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DEN 23. NORSKE EPIDEMIOLOGIKONFERANSEN

BERGEN,

26.-27. SEPTEMBER 2016

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GJESTEREDAKTØRER: VALBORG BASTE, ANDERS
ENGELAND OG GRACE M. EGELAND

The 23rd Norwegian Conference on Epidemiology Bergen, September 26 – September 27, 2016

Welcome to the 23rd conference of the Norwegian Epidemiological Association (NOFE) in Bergen. NOFE's Annual Conference continues to be an important venue for promoting excellence in epidemiological research in Norway. Along those lines, we are delighted to have EPINOR students join us again this year. As one of NOFE's primary goals is to help contribute to the education of the next generation of epidemiologists in Norway, we always welcome and prioritize student presentations at our annual conferences.

While registry-based epidemiology continues to be a strength of the association's scientific and public health endeavors, the epidemiological community in Norway is becoming increasingly diverse. This year's conference highlight themes reflected by the topics represented in the abstract submissions: cancer, cardiovascular disease and diabetes, pregnancy, behavior and psychology, and pharmaco-epidemiology. Our distinguished keynote speakers include: Dr. Savitz (U.S.A.) who will speak about the interpretation of epidemiological evidence, Dr. Wensaas on a longitudinal follow-up of the Giardia outbreak in Bergen, and Dr. Hopstock regarding the latest findings from the Tromsø Health Survey. Further, we have planned two highly relevant biostatistics lectures, one on competing risks by Dr. Lie, and one on the pitfalls of categorization of continuous variables by Dr. Thoresen.

Other important program items include the 2016 NOFE Annual Meeting with the presentation of the Publication of the Year Award and Honorary Membership Award on Monday at 4:00 pm. Also, to be discussed at the NOFE Annual Meeting is whether we want to continue to hold an annual NOFE conference given that we are also participants in our affiliate conference, Nordic Epidemiology, which takes place every other year. Please join us at the NOFE Annual Meeting to let us know your views on this important decision.

In addition to our NOFE Annual Meeting, we invite everyone to come to the Welcome Reception (7:00 pm) being hosted by the Norwegian Institute of Public Health at their new location (Zander Kaaes Gate 7) right across the street from the Grand Terminus Hotel. The Welcome Reception will be followed by dinner and entertainment at the dining hall at our conference hotel, Grand Terminus Hotel.

Welcome to NOFE 2016!

The organizing committee for the NOFE 2016 Conference & NOFE Steering Committee Members

The organizing committee for the NOFE conference 2016

Valborg Baste
Uni Research Health

Grace M. Egeland
Norwegian Institute of Public Health and University of Bergen

Anders Engeland
Norwegian Institute of Public Health and University of Bergen

The 23rd Norwegian Conference on Epidemiology Bergen, September 26 – September 27, 2016

Program Overview

Monday, September 26

09:15	Registration (Coffee and refreshments), Terminus Hall foyer, Grand Terminus Hotel
10:00	Welcome
10:05-10:50	Keynote, invited speaker: David Savitz Interpreting Epidemiologic Evidence: The Art of Using Research Wisely Chair / co-Chair: Grace Egeland / Lise Lund Håheim
10:50-11:00	Coffee break
11:00-12:15	Parallel session 1. Oral presentations: Cancer, A1-A5 Diabetes/CVD, B1-B5 Pregnancy, C1-C5
12:15-13:15	Lunch
13:15-13:45	Keynote, invited speaker: Laila Arnesdatter Hopstock The seventh Tromsø Study 2015-2016: Presentation of preliminary results and extensive opportunities for further research collaborations Chair / co-Chair: Kristin Benjaminsen Borch / Lise Lund Håheim
13:45-14:15	Keynote, invited speaker: Knut-Arne Wensaas Giardiasis in Bergen 2004 – The outbreak and its clinical consequences Chair / co-Chair: Lise Lund Håheim / Kristin Benjaminsen Borch
14:15-14:30	Coffee break
14:30-15:30	Parallel session 2. Oral presentations: Various topics, A6-A9 CVD, B6-B9 Behaviour, C6-C9
15:30-16:00	Poster viewing , Entrance Foyer of Terminus Hall Coffee break with refreshments
16:00-17:00	NOFE's annual meeting Announcement of Publication of the year and Honorary member
19:00	Welcome reception National Institute of Public Health, Zander Kaaesgate 7, Bergen Chair: Marta Ebbing
19:45	Conference dinner and entertainment, Grand Terminus Hotel

Oral presentations of submitted abstracts. Monday, September 26th									
Terminus Hall			Terminus Forum						
Cancer			Diabetes/CVD						
Pregnancy			Behaviour						
11:00-11:15	A1	Measured cardiorespiratory fitness and self-reported physical activity: associations with cancer risk and death in a long-term prospective cohort study	Robsaahm	B1	Decreasing incidence of type 2 diabetes in Norway 2009-2014	Gulseth	C1	Pre-eclampsia and childhood asthma	Magnus
11:15-11:30	A2	Risk of endometrial cancer and physical activity in Norwegian women – The NOWAC Study	Borch	B2	No increased incidence of type 1 diabetes under 40 years 2009-2014 in Norwegians and immigrants	Ruiz	C2	Maternal intake of fat soluble vitamins during pregnancy, infant supplementation and asthma development: the Norwegian Mother and Child Cohort Study	Parr
11:30-11:45	A3	The association between alcohol, physical activity and breast cancer subtypes in a nested case-control study from the Norwegian Breast Cancer Screening Program	Ellingjord-Dale	B3	Ethnic difference in the prevalence of pre-diabetes and diabetes mellitus in regions with Sami and non-Sami populations in Norway – The SAMINOR 1 study	Naseribafrouei	C3	Individual-based versus aggregate meta-analysis in multi-database studies of pregnancy outcomes: The Nordic example of selective serotonin reuptake inhibitors and venlafaxine in pregnancy	Selmer
11:45-12:00	A4	Indoor tanning and melanoma risk: a prospective, population-based cohort study	Ghiasvand	B4	Ethnic inequalities in acute myocardial infarction and stroke rates in Norway 1994-2009: a nationwide cohort study (CVDNOR)	Rabanal	C4	Comparison of self-report data in the Norwegian Mother and Child Cohort (MoBa) and data in national registries	Kristensen
12:00-12:15	A5	Melanoma and sunscreen use – A systematic review and meta-analysis	Rueegg	B5	Longitudinal and secular trends in total cholesterol levels and impact of lipid-lowering drug use among women and men born 1905-1977: The Tromsø Study, 1979-2008	Hopstock	C5	Complications in pregnancy: long-term risk and mortality of chronic diseases	Skjærven
14:30-14:45	A6	Assessing Genome-Wide Significance for the Detection of Differentially Methylated Regions	Page	B6	Cardiovascular risk factors and hearing loss: The HUNT study	Engdahl	C6	The second clinical survey of the Population-based Study on Health and Living conditions in regions with Sami and Norwegian populations (the SAMINOR 2 Clinical Study)	Broderstad
14:45-15:00	A7	The effects of childhood sensorineural hearing loss combined with aging or noise exposure later in life	Aarhus	B7	Educational differences in coronary out-of-hospital deaths in the Norwegian population during 1995-2009; a CVDNOR project	Sulo	C7	Mental health impairment and death from suicide and unintentional injuries/accidents in males. A longitudinal national cohort study	Fadum
15:00-15:15	A8	Association between weight change and mortality in community living older people followed for up to 14 years. The Hordaland Health Study (HUSK)	Haugsgjerd	B8	Aortic Valve Replacement Therapy in Norway 2012-2015. Patient characteristics and survival.	Ebbing	C8	Mediators and moderators between potentially traumatic events and outcomes PTSD and disability pension	Lassemo
15:15-15:30	A9	Acute Hepatic Porphyria and Cancer: A Population-Based Cohort Study	Baravelli	B9	Inter-rater Reliability of a National Acute Myocardial Infarction Register	Govatsmark	C9	Too many injury deaths lack information on external cause: The X59 problem	Lycke Ellingsen

Program Overview

Tuesday, September 27

09:00-10:00	Parallel session 3. Oral presentations: Behaviour, A10-A13 Various topics, B10-B13
10:00-10:15	Coffee break
10:15-11:00	Keynote, invited speaker: Magne Thoresen Spurious interaction as a result of categorization Chair / co-Chair: Valborg Baste / Geir Egil Eide
11:00-11:15	Coffee break with refreshments
11:15-12:30	Parallel session 4. Oral presentations: Cancer, A14-A18 CVD, B14-B18 Pregnancy, C10-C14
12:30-13:30	Lunch
13:30-14:45	Parallel session 5. Oral presentations: Cancer, A19-A23 Behaviour, B19-B23
14:45- 15:00	Coffee break with refreshments
15:00-15:45	Keynote, invited speaker: Stein Atle Lie From ordinary survival analyses to analyses of competing risk Chair / co-Chair: Geir Egil Eide / Valborg Baste
15:45	Closing

Oral presentations of submitted abstracts. Tuesday, September 27th						
Terminus Hall		Terminus Forum			Bull	
Behaviour		Various topics				
09:00-09:15	A10	ADHD treatment and diagnosis – Importance of relative age in grade in Norway	Bakken	Frequent alcohol consumption increases risk of hip fracture in men below 60 years in Cohort of Norway. A NOREPOS study	Søgaard	
09:15-09:30	A11	Economic volatility and adolescent mental health	Bøe	Milk intake in middle-aged Norwegians and risk of hip fracture: Is there an association? A linkage between the Norwegian Counties Study and the NOREPOS hip fracture database	Holvik	
09:30-09:45	A12	Alcohol and illicit drug use and school-related impairment among adolescents: the youth@hordaland-survey	Heradstveit	How is revision rates influenced by hospital procedure volume for the Oxford Unicomparmental Knee Arthroplasty?	Fenstad	
09:45-10:00	A13	High school dropout and later labor market success: Confounding from the early life course factors and cognitive ability, and a comparison of sibling	Mohn	Avoidable hospital admissions, length of hospital stay and probability of 30-day hospital readmission among elderly in Norway	Kristoffersen	
		Cancer			Pregnancy	
11:15-11:30	A14	The Fraction of Breast Cancer attributable to smoking. The Norwegian Women and Cancer study 1991-2012	Gram	Incidence and risk factors for unruptured intracranial aneurysms (UIAs) in a population-based study – preliminary results	Sandvei	C10 The influence of birth weight and childhood body mass index on overweight and obesity in adolescence. The Tromsø study.
11:30-11:45	A15	A closer look at the sex-differences in the survival of bladder cancer	Andreassen	Trends in use of oral anticoagulants as stroke prophylaxis in Norway – NOACs are trendy	Kjerpeseth	C11 Maternal serum levels of perfluoroalkyl substances and organochlorines and indices of fetal growth: a case-cohort study
11:45-12:00	A16	Prostate-specific antigen testing for prostate cancer: Emptying a limited pool of susceptible individuals?	Valberg	Plasma betaine and risk of incident atrial fibrillation: the Hordaland Health Study	Zuo	C12 Preeclampsia and long-term maternal cardiovascular disease mortality: heterogeneity of risk by lifetime parity and pregnancy conditions
12:00-12:15	A17	Cancer Risk among Insulin Users: Comparing Analogues with Human Insulin in the CARING five-Country Study	Hjellvik	The educational gradient in cardiovascular mortality, examining the impact of risk factors in cohorts born in the 1930s, 1940s and 1950s	Ariansen	C13 Gut microbiome of mothers delivering prematurely shows reduced diversity and lower relative abundance of Bifidobacterium and Streptococcus
12:15-12:30	A18	Ethnic differences in the incidence of cancer in Norway	Hjerkind	Is dietary calcium important in preventing hypertension?	Egeland	C14 Management of HIV positive pregnant women in Tanzania, are we meeting national guidelines?
		Cancer			Behaviour	
13:30-13:45	A19	A processual model for functional analyses of carcinogenesis in the prospective cohort design	Lund	The Norwegian student introductory week: who takes part and is participation associated with better social integration and satisfaction among students?	Askeland	
13:45-14:00	A20	How many future deaths from colorectal cancer can be prevented by 2030? A scenario-based quantification of risk factor modification, screening implementation and improved treatment in Norway	Skyrud	Risky drinking among participants in the university introductory week	Myrtveit	
14:00-14:15	A21	Alterations in DNA methylation and gene expression in blood years prior to lung cancer diagnosis - the NOWAC study	Sandanger	Factor analysis of the Hopkins Symptom Checklist (HSCL-25) in a student population	Skogen	
14:15-14:30	A22	Is a possible relationship between occupational noise exposure and vestibular schwannoma (acoustic neuroma) causal or due to detection bias?	Nordby	Antidepressant drug use among adolescents during 2004–2013: a population-based register linkage study	Skurtveit	
14:30-14:45	A23	Cohort Profile Update: The Janus Serum Bank Cohort in Norway	Hjerkind	Physical activity, sedentary behavior and sleep measured by accelerometer in the seventh Tromsø Study 2015-2016: Presentation of ongoing projects, preliminary results and extensive opportunities for future research collaborations	Morsest	

The 23rd Norwegian Conference on Epidemiology Bergen, September 26 – September 27, 2016

Scientific Program for Parallel Sessions

Parallel session 1 – Monday, September 26

Parallel session A1-A5		Terminus Hall	Chair / co-Chair
Topic: Cancer			Jo Stenehjem / Tone Bjørge
11:00-11:15	A1	Measured cardiorespiratory fitness and self-reported physical activity: associations with cancer risk and death in a long-term prospective cohort study	Robsahm
11:15-11:30	A2	Risk of endometrial cancer and physical activity in Norwegian women – The NOWAC Study	Borch
11:30-11:45	A3	The association between alcohol, physical activity and breast cancer subtypes in a nested case-control study from the Norwegian Breast Cancer Screening Program	Ellingjord-Dale
11:45-12:00	A4	Indoor tanning and melanoma risk: a prospective, population-based cohort study	Ghiasvand
12:00-12:15	A5	Melanoma and sunscreen use – A systematic review and meta-analysis	Rueegg
Parallel session B1-B5		Terminus Forum	Chair / co-Chair
Topic: Diabetes/CVD			Marjolein Iversen / Marta Ebbing
11:00-11:15	B1	Decreasing incidence of type 2 diabetes in Norway 2009-2014	Gulseth
11:15-11:30	B2	No increased incidence of type 1 diabetes under 40 years 2009-2014 in Norwegians and immigrants	Ruiz
11:30-11:45	B3	Ethnic difference in the prevalence of pre-diabetes and diabetes mellitus in regions with Sami and non-Sami populations in Norway – The SAMINOR 1 study	Naseribafrouei
11:45-12:00	B4	Ethnic inequalities in acute myocardial infarction and stroke rates in Norway 1994-2009: a nationwide cohort study (CVDNOR)	Rabanal
12:00-12:15	B5	Longitudinal and secular trends in total cholesterol levels and impact of lipid-lowering drug use among women and men born 1905-1977: The Tromsø Study 1979-2008	Hopstock
Parallel session C1-C5		Bull	Chair / co-Chair
Topic: Pregnancy			Mette Tollånes / Kari Furu
11:00-11:15	C1	Pre-eclampsia and childhood asthma	Magnus
11:15-11:30	C2	Maternal intake of fat soluble vitamins during pregnancy, infant supplementation and asthma development: the Norwegian Mother and Child Cohort Study	Parr
11:30-11:45	C3	Individual-based versus aggregate meta-analysis in multi-database studies of pregnancy outcomes: The Nordic example of selective serotonin reuptake inhibitors and venlafaxine in pregnancy	Selmer
11:45-12:00	C4	Comparison of self-report data in the Norwegian Mother and Child Cohort (MoBa) and data in national registries	Kristensen
12:00-12:15	C5	Complications in pregnancy: long-term risk and mortality of chronic diseases	Skjærven

Parallel session 2 – Monday, September 26

Parallel session A6-A9		Terminus Hall	Chair / co-Chair
Topic: Various topics		Bjørn Heine Strand / Trond Peder Flaten	
14:30-14:45	A6	Assessing Genome-Wide Significance for the Detection of Differentially Methylated Regions	Page
14:45-15:00	A7	The effects of childhood sensorineural hearing loss combined with aging or noise exposure later in life	Aarhus
15:00-15:15	A8	Association between weight change and mortality in community living older people followed for up to 14 years. The Hordaland Health Study (HUSK)	Haugsgjerd
15:15-15:30	A9	Acute Hepatic Porphyrria and Cancer: A Population-Based Cohort Study	Baravelli
Parallel session B6-B9		Terminus Forum	Chair / co-Chair
Topic: CVD		Grethe Tell / Linn Beate Strand	
14:30-14:45	B6	Cardiovascular risk factors and hearing loss: The HUNT study	Engdahl
14:45-15:00	B7	Educational differences in coronary out-of-hospital deaths in the Norwegian population during 1995-2009; a CVDNOR project	Sulo
15:00-15:15	B8	Aortic Valve Replacement Therapy in Norway 2012-2015. Patient characteristics and survival	Ebbing
15:15-15:30	B9	Inter-rater Reliability of a National Acute Myocardial Infarction Register	Govatsmark
Parallel session C6-C9		Bull	Chair / co-Chair
Topic: Behaviour		Børge Sivertsen / Svetlana Skurtveit	
14:30-14:45	C6	The second clinical survey of the Population-based Study on Health and Living conditions in regions with Sami and Norwegian populations (the SAMINOR 2 Clinical Study)	Broderstad
14:45-15:00	C7	Mental health impairment and death from suicide and unintentional injuries/accidents in males. A longitudinal national cohort study	Fadum
15:00-15:15	C8	Mediators and moderators between potentially traumatic events and outcomes PTSD and disability pension	Lassemo
15:15-15:30	C9	Too many injury deaths lack information on external cause: The X59 problem	Lycke Ellingsen

