treatment plan, including avoiding unnecessary SLNB or selecting patients for neo-adjuvant treatment.

No conflicts of interest

109 Poster

Is interpretation using CR (computed radiography) soft copy in mammographic screening reliable?

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Background: Over 90% of mammography machines in Japan have already become digital, however, almost three-fourths of them utilize computed radiography (CR). The majority of them necessitate hard copy diagnosis. Therefore, reliability of soft-copy interpretation of CR mammography is still controversial. The purpose of this study is to assess the usefulness and problems of soft-copy interpretation of CR mammography in breast cancer screening retrospectively.

Materials and Methods: We took CR mammograms of 44,058 women with PCM system (Konica Minolta) and digitized them with Regius Model 190 (Konica Minolta) at Kochi Kenshin Clinic and transferred them to Kochi Medical School via optic fiber (provided by NTT and STNet) between July 2005 and Aug. 2012. We interpreted them using two kinds of mammography viewing system: SenoAdvantage (GEYM) and a viewer produced by Carestream Health Care Inc. with a couple of 5M-pixel monitors and reported the results of interpretations through the same network. We introduced digital mammography systems with flat panel detector (FPD) (Amulet, FUJI) into our systems. We researched the process indexes of our mammographic screening program using CR soft-copy for 7 years. And we compared the usability of CR soft-copy diagnosis with FPD.

Results: The recall rate of our mammographic screening with CR soft-copy was 5.3%, the cancer detection rate 0.27%, the positive predictive value is 5.1%. These process indexes are almost equivalent to the other mammographic screening programs using film-screen (F/S) in Japan. 28,293 (64.2%) were repeated screenees in our program. Moreover, we could know only 82.8% of the all diagnoses of recalled screenees. The size of digital data of our CR systems is too large, 135 Mb for one mammogram, to interpret rapidly using a usual client server. Furthermore, the characteristics of CR soft-copy are partially unsuitable for monitor diagnosis in comparison with FPD.

Conclusions: Soft-copy interpretation of CR mammography has some limitations compared with FPD. However, the results of mammographic screening using that were not inferior to the conventional F/S systems. The CR soft-copy interpretation is still useful in mammographic screening in the regions where the majority of mammography is CR as Japan.

No conflicts of interest

110A Poster

Higher levels of HNE are associated with disease aggressiveness and worse outcome in breast cancer patients

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Background: Lipid peroxidation has been increasingly recognized as a biomarker of cancer. Reactive aldehydes, end-products of lipid peroxidation, are found to correlate with the stage of tumor. In addition, these aldehydes, especially 4-hydroxy-2-nonenal (HNE), are involved in different signaling pathways like differentiation, proliferation or apoptosis. Sera of early stage breast cancer patients prior to preoperative systemic chemotherapy (PST) were analyzed to evaluate if HNE can be measured and if higher levels of HNE correlate with disease stage and outcome.

Materials and Methods: In a retrospective analysis the previously developed HNE elisa was performed to measure HNE in sera of 108 female patients with histologically proven breast cancer before initiation of PST. The median patient age was 51.5 years (range 21−71). Tumor size was measured clinically and translated into the TNM-system before start of chemotherapy. Histopathological response in surgically removed specimens was evaluated using a modified Sinn regression score. Levels of pretreatment HNE were correlated with histopathological parameters, and with disease free and overall survival.

Results: The level of pretreatment HNE was associated with biologically more aggressive phenotype of breast cancer including high tumor grade, loss of hormone receptors and Her2 overexpression. There was no correlation with tumor size or pathologic complete response after PST. In univariate analysis higher levels of HNE (>47.8 μl/) were strongly associated with shorter disease free ($p = 0.028$) and overall survival ($p = 0.001$).

Conclusions: There was a strong association with the aggressiveness of breast cancer according to the grade, loss of hormone receptors and Her2 overexpression and higher levels of HNE. However, it remains unclear if higher levels of HNE are causing more aggressive phenotype or it is just a sequence of the stress caused by such a phenotype and has to be studied further.

No conflicts of interest

110 Poster

FDG uptake at PET/CT in stage I and II breast cancer: Early results

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Background: The positron emission tomography–computed tomography (PET/CT) is useful in staging, restaging, monitorizing therapy of breast carcinoma because of its usage of both metabolic and anatomic imaging. The maximum standard uptake value (SUVmax) is a semiquantitative predictor of FDG uptake. The purpose of this study is to understand the effect of tumor stage on fluorodeoxyglucose (F-18 FDG) uptake calculated from PET/CT.

Materials and Methods: This study included 31 female patients (age 35−76 years, mean±SD age 52.6±11.38) with breast cancer. 29 patients had invasive ductal carcinoma and the others had mixed type carcinoma. Fifteen patients were stage I, and 16 patients were stage II. The 7.3–14.7 mCi FDG was injected intravenously while the patients were fasted (at least 6 hours) and blood glucose level below 200 mg/dl.

Results: SUVmax was 5.66±4.07 and 10.05±6.18 at stage I and stage II, respectively. There was a statistical difference between stages ($p < 0.05$).

Conclusions: SUVmax reflects agressiveness of tumor biology. We found that stage I breast cancer had low FDG uptake than stage II. Especially, PET/CT is usefull for stage II breast cancer than stage I.

No conflicts of interest

Wednesday, 19 March 2014

POSTER SESSION

Epidemiology, Prevention, Screening

111 Poster

Physical activity, hormone replacement therapy and breast cancer risk: A meta-analysis of prospective cohort studies

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Background: Observational studies have found that physical activity (PA) could prevent breast cancer (BC) and use of hormone replacement therapy (HRT) increases the risk of BC. We quantified the impact of PA on BC, and whether HRT use influenced this impact.

Material and Methods: Prospective cohort studies were selected and meta-analysed using random-effect models with tests for statistical significance and heterogeneity. Because studies used different ways for assessing physical activity, BC risk in the highest category of physical activity was compared with the lowest.

Results: A systematic search identified 37 independent cohort studies published between 1987 and 2013, representing 4,287,368 women. More than 114,100 BC cases were included in the study, of which 4,300 were premenopausal, 31,500 were postmenopausal and 78,300 were of unknown menopausal status. Compared to the lowest level of PA, the highest level was associated with a summary relative risk (SRR) of

BC of 0.88 (95% CI: 0.85–0.91). The protective effect was observed for recreational as well as for occupational PA, and irrespective of areas where studies were done (USA, Europe and others). The SRR of studies that started before 1989 was 0.82 (95% CI: 0.74–0.91) but obtained heterogeneous results ($I^2 = 68\%$). The SRR of studies that started after 1989 was 0.89 (95% CI: 0.86–0.93) with no heterogeneity ($I^2 = 0\%$). The BC risk associated with PA was 1.11 (95% CI: 0.82–1.51) among HRT users and 0.71 (95% CI: 0.52–0.98) among HRT never users. Results differed by oestrogen receptor (ER) status: the SRR associated with PA was 0.87 (95% CI: 0.80–0.94) for ER+ patients whereas it was 0.80 (95% CI: 0.67–0.95) for ER− patients. The reduction in BC risk related to increasing PA was greater among women with BMI <25 kg/m^2 compared to >25 kg/m^2, respectively, SRR = 0.81 (95% CI: 0.73–0.90) and SRR = 0.90 (95% CI: 0.81–1.00). The 11 studies reporting results in metabolic equivalent of tasks (MET) obtained a SRR of 0.88 (95% CI: 0.84–0.92) without heterogeneity ($I^2 = 0\%$). The unit of reporting physical activity (MET-h/week vs hour/week) did not influence SRRs.

Conclusion: Compared with the least active women, a 12% reduction in BC risk exists in women with high levels of PA (e.g. >1 h/day of vigorous physical activity). Reductions are more pronounced for ER− cancers. HRT use seems to cancel out the preventive effects of PA.

No conflicts of interest

112 Poster

The Breast International Group (BIG) IT platform and pilot study for metastatic breast cancer molecular screening

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Background: BIG will soon launch AURORA, a large, multinational program for molecular screening of metastatic breast cancer patients. The two main goals of this program are to (1) deepen our understanding of the biology of metastatic disease, from clonal evolution to treatment response and (2) identify targetable molecular aberrations to enrol patients in clinical trials for targeted agents.

Running a large-scale molecular screening program in a timely manner poses multiple organizational, logistical, scientific and technical challenges and requires an appropriate IT infrastructure. In order to address all these challenges, we set up a dedicated pilot study.

Materials and Methods: Upon enrolment of the patient, biopsies of metastatic lesion(s) and blood are collected. Following central testing for standard biomarkers, the metastatic lesion(s) and blood undergo next generation sequencing (NGS) of known cancer genes, aiming to report results to the treating physician within maximum 15 working days, from the receipt of samples at central laboratories to the reporting of results.

Samples are being collected from 30 patients from 4 European hospitals and shipped to different laboratories for pathology testing and NGS of about 400 cancer-related genes, providing information about point mutations, small insertions/deletions and gene copy number aberrations. Results are reported to the treating physician.

