 80.3%, US 84.0% to 86.4%).

**Conclusions/Outlook**

Incidence trends decreased in recent years and the overall 5-year RS continued to improve in LS and in the US. Further research is warranted to elucidate ways to narrow the survival gaps for older patients with CLL and to assess the lower survival in LS compared to the US.

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**A-08-05****Incidence trends in colorectal cancer in different age groups - A population-based study using data from the cancer registry North Rhine-Westphalia (#171)****Lennart Möller**<sup>1</sup>, Ina Wellmann<sup>1</sup>, Prof. Andreas Stang<sup>1,2</sup>, Hiltraud Kajüter<sup>1</sup>

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**Introduction**

Recent studies show decreasing incidence trends of colorectal cancer (CRC) in highly developed countries. For younger adults, however, increasing incidence rates (IR) are reported. We aimed to analyze incidence-trends of CRC in North Rhine-Westphalia (NRW) by using cancer registry data.

**Methods**

CRC cases (ICD-10: C18-C20) diagnosed between 2008-2017 in NRW were evaluated. Death-certificate-only cases (9.4%) were excluded. The analysis was stratified by age-group (20-49, 50-74 and 75-99 years), site (proximal, distal, appendix and rectal based on ICD-10), morphologic subgroup (adenocarcinoma (AC), neuroendocrine carcinoma (NET)) and tumor size. Trends were estimated by calculating annual percent changes (APC).

**Results**

In total 129.264 cases of CRC were evaluated. In the age group 20-49 years the age-standardized IR of CRC increased with 1,7% per year (CI 1.1 to 2.4) while it decreased in the elderly (50-75 years: APC -2.4, CI -2.8 to -1.9; 75-99 years: APC -2.9, CI -3.3 to -2.4). Patients aged 20 to 49 years showed slightly increasing IR for proximal (APC 1.7, CI 0.3 to 3.1), distal (APC 1.1, CI -0.4 to 2.6) and rectal (APC 0.3, CI -0.7 to 1.4) sites of CRC. In older ages the IR remained constant or decreased. CRC located at the appendix showed increasing IR in all ages, notably in patients aged 20-49 years (APC 18.5, CI 12.9 - 24.4). Morphologic subgroups showed a similar pattern for NET with increases in all ages, specially in 20-49 aged patients (APC 16.2, CI 12.3 - 20.1). The IR for AC was constant for the youngest age-group and decreased in older ages. IR by size of tumor increased in patients aged 20-49 years for stage T1 (APC 14.4, CI 9.6 - 19.4) and to a lesser amount for T4 (APC 1.1, CI -0.6 - 2.8) and unknown T-stage (APC 3.0, CI 0.5 - 5.6). Rates of T2 and T3 CRC decreased for all ages.

**Conclusions/Outlook**

We found increasing IR in young patients especially for right tumor site proximal and appendix, NET and stage T1. Detailed analysis is needed to examine the etiology of CRC in young patients.

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## A-08-06

**Effect of counting DCO cases when calculating the relative incidence of Second Primary Cancer (#173)**

**Marian Eberl**<sup>1</sup>, Dr. Klaus Kraywinkel<sup>2</sup>, Dr. Luana Fiengo Tanaka<sup>1</sup>, Prof. Stefanie J. Klug<sup>1</sup>

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**Introduction**

A common problem in cancer registration is that some cases become known to the registry only after patients are deceased. The percentage of these death-certificate-only cases (DCO) in all registered cases is also used as a quality measure for cancer registries<sup>1</sup>. In light of regionally varying DCO rates over time in Germany, we have to decide whether or not to include DCO cases when analyzing the incidence of Second Primary Cancer (SPC). The objective of this research is to compare the effect of counting DCO cases when calculating the standardized incidence ratio (SIR) of SPC in patients that have initially survived lung cancer in Germany.

**Methods**

We used data from the German Center for Cancer Registry Data (ZfKD)<sup>2</sup> and demonstrate results for primary lung cancer cases [C33-34] diagnosed between 2000 and 2013. We calculate SIRs stratified by age, sex, region, year and diagnoses of second cancer, using reference rates by ZfKD. We then compared results including vs. excluding DCO cases in observed and expected cases.

**Results**

Of 264,476 patients diagnosed with lung cancer (DCO rate: 17.6%), 131,856 have survived at least 6 months. During the 15 year follow-up period 8145 (6.2%) patients developed second primary cancers of which 882 (10.8% of all SPC) were diagnosed based on DCO. The overall SIR for any second cancer was 1.38 (95%-CI: 1.30-1.46) during survival months 6-12 and 1.33 (1.28-1.39) during months 13-36 when including DCO cases; rates were considerably lower when excluding DCO: 1.08 (1.00-1.16) and 1.20 (1.15-1.26) respectively. Further, we will give an outlook whether these findings might depend on the primary cancer site investigated.

**Conclusions/Outlook**

This analysis indicates that the methodological choice of counting DCO cases might affect estimates of relative incidence of SPC in this scenario of cancer registry data with a high DCO rate. Calculations including DCO cases tend to result in higher SIR than excluding DCO from observed and expected cases.

**A-08-07****A comparison of prognostic tumor characteristics and relative survival between interval breast cancers and breast cancer in screening non-participants, a population-based cancer registry study (#207)****Florian Oesterling<sup>1</sup>**, Ina Wellmann<sup>1</sup>, Prof. Andreas Stang<sup>1,2</sup>, Dr. Laura Khil<sup>1</sup><sup>1</sup> Landeskrebsregister Nordrhein-Westfalen gGmbH, Abteilung Epidemiologie, Bochum, Germany; <sup>2</sup> Universitätsklinikum Essen, Institut für Medizinische Informatik, Biometrie und Epidemiologie, Essen, Germany**Introduction**

Interval cancers (IC), cancers presenting between two regular screening examinations after a negative result, have been supposed to have better prognostic characteristics than breast cancers (BC) in screening non-participants (NP). We compared tumor size (T-stages T1 to T4) and relative survival between IC and NP.

**Methods**

To determine whether symptomatic BC was diagnosed in NP or within 30 months after a negative screening result (IC), data from the mammography-screening-program were linked with invasive BC (diagnosis: 2006-2014, women aged 50-69 years) from the cancer registry NRW. Death certificate only cases (n = 3,733) were excluded. Tumors staged as T3 or T4 (> 5cm) were defined as large tumors. Crude as well as T-stage-standardized (T-stage distributions of the study population) relative 5-year survival (RS) was calculated using the period approach (calendar-period 2013-2014).

**Results**

There were 8,259 IC and 38,109 BC in NP. Age at diagnosis did not differ between groups. The amount of missing data for tumor size (n = 11,287) was lower in IC than NP (18.5% vs. 25.6%). The complete case analysis revealed that IC were less frequently large tumors (T1: 51.9%, T2: 40.2%, T3: 5.6%, T4: 2.2%) than BC in NP (T1: 52.1%, T2: 35.9%, T3: 5.8%, T4: 6.2%). The higher 5-year RS in IC compared to NP (92.2% [95%CI: 90.8-93.7%] vs. 88.4% [87.4-89.4%]) was mainly related to a different survival in large tumors (76.5% [69.0-83.9%] vs. 59.0% [55.1-62.2%]), as revealed by a T-stage-stratified analysis. Survival did not differ for T1 and T2 tumors. After standardization for T-stage, the difference in 5-year RS between IC and NP was attenuated (91.3% [89.7-92.9%] vs. 89.2% [88.3-90.1%]).

**Conclusions/Outlook**

For large tumors, interval cancers had a better 5-year survival than BC in non-participants. Our results suggest that large tumors in interval cancers have less aggressive characteristics than those in screening non-participants, which should be investigated in further studies.

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**A-08-08****Predictors of the regional variation of prostatectomy or radiotherapy: evidence from German cancer registries (#213)****Priv.-Doz. Daniel Medenwald<sup>2,1</sup>**, Dr. Julia Ferencz<sup>2</sup>, Prof. Dirk Vordermark<sup>3</sup>

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**Introduction**

Stereotactic body radiotherapy is an emerging technique to treat early lung cancer. The objective of this study is to assess the association of public health parameters with the regional variation in the initial treatment for prostate cancer.

**Methods**

We used data from German epidemiologic cancer registries for the years 2009-2013. Presence of a certified cancer center, a radiotherapy and/or urology institution, the district specific GDP and population density were used as predictors. Patients with indication for adjuvant treatment were excluded (T3b). Only districts with defined quality criteria were eligible.

We used general linear mixed models (equivalent to logistic regression) with a covariance matrix weighted by the Euclidean distances between districts. Models were adjusted for age, grading and TNM-stage. We performed sensitivity analyses by imputing missing data with multiple imputation and considering extreme case scenarios. We applied inverse probability weighting to account for missing values.

**Results**

When radiotherapy/surgery is compared to neither treatment, the probability for the latter was higher in East than in West Germany (OR=1.7, 95% CI: 1.43-2.02). The same was true for districts with both, a radiotherapy and urologic treatment facility (OR=1.43, 1.19-1.72).

Analyzing radiotherapy vs. surgery, the probability for prostatectomy was inversely associated with the presence of a radiotherapy unit when compared to district with neither treatment facility (OR=0.52, 95% CI: 0.38-0.73). Patients treated in East Germany were more likely to receive a surgical treatment (OR=1.34, 95% CI: 1.08-1.66). Sensitivity analyses revealed no relevant change of effect estimates.

**Conclusions/Outlook**

Treatment differs between East and West Germany and is associated with the presence of a radiotherapy or urology clinic.

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**A-08-09****Early Mortality of Prostatectomy vs. Radiotherapy as a Primary Treatment for Prostate Cancer: A Population-Based Study From the United States and East Germany. (#220)****Priv.-Doz. Daniel Medenwald**<sup>2,1</sup>, Dr. Christian T. Dietzel<sup>2</sup>, Prof. Dirk Vordermark<sup>2</sup>

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**Introduction**

Radiotherapy and surgery are both established options for the primary treatment of prostate cancer. It is the objective of this study to assess the extent of early mortality and its temporal course after prostatectomy and radiotherapy in the general population.

**Methods**

Data from the Surveillance, Epidemiology, and End Results (SEER) database and East German epidemiologic cancer registries were used for the years 2005-2013. Metastasized cases were excluded. Analyzing overall mortality, year-specific Cox regression models were used after adjusting for age (including age squared), risk stage, and grading. To estimate temporal hazards, we computed year-specific conditional hazards for surgery and radiotherapy after propensity-score matching and applied piecewise proportional hazard models.

**Results**

In German and US populations, we observed higher initial 3-month mortality odds for prostatectomy (USA: 9.4, 95% CI: 7.8-11.2; Germany: 9.1, 95% CI: 5.1-16.2) approaching the null effect value not before 24-months (estimated annual mean 36-months in US data) after diagnosis. During the observational period, we observed a constant hazard ratio for the 24-month mortality in the US population (2005: 1.7, 95% CI: 1.5-1.9; 2013: 1.9, 95% CI: 1.6-2.2) comparing surgery and radiotherapy. The same was true in the German cohort (2005: 1.4, 95% CI: 0.9-2.1; 2013: 3.3, 95% CI: 2.2-5.1). Considering low-risk cases, the adverse surgery effect appeared stronger.

**Conclusions/Outlook**

There is strong evidence from two independent populations of a considerably higher early to midterm mortality after prostatectomy compared to radiotherapy extending the time of early mortality considered by previous studies up to 36-months.

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## A-08-10

**Mortality after radiotherapy or surgery in the treatment of early stage non-small-cell lung cancer: a population based study on recent developments** (#224)

**Priv.-Doz. Daniel Medenwald**<sup>2,1</sup>, Christoph Evers<sup>2</sup>, Franziska Palm<sup>2</sup>, Prof. Dirk Vordermark<sup>2</sup>, Prof. Rafael Mikolajczyk<sup>1</sup>, Susan Langer<sup>2,1</sup>, Dr. Christian Ostheimer<sup>2</sup>

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**Introduction**

Stereotactic body radiotherapy (SBRT) can achieve high tumour control with limited toxicity for inoperable early stage non-small-cell lung cancer (NSCLC) patients.

**Methods**

The German Epidemiologic Cancer Registries from the Robert Koch Institute were assessed periods according to availability of SBRT: (1) 2000-2003 (pre-SBRT), (2) 2004-2007 (interim) and (3) 2007-2014 (broad availability of SBRT). To assess the association of cancer related parameters with mortality, hazard ratios (HR) from Cox proportional hazards models were computed. To evaluate the change of treatment related mortality, we performed interaction analyses and the relative excess risk due to interaction (RERI, additive scale) was computed.

**Results**

A total of 16,292 patients with UICC stage I NSCLC diagnosed between 2000 and 2014 were analysed. Radiotherapy utilization increased from 5% in pre-SBRT era to 8.8% after 2007. In univariate analyses survival in the whole cohort improved only marginally when 2000-2003 is compared to 2004-2007 (HR=0.92, 95% CI: 0.85-1.01) or 2008-2014 (HR=0.93, 95% CI: 0.86-1.01). Comparing surgery/radiotherapy, mortality in the radiotherapy group started from a 3.5-fold risk in 2000-2003 to 2.6 after 2007. The interaction analysis revealed a stronger improvement for radiotherapy (multiplicative scale for 2000-2003 vs. >2007: 0.74, 95% CI: 0.58-0.94). On an additive scale, treatment\*period interaction revealed a RERI for 2000-2003 vs. >2007 of -1.18 (95% CI: -1.8, -0.55).

**Conclusions/Outlook**

Using population-based data, we observed a survival improvement in stage I lung cancer over time. With an increasing utilization of radiotherapy, a stronger improvement occurred in patients treated with radiotherapy when compared to surgery.

## A-09 | Environmental medicine, exposure and risk assessments

**A-09-01****German Environmental Survey for Children and Adolescents 2014–2017 (GerES V): Internal exposure to polycyclic aromatic hydrocarbons (PAH) (#82)**

**Dr. Aline Murawski**<sup>1</sup>, Alexandra Roth<sup>1,2</sup>, André Conrad<sup>1</sup>, Dr. Gerda Schwedler<sup>1</sup>, Dr. Maria I. H. Schmied-Tobies<sup>1</sup>, Enrico Rucic<sup>1</sup>, Dr. Nikola Pluym<sup>3</sup>, Dr. Max Scherer<sup>3</sup>, Prof. Gerhard Scherer<sup>3</sup>, Dr. Marike Kolossa-Gehring<sup>1</sup>

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**Introduction**

The German Environmental Survey (GerES) is a large-scale population study carried out since the mid-1980s. As exposure to polycyclic aromatic hydrocarbons (PAH) is still of health relevance today, human biomonitoring (HBM) of PAH metabolites was performed in GerES V (2014-2017). The goal was to elucidate the current exposure of children and adolescents and the main exposure sources in order to support public health action.

**Methods**

Morning urine of 516 participants aged 3-17 years from 167 locations in Germany were analyzed for 9 metabolites of fluorene, naphthalene, phenanthrene, and pyrene by ultra-performance liquid chromatography-tandem mass spectrometry. GerES V was conducted in cooperation with the German Health Interview and Examination Survey for Children and Adolescents (KiGGS Wave 2) of the Robert Koch Institute (RKI). Hence, HBM data could be combined with extensive information on socio-demographics and behaviors.

**Results**

Geometric mean concentrations were i.a. 0.785 µg/L for 1-OH-naphthalene, 0.139 µg/L for 1-OH-phenanthrene, and 0.099 µg/L for 1-OH-pyrene. Levels generally decrease by age. Comparison with previous cycles of GerES documents a decline over time and still significant differences between former East and West Germany. Multivariate regression analysis revealed an overall positive association with tobacco smoke exposure. Consumption of grilled food and chocolate were positively associated only with some of the metabolite levels.

**Conclusions/Outlook**

Younger children with certain nutritional behaviors should receive particular attention in public health. Differences by region of residence is an important topic of further evaluation of GerES V data.

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**A-09-02****Burden of disease attributable to ambient particulate-matter pollution (PM<sub>2.5</sub>) – national and sub-national Years of Life Lost (YLL) estimates for Germany for 2017 (#119)**

**Heike Gruhl**<sup>1</sup>, Dr. Annelene Wengler<sup>2</sup>, Myriam Tobollik<sup>2</sup>, Michael Prost<sup>2</sup>, Janko Leddin<sup>2</sup>, Dr. Elena von der Lippe<sup>2</sup>, Dr. Dietrich Plass<sup>1</sup>, On behalf of the BURDEN2020 Project Team

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**Introduction**

Globally, ambient particulate matter pollution (APP) is, according to actual calculations, the most relevant environmental risk. Results from the Global Burden of Disease Study 2017 (GBD2017) show the impact on population health in Germany ranking APP 10<sup>th</sup> among all considered risk factors. Local exposures to APP vary widely and thus, the aim of this analysis, as part of the Burden2020 project, is to quantify the YLL related to APP on a country- and subnational level using national data sources for the year 2017.

**Methods**

Comparative risk assessment (CRA) methodology is used to quantify YLL attributable to PM<sub>2.5</sub>. Relative risks for risk-outcome-pairs are obtained from GBD2017 and combined with modelled population exposure to PM. Exposure assessment and YLL quantification was done at national level and based on 96 spatial planning regions. We intend to present preliminary estimates for ischemic heart diseases (IHD) and COPD and to compare the results with estimates for smoking.

**Results**

Preliminary results indicate that in 2017 about 9% of the YLL due to IHD can be attributed to APP which corresponds to 177k YLL (95%-CI: 136k-225k). Highest burden was found for the age groups 65-69 and 75-80 years. In the age groups 30-69 years the attributable burden is considerably higher for males. However, above 85 years the absolute attributable YLL for females were higher (fig. 1). YLL-rates increase with age for both sexes. Generally, YLL rates are higher for males. In the age groups 40-59 years rates for males are 5-times higher compared to females. The ratio decreases with increasing age (fig. 2).

**Conclusions/Outlook**

The analyses show, that a considerable share of YLL due to IHD can be attributed to APP. The estimates for males are higher due to the overall higher estimated underlying burden. It is expected that subnational estimations will reveal heterogeneous patterns and help to identify regions strongly affected by the impact of APP. Here, local measures can help to improve population health in these regions.



Final Accepted Contributions

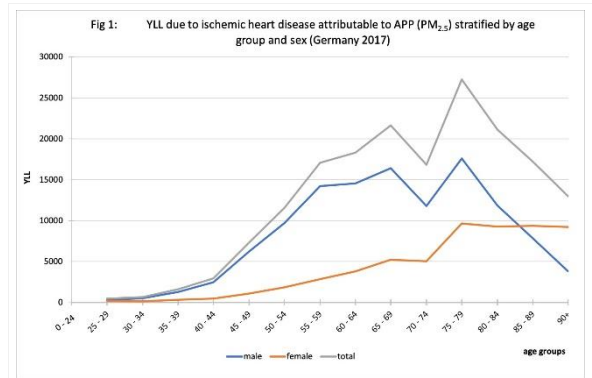


Fig. 1: YLL due to ischemic heart disease attributable to APP (PM<sub>2.5</sub>) (Germany 2017)  
YLL = years of life lost due to premature death,  
APP = ambient particulate matter pollution,  
PM<sub>2.5</sub> = particulate matter 2.5 (air pollutants with a diameter of 2.5 micrometers or less)

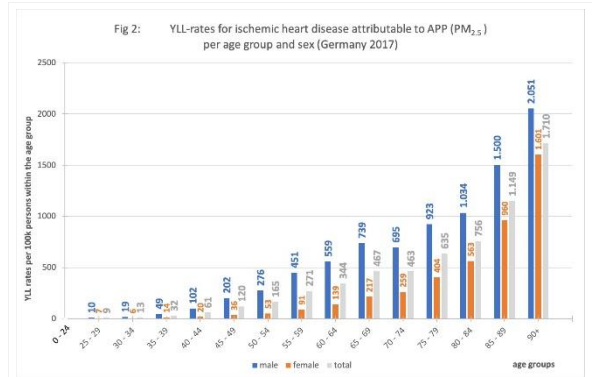


Fig. 2: YLL-rates for ischemic heart disease attributable to APP (PM<sub>2.5</sub>) (Germany 2017)  
YLL = years of life lost due to premature death,  
APP = ambient particulate matter pollution,  
PM<sub>2.5</sub> = particulate matter 2.5 (air pollutants with a diameter of 2.5 micrometers or less)

**A-09-03****The impact of a road maintenance intervention on air quality and population mobility patterns (#197)**

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**Introduction**

From January 12 to February 4, 2020, one of the main bridges connecting Mainz and Wiesbaden was closed for individual car traffic due to maintenance work. The aim of this study is to evaluate how this shutdown affected air pollution levels and mobility patterns.

**Methods**

Two monitoring stations were installed to measure meteorological and environmental variables (particulate matter and atmospheric trace gases) at high temporal resolution, during and after the intervention. Meteorological and environmental data were analysed together to identify different local sources of pollution.

A sample of 3,000 persons stratified by age, sex and postal code area was randomly drawn from General Registries Offices. A questionnaire was developed and sent to the participants in order to gain information on mobility patterns and alternative mobility choices.

**Results**

Clear diurnal patterns of air pollutants associated with traffic emissions were observed during and after the intervention, with slightly higher average levels during the closed period. In fact, NO<sub>x</sub> and black carbon decreased on average from 29.1 to 26.5 ppb and from 0.93 to 0.77 µg/m<sup>3</sup> respectively. Analysis shows strong dependence of air quality on wind direction and air mass origin.

From the original 3,000 questionnaires, 720 were returned (25.3%). Overall, 14% of the participants adapted their behavior by changing habits from car to ecological alternatives. More than 80% did not change their behavior and 48% of them continued using the car with noticeable gender, age, educational and professional qualification gradients.

