Lifestyle effects of colorectal cancer screening. Population-based survey study in Finland
Sanni Helander

Background
The European cancer screening guidelines recommend colorectal cancer (CRC) screening for 50-74-year-olds. CRC mortality can be reduced with screening, but it is yet unclear if CRC screening affects various lifestyle related factors. Due to population-level nature of screening, even minor adverse effects in health related lifestyle might have relevance for public health. A national programme for CRC screening with repeated faecal occult blood (FOB) testing followed by colonoscopy for test positives has been running in Finland since 2004. Our aim is to clarify, if screening is introducing harmful effects on colorectal cancer risk related life style, thus reducing the potential benefit of an otherwise feasible screening programme.

Methods
A population-based random sample of 10648 Finnish adults born in 1951 living in the municipalities voluntarily involved in CRC screening programme were sent a lifestyle questionnaire in 2010. In 2011, the 60-year old cohort was independently randomised (1:1) for their first ever CRC screening (invited) or control group (not contacted). The questionnaires were repeated in 2012 for all. From both survey rounds, 2508 pairs of completed questionnaires were available for analysis from the screening group and 2387 from the control group. The outcome was 2-year change in total lifestyle score of CRC risk related lifestyle factors (smoking, alcohol consumption, physical activity, diet and BMI).

Results
Preliminary results indicate that total lifestyle scores improved likewise in the screening group and in controls suggesting favourable changes for CRC risk in both groups. There was no difference by participation, either: the change in score did not differ in those participating screening compared to those invited, but not participated screening.

Conclusions
Present study found no unfavourable changes in total lifestyle in the studied age group after CRC screening. However, lifestyle counselling could be included in screening setting.

Key messages:
- Invitation or participation to colorectal cancer screening was not found to have a adverse effect on colorectal cancer risk related lifestyle in a population-based survey study in Finland
- Potential lifestyle change after colorectal cancer screening should be evaluated programme-wise. In Finland, this does not affect the cost-benefit ratio of the colorectal cancer screening programme

Cancer mortality by migrant Background in the 2000s in Belgium: patterns and determinants
Wanda Van Hemelrijk

Background
A growing, ageing migrant population challenges health systems in Europe. Cancer as a chronic disease is an important study topic for ageing societies. With high cancer occurrence and a large share of migrants and their children in the population, Belgium is an interesting research area. Belgian migrant health research has shown an important role of socio-economic position (SEP) and migrant generation for several causes of death. We study cancer mortality by migrant background for large migrant groups and their offspring in Belgium, and take SEP into account. This is the first Belgian study to take site-specific cancer mortality as its outcome. Few European studies have combined migrant generation and SEP in migrant health research so far.

Methods
We use individually linked census-mortality follow-up data for the period 2001-2011. Cancer mortality of first (FG) and second generation (SG) Italian, French, Dutch, Moroccan and Turkish migrants is compared with that of Belgians. We used indirect standardization and log-linear Poisson regression stratified by gender for those aged 25-84. SEP is accounted for. All cancers and the most common causes of cancer deaths in Belgium are researched.

Results
There is site-specific diversity in cancer mortality differences between natives and migrants. ISMRs generally increase with generation (e.g. 275.7 [256.4-296.1] to 594.4 [472.8-738.1], all cancers in Moroccan men). SEP mainly lowers RR (e.g. 0.79 [0.71 – 0.88] to 0.47 [0.42 – 0.52], lung cancer in FG Turkish men).

Conclusions
Results generally point to a disadvantaged position of SG migrants in terms of cancer mortality compared with FG migrants of the same origin. The SEP-effect observed warrants SEP-oriented policy measures.

Key messages:
- SG migrants have higher cancer mortality levels compared with their FG counterparts from the same origin group
- SEP plays an important role in observed cancer mortality differences for most cancer types
Mammography screening program in Austria. Survey Results
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Background
In 2014 a mammography screening program was implemented in Austria. Ever since then, women between 45 and 69 years are actively invited in a two year period to participate in the program; women at the age of 40+ and 70+ can opt in. Certified radiology institutes with appropriate experience, staff and a double-check system of the diagnostic result provide the mammography screening directly without a referral from a physician.

Our study focused on gathering information concerning the level of knowledge about facts of breast cancer screening by the female staff of the Austrian Social Security Institutions.

Method
We developed an online-survey containing 18 questions that was sent to 15,035 female colleagues within the Social Security Institutions in Austria. The survey was conducted in January/February 2016.