Results: To manage the different activities and information flow required for molecular screening, a web-based IT platform has been developed. It covers patient registration, acquisition of data from participating hospitals and central laboratories, sample tracking, reporting of molecular and pathology results to clinicians, and automated matching of these results to the eligibility criteria of available clinical trials. This platform has been developed using the best software development practices and is currently being validated per established quality assurance standards.

We will present the IT platform and the first logistical and molecular results obtained in the pilot study.

Conclusion: The available results of the pilot help us to effectively address the multiple challenges of the AURORA program.

No conflicts of interest

113 Poster

Survival after breast cancer recurrence: Effect of the disease-free interval

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Background: The impact of the disease-free interval (DFI) on survival after a locoregional recurrence (LRR) or second primary breast cancer is uncertain. We aim to clarify this association using the Netherlands Cancer Registry.

Methods: Women first diagnosed with early breast cancer from 2003 to 2006 were selected from the Netherlands Cancer Registry. Follow-up was complete until the 1st January 2013. First or synchronous LRRs and second primary tumours in the first five years after the initial diagnosis were examined. The five-year period was divided into three equal intervals. Prognostic significance of the DFI on overall survival was determined in a univariate analysis using the log-rank test and Kaplan–Meier estimates. Survival after recurrence was examined with multivariate Cox regression analysis to control for confounding. Overall survival was compared for women with and without a LRR or second primary tumour.

Results: In total 36,255 women were included in the analysis. Disease recurrence occurred in 1,666 (4.6%) patients: 611 women developed a local recurrence, 224 a regional recurrence, 745 second primary breast cancer, and 86 a combination of recurrences. In the univariate analysis DFI resulted significant differences for both LRR and second primary tumours ($P = 0.001$ and $P < 0.001$ respectively). Longer DFI was associated with better survival after LRRs; no significant association was found in the Cox regression analysis for DFI and survival after second primary tumours (table). Important covariates associated with higher survival rates were age <70 years and surgical removal of the recurrence.

	LRR		Second primary		No recurrence
	10-year survival [a]	HR (95% CI) [b]	10-year survival [a]	HR (95% CI) [b]	10-year survival [a]
Short DFI	35%	Ref.	64%	Ref.	
Medium DFI	49%	0.80 (0.64–1.01)	70%	1.32 (0.86–2.02)	
Long DFI	73%	0.64 (0.47–0.88)	82%	1.33 (0.80–2.21)	
Total	51%		72%		82%

[a] Counted from treatment of the primary tumour. [b] Counted from diagnosis of recurrence.

Conclusions: This is the first study to explore the relation between DFI and survival in a nation-wide population registry and it contributes to insight in prognosis after breast cancer recurrence. The DFI with regard to a LRR is an independent predictor of survival, with a longer interval resulting in longer survival.

No conflicts of interest

114 Poster

The 'FFORESTS' project: First FOrum and REgistration STudy of Secondary breast cancer: A novel concept in the data collection and management of secondary breast cancer

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Background: In March 2010, the Velindre cancer centre in Cardiff, UK, set up the FFORESTS project. This is the first forum and registration prospective study of new cases of Secondary breast cancer in the UK.

Methods: Patients living within of South East Wales who are newly diagnosed with secondary breast cancer are discussed within a multidisciplinary forum. The membership of the forum consists of: all the breast oncologists within the cancer centre and their teams, breast oncology nurse specialists, oncoradiologist, palliative care, clinical trial nurses, pharmacist and a therapeutic radiographer. Each case is discussed following a review of the history, biology and radiology and a management plan is recorded. Demographic data on the early breast cancer diagnosis where available including adjuvant therapy received, is documented. Other relevant factors recorded include performance status, referral to palliative medicine, and the pathology results including where rebiopsies are performed. The FFOREST project aims to collect prospective data on secondary breast cancer including incidence and prevalence and the overall survival of this population.

Results: There are more than 500 cases of newly diagnosed secondary breast cancer registered so far. The initial analysis of the first 12 months data is summarised here. The 3 year data will be available for presentation at this conference. From March 2010 to March 2011, 138 patients were

identified, 37 (27%) who were denovo metastatic breast cancer. All patients were female with an mean age of 62 yrs (range 27−86). ER status was known in 95% of cases. 100 (73%) of these were ER positive and 32 (23%) were ERnegative. Her2 status was either obtained on the original primary tumour or where possible on a biopsy of the metastatic deposit. 40 (29%) of all cases were found to be Her2 positive whilst 17 (12%) of all cases were classed as triple negative.

The most common presentation of metastatic disease were at multiple sites (47%) and bone only (29%). Most patients were of good performance status (PS): PS0 (42%), PS1 (29%), PS2 (19%), PS3 (12%). Chemotherapy was used first line in 73 cases (52%) whilst endocrine therapy was used first line in 60 cases (43%).

Overall survival was calculated from the date of diagnosis of metastatic disease to the date of death or censored at the time of final analysis. The median overall survival for this population was 20 months. Within the different biological groups, the Her2 positive population appear to have the best median overall survival at 31.1 months. The cases with a PS0 at presentation also have a similar median overall survival at 29.9 months.

Conclusion: The FFOREST project is succesfully coordinating the care of secondary whilst collecting invaluable statistics on this complex patient group. The completion of the 3 year analysis will provide accurate prospective data for this group which is lacking in the UK. These results will undoubtedly inform future studies and a multicentre FFOREST project is proposed as a next step.

No conflicts of interest

115 Poster

Mammography screening before the age of 50 in The Netherlands: Cost-effectiveness of different screening strategies

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Background: Women aged 50 to 74 years are invited biennially to participate in the Dutch breast cancer screening program, in which digital mammography is used since 2010. The costs and effects of extending the program, by inviting women under the age of 50, have not been explored so far. This study evaluated the cost-effectiveness of several strategies, in which digital mammography screening starts before the age of 50, in the Netherlands.

Material and Methods: The MISCAN micro simulation model was used to simulate individual life histories of 10 million women, with digital mammography screening under different schedules. Women were screened biennially between age 50 and 74 in all strategies, in accordance with the current program. Additionally, women were screened before the age of 50, with variation in starting age (between 40 and 50) and frequency (annually or biennially). Costs, life years gained (LYG) and incremental cost-effectiveness ratios (ICER) were calculated.

Results: The current screening strategy gained 143 life years per 1000 women screened (undiscounted), relative to a situation without screening. All other efficient strategies (those that gain life years for the lowest possible costs) led to more LYG, ranging from 157 to 220. The cost-effectiveness ratio of the current program was €3,674/LYG (3.5% discounted). The ICER for one additional screen at age 48 was €5,300/LYG. Screening with a two-year interval between age 45 and age 50 resulted in an ICER of €7,080/LYG. Biennial and annual screening between age 40 and age 50 led to ICERs of €10,321/LYG and €19,527/LYG respectively.

Conclusions: Extending the Dutch breast cancer screening program, by additional screening between age 40 and age 50, is cost-effective, especially for biennial strategies. Adding a few screens before the age of 50 increases the effect of the program for modest extra costs.

No conflicts of interest

116 Poster

Stage migration after introduction of sentinel node biopsy: Differences between lobular and ductal carcinoma

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Background: Due to the introduction of the sentinel node biopsy (SNB) with routine use of immunohistochemistry (IHC), the detection rate of micrometastases increased, which led to stage migration in patients with invasive breast cancer. Nodal metastases from invasive lobular cancer (ILC) can be difficult to detect on standard histological sections, as they are composed of non-cohesive cells of similar size to benign lymphocytes and histiocytes. With IHC, detection of H&E occults ILC metastases have been reported to be more common than from invasive ductal carcinoma (IDC). Therefore, we hypothesized that with the introduction of SNB, stage migration will be more pronounced in ILC than in IDC.

Material and Methods: Women with primary non-metastatic T1 and T2 IDC or ILC, diagnosed between 1995 and 2010, were selected from the Netherlands Cancer Registry. Information on axillary lymph node status was collected and defined as: negative, isolated tumour cells (ITC), micrometastases or macrometastases. Of note, ITC were first documented in 2003. Logistic regression analysis was performed to determine the probability of having ITC, micrometastases or macrometastases, adjusting for method of staging, period, age at time of diagnosis, tumour size and grade.

Results: In total 131,295 patients were treated for IDC (89%) or ILC (11%). The percentage of patients staged with SNB gradually increased from 0% in 1995 to 72% in 2010. The percentage of patients with micrometastases increased from 1.4% in 1995 to 7.5% in 2010 for patients with IDC, and from 1.0% in 1995 to 5.6% in 2010 for patients with ILC ($p < 0.0001$). The incidence of ITC in patients with IDC increased from 1.8% in 2003 to 3.9% in 2010 ($p < 0.0001$). In patients with ILC the percentage of ITCs increased from 3.7% in 2003 to 7.7% in 2010 ($p < 0.0001$). Logistic regression analyses showed that women diagnosed in the period 1999–2002, 2003–2006 and 2007–2010 had a 3.0 times higher risk of having micrometastases compared to women in period 1995–1998. Patients with ILC had a 1.8 (95% CI 1.6−2.1) times higher risk of ITCs compared to patients with IDC. Risks were not elevated for the risk of having micro- or macrometastases when comparing ILC with IDC, with OR of 0.94 (0.87–1.03) and 0.94 (0.91–0.98), respectively.