**Conclusions/Outlook**

The shutdown of the traffic on the bridge was used as a quasi-experimental opportunity both to evaluate changes of background levels of pollution and mobility choices among the citizenship. Only a small part of the participant changed behaviour. Due to weather conditions during the intervention period, air quality has been even worse during this time, despite the reduced local source intensity.

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**A-09-04****Changes in mobility attitudes and behaviours during a road maintenance intervention: results from a cross-sectional study in Mainz, Germany. (#226)**

**Britta Büchler**<sup>1</sup>, Pascal Kemmerer<sup>1</sup>, Nicola Riccetti<sup>1</sup>, Sabine Fencel<sup>1</sup>, Prof. Susanne Singer<sup>1</sup>, Prof. Maria Blettner<sup>1</sup>, Dr. Emilio Gianicolo<sup>1,2</sup>

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**Introduction**

Traffic limitation is both a political and environmental epidemiologic issue. However, little is known about the determinants for changes in mobility behaviours among people facing traffic limitations. Between January, 12<sup>th</sup> and February, 4<sup>th</sup>, 2020 the main bridge between the cities of Mainz and Wiesbaden, was closed to car traffic. The present study examines how this traffic limitation affected mobility habits and what factors are related to self-reported changes in mobility behaviour.

**Methods**

From the registration offices of Mainz and Wiesbaden, the addresses of a random sample of residents of the city of Mainz (N=2500) and three districts of the city of Wiesbaden (N=500) were identified. They received a letter with a self-developed questionnaire ascertaining mobility behaviour, personal attitudes and subjective norms.

**Results**

A total of 720 questionnaires (25%) were returned. 74% of the participants reported having constant access to a car, 9% report having access, in case of need. On a 5-step Likert Scale 27% of the respondents perceive a rather high health risk from traffic exhaust emission (4 or 5 on the scale). 55% of those who use the car as favourite vehicle and 24% of those using ecological alternatives described it as rather difficult to very difficult to reach the other town (6-point Likert scale). 24% of people older than 65 years changed their favourite vehicle from car to an ecological alternative but only 8% of the people younger than 40.

**Conclusions/Outlook**

Our study added evidence on the determinants of changes of mobility behaviours among people facing traffic limitations. Traffic limitations do not affect all people equally. It was mainly the higher age groups that adapted their mobility behaviour. Influencing factors are the employment situation and the fact that the younger age groups tended to use ecological alternatives more often also before the intervention. The results of this study can be used in politics to better estimate the effects of interventions related to traffic.

## A-11 | Statistical methods in epidemiology

**A-11-01****Application of the Ant Colony Optimization Algorithm as an item selection method for short scales (#114)****Dr. Anne Moehring**<sup>1,2</sup>

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**Introduction**

The usage of e- and m-health interventions in population-based behavioral prevention and epidemiological research facilitates the use of multi-behavioral tests. The applicability of these approaches in a population as short intervention depends on the burden of the assessment and therefore limits its effect at the population level. This highlights the increased demand for psychometrically robust short scales. The construction of short scales presents psychometric challenges to researchers and conventional methods of item selection (e.g. *confirmatory factor analysis* (CFA) and *item response theory*) cannot address these problems adequately. Instead, automatic metaheuristic optimization algorithms could consider these problems and be used to select item sets for short scales. The current paper presents a rational and outline to test the implementation of the *ant colony optimization* (ACO) algorithm to develop valid and reliable short scales for the assessment of self-efficacy and decisional balance concerning health-related behaviors.

**Methods**

To demonstrate the feasibility of the ACO algorithm as a time efficient optimization method for item selection, data from 5 projects of the research collaboration "Early interventions in health risk behaviors" (EARLINT) (up to  $n = 12.372$  participants) will be used. Additionally, longitudinal data will be used to establish measurement invariance across different points of time by using multiple group CFA.

**Results**

The current paper provides an outline for the application of the ACO algorithm as a time-efficient, automatized item selection method for the construction of short scales.

**Conclusions/Outlook**

Considering the limited time resources in clinical practice for surveys, psychometrically reliable short scales are required. The ACO algorithm might be a feasible approach to develop reliable short scales for these assessments.

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**A-11-02****The GermanVasc score: A new developed risk score predicts long-term amputation-free survival in patients with peripheral arterial occlusive disease. (#138)****M.Sc./M.A. Thea Kreutzburg**, M.Sc./M.A. Jenny Kuchenbecker, PhD/MD Christian-Alexander Behrendt

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## Final Accepted Contributions

**Introduction**

Patients with peripheral arterial occlusive disease (PAOD) face elevated risk for both amputation of the lower limbs and death. To date, no risk score is available to predict the long-term outcomes for symptomatic PAOD. For supporting patients' treatment choice, we aimed to develop a risk score, denoted as GermanVasc score, to predict five-year amputation-free survival in symptomatic PAOD.

**Methods**

In this retrospective analysis of health insurance claims data BARMER, a dataset with symptomatic PAOD patients with index hospitalization was created and split into training (60%) and validation set (40%). We performed variable selection using penalized Cox regression (LASSO) with 10-fold cross-validation to predict five-year amputation-free survival (AFS). Variables entered in the algorithm were patients' age and sex, polypharmacy, Elixhauser comorbidity groups, and the 190 most common secondary diagnoses at index stay. Using the top 10 selected variables, a point risk score is derived for usage in clinical routine care and grouped in five categories (from low to high risk). We assessed the validity with discrimination (c statistics) and calibration. All analyses were stratified by severity of PAOD: intermittent claudication (IC) and chronic limb-threatening ischaemia (CLTI).

**Results**

We included 87,293 patients with symptomatic PAOD (female 45.3%, mean age  $71.4 \pm 11.1$  years). Most important variables predicting long-term AFS were higher age, cancer, and polypharmacy in both groups, IC and CLTI. The GermanVasc score exhibits a good predictive accuracy for five-years AFS for both patients with IC,  $c=0.69$  (95% confidence interval 0.66-0.72) and CLTI ( $c=0.69$ , 0.67-0.71). Expected and observed risk in the validation set were largely in alignment representing an adequate calibration.

**Conclusions/Outlook**

The GermanVasc score adequately predicts five-year amputation-free survival supporting treatment choice by discriminating patients in lower or higher risk ([riskscore.germanvasc.de](http://riskscore.germanvasc.de)).

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**A-11-03****Classifying ICD-10 Codes and Syndromes from Emergency Department Data to Improve Syndromic Surveillance (#155)**

**M.Sc./M.A. student Birte Wagner<sup>1,2</sup>**, Dr. Alexander Ullrich<sup>1</sup>, Priv.-Doz. Linus Grabenhenrich<sup>1</sup>,  
M.Sc./M.A. student Theresa Kocher<sup>1</sup>

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**Introduction**

Syndromic surveillance (SyS) systems are used to monitor public health and enable timely outbreak detection. Emergency department (ED) data can serve as an important data source for SyS, but a high amount of missing diagnosis codes can make analyses relying on this information impossible. This study aims at enhancing an ED dataset from a piloted SyS system in Germany to enable the monitoring of an influenza-like illness (ILI) syndrome.

**Methods**

Data from one ED containing mixed-type variables were analyzed and two different approaches were implemented to deal with the missing diagnosis code. In the first approach, the missing diagnosis codes were imputed by predicting

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them from the remaining variables, using a multi-class naive Bayes classifier and a deep learning imputation package. In the second approach, a logistic regression model and a binary naive Bayes classifier were used to predict the ILI syndrome from all variables except the diagnosis code. The resulting ILI cases were evaluated on time series level with regard to seasonal patterns.

### Results

The predictions of both the missing ICD-10 codes and the ILI syndrome had sufficient precision (F1-measure of 34.37% and 39.63%, respectively). The resulting ILI time-series from all models showed high correlations ( $r = 0.865$  and  $r = 0.867$ , respectively) with the time-series of internal reference cases (an expert case definition based on ICD codes) and an external data source, a SyS of severe acute respiratory infections in hospitals. By changing the threshold of the syndrome classifiers, the sensitivity of these case definitions can be adapted.

### Conclusions/Outlook

The present study showed that the ED dataset can be enhanced through imputation and supervised learning to enable the SyS of an ILI syndrome based on the diagnosis codes, even if this variable is missing. Additionally, a flexible case definition for an ILI syndrome was developed that is independent of the diagnosis code and the underlying generic method can be applied to other syndromes as well.

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## A-11-04

### Machine-learned vectorization of diagnoses on healthcare claims data characterizes diseases and patients (#165)

Dr. Edgar Steiger, Dr. Lars E. Kroll

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#### Introduction

Analyses of claims data are mostly restricted to subsets of diagnoses. The high dimensionality of the ICD-10-GM and the overlapping meaning of diagnosis codes prohibit the comprehensive integration of all codes. Our goal is to characterize diagnoses and patients by an approach that uses all available claims data, that is, all diagnosis codes with diagnosis type and reliability, as well as the relationships between the codes. This allows novel characterizations of diseases and patients, or causal analyses.

#### Methods

We vectorized all empirical combinations of ICD-10-codes and diagnosis types/reliabilities. The vectorization generates a numerical representation for every occurring combination such that similar combinations are represented by similar vectors, which are directly comparable and quantifiable. These representations were to be learned from the claims data only. To this end, we employed a statistical method from natural language processing (Word2Vec). This method extracts and expresses semantic similarities between words as numerical representations, learned from a text corpus. We treated the combinations of codes and diagnosis types as words and the corpus is composed of the patient-wise quarterly claims data as sentences.

#### Results

Our first results showed expected similarities between disease groups (e.g. injuries and musculoskeletal disorders, infections and respiratory diseases). On the individual code level, we discovered interesting connections, e.g.

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between adiposity and mild depression. On the patient level, we achieved better results when predicting treatment cases, compared to conventional approaches.

**Conclusions/Outlook**

We show that Word2Vec can be applied successfully to the artificial language of medical diagnoses. The representations are meaningful and can be used for advanced machine learning methods like neural networks. It is still work in progress and difficulties in applying a full vectorization on the data remain. More data, like prescription claims, might be readily added.



## A-12 | Collection and use of secondary data (AGENS)

**A-12-01****Die Gute Praxis Datenlinkage erweitert die Familie ‚Gute Praxis‘. (#13)****Priv.-Doz. Enno Swart<sup>1</sup>**, Dr. Stefanie March<sup>2</sup>, Dr. Christoph Stallmann<sup>1</sup>

<sup>1</sup> Medizinische Fakultät, Otto-von-Guericke-Universität Magdeburg, Institut für Sozialmedizin und Gesundheitssystemforschung, Magdeburg, Germany; <sup>2</sup> Hochschule Magdeburg-Stendal, Fachbereich Soziale Arbeit, Gesundheit und Medien, Magdeburg, Germany

**Introduction**

Mit der Guten Epidemiologischen Praxis (GEP), erstmals veröffentlicht 2000 und zuletzt aktualisiert 2019 (Hoffmann et al. 2019), und der Guten Praxis Sekundärdatenanalyse (GPS), publiziert 2005 und zuletzt 2012/2014 revidiert (Swart et al. 2015), stehen etablierte wissenschaftliche Standards für Forschungsvorhaben zur Verfügung, die isoliert Primär- bzw. Sekundärdaten verwenden. Diese beiden Guten Praxen werden seit 2019 ergänzt um die Gute Praxis Datenlinkage (GPD), die für die zunehmende Zahl von Studien (z.B. NAKO Gesundheitsstudie) mit einem individuellen Datenlinkage einen Handlungsrahmen liefert (March et al. 2019).

**Methods**

Die drei Guten Praxen GEP, GPS, GPD werden in ihrer Struktur und wesentlichen Inhalten je einzeln und in ihrem wechselseitigen Bezug dargestellt.

**Results**

Die GEP und die GPS sind als eigenständige Standards für die Planung, Durchführung, Analyse und Publikation wissenschaftlicher Studien zu betrachten. Dabei sind sie aufgrund ihrer identischen Struktur mit gleichlautenden elf Leitlinien und ergänzenden Empfehlungen eng aufeinander bezogen. Die GPD fokussiert in sieben Leitlinien und jeweils spezifischen Empfehlungen stärker auf (datenschutz-)rechtliche, infrastrukturelle und methodische Aspekte des Datenlinkage. Dabei muss das Datenlinkage im Kontext der Studienplanung explizit begründet und in seinen Potenzialen und Limitationen bewertet werden.

**Conclusions/Outlook**

Mit der Veröffentlichung der Guten Praxis Datenlinkage stehen für Epidemiologen und Gesundheitswissenschaftler drei sich gegenseitig ergänzende Gute Praxen bereit. Weitere Gute Praxen ergänzen die o.g. wissenschaftlichen Standards. Dazu gehören die Gute Praxis Gesundheitsberichterstattung (Starke et al. 2017), die Gute Praxis Gesundheitsinformation (Netzwerk EbM 2016) oder die Gute Praxis Kartographie im Gesundheitswesen (Augustin et al. 2017). Abgerundet werden sie durch die Berichtsformate STROBE (von Elm et al. 2007) und STROSA (Swart et al. 2016).

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## A-12-02

## Survival time of palliative patients receiving non-specialized ambulatory palliative care - an analysis of routine data of a statutory health insurance (#46)

**Dr. Kilson Moon**, M.Sc./M.A. Laura Rehner, Prof. Wolfgang Hoffmann, Priv.-Doz. Neeltje van den Berg

Universitätsmedizin Greifswald, Institut für Community Medicine, Greifswald, Germany

### Introduction

Care for palliative patients is provided as non-specialized and specialized care, both in the in- and outpatient sector. However, two-thirds of the supply of palliative care is provided as non-specialized care in the outpatient sector (AAPV) and about one-fourth of the patients received AAPV for only one day. We explored whether the survival time of patients with only 1 day AAPV differs from patients with >1 day AAPV.

### Methods

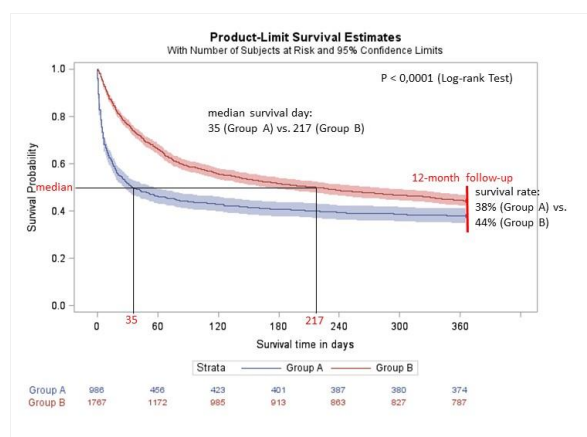
The analyses were based on routine data of the statutory health insurance AOK Nordost. The study population included 4,177 patients in Mecklenburg-Western Pomerania who received their first palliative care in 2015. The patients were followed up for a maximum of 12 months after the start of the treatment. Patients who received only AAPV with 1 day treatment were assigned to group A and AAPV with >1 day treatment to group B. The survival analysis was carried out using Kaplan-Meier curves. The median survival times were compared with the log-rank test.

### Results

2,753 patients received only AAPV. Thereof, 986 patients (36%) received only one day of AAPV treatment. The survival curves differed between the groups A and B (fig.1). The median survival time was significantly longer in group A (35 days, n=986) than in group B (217 days, n=1,767,  $p < 0.0001$ ). The survival rate after 12 months was higher in group A (38%) than in group B (44%).

### Conclusions/Outlook

Patients who received only AAPV probably received the appropriate kind of palliative care. However, a part of the patients with only 1 day of AAPV treatment might have received this care too late, this could be an indication for undersupply.



## Final Accepted Contributions

Fig. 1: Kaplan-Meier Curve of palliative care patients (12-month follow-up): Group A vs. Group B

Group A: patients receiving only non-specialized outpatient palliative care, treatment = 1 day;  
Group B: patients receiving only non-specialized outpatient palliative care, treatment > 1day

## A-12-03

## Assessment of routine data to describe the characteristics of invasive home mechanical ventilated patients (#53)

**Lilly Brandstetter**<sup>1</sup>, Martha Schutzmeier<sup>1</sup>, Dr. Jutta Ahnert<sup>1</sup>, Anna Grau<sup>1</sup>, Laura Gerken<sup>2</sup>, Hanna Klingshirn<sup>2</sup>, Prof. Bernd Reuschenbach<sup>2,3</sup>, Dr. Maximilian Kippnich<sup>4</sup>, Prof. Thomas Wurmb<sup>4</sup>, Katja Lehmann<sup>5</sup>, Prof. Peter Heuschmann<sup>1,6</sup>, Dr. Kirsten Haas<sup>1</sup>

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### Introduction

The number of patients with invasive home mechanical ventilation (IHMV) in Germany is vastly increasing. Currently, only limited data is available on patient numbers or their characteristics. Besides, new guidelines for the assessment of the nursing levels were implemented by the Medical Service of Health Insurances (MDK) in 2017. Within the project OVER- BEAS (funding by G- BA, Grant 01VSF17008) the health care of IHMV patients living in Bavaria was evaluated.

### Methods

Routine data were derived from the care assessment of the MDK in Bavaria (years 2017- 2018). IHMV patients were identified using specific filter variables, as they cannot be directly identified from the data. Patients were analyzed regarding demographic characteristics, the diagnosis justifying long-term care, their mobility, the nursing level, and therapeutic measures.

### Results

The dataset comprised 268 adult IHMV patients (64.9% male, median age 67, IQR 58- 76). They lived either in nursing homes (NH) (17.2%), at home (28.0%), or in assisted living communities (ALC) (54.9%). Patients living in NH had more often pneumological diseases (52.2%;  $p < 0.001$ ), compared to patients living at home or in ALC, who were more often diagnosed with neurological diseases (home 29.3%, ALC 27.2%;  $p = 0.049$ ). Regarding the mobility, patients living at home or in ALC were more often severely impaired (home 92.0%, ALC 93.2%) than those living in NH (73.9%;  $p = 0.001$ ). 69.8% of patients had a nursing level of 5 and 92.2% received at least one type of therapeutic measure (physical, occupational, speech therapy).

### Conclusions/Outlook

## Final Accepted Contributions

Routine data can be successfully used to describe the characteristics of patients in the highly complex setting of IHMV. The most severely impaired patients lived in ALC, which especially offer tailored care to fulfill their needs. However, further investigation using qualitative data is needed to unveil and improve the long-term care situation of IHMV patients.

## A-12-04

**InfAct – Information for Action: Towards a European Health Information System (EU-HIS) (#55)**

**Martin Thißen**<sup>1</sup>, Stefanie Seeling<sup>1</sup>, Dr. Angela Fehr<sup>1,2</sup>, Dr. Thomas Ziese<sup>1</sup>

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**Introduction**

Quality, as well as the level of comparability, of health information differs considerably between EU-Member States. In March 2018, the EU-Joint Action *InfAct* ('Information for Action') was launched to tackle this challenge. *InfAct* includes 40 partners in 28 EU and associated countries as well as international organisations. It aims to prepare a sustainable and solid EU-infrastructure for health information, thereby strengthening HIS at European and national levels. The infrastructure shall improve the availability of comparable and policy-relevant public health data and information. This, in turn, will facilitate public health research and support (health) policy developments.

**Methods**

*InfAct* builds on the BRIDGE Health project and other initiatives in health information (e.g. European Core Health Indicators, ECHI). It comprises 5 substantive, 2 structural and 3 central work packages (WP). The Robert Koch Institute (RKI) leads the WP on the status of HIS and, in this context, conducted a Delphi survey on the prioritisation of health information for national health reporting (e.g. indicator selection). In addition, RKI performed a web-based desk research on formats and target groups of national health reporting in *InfAct* partner countries. Based on the findings, a guidance document for health reports will be drafted. Furthermore, RKI contributed to the process of updating the ECHI indicators.

**Results**

The *InfAct* project aims to create a sustainable infrastructure for population health research and health information, thereby reducing health information inequalities. RKI contributions focus on good practice examples and guidance documents in the field of national health reporting, on prioritisation of health information and up-to-date ECHI indicators.

**Conclusions/Outlook**

Currently, several *InfAct* partner countries are contributing to an application for an EU preparatory procedure (ESFRI Roadmap) with a view to establishing a European Research Infrastructure Consortium (ERIC) on health information.

**A-12-05****Prävalenzvergleich zwischen DEGS- und Routinedaten: Was heißt Lebenszeitprävalenz in Routinedaten? (#70)**

**M.Sc./M.A. Batoul Safieddine**, Prof. Siegfried Geyer, Dr. Jelena Epping

*Medizinische Hochschule Hannover, Medizinische Soziologie, Hannover, Germany*

**Introduction**

Häufig wird vermutet, dass Prävalenzen in Routinedaten nicht die Morbiditätswirklichkeit abbilden, weil das Kodierverhalten von den Abrechnungsmodalitäten beeinflusst wird. Andererseits wird diskutiert, dass morbidere Personen durch Surveys schlecht erreicht werden, was zu einer Unterschätzung der Prävalenz führt. Am Beispiel Herzinfarkt (HI) wollen wir die Prävalenzen in DEGS-Daten mit denen in Routinedaten der AOK Niedersachsen (AOKN) vergleichen.

**Methods**

Basierend auf der Falldefinition in DEGS, haben wir in den AOKN-Daten eine entsprechende Falldefinition versucht umzusetzen. Problem 1: Der Beobachtungszeitraum in AOKN umfasst 2005-2017, was nicht der Lebenszeitprävalenz aus DEGS entspricht. Problem 2: Die soziodemographische Struktur unterscheidet sich zwischen DEGS und AOKN. Problem 3: In den AOKN-Daten konnten viele Personen identifiziert werden, die gesicherte ambulante aber keine stationären HI-Diagnosen erhielten.