Results
4.270 women answered the survey, which means a response rate of 28%.

The questions about definitions of screening, breast cancer screening, test accuracy of mammography and general questions about the program were answered correctly by 70-90% of the respondents.

Estimations about the incidence and mortality rate of breast cancer and overdiagnosis due to screening were answered correctly by 40-50% of the respondents.

7% of the respondents estimated the false positive rate within 10 years correctly, the age-of-highest-benefit was estimated correctly by 10% of the respondents.

Conclusions
The level of information about the breast cancer screening program is quite high within the Social Security Institutions in Austria but overestimation of screening benefits and under-estimation of screening harms are quite common.

The benefits and harms of breast cancer screening should be communicated in a more understandable way to women in order to enable them to decide prudently.

Key messages:
- About half of the respondents are aware of overdiagnosis in breast cancer screening
- Only 1 out of 14 women is informed of false positive rates and 60% of the respondents overestimate the reduction in mortality due to participating in the breast cancer screening

Efficient gastric cancer prevention through serum pepsinogen and helicobacter antibody testing
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Issue
Promoting gastric cancer prevention, i.e., achieving increased participation in cancer screening within the general population is an important task of municipal public health authorities in Japan. Upper gastrointestinal series (UGI) participation rates have hitherto been low.

Description of the study
The study aims to clarify the effect and economic efficiency of gastric cancer risk screening for inhabitants who had not previously undergone a UGI. In Machida City (430 thousand population), risk screening was introduced in Fiscal Year (FY) 2014. Participation in risk screening and the outcomes (fiber gastroscopy [FGS] referral and results) were analysed by UGI participation history, which included regular participation (undergoing a UGI every year, in the recommended periods); irregular participation; and no participation (not undergoing a UGI for 3 years).

Results
In FY2014, 25,808 inhabitants (mean age 62.6 years, male 37%) participated in the risk screening. The risk screening participation rate in the targeted population was 15.9%, significantly higher than that of UGI (1.8%–2.1%). A total of 9,486 participants were recommended for FGS, and 7,196 underwent the procedure. Gastric cancer was detected in 139 participants. The detection rates for screening participants (regular-participants: 0.19%, irregular-participants: 0.63%, no-participants: 0.43%) were significantly higher than that of UGI (0.09%–0.12%). The cost-effectiveness ratio of expenses per cancer detection was 5,691 thousand JPY (50.1 thousand EUR, FY2013) for UGI and 870 thousand JPY (7,650 EUR) for risk screening, and the incremental cost-effectiveness ratio of introducing risk screening was 764 thousand JPY (6,720 EUR) per life saved.

Lessons
Risk screening improves the convenience of participating in gastric cancer prevention. This simple, economically efficient screening method will contribute to gastric cancer prevention in East Europe, where gastric cancer has increased recently.

Key messages:
- Gastric cancer risk screening significantly improves cancer prevention among those who have not regularly or never undergone a UGI
- Serum pepsinogen and helicobacter antibody testing increases cancer detection rate and is demonstrated to be more cost-effective than UGI for gastric cancer screening within the general population

Determinants of general practitioner’s cancer related gut feelings – a prospective cohort study
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Background
General practitioners (GPs) use gut feelings to diagnose cancer in an early stage, but little is known about the predictive value of gut feelings and how this is influenced by patient and GP characteristics.

Methods
Prospective cohort study of patients in 44 general practices throughout the Netherlands, from January 2010 till December 2013. GPs completed a questionnaire regarding gut feelings, patient and GP characteristics, if they noticed a cancer-related gut feeling during patient consultation. Follow-up questionnaires were sent 3 months later requesting information about the patient’s diagnosis. Chi-square, uni- and multivariate logistic regression and multilevel analyses were performed.

Results
A gut feeling (N = 366) is most often triggered by weight loss (24%, N = 85) and rare GP visits (22%, N = 76), but none of the triggers were predictive of cancer in a multivariate analysis except for patient’s (P = 0.01) and doctor’s age (P = 0.04). Most GPs (95%) acted immediately on the gut feeling, either referring to a specialist or by performing additional medical tests. The average positive predictive value of cancer related gut feeling was 35%. This increases with 2% for every year a patient becomes older, and with 3% for every year a GP becomes older.

Conclusions
GP’s gut feeling for cancer proves to be a useful tool in diagnosing cancer and its relative high predicting value increases
if the GP is older or more experienced and when the patient is older. The value of GP’s gut feeling needs more attention in guidelines and medical training concerning cancer.