Conclusion: The introduction of SNB has led to stage migration due to a higher detection rate of micrometastases. Patients with ILC were more likely to have ITC than those with IDC.

No conflicts of interest

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Prognosis of metastatic breast cancer: Differences between patients with de novo and recurrent metastatic breast cancer

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Background: We aimed to determine the prognostic impact of time between primary breast cancer and diagnosis of distant metastasis (metastatic-free interval, MFI) on the survival of metastatic breast cancer patients and whether this was influenced by use of prior adjuvant systemic therapy.

Patients and Methods: Consecutive patients diagnosed with metastatic breast cancer in 2007–2009 in eight hospitals in the South-East of the Netherlands were included and categorized based on MFI. Survival was estimated using the Kaplan–Meier method. Cox proportional hazards model was used to determine the prognostic impact of *de novo* metastatic breast cancer (MFI <3 months) versus recurrent metastatic breast cancer (MFI 3−24 months and >24 months), adjusted for age, hormone receptor and HER2 status, initial site of metastases and use of prior adjuvant systemic therapy.

Results: A total of 815 patients were included; 154 (19%) patients with *de novo* metastatic breast cancer, 176 patients with MFI between 3 and 24 months and 485 patients with MFI >24 months. Median survival of patients with *de novo* metastatic breast cancer was 29.4 months which was comparable with the median survival of patients with recurrent metastatic breast cancer with MFI >24 months (median, 27.9 months, $P = 0.73$) but significantly better compared with patients with a distant recurrence between 3 and 24 months (median, 9.1 months, $P < 0.0001$). In multivariable analysis, MFI significantly influenced outcome for metastatic breast cancer with a hazard ratio (HR) for mortality of 1.93 (95% CI 1.45–2.58, $P < 0.001$) for recurrent metastatic breast cancer with MFI

between 3−24 months as compared with *de novo* metastatic breast cancer. Prognosis of patients with a MFI >24 months did not significantly differ from that of patients with *de novo* metastatic breast cancer (HR 0.90; 95% CI 0.70–1.15, P = 0.78). The association between MFI and survival was seen irrespective of use of adjuvant systemic therapy.

Conclusions: The prognosis of patients with *de novo* metastatic breast cancer was comparable to the outcome of patients with recurrent metastatic breast cancer with a MFI of more than 24 months but significantly better when compared with those with a MFI between 3 and 24 months, irrespective of use of prior adjuvant systemic therapy.

No conflicts of interest

118 Poster

Risk of contralateral breast cancer in relation to nodal status of the primary tumour

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Background: Nodal status in primary breast cancer is an important risk factor for distant recurrences. Its association with locoregional and contralateral breast cancer, however, is less well established. In this study the effect of nodal status on locoregional recurrence, distant recurrence, and contralateral breast cancer was assessed in a large population-based breast cancer registry.

Material and Methods: All early breast cancer patients (pT1−2, any N, M0) diagnosed and operated between 2003–2006 were selected from the Netherlands Cancer Registry. Patients without follow up were excluded. The five-year cumulative risk of developing locoregional (ipsilateral breast and locoregional lymph nodes) recurrence, distant recurrence, and contralateral breast cancer was calculated for various degrees of regional lymph node involvement: pN0, pN0(i+), pN1mi and ⩾pN1A.

Results: A total of 35,006 patients was identified. As expected the risk of distant recurrence increased with higher nodal status: 5.6%, 7.3%, 7.3% and 15.9% in N0, N0(i+), N1mi and ⩾N1A, respectively (see table). Overall, locoregional recurrence and contralateral breast cancer rates were comparable at 2−3%. Locoregional recurrence was not associated with nodal status. The risk of developing contralateral breast cancer, however, decreased with more extensive nodal involvement: 3.1%, 2.9%, 2.3%, and 1, 5% in N0, N0(i+), N1mi and ⩾N1A, respectively.

Conclusion: Locoregional recurrence rates after breast cancer treatment is very low and is comparable to the risk of developing contralateral breast cancer. The risk of contralateral breast cancer is inversely related to the nodal involvement of the primary tumour. This phenomenon may well reflect the higher proportion of patients receiving systemic treatment in case of nodal involvement.

Table: Breast cancer recurrences and contralateral breast tumours for 35,006 breast cancer patients

	pN0 (n = 20,964)		pN0(i+) (n = 906)		pN1mi (n = 2,137)		⩾pN1A (n = 10,999)	
	n	%	n	%	n	%	n	%
Locoregional recurrence	521	2.8%	27	3.4%	51	2.6%	336	3.6%
local	350	1.9%	18	2.3%	43	2.2%	230	2.5%
regional	171	0.9%	9	1.1%	8	0.4%	106	1.1%
Distant recurrence	1,043	5.6%	58	7.3%	144	7.3%	1,580	15.9%
Contralateral breast cancer	548	3.1%	22	2.9%	44	2.3%	138	1.5%

No conflicts of interest

119 Poster

Dynamic prediction in early breast cancer − feasibility of a novel prediction model in postmenopausal, endocrine sensitive breast cancer patients

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Introduction: Predictive models are an integral part of clinical practice and can help determine optimal treatment strategies for individual patients. However, a drawback of available models is that covariates are assumed to have a constant effect on overall survival (OS), while the *effect* of certain covariates on OS may change over time (dynamic). Patients may experience treatment- or disease-related events (early treatment discontinuation, relapse), resulting in an altered prognosis from that time onwards. Available models may thus not accurately reflect a patient's OS probability over time. We investigated time-varying effects of patient- and tumor-related factors and developed a nomogram enabling dynamic calculation of the 5-year OS probability in endocrine sensitive, postmenopausal breast cancer (BC) patients at any timepoint (prediction timepoint, t_p) up to 3 years after diagnosis.

Methods: Dutch and Belgian postmenopausal endocrine sensitive early BC patients enrolled in the TEAM trial were allotted 5 years of exemestane alone or 2.5−3 years of tamoxifen followed by 2.5−2 years of exemestane. We assessed the time-varying effects of various covariates and obtained the dynamic predictions of the 5-year OS probability using a proportional baselines landmark supermodel. Covariates were age at diagnosis, histological grade (Bloom & Richardson), tumor size, nodal stage, locoregional recurrence, HER2 status and treatment compliance. We designed a nomogram to calculate a patient's OS probability based on patient characteristics and time-varying variables.

Results: A total of 2602 patients were included (median age 64 years, range 38−92). Mean follow-up was 6.1 years. Locoregional recurrence, high-risk nodal stage (N2/N3) and HER2 positivity demonstrated a change in effect on OS at different t_ps during follow-up (time-varying effect) (Figure 1). Based on our model, the hazard ratio (HR) for locoregional recurrence at a certain t_p after the start of treatment was $HR = 8.43 \cdot 0.58^{t_p}$. Similarly, for N2/N3 and HER2 positive patients, $HR = 3.62 \cdot 0.82^{t_p}$ and $HR = 1.24 \cdot 0.85^{t_p}$. All other covariates showed time-constant effects.

Conclusion: The nomogram predicts an individual's 5-year OS probability over time, accounting for elapsed time and status change since primary diagnosis, revealing that prognosis varies during follow-up. With longer follow-up, this model can help determine the necessity of continuing (extended) adjuvant endocrine therapy at different points in time.

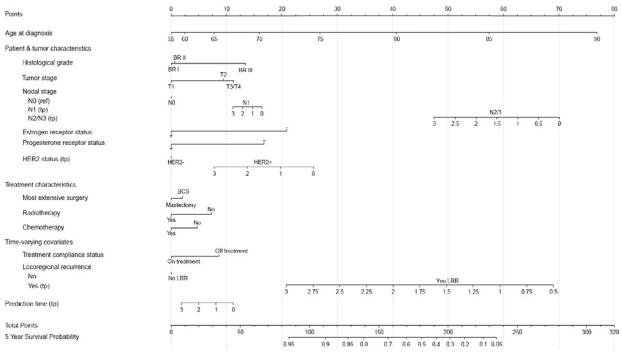

Figure 1. Nomogram for dynamic prediction of the 5-year survival probability.

5-year dynamic survival probability is calculated by taking the sum of the risk points, which are determined by the individual's patient-, tumor-, and treatment-specific characteristics. Dynamic 5-year overall survival probability can be calculated by taking the sum of the risk points, which are determined by the individual's patient-, tumor-, and treatment-specific characteristics. A number of risk points are assigned to each specific covariate that corresponds with the patient's individual characteristic.

No conflicts of interest

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The case–control design and breast cancer screening effectiveness: Insights from the UK Age trial

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Background: Randomised trials have shown that mammographic screening reduces breast cancer mortality risk. Although many observational studies support this finding, differences in study design may have resulted in different effect sizes. A direct comparison of various case-control and trial analyses would give more insight into the variation in observed breast cancer mortality reduction. In this study, we performed case-control analyses within the randomized UK Age trial.