**Results**

Lösung 1: Ausgehend vom verfügbaren Beobachtungszeitraum für AOKN-Daten wird die Fallzahl in den DEGS-Daten nur auf die Fälle beschränkt, die innerhalb von 13 Jahren vor Befragungszeitpunkt stattgefunden haben (n=162). Lösung 2: Um die Effekte der Unterschiede in der soziodemographischen Struktur aufzufangen, wurde die AOKN-Population nach Geschlecht, Alter und Berufsbildungsabschluss zur DEGS-Stichprobe parallelisiert. Lösung 3: Hinsichtlich der Diagnosedefinition wurden beide Varianten durchgerechnet, die gesicherte ambulante Diagnosen ausschlossen bzw. enthielten. Die errechneten Prävalenzen unterscheiden sich nicht signifikant: DEGS mit 2,8%(2,4-3,2) und AOKN mit 2,3%(1,9-2,7) bzw. 3,1%(2,7-3,6) inklusive ambulante Diagnosen.

**Conclusions/Outlook**

Wir vermuten, der fehlende Unterschied in der Prävalenz könnte zum einen aufgrund der Selektivität durch die Bedingung einer durchgängigen Versicherung entstanden sein. Andererseits könnte es bei DEGS-Befragten zu verfälschten Erinnerungen an einen Verdacht auf HI gekommen sein, der nie bestätigt wurde.

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**A-12-06****Continuity in palliative care: analysis of delays between inpatient palliative care and subsequent care based on routine data of a statutory health insurance (#100)**

**M.Sc./M.A. Laura Rehner**, Dr. Kilson Moon, Prof. Wolfgang Hoffmann, Priv.-Doz. Neeltje van den Berg

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**Introduction**

The aim of palliative care is to reduce a patient's suffering during the last phase of life and to maintain quality of life. Palliative care should be provided continuously during transitions between healthcare sectors. This can be a challenge in rural areas with a low density of palliative care providers. The aim of this study was to analyse the time intervals between inpatient care and subsequent palliative care.

**Methods**

The analysis was based on routine data of the statutory health insurance AOK Nordost. All patients who had received palliative care for the first time in 2015 were included. The course of treatment was followed for 12 months.

**Results**

In Mecklenburg-Western Pomerania 4,177 palliative patients were identified. The average age was 81.0 years. During the observation period 2,866 (68.7%) patients died.

415 patients received general palliative care in a hospital. Of these 281 (67.7%) patients received subsequent palliative care within 14 days after discharge, 29 (7.0%) of these patients returned to a hospital and 18 (4.3%) patients moved into a hospice. For 88 (21.2%) patients it took longer than 28 days to receive any subsequent palliative care, 43 (10.4%) were readmitted to a hospital. 124 patients were treated at a palliative care unit in hospital. Of these 93 (75.0%) patients received subsequent palliative care within 14 days, thereof 10 patients returned to hospital and 2 patients moved into a hospice. For 18 (14.5%) patients it took longer than 28 days to receive subsequent palliative care (readmission n=8).

**Conclusions/Outlook**

Time delays before subsequent palliative care after discharge from hospital mainly affects patients who received general inpatient palliative care, compared to patients after specialised palliative care at a palliative care unit. When outpatient palliative care was not provided, several patients returned to hospital after 28 days. Discharge management after general inpatient palliative care should be better coordinated, to avoid undersupply with palliative care.

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**A-12-07****A claims-based prediction model for mortality and hospitalization due to heart failure (#188)****Dr. Dagmar Drogan**<sup>1</sup>, Dr. Gerhard Schillinger<sup>2</sup>, Dr. Julian Bleek<sup>2</sup>, Christian Günster<sup>1</sup>

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**Introduction**

Heart failure (HF) is a leading cause of hospitalization and death in Germany. Since worsening of HF is partly avoidable, tailored care management programs could profit from early identification of patients at increased risk of HF deterioration. Thus, we developed a model to predict mortality and HF-related hospitalization in HF patients.

**Methods**

Using claims data of the largest statutory health insurance fund in Germany (AOK) we identified 1.345.496 individuals with a HF diagnosis in 2016 or 2017. The data was randomly split into a 60% training and a 40% testing set. In the training set, we performed logistic regression to predict likelihood of hospitalization due to HF and / or mortality in 2018. Adjustment variables included age, gender, nursing care level, past healthcare utilization, drug prescriptions, co-morbidities and stages of disease severity. The model was evaluated using area under the receiver-operating characteristics (AUC) and calibration curves. Furthermore, we calculated levels of sensitivity and positive predictive value (PPV) across percentiles of endpoint probabilities.

**Results**

In total, 88.170 HF-patients (6.6%) experienced a HF-related hospitalization in 2018 and 142.164 patients (10.6%) died. In the training set, prediction of either endpoint - experienced by 15.4% of HF-patients - resulted in an AUC of 0.79. The number of endpoint events tended to be overestimated in low-risk patients. A twofold increased event rate was observed for patients in the top 30% of endpoint probabilities (PPV=34%, sensitivity=66%). Care management focusing on the top 10% of high-risk patients would profit from a threefold increased event rate (PPV=47%), but lower sensitivity (30%). When applying the model to the test set, the AUC was 0.79 and predicted exceeded true events by 0.3%.

**Conclusions/Outlook**

Our claims-based prediction model seems to be useful to identify HF patients at increased probability of HF-related hospitalization or death who would benefit most from care management interventions.

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## A-12-08

**Health care utilization of children and adolescents with mental health problems: usual care versus an extended health coaching consultation by pediatricians (#189)**

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**Introduction**

The proportion of children and adolescents (CA) diagnosed with mental health problems (MHP) in Germany has increased over the last years, while a shortage of specialized care has been reported. To improve primary care, a statutory health insurance fund (BKK) introduced a program for its insurees targeted at primary care pediatricians. After having participated at a training concept pediatricians could offer an extended health coaching consultation (HCC) with the aim to reduce utilization of specialized care. The objective of our study was to compare health care utilization for CA receiving HCC to those not receiving HCC.

**Methods**

In the project PrimA-QuO (Primary Care of Children and Adolescents with Psychological Abnormalities and Disorders-Evaluation of Quality and Outcomes) we identified all CA diagnosed with MHP in Bavaria, based on BKK routine data from 2013 to 2016. CA with HCC during the quarter of their first MHP diagnosis were defined as treatment group. CA receiving usual care but never HCC were defined as control group. We calculated costs (specialized care, pediatrician care and overall disease related care) for the year after diagnosis, using them as proxies for health care utilization. To adjust for confounders, we used a Full Matching approach. Linear regression models were used to analyze group differences.

**Results**

We identified 3,085 CA in the treatment group and 44,552 in the control group. Overall disease-related costs were 45€ (95% CI: -95€, 5€) lower for CA with HCC ( $p = 0.078$ ). Costs for CA with HCC were 60€ (95% CI: -92€, -28€) lower for specialized care ( $p < 0.001$ ), but 63€ (95% CI: 58€, 67€) higher for pediatrician care ( $p < 0.001$ ).

**Conclusions/Outlook**

From a payer's perspective, the HCC lowers the utilization of specialized care of CA with MHP, while increasing the utilization of pediatrician care. Thus, the HCC could have the potential to relieve the specialized care.

**A-12-09****Prevalence and screening rate of gestational diabetes based on data from all hospital births in Germany (#223)**

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**Introduction**

Gestational diabetes (GDM) is defined as elevated blood glucose levels first diagnosed during pregnancy. GDM is associated with increased risk for pregnancy complications and future development of type 2 diabetes. A two-stage screening consisting of a pre- and diagnostic test (50g or 75g glucose) for GDM is recommended in the pregnancy guidelines of the Federal Joint Committee (G-BA). Based on data of all hospital births in Germany we estimated the prevalence and screening rate of GDM.

**Methods**

Based on the federal quality insurance, we analyzed all hospital births between 2013 and 2018. Women with existing diabetes were excluded. GDM cases were identified either by documentation in the antenatal card or the ICD-10 diagnosis O24.4 coded during the hospital stay. The screening rate was calculated using both the information on the pre- and diagnostic test documented in the antenatal card and was available for the reporting period 2016 to 2018. Data retrieved was stratified by age and reporting year.

**Results**

The prevalence of GDM rose from 4.6% in 2013 to 6.8% in 2018. For all reporting years, prevalence markedly increased with maternal age. In 2018, the prevalence for women aged 45 years and older was 15.9% compared to 2.5% for women under the age of 20. In the same year, 88.1% of women received either a pretest (63.7%), a diagnostic test (6.5%) or both (17.9%). With increasing age, the proportion of women receiving both test or the diagnostic test only increased. Between 2016 and 2018 the proportion without a documented test decreased from 16.6% to 9.9%.

**Conclusions/Outlook**

Given the steady increase of gestational diabetes, the dataset used for this study allows for continuous analysis of prevalence and screening rate of GDM, which is of great value for the surveillance of noncommunicable diseases. Further analysis of the data focusing on risk factors of GDM may lay the ground for the development of preventive measures.

## A-13 | Young Investigators Group Epidemiology

**A-13-01****CANKADO as Web-Based eHealth-System in Patients with Multiple Myeloma - A Pilot Project in the Hematological-Oncological Outpatient Department of the University Medical Center of the Johannes Gutenberg University Mainz (#10)****M.Sc./M.A. Katja Brudy***University Medical Center Mainz, Interdisciplinary Center Clinical Trials (IZKS), Mainz, Germany***Introduction**

In this prospective and exploratory cohort study the implementation of CANKADO as an ePRO-system (electronic Patient Reported Outcome) was tested in the hematological-oncological outpatient department of the University Medical Center in Mainz. CANKADO is a web-based digital patient diary as part of cancer therapy (1).

(1) Schinköthe T. Medizin-Management-Preis 2015 Ausschreibungsunterlagen: Bewerbung CANKADO eHealth-Projekt zur Steigerung der Therapieadhärenz in der Onkologie; 2014 [cited 2020 Apr 14]. Available from: URL: [www.medizin-management-verband.de/pdf/medizin-management-preis-2015/E\\_GEMKOM\\_Bewerbung.pdf](http://www.medizin-management-verband.de/pdf/medizin-management-preis-2015/E_GEMKOM_Bewerbung.pdf).

**Methods**

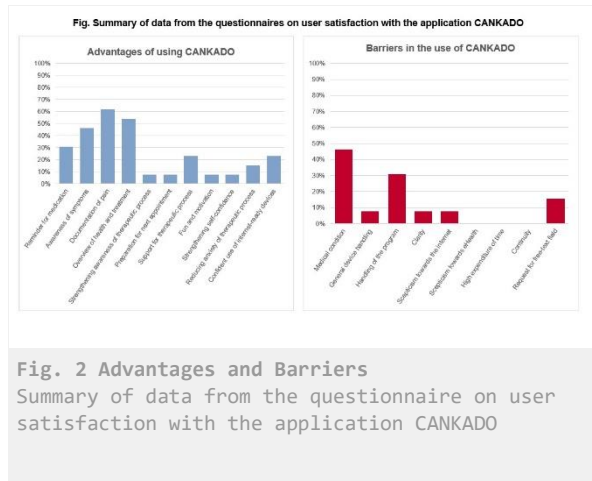
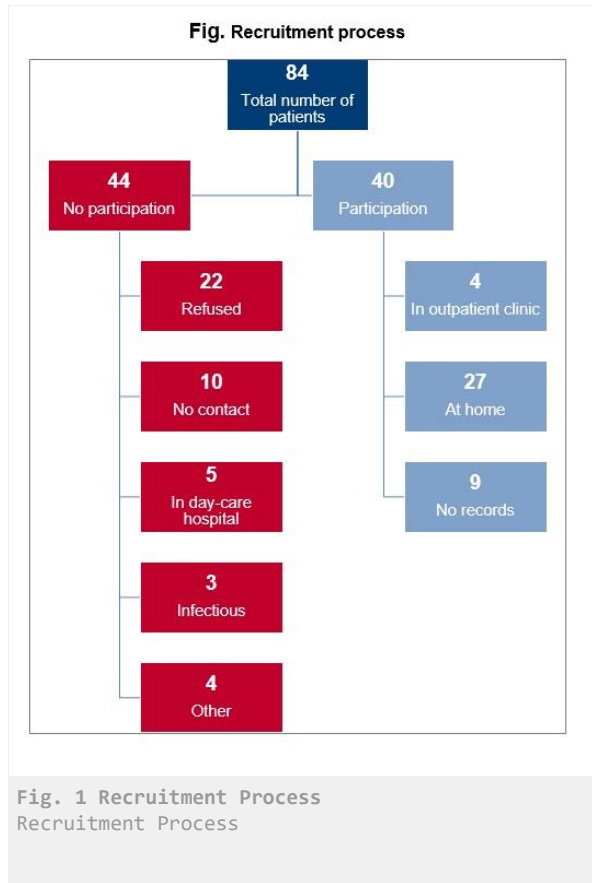
Between february and june 2018, the participating myeloma patients tested CANKADO. An additional questionnaire on complaints was triggered if there were significant changes. This trial period ended with a survey of user satisfaction.

**Results**

There were 31 active participants (20 men, 11 women; median age 66 years) out of 84 patients (Fig. 1). The most commonly named reason for non-participating was that no internet-ready devices was available. There were in total 844 records of health status, 835 on pain scales and 566 answered complaints-questionnaires. Thirteen patients answered the questionnaire on user satisfaction. The evaluation was largely positive and most patients wanted to continue the use of CANKADO (Fig.2).

**Conclusions/Outlook**

The most important findings are that there is a high personnel expenditure in implementing an ePRO-system and that there is a high heterogeneity within the user behavior that need to be addressed while implementation and evaluation. To reach more patients it is possible to include caregivers, provide technical devices and provide CANKADO in more languages.



**A-13-02****Years of Life Lost in Germany. Results from the German Burden of Disease Study BURDEN 2020. (#64)**

**Dr. Annelene Wengler<sup>1</sup>**, Janko Leddin<sup>1</sup>, Heike Gruhl<sup>2</sup>, Dietrich Plass<sup>2</sup>, Elena von der Lippe<sup>1</sup>

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**Introduction**

The German cause-of-death statistics are often used to draw conclusions about the health status of the population and the relative importance of certain disease. Along these lines, these statistics can be the basis for calculating years of life lost (YLL). Together with the years lived with disability (YLD) they form the disability-adjusted life years (DALY) as the main outcomes of Burden of Disease (BoD) calculations. YLL-estimates from the first national BoD-study for Germany (BURDEN 2020) are presented.

**Methods**

Beforehand, deaths from non-informative ICD-10-codes were redistributed to valid codes adapting the methodology of the Global BoD-study. YLL are a measure of lost years due to death in a population using the remaining life expectancy of a person at the time of death. For the analyses most recent data for Germany (year 2017) and the maximum German life expectancy across the federal states are used. YLL are estimated by cause, age, sex, and spatial planning region ( $n = 96$ ).

**Results**

The cause of death accounting for most YLL is ischemic heart disease for both sexes (around 1.9 million YLL). For women breast cancer causes the second most YLL (390,000 YLL). For men it is tracheal, bronchus, and lung cancer (660,000 YLL). As expected injuries as causes of death occurring more often in younger individuals and males cause higher YLL here. In higher ages (above 85) Alzheimer's disease and other dementias are the second most important cause of death (200,000 YLL), first still being ischemic heart disease (450,000 YLL). Further emphasis will be put on presenting regional variations.

**Conclusions/Outlook**

Not considering age at death and assessing the importance of a certain disease for population health by only using number of deaths might be insufficient. Combining the number of deaths and age at death by estimating the time lost (YLL) due to specific causes allows a more detailed and comprehensive appraisal of the impact of diseases and therefore a more precise targeting of public health strategies.

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**A-13-03****Exposition gegenüber Tieren unter Studienanfänger\*innen der Veterinärmedizin – Bewertung mit Hilfe eines Scoring-Systems (#88)**

**Christoph Nöllenheidt**, Priv.-Doz. Frank Hoffmeyer, Dr. Alexandra Beine, Dr. Martin Lehnert, Prof. Thomas Behrens, Prof. Thomas Brüning, Dr. Dirk Taeger, Prof. Monika Raulf

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**Introduction**

Im Rahmen einer Längsschnittuntersuchung mit 313 Studienanfänger\*innen der Veterinärmedizin wird die Tierallergenbelastung im Laufe des Studiums erfasst und ihr Einfluss auf die Entwicklung von Sensibilisierungen und Beschwerden an den Atemwegen bewertet. Ziel der hier dargestellten Analyse ist es, die mittels Fragebogen erhobenen Angaben zur Exposition gegenüber Tieren vor Beginn des Studiums in einem Score zu erfassen.

**Methods**

Die vor dem Studienbeginn bestehende Exposition gegenüber Haus- und Nutztieren wurde anhand von Fragebogen-Items in einem Score zusammengefasst. Jeder Tierkontakt wurde in Abhängigkeit von der Tierart, Ort (u. a. Bauernhofkindheit) und Zeitraum der Exposition unterschiedlich gewichtet. Des Weiteren wurde die Intensität der Exposition berücksichtigt und mit der Anzahl der Expositionsmonate sowie dem Gewichtungsfaktor multipliziert. Für jede/-n Befragte/-n wurde der prozentuale Anteil am größtmöglichen Scorewert berechnet und in eine niedrige (0-10%), mittlere (über 10-30%) und höhere (über 30%) Exposition zusammengefasst.

**Results**

97% der Proband\*innen hatten häufig Umgang mit Haustieren in der Jugend, 72% mit Hunden, 64% mit Katzen und 77% mit anderen Haustieren, wobei darunter Kaninchen (37%) am häufigsten genannt wurden. Kontakt zu Nutztieren hatten 79% der Proband\*innen, wobei der Kontakt zu Pferden (65%) am häufigsten angegeben wurde. Die größte Gruppe (n=243) der Studienanfänger\*innen entfiel auf einen Anteil von bis zu 10% am Maximalscore. Mit zunehmender Tierexposition nahm die Gruppengröße ab. In die 2. Kategorie (mittlere Exposition) fielen 62 Proband\*innen. Eine höhere Exposition wurde nur bei 8 Teilnehmer\*innen beobachtet.

**Conclusions/Outlook**

Anhand des Scores konnte die Vorexposition gegenüber Tieren klassifiziert werden. In weiterführenden Analysen wird untersucht, ob sich diese Gruppen hinsichtlich Sensibilisierung, medizinischer Parameter wie FeNO oder Lungenfunktionsdaten unterscheiden.

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**A-13-04****Various types of childhood trauma are associated with mental disorders in adults: Results from a population-based study (#99)****Katharina Piontek**<sup>1</sup>, Christian Apfelbacher<sup>1</sup>, Ulrich Wiesmann<sup>2</sup>, Hans-Jürgen Grabe<sup>3</sup>

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**Introduction**

Childhood adversity is linked to a wide range of mental illness in adult age such as somatization, but data from population-based studies are scarce. We aimed to investigate (i) the association of type of childhood trauma with somatoform disorders and its comorbidities depression and anxiety disorders and (ii) the nature and frequency of physical and mental complaints in individuals with and without a history of childhood trauma.

**Methods**

Data from 2,400 participants from the population-based Study of Health in Pomerania aged 20 to 80 years were analyzed. We assessed childhood trauma using the Childhood Trauma Questionnaire (CTQ). Diagnoses for mental disorders were obtained from the Munich Composite International Diagnostic Interview (M-CIDI). Physical and mental complaints were measured using the Zerssen Complaint Scale (38 items). Multivariate logistic regression analysis was conducted to investigate the association of type of childhood trauma with mental disorders.

**Results**

Sexual abuse was related to somatoform disorders (Odds Ratio [OR] 1.94; 95% Confidence Interval [CI] 1.34-2.80), emotional abuse (OR 1.63; 95% CI 1.14-2.33) and emotional neglect (OR 1.47; 95% CI 1.13-1.92) were related to depression, and physical abuse were related to anxiety disorders (OR 1.57; 95% CI 1.10-2.24). Participants with and without childhood trauma differed significantly in 33 out of 38 physical and mental complaints, whereas scores were generally higher in participants with childhood trauma compared to those without. Joint pain, nervousness, irritability, rumination and poor concentration were among the most debilitating symptoms.

**Conclusions/Outlook**

Present results suggest that childhood sexual abuse is a risk factor for the development of somatoform disorders, and give further support for the hypothesis that bodily symptoms are a physical expression of psychological distress. Our findings emphasize the need to assess childhood trauma in individuals with mental disorders.



## A-14 | Neurological and psychological epidemiology

## A-14-01

**Health-related quality of life in patients of different symptom groups presenting in centres for rare diseases (#72)**

**Lilly Brandstetter**<sup>1</sup>, Kathrin Ungethüm<sup>1</sup>, Udo Selig<sup>1</sup>, Lisa Pfister<sup>2</sup>, Eva Grauer<sup>2</sup>, Prof. Jürgen Deckert<sup>3,4</sup>, Prof. Peter Heuschmann<sup>1,3</sup>, Prof. Helge Hebestreit<sup>2,5</sup>, Dr. Kirsten Haas<sup>1,6</sup>

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**Introduction**

Patients presenting in Centres for Rare Diseases (ZSE) often suffer from unnoticed psychiatric/psychosomatic (PP) co-morbidities. Little is known about health-related quality of life (QoL) in this complex patient group. The aim of this analysis was to determine QoL in patients of different somatic symptom groups.

**Methods**

Data were derived from ZSE-DUO (Dual guidance structure in Centres for Rare Diseases), a multicentre study in 11 ZSE (funding by G-BA, Grant 01NVF17031), evaluating the benefit of involving a PP expert in the diagnostic process. Symptom groups were extracted from PHQ-15 (somatoform disorder) by principal component analysis. QoL was assessed by EQ-5D index and SF-12 (physical/ mental component scale, PCS/ MCS). Sociodemographic and clinical characteristics were documented.