Parallel session 3 – Tuesday, September 27

Parallel session A10-A13		Terminus Hall	Chair / co-Chair
Topic: Behaviour		Bo Engdahl / Trond Peder Flaten	
09:00-09:15	A10	ADHD treatment and diagnosis – Importance of relative age in grade in Norway	Bakken
09:15-09:30	A11	Economic volatility and adolescent mental health	Bøe
09:30-09:45	A12	Alcohol and illicit drug use and school-related impairment among adolescents: the youth@hordaland-survey	Heradstveit
09:45-10:00	A13	High school dropout and later labor market success: Confounding from the early life course factors and cognitive ability, and a comparison of siblings	Mohn

Parallel session B10-B13		Terminus Forum	Chair / co-Chair
Topic: Various topics		Wenche Nystad / Trond Riise	
09:00-09:15	B10	Frequent alcohol consumption increases risk of hip fracture in men below 60 years in Cohort of Norway. A NOREPOS study	Søgaard
09:15-09:30	B11	Milk intake in middle-aged Norwegians and risk of hip fracture: Is there an association? A linkage between the Norwegian Counties Study and the NOREPOS hip fracture database	Holvik
09:30-09:45	B12	How is revision rates influenced by hospital procedure volume for the Oxford Unicompartmental Knee Arthroplasty?	Fenstad
09:45-10:00	B13	Avoidable hospital admissions, length of hospital stay and probability of 30-day hospital readmission among elderly in Norway	Kristoffersen

Parallel session 4 – Tuesday, September 27

Parallel session A14-A18		Terminus Hall	Chair / co-Chair
Topic: Cancer		Steinar Tretli / Trude Robsahm	
11:15-11:30	A14	The fraction of breast cancer attributable to smoking. The Norwegian Women and Cancer study 1991-2012	Gram
11:30-11:45	A15	A closer look at the sex-differences in the survival of bladder cancer	Andreassen
11:45-12:00	A16	Prostate-specific antigen testing for prostate cancer: Emptying a limited pool of susceptible individuals?	Valberg
12:00-12:15	A17	Cancer Risk among Insulin Users: Comparing Analogues with Human Insulin in the CARING five-Country Study	Hjellvik
12:15-12:30	A18	Ethnic differences in the incidence of cancer in Norway	Hjerkind

Parallel session B14-B18		Terminus Forum	Chair / co-Chair
Topic: CVD		Stein Emil Vollset / Inger Johanne Bakken	
11:15-11:30	B14	Incidence and risk factors for unruptured intracranial aneurysms (UIAs) in a population-based study – preliminary results	Sandvei
11:30-11:45	B15	Trends in use of oral anticoagulants as stroke prophylaxis in Norway – NOACs are trendy	Kjerpeseth
11:45-12:00	B16	Plasma betaine and risk of incident atrial fibrillation: the Hordaland Health Study	Zuo
12:00-12:15	B17	The educational gradient in cardiovascular mortality; examining the impact of risk factors in cohorts born in the 1930s, 1940s and 1950s	Ariansen
12:15-12:30	B18	Is dietary calcium important in preventing hypertension?	Egeland

Parallel session 4 – Tuesday, September 27 (cont.)

Parallel session C10-C14		Bull	Chair / co-Chair
Topic: Pregnancy			Anne Kjersti Daltveit / Margaretha Haugen
11:15-11:30	C10	The influence of birth weight and childhood body mass index on overweight and obesity in adolescence. The Tromsø study: <i>Fit Futures</i>	Evensen
11:30-11:45	C11	Maternal serum levels of perfluoroalkyl substances and organochlorines and indices of fetal growth: a case-cohort study	Lauritzen
11:45-12:00	C12	Preeclampsia and long-term maternal cardiovascular disease mortality: heterogeneity of risk by lifetime parity and pregnancy conditions	DeRoo
12:00-12:15	C13	Gut microbiome of mothers delivering prematurely shows reduced diversity and lower relative abundance of Bifidobacterium and Streptococcus	Dahl
12:15-12:30	C14	Management of HIV positive pregnant women in Tanzania; are we meeting national guidelines?	Rebnord

Parallel session 5 – Tuesday, September 27

Parallel session A19-A23		Terminus Hall	Chair / co-Chair
Topic: Cancer			Tone Bjørge / Inger Torhild Gram
13:30-13:45	A19	A processual model for functional analyses of carcinogenesis in the prospective cohort desi	Lund
13:45-14:00	A20	How many future deaths from colorectal cancer can be prevented by 2030? A scenario-based quantification of risk factor modification, screening implementation and improved treatment in Norway	Skyrud
14:00-14:15	A21	Alterations in DNA methylation and gene expression in blood years prior to lung cancer diagnosis – the NOWAC study	Sandanger
14:15-14:30	A22	Is a possible relationship between occupational noise exposure and vestibular schwannoma (acoustic neuroma) causal or due to detection bias?	Nordby
14:30-14:45	A23	Cohort Profile Update: The Janus Serum Bank Cohort in Norway	Hjerkind

Parallel session B19-B23		Terminus Forum	Chair / co-Chair
Topic: Behaviour			Lise Lund Håheim / Eva Skovlund
13:30-13:45	B19	The Norwegian student introductory week: who takes part and is participation associated with better social integration and satisfaction among students?	Askeland
13:45-14:00	B20	Risky drinking among participants in the university introductory week	Myrtveit
14:00-14:15	B21	Factor analysis of the Hopkins Symptom Checklist (HSCL-25) in a student population	Skogen
14:15-14:30	B22	Antidepressant drug use among adolescents during 2004–2013: a population-based register linkage study	Skurtveit
14:30-14:45	B23	Physical activity, sedentary behavior and sleep measured by accelerometer in the seventh Tromsø Study 2015-2016: Presentation of ongoing projects, preliminary results and extensive opportunities for future research collaborations	Morseth

A1**Measured cardiorespiratory fitness and self-reported physical activity: associations with cancer risk and death in a long-term prospective cohort study**

Trude E. Røsbahm¹, Ragnhild S. Falk², Trond Heir³, Leiv Sandvik², Linda Vos¹, Jan Erikssen³, Steinar Tretli^{1,4}

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²Oslo Centre for Biostatistics and Epidemiology, Oslo University Hospital, Oslo, Norway

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⁴Department of Public Health and General Practice, Norwegian University of Science and Technology, Trondheim, Norway

Introduction: Physical activity is inversely associated with risk of some cancers. The relation with cancer-specific death is uncertain. Mainly, studies on relationships between physical activity and cancer are based on self-reported physical activity (SPA).

Aims: To examine whether objectively measured cardiorespiratory fitness (CRF) is associated with cancer risk, mortality and case fatality. We also describe relationships between SPA and these outcomes, and between CRF and SPA.

Methods: A cohort of 1,997 healthy Norwegian men, aged 40-59 years at inclusion in 1972-75, was followed throughout 2012. At baseline, CRF was objectively measured. SPA (leisure time and occupational) was obtained through a questionnaire. Relationships between CRF or SPA, and the outcomes were estimated using Cox regression, adjusted for age, BMI and smoking. Pearson correlation coefficients evaluated agreements between CRF and SPA. During follow-up, 758 were diagnosed with cancer and 433 cancer deaths occurred.

Results: Analyses revealed lower cancer risk (HR 0.85, 95% CI 0.68-1.00), mortality (HR 0.68, 95% CI 0.53-0.88) and case fatality (HR 0.74, 95% CI 0.57-0.96), in men with high CRF compared to low CRF. Light leisure time SPA was associated with lower cancer risk (HR 0.70, 95% CI 0.56-0.86) and mortality (HR 0.64 95% CI 0.49-0.83), while strenuous occupational SPA was associated with higher risks (HR 1.42 95% CI 1.13-1.78 and HR 1.45 95% CI 1.09-1.93). Correlations between CRF and SPA were 0.3511 ($p < 0.001$) and -0.1061 ($p < 0.001$) for leisure time and occupational SPA, respectively.

Conclusion: A high midlife CRF may be beneficial for cancer risk, cancer mortality and case fatality.

A2**Risk of endometrial cancer and physical activity in Norwegian women – The NOWAC Study****Kristin B. Borch**¹, Elisabete Weiderpass^{1,2,3,4}, Tonje Braaten¹, Mie Jareid¹, Oxana A. Gavriluk¹, Ildir Licaj¹¹ Department of Community Medicine, Faculty of Health Sciences, UiT, The Arctic University of Norway, Tromsø, Norway² Department of Medical Epidemiology and Biostatistics, Karolinska Institutet, Stockholm, Sweden³ Department of Research, Cancer Registry of Norway, Institute of Population-Based Cancer Research, Oslo, Norway⁴ Genetic Epidemiology Group, Folkhälsan Research Centre, Samfundet Folkhälsan, Helsinki, Finland**Introduction:** Few studies have investigated endometrial cancer in Norway attributable to low levels of physical activity (PA).**Aims:** To investigate the association between PA and incidence of endometrial cancer using PA measurements at study enrollment and during follow-up calculating the population attributable fraction (PAF) for low levels of PA.**Methods:** Of 82 759 women enrolled in the nationally representative Norwegian Women and Cancer Study with complete information on PA, whereof 52 370 women had follow-up information on PA, 687 women with endometrial cancer were identified. Follow-up time was defined as the interval between age at enrollment and age at diagnosis, death, emigration, or last complete follow-up (31 December 2013), whichever came first. Multivariate cox proportional hazard models were used to estimate hazard ratios (HR) and 95% confidence intervals (CI). PAF indicated what proportion of endometrial cancer in the population that would be avoided if women were set at PA level above the median level corresponding to 90 minutes of moderate/vigorous PA per week.**Results:** We found a significant dose-response trend that lower levels of PA at enrollment and during follow-up were associated with a higher risk of overall endometrial cancer; i.e. HR = 1.85 (95 % CI 1.36-2.53) for the lowest levels of PA compared to a median level and HR = 0.71 (95 % CI 0.45-1.12) for the highest level. The association was attenuated with adjustments for body mass index and more pronounced among obese women. PAF showed that if women increase their PA level corresponding to 90 minutes per week 13.4% (95% CI: 0.10-25.0) of endometrial cancers have potential to be avoided.**Conclusions:** We found an inverse dose-response association between PA and endometrial cancer and more than 1/8 cases could potentially been avoided if women reach a higher level of PA.

A3**The association between alcohol, physical activity and breast cancer subtypes in a nested case-control study from the Norwegian Breast Cancer Screening Program**

Merete Ellingjord-Dale¹, Linda Vos¹, Steinar Tretli¹, Solveig Hofvind¹, Isabel dos Santos Silva², Giske Ursin^{1,3,4}

¹ Cancer Registry of Norway, Oslo, Norway

² Department of Non-Communicable Disease Epidemiology, London School of Hygiene and Tropical Medicine, London, United Kingdom

³ University of Oslo, Oslo, Norway

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Background: Breast cancer (BC) is a complex disease, consisting of molecular subtypes with different prognosis and possibly different etiology. Studies have reported that hormonal factors affect luminal-like BC, but it is unclear whether alcohol and physical activity are associated only with certain subtypes.

Methods: We conducted a case-control study nested within a cohort of 457,036 women who participated in the Norwegian Breast Cancer Screening Program (NBCSP) in 2006-2012. In all, 5,554 BC cases with information on risk factors and hormone receptor status (i.e. estrogen receptor (ER), progesterone receptor (PR) and human epidermal growth factor 2 (HER2) occurred during the follow-up. The following surrogate definitions of BC subtypes were used: ER+PR+HER2- ("luminal A-like"), ER+PR-HER2- ("luminal B-like, HER2 negative"), ER+HER2+ ("luminal B-like, HER2 positive"), ER-PR-HER2+ ("HER2 positive") and ER-PR-HER2- ("triple negative"). We used multinomial logistic regression to estimate odds ratios (ORs), with 95% confidence intervals (CIs), adjusted for age, body mass index (BMI), education, age at menarche, number of pregnancies and menopausal status.

Results: Weekly amount of alcohol intake was associated with an increased risk of BC overall (p for trend=0.001). Compared to never drinkers, women who reported an alcohol intake >6 glasses/week had a moderately increased risk of luminal A-like (OR=1.41, 95% CI 1.14-1.73, p for trend=0.0001), luminal B-like Her2 positive (OR=1.55, 0.87-2.75) and triple negative BC (OR=1.39, 0.81-2.37). In contrast, physical activity (low and high intensity exercise) was inversely associated with risk of breast cancer overall (p for trend=0.002). Relative to women who reported doing no exercise, those who reported physical activity of ≥4 hours/week were at reduced risk for luminal-A like (OR=0.76, 95% CI 0.63-1.01, p for trend=0.01), luminal B-like Her2 positive (OR=0.84, 0.46-1.54), and triple negative BC (OR=0.80, 95% CI 0.45-1.44).

Conclusions: Alcohol intake was positively associated, and physical activity negatively associated, with BC overall. Although these associations were statistically significant only for luminal A-like BC, their direction and magnitude were rather similar across several subtypes.

A4**Indoor tanning and melanoma risk: a prospective, population-based cohort study****Reza Ghasvand**¹, Corina S. Rueegg¹, Elisabete Weiderpass^{2,3,4,5}, Adele C. Green^{6,7}, Eiliv Lund², Marit B. Veierød¹¹ Oslo Centre for Biostatistics and Epidemiology, Institute of Basic Medical Sciences, University of Oslo, Norway² Department of Community Medicine, Faculty of Health Sciences, University of Tromsø, The Arctic University of Norway, Tromsø, Norway³ Department of Research, Cancer Registry of Norway, Oslo, Norway⁴ Department of Medical Epidemiology and Biostatistics, Karolinska Institutet, Stockholm, Sweden⁵ Genetic Epidemiology Group, Folkhälsan Research Center, Helsinki, Finland⁶ Cancer and Population Studies Group, QIMR Berghofer Medical Research Institute, Australia⁷ CRUK Manchester Institute, University of Manchester, United Kingdom

Introduction: Several case-control studies and a few cohort studies have investigated indoor tanning in relation to melanoma risk and the majority showed a higher risk of melanoma among indoor tanners compared with non-users of tanning devices. However, many studies were unable to adjust for important confounders, confirm a dose-response, or examine the role of age at initiation of indoor tanning on melanoma risk.

Aims: To examine in detail the association between indoor tanning and melanoma including dose-response and age of initiating indoor tanning.

Methods: We used data from the Norwegian Women and Cancer study, a large, prospective, population-based cohort study established in 1991. Host characteristics and history of UV exposure (sunburns, sunbathing, and indoor tanning) were recorded by questionnaire at inclusion and updated with follow-up questionnaires every 4–6 years. Multivariable relative risks (RRs) and 95% confidence intervals (CIs) were estimated by Poisson regression. We adjusted for birth-cohort, year at inclusion, ambient UV of residence, hair colour, skin colour, cumulative sunburns, and sunbathing.

Results: During follow-up of 141,045 women to December 2012 (mean follow-up 13.7 years), 861 women were diagnosed with melanoma. Melanoma risk increased with increasing cumulative number of sessions (P -trend=0.006; adjusted RR=1.32, 95% CI: 1.08–1.63, for highest tertile versus never-use). Age at initiation <30 years was similarly associated with a higher risk compared to never-use (adjusted RR=1.32, 95% CI: 1.04–1.67). We found a significant interaction between cumulative number of sessions and age at initiation with a higher melanoma risk among those aged <30 years at initiation (P -interaction=0.02).

Conclusions: This prospective study provides strong evidence of a dose-response association between indoor tanning and risk of melanoma and supports the hypothesis that vulnerability to harmful effects of indoor tanning is greater at younger ages.

A5**Melanoma and sunscreen use – A systematic review and meta-analysis**

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Introduction: Melanoma represents a large burden to society because of its increasing incidence and large number of survivors with special needs. In 2012, incidence reached 11.1 per 100,000 person-years in Europe with highest incidences in Switzerland (25.8) and Norway (25.3).

Primary prevention is the most effective way to fight this cancer because it is mainly caused by UV-exposure in sun-sensitive subjects. Therefore, the effect of sunscreen use on melanoma risk has been widely studied, but mainly with case-control studies with contradictory results. To obtain best-available evidence about sunscreen use and melanoma, we are undertaking a systematic review and meta-analysis of all relevant studies.

Aims: Overall, we aim to describe the effect of sunscreen use on melanoma risk. Further, we want to assess whether 1) the effect changes with each additional study over time; 2) there is a dose-response relationship; 3) the effect differs by study characteristics; and, 4) there is a relationship between body site of sunscreen application and melanoma occurrence.

Methods: We systematically searched literature up to December 2015. We will use random-effects meta-analysis to combine the effect sizes of the association between sunscreen use and melanoma risk in humans. We will compare never vs. ever users as well as never vs. low and high sunscreen users. Results will be stratified by study type and quality. We will perform a cumulative meta-analysis as well as subgroup analyses. Heterogeneity will be tested with the Q-test and quantified with the I^2 -index. Publication bias will be estimated using funnel plot and Egger's regression test.

Results: The literature search yielded 2,306 eligible references. Of these, 2,241 were excluded after screening. An additional 8 records were identified through other sources resulting in 73 articles to be assessed for eligibility. This is an ongoing study and further results will be presented at the conference.

A6

Assessing Genome-Wide Significance for the Detection of Differentially Methylated Regions

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Motivation: DNA methylation plays an important role in human health and disease, but there is a lack of statistical methods to identify genome-wide significant differentially methylated regions (DMRs) that are associated to a disease. Other methods published so far do not adjust for multiple testing challenges properly.