Materials and Methods: The UK Age trial assessed the effect of screening in women aged 40−49 years. In our approach cases were defined as women who died from breast cancer between date of trial entry (between 1991 and 1996) and 2004. Women were aged 39−41 years at entry. For every case, five controls were selected through incidence density sampling. All trial cases were included in screening invitation (intention-to-treat) analyses (356 cases, 1780 controls), whereas analyses on screening attendance (per-protocol) were restricted to women invited to screening (105 cases, 525 age-matched controls). Conditional logistic regression was used to estimate odds ratios (OR) and corresponding 95% confidence intervals (CI). The ORs were adjusted for self-selection bias.

Results: Screening invitation resulted in a non-significant breast cancer mortality reduction of 17% in the case-control analyses, similar to full trial results. The analyses on attendance showed that the screening effect greatly depends on the definition of screening exposure and adjustments for self-selection bias. Having ever attended a screening exam only appeared to have some effect after adjustment for self-selection (OR 0.86, 95% CI 0.39–1.94), whereas recent attendance resulted in an adjusted mortality reduction of 36% (OR 0.64, 95% CI 0.31−1.31).

Conclusions: Differences in study design should be taken into account when comparing studies on breast cancer screening effect. Screening policies have to be based on the most current and accurate benefit-risk ratios possible in order to obtain the maximum net benefit from screening. Future studies on screening effectiveness should therefore appropriately adjust for these potential biases.

No conflicts of interest

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Variation in multidisciplinary treatment in breast cancer in The Netherlands, 2006−2011

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Background: In the Netherlands about 14,000 breast cancer patients are diagnosed yearly. Descriptions of patterns of care thus far mainly focused on surgical treatment. The aim of this study was to describe the variation in multidisciplinary treatment of breast cancer patients.

Methods: All patients diagnosed with invasive breast cancer or ductal carcinoma in situ (DCIS) between 2006 and 2011 were selected from the population based Netherlands Cancer Registry. Variation in treatment between type of hospital (non-teaching, teaching or university) and region was determined for several indicators and specific subgroups. Case-mix adjustment was performed on relevant factors like age and socioeconomic status. Selected results are presented in this abstract.

Results: A decreasing trend over time in axillary lymph node dissection (ALND) was seen in clinically node negative patients (cT1–2N0) toward less than 10%. In university hospitals ALND was performed the least in pN0 (i-) (6.6%). The percentage ALND after positive macro of micro metastasis in the SN decreased towards resp. 83% and 49%in 2011. The percentage ALDN after positive ITC decreased from 40% in 2006 to 4% in 2011. University and teaching hospitals were more likely than non-teaching hospitals to offer breast-conserving therapy to elderly patients. Regional differences were revealed in the percentage radical surgeries after first breast-conserving surgery in patients with invasive breast cancer (from 6.1% to 9.8%) and in patients with DCIS (from 28% to 31%).

Variation was also observed for the percentage adjuvant radiotherapy after breast-conserving surgery for DCIS, 77% versus 86% in both other hospital types. In patients with locally advanced breast cancer variation was seen in locoregional radiotherapy between regions from 76% to 84%.

Regional variation was observed in the use of neo-adjuvant chemotherapy for cT4 tumors, ranging between 60−80%. The use of adjuvant chemotherapy in patients younger than 60 years with node positive breast cancer (T1–2N1) varied between 85% and 95% between regions.

Conclusion: Variation in multidisciplinary treatment of breast cancer patients between hospital types and regions was revealed. Insight in the cause of this variation could give clues for future guideline implementation strategies.

No conflicts of interest

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New era of mutation screening in breast cancer using targeted next-generation sequencing

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Background: With the establishment of the Hong Kong Hereditary Breast Cancer Family Registry in 2007, genetic test was offered to high-risk breast cancer patients and their family members. However, only 508 probands underwent mutation screening by Sanger full gene sequencing from 2008 to 2012. In 2013, with high throughput sequencing, the numbers of probrands sequenced were 464 within nine months. This study aims to explore the capability of NGS as mutation screening and to discover variants of unknown significance in cancer cohort.

Methods: 464 patients with breast cancer, 54 positive controls (previously identified by Sanger) were recruited from the Hong Kong Hereditary Breast Cancer Family Registry and underwent genetic testing for *BRCA1* and *BRCA2* mutations. 100 normal controls were also included in the study. DNA was extracted from peripheral blood samples from patients and controls. *BRCA* full gene sequencing using next generation Sequencing was carried out by 454 GS Junior System and further validated by Sanger sequencing. Sequencing data were analyzed by our in-house developed fully automatic bioinformatics pipeline including GS Amplicon Variant Analyzer, SAMtools and Ensembl Variant Effect Predictor.

Results: Data showed that next-generation sequencing was able to detect all 54 types of mutations (positive controls) that previously identified by Sanger sequencing. In cancer cohort, there were 59 missense variants of unknown significance detected, in which they were not listed in 1000Genome. With careful assessment, based on their absence in healthy controls and in silico prediction and analysis (SIFT, PolyPhen-2 and Align-GVGD), 12 of these variants were classified as deleterious.

Conclusions: Targeted next-generation sequencing is a powerful tool for mutation spectrum characterization. This platform cost less with a high turn over time, and with relatively low DNA input. Moreover, the capability to test more genes in one test is more feasible. This technology is the commencement of a new era in genetic testing and diagnostic settings.

No conflicts of interest

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Genetic variation in CYP19A1, daily estrogen level and mammographic density in premenopausal women

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Background: Mammographic density is a strongly heritable biomarker for breast cancer development, but less is known about the associations between genetic variants of the *CYP19A1* gene, involved in the estrogen pathway, daily levels of estrogens and mammographic density in premenopausal women.

Material and Methods: We investigated the association between eight selected SNPs in *CYP19A1*gene, daily levels of salivary 17β-estradiol (E2) and mammographic density in 203 healthy women, aged 25−35 years participating in the Norwegian Energy Balance and Breast cancer Aspects (EBBA) study-I. Clinical examinations were performed. DNA was extracted from whole blood and genotyped using Illumina Golden Gate platform

including eight common polymorphisms in *CYP19A1*. Daily salivary 17β-estradiol was measured throughout an entire menstrual cycle using validated methods. Computer assisted mammographic density (Madena) was obtained from digitized mammograms taken at days 7−12 of the menstrual cycle. The associations between genetic variations in *CYP19A1*, 17β-estradiol and mammographic density were studied in multivariable linear and logistic regression models.

Results: The rs749292 minor alleles were associated with lower absolute mammographic density ($\beta = -4.83$, $p = 0.032$), and lower total breast area ($\beta = -9.66$, $p = 0.024$). Among lean women (BMI $\leqslant 23.6$ kg/m^2), the risk of having absolute mammographic density >32.4 cm^2 was reduced by 78% in rs749292 heterozygote haplotype *Aa*, Odds Ratio (OR) 0.22, 95% CI 0.07−0.7, and by 74% in minor haplotype *aa*, OR 0.26, 95% CI 0.07–0.95. Similar findings were observed for this genetic variation in *CYP19A1* and percent mammographic density in lean women. The negative association with mammographic density could not be explained by variation in daily 17β-estradiol. There was no association between rs749292 and mammographic density among women with BMI > 23.6 kg/m^2.

Conclusion: Our findings suggest an association between the single nucleotide polymorphism rs749292 in *CYP19A1* and mammographic density in premenopausal women, not explained by cycling estradiol levels.

No conflicts of interest

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Birth weight, childhood BMI and height in relation to mammographic density and breast cancer: Register based cohort study

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Introduction: High breast density, a strong predictor of breast cancer risk, may be determined early in life. Childhood anthropometric factors have been related to breast cancer and breast density, but rarely simultaneously. We examine whether mammographic density (MD) mediates an association of birth weight, childhood body mass index (BMI) and height with the risk of breast cancer.

Methods: 13,572 women (50−69 years) in the Copenhagen mammography screening program (1991–2001) with childhood anthropometric measurements in the Copenhagen School Health Records Register were followed for breast cancer until 2010. Using logistic and Cox regression models we investigated associations among birth weight, height and BMI at ages 7−13 with MD (mixed/dense or fatty) and breast cancer, respectively.

Results: 8,194 (60.4%) women had mixed/dense breasts and 716 (5.3%) developed breast cancer. Childhood BMI was significantly and inversely related to having mixed/dense breasts at all ages, with age at screening and birth cohort adjusted odds ratios (95% confidence intervals) ranging from 0.69 (0.66–0.72) at age 7 to 0.56 (0.53–0.58) at age 13, per one unit increase in z-score. No statistically significant associations were detected between birth weight and MD, height and MD, or birth weight and breast cancer risk. BMI was inversely associated to breast cancer risk, with age and birth cohort adjusted hazard ratios (HRs) of 0.91 (0.83–0.99) at age 7 and 0.92 (0.84–1.00) at age 13, whereas height was positively associated with breast cancer risk [age 7: 1.06 (0.98–1.14) and age 13: 1.08 (1.00–1.16)]. After additional adjustment for MD, associations of BMI with breast cancer risk diminished [age 7: 0.97 (0.88–1.06) and age 13: 1.01 (0.93–1.11)], but remained with height [age 7: 1.06 (0.99–1.15) and age 13: 1.09 (1.01−1.17)].