**Results**

Of 639 consecutively enrolled patients (median age 48 years, IQR 35-57; 61% female), 11% presented gastrointestinal (GI), 5% cardiovascular (CV), and 34% muscular skeletal (MUS) symptoms, while 44% were high somatised patients (HS) and 5% had unspecific symptoms (US). Mean EQ-5D index  $0.64 \pm 0.2$ , PCS  $31.3 \pm 10.9$ , MCS  $43.9 \pm 12.0$ . The lowest QoL was observed in HS, MUS and CV patients in different scales (EQ-5D: HS  $0.55 \pm 0.24$ , MUS  $0.68 \pm 0.22$ , CV  $0.70 \pm 0.28$ , GI  $0.80 \pm 0.19$ , US  $0.82 \pm 0.18$ ,  $p < 0.01$ ; PCS: HS  $27.0 \pm 8.1$ , MUS  $32.8 \pm 11.3$ , CV  $33.9 \pm 10.2$ , GI  $40.5 \pm 10.1$ , US  $36.5 \pm 13.6$ ,  $p < 0.01$ ; MCS: HS  $40.1 \pm 11.8$ , MUS  $47.6 \pm 11.1$ , CV  $41.4 \pm 12.7$ , GI  $45.8 \pm 11.8$ , US  $50.6 \pm 8.4$ ,  $p < 0.01$ ). In a linear regression, adjusted for age, gender, income, disability and a variable manifestation of the main complaint, symptom groups remained statistically significant associated with QoL.

**Conclusions/Outlook**

Low QoL was found in HS patients, suffering from a high burden of several co-morbidities. Low scores were also detected in patients with MUS, affecting several QoL domains e.g. mobility, pain or daily activities. CV symptoms are suggested to affect especially the mental domain. Hence, it might be important, to consider QoL to shape the care in these patients.

## A-14-02

**Associations between brain white matter hyperintensities and obstructive sleep apnea in a large-scale population study (#108)**

**Helena U. Zacharias**<sup>1</sup>, Antoine Weihs<sup>1</sup>, Mohamad Habes<sup>2</sup>, Katharina Wittfeld<sup>1,3</sup>, Stefan Frenzel<sup>1</sup>, Beate Stubbe<sup>4</sup>, Anne Obst<sup>4</sup>, András Szentkirályi<sup>5</sup>, Klaus Berger<sup>5</sup>, Ingo Fietze<sup>6</sup>, Thomas Penzel<sup>6</sup>, Norbert Hosten<sup>7</sup>, Ralf Ewert<sup>4</sup>, Henry Völzke<sup>8,9</sup>, Hans J. Grabe<sup>1,3</sup>

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**Introduction**

The pathogenesis of brain white matter hyperintensities (WMH), significant hallmarks of Alzheimer's disease and brain ageing, has not yet been fully elucidated. We investigated the role of chronic obstructive sleep apnea (OSA) in increasing WMH burden in a large-scale general population study to uncover additional, important risk factors and underlying pathomechanisms of brain WMH formation.

**Methods**

The study sample comprised 529 participants of the observational SHIP-TREND-0 (Study of Health in Pomerania – TREND baseline) study with WMH data, automatically segmented from magnetic resonance images, as well as apnea hypopnea (AHI) and oxygen desaturation indices (ODI), assessed during a single-night, laboratory-based polysomnography measurement. Multivariate regression analyses were carried out between WMH values and OSA variables, adjusted for age, sex, intra-cranial volume, and body height. In subsequent sensitivity analyses, models were additionally adjusted for vascular, metabolic, and lifestyle risk factors for WMH presence, two-way interactions between OSA parameters and these additional risk factors were explored, and a possible mediating effect of subclinical inflammation was tested.

**Results**

We found significant, positive associations between both AHI and ODI values on brain WMH, with stronger effects of OSA on WMH volumes than counts. These associations were robust even in the presence of additional vascular, metabolic, and lifestyle WMH risk factors. We observed significant interactions between OSA parameters and smoking, mental health, physical activity, waist circumference, and education level on WMH data. The systemic inflammation markers C-reactive protein, white blood cell counts, or fibrinogen did not show any significant mediation effects on the associations between OSA parameters and WMHs.

**Conclusions/Outlook**

Our analyses revealed significant, robust associations between obstructive sleep apnea and brain white matter hyperintensities, indicating a novel, treatable WMH pathomechanism.

**A-14-03****Mental disorders and total mortality after 20 years in an adult general population sample (#127)****Prof. Ulrich John**<sup>1</sup>, Priv.-Doz. Hans-Jürgen Rumpf<sup>2</sup>, Monika Hanke<sup>1</sup>, Prof. Christian Meyer<sup>1</sup>

<sup>1</sup> Universitätsmedizin Greifswald, Institut für Community Medicine, Abt Sozialmedizin und Prävention, Greifswald, Germany; <sup>2</sup> Universitätsklinikum Schleswig-Holstein, Campus Lübeck, Klinik für Psychiatrie und Psychotherapie, Forschungsgruppe S:TEP, Lübeck, Germany

**Introduction**

General population data on associations between mental disorders and total mortality are rare. Our aim was to analyse whether the number of and single mental disorders and whether treatment utilization for the disorders may predict time to death 20 years later in the general adult population.

**Methods**

We used data from the Composite International Diagnostic Interview, which includes diagnoses standardized according to the American Psychiatric Association, among them substance use, mood, and anxiety disorders, for a sample of 4075 residents in Germany who were 18 to 64 years old in 1996. Twenty years later, total mortality could be ascertained for 4028 study participants using the public mortality database. Cox proportional hazards models were applied for disorders that existed at any time in life before the interview.

**Results**

We found increased hazard ratios (HRs) for number of mental disorders (3 or more; HR 1.4; 95 % confidence interval, CI, 1.1-1.9) and for single disorders (alcohol dependence, dysthymia, panic disorder with agoraphobia, hypochondriasis), with the reference group being study participants who had not suffered from any of the mental disorders analysed and with adjustments made for age, sex, and education. Among individuals with any mental disorder during their lifetimes, having been an inpatient in treatment for a mental disorder was related to a higher HR (2.2; CI 1.6-3.0) than was not having been in any treatment for a mental disorder.

**Conclusions/Outlook**

In this sample of adults in the general population, 3 or more mental disorders, alcohol dependence, dysthymia, panic disorder with agoraphobia, and hypochondriasis were related to premature death.

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## A-14-04

## Study to investigate risk factors for the occurrence and progression of Multiple Sclerosis (StERKE) – Study protocol (#146)

**PhD/MD student Anja Holz**<sup>1</sup>, PhD/MD student Karin Riemann-Lorenz<sup>2</sup>, Dr. Nadia Obi<sup>1</sup>, Prof. Kerstin Hellwig<sup>4</sup>, Prof. Friedemann Paul<sup>5,6</sup>, Prof. Wolfgang Ahrens<sup>7,8</sup>, Prof. Klaus Berger<sup>9</sup>, Dr. Bernd Holleczek<sup>10</sup>, Prof. Karl-Heinz Jöckel<sup>11</sup>, Prof. Rudolf Kaaks<sup>12</sup>, Prof. Gérard Krause<sup>13</sup>, Dr. Lilian Krist<sup>14</sup>, Prof. Michael Leitzmann<sup>15</sup>, Prof. Wolfgang Lieb<sup>16</sup>, Prof. Markus Löffler<sup>17,18</sup>, Prof. Karin Michels<sup>19</sup>, Prof. Rafael Mikolajczyk<sup>20</sup>, Prof. Annette Peters<sup>21</sup>, Prof. Tobias Pischon<sup>22</sup>, Dr. Tamara Schikowski<sup>23</sup>, Prof. Matthias Schulze<sup>24</sup>, Prof. Henry Völzke<sup>25</sup>, Prof. Christoph Heesen<sup>2,3</sup>, Prof. Heiko Becher<sup>1</sup>

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### Introduction

The cause of multiple sclerosis (MS) is not yet fully understood. Prior studies showed that genetic, environmental and lifestyle factors influence the development and the course of disease. In addition, few studies evaluated differences in impairment patterns between malignant and benign courses of MS.

### Methods

We aim to conduct a case-control study nested within the German National Cohort (NAKO) using its baseline data. Additional data on potential prenatal and early life risk factors, disease onset and progression will be collected using a self-administered online questionnaire. Cases will be chosen based on their self-reported MS-diagnosis in the NAKO baseline questionnaire. Diagnoses will be verified by medical records. Two controls will be matched to each case by sex, age and study centre. Regression models will be applied to relate MS variables to potential risk factors.

## Final Accepted Contributions

In order to model the course of disease, statistical models for recurrent events will be used. The study protocol and characteristics of the study participants will be presented.

**Results**

Regarding the NAKO baseline survey 862 participants self-reported a MS diagnosis, whereof 11 are men and 35 are women in the Hamburg study centre with mean ages of 51.73 (SD 7.56) and 49.03 (SD 10.86) years, respectively. Descriptive analyses on all cases are in progress.

After the questionnaire pilot testing in January 2020 with 26 volunteers of the MS outpatient clinic in Hamburg, minor changes were made to improve the questionnaire's comprehensibility.

**Conclusions/Outlook**

This study has the potential to gain comprehensive insights into the impact of environmental and lifestyle factors on the development of MS and its course. Furthermore, impairment patterns regarding malignant and benign MS can be derived.

## A-14-05

## Quantification of white matter hyperintensities in a healthy population-based cohort (#184)

**M.Sc./M.A. Niklas Wulms**<sup>1</sup>, PhD/MD student Christine Herpertz<sup>1</sup>, PhD/MD student Lea Redmann<sup>1</sup>, Dr. Benedikt Sundermann<sup>2</sup>, Prof. Klaus Berger<sup>1</sup>, Priv.-Doz. Heike Minnerup<sup>1</sup>

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**Introduction**

Neuroimaging in population studies is crucial for the understanding of normal versus pathological brain aging. White matter hyperintensities (WMH) detected on cerebral MRI, for instance, were shown to predict stroke, mortality, and cognitive decline (DeBette et al., 2010). However, most automated lesion segmentation algorithms have problems in validly and reliably detecting WMH in populations with a low WMH prevalence and a general low lesion load. We therefore tested the conformance of WMH volumes generated by FSL BIANCA (Griffanti et al., 2016), an automated lesion detection tool, with WMH volumes of manually delineated lesion masks of 80 healthy population-based participant scans of the BiDirect Study (Teismann et al., 2014, Teuber et al., 2017).

**Methods**

The longitudinal BiDirect comprises MRI data of 687 population-based healthy participants, aged 35-65 years at baseline. MRI was performed every 2-3 years with the same protocol in the same scanner over 12 years. A random sample of participants (n = 80) was drawn from the baseline of this cohort for manual segmentation of white matter lesions using FLAIR images. BIANCA (Griffanti et al., 2016) working with multi-modal data was evaluated with regard to the conformance with the manual masks.

**Results**

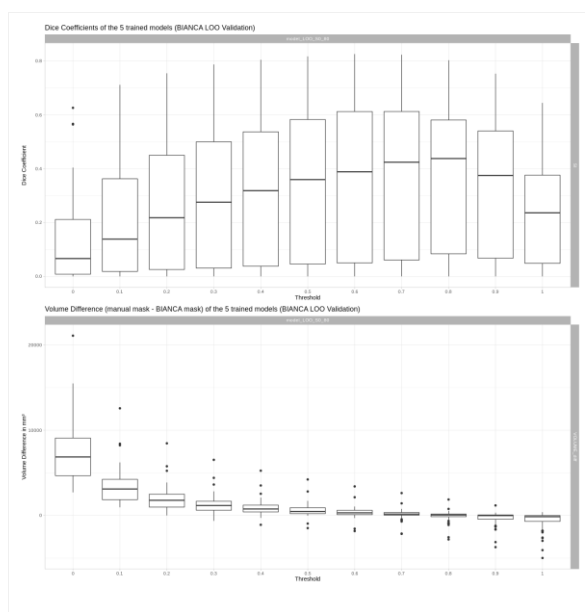
The Dice coefficient (SI) and volume differences were compared to identify a reasonable threshold for the cohort (Figure 1). Additionally we show in Bland-Altman plots (Figure 2) the mean and standard deviation of Dice

## Final Accepted Contributions

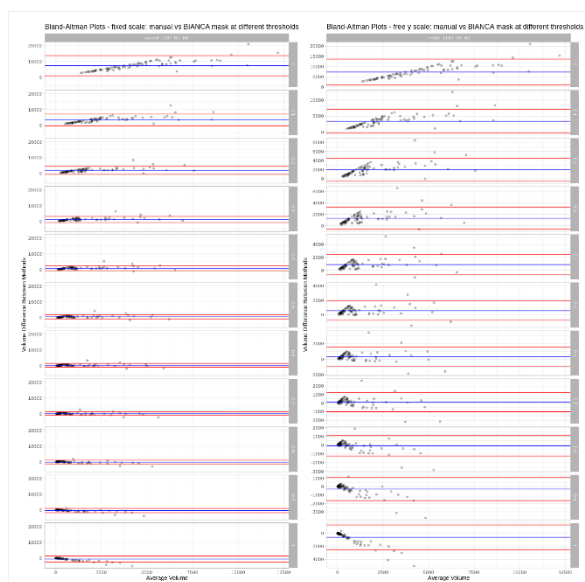
coefficients and volume differences in  $\text{mm}^3$  (manual – BIANCA mask) for each threshold. A threshold of 0.8 shows a minimal mean volume difference of  $-78.12 \text{ mm}^3$  with a standard deviation of  $595.17 \text{ mm}^3$ .

**Conclusions/Outlook**

BIANCA is mentioned to be robust, even with only ten training subjects, we trained with 80 manual masks, containing a wide variety of lesion load, also subjects without white-matter hyperintensities. We show here, that BIANCA is a robust tool for population-based healthy cohorts after thresholding.



**Figure 1**  
Boxplots of dice coefficient (top) and white matter lesion volume difference between manual and BIANCA mask (bottom) at different thresholds



**Figure 2**



Bland-Altman plots of white matter lesion volume difference at different thresholds with a fixed y-axis scale (left) and a free y-axis scale (right)

## A-14-06

### The BiDirect study - Establishing the relationship between depression and subclinical arteriosclerosis using MR imaging - processing and quality control protocol (#192)

**PhD/MD student Niklas Wulms**<sup>1</sup>, M.Sc./M.A. student Sven Eppe<sup>1</sup>, Dr. Benedikt Sundermann<sup>2</sup>, Prof. Klaus Berger<sup>1</sup>, Priv.-Doz. Heike Minnerup<sup>1</sup>

<sup>1</sup> Westfälische Wilhelms-Universität Münster, Institut für Epidemiologie und Sozialmedizin, Münster, Germany; <sup>2</sup> Evangelisches Krankenhaus Oldenburg, Institut für Radiologie und Neuroradiologie, Oldenburg, Germany

#### Introduction

The longitudinal BiDirect study aims to establish the bidirectional relationship between depression and subclinical arteriosclerosis. Three cohorts were acquired, one community-dwelling cohort, a depression cohort and a cohort with cardio-vascular disease. Neuroimaging is also a part of the acquired data. The acquired data, quality control and processing pipelines are described here.

Anatomical sequences, in detail T1w, FLAIR, T2star and T2w were acquired. Furthermore, a dwi sequence, a functional emotional-faces task and a functional resting state sequence were acquired. For a small group of about 200 participants per cohort (community-dwelling and depression) additional highresolution anatomical images were acquired, in detail T1w, FLAIR, T2w and mFFE. The MR protocol was assessed at every 2nd survey. In total the participants could attend four acquisitions (s0, s2, s4, s6).

The BiDirect neuroimaging is used to answer questions regarding (I) structural and functional changes and the effect of sex in the aging brain, (II) identifying markers (WMH, PSMD/MSMD), that could predict cardiovascular disease & cognitive decline and (III) replication on other population study findings (e.g. NAKO, LIFE).

#### Methods

**File specification:** BIDS specification (Gorgolewski et al., 2016)  
**Structural processing:** VBM (CAT12, fsl\_anat), Cortical thickness (Freesurfer)  
**Functional processing:** fMRIPrep (Esteban et al., 2019) and additional ICA-AROMA calculations.  
**Diffusion-weighted processing:** PSMD-Marker (v1.5) (Baykara et al., 2016) to calculate the PSMD and MSMD value. FA/MD/TBSS  
**Quality Control:** Metadata, MRIQC  
**White-matter hyperintensities:** CAT12, FSL-BIANCA (Griffanti et al., 2016), Lesion Segmentation Toolbox (Schmidt, 2017; Schmidt et al., 2012, 2019)

#### Results



## Final Accepted Contributions

All pipelines used for processing are provided in the following repository: <https://github.com/wulms/BiDirect-Neuroimaging-Pipelines>

## Conclusions/Outlook

The raw data and output files can be provided for cooperation or review by Klaus Berger.

Sequence Info		Healthy cohort				Depression cohort				Cardio-vascular disease cohort			
Type	Sequence	s0	s2	s4	s6	s0	s2	s4	s6	s0	s2	s4	s6
anat	FLAIR	687	609	488	475	735	444	325	292	53	91	78	60
		f=359 f=333 f=245 f=250 f=448 f=268 f=195 f=178 f=12 f=20 f=12 f=12 f=11	m=328 m=276 m=243 m=225 m=287 m=176 m=130 m=114 m=41 m=71 m=66 m=49										
anat	T1w	687	608	488	475	732	441	324	291	53	90	78	60
		f=369 f=332 f=245 f=250 f=444 f=266 f=194 f=177 f=12 f=20 f=12 f=12 f=11	m=327 m=276 m=243 m=225 m=288 m=175 m=130 m=114 m=41 m=70 m=66 m=49										
anat	T2star	688	609	488	475	734	445	325	292	54	91	78	60
		f=361 f=332 f=245 f=250 f=444 f=268 f=195 f=178 f=12 f=20 f=12 f=12 f=11	m=327 m=277 m=243 m=225 m=290 m=177 m=130 m=114 m=42 m=71 m=66 m=49										
anat	T2w	5 f=3 609	488	475	4 f=4	443	325	291	0	90	78	60	
		m=2 f=332 f=245 f=250 m=0	m=277 m=243 m=225	m=176 m=130 m=114	m=70 m=66 m=49								
dwi	dwi	683	608	476	475	728	441	322	291	53	89	77	60
		f=357 f=332 f=237 f=250 f=443 f=266 f=193 f=177 f=12 f=19 f=12 f=12 f=11	m=326 m=276 m=239 m=225 m=285 m=175 m=129 m=114 m=41 m=70 m=65 m=49										
func	task_faces_bold	550	0	0	0	628	0	0	0	44	0	0	0
		f=295				f=389				f=9			
func	task-rest72_bold	678	608	0	0	723	440	0	0	52	89	0	0
		f=337 f=332				f=441 f=265				f=12 f=19			
func	task-rest133_bold	m=321 m=276				m=282 m=175				m=40 m=70			
		0 0	485 472	0 0	321 290	0 0	78 60			f=12 f=11			
			f=245 f=249		f=191 f=177		f=12 f=11			m=66 m=49			
			m=240 m=223		m=130 m=113								

Table 1

Acquired BiDirect data - for further information on the sequence parameters please read Teuber, et al. 2017

Sequence Info		Healthy cohort		Depression cohort	
Type	Sequence	s4	s6	s4	s6
anat	acq-highres_FLAIR	225	207	207	154
		f=121 f=115	f=127 f=87		
		m=104 m=92	m=80 m=67		
anat	acq-highres_run-1_mFFE	211	198	201	143
		f=113 f=109	f=122 f=80		
		m=98 m=89	m=79 m=63		
anat	acq-highres_run-1ph_mFFE	211	198	201	143
		f=113 f=109	f=122 f=80		
		m=98 m=89	m=79 m=63		
anat	acq-highres_T1w	222	200	203	147
		f=119 f=110	f=123 f=82		
		m=103 m=90	m=80 m=65		
anat	run-1_mFFE	11	0	2 f=0	0
		f=5		m=2	
		m=6			
anat	run-1ph_mFFE	11	0	2 f=0	0
		f=5		m=2	
		m=6			
anat	FLAIR	0	1 f=1	0	0
			m=0		
anat	T1w	0	1 f=1	0	0
			m=0		
dwi	dwi	0	1 f=1	0	0
			m=0		

Table 2

Acquired BiDirect protocol plus data (high resolution sequences) -for further information on the sequence parameters please read Teuber, et al. 2017

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A-14-07**Do proportion and severity of childhood maltreatment depend on local area? (#233)**

**Johanna Klinger-König**<sup>1</sup>, Dr. Fabian Streit<sup>2</sup>, Prof. Marcella Rietschel<sup>2</sup>, Prof. Steffi Riedel-Heller<sup>3</sup>, Prof. Dan Rujescu<sup>4</sup>, Prof. Henry Völzke<sup>5,6</sup>, Prof. Klaus Berger<sup>7</sup>, Prof. Hans J. Grabe<sup>1,8</sup>

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**Introduction**

The history of childhood maltreatment has been associated with various psychiatric and somatic diseases. Moreover, within a circle of violence, childhood maltreatment has been reported to be transmitted into the next generation. It is very important to know the frequency of occurrence as well as the social and regional distribution of childhood maltreatment to successfully implement support systems to interrupt psychiatric and somatic pathogenesis strengthened by childhood maltreatment experiences as well as a transgenerational consolidation.

**Methods**

Within the German National Cohort (NAKO) the Childhood Trauma Screener (CTS) was used to assess childhood maltreatment. NAKO (N=81,397 from the first data freeze 100K) is a general population study based on German residents of 18 study centres spread over Germany. Each of the five items of the CTS assesses one maltreatment scales (emotional/physical/sexual abuse, emotional/physical neglect) and can be aggregated into a summary score. The Study of Health in Pomerania (SHIP-Trend, N=4143), a general population cohort study based on German residents of the north-east of Mecklenburg-Western Pomerania, was used as a comparison cohort.