Key messages:
• Profesional experience enhances development of cancer related gut feelings
• The value of GP’s gut feeling needs more attention in guidelines and medical training concerning cancer

Colorectal Cancer Screening in WHO European region: differences among countries by income level
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Background
In WHO European Region colorectal cancer (CRC) is the first tumor with 471,000 new cases per year and a mortality rate of 28.2 per 100000 population. WHO European Region is composed by 53 countries. Large-scale studies have found a considerable reduction in mortality due to the adoption of population-based screening programs with cost-effectiveness.

Methods
We consider the income level for each country referred to pro capita gross national income (current US$) as indicated by World Bank. High income: $12,736 or more divided into OECD group (Organization for Economic Co-operation and Development) and non-OECD; upper middle: from $4,126 to $12,735; lower middle: from $1,046 to $4,125. These data were implemented using available literature, single state ministerial web pages, data from Globocan 2012 and World Cancer Registry, X edition.

Results
Of the 24 high-income OECD countries, 17 (71%) have CRC organized screening, while only 6 of 10 States (60%), belonging to group high-income non-OECD countries, have an organized screening. The majority of countries with a high income are members of European Union (EU), where a 2010 European Parliament resolution invited single States to adopt the screening prevention programmes.

Conclusions
The data suggest a wide inequality among different European countries. Increase of life expectancy and the progressive improvement of quality of life make reasonable a major diffusion of preventive strategies.

Key message:
• Adoption of screening programmes reduces incidence and mortality of CRC. The increase of screening coverage should be a main objective of each country

Occupational Exposures and Genetics in Urinary Tract Cancers: A Systematic Review and Meta-analysis
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Background
High Mediterranean diet adherence is associated with reduced risk of overall cancer mortality as well as a reduced risk of incidence of several cancer types, especially cancers of the colorectum, breast, and head and neck. However, only a few studies investigated the association between a certain genetic polymorphisms, occupational exposures and urinary tract cancers.

Methods
We carried out a literature search in MEDLINE, ISI Web of science, and SCOPUS online databases of all articles published in English language up to February 2015. Meta-analysis was performed in order to provide summary estimates for the association between genetic polymorphisms, occupational exposures and urinary tract cancers.

Results
Thirteen studies on BC and six on KC were deemed eligible for the review. Concerning BC, an overall OR of 2.07 (95% CI, 1.38-3.09) for those with GSTM1 and an OR of 2.07 (95% CI, 1.38-3.09) for those with GSTT1 Null Genotypes carriers was reported when exposed to polycyclic aromatic hydrocarbons (PAHs). NAT2 slow genotype carriers had an OR of 3.59 (95% CI, 2.62-4.93) for BC when exposed to aromatic amines (AAs) and an OR of 2.07 (95% CI, 1.36-3.15) when exposed to PAHs.

Concerning KC and pesticide exposure, the meta-analysis reported an OR of 4.38 (95% CI, 2.28-8.41) for GSTM1 present genotype, an OR of 2.59 (95% CI, 1.62-4.15) for GSTT1 present genotype and an OR 6.51 (95% CI, 2.85-14.89) for combined effects of GSTM1 and GSTT1 active genotypes.

Conclusions
This meta-analysis indicates a possible association between the variant genotypes of GSTM1, GSTT1, NAT2 and SULT1A1, occupational exposures to AAs or PAHs and development of BC. Our results suggest that polymorphisms in GSTM1 and GSTT1 genes could influence risk for developing KC in individuals occupationally exposed to pesticides.

Key messages:
• development of BC is possibly associated to the variant genotypes of GSTM1, GSTT1, NAT2 and SULT1A1, occupational exposures to AAs or PAHs
• polymorphisms in GSTM1 and GSTT1 genes could influence risk for developing KC in individuals occupationally exposed to pesticides

Association between Mediterranean diet and gastric cancer: Results of a case-control study in Italy
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Background
High Mediterranean diet adherence is associated with reduced risk of overall cancer mortality as well as a reduced risk of incidence of several cancer types, especially cancers of the colorectum, breast, and head and neck. However, only a few studies investigated the association between gastric cancer risk and adherence to the Mediterranean diet.