Conclusions: Among women 50 years and older, childhood body fatness reduces the breast cancer risk, possibly via a mechanism mediated by MD, at least in part. Childhood tallness increases breast cancer risk, seemingly via a pathway independent of MD. Birth weight was not associated with MD or breast cancer risk in this age group.

No conflicts of interest

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An exploratory analysis of the factors leading to delays in cancer drug reimbursement in the European Union member states: The trastuzumab case

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Background: Trastuzumab has dramatically improved the outcome of HER2 positive breast cancer patients; however its uptake is not homogeneous across different European countries.

The European Union (EU) has adopted a common procedure for drug approval, through the European Medicines Agency (EMA), for the granting marketing authorization for oncologic medicines in the EU countries. Nevertheless pricing and reimbursement decisions are a competency of EU national governments and these policies are diverse among the EU member states.

We aim to evaluate the reimbursement times of trastuzumab in the EU countries and its association to health expenditure and wealth indicators, to health policy efficacy indicator, the availability of cost-effectiveness studies and finally to breast cancer outcome.

Material and Methods: Cancer indicators and health and wealth indicators were extracted from the World Health Organization and the World Bank databases. Breast cancer outcome was estimated by the mortality/incidence (M/I) ratio. The Mackenbach score, used quantitatively and categorized (>50, 0−50, <0), was used as health policy efficacy indicator. The dates of reimbursement approval of trastuzumab were provided by Roche. The Spearman rank Correlation test, the Wilcoxon rank-sum test end and the Fisher exact test were used to evaluate associations and/or differences between these variables. Additional analyses were made by dichotomizing countries in groups according to compliance to the 180 days EU recommendation for drug reimbursement.

Results: A statistically significant inverse and strong correlation between breast cancer M/I ratio and health expenditure ($r_s = -0.730$, $p < 0.001$) and the health policy performance ($r_s = -0.711$, $p < 0.001$) was found, meaning the better the score and the higher the expenditure, the fewer patients die after a breast cancer diagnosis. Factors associated with compliance to the 180 days EU recommendation for trastuzumab reimbursement were better health policy score (100%, 85% and 25% respectively, $p = 0.005$), higher health expenditure (3631.7$ vs. 693.8$, $p < 0.001$) and availability of cost effectiveness studies (100% vs. 53%, $p = 0.026$).

Conclusions: Higher health policy score and health expenditure are related to faster reimbursement of trastuzumab and better breast cancer outcome. A marked difference is observed between Eastern and Western Europe, with long delays and increased breast cancer mortality identified in Eastern European countries.

No conflicts of interest

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The experience of high-risk patients in a breast cancer family history clinic in a district general hospital in the United Kingdom

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Background: Guidelines were issued by NICE in 2004 and further updated in 2006 for the management of women with a family history of breast cancer. This led to the establishment of a dedicated breast cancer family history clinic in this district general hospital. The experience from this risk assessment clinic and how it has evolved is presented here.

Material and Methods: The clinic was originally set up with a research grant from the QUEST cancer research charity. Women with a family history of breast cancer were referred to this clinic by their general practitioner or breast clinician. Women were asked to complete a family history questionnaire. Originally in late 2006 these patient's pedigrees were handwritten, then entered onto Progeny software, but by August 2009 this was replaced by FaHRAS software which is still in use.

Using the NICE guidelines the women were categorised into population, moderate and high risk groups and managed accordingly.

Results: Between August 2009 and October 2013 a total of 1089 women have been assessed in the clinic. A further 50 patients were referred directly to the regional genetics service. 146 were declined at the initial triage stage as population risk. Of those seen, 218 (20%) are near population risk, 386 (35.4%) are moderate risk and 485 (44.5%) are high risk. A total of

436 women were referred to the regional genetics service. Of them, 118 were offered testing for the BRCA gene mutations. Of these, 106 have been tested, 43 BRCA1 or BRCA2 mutation carriers were identified, 37 tested negative and 19 were inconclusive.

Since testing positive for a BRCA mutation 7 women have undergone bilateral salpingo-oophorectomy (BSO) alone, 2 have had risk-reducing bilateral mastectomy (RRM) alone, and 5 have had both BSO and RRM.

Conclusion/Summary:

- The family history clinic provides a comprehensive service to women with a breast cancer family history encompassing specialised risk analysis, clinical and radiological assessment and appropriate counselling.
- There is a high demand for this service in a district general hospital
- A significant proportion of these women will require genetic counselling
- A number of these women will go on to require further specialist management such as risk-reducing surgery.

References

Familial breast cancer: Full Guideline http;//www.nice.org.uk/nicemedia/pdf/CG14fullguidance.pdf

No conflicts of interest

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Relevance and efficacy of breast cancer screening in BRCA1 and BRCA2 mutation carriers above 60 years: A national cohort study

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Background: Annual MRI and mammography is recommended for *BRCA1* and *BRCA2* mutation carriers to reduce breast cancer mortality. Less intensive screening is advised ⩾60 years, although effectiveness is unknown.

Materials and Methods: We identified *BRCA1/2* mutation carriers without bilateral mastectomy before age 60 to determine for whom screening ⩾60 is relevant, in the Rotterdam Family Cancer Clinic and HEBON: a nationwide prospective cohort study. Furthermore, we compared tumour stage at breast cancer diagnosis between different screening strategies in *BRCA1/2* mutation carriers ⩾60 with univariable analysis and multivariable logistic regression. Tumours >2 cm, positive lymph nodes, or distant metastases at detection were defined as 'unfavourable'.

Results: Of 548 *BRCA1/2* mutation carriers ⩾60 years in 2012, 395 (72%) did not have bilateral mastectomy before the age of 60. Of these 395, 224 (57%) had a history of breast or other invasive carcinoma. In 136 *BRCA1/2* mutation carriers, we compared 148 breast cancers (including interval cancers) detected ⩾60, of which 84 (57%) were first breast cancers. With biennial mammography 53% (30/57) of carcinomas were detected in unfavourable stage, compared to 21% (12/56) with annual mammography (adjusted odds ratio: 4.07, 95% confidence interval [1.79–9.28], $p = 0.001$). Moreover, with biennial screening 40% of breast cancers were interval cancers, compared to 20% with annual screening ($p = 0.016$). Results remained significant for *BRCA1* and *BRCA2* mutation carriers, and first breast cancers separately.

Conclusions: Over 70% of 60-year old *BRCA1/2* mutation carriers remain at risk for breast cancer, of which half has prior cancers. When life expectancy is good, continuation of annual breast cancer screening of *BRCA1/2* mutation carriers ⩾60 is worthwhile.

No conflicts of interest

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Does digital mammography increase ductal carcinoma in situ detection rate? Trends after 7 years of digitalisation in Barcelona, Spain

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Background: The aim of this study was to explore trends of ductal carcinoma *in situ* (DCIS) and invasive breast cancer detection rates in initial and successive screenings in a cohort of women screened from 1996 to 2011, before and after the transition from screen-film mammography (SFM) to digital mammography (DM).

Material and Methods: We analyzed a retrospective cohort of screened women from a population-based screening program in Barcelona (Catalonia, Spain) screened from 1996 to 2011 (n = 58,647). A total of 198,989 screening mammograms were included in the analysis, 102,970 SFM and 96,019 DM. We divided the study period in 8 periods of 2 years, from 1996 to 2003 with SFM and form 2004 to 2011 with DM. Invasive and DCIS cancer detection rates per 1,000 mammograms were computed and compared among periods, using Chi-squared tests.

Results: An overall number of 910 breast tumors were detected in the study period. No statistically significant differences were observed in cancer detection rate comparing SFM and DM periods neither in initial (5.10‰ and 5.21‰ respectively, p = 0.580) nor in successive screenings (4.26‰ and 4.40‰ respectively, p = 0.679). However, rates of DCIS were higher in DM than in SFM period (0.80‰ and 0.56‰ respectively, p = 0.041) while invasive cancer rates were lower (3.70‰ and 3.95‰ in DM and SFM respectively, p = 0.350). The highest rate of DCIS was observed in initial screenings in the first DM period, followed by a decrease in the subsequent DM periods, from 0.14‰ to 0.02‰. In successive screenings, rates of DCIS were higher in the second and third DM periods (0.091‰ and 0.097‰) to decrease in the fourth one (0.06‰).

Conclusion: Some controversies have risen concerning the higher detection rate of DCIS with digital mammography. Observed trends in rates of DCIS and invasive cancer in initial and successive screenings after the introduction of DM suggest an advance in early diagnosis.

No conflicts of interest

129 Poster

'True' interval breast cancers have worse tumour characteristics and survival compared to screen-detected breast cancers, while missed screen-detected breast cancers have not

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Background: There is debate whether tumours discovered in the breast screening programme after a positive screen examination (screen-detected cancer, SDC) differ from tumours that manifest clinically in the period between two screens after a negative screen examination (<24 months, 'true' interval cancer [IC]) and from tumours from patients with a positive screen examination, who have a benign assessment in the hospital, but still develop breast cancer within 12−24 months after screen examination (IC-after-positive-screen). We aim to identify differences in tumour and survival characteristics of SDC, IC, and IC-after-positive-screen.