**Results**

Of the NAKO participants, 22,468 reported any maltreatment. More precisely, 6,774 reported emotional abuse, 7,137 reported physical abuse, 5,259 reported sexual abuse, 6,719 reported emotional neglect and 8,798 reported physical neglect. The maltreatment severity was lower in participants recruited in northern than in southern study centres (except of emotional abuse and physical neglect) and lower in eastern than in western study centres (except of physical neglect). These regional differences were supported by results from SHIP-Trend that differed from NAKO in all maltreatment scales by reporting less severe maltreatment.

**Conclusions/Outlook**

Frequency of occurrence and severity of childhood maltreatment were dependent on local area and cohort.

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## A-14-08

**Moderating effects of serum vitamin D on brain structure (#239)**

**Sarah Bonk**<sup>1</sup>, PhD/MD Jan Terock<sup>1,2</sup>, Dr. Sandra Van der Auwera<sup>1,3</sup>, Stefan Frenzel<sup>1</sup>, Dr. Katharina Wittfeld<sup>3</sup>, Prof. Norbert Hosten<sup>4</sup>, Prof. Matthias Nauck<sup>5,6</sup>, Prof. Henry Völzke<sup>6,7</sup>, Prof. Hans J. Grabe<sup>1,3</sup>

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**Introduction**

Vitamin D deficiency is common in the German population and is known to affect a wide range of pathways in human metabolism. As an example, previous studies found a link between Alzheimer's disease and modifications of brain structures (Karakis et al., 2016; Licher et al., 2017). Motivated by these studies, we here investigate this association in the second cohort of the "Study of Health in Pomerania" (SHIP-TREND-0) study (Völzke et al., 2011). Head MRI and 25(OH)D serum values were collected from N=1996 subjects. The brain data is characterized by hippocampus volumina and brain structure-based scores for Alzheimer's disease and brain age.

**Methods**

We study the influence of vitamin D on FreeSurfer calculated Brain Age (BA) score, Alzheimer's Disease (AD) score and hippocampus volumina using regression models. The data is adjusted for various confounders such as age, sex, season, intracranial volume, alcohol, diabetes.

**Results**

We found a significant association between vitamin D deficiency and an increased brain age score. An association between vitamin D deficiency and reduced hippocampus volumina and increased Alzheimer's score was not significant.

**Conclusions/Outlook**

The association of vitamin D levels with the brain age might offer a strategy to positively influence the brain age by providing vitamin D supplementation. However, this needs to be addressed in clinical trials.

## A-14-09

**Some mental health outcomes in Pomerode's Population (SHIP-Brazil) – Preliminary Results (#248)**

**Ernani T. D. Santa Helena**, Helena M. Menezes, Michele Zanella, Carlos R. D. O. Nunes

Universidade Regional de Blumenau, Programa de Pós-Graduação em Saúde coletiva, Blumenau, Brazil

## Final Accepted Contributions

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### Introduction

This research has used secondary data from the Study of Health in Pomerode (SHIP-Brazil).

### Methods

The sample was composed by 2488 residents of the municipality, between 20 and 79 years old, who underwent exams and answered the assessment instruments at the Examination Center of the Universidade Regional de Blumenau. For the collection of data about childhood maltreatment, it was applied the Childhood Trauma Questionnaire (CTQ). Regarding the symptoms of Common Mental Disorders (CMD), the instrument used was the Self-Reported Questionnaire (SRQ-20). Regarding the depressive episodes, the instrument used was the Patient Health Questionnaire (PHQ-9). Descriptive statistics tools were applied to characterize the sample in percentage, mean and 95% confidence interval. Multivariate logistic regression was used ( $p < 0.05$ ).

### Results

The prevalence of CMD symptoms was 24.5%. Emotional abuse, sexual abuse, emotional neglect and physical neglect were the dimensions of maltreatment that showed significant associations with CMD symptoms. Female gender, use of antidepressants and other psychotropic drugs were the covariates that had a strong association with CMD. The history of at least one type of abuse or neglect was indicated by 55.4% of the sample. Among those who did not report abuse, 88.7% denied aversive childhood experiences. The results found about the prevalence of CMD are in agreement with other studies. Sexual abuse and emotional neglect had values similar to those of another population-based study and emotional abuse and physical neglect had higher values. 7.4% of the participants had symptoms for major depression. Older people and women had a higher frequency of symptoms of major depression in this research. Emotional neglect and sexual abuse were dimensions of child maltreatment associated with major depressive symptoms.

### Conclusions/Outlook

We conclude that child maltreatment can be a precursor of suffering in adult life.

## A-15 | Health geography

**A-15-01****PsoRegio – Regional variations of psoriasis prevalence across Germany (#47)**

**M.Sc./M.A. Valerie Andrees**, M.Sc./M.A. Sandra Hischke, M.Sc./M.A. Nicole Zander, Prof. Matthias Augustin, Dr. Jobst Augustin

*Universitätsklinikum Hamburg-Eppendorf, Institut für Versorgungsforschung in der Dermatologie und bei Pflegeberufen, Hamburg, Germany*

**Introduction**

Psoriasis is a chronic skin disease with severe impairments in quality of life. Worldwide prevalence is characterized by strong regional variations, with a tendency of higher rates in the north. Interestingly, these variations were also detected on national level within the UK. Information on such variations in Germany are missing. This study investigates the regional variation and the presence of a north-south-gradient of psoriasis prevalence in Germany.

**Methods**

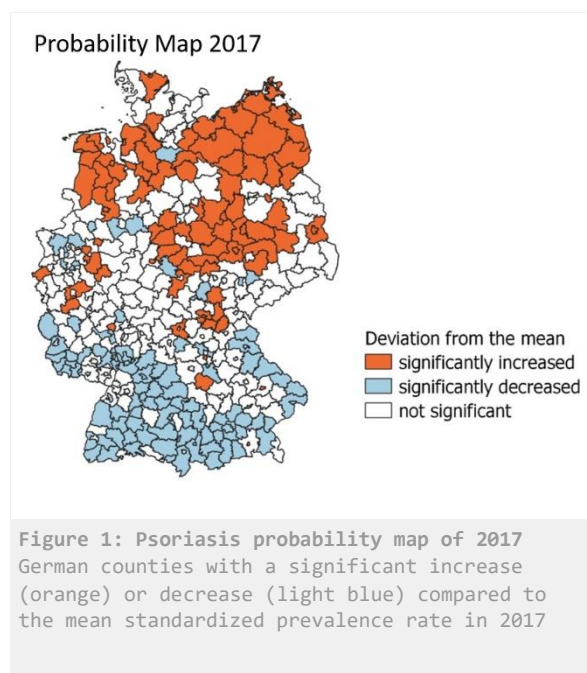
Basis for the analyses were outpatient billing data on county level from the National Association of Statutory Health Insurance Physicians for 2010 to 2017, covering 90% of the German population. We performed descriptive spatio-temporal analyses of psoriasis prevalence rates, with probability mapping and Bayesian smoothing. In addition, we identified spatial clusters, and examined a north-south gradient for Germany, using spatial statistics.

**Results**

The standardized prevalence of psoriasis in Germany increased from 147.4 per 10,000 in 2010 to 173.5 in 2017. On county level, prevalence rates increased particularly in the east. In 2017, counties' prevalence rates range between 93.8 and 340.9. Probability mapping (Figure 1) and Bayesian smoothing show that mainly rates in southern counties significantly decrease from the mean and the expected value while rates in northern and eastern counties increase from the mean and the expected value. Clusters of low rates occur in the south and south-west of Germany, while clusters of high rates mainly occur in the north and north-east. The correlation between the latitude of the counties and their prevalence rates was high with Pearson's  $r = 0.65$  (95% CI: 0.58-0.70;  $p < 0.05$ ), with higher rates in the north.

**Conclusions/Outlook**

Significant differences across Germany occur with high rates in northern and eastern counties. Reasons for the variations need to be determined for a better understanding of the disease and an improvement of psoriasis care in Germany.



## A-15-02

### Risikocluster und räumliche Determinanten der MMR-Impfung bei Kindern (#130)

Dr. Sebastian Völker

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#### Introduction

Durch das Inkrafttreten des Masernschutzgesetzes am 01. März 2020 erfährt die MMR-Impfung eine neue Akzentuierung. Die Existenz von räumlich unterschiedlichen Verteilungen im Impfschutz und dem verstärkten Auftreten von Krankheitsinzidenzen wurde mehrfach belegt. Ziele der Studie

- Beschreibung der räumlichen Verteilung von Kindern mit nicht ausreichendem Impfstatus bei MMR
- Identifikation von Risikoclustern, in denen die Wahrscheinlichkeit eines nicht ausreichenden Impfschutzes signifikant erhöht ist
- Berechnung lokaler Cluster-Risikomodelle auf Basis räumlich-nachbarschaftlicher Einflussfaktoren

#### Methods

Grundlage waren Abrechnungsdaten der KVWL. Es wurden Geburtsjahrgangskohorten von gesetzlich versicherten Kindern der Jahrgänge 2013-2016 gebildet und auf PLZ-5-Ebene (n=410) aggregiert. Generelle und spezifische Cluster-Methoden identifizierten statistisch signifikante, räumlich kompakte Cluster und relative Risiken (RR) nicht geimpfter Kinder. In binär-logistischen Regressionen wurden lokale Risikomodelle auf Basis von räumlich-nachbarschaftlichen Variablen geschätzt.

#### Results

## Final Accepted Contributions

Für die Impfquoten „min. eine MMR-Impfung“ und „beide MMR-Impfungen“ wurden jeweils 2 signifikante Cluster identifiziert. Diese umfassen das nördliche Ruhrgebiet (n=9692 Kinder gesamt, RR=2,05 [CI 95%: 1,92-2,18]) und Dortmund-Ennepe-Ruhr-Kreis (n=6031, RR=1,78 [CI 95%: 1,65-1,91]) bzw. Ennepe-Ruhr-Kreis-Dortmund (n=3540, RR=2,68 [CI 95%: 2,56-2,80]) und Dortmund-Unna-Hamm (n=15.271, RR=1,32 [CI 95%: 1,27-1,37]). Signifikante Risikofaktoren für niedrige Impfquoten umfassten die Altersstruktur, sozio-ökonomische Variablen, Einwohnerdichte, medizinische Versorgung und Werterhaltung.

**Conclusions/Outlook**

Die Identifikation räumlicher Cluster ermöglicht Gesundheitsversorgern und -organisationen räumlich fokussiert Programme zur Reduzierung durch Impfung vermeidbarer Erkrankungen zu planen und zu evaluieren. Dabei können die Patienten und Patientinnen und Eltern in Nachbarschaften mit dem größten Interventionsbedarf adressiert werden.

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**A-15-03****Spatio-temporal variations of Psoriasis comorbidities in Germany (#136)**

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*University Medical Center Hamburg-Eppendorf, Institute for Health Service Research in Dermatology and Nursing, Hamburg, Germany*

**Introduction**

Psoriasis is a chronic skin disease which can massively reduce quality of life. The disease is typically associated with specific comorbidities. It is unclear, which role the regional variation of these comorbidities play in the prevalence of psoriasis in Germany. Here we want to present first results of a study, that analyses regional variations of typical psoriasis comorbidities (diabetes mellitus type II, obesity, affective disorders, hypertension) and their association with psoriasis prevalence.

**Methods**

Basis for the analyses was a set of ambulatory claims data (2010-2017) of the statutory health insurances in Germany (N= 70.2 million people). All analyses were conducted on county level. Descriptive spatio-temporal analyses for all years and spatial cluster analyses for 2017 were performed to identify patterns of psoriasis comorbidities and their association with psoriasis prevalences. The regional variation was measured with the extremal quotient (1%- and 99% Percentile, EQ) and the Gini coefficient.

**Results**

Prevalence rates of patients with psoriasis varied temporally and spatially with each of the comorbidities and increased between 2010-2017. The average annual increase was 13,1%, for psoriasis with obesity. The highest prevalences (apart from affective disorders) occur in the counties within eastern Germany. The highest regional variation was measured for psoriasis with obesity (i.e. Gini coefficient of 0.23). For the other comorbidities, we found nearly the same spatial patterns and large clusters with high prevalences in eastern Germany and low prevalences in the southwestern part of Germany. The patterns for psoriasis with affective disorders are different, including small dispersed clusters of high prevalences.

**Conclusions/Outlook**



It can be assumed that the patterns can be explained by the tendency towards higher prevalence of comorbidities (e.g. obesity) in eastern Germany. However, this requires further investigation by considering socio-demographic factors.

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## A-15-04

### Analysis of Type 2 Diabetes Mellitus in Westphalia-Lippe (Germany)

(#149)

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#### Introduction

The rapid global increase of Type 2 Diabetes Mellitus (T2DM) diagnosed cases in the last years, causes serious social, personal and health costs. This study aims at the following research questions: a) does the T2DM diagnosed cases change in Westphalia-Lippe over time? b) what is the spatial distribution of T2DM prevalence in Westphalia-Lippe? c) what are the determinant socioeconomic risk factors and their spatial variation for T2DM prevalence?

#### Methods

T2DM data from 2013 to 2017 were analyzed using geographic information systems (ArcGIS) and the statistical package for the Social Sciences (SPSS). The two steps floating catchment area methodology (2SFCA) was used to determine the index of the accessibility to doctors. The software Rstudio version 3.4.0 was applied to calculate 4 explanatory analysis: ordinary least squares method (OLS), spatial error model, spatially lagged model and geographically weighted regression (GWR).

#### Results

Generally, there is an increase in T2DM prevalence in the study area 2013-2017. The highest prevalence of T2DM can be found in urban areas (Bielefeld, Ruhr area), while the lowest prevalence can be found in rural areas. T2DM prevalence varies strongest at the local level and the socio-economic risk predictors show important differences between urban and rural areas. Furthermore, the health professionals location index is a significant predictor of T2DM prevalence.

#### Conclusions/Outlook

GWR provides greater precision at the local level on the geographic variation of T2DM prevalence, which is useful for good public health planning practice. Socio-economic predictors could support future decision making and structure strategies enrolling locally focused programs to reduce T2DM.

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**A-15-05****Regional distribution of care characteristics of atopic dermatitis in Germany (#151)**

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**Introduction**

Atopic dermatitis (AD) is a chronic inflammatory skin disease affecting 2-7 % of adults in Germany. The treatment is complex and studies show that patients are often dissatisfied with their therapy. Psoriasis, a disease that is comparable in some respects, is known to have strong regional variations of care, which cannot always be explained by different needs. This study aims to investigate whether there are comparable regional variations of care for AD.

**Methods**

A nationwide cross-sectional health care study was conducted in which 1291 patients in 112 practices were included. Quality of care was evaluated using an index consisting of eleven care-related parameters. Regional comparisons were made at the level of the Associations of SHI physicians (KV), East/West and by region type by BBSR. The study was financially supported by Sanofi (unrestricted grant).

**Results**

Some KVs differed significantly in terms of the quality index. The highest index was found in Hamburg (mean of 77.7% of the criteria), the lowest in Schleswig-Holstein (67.5%). No difference could be found between eastern and western KVs. The average severity was significantly higher in the eastern KVs than in the western ones. Regarding quality of life, a contrasting picture emerged with a significantly stronger impairment in the western KVs. The proportion of patients who have received systemic therapy in the last five years was 41.5% in Saxony-Anhalt and 92.0% in Brandenburg. In addition, this proportion was significantly higher in areas of agglomeration (63.7%) than in urbanised (58.1%) and rural areas (54.4%).

**Conclusions/Outlook**

The first analyses suggest that there are variations of care for AD. It needs to be investigated whether these are unwarranted variations. In a further step, the determinants of these differences need to be identified. Multi-level analyses will be used to investigate whether these differences can be explained at the patient or at the regional level.

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A-15-06**Regionale Inanspruchnahme von Leistungen der spezialisierten ambulanten Palliativversorgung in Mecklenburg-Vorpommern (#166)**

**M.Sc./M.A. Maren Leiz**, Dr. Kilson Moon, M.Sc./M.A. Laura Rehner, Franziska Radicke, Prof. Wolfgang Hoffmann, Priv.-Doz. Neeltje van den Berg

*Universitätsmedizin Greifswald, Institut für Community Medicine, Greifswald, Germany*

**Introduction**

Ein gleichwertiger Zugang zur Palliativversorgung wird aufgrund demografischer und epidemiologischer Prozesse an Relevanz zunehmen. In einem Flächenland wie Mecklenburg-Vorpommern (MV) müssen SAPV-Teams (SAPV: Spezialisierte Ambulante Palliativversorgung) zum Teil große Distanzen überbrücken. Die Empfehlung der Deutschen Gesellschaft für Palliativmedizin e. V. und des Deutschen Hospiz- und PalliativVerbandes e. V. eines max. 30km-Versorgungsradiuses kann in ländlichen Regionen nicht immer eingehalten werden. **Fragestellung:** Wie ist die Versorgung durch SAPV-Teams in MV, insbesondere für Regionen mit über 30km Entfernung vom SAPV-Standort?

**Methods**

Datengrundlage sind anonymisierte Daten der Kassenärztlichen Vereinigung MV von 2014 bis 2017, die auf 5-stelliger PLZ-Ebene vorliegen. Von 10 der 12 SAPV-Teams in MV standen Daten zur Verfügung. Die Identifizierung als Palliativpatient erfolgt anhand palliativspezifischer ambulanter Gebührenordnungspositionen. Die Daten werden deskriptiv analysiert, altersstandardisiert (Standardbevölkerung MV) und kartografisch visualisiert.

**Results**

Insgesamt wurden in den Daten n=6.937 SAPV-Patienten identifiziert. Der Altersmedian liegt bei 76 Jahren, 49% der Patienten sind weiblich. Abb.1 zeigt die Anzahl abgerechneter SAPV-Eingangsassessments altersstandardisiert pro 10.000 Einwohner nach PLZ-Gebieten ( $\bar{X}$ =46; SD=44; IQR=38). Für 28,5% der SAPV-Patienten (n=1.974) haben die SAPV-Teams eine Fahrstrecke von >30km. Die Hälfte dieser Patienten ist wohnhaft in nur 10% der PLZ-Gebiete (Abb.2).

**Conclusions/Outlook**

In Regionen mit einem SAPV-Standort ist die bevölkerungsbezogene Patientenzahl in der Regel höher als in weiter entfernten Regionen. Das deutet darauf hin, dass der Zugang zur SAPV in MV ungleich verteilt ist und in peripheren Regionen eine Unterversorgung bestehen könnte. SAPV-Teams haben für fast ein Drittel der Patienten eine Fahrstrecke >30km. Dies zeigt, dass die Teams große Wegeaufwände auf sich nehmen, um Patienten auch in entfernten Regionen zu betreuen.



## Spatio-temporal variations of skin cancer and skin cancer screening in Germany (#186)

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Hamburg, Germany

## Final Accepted Contributions

Statutory skin cancer screening is offered every two years in the statutory health insurance for persons of 35 years and older. It should detect skin cancer in early stages to improve skin cancer treatment and disease course. It is unclear, so far, if both skin cancer screening frequency and skin cancer prevalence show spatial variations. This study examines skin cancer screening frequencies and skin cancer prevalence with temporal and regional variation to examine the relation between skin cancer prevalence and screening frequency.

**Methods**

We used nationwide ambulatory claims data including skin cancer screening frequency and prevalence on county level from 2009 to 2018 (N=72,703,376 in 2018). As a first step, we tested for spatial autocorrelation and calculated according indices (Moran's I) for every year in order to consider the spatio-temporal trend of skin cancer (screening). Secondly, spatio-temporal clusters were identified. These are the first results; further analyses are in progress.

**Results**

Moran's I decreased from 2009 (I=0.36) to 2018 (I=0.21) for skin cancer screening frequencies. For skin cancer prevalence rates Moran's I increased from 2009 (I=0.16) to 2010 (I=0.19), then stabilized, and from 2017 the autocorrelation coefficient decreased again (I=0.16). In addition, we could identify spatio-temporal clusters: In the south-east of Germany there was an above-average number of skin cancer cases in 2014-2018. However, there was no increased screening frequency within this region and time. In the west of Germany, there was a beneath-average cluster for skin cancer cases from 2009-2012.

**Conclusions/Outlook**

This study demonstrates spatio-temporal variations of skin cancer (screening) over a 9-year period. We could identify cluster with significant deviations of skin cancer (screening) frequencies. In a next step, reasons for variations needs to be determined with spatial regression models. Furthermore, small scale analyses will be necessary to examine the spatio-temporal differences in depth.

## A-15-08

**Why is there a need for good practice accessibility analyses in the health care system? (#206)**

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**Introduction**

Regional accessibility analyses are increasingly used as a rational basis for participatory processes and health policy decisions. Accessibility is not only defined by the indication of travel time in minutes. Furthermore, the use of routable data and its attribution in accessibility modelling have a big influence on the results.

**Methods**

Based on selected speed profiles (slow, fast and average), road types (highway, national and country road) and road networks (e.g. OSM, TomTom), the same accessibility analyses are carried out for medical care facilities in an urban and rural region. The comparison of the analysis results addresses the question to what extent the different speed parameters in the different road networks are relevant in the results.

**Results**

## Final Accepted Contributions

A threshold value is used to define good or bad accessibility. The threshold can depend on a few minutes of travel time and can be decisive for the basis for guidelines in health care. In many cases, there is a lack of sufficiently formulated guideline values that create regulatory gaps and room for interpretation. The information varies from specialist analysis data to inaccurate instructions for calculating travel time, which in turn are implemented by different actors and users. Mainly road networks and their speed profiles with defined traffic volumes fade into the background. The deprivation of the resulting variety of application, results from different studies and expert opinions can hardly be evaluated comparatively.