Methods
A case-control study was conducted at the Gemelli Hospital of Rome, Italy. A total of 226 cases and 444 controls were interviewed. Dietary intake was assessed through a validated food frequency questionnaire that collected information on over 25 food items. A Mediterranean diet score was used to evaluate the level of adherence to the traditional Mediterranean dietary pattern. Odds Ratios (ORs) and 95% confidence intervals (CI) were estimated for increasing levels of the score using multiple logistic regression models.
Results
We reported a reduced risk of gastric cancer for increasing adherence to Mediterranean diet (OR = 0.86; CI: 0.77-0.96). Risk estimates were consistent across strata of age and gender. With reference to single specific components of the Mediterranean diet, we also found a high consumption of fruit (OR = 0.75; CI: 0.67-0.84), vegetables (OR = 0.64; CI: 0.53-0.75) and legumes (OR = 0.87; CI: 0.66-0.98) to be significantly associated with lower risk of gastric cancer.

Conclusions
Our study showed that following a Mediterranean dietary pattern may have beneficial effects on gastric cancer risk. Data on the association between Mediterranean diet and gastric cancer risk, although scarce, are promising. Efforts towards the prevention of gastric cancer by dietary recommendations could directly lead to substantial reduction of morbidity.

Key message:
- High adherence to Mediterranean diet may be associated with gastric cancer

Methodological features of prostate cancer screening models – A review of simulation models
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Background
Although Prostate-Specific antigen (PSA) screening is currently the most used prostate cancer (PCa) screening method, its benefits are still controversial. In absence of empirical data on the lifetime consequences of screening and potential overdiagnosis, which is difficult to assess in empirical studies, mathematical models are frequently used to assess the benefit-harm balance of PSA screening. Such models differ in methodological features and provide controversial results. The goal of our study is to conduct a systematic review which will answer (1) What are the necessary features that should be included in models evaluating the benefit and harms of PCa screening? and (2) How can those affect the model-generated benefit-harm results?

Methods
We performed a systematic literature search for studies modeling the effect of PSA screening in PUBMED up to March 2016. For extracting methodological features, we applied a set of criteria based on identifying key variables or processes that a PCa screening model should have to provide a comprehensive and unbiased benefit-harm evaluation.

Results
We identified 41 articles based on 28 models. 24 of those used a stage-shift approach to model the screening effects. Health-related quality of life (HRQOL) was considered in nine models. Six of the models explicitly modeled the preclinical phase and only ten models controlled for overdiagnosis. Nine models validated the clinical incidence, stage distribution at clinical diagnosis and survival against published data.

Conclusions
PCa screening models differ in important methodological aspects. Understanding the consequences of using some features will enable easier interpretation of the results and improvement in future modeling.

Key messages:
- Methodological features of prostate cancer screening model affect the predicted benefit-harm balance of screening
- Prostate cancer screening model should account for over-diagnosis and HRQoL

The burden of rare cancer among adults in Austria, 2000-2012
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Background
Burden of rare cancer is seldom studied, although in Europe rare cancers represent about 22% of all newly diagnosed cancers each year.

Methods
All malignant cancer cases diagnosed in 2000-2012 in patients aged ≥15 years were derived from the Austrian National Cancer Registry and classified according to the RARECARE entities (65 first and 218 second-layer entities, version December 2015). Cancers showing an average annual crude incidence rate <6/100,000 in 2000-2012 were defined as rare. Relative survival was calculated for 2000-2004 and 2005-2009 based on follow-up until December 31st 2014. Reference date for prevalence was December 31st 2012.

Results
Each year about 7 000 rare cancers were diagnosed, which is 18% of all newly diagnosed cancer cases per year. 84% of all second-layer entities (183) were rare, 13 entities were not observed, and 2 entities (epithelial skin tumours) were not collected. Rare haematological, digestive, and head and neck cancers were most common comprising 57% of all rare cancers. Five-year relative survival remained stable in 2000-2009 at 53% for all rare cancers, varying from 22% (digestive cancers) to 93% (male genital cancers). 60 000 patients with a rare cancer were alive at the end of 2012 (19% of total cancer prevalence).

Conclusions
In Austria, almost one in six cancer cases among adults is a rare cancer. This is in line with the European results. Taking into account that this group consists of at least 183 different entities indicates the challenge that health care faces. Therefore increased awareness among clinicians and policy makers is needed, leading to improvement of diagnostics and treatment by (inter)national cooperation and concentration of care. Preferably, the next national cancer plan should focus on rare cancer.