Aims: To identify DMRs with a corresponding p-value adjusted for multiple testing, while controlling the level of false discovery rate.

Methods: We introduce a scan statistic to identify such regions. We evaluated three different ways of constructing the cut-off parameter in our scan statistic method. Two of those ways are empirical estimation based on Monte Carlo simulation and the observed dependency structure in the data, and the last way is based a theoretical model. We benchmark our method against two other published methods for identifying differentially methylated regions: Bumphunter and DMRcate. The benchmarking was done using simulated data based on real methylation data from the Finnish health in teens study.

Results: We show that the power in identifying associated regions to a phenotype can be substantially improved over alternative methods by using a scan statistic while controlling for the false discovery rate. Moreover, by using the theoretical framework around scan statistics, the region wise p-values for identified regions can be reported with a threshold adjusted for genome-wide significance.

A7**The effects of childhood sensorineural hearing loss combined with aging or noise exposure later in life**

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Introduction: Sensorineural hearing loss (SNHL) is one of the most common disabilities in the developed countries. Knowledge on possible interactions when SNHL of different causes coexist in the same ear and at the same frequency area is scarce.

Aims: To assess whether childhood-onset SNHL is associated with altered susceptibility to later noise-induced hearing loss or age-related hearing loss.

Methods: Cohort study of 30,003 participants who had their hearing tested in both childhood (ages 7-13 years) and adulthood (ages 20-56 years). The exposed group (N=283) was diagnosed with high-frequency SNHL in childhood. The reference group (N=29,720) had normal childhood hearing. Noise exposure was assessed in adulthood by a questionnaire.

Results: The effect of childhood SNHL combined with noise exposure was a simple additive effect. However, the effect of childhood SNHL was significantly moderated by age. Age stratified analyses showed that the difference in high-frequency hearing thresholds between adults with and without childhood SNHL was 33 dB (95% CI: 31-34) in young adults (aged 20-39 years) and 37 dB (95% CI: 34-39) in middle-aged adults (aged 40-56 years).

Conclusions: Our large cohort study could not reveal that childhood-onset SNHL is associated with altered susceptibility to noise-induced hearing loss later in life. Although noise protection is still important, this is valuable information for persons with a childhood-onset hearing loss. Childhood SNHL seems to be associated with a somewhat accelerated age-related hearing loss. This finding should be further investigated by a study with repeated audiometries in adulthood.

A8**Association between weight change and mortality in community living older people followed for up to 14 years. The Hordaland Health Study (HUSK)****Teresa R. Haugsgjerd**¹, Jutta Dierkes², Stein Emil Vollset^{1,3}, Kathrine J. Vinknes⁴, Ottar K. Nygård^{5,6}, Reinhard Seifert⁵, Gerhard Sulo¹, Grethe S. Tell^{1,7}

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Introduction: It is unclear what degree of weight changes in older people that are associated with mortality.**Aims:** To study the importance of weight change with regard to mortality in older people.**Methods:** The cohort includes participants in the Hordaland Health Study 1997-99 (N=2935, age 71-74 years) who had previously participated in a survey in 1992-93. Participants with weight measured at both surveys were followed for mortality through 2012. Cox proportional hazards models were used to calculate risk of death according to changes in weight. Hazard ratios (HR) with 95% confidence intervals (CIs) for people with stable weight ($\pm < 5\%$ weight change) were compared to people who lost ($\geq 5\%$) or gained ($\geq 5\%$) weight. Chi-square analyses or t-tests were applied to determine whether the survivors and non-survivors in the weight change groups differed on the baseline characteristics (1997-99). Cox regression with penalized spline was used to evaluate the association between weight change (in kg) and mortality. Analyses were adjusted for age, sex, physical activity, smoking, diabetes, hypertension, and previous myocardial infarction or stroke. Participants with cancer were excluded.**Results:** Compared to those with stable weight, participants who lost $\geq 5\%$ weight had an increased mortality risk (adjusted HR 1.59 [95% CI: 1.35-1.89]) while the group with weight gain $\geq 5\%$ did not (adjusted HR 1.07 [95% CI 0.90-1.28]). Among the survivors in both weight change groups, the proportion of men, ever smokers, participants with diabetes and with previous myocardial infarction were significantly lower than among those who died. Penalized spline identified those who lost more than about three kg or gained more than about 12 kg as having increased risk of death.**Conclusions:** A weight loss of $\geq 5\%$ and $> 3\text{kg}$ showed increased risk of mortality. Thus, weight should be routinely measured in older people.

A9**Acute Hepatic Porphyrin and Cancer: A Population-Based Cohort Study**

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Introduction: Acute hepatic porphyria (AHP) is considered to be a risk factor for primary liver cancer (PLC), but the magnitude of this excess risk is not known.

Aims: Our aim was to investigate the risk of cancer in people with AHP.

Methods: The study sample consisted of all Norwegian residents aged 18 years or older during the period 2000-2011. Persons with AHP (n = 251) were identified through the Norwegian Porphyrin Centre, while patients with a cancer diagnosis were identified by linkage to the Cancer Registry of Norway.

Results: For people with AHP, the annual reported incidence rate of primary liver cancer (PLC) was 3.5 and 6.3 per 1,000 persons per year, for all participants and for those 50 years or older, respectively. PLC risk was substantially higher for people with an AHP diagnosis relative to that in the reference population (≥ 18 years: HR=106, 95% confidence interval (CI): 56-207; ≥ 50 years: HR=114, 95% CI: 59-219). Exploratory analysis suggested that people with AHP had increased risks of kidney (HR=7.6, 95% CI: 1.6-22.1) and endometrial cancers (HR=6.1, 95% CI: 1.5-21.8).

Conclusions: Our findings confirm a substantially high excess risk of PLC associated with AHP. The novel findings of a moderate association between AHP and kidney and endometrial cancers should be investigated further in other populations.

A10

ADHD treatment and diagnosis – Importance of relative age in grade in Norway

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Introduction: Studies from several countries have reported that the youngest children in a grade are at higher risk of being diagnosed with ADHD or to receive ADHD drugs than their older-for-grade peers. The school start age cut-off follows the calendar year in Norway, i.e. the youngest-for-grade children are born in December.

Aims: To investigate whether birth month is associated with the risk of receiving ADHD drugs (primary endpoint) or an ADHD diagnosis (secondary endpoint).

Methods: The study population included all children born in Norway during 2000-2008 (N>500,000). Information was retrieved from the Central Registry (sex, dates of birth, emigration and death), the Norwegian Prescription Database (dispensed ADHD drugs), the Norwegian Patient Register (specialist healthcare ADHD diagnoses), and reimbursement data (primary healthcare ADHD diagnoses). Cox proportional hazard analyses were performed separately for boys and girls with number of days since birth as the time metric, birth month as exposure, and adjusting for calendar year of birth and parental education.

Results: 11,003 children (2.17%) had received ADHD drugs. By the end of follow-up, 2.54% of boys born in January, 3.08% of boys born in June, and 3.93% of boys born in December had received ADHD drugs. Corresponding proportions for girls were 0.81%, 1.02%, and 1.68%. The adjusted hazard ratio was 1.57 (95% CI: 1.41-1.75) for boys born in December (ref.: boys born in January), and 2.11 (1.75-2.55) for girls born in December (ref.: girls born in January). The same pattern of higher risk for children born later in the year compared to children born early in the year was also observed for ADHD diagnoses.

Conclusions: Children born later in the year are at higher risk of receiving ADHD drugs and of receiving an ADHD diagnosis than children born early in the year.

A11

Economic volatility and adolescent mental health

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Introduction: Negative associations between poverty/poor economy and poorer mental health in children have consistently been documented in the literature. However, family incomes are volatile over time, and questions remain about how variability in household economy across childhood influences mental health in adolescence.

Aims: To investigate associations between patterns of household economic variability and symptoms of mental health problems in Norwegian adolescents.

Methods: In the youth@hordaland study, conducted in Hordaland county in 2012, a survey of mental health and other central topics related to functioning and well-being was administered to more than 10,000 16-19 years olds, and later linked to registry information about household incomes for the years 2004-10. Latent class analysis was conducted in Mplus to 1) determine patterns of household economic variability across these years, using the EU60 relative poverty definition, and 2) to investigate differences in symptoms of mental health problems measured with the Strengths and Difficulties Questionnaire related to these patterns.

Results: Four classes of relative poverty trajectories emerged from the data: 1. Consistently low probability of being poor (89.6%), 2. Consistently high probability of being poor (2.8%), 3. Increasing probability of being poor over time (3.1%), and 4. Decreasing probability of being poor over time (4.5%). Overall, there were significant differences in mean symptom scores between the classes, e.g. for total mental health problems, the mean score was significantly higher in class 2 ($M = 10.84$), 3 ($M = 11.31$) and 4 ($M = 11.48$) compared to class 1 ($M = 9.9$). Results for subdomains of mental health problems were less consistent.

Conclusions: Earning volatility across childhood is related to adolescent mental health. Those living in relative poverty have more symptoms of mental health problems than their more affluent peers. Moving into relative poverty was for some problems associated with more mental health problems than chronic poverty.

A12

Alcohol and illicit drug use and school-related impairment among adolescents: the youth@hordaland-survey

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Introduction and aims: The aim of this study was to investigate the association between alcohol and drug use, and school-related impairment measured by grade point average (GPA) and school attendance. We also wanted to examine potential confounding from socioeconomic factors and mental health, and the potential modifying effect from gender and age.

Methods: A cross-sectional design is employed in this study using data from a large population-based sample, youth@hordaland, in combination with a unique link to official school registry data. All adolescents aged 16-19 years living in Hordaland county (Norway) were invited to participate, and the current study presents data from N=7874. The main independent variables were alcohol use and drug use, as well as alcohol- and drug-related problems. Co-variables included age and gender, self-reported socioeconomic status and symptoms of anxiety, depression, inattention and hyperactivity, and conduct problems. The dependent variables were registry-based school attendance and grades. Statistical analyses included regression models.

Results: All the alcohol- and drug measures included were consistently associated with lower average grades (mean differences ranging 0.17-0.38, all $p < 0.001$) and decreased levels of school attendance measured by days missed (mean differences ranging 1.56-2.82, all $p < 0.001$) and hours missed (mean differences ranging 4.00-7.16, all $p < 0.001$). After adjusting for gender, age, socioeconomic factors and mental health the associations between alcohol and illicit drug use and the school-related outcomes remained statistically significant. The associations between alcohol and illicit drug use were in part stronger for girls.

Conclusions: The results indicate that alcohol- and drug-related problems are important factors in school-related impairment.

A13

High school dropout and later labor market success: Confounding from the early life course factors and cognitive ability, and a comparison of siblings

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Introduction: There is a widespread concern that high school dropout leads to adverse economic situation later in life.

Aims: To compare how high school completers and dropouts fare as adults in the labor market, adjusting for early health, parental socioeconomic position, cognitive ability, as well as confounding from factors shared by siblings.

Methods: The study population comprised all males born in Norway 1967–1976 ($n=300,550$). Merging data from national registries, we compute associations between high school non-completion and work participation/labor earnings at age 35, adjusted for early-life exposures, such as birth weight, birth order, early health, parents' income and education, as well as cognitive ability at conscription. Separate regressions compare maternal brothers.

Results: Not completing high school by 19 and 21 was associated with, respectively, a 6% and 8% lower probability of work participation, after adjustment. The analogous estimates comparing brothers were 3% and 4%. The corresponding mean reductions in the labor earnings of employed men were 13% and 16%, 9% and 11% between brothers. Adjustment for cognitive ability score reduced gross associations at magnitudes equal to that seen in models adjusting for all other background covariates.

Conclusions: While the association between high school dropout and labor market success is partly confounded by cognitive ability, parental socioeconomic position and unobserved confounding traits shared by siblings, dropping out seems to have a negative effect on adult labor market success, net of these factors.

A14

The fraction of breast cancer attributable to smoking. The Norwegian Women and Cancer study 1991-2012

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Introduction: Results from several recent cohort studies on smoking and breast cancer incidence and mortality suggest that the burden of smoking on society is underestimated.

Aims: To estimate the fraction of breast cancer attributable to smoking in Norway utilizing the Norwegian Women and Cancer Study, a nationally representative prospective cohort study.

Methods: We followed 130 053 women, aged 34 to 70 years, who completed a baseline questionnaire between 1991 and 2007, through linkages to national registries through December 2012. We used Cox proportional hazards models to estimate hazard ratios (HRs) with 95% confidence intervals (CIs), while adjusting for confounders. We estimated attributable fractions (AF's) % in smokers and in the population (PAF's) % with 95% CIs.

Results: Altogether, 4 293 women developed invasive breast cancer, confirmed by histology. Compared with never active, never passive smokers, ever (former and current) smokers had an overall risk of breast cancer that was 21% higher (HR=1.21; 95% CI = 1.08-1.34). For ever smokers, the AF was 17.3 % (95% CI =7.4-25.4) and for the population the PAF of breast cancer was 11.9 % (95% CI =5.3-18.1).

Conclusions: In smokers, one in six and in the population, one in nine breast cancer cases could have been avoided in the absence of smoking. Our findings support the notion that the global cancer burden due to smoking is substantially underestimated.

A15

A closer look at the sex-differences in the survival of bladder cancer

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Introduction: It has been noticed that bladder cancer survival is worse in women compared to men. There have been several attempts to explain this phenomenon. Among the arguments mentioned are biological or hormonal differences and a delayed diagnosis in women compared to men due to misclassification of the symptoms in women. Results based on registry data all show advantageous survival of bladder cancer for men compared to women but the explanations given are contradictory.

Aims: Based on survival data of bladder cancer patients from the Cancer Registry of Norway, we will investigate this sex difference with respect to factors like age, diagnosis period and tumor stage at date of diagnosis.

Methods: We used a relative survival framework with sex as a time-dependent covariate allowing the sex-related hazard ratio to vary across time since diagnosis. This hazard ratio has been evaluated by 1) a descriptive (life-table) approach, stratifying with respect to the factors of interest and 2) a parametric flexible model approach, allowing for covariate adjustment. The estimators are provided together with confidence intervals and p-values respectively.

Results: We show that the modeling of sex as a time-dependent covariate is mandatory to capture the fact that survival prognosis for women with bladder cancer is only worse (compared to men) within the first two years after diagnosis. A closer look at the sex-difference in survival across several risk factors provides additional information about its characteristics.

A16

Prostate-specific antigen testing for prostate cancer: Emptying a limited pool of susceptible individuals?

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Introduction: After the introduction of the prostate specific antigen (PSA) test in the 1980s, a sharp increase in the incidence rate of prostate cancer (PC) was seen in the United States. The age-specific incidence patterns exhibited remarkable shifts to younger ages, and declining rates were observed at old ages. Similar trends were seen in Norway.

Aims: To investigate whether these features could, in combination with PSA testing, be explained by a varying degree of susceptibility to PC in the populations.

Methods: We analyzed incidence data from the United States' Surveillance, Epidemiology, and End Results program for 1973 – 2010, comprising 511 027 PCs in men ≥ 40 years old, and national Norwegian incidence data for 1953 – 2011, comprising 113 837 PCs in men ≥ 50 years old. We developed a frailty model where only a proportion of the population could develop PC, and where the increased risk of diagnosis due to the massive use of PSA testing was modelled.

Results: The frailty model describes the changing age-specific incidence patterns across birth cohorts well. The proportion of men that were susceptible was 39.9% (95%CI: 38.2%, 41.6%) in the United States and 30.4% (95%CI: 28.9%, 32.0%) in Norway. Cumulative incidence rates at old age are unchanged across birth cohort exposed to PSA testing at younger and younger ages.

Conclusions: The peaking cohort-specific age-incidence curves of PC may be explained by the underlying heterogeneity in PC risk. Although the introduction of the PSA test has led to a larger number of diagnosed men, there are not more cases being diagnosed in total in birth cohorts exposed to the PSA era at younger and younger ages, even though they are diagnosed at younger ages. This constitutes convincing evidence that the PSA test has led to a higher proportion, and an earlier timing, of diagnoses in a limited pool of susceptible individuals.

A17**Cancer Risk among Insulin Users: Comparing Analogues with Human Insulin in the CARING five-Country Study**

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Introduction: Some observational studies have suggested an association between certain insulin analogues and increased cancer risk. However, these studies have been hampered by methodological shortcomings, short follow-up, and small sample sizes.

Aims: To compare the risk of cancer at ten specific sites (prostate, breast, lung, colorectal, bladder, pancreas, liver, corpus uteri, melanoma of skin, and non-Hodgkin lymphoma) in users of insulin glargine or detemir and users of human insulin.

Methods: We used cancer- and prescription data from Norwegian, Swedish, Danish, and Finnish national health registries and the Clinical Practice Research Datalink from the United Kingdom. The effect of cumulative time (0-0.5, 0.5-1, 1-2, 2-3, 3-4, 4-5, 5-6 and >6 years) on glargine, detemir and human insulin on cancer incidence in new insulin users was assessed by applying multivariate Poisson models to semi-aggregate data from the five cohorts.

Results: During a mean follow-up of 4.6 years, a total of 1.45 million person-years accumulated, and 21,298 cancer cases occurred among 327,040 new insulin users. Comparing female users of glargine and human insulin (reference) we found an increased risk of colorectal and endometrial cancer in glargine users after 0-0.5 years exposure (RR, 95% CI: 1.54, 1.06-2.25 and 1.78, 1.07-2.94, respectively), of melanoma of skin after 2-3 and 4-5 years (1.93, 1.03-3.64 and 3.59, 1.70-7.56, respectively), and of lung cancer after 4-5 years (2.08, 1.00-4.31). In male users of glargine we found a decreased risk of pancreas cancer after 2-3 years (0.34, 0.17-0.66) and liver cancer after 3-4 and >6 years (0.37, 0.14-0.95 and 0.22, 0.05-0.93, respectively). Similarly, comparisons between detemir and human insulin revealed no consistent differences. Altogether, no trends with longer cumulative use were observed for any of the ten studied cancer outcomes.