### Conclusions/Outlook

A guideline is essential for the practical application of accessibility analyses in health care. A good practice accessibility analysis should provide guidance for the evaluation of speed parameters, which must also be considered in the formulated guideline values and in the justification of the choice of methods.

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## A-15-09

### Differenzierung der Feinstaubexposition nach sozioökonomischem Status in Deutschland (#238)

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#### Introduction

Epidemiologische Studien zeigen Zusammenhänge zwischen der Exposition gegenüber umweltbedingten Risiken und dem sozioökonomischen Status (SES). Feinstaub in der Außenluft ist der Umweltrisikofaktor, auf den die höchste Krankheitslast zurückgeführt wird. Bisher ist eine sozioökonomische Stratifizierung der Exposition jedoch für Deutschland nicht verfügbar. Ziel war es daher zu untersuchen, inwiefern geeignete Datensätze für eine solche Analyse deutschlandweit flächendeckend verfügbar sind und wie diese aufbereitet und analysiert werden können.

#### Methods

Zur Analyse der räumlichen Variation der Feinstaubbelastung und des SES innerhalb von Siedlungsflächen werden Datensätze in einer räumlichen Auflösung unterhalb der Gemeindeebene benötigt. Identifiziert und akquiriert wurden Datensätze zur Feinstaubkonzentration (Jahresmittel) in räumlicher Auflösung von 2 x 2 km<sup>2</sup> (für Hamburg und Berlin auch höher aufgelöst), zur Bevölkerungsverteilung (Zensus) und zum Haushaltseinkommen (Auflösung je 1 x 1 km<sup>2</sup>) sowie zum Miet- und Kaufspiegel (auf Wohnblockebene). Die Datensätze wurden aufbereitet, auf Gemeindeebene standardisiert, räumlich aggregiert und auf statistische Zusammenhänge hin untersucht.

#### Results

Zur Differenzierung der Feinstaubexposition nach SES sind aufgrund der Datenlage derzeit noch keine belastbaren Analysen möglich. Dies betrifft vor allem die zu geringe räumliche Auflösung der verfügbaren Feinstaubdaten. Das Haushaltseinkommen ist ein repräsentativer SES-Indikator, jedoch wäre auch hier eine genauere räumliche Auflösung wünschenswert. Ideal erscheint die deutschlandweite Auflösung der Datensätze Kauf- und Mietspiegel auf Wohnblockebene. Beide Indikatoren eignen sich dennoch nur bedingt, weil Quadratmeterpreise ohne Information zur Größe der bewohnten Fläche den SES nicht ausreichend repräsentieren.

#### Conclusions/Outlook

**Final Accepted Contributions**

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Für eine bundesweite Differenzierung der Exposition gegenüber Luftschadstoffen nach SES braucht es zukünftig vor allem flächendeckende Datensätze in präziserer räumlicher Auflösung.

## A-16 | Social epidemiology



**A-16-01****The intersectionality of non-response in a national health survey in Germany: a multilevel analysis of individual heterogeneity and discriminatory accuracy. (#33)**

**Philipp Jaehn**<sup>1</sup>, Emily Mena<sup>2,3</sup>, Sibille Merz<sup>1</sup>, Robert Hoffmann<sup>4</sup>, Antje Gößwald<sup>4</sup>, Alexander Rommel<sup>4</sup>, Christine Holmberg<sup>1</sup>, On behalf of the ADVANCE GENDER study group

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**Introduction**

Dimensions of social location such as socioeconomic position or sex/gender are often associated with low response rates in research studies. Analyses of population strata that are defined by combinations of multiple dimensions of social location represent an intersectional approach. We applied an intersectional approach to analyse non-response in a health survey in Germany.

**Methods**

We used data from the cross-sectional sample of the German Health Interview and Examination Survey for Adults (DEGS1) conducted between 2008 and 2011. Information about non-responders was available from a mailed non-responder questionnaire. Intersectional strata were constructed by combining all categories of age, sex/gender, marital status, and level of education in scenario 1. Subjective health was additionally used to construct intersectional strata in scenario 2. We applied multilevel analysis of individual heterogeneity and discriminatory accuracy (MAIHDA) to calculate measures of discriminatory accuracy, proportions of non-responders among intersectional strata, as well stratum-specific total interaction effects (intersectional effects). Markov chain Monte Carlo methods were used to estimate multilevel logistic regression models.

**Results**

Data was available for 6,534 individuals of whom 36% were non-responders. In scenario 2, we found weak discriminatory accuracy (variance partition coefficient=3.6%) of intersectional strata, while predicted proportions of non-response ranged from 20.6% (95% credible interval (CI) 17.0%-24.9%) to 57.5% (95% CI 48.8%-66.5%) among intersectional strata. No evidence for intersectional effects was found. These results did not differ substantially between scenarios 1 and 2.

**Conclusions/Outlook**

MAIHDA revealed that proportions of non-response varied widely between intersectional strata. However, poor discriminatory accuracy of intersectional strata and no evidence for intersectional effects do not support targeting specific intersectional strata to achieve more equal study participation.

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**A-16-02****Promotion of children in day care centers in Mecklenburg-Western Pomerania (MWP): effects of the targeted individual promotion for 3 to 6 year olds affected by motor, linguistic, cognitive, and social-emotional developmental risks (#37)**

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**Introduction**

In MWP, day care centers in socially deprived regions are claiming additional funds for support for children with developmental risks. Mandatory criteria for claiming these funds are an annual assessment of all children with the "Dortmund Developmental Screening for Preschools (DESK 3-6 R)" to detect developmental risks in the domains fine motor, gross motor, language skills, cognition, and social development. Research question: what is the proportion of children with a developmental risk at survey wave 1 (sw1, conducted in 2017) and no developmental risk at survey wave 2 (sw2, conducted in 2018) vs. vice versa?

**Methods**

Longitudinal comparison of the frequency of the categories "reasonable grounds to suspect a developmental risk/inconclusive screening result" and "no reason to suspect a developmental risk". Calculation of (1.) the prevalence rate ratio (PRR), and (2.) the ratio of the rate of improvements (risk at sw1, no risk at sw2) divided by the rate of deteriorations (no risk at sw1, risk in sw2) ( $n = 4,477$ ).

**Results**

2/3 of the longitudinal comparisons are associated with  $PRR < 1$ . Statistically significant improvements were observed for the DESK domains fine motor ( $PRR = 0,88$ ;  $p = 0,012$ ) and attention & concentration ( $PRR = 0,78$ ;  $p = 0,019$ ). Children benefit the most with respect to the DESK domain attention & concentration: the ratio of the rate of improvements is 8,47 times higher than the rate of deteriorations. Referring to children's linguistic and communicative skills the ratio of the rate of improvements is 2,55 times higher than the rate of deteriorations.

**Conclusions/Outlook**

The results provide evidence for the effectiveness of the targeted individual intervention referring to all DESK domains. This is particularly significant considering the small time interval and the conservative categorization of the DESK scores. Nevertheless, over the same time period the DESK results of some children are deteriorating. This points out the need for more effective promotion also of children not at risk.

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**A-16-03****Widening inequalities in myocardial infarction? Trends in life years free of myocardial infarction and after incidence based on health insurance data (#58)**

**Dr. Juliane Tetzlaff**<sup>1</sup>, M.Sc./M.A. Fabian Tetzlaff<sup>2</sup>, Priv.-Doz. Stefanie Sperlich<sup>1</sup>, Prof. Siegfried Geyer<sup>1</sup>, Dr. Jelena Epping<sup>1</sup>

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**Introduction**

Although incidence and mortality rates of myocardial infarction (MI) have decreased substantially over the last decades, little is known on whether all socioeconomic groups benefitted equally from these improvements. The study investigates the development of MI incidence and mortality risks over time. Special emphasis is laid on the question whether trends in MI-free life years and life years after MI differ between income groups.

**Methods**

The analyses are based on the claims data of individuals insured with the AOK Niedersachsen aged 60 years and older and cover the periods 2006-2008 (N=730'360) and 2015-2017 (N=783'649). Income inequalities in MI incidence and mortality were estimated using multistate survival analyses. Trends in the expected number of life years at age 60 were calculated separately for two income groups (low ( $\leq 60\%$ ) and higher ( $> 60\%$  of the German average income)) using multistate life table analyses.

**Results**

MI incidence and mortality risks decreased among all income groups, but they were more pronounced in the higher income group. Significant increases in the number of life years free of MI were only found among men (18.8 to 19.6) and women (23.1 to 23.9) with higher incomes. While the number of life years after MI increased among men of both income groups (0.78 to 1.04 (low), 0.79 to 1.02 (higher)), no changes were observed in women.

**Conclusions/Outlook**

Not all groups benefitted equally from decreasing MI incidence and mortality risks. Trends in incidence and in mortality varied by income levels as well as between men and women. Especially men with low incomes were disadvantaged as no healthy years were gained, thus leading to an expansion of lifetime after MI.

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**A-16-04****Can small-area health inequalities be reduced through neighborly mediated, social mechanisms? An agent-based modelling study (#69)**

**Kim A. Zolitschka**, Prof. Oliver Razum, Priv.-Doz. Odile Sauzet

Bielefeld University, School of Public Health, Bielefeld, Germany

## Final Accepted Contributions

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**Introduction**

**Background:** Different factors and mechanisms are responsible for the production of neighbourhood level health inequalities. Small-area social mechanisms —social processes involving the social environment around the place of residence — can possibly play a role in reducing health inequalities. Using agent-based modelling involving such social mechanisms as social contagion and social cohesion, we investigated how these mechanisms could affect small-area health inequalities induced by physical environmental conditions.

**Methods**

**Methods:** Modelling of the social mechanisms was based on a neighbour dependant behaviour adaption model. We considered a range of strengths of association between both social mechanisms, health and the environment. Models reflecting behaviour adaption, individual factors and environmental influences are all based on the individual level. We measured small-area health inequalities on the macro level as the spatial correlation structure of health (“correlation neighbourhood”) with semivariograms. Each simulation was carried out 100 times and relevant values for health and behaviour were saved, graphically prepared and analysed.

**Results**

**Results:** A small influence of social contagion led to a reduction of small-area health inequalities and a middle influence was able to remove them. A high influence led to health inequalities based on social factors rather than environmental factors. . Social cohesion reduced of small-area health inequalities.

**Conclusions/Outlook**

**Conclusion:** The results of the agent-based simulations can be used to develop interventions to reduce small-area health inequalities, based on the theoretical assumption made in this work: Encouraging health-promoting behaviour from several individuals, strengthening the feeling of belonging and strengthening the beliefs from individuals with health-promoting behaviour.

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**A-16-05****Negative life events following German reunification 1989/90 and their long-term impact on subjective health: The moderating role of age and social support (#132)**

**Stefanie Hahm**<sup>1</sup>, Dr. Laura Altweck<sup>1</sup>, Dr. Holger Mühlen<sup>1</sup>, Johanna Klinger-König<sup>2</sup>, Prof. Hans J. Grabe<sup>2,3</sup>, Prof. Silke Schmidt<sup>1</sup>

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**Introduction**

German reunification was marked by extensive socio-structural changes such as increased unemployment and changes in social networks. Research shows detrimental effects of such negative life events (NLEs) on subjective health. Studies suggest that perceived social support (PSS) may buffer these negative effects. Life-course epidemiology also assumes that vulnerability to the effects of NLEs varies by age. Therefore, this study aims to investigate the effects of NLEs following reunification on subjective health and the moderating role of age and PSS.

**Methods**

## Final Accepted Contributions

Data was taken from four waves of the Study of Health in Pomerania (SHIP-0/-2/-3/-LEGENDE; N≈1400; age 1990: 16–68 years). NLEs were measured with the “Stralsund Event List” (König et al, 2018). Different NLE-categories (employment, living conditions, partnership, friendships, health, finances) between 1990 and SHIP-0 were analyzed. Latent growth models were employed to assess the impact of each NLE-category and its interaction with age and PSS on physical health (SF-12-PCS) and mental health (SF-12-MCS).

**Results**

Lower baselines of subjective health were associated with a higher number of specific NLE-categories (PCS: health; MCS: partnership, friendships, health, and finances). Partnership-NLEs were also positively associated with MCS-trajectories. Regarding PCS-baselines, no significant age-interaction was found, but a positive PSS-interaction for NLEs related to living conditions. Regarding MCS-baselines, there was a positive age-interaction for finance-related NLEs. MCS-baselines were also significantly affected by a positive PSS-interaction, but only for employment-related NLEs. Regarding MCS-trajectories, a positive PSS-interaction was found for finance-related NLEs.

**Conclusions/Outlook**

The results indicate that NLEs following German reunification mainly had a long-term impact on subjective mental health. Furthermore, the negative effects of some NLE-categories were attenuated by higher PSS or higher age.

## A-16-06

**Discrimination has an effect on cognition in ageing men and women**

(#154)

**Prof. Jutta Lindert***University of Emden, Emden, Germany***Introduction**

Discrimination and inequality might have an impact on cognitive function. We sought to assess changes in Cognitive functioning (episodic memory, executive functioning) among men and women in the Midlife in the United States (MIDUS) cohort study; and to determine the impact of discrimination on longitudinal changes in episodic memory and executive functioning in men and women.

**Methods**

We used data from the MIDUS study - a national probability sample of non-institutionalized, English speaking respondents aged 25-74 living in the 48 contiguous states of the United States. The initial wave in our study (1995) included 4963 non-institutionalized adults aged 32 to 84 (M=55, SD=12.4). The dependent variables are episodic memory and executive functioning, which were assessed with the Brief Test for Cognition. The independent variables were social stress and discrimination variables at the family / partner level, the work level and the society level, assessed with validated discrimination measures. To assess cognition changes we estimated adjusted linear regression models.

**Results** After controlling for other explanatory such as age and baseline cognition, the effect of discrimination on cognition for all age groups was found. Discrimination has an impact on episodic memory 10 years later on women across all age groups (Beta: 0.29, SE = 0.09; p-value : 0.0001) and on men ((Beta: 0.20, SE = 0.10; p-value : 0.04). Additionally, daily discrimination has a negative impact on executive functioning 10 years later in men (Beta: 0.01; SE: 0.004; P-value: =.0001).

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**Conclusions/Outlook**

Exposure to discrimination undermines cognitive function – albeit different ones – in both, men and women. Public health strategies should add measures to reduce social stress and discrimination to the preventive measures of lifestyle modifications as a means to foster healthy aging and reduce cognitive decline burden.

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**A-16-07****Einsatz diversitätssensibler Maßnahmen in der Gesundheitsversorgung – Ergebnisse einer postalischen Befragung von Einrichtungen der Gesundheitsversorgung in Deutschland (#194)**

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**Introduction**

Die Berücksichtigung von Diversitätsmerkmalen, wie Geschlecht, Alter und Migrationshintergrund, und den damit einhergehenden Bedürfnissen trägt maßgeblich zur Nutzerorientierung in der Versorgung bei. In dieser Studie wurde untersucht, inwiefern Versorgungseinrichtungen diversitätssensibel ausgerichtet sind und welche Hindernisse den Einsatz entsprechender Maßnahmen behindern.

**Methods**

Im Rahmen einer repräsentativen postalischen Querschnittsbefragung von 5% aller Pflegeeinrichtungen, 50% aller ambulanten Reha-Einrichtungen und alle verzeichneten Krankenhäuser und stationären Reha-Einrichtungen in Deutschland (n=4000) wurde erhoben, welche Bedeutung Einrichtungen einer diversitätssensiblen Versorgung beimessen, welche Angebote und Strukturen vorhanden sind und welche Faktoren eine Implementation verhindern oder erschweren.

**Results**

Es lagen Angaben von n=622 Einrichtungen vor. Die Mehrheit der Einrichtungen sieht eine diversitätssensible Ausrichtung als notwendig an (60,0%). Diese wird besonders für die Zufriedenheit der Patient\*innen (76,7%), der Mitarbeiter\*innen (72,8%) und den Behandlungserfolg (72,7%) als wichtig erachtet. In der Praxis findet Diversität vorwiegend in Leitbildern (60,1%) und im Qualitätsmanagement (58,5%) Berücksichtigung. Fortbildungen zu Diversitätssensibilität (19,5%), spezielle Arbeitsgruppen (8,2%) und Diversitätsbeauftragte (7,9%) werden seltener angegeben. Als wesentliche Hindernisse gelten fehlende Anreize der Versorgungsträger (45,8%), fehlende finanzielle Ressourcen (42,9%) und organisatorische Schwierigkeiten (36,5%).

**Conclusions/Outlook**

Während ein großer Teil der Einrichtungen Diversitätssensibilität als wichtiges Thema ansieht, findet die Umsetzung entsprechender Maßnahmen in geringerem Maße statt. Wesentliche Hindernisse sind finanzielle und organisatorische Faktoren. Zur Förderung einer diversitätssensiblen Versorgung sind daher weitere Anstrengungen zur Allokation von Ressourcen und Unterstützungsangebote für die Implementation entsprechender Ansätze notwendig.

**A-16-08****Change in disabilities rates among people with diabetes between 2004 and 2015: ‘Expansion of morbidity’ or ‘dynamic equilibrium’? (#202)**

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**Introduction**

For the case of type 2 diabetes evidence suggests a marked increase of prevalence rates over the past decades. However, studies investigating temporal changes of disabilities and functional impairments among people with diabetes are scarce. At the theoretical level the division between decreasing and increasing disability rates among diabetics decides whether ‘morbidity expansion’ or ‘dynamic equilibrium’ has taken place. The purpose of this study was to investigate changes of disability rates among older adults with type 2 diabetes and to analyze the contribution of co-morbidities (obesity, depression and multimorbidity) on this trend.

**Methods**

German Data were derived from the Survey of Health, Ageing, and Retirement in Europe (SHARE). We estimated predicted probabilities of self-reported disabilities (ADL / IADL) by means of logistic regression. Multivariate decomposition for nonlinear response models was employed for analyzing the impact of co-morbidity on changes in disability rates among individuals with diabetes between 2004/5 (wave 1) and 2015 (wave 6).

**Results**

Among subjects with type 2 diabetes, predicted probabilities of ADL rose significantly from 11.3% in 2004 to 19.1% in 2015. With respect to IADL, probabilities increased substantially among younger diabetics aging 50 to 69 years. Decomposition analysis revealed that the simultaneous increase in multimorbidity, depression and obesity contributed to the rise in disabilities among diabetics.

**Conclusions/Outlook**

In addition to diabetes prevalence also the rates of functional limitations among individuals with diabetes increased over time. As our findings lend support to the hypothesis of expansion of morbidity for the case of diabetes, the German health care system may be facing higher demands in the future. Our findings suggest that this may be fueled by parallel increases of co-morbidity and obesity among individuals with diabetes.

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**A-16-09****Der Einfluss wahrgenommener Diskriminierung auf den subjektiven Gesundheitszustand bei Jugendlichen – Ergebnisse aus KiGGS Welle 2 (#221)**

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**Introduction**

Interpersonelle Diskriminierung spielt eine entscheidende Rolle für die körperliche und mentale Gesundheit. Personen können von rassistischer Diskriminierung, z.B. wegen Herkunft, Aussehen oder Akzent, betroffen sein, ohne einen nach Mikrozensus statistisch definierten Migrationshintergrund (MH) aufzuweisen. Auch im Kindes- und Jugendalter kann sich rassistische Diskriminierung negativ auf den allgemeinen und subjektiven Gesundheitszustand auswirken.

**Methods**

Mittels logistischer Regression wurde anhand von KiGGS Welle 2-Daten der Einfluss wahrgenommener Diskriminierung (nie vs. selten, manchmal, oft, sehr oft) wegen der Herkunft, der Hautfarbe sowie Sprache, Akzent oder Dialekt sowie der Einfluss des Migrationshintergrundes auf die subjektive Gesundheit (sG) von 14- bis 17-jährigen Jugendlichen (Ju) untersucht.

**Results**

11% der 3.573 befragten Ju berichteten Diskriminierung wegen der Herkunft, der Hautfarbe (5%) oder des Akzents (12%) erlebt zu haben. 8% hatten einen ein- und 12% einen beidseitigen MH (bestimmt nach Herkunft der Eltern). Ju, die Diskriminierung erlebt hatten, berichteten häufiger eine schlechte oder sehr schlechte sG (Herkunft: OR=1,58; Hautfarbe: OR=1,92; Akzent: OR=1,83). Der MH hatte hingegen keinen Einfluss. Diese Effekte bleiben bei Kontrolle für Geschlecht, Alter und sozioökonomischen Status der Eltern bestehen (Herkunft: OR=1,47; Hautfarbe: OR=1,74; Akzent: OR=1,82).

**Conclusions/Outlook**

Wahrgenommene Diskriminierung zeigt einen negativen Zusammenhang mit schlechterer sG bei Ju, wohingegen der MH keine Assoziation mit schlechteren sG-Outcomes aufweist. Unterschiedliche Aspekte rassistischer Diskriminierung zeigen unterschiedlich starke Effekte. Auswertungen, die lediglich den MH berücksichtigen, sind unzureichend, da sie von rassistischer Diskriminierung betroffene Personen vernachlässigen, die von dieser statistischen Kategorie nicht erfasst werden. Weitere Analysen im Hinblick auf erklärende Mechanismen und protektive Faktoren sind notwendig.