Methods: All women (50−75) who underwent a screen examination by the Dutch National Cancer Screening Programme, region North between 2004 and 2008 were selected and data were merged with data of the Netherlands Cancer Registry. SDC (diagnosed <12 months after a positive screen), IC diagnosed <12 months (IC<12m) or 12−24 months (IC12−24m) after a negative screen, and IC-after-positive-screen were identified. Tumour characteristics of each group were compared with the SDC using chi square tests. Differences in survival between groups were analysed with multivariable cox regression, corrected for differences in tumour characteristics.

Results: In total 4472 patients were included, 3363 with SDC, 501 IC<12m, 861 IC12−24m and 48 IC-after-positive-screen. Screen-detected cancers, compared to IC<12m and IC12−24m respectively, were more often of the ductal type (84% vs. 76% and 77%), well differentiated (28% vs. 17% and 15%) and hormone receptor positive (77% vs. 71% and 67%). SDC had less often T2+ (17% vs. 44% and 50%), positive lymph nodes (28% vs. 51% and 45%) or metastasis (1% vs. 5% and 4%). IC-after-positive-screen were not different compared to SDC for all these factors. In total 608 women (13%) died. No difference in survival was found for IC<12m (HR 0.86, 95% CI 0.66–1.12) and IC-after-positive-screen (HR 1.40, 95% CI 0.58–3.39) compared to SDC. Women with an IC12−24m had worse survival (HR 1.44, 95% CI 1.17−1.77).

Conclusions: 'True' IC had less favourable characteristics than SDC. IC-after-positive-screen had the same characteristics and could have the same prognosis as SDC. It has to be determined why these cancers were missed in the hospital. Only women with an IC12−24m had a worse survival compared to SDC.

No conflicts of interest

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Benign invasive procedures in breast cancer screening and subsequent diagnosis of breast cancer: Results from a cohort of screened women in Spain

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Background: The purpose was to compare rates of women who developed a breast cancer in mammography screening between those with and without previous benign invasive procedure, according to mode of detection (screening detected or interval cancers) and type of invasive test (cytology or biopsy).

Material and Methods: Retrospective cohort of 555,285 women aged 50−69 years screened in Spain during 1994 to 2011. Population-based screening in Spain is offered every two years. Rates of women who developed a breast cancer were defined as breast cancers detected among 1000 mammograms in successive screenings, or during screening interval (after a negative screening episode and before the following invitation). Rates and difference between rates (DR) in women with and without previous benign invasive procedure, and 95% confidence intervals (95% CI) were calculated for all breast cancers, and according to mode of detection and type of invasive test.

Results: An overall of 6,652 breast cancers were detected in successive screenings. Of them 215 presented previous benign invasive procedure. Rates of women who developed a breast cancer were higher among those with previous benign invasive procedure than among those without (11.1‰, 95% CI = [9.6–12.6] vs. 5.0‰ [4.9−5.1] respectively), and DR was 6.1‰ (95% CI = [4.6−7.6]). Specifically, DR for screening detected cancer was 5.3‰ (95% CI = [3.9−6.6]), and for interval cancers was 0.8‰ (95% CI = [0.2−1.4]). Among screening detected cancers DR for biopsies was of 7.1‰ (95% CI = [4.5−9.7]), and for cytology 4.8‰ (95% CI = [3.2−6.3]). Among interval cancers DR for biopsies was of 0.5‰ (95% CI = [−0.4−1.5]), and for cytology 1.1‰ (95% CI = [0.4−1.9]).

Conclusions: Results showed that previous benign invasive procedures increase breast cancer detection in subsequent screenings, which suggests the suitability of this factor into future screening strategies based on individual risk. Further studies are needed to explore these differences considering the time between the invasive procedure and cancer diagnosis, and tumour characteristics.

No conflicts of interest

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Hormone therapy and risk of breast cancer

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Background: Studies suggest an increased risk of breast cancer among women taking postmenopausal hormone therapy. Data on the effect of different formulations of these hormones remain sparse. Our aim was to compare breast cancer risk in women receiving different types of hormonal therapy.

Materials and Methods: Nationwide prospective cohort study including 947 453 Norwegian women aged 45 to 79 years from 2004 to 2008, with no previous history of cancer. The National Population Registry was used to identify all women residing in Norway during the study period. Individual exposure information to hormonal treatment was obtained from the Norwegian Prescription Database. Data on incidence of breast cancer was obtained from the Cancer registry of Norway. The unique personal identification number was used to link the databases. The id was encrypted. We studied exposure to estrogen therapy (ET) and the combination of estrogens plus progestin (EPT). The breast cancer incidence rate (BCR) and its 95% confidence intervals (95% CI) were computed. BCR was defined as number of new cases per 1000 women. The crude Relative Risk (RR) and 95% CI of breast cancer risk associated with the use of hormonal treatment was calculated. The referent group were women who did not receive hormonal therapy during the study period.

Results: A total 9 960 incidence breast cancers were diagnosed in the study period. Of these cancers, 1207 were diagnosed among ET users, 1668 among EPT users, and 7 085 among non-users. The BCR for ET users was 8.8‰ (95% CI: 8.3−9.3), for EPT users 16.6‰ (95% CI: 15.8–17.4) and for non-users 10.0‰ (95% CI: 9.7–10.2), respectively. Users of hormone therapy had an overall increased RR compared to non-users of hormone therapy (RR = 1.21 (95% CI: 1.16–1.27). However, the risk differed significantly with different hormone therapies. ET users were at a lower risk for breast cancer than non-users (RR = 0.88 (95% CI: 0.83–0.94), whereas EPT users were at an increased risk for breast cancer (RR = 1.66 (95% CI: 1.58−1.75).

Conclusions: Women taking EPT had an increased risk of breast cancers compared with non-hormonal treatment users. However, ET users had a decreased breast cancer risk.

Table 1. Number of women and breast cancer cases by hormonal therapy user group

	Hormonal therapy users		Non HT users
	Estrogen	Estrogen plus progestin	
Women, No.	136,606	100,549	710,298
Incidence of breast cancer, No.	1,207	1,668	7,085
Breast cancer incidence rate (‰)	8.8	16.6	10.0

No conflicts of interest

132 Poster

Radiological findings in prior screening mammograms and subsequent risk of breast cancer: Results from a cohort of screened women in Spain

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Background: The purpose was to compare rates of women who developed a breast cancer in mammography screening between those with and without previous radiological findings, and to assess the relative risk of cancer detection in subsequent screenings associated to each radiological pattern.

Material and Methods: Retrospective cohort of 555,285 women aged 50−69 years screened in Spain during 1994 to 2011. Population based screening in Spain is offered every two years. At each screening episode, information of radiological patterns was recorded as, negative, tumour-like mass, distortion, calcification, asymmetry, or other. Rates of women who developed a breast cancer was defined as breast cancers detected among 1000 mammograms in successive screenings, or during screening interval (tumours diagnosed after a negative screening mammogram and before the following screening). Cancer rates and 95% confidence intervals (95% CI) were calculated. The relative risk (RR) and 95% CI of cancer detection associated to each radiological pattern were calculated. The referent group was women without previous radiological patterns in screening mammograms.

Results: An overall of 6,652 breast tumours were detected in successive screenings. Of them 4,284 presented radiological patterns in previous screening mammograms. Rates of women who developed a breast cancer were higher among those with radiological patterns in previous screening mammograms than among those without [8.4 (95% CI 8.0−8.7) vs. 4.2 (4.1−4.3), respectively; RR = 2.0 (95% CI: 1.9−2.1)]. The radiological pattern associated with the highest relative risk of subsequent cancer detection was distortions [RR = 3.2 (2.6−3.9)], followed by microcalcifications [RR = 2.4 (2.3−2.6)], tumour-like mass [RR = 2.0 (1.9−2.1)], asymmetry [RR = 1.9 (1.7−2.1)], and others [RR = 1.3 (1.1−1.6)]. Specifically, the RR of cancer detection in subsequent screenings was 2.1 (95% CI: 2.0−2.2) and for interval cancer 1.8 (1.6−2.0).

Conclusions: Women with previous radiological findings were more likely to be diagnosed of breast cancer in subsequent screenings, both for screen-detected and interval cancer. Distortion presented the highest

risk of subsequent cancer detection followed by microcalcifications. Further studies are needed to explore these differences considering the additional assessments performed after a radiological suspicious.

No conflicts of interest

133 Poster

Survival of breast cancer patients diagnosed with CNS metastases: A nationwide study over the time period 2004−2010

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Background: Central nervous system (CNS) metastases represent a serious complication in breast cancer patients. In this survey, we aim to establish prognostic factors of survival for both synchronous and metachronous CNS metastases.

Material and Methods: Using the Netherlands Cancer Registry (NCR), we identified 167 breast cancer patients who presented with synchronous CNS metastases over the time period 2004–2010, 144 of which involved brain metastases (BM), 23 leptomeningeal metastases (LM). During follow-up of breast cancer patients who were initially disease-free, 513 patients developed metachronous CNS metastases, 441 BM and 67 LM. We measured overall survival from the date of metastatic diagnosis. The impact of prognostic factors was assessed by extended Cox-regression models.