Conclusions: No major differences in cancer risk were found between users of human insulin and insulin glargine/detemir.

A18

Ethnic differences in the incidence of cancer in Norway

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Introduction: Disparities in cancer risk patterns across ethnic groups and between immigrants and native populations have been reported previously. However, since medical records in Norway do not record country of birth or origin, there has been no monitoring of cancer incidence among different immigrant groups in Norway.

Aims: To examine cancer incidence among different immigrant groups in Norway.

Methods: This project links data from the Cancer Registry of Norway with data from Statistics Norway to examine age specific and age-standardized overall and site-specific cancer incidence rates in different immigrant groups and compare them to rates among persons born in Norway to Norwegian-born parents, using the age distribution from the world standard population.

Results: Analyses of 850 333 immigrants show that 10 306 women and 9 118 men developed total minus non-melanoma skin cancer in the period 1990-2012. During this period, the age- and period-standardized incidence rates per 100 000 person-years were 235 for women and 267 for men. Among 4 882 955 persons born in Norway to Norwegian-born parents, 229 282 women and 257 252 men developed cancer during the same period, and the age- and period-standardized incidence rates were 248 women and 298 for men. Cancer in the lung, liver, stomach, prostate, and cervix was more common in specific immigrant groups.

Conclusions: This study found differences in cancer incidence rates between immigrants and persons born in Norway to Norwegian-born parents. Identifying and monitoring cancer types among immigrants that are rare in the Norwegian population is important for early detection, and to ensure appropriate health care. At the same time, identifying lifestyle-related cancers which are less common among immigrants could help prevent lifestyle changes that may occur after migration.

A19

A processual model for functional analyses of carcinogenesis in the prospective cohort design

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Traditionally, the prospective design has been chosen for risk factor analyses of lifestyle and cancer using mainly estimation by survival analysis methods. With new technologies, epidemiologists can expand their prospective studies to include functional genomics given either as transcriptomics, mRNA and microRNA, or epigenetics in blood or other biological materials. The novel functional analyses should not be assessed using classical survival analyses since the main goal is not risk estimation, but the analysis of functional genomics as part of the dynamic carcinogenic process over time, i.e., a “processual” approach. In the risk factor model, time to event is analyzed as a function of exposure variables known at start of follow-up (fixed covariates) or changing over the follow-up period (time-dependent covariates). In the processual model, transcriptomics or epigenetics is considered as functions of time and exposures. The success of this novel approach depends on the development of new statistical methods with the capacity of describing and analysing the time-dependent curves or trajectories for tens of thousands of genes simultaneously. This approach also focuses on multilevel or integrative analyses introducing novel statistical methods in epidemiology. The processual approach as part of systems epidemiology might represent in a near future an alternative to human in vitro studies using human biological material for understanding the mechanisms and pathways involved in carcinogenesis.

A20**How many future deaths from colorectal cancer can be prevented by 2030? A scenario-based quantification of risk factor modification, screening implementation and improved treatment in Norway****Katrine D. Skyrud**¹, Tor Åge Myklebust¹, Freddie Bray², Morten Tandberg Eriksen³, Thomas de Lange¹, Inger Kristin Larsen¹, Bjørn Møller¹¹ Department of Registration, Cancer Registry of Norway, Oslo, Norway² Section of Cancer Information, International Agency for Research on Cancer, Lyon, France³ Department of Digestive and Pediatric Surgery, Oslo University Hospital, Oslo, Norway**Introduction:** Colorectal cancer (CRC) mortality may be reduced through different prevention strategies.**Aims:** This study will estimate potential reduction in CRC mortality by scenarios on risk factors modification (primary prevention), screening (secondary prevention), and improved treatment and medical care (tertiary prevention).**Methods:** The reduction in CRC mortality due to risk factor modification was estimated by using the software Prevent, assuming the whole population in Norway follows the national recommendations for smoking, alcohol intake, physical activity, body weight and diet (fiber, red- and processed meat). The impact of screening was calculated assuming the introduction of a national flexible sigmoidoscopy (FS) screening program with 50% attendance. Predicted positive trend in CRC survival was used to estimate the reduction in CRC mortality due to expected improved treatment and medical care.**Results:** If the whole population in Norway followed the recommended guidelines on risk factor exposure, the mortality would be reduced by 33% (corresponding to 730 prevented deaths) in 2030, 37% (437 prevented deaths) among males and 28% (290 prevented deaths) among females. FS screening implementation in Norway would reduce the CRC mortality by 17% (388 prevented deaths) in 2030, and if we assume that the CRC survival continues to improve, the CRC mortality would be reduced by 29% (650 prevented deaths) in 2030. Finally, the combined effect of primary, secondary and tertiary prevention would reduce the CRC mortality by 61% (1365 prevented deaths) in 2030.**Conclusions:** All the investigated scenarios had considerable potential of reducing the CRC mortality. Full adherence to lifestyle recommendation had the largest effect and especially among males.

A21

Alterations in DNA methylation and gene expression in blood years prior to lung cancer diagnosis – the NOWAC study

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Introduction: Lung cancer is the leading cause of cancer death worldwide with smoking as one of the main risk factors. Smoking has been shown to significantly alter DNA methylation for a number of specific CpG sites, effects detectable years after smoking cessation. It is however not clear whether these effects are significantly different in people that later develop lung cancer compared to people that do not, or if alterations lead to changes in gene expression detectable in blood.

Aims: The aim is to describe changes in DNA methylation and gene expression in blood years prior to lung cancer diagnosis, in a nested case control analysis.

Methods: Blood samples (plasma, PAX tubes and buffy coat) was collected in 2003-2006 as part of the Norwegian Women and Cancer study (NOWAC). Here we used samples from 130 women that developed lung cancer between 2007 and 2011 and controls matched on age and sampling date. The DNA methylation and gene expression data is obtained from Illumina array methods and is previously described in literature for lung cancer case-control set. Comparisons are performed genome wide.

Results: Unconditional logistic regression revealed 28 Bonferroni significant CpG sites that were all demethylated in lung cancer cases independent of time to diagnosis. (Bonferroni threshold=1.08E-07) Top two hits were AHRR and F2RL3, both previously linked to smoking status. Correlating CpG sites and Gene expression revealed 139 CpG-transcript pairs Bonferroni significantly associated. Most transcripts were associated to a few CpG sites, with 9 unique CpG sites and 87 unique transcripts.

After adjusting for smoking status, none of the CpG sites were significantly different between cases and controls. The results from the prospective analysis will describe changes with time to diagnosis.

Conclusions: These analysis show distinct aberrations in DNA methylation and gene expression in prospective lung cancer cases mainly linked to smoking status.

A22

Is a possible relationship between occupational noise exposure and vestibular schwannoma (acoustic neuroma) causal or due to detection bias?

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Introduction: Vestibular schwannoma, often called acoustic neuroma, is a benign, slow-growing tumor, which arise from the nerve sheath of the vestibular branch of the eighth cranial nerve, and accounts for 5-6% of brain tumors. Some studies have shown a possible relationship between noise exposure and schwannoma, while others have not.

Aims: To assess possible associations between occupational noise exposure and the risk of being diagnosed with vestibular schwannoma, based on a systematic review of published studies.

Methods: We performed a systematic critical literature review of original articles from key literature databases of associations between workplace noise and health. The studies were identified by search in Ovid Medline, Ovid Embase, Web of Science, Scopus and ProQuest Health and Safety Sciences Abstracts. The search was completed in May 2013 and updated in March 2016. We selected longitudinal studies of adequate quality with a measure of association between occupational noise exposure and vestibular schwannoma.

Results: Six studies, of which five were population-based case-control studies and one registry-based, were included in the review. Information on noise exposure was based on self-report in three studies, job-exposure-matrices (JEMs) in two, including the registry-based study, and both self-report and JEM in one study. Noise exposure was positively associated with schwannoma in four of the population-based studies, but not in the registry-based study and one population-based study. Some studies showed a positive trend for longer exposure and longer latency period.

Conclusions: The results indicate that noise exposure might be associated with schwannoma. However, reasons other than a causal relationship cannot be excluded, such as recall bias, which is not uncommon in case-control studies, and detection bias, since noise exposed workers undergo regular hearing controls and therefore might have a larger possibility of being diagnosed with schwannoma.

A23**Cohort Profile Update: The Janus Serum Bank Cohort in Norway**

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Introduction: The Janus Serum Bank Cohort was established in 1973 and contains biological samples from 318 628 individuals. This update describes the additional data available on the large subset of Janus cohort members who were recruited from the Norwegian Regional Health Studies (n=292 851).

Aims: To standardize and harmonize the large amount of health data across the health studies to simplify access and utilization of the Janus Serum Bank Cohort in cancer research.

Methods: We standardized and harmonized data across the health studies and performed a linkage of all available variables from the Janus cohort. Statistical analyses were performed to investigate associations between the known risk factors body mass index, physical activity, and smoking, and total cancer.

Results: At the time of the original examination 7% of men and 8% of women were obese (body mass index ≥ 30 kg/m²), 36% of men and 20% of women were hypertensive (systolic blood pressure ≥ 140 and/or diastolic blood pressure ≥ 90 and/or use of blood pressure medication), 45% of men and 40% of women were current smokers, and 20% of men and 21% of women had a sedentary activity level. Compared to normal weight, obesity was positively associated with cancer incidence, although the magnitude was modest (hazard ratio < 1.2). Former and current smokers had an increased risk of developing cancer compared with never smokers (hazard ratios in the magnitude of 1.4 for men and women). Physical activity was inversely associated with cancer incidence (hazard ratios around 0.94 and 0.95 comparing moderately active and active individuals with sedentary).

Conclusions: The distribution of baseline risk factors is as expected, and the associations with total cancer likewise, indicating that the variables collected in the health studies can be used in analyses of baseline Janus biological specimens.

B1

Decreasing incidence of type 2 diabetes in Norway 2009-2014

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Introduction: The prevalence of type 2 diabetes is increasing in many countries, but few have assessed trends in incidence.

Aims: We aimed to study the incidence of diagnosed type 2 diabetes above age 30 years in Norway 2009-2014, in both Norwegians and immigrants.

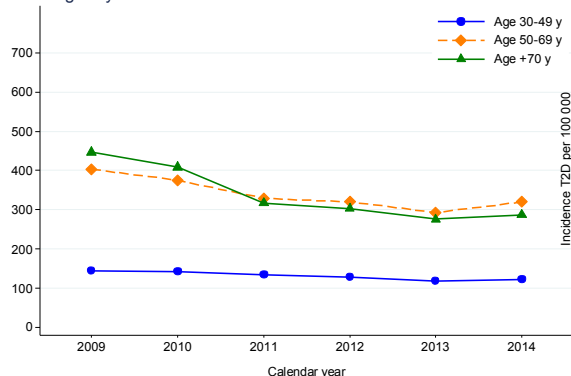
Methods: In this nationwide population-based cohort study we used the central population registry as the population frame (complete Norwegian population from January 1st 2009; age ≥ 30 years, $n=3,258,708$), and identified type 2 diabetes by linking data from several national registries using the personal identification number (NorPD, KUHR, NPR). Incident diabetes was classified as pharmacological or non-pharmacological. We estimated the incidence from Jan 1st 2009 to Jun 30th 2014.

Results: The overall incidence of type 2 diabetes was 494 per 100,000 persons/year for Norwegians (95% CI: 491-498), and 49.0 % were pharmacologically treated. The highest incidence rates were seen at age 70-79 years. The total incidence rate decreased across calendar years (p for trend <0.001). Average decrease per year for non-pharmacological treated diabetes was 13% (95% CI: 12.8-13.9, $p<0.001$), and the decrease for pharmacologically treated diabetes was 6.5% (95% CI: 6.0-7.1, $p<0.001$). Subjects above age 70 years had the largest absolute decrease in incidence (Fig), but incidence rates were significantly decreased across all age-groups, and in Norwegians and immigrants (all $p<0.001$).

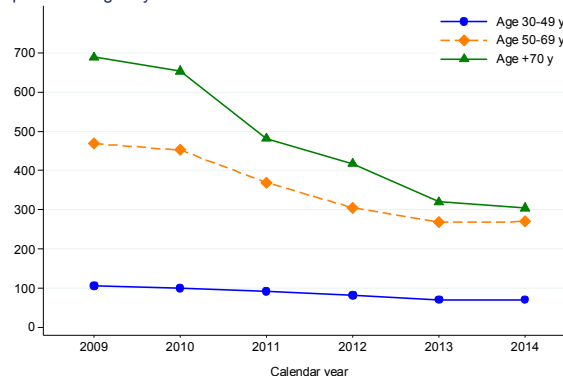
Proportion of patients pharmacologically treated the first 6 months varied according to immigrant status; 47 % of Norwegians and 57% of the non-European immigrants received glucose lowering medication.

Conclusion: There was an apparent decrease in incidence of diagnosed type 2 diabetes in Norway in all age groups and in both Norwegian and immigrants.

a Pharmacologically treated



b Non pharmacologically treated



B2

No increased incidence of type 1 diabetes under 40 years 2009-2014 in Norwegians and immigrants

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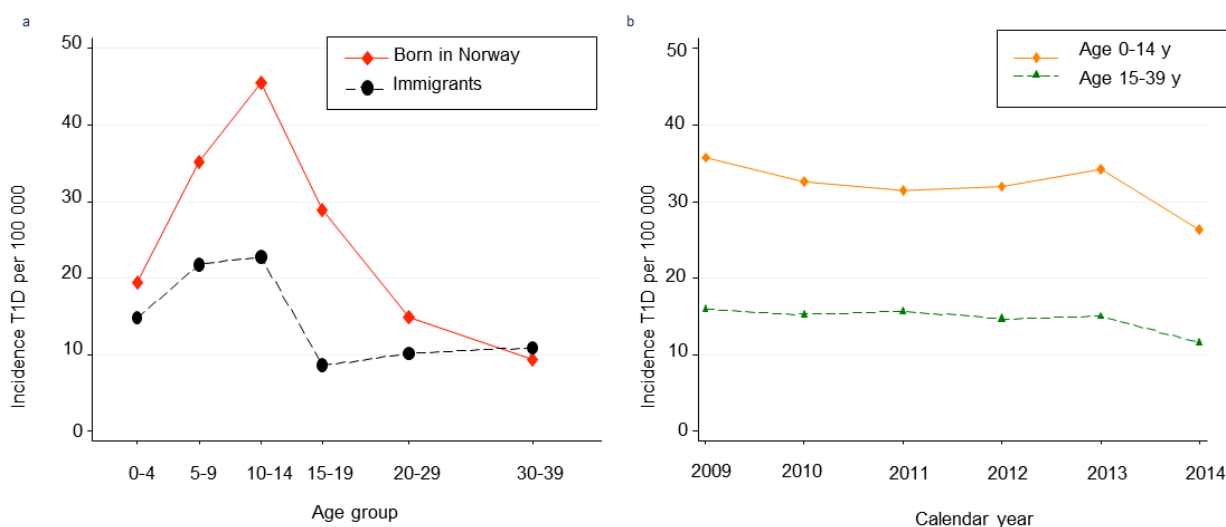
Introduction: The incidence of type 1 diabetes in children has increased in most countries over the past decades.

Aims: We aimed to study the incidence of T1D before age 40 years in Norway 2009-2014.

Methods: In this nationwide population-based cohort study we used the central population registry as the population frame (complete Norwegian population from January 1st 2009; age under 40 years, n=3,057,221), and identified T1D by linking data from several national registries using the personal identification number. Medication from the Norwegian Prescription Database, diagnosis codes from primary care in KUHR and hospital and outpatient clinic diagnoses from the Norwegian Patient Register. T1D was defined as registration of at least one T1D diagnosis in primary or secondary health care, and start of insulin within 6 months of diagnosis and use for at least 6 months thereafter, and no use of oral glucose lowering medication 12 months after the diagnosis. We estimated the incidence from Jan 1st 2009 to Jun 30th 2014. Immigrants were defined as subjects not born in Norway or having two parents born abroad.

Result: Overall incidence <40 year was 23.1 per 100,000 persons/year for Norwegians (95% CI: 22.2-24.0) (Fig a). The incidence rates were stable across the calendar years (Fig b). Immigrants from Europe represented 11.5% of the population, non European immigrants represented 11.4%. Incidence in different regions of origin were: Africa 28.8 per 100,000 persons/year (95% CI: 23.4-35.5), Europe (non-Norway) 12.0 per 100,000 persons/year (95% CI: 10.0-14.2), Asia 8.0 per 100,000 persons/year (95% CI: 6.2-10.2) and South America 5.3 per 100,000 persons/year (95% CI: 2.0-14.2).

Conclusion: The incidence of T1D seems to be stable over time in both children and young adults. Immigrants had an incidence that was nearly half of that in people born in Norway, but there were large differences between regions.



B3

Ethnic difference in the prevalence of pre-diabetes and diabetes mellitus in regions with Sami and non-Sami populations in Norway – The SAMINOR 1 study

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Introduction: Type 2 diabetes is a chronic disease with long-term complications evolving to a major cause of morbidity and mortality worldwide. We lack up-to-date knowledge about the prevalence of pre-diabetes and diabetes mellitus among inhabitants of northern and mid-Norway especially among the indigenous Sami population.

Objective: to measure the prevalence of pre-diabetes and diabetes mellitus as well as exploring potential ethnic disparities.