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A-16-10**Der Einfluss sozialer Unterstützung auf die Gesundheit – Ergebnisse einer Machbarkeitsstudie im Rahmen des IMIRA-Projekts (#230)**

**Marleen Bug**, Dr. Katja Kajikhina, Dr. Claudia Santos-Hövenner, Carmen Koschollek

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**Introduction**

Soziale Unterstützung (sU) kann als psychosoziale Ressource einen grundlegenden Einfluss auf die Gesundheit einer Person haben. Sie kann eine bessere Stressbewältigung ermöglichen und sich positiv auf das allgemeine psychische sowie körperliche Wohlbefinden auswirken. Wahrgenommene sU wurde als Einflussfaktor auf die subjektive Gesundheit und depressive Symptomatik unter Menschen mit ausgewählten Staatsangehörigkeiten (StaAng) im Rahmen des Projekts IMIRA (Improving Health Monitoring in Migrant Populations) untersucht.

**Methods**

Betrachtet wurde die wahrgenommene sU (Messung mit Oslo-3-Items-Social-Support Scale, Oslo-3) als Einflussfaktor auf die subjektive Gesundheit (sG) sowie depressive Symptomatik (dS) (Patient Health Questionnaire (PHQ-8)) bei Teilnehmenden (TN) ab 18 Jahren der IMIRA-Machbarkeitsstudie „Befragung“ (n=1.190, ungewichtet). Die Stichprobe wurde aus Einwohnermelderegistern aus 7 Primary Sampling Units in Berlin und Brandenburg gezogen, wobei die Ziehung nach kroatischer, polnischer, rumänischer, türkischer und syrischer StaAng erfolgte.

**Results**

TN berichteten zu 33,1% eine geringe, zu 50,4% eine mittlere und zu 16,5% eine starke sU. TN, die eine mittlere oder starke sU berichteten, gaben seltener eine mittelmäßige, schlechte oder sehr schlechte sG an (OR=0,49 (mittlere sU) bzw. OR=0,50 (starke sU)) und wiesen seltener Anzeichen für eine dS auf (OR=0,38 (mittlere sU) bzw. OR=0,32 (starke sU)) vergleichen mit denjenigen, die nur eine geringe sU berichteten. Bei der Kontrolle für Geschlecht, Alter und sozioökonomischen Status bleiben diese Befunde bestehen.

**Conclusions/Outlook**

Unsere Ergebnisse bestätigen die Befunde für die Allgemeinbevölkerung auch in einem Sample von Menschen mit ausgewählten StaAng. In weitergehenden Analysen soll untersucht werden, welche Faktoren die wahrgenommene sU und damit indirekt die Gesundheit beeinflussen können, z.B. Aufenthaltsdauer oder Deutschkenntnisse.

## A-17 | Epidemiology of aging

**A-17-01****Systematic review on the impact of intelligence on cognitive decline and dementia risk (#1)****Francisca S. Rodriguez<sup>1</sup>**, Thomas Lachmann<sup>2</sup>

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**Introduction**

In an aging society, the number of individuals at risk for cognitive decline and Alzheimer's disease and related dementia (ADRD) is increasing. It remains the question whether higher intelligence may protect against this, given that previous studies have shown that an intellectually stimulating lifestyle is associated with a lower risk for ADRD. Aim of the study was to conduct a systematic review on the association between intelligence and cognitive decline and ADRD risk.

**Methods**

We searched in the databases PubMed, web of science, and Scopus following the Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) and Population, Intervention, Comparison, and Outcome (PICO) criteria. Quality of evidence was assessed using Critical Appraisal Skills Programme (CASP) checklists.

**Results**

From an initial n=8,371 search hits, n=18 studies met the criteria. A total of n= 16 studies had sufficient quality. Evidence indicates that cognitive decline in old age is not significantly associated with childhood intelligence (n=9). Evidence with regard to ADRD risk is non-conclusive (n=7) with some studies showing no effects and other studies with significant effects having limitations in their design.

**Conclusions/Outlook**

Given the available evidence, there seems to be no or only a small association between intelligence in early and mid-life on cognitive decline and the risk for developing ADRD in later life. Further studies are necessary that systematically assess the influence of those factors that shape intelligence and those that influence ADRD risk in order to disentangle the impact of the innate intelligence and the environmentally-formed intelligence.

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## A-17-02

## Associations of urinary 8-iso-prostaglandin $F_{2\alpha}$ levels with all-cause dementia, Alzheimer's disease, and vascular dementia incidence: results from a prospective cohort study (#59)

**PhD/MD student Kira Trares**<sup>1,2</sup>, PhD/MD Xin Gào<sup>2</sup>, PhD/MD Laura Perna<sup>3</sup>, PhD/MD Dan Rujescu<sup>4</sup>, PhD/MD student Hannah Stocker<sup>1,2</sup>, PhD/MD student Tobias Möllers<sup>1,2</sup>, Prof. Konrad Beyreuther<sup>1</sup>, Prof. Hermann Brenner<sup>2,1</sup>, PhD/MD Ben Schöttker<sup>2,1</sup>

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### Introduction

Prospective studies on a potential association of 8-iso-prostaglandin  $F_{2\alpha}$  (8-iso-PGF $_{2\alpha}$ ) levels, a biomarker of lipid peroxidation, with dementia are limited.

### Methods

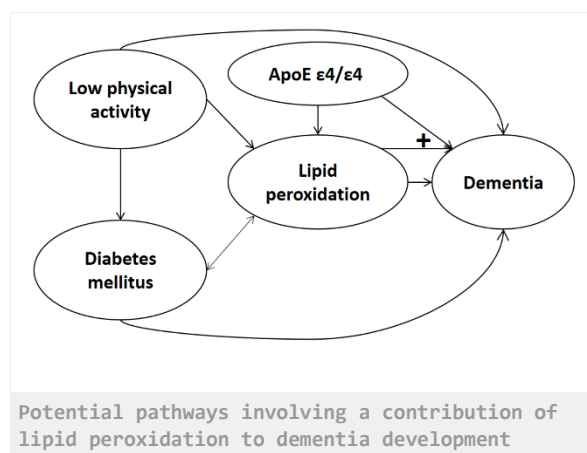
Multivariate Cox regression models were used to assess potential associations of urinary 8-iso-PGF $_{2\alpha}$  levels with all-cause, Alzheimer's disease (AD), and vascular dementia (VD) incidence in 5853 older adults from a German, population-based cohort.

### Results

Over 14 years of follow-up, 365 all-cause dementia cases including 127 VD and 109 AD cases were diagnosed. Participants in the top compared to the bottom 8-iso-PGF $_{2\alpha}$  tertile had a 45% increased risk of all-cause dementia incidence (hazard ratio [95% confidence interval]: 1.45 [1.12 to 1.88]). Interaction with the apolipoprotein E (APOE)  $\epsilon 4/\epsilon 4$  genotype was detected ( $P=.02$ ). Furthermore, continuously modeled, logarithmized 8-iso-PGF $_{2\alpha}$  levels were statistically significantly associated with all-cause dementia and AD incidence.

### Conclusions/Outlook

Oxidative stress may be involved in the pathogenesis of dementia. Individuals with increased 8-iso-PGF $_{2\alpha}$  levels and the APOE  $\epsilon 4/\epsilon 4$  genotype showed a considerably increased dementia risk.



The arrows symbolize associations. Double-headed arrows represent bidirectional associations. The plus sign indicates an interaction between two risk factors.

## A-17-03

### Diagnosing and treating dementia in Germany: a descriptive study on statutory health insurance data (#102)

**M.Sc./M.A. Cornelia Becker<sup>1</sup>**, Dr. Willy Gomm<sup>2</sup>, Lucas Herschung<sup>2</sup>, Dr. Steffen Heß<sup>1</sup>, Prof. Britta Hänisch<sup>1,2,3</sup>

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#### Introduction

In an aging population, the number of patients with dementia increases in Germany. This study examines the practice of diagnosing dementia patients in routine care with respect to type of diagnoses, medical specialists making the diagnoses, and the prescription of antidementia drugs.

#### Methods

Data of patients with a dementia diagnosis from a longitudinal sample (2004-2016) from a large German health insurance, the Allgemeine Ortskrankenkasse (AOK), were analyzed. Included were 29,925 patients who were 60 years or older, whose initial dementia diagnosis was followed by at least 2 years survival and by dementia diagnoses in at least 75% of subsequent quarters. The main dementia diagnosis for a patient was the diagnosis that was reported in most quarters for this patient.

#### Results

Alzheimer's disease was the main dementia diagnosis in 22.9% of patients, dementia due to a cardiovascular disease in 17.8%, dementia due to another specific etiology in 1.2%, and unspecific dementia in 56.6%.

Diagnoses by general physicians accounted for half of dementia diagnoses; of these, 59.1% were unspecific. 17.1% of dementia diagnoses were made by neurologists and psychiatrists; of these, 63% were Alzheimer's disease. Neurologists and psychiatrists as well as general physicians diagnosed the majority of all patients with Alzheimer's disease (33.8% and 33.7%).

35.4% of all dementia patients had at least one antidementia drug prescription. The majority of patients with Alzheimer's disease were treated with an antidementia drug at least once, whereas most patients with vascular dementia never had such a prescription. Cholinesterase-inhibitors and memantine were prescribed most often. Most prescriptions were made by neurologists and psychiatrists.

#### Conclusions/Outlook

Dementia diagnosis in routine care was often unspecific. Neurologists and psychiatrists seem to make more specific dementia diagnoses than general physicians and they prescribe antidementia drugs more often.

**A-17-04****Diabetes Duration and the Risk of Dementia: a prospective cohort study based on German claims data (#103)**

**PhD/MD student Constantin Reinke**<sup>1</sup>, Dr. Nikolaus Buchmann<sup>3,5</sup>, Dr. Anne Fink<sup>2,4</sup>, Dr. Christina Tegeler<sup>3</sup>, Prof. Ilja Demuth<sup>3</sup>, Prof. Gabriele Doblhammer<sup>1,2</sup>

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**Introduction**

The implication of diabetes as a risk factor for dementia is already well established. However, little is known about the duration and progression effects of diabetes and the risk of subsequent dementia.

**Methods**

To evaluate the risk of dementia over time since incident diabetes type 2 (T2D) diagnosis, we used health claims data from the largest German health insurance ("Allgemeine Ortskrankenkasse") with up to 9 years of follow-up. The data contain information about all diagnoses (ICD-10) and all medical prescriptions. We performed piecewise exponential models with time since incident T2D diagnosis as predictor. The analyzed sample contained 13,716 subjects (2,558 dementia cases) older than 65 years with an incident diabetes diagnosis (mean follow-up: 4.18 years). We controlled all models for comorbidity and severity of diabetes using the *Adopted Diabetes Complications Severity Index* (aDCSI).

**Results**

We found U-shaped risks of dementia over time since first T2D-diagnosis. After the incident T2D diagnosis the risk of dementia decreased (26% after 1 year, predicted HR=0.74 95%CI=0.70–0.78) and reached a minimum after 4.75 years (HR=0.44; 95%CI=0.39–0.50), followed by an increase. The U-pattern consisted over different treatment groups but was strongest for insulin treatment (Groups: no medication, oral medication, insulin and mixed medication). Stratified models by diabetes-severity at baseline revealed a stronger u-shape for less severe cases (no diabetes complication at baseline: aDCSI=0) than for severe cases (at least one diabetes complication at baseline: aDCSI≥1).

**Conclusions/Outlook**

The identified U-shaped pattern may suggest a decreasing compliance of diabetes self-management over time. Initially the benefits of therapy may reduce or outweigh the micro- and macrovascular complications of diabetes. These benefits, however, decrease over time leading to an upsurge in the risk of dementia. New incentives and better strategies for long-term treatment compliance may decrease the risk of dementia.

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## A-17-05

**Referral trajectories in patients with vertigo, dizziness and balance disorders and their association with functioning and health-related quality of life – Results from the MobilE-TRA cohort study (#159)**

**M.Sc./M.A. Benedict Katzenberger**<sup>1</sup>, Dr. Daniela Koller<sup>1</sup>, Dr. Linda Sanftenberg<sup>2</sup>, Dr. Karen Voigt<sup>3</sup>, Prof. Eva Grill<sup>1</sup>

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**Introduction**

Heterogeneous and non-rational referral patterns in primary care seem to delay effective therapy of vertigo, dizziness and balance problems (VDB). We therefore examined current trajectories of referral in a cohort of older adults, their predictors, and their potential impact on patient-reported outcomes of functioning and health-related quality of life (HRQoL).

**Methods**

MobilE-TRA is a primary care based cohort study among adults aged 65 or older in two German federal states (Bavaria and Saxony) conducted from 2017 to 2019 with a baseline examination and two follow-ups after 6 and 12 months. Referral trajectories were clustered using state sequence analysis. Predictors for cluster membership were identified using multinomial logistic regression. The effect of cluster membership on HRQoL and vertigo-specific functioning (Vestibular Activities and Participation Measure) at 12 months was examined using linear regression models.

**Results**

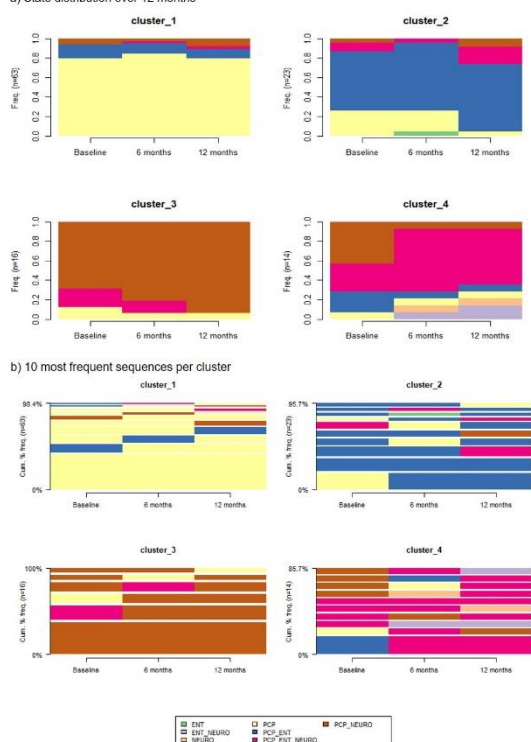
116 patients (73.28% women, mean age at baseline = 76.9 years) were included. We identified four distinct clusters of similar referral trajectories. Cluster size decreased with increasing number of referrals. Participants most frequently remained at the primary care physician (PCP) without further referral (cluster 1), followed by a combination of PCP and additional referral to one specialist (clusters 2 and 3). Simultaneous referrals to more than one specialist (cluster 4) were rare. Cluster membership was significantly predicted by federal state. Referral trajectories mostly predicted vertigo-specific functioning. Patients having simultaneously visited both PCP and neurologist over several assessment periods (cluster 3) were significantly more disabled by vertigo than patients without further referral (cluster 1). Cluster membership did not predict HRQoL.

**Conclusions/Outlook**

This study implies inefficiency of current referral patterns in primary care. Referral patterns showed significant regional differences. Measures to standardize care pathways are urgently needed.

<sup>1</sup>Vertigo, dizziness and balance problems; <sup>2</sup>Health-related quality of life; <sup>3</sup>Visual analog scale; <sup>4</sup>Vestibular Activities and Participation questionnaire; <sup>5</sup>Dizziness Handicap Inventory; <sup>6</sup>Confidence interval

Multiple linear regression models assessing the influence of different clusters of similar referral trajectories on patient-reported outcomes of functioning and health-related quality of life at 12 months after baseline assessment.





State distribution and 10 most frequent sequences per cluster of similar referral trajectories

Graphical presentation of the clusters of similar referral trajectories identified by the state sequence analysis (SSA) showing the state distribution over time and the 10 most frequent referral trajectories per cluster.

## A-17-06

### Gastrointestinal infections and subsequent risk of dementia (#163)

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#### Introduction

Dementia is characterized by an impairment of memory, thinking, and social abilities and interferes with a patient's daily life. Alzheimer's disease is the most common type of dementia. Recent findings indicate that microbiota of the gastrointestinal tract directly contribute to the pathogenesis of Alzheimer's disease, e.g., by triggering inflammation or after neuroinvasion. We hypothesized that gastrointestinal infections may be associated with a higher risk of dementia and assessed the subsequent risk of dementia in patients who were diagnosed with gastrointestinal infections.

#### Methods

In this cohort study, we used a longitudinal sample of 197,027 individuals aged 50 and older from health claims data of the largest German health insurer, containing 19,249 incident dementia diagnoses between 2006 and 2014. We used Cox regression to compute hazard ratios (HR) for dementia and corresponding 95 % confidence intervals (CIs), adjusting for potential confounders.

#### Results

The risk of dementia was increased in patients with gastrointestinal infections (HR = 1.11; 95% CI = 1.07–1.15). The risk of subsequent dementia was higher in patients with a higher number of quarters with diagnosed gastrointestinal infections (one quarter: HR 1.03, 95 % CI 0.99–1.08; two quarters: HR 1.37, 95 % CI 1.26–1.48; three or more quarters: HR 1.42, 95 % CI 1.26–1.59).

#### Conclusions/Outlook

Gastrointestinal infections are associated with an increased risk of subsequent dementia.

## A-20 | Free and multidisciplinary topics

**A-20-01****Family aggregation of sleep characteristics: Results of the Heinz Nixdorf Recall and the Multi-Generational Study (#68)**

**Priv.-Doz. Bernd Kowall**, Dr. Anna-Therese Lehnich, Prof. Raimund Erbel, Prof. Karl-Heinz Jöckel, Dr. Nils Lehmann, Prof. Andreas Stang

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**Introduction**

Health impairments due to poor sleep have been observed in many studies. For health prevention, it is important to know whether the presence of a health-relevant sleep characteristic in an individual is associated with a higher probability that the partner (or children) of this individual also exhibit this sleep characteristic.

**Methods**

In the Multi-Generational Study (MGS, conducted from 2013 to 2016), 1238 partners and 1660 children of index persons were recruited. The latter are participants of the Heinz Nixdorf Recall Study, a population-based cohort study in the Ruhr area (study start 1999 - 2001, 4841 participants aged 45 - 75 years). We used two data sets: one with 1181 index persons who participated in the third visit to the study center (2010 - 2015) and whose partners were in MGS, and one with 1108 index persons with at least one grown-up child in MGS. Sleep characteristics were assessed using questionnaires (including the Pittsburgh Sleep Quality Index). The exposure was the presence of a sleep characteristic of the index subject. Prevalence ratios (PR) and odds ratios (OR) were estimated for the association of the exposure with the presence of the same sleep characteristic in the partner (child).

**Results**

In index subjects who took a midday nap at least once a week or had a preference for getting up early (before 7 a.m.) or late (9 a.m. and later), the probability was increased that their partner also took a midday nap or had the same preferences for getting up (PR=2.41 (95% CI: 2.08 - 2.80), 3.75 (2.09 - 6.73), 2.10 (1.63 -2.73)). In partners, only weak associations were observed for snoring, poor sleep quality and sleep disorders. Children showed the investigated sleep characteristics more often, if these were also present in their parent (e.g., OR=1.44 (1.08 - 1.91) for poor sleep quality).

**Conclusions/Outlook**

Aggregation is observed for many sleep characteristics in people living in partnerships as well as in parents and their grown-up children.

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**A-20-02****Associations between magnetic resonance imaging of the spine and future pain severity among persons with present low back pain (#78)**

**Dr. Julia Truthmann**, Priv.-Doz. Richard Kasch, Christopher Nell, Dr. Markus Otto, Niklas Reichwein, Prof. Jean-François Chenot, Prof. Carsten O. Schmidt

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**Introduction**

Low back pain (LBP) is one of the most common causes of disability. Magnetic resonance imaging (MRI) of the spine is able to detect many structural deviations potentially causing LBP. Longitudinal studies on the association of MRI and future LBP are sparse. The aim of this study was to investigate the association of MRI findings of the lumbar spine and LBP severity five years later in patients with LBP at baseline.

**Methods**

The analysis uses data from two separate cohorts of the Study of Health in Pomerania: SHIP-2 and SHIP-TREND-0 and the respective follow-up examinations. 1,997 Participants who underwent the MRI examination and had LBP at baseline were included. MRI findings were defined as imaging findings at any level of the lumbar spine (L1/L2 to sacrum). Average LBP and disability (10-point numerical rating scale) during the last three months were assessed. LBP severity was calculated as the mean of average LBP and disability. Multilevel linear regression models (level 1: timepoints, level 2: participants) were fitted to estimate the contribution of MRI findings on LBP severity using STATA 14.2.

**Results**

The percentages of MRI findings at baseline were: 24% disc height loss, 62% disc degeneration, 20% disc herniation, 37% high intensity zone, 2% spondylolisthesis, 8% Modic change type 1, 13% Modic change type 2, 11% hypertrophy of the ligamenta flava, 37% Schmorl lesion, 21% spinal canal stenosis. Mean LBP severity at baseline was 2.8 points. No statistically significant association with change in LBP severity was found, except for Schmorl lesion which was associated to lower LBP severity after five years ( $\beta = -0.25$  [-0.48; -0.02]). Explained variance ranged from 1 to 2%.

**Conclusions/Outlook**

The proportion of variance explained suggests that the considered MRI findings play a minor role in the prediction of future LBP. No clinically significant association with change in LBP severity was found. This supports guideline recommendations for restrictive imaging.

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**A-20-03****Divergence in the prevalence of self-reported and physician -reported diagnosis of atopic dermatitis in adults: Results from a population-based study (#86)****Katharina Piontek**<sup>1</sup>, Till Ittermann<sup>2</sup>, Andreas Arnold<sup>3</sup>, Sebastian Baumeister<sup>4</sup>, Christian Apfelbacher<sup>1</sup>

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**Introduction**

Atopic dermatitis (AD) is a chronic inflammatory skin disease characterized by itch, skin pain, sleep disturbances and multiple comorbidities. Until now, data from German studies regarding the epidemiology of AD in adults and the validity of self-reported AD in the general population are scarce. We aimed to analyze (i) the prevalence of AD based on self-report and physician-report and (ii) differences in AD prevalence by age and gender using data from a large cohort of adults.