Results: For all patients diagnosed with metastases, advanced age (⩾70 years) and abstinence of systemic therapy proved prognostically unfavourable. In patients with metachronous metastases, disease-free interval <1 year and the occurrence of prior or simultaneous extracranial metastases were associated with poor survival. Molecular subtype did not reach statistical significance in the multivariate analysis.

Conclusions: Age and provision of systemic therapy constitute prognostic factors for survival in both synchronous and metachronous CNS metastases. The prognostic value of therapy may be subject to selection bias by exclusion of frail patients. In metachronous CNS metastases, the presence of extracranial metastases and the disease-free interval have additional prognostic value.

Table: Extended Cox-regression analyses of mortality risk factors for breast cancer patients diagnosed with CNS metastases

	n	HR	95% CI	p
Synchronous CNS metastases (n = 167)*				
Age at primary diagnosis (y)				
18−49	37	1.00		
50−59	39	1.39	0.87–2.22	0.17
60−69	43	0.97	0.61–1.54	0.91
⩾70	48	1.81	1.15–2.84	0.01
Systemic therapy				
no	53	1.00		
yes	109	0.43	0.30–0.60	<0.00
Metachronous CNS metastases (n = 513)**				
Age at primary diagnosis (y)				
18−49	215	1.00		
50−59	142	1.51	1.08–1.84	<0.00
60−69	98	1.41	1.08–1.84	0.01
⩾70	58	2.47	1.79–3.41	<0.00
Systemic therapy				
no	400	1.00		
yes	113	0.71	0.56–0.89	<0.00
Other metastatic sites				
no	206	1.00		
yes	307	1.65	1.33–2.06	<0.00
Time until CNS metastases				
<1 year	72	1.00		
1−2 years	156	0.58	0.43–0.78	<0.00
2−4 years	196	0.41	0.30–0.55	<0.00
⩾4 years	86	0.36	0.25–0.53	<0.00

Included in the multivariable model as time-varying covariates:
*provision of radiation therapy;
**use of metastasectomy and provision of radiation therapy.

No conflicts of interest

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Survivor and other bias in survival studies: The example of BRCA1/2-associated breast cancer

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Retrospective studies may significantly contribute to answering survivorship issues for rare tumor types or subgroups of patients. The biological background and different pathological aspects of *BRCA1*-associated tumors support the hypothesis that patients carrying a *BRCA1* and/or *BRCA2* germline mutation, a relatively rare characteristic, might have a worse breast cancer prognosis compared to non-carriers. However, studies showed inconsistent results.

We performed a systematic review taking into account the quality of all relevant studies published so far on *BRCA1/2* mutation carriership and survival (n = 66). Using a best-evidence synthesis, we found that there is only moderate evidence for a worse unadjusted recurrence-free survival for *BRCA1* mutation carriers compared to non-carriers and lack of evidence for all other outcomes. Results were heterogeneous due to differences in study design, study size, study populations and methodological quality.

We compared these findings to those of our own study including invasive pathologically-confirmed breast cancers, diagnosed before <50 years of age, in the period 1970–2002, in ten Dutch centers, in patients with no previous malignancies. In this retrospective study, DNA for *BRCA1/2* analyses was isolated from formalin-fixed, paraffin-embedded tissue blocks containing normal (non-tumor) tissue; hence including all patients with tissue blocks without any selection for survivorship or family history. Most frequently occurring *BRCA1/2* mutations were analyzed using Taqman PCR and fragment length analyses and confirmed by direct sequencing, capturing ~70% of all Dutch pathogenic mutations. We found 3.6% *BRCA1* and 1.2% *BRCA2* mutation carriers among 5391 breast cancer patients. *BRCA1/2* carriers who were identified by the clinical genetic center had a better survival (30% at 10 years follow-up; overall survival, unadjusted) than *BRCA1/2* carriers who were only identified by our study.

Comparing our study with earlier studies, we will clearly demonstrate that e.g. survivor bias, and selection through clinical genetic centers contribute to the heterogeneity of findings among studies in *BRCA1/2*-carriers. In addition, we observed time dependency of *BRCA1/2* mutation status in our study, comparable to that reported earlier for estrogen receptor status, something not reported by any other study so far.

The presentation will provide an overview, including examples of typical bias issues, of the evidence of worse survival in *BRCA1/2* carriers, and the relationship with tumor subtypes. As such it will also illustrate issues that are relevant for any retrospective analyses of (trial) data to answer survivorship issues.

No conflicts of interest

135 Poster

Brain metastases as first metastatic site in HER2 positive breast cancer patients − prospective breast cancer brain metastases database evaluation

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Background: According to current knowledge brain metastases (BM) cannot be predicted. However, HER 2 over expression is notorious for predisposing breast cancer patients for BM, either as a first or subsequent metastatic site.

The aim of this analysis is to evaluate incidence of BM as a first metastatic site, among HER2 3+ BC patients and to explore their characteristics. Better knowledge of these characteristics might help in defining a subgroup of patients in whom BM screening is most justified. Actually, because there is no recommendation for routine BM screening it is not well explored whether earlier diagnosis and BM directed treatment, could influence survival.

Material and Methods: From January 2008 to October 2013, 230 consecutive patients with BCBM have been prospectively registered at the Institute for Oncology and Radiology of Serbia.

HER2 status of the primary BC was known for 206 pts (89.5%), and HER2 3+ BCBM is registered in 73 pts (31.7 %). Total 62 pts (85%) received trastuzumab as adjuvant/neoadjuvant (27%) or systemic treatment (73%). BM were confirmed by brain CT/MR.

Results: BM as a first and sole metastatic site is registered in 24/73 HER2 3+ pts (32%), median 20 months after BC diagnosis (Table 1); 25% (6/24) of those pts developed BM during adjuvant treatment (EBC); 75% (18/24) during treatment for locally advanced BC (LABC). Median number of adjuvant/neoadjuvant trastuzumab was 7 (7−14). Brain surgery was performed in 12 patients, 6 for BM located at the cerebellum. All patients also underwent WBRT. Survival after BM is median 6 months.

Table 1

HER2 3+BC BM 1st metastatic site	24/73 (32%)
Time to BM (months)	median 20 (range 0−63) mean 25
Initial stage EBC	6/24 (25%)
Initial stage LABC	18/24 (75%)
Median no. of trastuzumab cycles	7 (range 7−14)
Survival after BM (months)	median 6 (range 2−79) mean 11

Conclusion: Patients with initial stage LABC represents majority (75%) of pts with HER2 3+ BCBM as a first metastatic site. This might be a subgroup of patient in whom BM screening seems most reasonable option.

No conflicts of interest

136 Poster

Aggressive tumour biology in breast cancer: The relationship with age and race in South Africa

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Background: Racial disparity in breast cancer survival persists globally and a belief exists that black women tend to have more advanced, more aggressive disease. We aim to determine whether the tumour biology varies significantly with race.

Methods: This was a review over a one-year period of consecutive patients diagnosed with an invasive or in-situ breast malignancy in an uninsured population. Data from radiological reports and histology was recorded in addition to demographics including age and race. Tumour characteristics between races were compared, particularly with reference to black patients.

Results: 334 patients had a new diagnosis of breast malignancy. 309 patients had an adenocarcinoma including 292 invasive ductal carcinomas, 12 lobular carcinomas and 13 patients had ductal carcinoma in situ. Other malignancies were 5 lymphoma and 7 sarcoma patients. The median age at diagnosis was 55.

65.3% (218) of patients presenting with a breast malignancy were black. The remaining 116 patients were white (17.1%), asian (6.9%), coloured (5.7%) and unknown (5.1%)

In a comparison of invasive adenocarcinoma patients with known race only (n = 314), 86 patients with malignancy were below 45 years: 32.8% of black patients and 18.7% of non-black patients (p = 0.0378). 38.9% (84 of 218) black patients and 29.2 %(28 of 96) non-black patients had a grade 3 tumour (p = 0.1789). Overexpression of HER2 receptors was found in 63 (20.1%) of all invasive adenocarcinomas; in 19.3% (n = 42) of black patients and 21.9% (n = 21) of non-black patients (p = 0.7264). 52 (16.6%) patients were diagnosed with triple negative malignancies including 17.0% of black patients and 15.6% non-black (p = 1.000).

Conclusion: Our experience suggests there is a relationship between race and a younger age at presentation, but our evidence does not support a link between race and biologically aggressive tumours, with none of the three surrogate markers for aggression significantly more common in our black patients.

No conflicts of interest

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CDH1 and genetic predisposition to lobular breast carcinoma

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Background: Invasive lobular breast cancer (ILC) and lobular carcinoma *in situ* (LCIS) are characterised by loss of E-cadherin expression, an adhesion molecule encoded by the *CDH1* gene. However germline *CDH1* mutations are rare in cases of ILC with no family history of diffuse gastric cancer (DGC) and have not been described in women with LCIS.