Methods: A cross-sectional population-based health study was performed in 2003–2004 in regions with both Sami and non-Sami populations (SAMINOR). The response rate was 60.9%. Finally, 15,208 men and women aged 36–79 years were included in the analysis. Information was collected using two self-administrated questionnaires as well as clinical examination and laboratory tests.

Results: Age-standardised prevalence rates of pre-diabetes and diabetes mellitus for the Sami men were 3.4% and 5.6%, respectively. Corresponding rates for the non-Sami men were respectively 3.4% and 4.6%. Age-standardised prevalence rates of pre-diabetes and diabetes mellitus for the Sami women were 2.7% and 5% respectively, while the corresponding rates for the non-Sami women were 2.3% and 4.6% respectively. Relative risk ratios for having diabetes mellitus for the Sami compared to the non-Sami were significantly different in different geographic regions, with the southern region having the highest prevalence rates of pre-diabetes and diabetes mellitus among the Sami. These differences were not explained by the included risk factors.

Conclusion: There was observed a heterogeneity in the prevalence of pre-diabetes and diabetes mellitus in different geographic regions both within and between different ethnic groups. Higher age, having positive family history for diabetes mellitus and truncal obesity did not explain the ethnic disparity in the burden of pre-diabetes and diabetes mellitus. Prevalence of diabetes mellitus in our study was slightly higher than that of Norway as a whole.

B4**Ethnic inequalities in acute myocardial infarction and stroke rates in Norway 1994-2009: a nationwide cohort study (CVDNOR)**

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Background: Immigrants to Norway from South Asia and Former Yugoslavia have high levels of cardiovascular disease (CVD) risk factors. Yet, the incidence of CVD among immigrants in Norway has never been studied. Our aim was to study the burden of acute myocardial infarction (AMI) and stroke among ethnic groups in Norway.

Methods: We studied the whole Norwegian population (n=2 637 057) aged 35-64 years during 1994-2009. The Cardiovascular Disease in Norway (CVDNOR) project provided information about all AMI and stroke hospital stays for this period, as well as deaths outside hospital through linkage to the Cause of Death Registry. The direct standardization method was used to estimate age standardized AMI and stroke event rates for immigrants and ethnic Norwegians. Rate ratios (RR) with ethnic Norwegians as reference were calculated using Poisson regression.

Results: The highest risk of AMI was seen in South Asians (men RR =2.27; 95% CI 2.08-2.49; women RR=2.10; 95% CI 1.76-2.51) while the lowest was seen in East Asians (RR=0.38 in both men (95% CI 0.25-0.58) and women (95% CI 0.18-0.79)). Immigrants from Former Yugoslavia and Central Asia also had increased risk of AMI compared to ethnic Norwegians. South Asians had increased risk of stroke (men RR=1.26; 95% CI 1.10-1.44; women RR=1.58; 95% CI 1.32-1.90), as did men from Former Yugoslavia, Sub-Saharan Africa and women from Southeast Asia.

Conclusions: Preventive measures should be aimed at reducing the excess numbers of CVD among immigrants from South Asia and Former Yugoslavia.

B5**Longitudinal and secular trends in total cholesterol levels and impact of lipid-lowering drug use among women and men born 1905-1977: The Tromsø Study 1979-2008**

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Introduction: Elevated blood cholesterol is a modifiable risk factor for cardiovascular disease. Cholesterol level surveillance is necessary to study population disease burden, consider priorities for prevention and intervention, and understand the effects of diet, lifestyle and medication use. Previous studies show a cholesterol decline in recent decades, but lack data to follow individuals born in different decades throughout life.

Aims: To analyse secular trends (i.e. cross-sectional trends in age groups) and longitudinal trends (i.e. follow individuals or birth cohorts with repeated measurements) in total cholesterol levels, and to examine the impact of lipid-lowering drugs.

Methods: We investigated changes in age-specific and birth cohort specific total cholesterol levels by repeated measurements in 37,968 women and men born 1905-1977 (aged 20-89 years at screening) examined up to five times between 1979 and 2008 in the population-based Tromsø Study. Linear mixed models were used to test for time trends.

Results: Mean cholesterol decreased with time during 1979-2008 in both genders, all age groups and all birth cohorts. For example, the decrease in cholesterol in age group 40-49 years was 1.2 mmol/L in women and 1.0 mmol/L in men. Both the 80th and the 20th percentile of the population cholesterol distribution decreased in both genders and all age groups. Use of lipid-lowering drugs was rare in 1994 and increased thereafter, but was low (<1.5% in women and <4% in men) among those younger than 50 years in all surveys. Between 1994 and 2008, treatment with lipid-lowering drugs explained 19-27% of the cholesterol decrease among those 50 years and older.

Conclusions: The findings indicate a population effect on cholesterol levels, partly explained by treatment with lipid-lowering drugs.

B6**Cardiovascular risk factors and hearing loss: The HUNT study****Bo Engdahl**¹, Lisa Aarhus¹, Arve Lie², Kristian Tambs¹¹Norwegian Institute of Public Health, Oslo, Norway²National Institute of Occupational Health, Oslo, Norway

Introduction: Sufficient circulation is essential for the hearing function. While hearing loss has been associated with cardiovascular risk factors, prospective data are scarce and the potential of prevention is disputed.

Aims: To examine the association between prospectively and cross-sectionally assessed cardiovascular risk factors and hearing loss.

Methods: A population-based cohort of 31,547 subjects. Hearing was assessed by pure-tone audiometry at low, middle, and high frequencies. Self-reported or measured cardiovascular risk factors were assessed both 11 years before and simultaneously with the audiometric assessment. Cardiovascular risk factors were smoking, alcohol use, physical inactivity, waist circumference, body mass index, resting heart rate, blood pressure, triglycerides, total serum cholesterol, LDL cholesterol, HDL cholesterol, and diabetes.

Results: After adjustment for age, sex, level of education, income, recurrent ear infections, and noise exposure, risk factors associated with poorer hearing sensitivity were smoking, diabetes, physical inactivity, resting heart rate and waist circumference. Smoking was only associated with hearing loss at high frequencies. The effects were very small, in combination explaining only 0.2-0.4% of the variance in addition to the component explained by age and the other cofactors.

Conclusions: This cohort study indicates that, although many cardiovascular risk factors are associated with hearing loss, the effects are small and of doubtful clinical relevance.

B7**Educational differences in coronary out-of-hospital deaths in the Norwegian population during 1995-2009; a CVDNOR project**

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Introduction: Coronary heart disease (CHD) is the leading cause of death worldwide with the majority of deaths occurring outside hospitals. Little is known of the potential role of educational level on risk of out-of-hospital coronary deaths (OHCD).

Aims: To explore the association between educational level and risk of OHCD in Norway during 1995-2009.

Methods: Information on date, causes and location of the death was retrieved from the Norwegian Cause of Death Registry. Information on highest attained education was obtained from The Norwegian Education Database and categorized into primary, secondary and tertiary. Information on the population of Norway during 1995-2009 was retrieved from the Population Registry.

Educational differences in the risk on OHCD were explored using Poisson regression analysis. Separate analyses were conducted for younger (35-69 years) and older (70-89 years) individuals by gender. Results are expressed as incidence rate ratio (IRR) and 95% CI, estimating the relative risk of dying out of hospital among individuals with secondary or tertiary education compared to primary education (reference).

Results: Of 100,783 CHD deaths [mean age 79.3 (11.1) years; 41.5% women], 58.8% died out-of-hospital. In the group 35-69 years, men with secondary or tertiary education had 35% (IRR=0.65, 95% CI: 0.62-0.67) and 63% (IRR=0.37, 95% CI: 0.35-0.40) lower risk of OHCD compared to those with primary education. Corresponding relative rates among women were IRR=0.58, 95% CI: 0.54-0.64 and IRR=0.26, 95% CI: 0.22-0.30.

Among those 70-89 years, men with secondary or tertiary education had a lower risk of OHCD (IRR=0.76, 95% CI: 0.74-0.79 and IRR=0.52, 95% CI: 0.49-0.55) compared to those with primary education. Corresponding rates among women were IRR=0.77, 95% CI: 0.75-0.80 and IRR=0.62, 95% CI: 0.57-0.66.

Conclusions: We found an inverse association between educational level and risk of OHCD, most pronounced among those under 70 years, and especially among women.

B8**Aortic Valve Replacement Therapy in Norway 2012-2015. Patient characteristics and survival**

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Introduction: Aortic stenosis is the most common acquired heart valve disorder in the western world, with an incidence of approximately 5% in those older than 75 years. The incidence increases with age, and patients often have significant comorbidities. Transcatheter aortic valve replacement (TAVR) has been in use in Norway since 2008. According to European guidelines, TAVR is indicated in patients with severe symptomatic aortic stenosis who are judged, by the 'heart team', to be unsuitable for surgery but have sufficient life expectancy. The Norwegian Cardiovascular Disease Registry (NCVDR) was established in 2012, and contains information on diagnoses and procedures for all patients hospitalized with cardiovascular disease in Norway, and eventually their date and cause of death.

Aims: To examine the incidence of, and survival after, TAVR or conventional aortic valve replacement surgery according to patient age, gender and co-morbidities during 2012-2015.

Methods: Data on patients who have undergone TAVR (procedure codes FMD12 and FMD13) or conventional aortic valve replacement surgery (procedure codes FMD00, FMD10, FMD20-FMD96) for aortic valve stenosis (ICD-10 diagnosis code I35) will be extracted from the core part of the NCVDR when data from 2015 are completed (due 25 April 2016). Patient characteristics (age, gender, comorbidities), 30-days and long-time survival according to aortic valve replacement method (TAVR or conventional surgery) will be shown. Comparisons across treatment groups will be performed using standard statistical methods.

Results: To be shown.

Conclusions: To be entered.

B9**Inter-rater Reliability of a National Acute Myocardial Infarction Register**

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Introduction: Medical quality registers are an important tool for measuring and improving healthcare and patient outcomes and are also used in disease surveillance and research. However, there are challenges in obtaining valid and reliable data.

Aim: to assess the inter-rater reliability of all variables in a national myocardial infarction register.

Methods: We randomly selected 280 patients who had been enrolled from 14 hospitals to the Norwegian Myocardial Infarction Register during the year 2013. Experienced audit nurses who were blinded for the data in the register completed all variables in the register by review of electronic medical records. We then extracted the data already registered on the same patients. To compare the inter-rater reliability between the register and the audit nurses we calculated intra class correlations coefficient (ICC) for continuous variables, Cohen's kappa and Gwet's AC₁ for nominal variables, and quadratic weighted kappa and Gwet's AC₂ for ordinal variables.

Results: We found excellent (AC₁ >0.80) or good (AC₁ 0.61-0.80) agreement for most variables in the register, including date and time variables, medical history, investigations and treatments during hospitalization, medication at discharge, and ST-segment elevation or non-ST segment elevation AMI. However, only moderate agreement (AC₁ 0.41-0.60) was found for family history of coronary heart disease, diagnostic ECG and complications during hospitalization, whereas fair agreement (AC₁ 0.21 - 0.40) was found for AMI location. A high percentage of missing data was found for symptom onset, family history, body mass index, infarction location and new Q-wave.

Conclusion: Most variables in Norwegian Myocardial Infarction Register had excellent or good reliability. However, some important variables had lower reliability than expected or had missing data. Precise definitions of data elements and proper training of data abstractors are necessary to ensure that clinical registries contain valid and reliable data.

B10**Frequent alcohol consumption increases risk of hip fracture in men below 60 years in Cohort of Norway. A NOREPOS study***

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Introduction: There seems to be a J-shaped association between consumption of alcohol and risk of hip fracture, but whether this differs with age and gender is not established. Observations from clinical practice indicate frequent findings of ethanol in serum in middle-aged men hospitalized with hip fracture.

Aims: To examine risk of hip fracture among participants in Cohort of Norway (CONOR) 1994-2003 according to age and gender.

Methods: CONOR comprises ten population-based health studies in Norway. Socio-demographic factors, lifestyle, health and diseases were self-reported. Weight and height were measured. Information on hip fractures treated in Norwegian hospitals (1994-2013) was retrieved from electronic patient administrative systems in all hospitals and from the Norwegian Patient Registry. Alcohol consumption was categorized as: never/not last year/very rare (never), once a month to 2-3 times a week (moderate), or ≥ 4 times a week (frequent). 77,252 men and 78,931 women had valid baseline data on alcohol use, BMI, smoking, physical activity and self-perceived health, and on subsequent hip fractures. Cox's proportional hazards models were used to estimate hazard ratios (HR) stratified on gender and baseline age <60 and 60+ years.

Results: During median 15.3 years of follow up, 1,876 men and 2,874 women suffered a hip fracture. Using moderate drinkers as reference, men <60 years drinking frequently had HR=1.74 (CI 1.03-2.95) for hip fracture, adjusted for covariates. The corresponding HR in women <60 years was 0.89 (0.37-2.17). No statistically significant increased risk was found in frequent drinkers aged 60+. All never-drinkers had an increased risk of hip fracture, but the association was only statistically significant in women <60 years.

Conclusions: Men below 60 years drinking alcohol 4 times a week or more had a 1.74-fold increased risk of hip fracture compared to moderate drinkers. No such associations were found in older men or in women.

* NOREPOS=The Norwegian Epidemiologic Osteoporosis Studies

B11**Milk intake in middle-aged Norwegians and risk of hip fracture: Is there an association? A linkage between the Norwegian Counties Study and the NOREPOS hip fracture database****Kristin Holvik**¹, Haakon E. Meyer^{1,2}, Ida Laake³, Tone K. Omsland², Anne Johanne Sjøgaard¹

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Introduction: A meta-analysis of cohort studies found no association between milk intake and risk of hip fracture in women, and a suggestive (non-significant) protective association in men. In contrast, a recent study in two Swedish cohorts identified an increased risk of hip fracture with higher milk consumption in women, but no association in men.

Aims: To study the association between milk intake in middle-aged Norwegians and later risk of hip fracture in middle-aged Norwegians.

Methods: We here use baseline data from the third wave of the Norwegian Counties Study carried out in Finnmark, Oppland and Sogn og Fjordane 1985-88. Diet was assessed by a semi-quantitative FFQ. Height and weight were measured, lifestyle variables were collected through questionnaires, and education level was obtained from Statistics Norway. Incident hip fractures during 1994-2013 were obtained by linkage to the NOREPOS hip fracture database. We performed Cox proportional hazards regression within the genders with frequency of milk consumption as the explanatory variable, adjusted for year of birth, body mass index and daily smoking.

Results: Of 57 194 participants with median age 46 years who responded to the milk questions, 2 128 individuals suffered a hip fracture during 1994-2013 (median age at fracture 72 years). Mean daily milk consumption was 3.7 glasses in men and 2.8 glasses in women. There was no significant association between number of glasses of milk consumed and risk of hip fracture in men: HR 0.96 (95% CI 0.91, 1.01) per glass of milk per day, nor in women: HR 1.03 (95% CI 0.98, 1.07) per glass of milk per day. Results were similar with additional adjustment for body height, physical activity level, self-reported diseases, calcium and energy intake, and education level.

Conclusions: In line with a previous meta-analysis, we could not demonstrate any relationship between self-reported milk intake and subsequent risk of hip fracture.

B12**How is revision rates influenced by hospital procedure volume for the Oxford Unicompartmental Knee Arthroplasty?**

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Introduction: Results of unicompartmental knee arthroplasty (UKA) have been shown to be inferior to results after total knee arthroplasty in national registries. Most independent studies regarding the Oxford UKA, demonstrate either excellent results or poor long-time survival of such implant. Register studies have demonstrated a difference in results regarding procedure volume and survival rates for UKA.

Aims: The objective is to calculate if there are any differences in rates of revision between the high and low volume hospitals by using registry data for the Oxford UKA, and discuss several methods for evaluation.

Methods: The Nordic Arthroplasty Register Association (NARA) has established a dataset for knee arthroplasties. This dataset was used to investigate the revision rates for the Oxford UKA regarding to procedure volume at the operating hospital. 12,986 Oxford UKA operated in the period 2000-2012 in the four Nordic countries were included in this study. Three methods of calculating hospital volume were tested; 1) Annual procedure volume per hospital counting each year separately, 2) Total hospital volume over the 13 year study period, calculating mean number of operation per year and 3) The proportion of Oxford compared to the total procedure volume of knee arthroplasty. To compare results we used adjusted Cox-analysis.

Results: Method 1 showed that if the hospital performs <13 operations annually the results are poorer (RR= 1.2, p-value = 0.016), method 2 showed better results if a hospital operates >26 per year (RR = 0.80, p-value = 0.003), and method 3 that hospital with usage >20% performed better (RR = 0.70, p-value = 0.001).

Conclusions: There is a difference in performance due to annual procedure volume in hospitals. Higher procedure volumes of Oxford UKA a year and usage >20% were associated with a decreased risk of revision in the 3 different methods of analysis.

B13

Avoidable hospital admissions, length of hospital stay and probability of 30-day hospital readmission among elderly in Norway

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Introduction: Unplanned readmissions of elderly patients has been introduced as a quality indicator in Norway and reports show significant variation both between municipalities and between hospitals. Shorter length of hospital stay is often suggested to be an important explanation for higher readmission rates.

Aim: To evaluate length of hospital stay as a predictor for readmission when adjusting for rate of potentially avoidable admissions according to the patient's municipality.

Methods: All hospital admissions during 2012-2014 were provided by the Norwegian Patient Registry. *Readmission* is defined as an acute admission between 8 hours and 30 days subsequent to a previous hospital discharge (*primary admission*). Readmissions following a primary admission for patients 67 years and older within eleven diagnosis groups were included. Avoidable admissions were identified according to the model reported by the Swedish National Board of Health and Welfare (seven chronic and six acute conditions). Adjusted for sex and age, avoidable hospitalization rate were calculated and included in the model to explore the relationship between the probability of readmission and length of stay for the municipalities.