Key messages:
- 18% of all newly diagnosed cancer cases per year are rare cancers among adults in Austria
- 183 different rare cancer entities indicate a big challenge for clinicians and policy makers

Personalized prostate cancer screening accounting for individual risk factors and preferences
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Conclusions
We identified 41 articles based on 28 models. 24 of those used a stage-shift approach to model the screening effects. Health-related quality of life (HRQOL) was considered in nine models. Six of the models explicitly modeled the preclinical phase and only ten models controlled for overdiagnosis. Nine models validated the clinical incidence, stage distribution at clinical diagnosis and survival against published data.

Conclusions
PCa screening models differ in important methodological aspects. Understanding the consequences of using some features will enable easier interpretation of the results and improvement in future modeling.
Background

A specific health-prone behavior, such as individual frequency of breast cancer screening, may affect other aspects of subsequent health status, such as blood pressure control. If it is assumable, intervention to a specific health behavior may change other aspects of health status.

Methods

This study was conducted as sub-analyses of intervention study regarding public education for breast cancer screening. Participants for analyses were 738 hypertensives (SBP >140 or DBP >90, or on anti-hypertensive) at baseline survey in 2012. They were divided into three groups by history of breast cancer screening, never [reference group], irregular, and regular; with annually/biennially check-up at baseline. Better control of blood pressure was defined as SBP<140 and DBP<90 at follow-up survey in 2014. Logistic regression analysis was performed to estimate odds ratios[ORs] and 95% confidence intervals[CIs] of better control of blood pressure by history of breast cancer screening adjusting for age, BMI and SBP at baseline and w/o public education. Similar analysis was performed to estimate the effect of intervention about public education regarding breast cancer screening on blood pressure control.

Results

At baseline, SBP of each group did not have significant difference; 144.9±17.6 mmHg for ‘never’ group, 143.7±15.3 for ‘irregular’ and 141.4±16.5 for ‘regular’ (p=.11). Proportions of better control of blood pressure at follow-up survey were 43%(164/382) for ‘never’ group, 44%(95/214) for ‘irregular’, and 59%(83/142) of ‘regular’. Multivariate adjusted OR(95%CI)s of better control of blood pressure were .98(68.1-1.42) for ‘irregular’ and 1.67(1.09-2.57) for ‘regular’. Any significant effect of public education about breast cancer screening on blood pressure control was not observed.

Conclusions

Health-prone behavior in cancer screening affected subsequent blood pressure control. However, two years public education of cancer screening did not have an impact on them.

Key messages:

- Health-prone behavior of cancer screening affected subsequent blood pressure control
- Short-term public education of cancer screening did not have an impact on blood pressure control

Regional lung cancer incidence trends in Croatia: emergency for public health intervention

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Background

Recent data show that more than one quarter of adult inhabitants of Croatia are everyday smokers. The aim of this study was to determine trends of trachea and lung cancer incidence in Croatia, Zagreb and Split-Dalmatia County (SDC) and compare them between regions, to stress importance of comprehensive tobacco control program.

Methods

Incidence data for the period 2001 – 2013 were obtained from the Croatian National Cancer Registry and European Health for All Database. For calculating incidence rates per 100.000
persons we used Censuses from years 2001 and 2011. Age-standardized rates of lung cancer incidence were calculated by the direct standardization method using the European Standard Population. To describe incidence trends we used joinpoint regression analysis.

**Results**

Lung cancer incidence rates in men show declining trend. Joinpoint analysis showed a significant decrease in the incidence for all regions, with estimated annual percentage change (EAPC) for Zagreb of -4.3%, for Croatia of -2.3%, and for SDC of -1.6%. In women there is an increasing trend. Joinpoint analysis showed a significant increase in the incidence for Croatia with EAPC of 1.6%. There was no significant increase for Zagreb and SDC. In terms of both sexes, joinpoint analysis showed a significant decrease in age-standardized incidence rates for Croatia with EAPC of -1%. There were no significant results for SDC and Zagreb.

**Conclusions**

This study shows there is an increase in female lung cancer incidence rate and a decrease in male lung cancer incidence rate. Those findings correlate with decreasing trend of smoking prevalence among men and increasing trend among women. Despite all of that, Croatia is still among the European countries with the highest lung cancer incidence. These results stress importance of smoking prevention and cessation policies especially among women and young people.

**Key messages:**

- Croatia is among the EU countries with the highest lung cancer incidence
- That raises question about introducing screening in high-risk population and comprehensive tobacco control program