**Methods**

Data from 3,054 participants from the population-based Study of Health in Pomerania (SHIP) aged 20 to 83 years were analyzed. All participants underwent a standardized dermatological examination encompassing a personal interview and a clinical examination. Population-weighted analyses were conducted to determine AD prevalence stratified by age and gender.

**Results**

The overall prevalence of self-reported and physician-reported AD was 2.5% and 4.2%, respectively. Prevalence was higher in women compared to men both in self-reported (2.8% vs. 2.2%) and physician-reported data (4.4% vs. 4.1%). Prevalence rates decreased across age. A considerable proportion of participants stated not to know whether they were suffering from AD (overall: 2.4%, men: 3.2%, women: 1.7%).

**Conclusions/Outlook**

Our study is the first to provide data on AD prevalence in the general adult population in Germany. A recent review reported a considerably higher AD prevalence based on AD diagnoses for other European countries such as Denmark (10%), France (8%) and Sweden (9%). We revealed a divergence between self-reported and physician-reported AD prevalence with lower rates in self-reported data, suggesting limited validity of these data. Interview data indicate that a significant proportion of the participants was presumably aware of having a skin disease, but did not know which one, indicating the need for improvements in patient information and promotion of health literacy.

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**A-20-04****The architectural concept for a transfer unit to support ‘Use and Access’ of research data in the NAKO health study (#109)**

**Jens Piegsa**, Lars Erdmann, Thomas Bahls, Prof. Wolfgang Hoffmann, Dr. Gunthard Stübs

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**Introduction**

The NAKO health study is a population-based prospective cohort study, which included 200,000 participants in the baseline. At the transfer unit of this study, we expect an annual throughput in the order of 1,000 data and biosample applications for secondary use. Based on this expectation we developed the software system *TransferHub* to support the execution of these ‘Use and Access’ processes (UAP). UAP regulations develop over the course of a study. A UAP requires a flexible application form and subsequent data collection in the context of various review steps to support both the decision on whether to accept or reject a research project and its proactive monitoring.

**Methods**

From our requirements and strategic goals, we derived a set of weighted qualitative selection criteria to evaluate existing tools and identify their limitations. The goal was to select candidates for the different modules: *BPMN* (business process modeling notation) engines, issue trackers, authorization tools, template engines, and web frameworks. Finally, we designed and implemented a system architecture for the TU and iteratively conceptualized use cases and interactions.

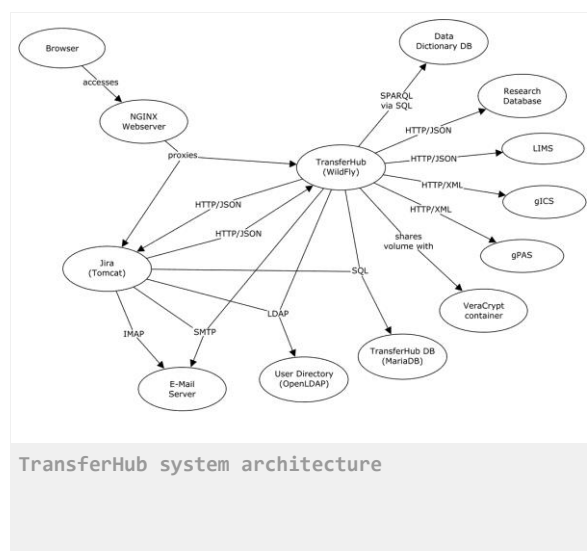
**Results**

Major identified quality criteria were: simplicity for applicants, customizable forms and workflows, long-term availability, data import and export capabilities, search, compare, and annotation features.

We hereby present the architectural concept around these core modules and services: a self-implemented application module based on Java EE standards, the issue tracker *Atlassian Jira*, a contract document generator (docx/pdf) utilizing *XDocReport*, transition handling and notifications, user management via *OpenLDAP*, and domain object-based access control via integrating *Apache Shiro*.

**Conclusions/Outlook**

*TransferHub* optimizes and harmonizes UAPs for large studies. The NAKO transfer unit is running in production and is planned to be open-sourced and provided as a generalized TU solution for other cohort studies, registers, and medical data repositories.



## A-20-05

### Supporting secondary data use for large medical data repositories by provision of interactive metadata (#111)

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#### Introduction

Dataset provisioning in large multi-party medical research projects requires optimization regarding exact dataset definition, data protection compliance, quality standards, automation capabilities, and interoperability. From a methodological perspective, data collection is often modified over the course of a study. As a consequence, the initial metadata representation needs to be adopted and advanced to fully describe the study data at any point in time. This includes follow-ups, data and biosample analysis, result sharing, and publication over the full study lifecycle. We present major cornerstones for the transfer unit of the NAKO health study.

#### Methods

Within the scope of the transfer unit development, a requirements analysis and a reevaluation of existing metadata were mandatory, followed by the modeling of a minimal ontology for presenting metadata, and the design of a *domain-specific language (DSL)* for single and combined selection criteria. Finally, a user-friendly interface needed to be designed.

#### Results

For the NAKO transfer unit, we designed and implemented a web-based data dictionary to enable applicants to select requested study variables. The underlying metadata is transformed via the W3C standard *R2RML (RDB2RDF mapping language)*. Our subpopulation editor is based on *ANTLR* and allows researchers to define topic-specific inclusion criteria based on a single variable or a combination of several variables.

#### Conclusions/Outlook

## Final Accepted Contributions

The system urges the user to formally describe both his variable set and biosamples and the required subpopulations. This provides exact information for the assessment by the Use and Access Committee and facilitates the automatic data extraction and provision for secondary data use.

### Study population editor

### Interactive data dictionary



**A-20-06****Towards a multidimensional sex/gender assessment in human biomonitoring studies (#118)**

**M.Sc./M.A. Katrin Groth**<sup>1</sup>, Dr. Małgorzata Dębiak<sup>1</sup>, Dr. Lisa Dandolo<sup>2</sup>, Dr. Katharina Jacke<sup>3</sup>, Dr. Ute Kraus<sup>4</sup>, Prof. Gabriele Bolte<sup>2</sup>, Prof. Kerstin Palm<sup>3</sup>, Dr. Alexandra Schneider<sup>4</sup>, Lotta Fiedel<sup>3</sup>, Dr. Marike Kolossa-Gehring<sup>1</sup>, On behalf of the INGER Study Group

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**Introduction**

Beyond sex-stratified data analysis, sex and gender has been hardly considered in human biomonitoring studies. The interdisciplinary consortium INGER (Integrating sex/gender into environmental health research) developed a concept for the advanced assessment of sex/gender in environmental health studies and its application for the human biomonitoring was tested for the first time within the German Environmental Specimen Bank (ESB).

**Methods**

A questionnaire including 32 questions related to sex/gender and the social environment (living conditions, stress, discrimination experiences and nutritional habits) was established and tested for feasibility and acceptance in the ESB survey 2019. The category sex/gender was operationalized on the basis of existing questionnaires in the dimensions sex assigned at birth, current sex/gender identity, internalized sex/gender roles and externalized sex/gender expression.

**Results**

505 study participants at the age of 20 to 29 answered the INGER questionnaire, which corresponds to 98.4% of all ESB participants. For the categories "sex assigned at birth" and "current sex/gender identity" there was no differentiation beyond the binary. The results of the used instruments for the dimensions "internalized sex/gender roles" and "externalized sex/gender expression" showed sufficient group variation for the beyond binary assessment of sex /gender in human biomonitoring studies.

**Conclusions/Outlook**

The high response rate indicates a high acceptance for the sex/gender related questions among the study population. Promising instruments for the assessment of the different sex/gender dimensions among young adults, such as the measurement of socially assigned gender nonconformity by Wylie et al. (2010) and the revised Bem Sex-Role Inventory by Troche et al. (2011) to investigate sex/gender roles, were identified. They will be presented and discussed as an added value for human biomonitoring studies.

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**A-20-07****The quality of care for people with home mechanical ventilation from the perspective of healthcare professionals and providers – a qualitative study (#120)**

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**Introduction**

Even though, home mechanical ventilation (HMV) is a well-established treatment option, the growing number of people living with HMV poses major challenges for the German healthcare system. People with HMV can be supported at home by a specialized outpatient nursing service (ONS) or in specialized assisted living communities (ALC). Within the project OVER- BEAS (funding by G- BA, Grant 01VSF17008) the quality of care for people with HMV was evaluated from the perspective of healthcare professionals and providers.

**Methods**

Semi-structured expert interviews were conducted by telephone. Transcripts were analyzed by two independent researchers using qualitative content analysis. The coding was guided by the nine domains of “the quality framework” (Healthcare Improvement Scotland, 2018) using the themes “outcomes and impact”, “service delivery” and “vision and leadership” as main categories.

**Results**

Overall, 84 experts were interviewed from June 2019 to February 2020. Mean interview duration was 33 minutes (range: 12-88 minutes). Expert characteristics from 64 healthcare professionals (female: 55%) and 20 providers (female: 65%) were analyzed. Healthcare professionals were nurses (n=43; 67%), physicians (n=4; 6%), speech (n=9, 14%), physical (n=5, 8%) and occupational therapists (n=3; 5%) with a mean professional experience of 9 years (range: 2-25 years). Providers were ONS providers (n=13; 65%) or equipment providers (n=7; 35%) with a mean professional experience of 11 years (range: 3-30 years). Preliminary results revealed the lack of skilled staff to deliver safe care as a “key organisational outcome” barrier. A “quality improvement-focused leadership” was identified as a key facilitator.

**Conclusions/Outlook**

Our results provide recommendations from the perspective of healthcare professionals and providers for appropriate governance structures, systems and procedures to support staff in delivering safe, effective, compassionate and person-centred care in HMV.

## A-20-08

**Design and quality control of the oral health status examination in the German National Cohort (GNC) (#133)**

**Stefanie Samietz**<sup>1</sup>, Birte Holtfreter<sup>2</sup>, Katrin Hertrampf<sup>3</sup>, Ghazal Aarabi<sup>4</sup>, Daniel Hagenfeld<sup>5</sup>, Ti-Sun Kim<sup>6</sup>, Thomas Kocher<sup>2</sup>, Bernd Koos<sup>7</sup>, Marc Schmitter<sup>8</sup>, Jan Kühnisch<sup>9</sup>, Stefan Rupf<sup>10</sup>, for the German National Cohort (Nationale Kohorte e.V., Heidelberg, Deutschland)

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**Introduction**

Dental caries and periodontal disease, both are highly prevalent and the most common oral diseases and major causes for tooth loss worldwide. Because detailed data on these oral diseases were collected within the framework of the German National Cohort (GNC), associations between oral and systemic diseases and conditions can be investigated.

**Methods**

The GNC, a population-based study in Germany, was designed to investigate possible causes and mechanisms for the onset of frequent chronic diseases. The study protocol for the oral examination was designed to ensure a comprehensive collection of dental findings by trained non-dental staff. At the mid-term of the baseline examination, a first quality evaluation of dental data was performed to check the plausibility of results and to propose measures to improve the data quality. A dental interview, saliva sampling and oral diagnostics were conducted. As part of the level-1 examination, the number of teeth and prostheses were recorded. As part of the level-2 examination, detailed periodontal, cariological and functional aspects were examined. Parameters were checked for plausibility and variable distributions were descriptively analysed.

**Results**

Analyses included data of 57,967 interview participants, 56,913 level-1 participants and 6,295 level-2 participants. Percentages of missing values for individual clinical parameters assessed in level 1 and 2 ranged between 0.02 and 3.9%. Results showed a plausible distribution of the data; rarely, implausible values were observed, e.g. for measurements of overjet and overbite. Intra-class correlation coefficients indicated differences in individual parameters between regional clusters, study centres and across different examiners.

**Conclusions/Outlook**

The results confirm the feasibility of the study protocol by non-dental personnel and its successful integration into the GNC's overall assessment program. However, rigorous dental support of the study centres is required for quality management.

**A-20-09****Stress factor "itching" in patients with atopic dermatitis in Germany: results of the study "AtopicHealth2" (#157)**

**Anna Langenbruch**, Prof. Matthias Augustin, Nicole Zander

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**Introduction**

Itching or pruritus is an unpleasant sensation of the skin that provokes scratching. It is one of the main symptoms of atopic dermatitis (AD). The aim of this study was to determine the burden patients with AD experience due to pruritus.

**Methods**

The cross-sectional survey "AtopicHealth2" was carried out in 112 dermatological centers nationwide. Various itch-related patient data as well as the perceived therapy success with regard to pruritus were recorded. In the presentation of results, patients for whom the physician gave an indication for systemic therapy (ST) were considered moderately to severely affected by AD and those without an indication for ST were considered slightly affected. This study was financially supported by Sanofi (unrestricted grant).

**Results**

Between August 2017 and June 2019 1291 patients with AD were included (mean age: 41 years). 682 were certified as having an indication for ST, 367 were not. Among those with an indication for ST, 73.9% stated that the eczema itched every day (vs. 51.9% of those without indication for ST). Among patients with an indication for ST, 42.4% reported having suffered from sleep disturbances frequently or always due to itching in the last seven days (22.4% without indication for ST). 46.6% of those with an indication for ST reported having scratched the skin frequently or always until it bled (24.1% of those without indication for ST). One of the most important therapeutic goals was "to be free of itching". To have achieved this goal through therapy was declared by 41.3% of patients with an indication for ST (49.4% of patients without indication for ST).

**Conclusions/Outlook**

The high prevalence of AD related pruritus and serious consequences such as insomnia point to severe impairments of these patients and indicates gaps in AD care. This is also supported by the therapy goal "to be free of itching" being not satisfactorily achieved by the therapy from the perspective of the majority of patients. It points out an urgent need for therapeutic innovations.

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**A-20-10****Topology of atopic dermatitis in dermatological care: results of the study “AtopicHealth2” (#183)**

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**Introduction**

A methodological innovation for recording the topology of atopic dermatitis (AD) is the use of a high-resolution, topological grid system with which the surface area of the lesions can be measured in a differentiated manner. This method had already been applied in a study on psoriasis. At that time, the mean affected body surface of psoriasis patients was 10.7%. The aim of this study was to characterize the affected body surface in patients with AD in Germany.

**Methods**

Within the scope of the national cross-sectional study "AtopicHealth2" data on patients with AD collected in 112 dermatological centres were analysed. The distribution of lesions was determined by a body surface grid into which the patients could draw their affected areas. It consists of 1423 points, which are assigned to body regions. Data on the AD severity and dermatology-specific quality of life, pruritus and therapy benefit were also recorded. The study was financially supported by Sanofi (unrestricted grant).

**Results**

Between August 2017 and June 2019 1291 patients were included (56.5% female, mean age: 41 years). On average, 15.7% of the body surface was marked (21.5% by patients with moderate to severe AD and 8.6% by those with mild AD). The hands and elbows were among the most frequently affected regions. In a linear regression analysis, predictors of the affected body surface were male gender, disease severity, quality of life restrictions, as well as scratching the skin until it bleeds (as an indicator for the severity of pruritus).

**Conclusions/Outlook**

The extent of the body surface affected by AD seems to be slightly higher than in psoriasis. The association of the extent of the lesions with other stress factors suggests that it can be regarded as an indicator of the severity of AD. The surface area affected by AD should be considered in dermatological routine and taken into account in therapy decisions. The presented method offers an alternative to the detection of affected body regions without the need for a patient to undress.

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## A-20-11

**The role of family caregivers in decision-making of older cancer patients: extending the concept of “shared decision-making” (#190)**

**M.Sc./M.A. Andreas Heidenreich**<sup>1</sup>, Prof. Frank Gieseler<sup>2</sup>, Jacqueline Schubert<sup>2</sup>, Dr. Fabian Frielitz<sup>1</sup>, Prof. Christoph Rehmann-Sutter<sup>3</sup>, Dr. Frank Wörler<sup>3</sup>, Prof. Christina Schües<sup>3</sup>, Dr. Joachim Hübner<sup>1</sup>, Dr. Susanne Elsner<sup>1</sup>, Katarina Block<sup>1</sup>, Prof. Achim Rody<sup>4</sup>, Prof. Nikolas von Bubnoff<sup>2</sup>, Prof. Tobias Keck<sup>5</sup>, Dr. Monika Steimann<sup>6</sup>, Dr. Gero Endsin<sup>7</sup>, Prof. Alexander Katalinic<sup>1</sup>

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**Introduction**

Family caregivers (FCGs) play an important role in assisting their family members with cancer, but their role in the treatment decision-making process has not yet been adequately investigated.

**Methods**

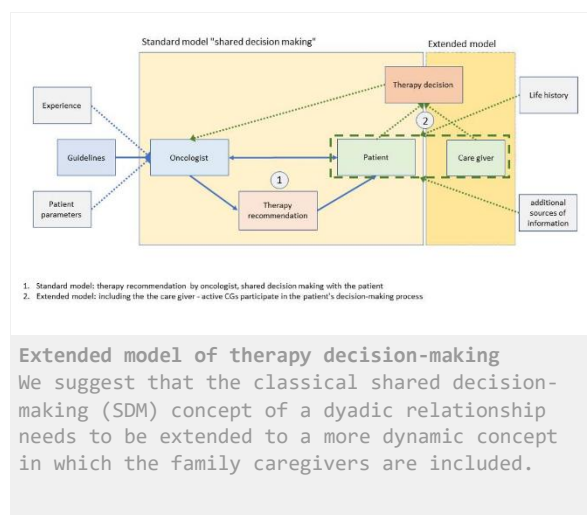
We conducted semi-structured interviews with 37 cancer patients (median: 73 years; 29 patients were 69 or older) about the context of their diagnosis, treatment decision, and family support. Additionally, we interviewed FCGs: 6 FCGs were interviewed simultaneously with the patient, 19 were referred to by the patient and interviewed in a one-on-one setting, 8 FCGs were directly recruited without a prior patient interview. We analyzed our data according to Grounded Theory towards understanding the treatment decision-making processes and the FCGs' potential role therein.

**Results**

The vast majority (75 %) of patients included in our study indicated that they were supported by an FCG. The patient/FCG interaction pattern was found to be either (i) supportive, relieving patients from some burdens, (ii) experienced as a 'community of fate' with decisions achieved as joint efforts, or (iii) as a reversal of the traditional FCG-patient care relationship with FCG acting rather as initiators in the decision-making processes. Despite the fact that FCGs play partnering roles in the patients' therapy decisions, only 38 % were directly involved in the physician-patient therapy discussion.

**Conclusions/Outlook**

We suggest that the traditional concept of shared decision-making, which assumes a dyadic relationship, needs to be extended to a more dynamic concept in which FCGs should be involved. Such a constellation could enable physicians to gain a better understanding of the reasons for a patient's decision for or against a therapy proposed by the physician.



## A-20-12

# Computational performance of automated data cleaning in an epidemiologic cohort study (#191)

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## Introduction

Study data requires complex preprocessing steps before the conduct of substantial scientific analyses. Yet, in complex studies this may become a computationally extensive task. This work describes the implementation of an automated data cleaning procedure and measures taken to improve computational efficiency.

## Methods

Work was realized as part of the Study of Health in Pomerania (SHIP), a population-based cohort study. It comprises in total 8728 participants with several thousands of variables per person. Data capture in SHIP is mostly conducted via electronic Case Report Forms and values are directly saved in a PostgreSQL database. In addition, complex import routines realize the storage of data from medical measurement devices and the laboratory in PostgreSQL too. Until 2013 data was checked on a quarterly basis and cleaned manually using separate SAS scripts. Subsequently, we have implemented automated modular routines in SAS, which realize data cleaning steps in a nightly running task.

## Results

A daily runtime of 6 hours of the initial modular pipeline and the related high memory demands were not acceptable. Therefore many improvements were made. Some targeted a faster access to the database (i.e. using the PostgreSQL-Engine with appropriate parameters, using database-specific functions for importing tables and setting rights) some with the aim to reduce the metadata table complexity to essential information (i.e. creating distinct list of variables values). In addition program code was shortened for greater clarity. Implementing these steps led to a reduction of the runtime by about 50%.



## Final Accepted Contributions

**Conclusions/Outlook**

The automated data processing leads to a better availability of cleaned data on a daily basis and a higher data quality. The optimization of computational processes substantially reduced the running times of the automated routines and improved the transparency of all data cleaning steps.

**A-20-13****Methodology of the First German National Sex Survey – GeSiD (Gesundheit und Sexualität in Deutschland) (#201)**

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**Introduction**

Unlike other European countries, Germany so far has not carried out a national survey into the sexual attitudes, lifestyles and behaviors of its general adult population. GeSiD (Gesundheit und Sexualität in Deutschland) is the first representative German survey regarding sexuality and its relevance for health. The main topics are sexually transmitted infections and sexual health.

**Methods**

The study consisted of a questionnaire with a computer-assisted personal interview for socio-demographic questions and a computer-assisted self interview for the more personal questions such as sexual experiences, attitudes towards sexuality, and sexual problems. Sampling was designed as a two-stage register sample and the field phase lasted from 10/2018-09/2019. In the first stage 200 sample points out of 178 municipalities from all 16 federal states were sampled, while in the second stage persons were drawn from these sample points.

**Results**

With a response rate of 30.2 percent a sample size of 4955 participants was accomplished. The characteristics of respondents matched well for most sociodemographic variables compared to non-respondents and census data. The most pronounced differences occurred for marital status and self-reported general health, the GeSiD population overrepresents persons with good health conditions while it underrepresents married persons.

**Conclusions/Outlook**

Data from the first representative national sex-survey allow an empirically sound assessment of sexual health in Germany. In addition, they will be helpful in identifying certain health risks and contribute to the development of target group specific care and prevention measures. Improving sexual and reproductive health remains a high priority and results from GeSiD will be used to inform sexual health policy in Germany.



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