Results: There was no significant relationship between probability of readmission and length of stay ($r=-0.02$).

Conclusion: Length of stay was not identified as an important predictor for the probability of readmission. Further research is needed to identify potential areas of improvement to reduce the proportion of readmission of elderly patients.

B14**Incidence and risk factors for unruptured intracranial aneurysms (UIAs) in a population-based study – preliminary results****Marie S. Sandvei**^{1,2,3}, **Anne Vik**^{4,5}, **Pål R. Romundstad**¹, **Tomm B. Müller**⁵

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Introduction: The rupture of an intracranial aneurysm (IA) causes subarachnoid hemorrhage (SAH), a catastrophic event with high morbidity and mortality. In the recent years, more unruptured IAs (UIAs) are being detected due to increased availability of brain imaging. However, little is known about which factors that increase risk of UIA.

Aims: To assess the associations of sex, smoking, blood pressure, alcohol consumption and serum lipids with the risk of UIA in a large, prospective study of the general population.

Methods: We identified all patients diagnosed with UIA after participating in the HUNT study (HUNT 1 (1984-86); 2 (1995-97); or 3 (2006-08)) using the patient administrative databases at the hospitals serving the study population, and the Cause of Death Registry. We followed the participant January 1, 1999 as CT angiography was introduced around 1998, and until December 31, 2014. We reviewed all patient files for case ascertainment.

Results: We identified 103 patients with 142 unruptured intracranial aneurysms during 1.18 million person years, 74 women and 29 men. The incidence was 8.7 per 100,000 person years, 11.8 in women and 5.2 in men. Female sex (HR 2.8, 95% CI 1.8-4.4) and current smoking (HR 3.6, 95% CI 2.1-6.1, as compared to never smoking) were strongly associated with increased risk of UIA. However, we found no clear associations with systolic or diastolic blood pressure, alcohol consumption or serum lipids (total and HDL cholesterol or triglycerides) with the risk of UIA. There may be a negative association between body mass index (BMI) and the risk of UIA (p for trend 0.06).

Conclusions: Female sex and current smoking is associated with increased risk of UIA. However, in contrast to what has been found regarding SAH, we found no clear associations with systolic or diastolic blood pressure.

B15**Trends in use of oral anticoagulants as stroke prophylaxis in Norway – NOACs are trendy**

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Introduction: Atrial fibrillation is an important contributor to the disease burden in our society, and stroke is its most feared complication. International guidelines in the last decade have recommended a more aggressive approach to the use of oral anticoagulants as stroke prophylaxis in affected individuals. For decades, warfarin has been the mainstay in this regard, but since 2011, novel oral anticoagulants (NOACs; dabigatran, rivaroxaban, apixaban) have been introduced in the market.

Aims: To describe the utilization pattern of oral anticoagulants in atrial fibrillation in Norway. The study is part of a larger project aiming to assess the efficacy and safety of NOACs and warfarin in a Norwegian atrial fibrillation cohort.

Methods: We use data from the Norwegian Prescription Database. Indication of atrial fibrillation can be identified by the reimbursement codes used in hospital and primary care, namely I48 (ICD-10) and K78 (ICPC-2), and drugs by ATC-code. We will describe trends in prevalence and incidence as well as the switching pattern between warfarin and NOACs between January 1st 2010 and August 31st 2015, and how these trends relate to age, sex, geography and prescriber specialty. Incident users are defined by a 1-year washout period.

Results: We identified 131 585 patients who were reimbursed with oral anticoagulants for atrial fibrillation in the study period. Our preliminary findings show an increase in incident use of oral anticoagulants, with a sharp increase in 2013, especially among elderly above 80 years old. This coincides with a similar trend in NOAC use. By 2013, there is a significant change in drug preference; among incident users, the majority is prescribed NOACs, while warfarin use steadily declines.

Conclusions: NOACs are fast becoming the drug of choice for anticoagulation in atrial fibrillation in Norway.

B16**Plasma betaine and risk of incident atrial fibrillation: the Hordaland Health Study****Hui Zuo**^{1,2}, Per M. Ueland^{2,3}, Ottar Nygård^{2,4}, Stein E. Vollset^{1,5}, Grethe S. Tell¹

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Introduction: Studies have shown that betaine supplementation can decrease plasma homocysteine in healthy adults, and high homocysteine levels may be associated with the presence of persistent atrial fibrillation (AF). However, the association between betaine and AF risk has not been evaluated so far.

Aims: To investigate the association between plasma betaine and risk of incident AF.

Methods: We conducted a prospective analysis of the Hordaland Health Study in 6949 adults without known AF at baseline (1998-99). They were followed via linkage to the CVDNOR project and the Cause of Death Registry. Hazard ratios (HRs) and 95% confidence intervals (CIs) were calculated using Cox proportional hazards analyses.

Results: A total of 552 participants (320 men and 232 women) developed AF over a median follow-up period of 10.9 years. Baseline plasma betaine was significantly associated with AF risk in models adjusted for covariates. The multivariate-adjusted HR (95% CI) for log-transformed betaine was 1.66 (1.21-2.27). Age, gender and smoking status didn't modify the association.

Conclusions: Our findings indicate that plasma betaine is associated with a significantly increased risk of AF. Further studies are needed to confirm the findings.

B17**The educational gradient in cardiovascular mortality; examining the impact of risk factors in cohorts born in the 1930s, 1940s and 1950s**

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Introduction: Modifiable risk factors for cardiovascular disease (CVD), such as blood pressure, blood lipids, body composition, smoking and physical activity mediate a substantial part of the inverse association between education and CVD.

Aims: We aimed to assess to what extent CVD risk factors differ in their mediating effect on the educational gradient in CVD mortality by birth cohort and gender.

Method: In all, 293,091 40-45 year olds born in the 1930s 1940s or 1950s from the Norwegian health examination surveys (1974-1997) with national educational data were followed for premature CVD mortality up to age 60 years. Rate differences (RD) and Hazard ratios (HR) were calculated using Aalen's additive- and Cox proportional hazards models.

Results: For both genders absolute differences in premature CVD mortality between those with basic and tertiary education decreased from the 1930 to the 1950 generations while relative differences were stable over the generations (RD [95% CI] per 100 000 observation years 169 [117, 221] to 54 [39, 69] in men, and 60 [34, 84] to 22 [19, 25] in women, HR [95% CI] 2.3 [1.6, 3.3] to 2.4 [1.9, 3.0] in men, and 4.2 [1.5, 11.4] to 4.3 [2.6, 7.1] in women). Adjusted for all CVD risk factors, the RD were attenuated by 68% and 60% in men and 96% and 60% in women, for the 1930 and 1950 generation respectively. Smoking was the single strongest risk factor for explaining the educational differences in men in all generations, and in women in the 1940 and 1950 generations.

Conclusion: CVD risk factors have a strong impact on educational differences in premature CVD mortality in the 1930, 1940 and 1950 generations. Smoking seemed to be the driving force behind educational differences from the 1930 generation and forth in men, and from the 1940 generation and forth in women.

B18**Is dietary calcium important in preventing hypertension?**

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Introduction: Low dietary calcium may be a risk factor for hypertension given that calcium inhibits the renin-angiotensin system and promotes favorable sodium-potassium balance.

Aims: To evaluate the importance of low calcium intake early in pregnancy as a predictor of hypertension after pregnancy.

Methods: The Norwegian Mother and Child Cohort (MoBa, 1999-2009) was linked to the Norwegian Prescription Database (2004-2013) for ascertainment of antihypertensive medication usage after delivery. Women with preexisting hypertension before pregnancy were excluded and only the last pregnancy in which the mother participated in MoBa was included in analyses (N=61,478 mothers). Calcium intake was estimated from a food frequency questionnaire. Analyses were stratified by the presence or absence of gestational hypertension. Cox proportional hazard analyses included mothers' age, parity, preterm delivery, smoking, prepregnancy body mass index, any type of diabetes mellitus, maternal educational level, and energy intake.

Results: The mean maternal age at delivery was 30 years and the mean length of follow-up was 7.1 years. Those in the lowest quartile of calcium intake, corresponding to inadequate intakes (median 604 mg/day), had a hazard ratio (HR) for hypertension of 1.35 (95% CI 1.08-1.69) relative to the highest intake group (median of 1482 mg/day). In analyses of women who had gestational hypertension, inadequate dietary intake of calcium also showed a significant increased risk of hypertension development also after pregnancy (HR= 1.52; 95% CI 1.08-2.13). The addition of other nutrients/covariates to the models did not alter the findings.

Conclusions: The results suggest that inadequate dietary calcium intake during pregnancy is an important risk factor for later development of pharmacological treated hypertension.

B19**The Norwegian student introductory week: who takes part and is participation associated with better social integration and satisfaction among students?**

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Introduction: Norwegian universities and university colleges arrange yearly introductory weeks to welcome new students. Little is known about 1) who takes part in the event, 2) students' experiences with the event and 3) whether the event is associated with social integration.

Methods: Data from the Norwegian study of students' health and well-being, SHoT, were used. Data was collected in 2014 and 13,663 students (29%) responded. The current study included first year students in the cities of Bergen, Trondheim, Tromsø and Oslo. Satisfaction with the introductory week was investigated, and demographic characteristics and other variables of interest were described for individuals taking part, partly taking part and not taking part in the event. Using linear regression the association between participation status and social integration was investigated.

Results: Individuals who were younger, single and had moved to the student city were more likely, while individuals who abstain from alcohol were less likely to take part in the event. Though most students seemed satisfied with the introductory week, some were dissatisfied with the amount of alcohol associated with the event. Individuals with partly or no participation were less satisfied with their student community, less often part of a network of friends and experienced more loneliness.

Conclusions: Participation in the introductory week is associated with higher satisfaction and better social integration. Participants were younger, single and more likely to have moved to the city. Individuals who did not drink alcohol participated less and were thus excluded from a potentially important arena for social integration.

B20**Risky drinking among participants in the university introductory week**

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Background: Norwegian universities and university colleges arrange yearly introductory weeks to welcome new students. It has been questioned whether these events are too centered on alcohol. We aimed to investigate whether participation in the event is associated with risky drinking, whether risky drinking is associated with academic performance, and whether attitudes regarding alcohol are associated with participation in the event and alcohol consumption.

Methods: Data from the Norwegian study of students' health and well-being (SHoT) were used. Data were collected in 2014 and 13,663 students (29%) responded. The odds ratio of risky drinking (Alcohol Use Disorders Identification Test score of 8+) was calculated for individuals participating and partly participating in the event compared to those not (logistic regression). The relative risk ratio of having failed exams once or more than once (multinomial logistic regression), the risk of delayed study progression (logistic regression), and mean difference in study-related self-efficacy (linear regression) was calculated for individuals reporting risky drinking compared to others. The association between attitudes (liberal/conservative) and participation in the event and alcohol consumption was investigated (logistic regression).

Results: Alcohol consumption is high among Norwegian students. Individuals who participate in the Norwegian university introductory week have increased odds of risky drinking (OR (95%CI) = 2.32 (2.00-2.68), adjusted for age, gender, marital status and semesters studied). Individuals reporting risky drinking report lower self-efficacy and are more likely to have failed exams more than once. Study progression is unassociated with risky drinking. Individuals with liberal attitudes towards alcohol are more likely to participate in the event and to report risky drinking.

Conclusions: Individuals participating in the Norwegian introductory week are more likely to report risky drinking than others. The event might be in danger of excluding individuals who do not drink much, or of promoting an unhealthy drinking culture among students.

B21

Factor analysis of the Hopkins Symptom Checklist (HSCL-25) in a student population

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Introduction: The Hopkins Symptom Checklist (HSCL-25) is a widely used scale designed to measure symptoms of anxiety and depression. The questionnaire contains 25 items. Despite the original aim to measure two distinct factors (i.e. symptoms of anxiety and depression) several different factor structures have been suggested.

Aims: The present study aims to investigate the factor structure of the Norwegian version of HSCL-25 in a student population.

Methods: Data from a Norwegian study of students' health and well-being (SHoT) were used. Data were collected in 2014 and 13,663 students (29%) responded. Using confirmatory factor analyses (CFA) we investigated previously suggested factor structures, ranging from a 1-factor to a 5-factor solution. Additionally, a 3-factor structure suggested by the authors was tested. CFA was performed using the WLSMV estimator. Comparisons of different factor structures were based on the following fit-indices: Root Mean Square Error of Approximation (RMSEA), Comparative Fit Index (CFI) and Tucker Lewis Index (TLI). After identification of the best-fitting model, measurement invariance across genders, as well as associations with self-reported socioeconomic and social factors, use of medication and help-seeking behaviour were examined.

Results: Compared to the previously suggested factor structures, a 3-factor structure differentiating between anxiety, depression and somatic symptoms fitted the data best (RMSEA .061; CFI .955; TLI .950). There was little evidence of measurement non-invariance based on gender. Patterns of associations with self-reported socioeconomic and social factors, use of medication and help-seeking behaviour differed somewhat across the three factors, providing some support for the importance of distinguishing between the three aspects of psychological distress.

Conclusions: We found support for a 3-factor structure of HSCL-25, differentiating between symptoms of anxiety, depression and somatic in a student population. Future research should investigate the generalisability of our findings.

B22**Antidepressant drug use among adolescents during 2004-2013: a population-based register linkage study**

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Introduction: In view of the ongoing debate, and after consideration of the observed increase in prescribing of antidepressant drugs in adolescents following the warning of 2004–5, more detailed information on use and users is needed.

Aims: To study trends in use of antidepressants by adolescents, and psychiatric morbidity and psychotropic co-medication in incident users.

Methods: The 1-year prevalence of antidepressant drug use was analysed for 13–17 year olds in Norway during 2004–13. Concomitant use of psychotropic drugs and mental health-care services was analysed for incident antidepressant users in 2012, using linked data from the Norwegian Prescription Database and the Norwegian Patient Register.

Results: The 1-year prevalence of antidepressant drug use increased from 6.4/1000 to 9.1/1000 during 2004–13, with the steepest increase happening from 2010, particularly among girls. The highest prevalence was found in 17-year-old girls (27.5/1000 in 2013). Of incident antidepressant drug users in 2012, 78.7% had received a diagnosis of a mental disorder and/or were registered for child and adolescent mental health care. Of incident users in 2012, 78.4% were prescribed a selective serotonin reuptake inhibitor. The most common types of psychotropic co-medications were melatonin (24.6%), antipsychotic drugs (13.2%), stimulants (8.8%) and anxiolytics (6.0%).

Conclusions: Use of antidepressants among adolescents has increased over the last 3–4 years, particularly among 16- to 17-year-old girls. Three out of four incident antidepressant users in 2012 had been referred to specialist mental health care, which indicates that antidepressant drug therapy is used by the most severe cases.

B23**Physical activity, sedentary behavior and sleep measured by accelerometer in the seventh Tromsø Study 2015-2016: Presentation of ongoing projects, preliminary results and extensive opportunities for future research collaborations**

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Introduction: Objective measurements of physical activity, sedentary behavior and sleep by accelerometers are increasing in population-based studies. The Tromsø Study is the most longstanding cohort study in Norway, with seven surveys (Tromsø 1 – Tromsø 7) from 1974, inviting total birth cohorts and representative population samples (66-79% response rate). The study comprises repeated measurements from questionnaires, biological specimens, comprehensive clinical examinations and disease endpoint registries. Accelerometers were first introduced in Tromsø 6 (subsample) and Fit Futures (the youth cohort). In Tromsø 7, all participants invited to the second screening are invited to wear an accelerometer.

Aims: The project aims to provide new insight into the relationship between physical activity, sedentary behavior, sleep and health, including starting points for intervention studies. We will present current research projects, preliminary results and further opportunities for research collaboration.

Methods: All individuals 40 years and older living in the Tromsø municipality (33,423 persons) are invited to the first visit including questionnaires, biological sampling and clinical measurements. The second visit (10,000 participants) includes extensive clinical examinations, including accelerometers measurements. ActiGraph wGT3X-BT (ActiGraph) is worn on the hip for 7 days and nights. Actiwave Cardio (CamNtech) is worn on the chest for 24 hours.

Results: By March 2016, 4,600 of the 5,100 participants (91% response rate) attending the second screening so far had worn ActiGraph, and of them, 600 had worn Actiwave Cardio (final n expected to be 9,000 and 1,000, respectively). Research possibilities combining information from the comprehensive data collection goes far beyond the ongoing research projects.

Conclusions: Wearable accelerometers are well tolerated by study participants in the ongoing Tromsø 7 study. A combination of information from accelerometers and questionnaire data, biological samples, clinical measurements, and later endpoint registries, offers extensive opportunities for future research collaborations.

C1

Pre-eclampsia and childhood asthma

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Introduction: Studies of pre-eclampsia and childhood asthma report conflicting findings, and no studies have done a formal mediation analysis with preterm birth as an intermediate factor between pre-eclampsia and childhood asthma.

Aims: To examine the association between pre-eclampsia and childhood asthma.

Methods: We examined the association between pre-eclampsia and asthma at 7 years using national registries, including all births in Norway from 1996 to 2006 (n=406,907), and further investigating this in a subsample of these children participating in the Norwegian Mother and Child Cohort Study (MoBa) (n=45,028). We calculated relative risks (RR) and 95% confidence intervals (CI). Additionally, we performed a mediation analysis of the indirect effect mediated through preterm birth, and a sibling design to account for unobserved confounding at sibling level.

Results: There was a positive association between pre-eclampsia and asthma, with an adjusted RR of 1.31 (95% CI: 1.22, 1.41) in the registry study, and an adjusted RR of 1.19 (95% CI: 0.99, 1.44) in MoBa. The odds ratio for the direct effects of pre-eclampsia after accounting for preterm birth was 1.19 (95% CI: 1.10, 1.29) in the registry study and 1.11 (95% CI: 0.89, 1.37) in MoBa. The sibling comparison indicated no association between pre-eclampsia and childhood asthma, adjusted odds ratio 1.07 (95% CI: 0.87, 1.33).

Conclusions: We observed a positive association between pre-eclampsia and childhood asthma at 7 years of age which seemed to be mediated through preterm birth. The sibling design to account for unobserved confounding at sibling level supported that there is no direct causal effect of pre-eclampsia on childhood asthma.

C2

Maternal intake of fat soluble vitamins during pregnancy, infant supplementation and asthma development: the Norwegian Mother and Child Cohort Study

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Introduction: Prenatal and infant exposure to fat soluble vitamins may affect later airway morbidity via effects related to antioxidant properties, modulation of immune function, lung tissue development and maturation.

Aims: To examine if maternal intake of vitamin A, D, and E from diet and supplements during pregnancy, as well as supplementation with vitamin D drops, cod liver oil or multivitamins during infancy (first 6 months) are associated with risk of current asthma at 7 years.

Methods: We used data from the Norwegian Mother and Child Cohort Study linked to the Medical Birth Registry and the Norwegian Prescription Database. Maternal diet was assessed with a validated food frequency questionnaire and compared with plasma biomarkers in a study subsample. Infant supplementation was assessed from maternal questionnaire report at 6 months. The current analysis included 39,846 children born 2002 to 2006 with prescription follow-up to April 2014. We used log-binomial regression to calculate adjusted relative risks with 95% confidence intervals.

Results: The prevalence of current asthma at 7 years based on prescribed medications was around 5% (1901 cases) After multivariable and mutual adjustment, a high retinol intake (upper quintile: ≥ 1713 $\mu\text{g}/\text{day}$) and a low vitamin D3 intake (lower quintile: ≤ 3.3 $\mu\text{g}/\text{day}$) during pregnancy were associated with a higher relative risk of asthma, whereas vitamin E intake showed no association. Infant supplementation with multivitamins was also associated with a higher relative risk of asthma, whereas vitamin D drops or cod liver oil showed a suggestive protective, but statistically non-significant, effect (daily use versus no use, all supplements). Potential interaction effects and the association with multivitamins will be explored further. Final results will be presented using an updated linkage.

Conclusions: Our preliminary results suggest that early exposure to both low and high levels of fat soluble vitamins may affect children's asthma development.

C3

Individual-based versus aggregate meta-analysis in multi-database studies of pregnancy outcomes: The Nordic example of selective serotonin reuptake inhibitors and venlafaxine in pregnancy

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Introduction: In a Nordic collaboration data from national prescription registers and birth registers have been combined to study the effect of exposure to antidepressants on birth outcomes. There are some logistical and legal challenges when sending data on the individual level to a common study center. Alternative approaches are needed.

Aims: Compare two approaches: analyses of a pooled data set on the individual level with aggregate meta-analysis of country specific results.

Methods: The study data included 2.3 million births. We compared estimated odds ratios (OR) for the effect of selective serotonin reuptake inhibitors (SSRI) and venlafaxine use in pregnancy on any cardiovascular birth defect and the rare outcome right ventricular outflow tract obstructions (RVOTO). Common covariates included maternal age, calendar year, birth order, maternal diabetes, and co-medication. Additional covariates were added in analyses with country-optimized adjustment.

Results: Country adjusted OR (95% CI) for any cardiovascular birth defect in the individual-based pooled analysis was 1.27 (1.17-1.39), 1.17 (1.07-1.27) adjusted for common covariates and 1.15 (1.05-1.26) adjusted for all covariates. In fixed effects meta-analyses pooled OR was 1.29 (1.19-1.41) based on crude country specific ORs, 1.19 (1.09-1.29) adjusted for common covariates, and 1.16 (1.06-1.27) for country-optimized adjustment. In a random effects model the adjusted OR was 1.07 (0.87-1.32). For RVOTO, OR was 1.48 (1.15-1.89) adjusted for all covariates in the pooled data set, and 1.53 (1.19-1.16) after country-optimized adjustment. Country-specific adjusted analyses at the substance level were not possible for RVOTO.

Conclusion: Results of fixed effects meta-analysis and individual-based analyses of a pooled dataset were similar in this study on the association of SSRI/venlafaxine and cardiovascular birth defects. The results of the random effects model speak against a causal relationship. When data are sparse pooled data on the individual level are needed for adjusted analyses.

C4

Comparison of self-report data in the Norwegian Mother and Child Cohort (MoBa) and data in national registries**Petter Kristensen**^{1,2}, Karina Corbett¹, Ferdinand A. Mohn¹, Ingrid S. Mehlum¹¹ Department of Occupational Medicine and Epidemiology, National Institute of Occupational Health, Oslo, Norway² Institute of Health and Society, University of Oslo, Norway

Introduction: Assessing the validity of Norwegian Mother and Child Cohort (MoBa) studies is important because of rather low participation and data that are partly maternal self-report.

Aims: To compare education level and mid-pregnancy sickness absence in self-report MoBa data with national registry data.

Methods: We followed MoBa mothers, born in Norway 1967–1976, in several national registries. Time of the first pregnancy 1999–2009 to 49 637 mothers was considered for analysis of education level in MoBa and the National Education Database, and for mid-pregnancy sickness absence in MoBa and in the national event database FD-Trygd. We computed agreement in 5-level educational attainment and absence >14 days between gestational week 13 and the week-30 questionnaire and estimated associations between sickness absence and years of education in binomial regression as a measure of the educational gradient in sickness absence.

Results: Agreement in education level was 75% among mothers with data from both sources. The self-report level was higher than the register data for 18%, register data level was higher for 7%. The sickness absence risk was 39% in self-report data and 48% in register data, with 80% agreement for those with data from both sources. Absence risk differences between register and self-report data were increasingly larger for higher education levels. A one-year increment in education was associated with a 3.2 percent point absence risk reduction (95% CI 3.0 to 3.4) for self-report data and 2.7 percent points reduction (95% CI 2.5 to 2.9) for register data.

Conclusions: Participating MoBa mothers tended to report higher education level and lower sickness absence than what was reported in national registries. The educational gradient in sickness absence in mid-pregnancy was 20% steeper when based on self-report rather than on register data. Linkage can be useful whenever registries contain data similar to MoBa self-report items.

C5

Complications in pregnancy: long-term risk and mortality of chronic diseases

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Introduction: Pregnancy problems, including preeclampsia, intrauterine growth restriction, gestational diabetes, and preterm birth have direct effects on infant health and may also influence the mothers' long-term health. Thus, women with a history of pregnancy complications may die at a younger age than parous women without these experiences. However, studies have typically been restricted to information about the 1st pregnancy, and ignored subsequent pregnancies. Adverse pregnancy outcomes may also impede a 2nd pregnancy, and lifetime risk of death is higher in women with only one lifetime delivery than in women with more than one delivery.

Aims: To study long-term maternal health by taking account complete pregnancy histories, utilising information from the Medical Birth Registry of Norway (MBRN).

Methods: The MBRN is a unique source of population-based data covering births from 1967 to 2015, and includes information about 2.9 million births in 1.4 million sibships, with linkage to national death and education registries. We will emphasize preeclampsia, preterm birth, gestational diabetes, perinatal death, fertility, and fetal growth. Outcomes will include deaths due to cardiovascular causes, stroke, and site-specific cancers. Maternal results will be contrasted with corresponding paternal mortality, and patterns of selection and possible biological pathways will be explored. To test the hypothesis that complications may have direct long-term effects attributable to the pregnancy, sisters without a history of pregnancy complications will be compared with affected mothers.

Results: Using data on complete reproductive history, we recently found that the increased mortality risk following preeclampsia in first pregnancy is not present in mothers who continue giving birth, and have healthy, unaffected pregnancies after the pre-eclamptic pregnancy. Additional results will be presented.

Conclusions: Project results will influence the understanding of how adverse pregnancy outcomes affect maternal future health and may open opportunities for prevention of latent maternal diseases first expressed as pregnancy complications.

C6

The second clinical survey of the Population-based Study on Health and Living conditions in regions with Sami and Norwegian populations (the SAMINOR 2 Clinical Study)**Ann Ragnhild Broderstad**^{1,2}, Solrunn Hansen³, Bent-Martin Eliassen¹, Marita Melhus¹¹ Centre for Sami Health Research, UiT the Arctic University of Norway, Norway² Medical Department, University Hospital of North Norway, Harstad³ Department of Community Medicine, UiT The Arctic University of Norway

Introduction: It is increasing focus on health and social inequalities between ethnic groups. The differences in average life expectancy between indigenous and non-indigenous peoples, are several years in some countries. Still, there is an enormous lack of relevant research information about widespread lifestyle diseases and living conditions in indigenous – non-indigenous settings. The Sami is the indigenous people living in the northern parts of Norway, Sweden, Finland and Russia. Norwegian health authorities have had little systematic knowledge about health status and living conditions among the Sami. There exist no updated systematic registration of ethnicity that can be used for research purposes.

The second *Population based Study on Health and Living Conditions in Areas with Both Sami and Norwegian population – The SAMINOR study* was conducted in 2012 – 2014. The data collection was done in two parts. A questionnaire study (part 1) and a clinical part (part 2).

Aim: The main objectives are to give a cohort profile where the objectives, new target areas, study design, follow-up studies, data collection, attendance, and characteristics of the participants are described. Highlight the study as an example of performing health research among Indigenous groups and even in minority- majority settings.

Methods: SAMINOR 2 clinical part is a population based study of health and living conditions in areas home to both Sami and non-Sami populations. All inhabitants aged 40-79 years registered in the Norwegian National Population Register in 10 municipalities in Northern Norway were invited. The following municipalities are included; Skånland, Evenes, Karasjok, Kautokeino, Porsanger, Tana, Nesseby, Kåfjord, Storfjord and Lyngen.

Results: In total, 6004 (48,6 %) men and women participated in the SAMINOR 2 clinical study and gave informed consent for medical research. In total, 53 % of the participants reported Sami affiliation. It is a decreasing level of self-reported Sami affiliation going from north- east to south-vest in the 10 municipalities included.

Conclusion: The SAMINOR study have raised important questions how to perform comprehensive health studies in indigenous societies. The study has demonstrated some health challenges in the multiethnic population in north. In addition, the study can contribute to comprehensive information and knowledge about health-related lifestyle among Sami and non-Sami population in Norway, by linking it to local, regional and national registers.

C7

Mental health impairment and death from suicide and unintentional injuries/accidents in males. A longitudinal national cohort study**Elin Anita Fadum**^{1,2}, Vinjar Fønnebø^{1,2}, Einar Kristian Borud^{1,2}¹ The Norwegian Armed Forces Medical Services, Institute of Military Epidemiology² Institute of Community Medicine, Faculty of Health Sciences, UiT The Arctic University of Norway, Tromsø, Norway

Introduction: Suicide and unintentional injuries/accidents account for more than half of all male deaths in young and middle aged life. The link between suicide and severe mental health disorders is well established. But most studies used hospital records of psychiatric patients, thus males with minor degree of mental health impairment has received little focus in research. Further, the association between minor and major health impairment and unintentional injury/accident death has been little studied.

Objective: To examine the association between minor and major mental health impairment and death from suicide and unintentional injuries/accidents in males.

Methods: In Norway, until 2010 all males were called for a compulsory medical and psychological examination prior to military service. We included 558,949 17-19 year old males who attended their examination in 1980-1999 and followed them for death from suicide and unintentional injuries/accidents until the end of 2013. We used Cox proportional hazard models to examine the association between the presence of minor and major mental health impairments at examination and death from suicide and unintentional injuries/accidents.

Results: Compared to males with no mental health impairment, minor mental health impairment was associated with an increased risk of death from suicide (adjusted hazard ratio [HR_{adj}]=1.63, 95% confidence interval [CI] 1.39-1.92), transport accidents (HR_{adj}=1.33, 95%CI 1.09-1.63), accidental poisoning (HR_{adj}=2.27, 95%CI 1.79-2.88), and other unintentional injuries/accidents (HR_{adj}=1.54, 95%CI 1.17-2.02). In males with major mental health impairment, the risk of death from suicide and accidental poisoning was elevated two (HR_{adj}=2.29, 95%CI 1.85-2.85) and three times (HR_{adj}=3.53, 95%CI 2.61-4.79), respectively.

Conclusion: We found an increased risk of death from suicide and unintentional injuries/accidents in males with minor and major mental health impairment at age 17-19 years.

C8**Mediators and moderators between potentially traumatic events and outcomes PTSD and disability pension****Eva Lassemo**¹, **Knut Sørgaard**^{2,3}, **Inger Sandanger**³¹ SINTEF Technology and Society, Health, Trondheim, Norway² Nordland Hospital, Bodø, Norway³ University of Tromsø, Tromsø, Norway

Introduction: Exposure to potentially traumatic events (PTE) may seem to have random effects. While a vast majority of the population may be exposed, only a fraction ever develops post-traumatic stress disorder (PTSD). Not enough is known about mediators and moderators between exposure and outcomes.

Aims: Using a random Norwegian population sample study, the aims of the present study were to; (1) explore mediators and moderators between exposure to PTE and PTSD and/ or other lasting psychiatric ailments, and (2) determine differences in risk for disability pension among the general population, trauma victims, and PTSD cases. All by gender.

Methods: Data were from 1,634 men and women, 18+, participating in the OsLof (Oslo and Lofoten) study. To obtain accurate diagnoses based on ICD-10 criteria an updated electronic version – CIDI-M 1.1, of the Composite International Diagnostic Interview (CIDI) was used. We included; post-traumatic stress disorder (ICD-10 code F43.1), affective- and depressive disorders (ICD-10 codes F31.4 - F34.1) and organic depressive disorder (ICD-10 code F06.32), anxiety disorders (ICD-10 codes F40.0 - F41.9), and somatoform disorders (ICD-10 codes F45.0 – F45.9). The extensive self-reported data were linked with registry data on disability pension, with follow-up period from time of interview in 2000-01 throughout year 2010.

Results: Preliminary results indicate that lower age at PTE is associated with higher risk of PTSD. Poor perceived social support is associated with PTSD among women, but not men. Having been exposed to premediated PTE significantly increases the risk of receiving disability pension. Filling diagnostic requirements for PTSD further aggravates the risk. Experiencing accidental trauma has no effect on the risk for disability pension. Results differ by gender.

Conclusions: Potentially traumatic exposure, and particularly premediated trauma, bears a significant risk of not only lasting psychiatric ailments, but also disability pension.

C9

Too many injury deaths lack information on external cause: The X59 problem

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Introduction: In injury deaths, according to WHO rules, the underlying cause of death is defined as the circumstances leading to the injury. When this information is lacking, the cause of death is registered as “Exposure to unspecified factor” (ICD-10 code X59) and the data are of limited use for injury epidemiology and prevention. The X59 fraction should be as low as possible, and the “real” underlying cause should be sought.

Aims: Describe the distribution of X59 deaths in Norway across demographic characteristics and injury diagnosis and compare these with other deaths due to external causes.

Methods: Information on: age, sex, underlying cause of death, type of injury and place of death for all deaths from accidents (ICD-10 codes V01-X59) in the years 2005-2014 was retrieved from the Norwegian Cause of Death Registry.

Results: There were in total 19,083 deaths due to accidents. Of these, 6,440 (33.7%) lacked information on the circumstances. For both sexes, the “Unspecified factor” was the largest accident group, but more pronounced in women.

Cause of death	N	%	M/F ratio	Median age (yrs)	Fracture in hip region < 70 yrs (%)	Fracture in hip region ≥ 70 yrs (%)	Dying in health care institution (%)
Unspecified factor (X59)	6,440	33.7	0.62	88	31.9	86.0	93.0
Falls	4,218	22.1	1.03	85	4.6	41.0	82.5
Traffic accidents	1,987	10.4	2.77	43	0.9	2.7	28.9
Other accidents (combined)	6,438	33.8	2.48	49	0.2	2.7	25.1

Conclusions: We lack information on the underlying cause for 1/3 of the accidental deaths in Norway. The typical death due to “unspecified external factor” occurs in an elderly woman with a hip fracture, dying in a health care institution. The characteristics are very similar to deaths due to falls, especially in persons above 70 years.

C10**The influence of birth weight and childhood body mass index on overweight and obesity in adolescence. The Tromsø study: *Fit Futures*****Elin K. Evensen**¹, Guri Skeie², Nina Emaus³

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Introduction: The overweight and obesity prevalence among children in Norway is stabilizing, but still regarded as one of the primary childhood health problems today. Overweight and obesity during childhood is associated with overweight and obesity in adolescence and young adulthood. However there is no clear consensus of the association between birth weight and overweight and obesity later in life.

Aims: To determine the presence and degree of tracking of overweight and obesity between birth weight and two ages in childhood and adolescence.

Methods: This observational study used data from the youth cohort in The Tromsø Study, Fit Futures (FF). The cohort was retrospectively supplemented with anthropometric measurements from childhood health records and linked data from the Medical Birth Registry of Norway. Adolescents in FF1 (15-18 years) and FF2 (18-20 years) (n=961), were included. Participants were classified into weight classes: thin/normal weight (adult BMI < 25 kg/m²) and overweight/obese (adult BMI ≥ 25 kg/m²) based on body mass index (BMI) and according to international age- and sex-specific cut-off values for children and adults. Birth weight was analysed as ponderal index (kg/m³). Tracking was analysed using generalized estimating equations with adolescent weight class as outcome.

Results: Mean (standard deviation (SD)) ponderal index was 28.58 (2.78) kg/m³, while mean BMI at 2-4 years was 16.28 (1.35), and at 5-7 years 15.88 (1.89) kg/m². Preliminary results indicate that ponderal index was significantly associated with overweight/obesity at adolescence with crude Odds ratio (OR) of 1.06 (95% confidence interval (CI) 1.00-1.11) p = 0.04. Stronger associations were found between BMI at 2-4 years of age OR: 1.59 (95% CI: 1.39-1.81) and 5-7 years of age OR: 1.96 (95% CI: 1.74-2.21) and overweight/obesity at adolescence.

Conclusions: Preliminary results indicate that birth weight only was weakly associated with overweight/obesity at adolescence, while tracking was moderate from early childhood to adolescence.

C11

Maternal serum levels of perfluoroalkyl substances and organochlorines and indices of fetal growth: a case-cohort study

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Background: The associations between prenatal exposure to endocrine disruptive chemicals (EDCs) and small for gestational age (SGA) birth are inconsistent and few studies have assessed cumulative impact of these chemicals. Our current study of Scandinavian parous women aimed to address these inconsistencies and gaps in the literature.

Objective: To study the association between maternal serum levels of perfluoroalkyl substances (PFASs) and organochlorines (OCs), both individually and using a cumulative exposure score, and indices of fetal growth including birth weight, birth length, head circumference, and SGA birth outcome, and to explore possible effect modification by country and offspring sex.

Methods: This case-cohort study included 424 mother-child pairs who participated in a prospective, multi-center study of parous women in Trondheim and Bergen (Norway) and Uppsala (Sweden). We independently analyzed two PFASs and five OCs from early second trimester, and assessed cumulative exposure of these EDCs.

Results: Among Swedish women, prenatal exposure to cumulative and individual EDCs (perfluorooctanoate (PFOA), perfluorooctane sulfonate (PFOS), polychlorinated biphenyl (PCB) 153 and hexachlorobenzene (HCB)) were associated with higher odds for SGA birth. We found stronger associations among Swedish male offspring. In the Norwegian cohort, we found no significant associations between EDC exposure and indices of fetal growth.

Conclusions: Some populations may be more vulnerable to EDCs, possibly due to differences in exposure sources or modifiable lifestyle factors. Male offspring may be more vulnerable to endocrine disruption.

C12**Preeclampsia and long-term maternal cardiovascular disease mortality: heterogeneity of risk by lifetime parity and pregnancy conditions**

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Introduction: It is well established that women who experience preeclampsia (PE) have an approximately 2-fold increased risk of cardiovascular disease (CVD). However, most studies have examined first pregnancies only, overlooking information on later pregnancies.

Aims: To explore heterogeneities in CVD mortality risk after PE, considering complete reproductive history.

Methods: We conducted a population-based cohort study using linked Medical Birth Registry and Death Registry data among women with a first birth in 1967-2002 in Norway and 1973-2003 in Sweden, excluding women with multiple gestations. Women were followed through 2009 and 2010, respectively, to ascertain subsequent pregnancies and mortality. Cox regression analysis was used to estimate adjusted associations between PE and CVD mortality, taking into account lifetime parity (1, 2+), preterm delivery, PE recurrence and timing (first pregnancy or later).

Results: Among 2,083,732 women, 112,430 (5.4 %) experienced PE. After an average follow-up of 18 years, there were 5,385 CVD deaths. Women who experienced PE in a first term pregnancy, had 2 or more pregnancies and no PE recurrence had a hazard ratio (HR) for CVD mortality of 1.4 (95 % confidence interval 1.1, 1.8) compared with women with 2 or more term pregnancies without PE. HRs were greater for one-child mothers with preterm PE (HR= 8.4; 6.4, 10.9) and for multiparous women with non-recurrent preterm PE in the first (HR=2.4; 1.5, 3.7) or a later pregnancy (HR=4.9; 3.5, 6.9) and recurrent PE (HR=2.6; 2.0, 3.6). Women ending reproduction with a pre-eclamptic pregnancy had larger HRs than those with PE who had an unaffected last pregnancy (HR=2.5 vs. 1.5 for non-recurrent and HR=2.8 vs. 0.9 for recurrent).

Conclusions: CVD mortality risk after PE differed by characteristics of reproductive history. These findings can help identify high-risk women for targeted prevention and may shed light on underlying mechanisms of this association.

C13**Gut microbiome of mothers delivering prematurely shows reduced diversity and lower relative abundance of *Bifidobacterium* and *Streptococcus***

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Introduction: Spontaneous preterm delivery has been linked to vaginal infections and chronic illnesses such as inflammatory bowel disease, but few have considered whether maternal gut microbiota may play a role.

Aims: To determine whether maternal gut microbiota is associated with preterm delivery, accounting for potential confounders.

Methods: The Norwegian Microbiota Study (NoMIC) was established to study the colonization of infant gut microbiota and subsequent health outcomes. Gestational age was calculated based on the last menstrual period, and participants were selected based on their preterm/term delivery status. Fecal samples were collected at day 4 postpartum from the mother. We used samples from 121 mothers (19 delivering prematurely), analyzed by 16S rRNA Illumina amplicon sequencing. Data were combined with information from pregnancy journals and questionnaires. Multiple imputations were used when adjusting for covariates: maternal age, marital status, ethnicity, parity, BMI, education, antibiotic use, pets in the household, income and smoking. The association between gut diversity and spontaneous preterm delivery was examined with logistic regression. To explore taxonomic differences, we applied a random forest algorithm, classifying Operational Taxonomic Units (OTUs) based on their predictive ability.

Results: Women delivering prematurely had lower gut diversity (measured by Shannon, Phylogenetic diversity, and Observed OTUs). One IQR increase in Shannon diversity was significantly associated with 38% (1%, 61%) lower odds of having a spontaneous preterm birth, and the association was stronger when adjusting for potential confounders (48% lower odds, 95% CI: 4.2%, 72%). They also had a lower relative abundance of OTUs belonging to *Bifidobacterium* and *Streptococcus*.

Conclusions: Analysis of maternal gut microbiota using next-generation sequencing shows that low gut diversity, with a distinct microbial composition, may be associated with spontaneous preterm delivery.

C14

Management of HIV positive pregnant women in Tanzania; are we meeting national guidelines?

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Introduction: Prevention of mother-to-child transmission is the key way to reduce HIV infection in infants and children, and national guidelines for HIV in pregnancy to prevent HIV in infants have been developed.

Aims: To study adherence to these national guidelines over time using birth registry data.

Methods: Data on 34 159 deliveries between 2000 and 2014 recorded at the Kilimanjaro Christian Medical Centre, Moshi, Tanzania, were analysed. A set of outcomes concerning management and pregnancy complications were selected for analysis. Time trends were analysed according to periods corresponding with changes in guidelines (2000-2003, 2004-2006, 2007-2011, 2012-2014).

Results: Overall, 77.2% of the deliveries had a known maternal HIV status, changing from 26.3% in 2000-2003 to 98.6% in 2012-2014. Positive maternal HIV status was recorded in 1394 deliveries (5.3%). The percentage of HIV positive women treated during pregnancy increased from 62.1% in 2000-2003 to 90.9% in 2012-2014. Over time, increased adherence to national guidelines was found for insufficient folate and iron supplementation and invasive procedures (reduced prevalence). We also observed favourable trends over time for being referred for delivery and elective CS (reduced and increased relative risk, respectively, p-values for trend <0.01). Proportion of elective CS versus other CS was highest in HIV positive women, and this difference increased over time. An unfavourable trend was seen for anaemia (increased relative risk, p for trend <0.05).

Conclusions: Increased adherence to national guidelines over time was found for many of the selected outcomes. This includes an increased proportion of women with known HIV status, an increased proportion of HIV positive women being treated, and favourable trends for many outcome measures. An exception was the trend for anaemia, where the risk was significantly higher for HIV positive women than for HIV negative women in the last period.

POSTERS

P1

Validity of self-reported myocardial infarction and stroke in regions with Sami and Norwegian populations – The SAMINOR 1 study and the CVDNOR project

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Introduction: Updated knowledge on the validity of self-reported myocardial infarction (SMI) and self-reported stroke (SRS) is needed in Norway.

Aims: To assess the validity and reliability of SMI and SRS by ethnicity, sex, age, and educational attainment.

Methods: 16 865 men and women aged 30, and 36–79 years participated in the first population-based study on health and living conditions in regions with Sami and Norwegian populations (SAMINOR 1) in 2003–2004. Information on SMI and SRS was available from self-administered questionnaires for 14 509 and 14 600 of these participants, respectively. We compared this information to discharge diagnoses from all Norwegian somatic hospitals from 1994 through to the SAMINOR 1 attendance dates. Hospital discharge data was retrieved from the CVDNOR project.

Results: The sensitivity and positive predictive value (PPV) of SMI were 90.8% and 78.6%, respectively. The PPV increased to 93.2% when all ischaemic heart disease (IHD) diagnoses were included. The SMI prevalence estimate was 2.3% and the hospital-based prevalence 2.0%. The sensitivity and PPV of SRS were 82.4% and 64.5%, respectively. The SRS prevalence was 1.5% and the hospitalisation-based 1.2%. Moderate to no variation was observed in validity and reliability according to ethnicity, sex, age, and educational attainment.

Conclusion: The sensitivity and PPV of SMI were high and moderate, respectively; for SRS both of these measures were moderate. SMI may in the SAMINOR population be used in etiological/analytical studies due to a high IHD-specific PPV. Furthermore, the SAMINOR 1 questionnaire may be used to estimate the prevalence of acute myocardial infarction and acute stroke in this population.

P2**Gastroenteritis in primary care in Norway 2004-2015: use of general practice and out-of-hours services**

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Introduction: Gastroenteritis is a set of clinical symptoms indicating acute gastrointestinal infection. Most patients experience self-limiting symptoms and therefore do not seek medical care. General practitioners (GP) and primary care doctors in the out-of-hours (OOH) services handle the majority of those patients with gastroenteritis seeking medical care. Little is known about how many patient consultations in primary care are due to gastroenteritis in Norway, and whether the gastroenteritis patients primarily seek GP or OOH services. Increased knowledge of this patient group's seeking to primary care is useful as data from primary care can be suitable for surveillance and detecting outbreaks of gastroenteritis based on symptoms rather than laboratory confirmed cases, and for health services planning and organization.

Aims: The aims of this planned study are to investigate the use of GP and OOH services among patients with gastroenteritis and explore potential differences according to patient and doctor characteristics as well as geographic characteristics.

Methods: Observational study of all patients seeking GP or OOH services in Norway during the time period 2004-2015. Patients will be identified using data from electronic reimbursement claims from all OOH doctors and regular GPs (KUHR database) as the claims contain ICPC or ICD diagnoses for each consultation. The KUHR database also provides information on seasonality, the patients' age, gender, place of living, previous visits to primary care doctors and presence of chronic disorders

Results: Preliminary results will be presented at the conference.

Conclusion: This is a planned observational study. The main methodological weakness is expected to be the validity of diagnoses in this data set from an administrative registry for reimbursement claims data.

P3**Nordic Diet in the Norwegian Women and Cancer Cohort (NOWAC)**

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Introduction: In the last five years, a Healthy Nordic Food Index (HNFI) has been developed and applied to cohorts in Sweden and Denmark. High adherence with the HNFI has been associated with beneficial health effects. At the same time, those who adhere to the HNFI also appear to have a high intake of other foods that are not associated with beneficial health effects.

Aims and methods: To adapt the HNFI to the NOWAC cohort and examine the degree of adherence to the HNFI in the cohort. Other participant characteristics and dietary variables will be examined by level of adherence to the HNFI using descriptive statistics and regression analysis.

Results: The HNFI was applied to dietary data for 73 523 women in the NOWAC cohort. The participants were distributed as follows: low adherence (0-1 points): 23.5%, medium adherence (2-3 points): 49.2% and high adherence (4-6 points): 27.3%.

Preliminary analyses indicate a higher consumption of dairy and red and processed meat, as well as a higher energy intake, but a lower consumption of alcohol and coffee, among those with high adherence compared to those with low and medium adherence.

Conclusions: The HNFI was successfully adapted to data from the NOWAC cohort.

Those that have a high adherence to the HNFI also seem to have a higher consumption of some other foods that are not considered beneficial. This might occlude potential health effects of the HNFI, and has to be taken into consideration when effects of the HNFI are explored. The preliminary results are in line with results from other Scandinavian studies.

P4**DNA methylation markers related to reproductive factors**

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Introduction: Certain DNA methylation profiles have revealed relations to various environmental factors, e.g. revealing smoking exposure, and internal processes, such as aging. This epigenetic signaling on the DNA is essential for normal cell function and DNA methylation is one of the pathways to regulate gene-expression in cells. Inactivation of tumor-suppressor genes by altering the DNA methylation within the promoter regions have been related to different cancer types. The established relation between risk of breast cancer and parity warrants exploration of parity-related patterns in DNA methylation.

Previously, a methylation pattern was described in breast tissue from cancer-free women with early parity or nulliparity. Still, indications of hypomethylation for DNA in parous women compared to nulliparous women have also been observed. Also, studies have found no significant association between total methylation status and parity.

Aims: Identify any CpG sites associated with parity and other reproductive factors, e.g. age at first birth.

Methods: The study group includes cancer-free women in prospective case-control subsets within the Norwegian Women and Cancer study (NOWAC) with available data for DNA methylation, i.e. combine controls from data case-control subsets for breast (n=168) and lung cancer (n=132).

The DNA methylation data is obtained from Illumina microarray methods and is previously described in literature for both the breast cancer and lung cancer case-control set. The cases and controls are matched on birth year and year-month of recruitment. Epigenome-wide comparisons of DNA methylation will be conducted across selected variables representing reproductive factors, e.g. parity, time since last birth, delivery intervals and breast-feeding as well as age at menarche, age at menopause and hormone therapy use. As there could be relations to the interplay between the reproductive factors and age (e.g. age at first birth), age per se must likely also be regarded in this study.

Results: Results will be presented at the conference.

P5**Blood gene expression profiles reflect temporality and clinical parameters up to six years before breast cancer diagnosis – The Norwegian Women and Cancer (NOWAC/Kvinner og Kreft) Post-genome cohort****Karina S. Olsen**¹, Lars Holden², Hege Bøvelstad¹, Sandra Plancade³, Clara-Cecilie Günther², Jean-Christophe Thalabard⁴, Marit Holden², Eiliv Lund¹¹ Department of Community Medicine, UiT The Arctic University of Norway, Tromsø, Norway² Norwegian Computing Center, Oslo, Norway³ INRA, UR1404 Unité Mathématiques et Informatique Appliquées du Génome à l'Environnement, Jouy-en-Josas, France⁴ MAP5 Université Paris Descartes, Sorbonne Paris Cité, France

Introduction: The understanding of time related aspects of systemic processes during carcinogenesis is very limited, and increased knowledge of systemic immunological changes in the years before cancer diagnosis may improve cancer detection and treatment. The characteristics of a newly diagnosed breast cancer may vary considerably according to mode of detection and lymph node status, but how this is reflected systemically and over time is unknown.

Aim: To identify time- and metastasis-related blood gene expression patterns present years before cancer diagnosis.

Methods: Blood samples were collected prospectively from healthy, middle-aged women participating in the Norwegian Women and Cancer Post-genome cohort. Breast cancer cases were identified via linkage to the Cancer Registry of Norway, and matched controls were drawn from the cohort biobank. Full-blood gene expression was measured using Illumina Bead chips. The Cancer Registry provided information on time of diagnosis relative to screening visits, and on lymph node status. The included 441 case-control pairs were ranked according to the time interval between blood sampling and cancer diagnosis, and collectively provide information on blood gene expression up to six years before diagnosis. A non-parametric statistical method was developed to study changes in gene expression over time, named *curve group analysis*, which detects small gene expression differences that vary over time, and group genes that display similar expression curves.

Results: Blood gene expression differences between breast cancer cases and controls are dependent on time, and are strongest in the last year before diagnosis. Gene expression curves in the six years before diagnosis were only evident when stratifying cases according to mode of cancer detection and lymph node status.

Conclusion: Blood gene expression patterns do reflect clinical variability and temporality in the years before breast cancer diagnosis. Our findings hold promise of increased insight into previously unreachable aspects of systemic cancer biology.

P6

Conflict exposure and disease-related mortality among 22 000 Norwegian male military peacekeepers deployed to Lebanon between 1978 and 1998

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Introduction: In a previous study on this cohort, we found higher incidence of lung cancer among those who served during high-conflict periods compared to those who served during low-conflict periods, presumably caused by higher smoking rates. Increased smoking might be mediated by a higher level of traumatic stress experienced during service in Lebanon.

Aims: To see the effect of high and low conflict exposure during peacekeeping service on disease-related mortality.

Methods: The high-conflict exposure group included those who ever served during the first 9 years and/or during the Israeli operations in 1993 (25–31 July) and 1996 (11–27 April), the low-conflict exposure group included those who served in Lebanon but never during these periods. The cohort was followed for mortality from first day of service in Lebanon through 2013. Standardized mortality ratios (SMRs) were calculated from national rates for the whole cohort, and for high- and low-conflict exposure groups. Poisson regression, expressed as rate ratio, was used to see the effect of conflict exposure.

Results: Peacekeepers who served during high-conflict periods had doubled risk of dying from diseases overall, from circulatory diseases, and from ischaemic heart disease, than those who served during low-conflict periods.

Conclusions: Service during high-conflict periods was associated with higher risk of disease-related mortality, hereunder ischaemic heart disease, than service during low-conflict periods, which is probably due to higher smoking rates in the high-conflict exposure group.

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