The aims of this study were to:

1. assess the frequency of rare genetic variants in *CDH1* in lobular breast cancer
2. assess whether common polymorphisms within *CDH1* predispose to lobular breast cancer

Materials and Methods: Germline DNA was extracted from peripheral blood samples collected in the GLACIER (Genetics of LobulAr Carcinoma *In situ* in EuRope) Study, MREC 06/Q1702/64, which has ascertained patients from throughout the UK with the aim of understanding genetic predisposition to LCIS and/or ILC.

Rare genetic variants were identified by screening the entire coding sequence and associated splice sites of the *CDH1* gene by Sanger sequencing in 50 cases of bilateral LCIS/ILC as these cases are more likely to have an inherited component to their disease. MLPA was also performed in order to identify any large scale deletions.

Common genetic variation was assessed in *CDH1* by genotyping 52 SNPs that capture the majority of the common genetic variation across the gene using a combination of an Illumina custom array (iCOGS chip) and Taqman in 2500 cases and 3000 controls.

Results: Sanger sequencing of *CDH1* in 50 cases of bilateral lobular carcinoma revealed four pathogenic germline mutations, including a novel splicing mutation (c.48+1G>A). The remaining three have been previously described (c.1465insC, c.1942G>T, c.2398delC). All four cases developed bilateral LCIS +/− ILC under 51 years of age and had no family history of gastric cancer. No large scale deletions with MLPA were detected.

There was no evidence of an association with lobular cancer for any of the 52 SNPs genotyped at P < 0.05. This included rs35187787, which is relatively rare (MAF = 0.008) and predicted to be potentially pathogenic (Fisher's exact, p = 0.58).

Conclusion: Rare variants in *CDH1* are more common than previously described when bilateral cases of ILC or LCIS are selected for analysis. This has implications for the current guidelines on *CDH1* testing in clinical practice, which require a family history of DGC before *CDH1* screening can be offered to a patient with ILC.

In contrast common polymorphisms in *CDH1* do not appear to predispose to lobular breast cancer.

No conflicts of interest

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Costs of hospital care over ten years from diagnosis of early breast cancer in England

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Background: Improvements in the efficiency of healthcare are dependent on data describing the costs of care. The costs of breast cancer care to healthcare providers are poorly reported. This is particularly the case for clinical events beyond initial diagnosis. We therefore used new techniques in data linkage to report the costs of care for a cohort of patients with a new diagnosis of breast cancer. We include the costs following cancer recurrence and the costs of care at the end of life.

Methods: 1,000 consecutive patients diagnosed with breast cancer (ICD10 C50) from January 1999 were identified from the electronic clinical record of a large cancer centre and the Northern and Yorkshire Cancer Registration and Information Service (NYCRIS). Eligible patients were followed up for minimum of 10-years or until death if earlier, and had complete data linkage. Baseline demographics, clinical characteristics, treatment date and type of recurrence and date of death were available and were verified by 100% clinical audit. Linked data was obtained from the local NHS finance records to provide details of hospital resources used and the costs of care based on the NHS England Payment-By-Results national tariff. Costs are reported in 2011 GBP.

Results: There were 484 eligible patients. The mean 5 year cost from diagnosis was £9,961 (95% CI 9,219–10,718) and the mean 10 year cost from diagnosis was £14,220 (95% CI 13,017–15,464). The mean 10 year cost in patients with no observed recurrence was £12,443 (95% CI 11,504–13,411) compared with £19,706 (95% CI 16,072–23,480) in patients with an observed recurrence. The mean 5 year cost from recurrence was £13,308 (95% CI 10,644–16,480) in the 182 with an observed recurrence events. The cost fell from a mean of £3,232 over the first 3 months from diagnosis to plateaux at around £250 per 3 month period from 18 months onwards. The mean cost of care for the final 30 days of life was £1,050 (95% CI 839–1,288) in the 364 patients who died.

Conclusions: The costs of hospital care for breast cancer falls rapidly over the first 18 months from diagnosis. Cancer recurrence places an additional financial burden on the hospital which is of a noteworthy magnitude. Investment in the prevention of recurrence should be a priority for financial as well as clinical reasons. The costs of care during the end-of-life phase of breast cancer should also be taken into account.

No conflicts of interest

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Genomic alterations, biochemical analysis and association of BRCA1 and BRCA2 gene polymorphism in hereditary breast cancer patients in South Indian population

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Background: Breast cancer is the second most common cancer in India. Epidemiological studies on breast cancer have largely focused on risk factors such as age at menarche, menopause and reproductive history and religion, little or no report exist on familial breast cancer or mutations in breast cancer predisposing genes even though genetic predisposition is likely responsible for 5−10% of all breast cancers. BRCA1 and BRCA 2 is a highly penetrate gene that contributes an estimated 56−85% lifetime risk of developing breast cancer.

The **Objective** of the present study was to evaluate the Genomic alterations, Biochemical analysis and Association of BRCA1 and BRCA2 Gene Polymorphism in Hereditary Breast Cancer Patients in South Indian Population.

Methods: Peripheral blood samples were obtained from 42 Breast cancer patients and 42 Healthy controls were investigated by means of Conventional Cytogenetic analysis using Giemsa Trypsin Giemsa (GTG) banding, Genetic Alteration were confirmed using Florescence *in Situ* Hybridization. Biochemical Serum GSH, GST and NO levels were estimated by spectrophotometric methods. BRCA1 and BRCA2 gene polymorphism were carried out using Restriction Fragment Length Polymorphism analysis.

Results: Breast cancer cases showed Higher Frequency of Genomic instability ($p < 0.001$) compared to controls, Florescence *in Situ* Hybridization showed frequent Chromosomal Aberrations, largely involve the loss of 17p and the gain of 6q were confirmed. In comparison with Breast cancer patients, the control subjects exhibited very low levels of major CA ($P < 0.05$). The serum level of reduced glutathione, GST and $NO^{\bullet}$ were significantly higher ($P < 0.0001$) breast cancer patients before chemotherapy as compared to healthy controls. BRCA1 and BRCA2 Gene polymorphism showed a significant association in Hereditary breast cancer patients when compared to controls.

Conclusions: Chromosomal instability and Biochemical alterations proven to be a potential biomarker for Breast cancer susceptibility. While the molecular genetic events associated with the initiation and progression of Breast cancer remains poorly understood, it has long been considered that genetic instability plays a pivotal role in the development and progression of human cancer, and as with most types of human cancer, multiple genetic changes are probably necessary for Breast carcinogenesis. Identification and understanding of critical molecular pathways leading to cancer progression gives some fresh prospective in development of novel and more effective therapies for Breast cancer.

No conflicts of interest

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Chromosomal instability, antioxidant status and drug metabolising gene polymorphism in hereditary breast cancer patients in South Indian population

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Background: Breast cancer is the second most common cancer among women in India and accounts for 7% of global burden of breast cancer and one-fifth of all cancers among women in India. Breast cancer is currently the number one cause of cancer deaths in women around the globe. Worldwide breast cancer incidence and mortality are expected to increase by 50 percent from 2002 and 2020 and those rates will be highest developing nations.

The aim of the present study was to investigate the Chromosomal Instability, Biochemical alterations and Drug metabolizing gene polymorphism in breast cancer Patients in South Indian Population

Methods: Peripheral blood samples were obtained from 30 Breast cancer patients and 30 Healthy controls were investigated by means of Conventional Cytogenetic analysis using Giemsa Trypsin Giemsa (GTG) banding. Chromosomal alterations were confirmed using Fluorescent In situ Hybridization. Biochemical Antioxidant Stress Marker (malonyldialdehyde (MDA), total lipid hydroperoxides (LOOH), Protein carbonyl (PC) Using Spectrophotometer and Drug metabolizing gene polymorphism Using Restriction Fragment Length Polymorphism analysis.

Results: Breast cancer cases showed a Higher Frequency of Chromosomal instability ($p < 0.001$) compared to controls, Few cases showed characteristic genetic alteration in chromosome 3p, 6q, 9p, 10q, 11q, 16q, 16p, 17p and X. Elevated frequency of Biochemical alteration showed statistically significant ($p < 0.001$) in Breast cancer patients compared to controls. Drug metabolizing gene polymorphism (CYP1A1 and GSTM1) showed a significant association in breast cancer patients when compared to controls.

Conclusions: Conventional cytogenetic analysis play a major role in early diagnostic screening of Breast Cancer Patients. MDA, LOOH, and PC could be used as important biochemical Antioxidant parameter for differentiation and progression of breast cancer with and without metastasis, which are cost effective, and can be easily assayed in smaller laboratories. Thus the study provides an evidenced based data, which indicates a increased risk for Breast cancer in individuals carrying the mutation in CYP1A1 and GSTM1. Cytogenetic Analysis remains the first choice and backbone for laboratory investigation in cancer research. Its usefulness in initial diagnosis as well as in monitoring the therapy. Thus, more ongoing cytogenetic analysis along with molecular cytogenetic will allow better evaluation of the genomic aberrations involved in Breast Cancer, and will offer a new directions for further molecular investigation.

No conflicts of interest

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Worse event-free and relapse-free survival in financially disadvantaged patients with breast cancer in South India

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Introduction: Economic disparity affects the treatment and hence the outcome of malignancies. We for the first time in South India have attempted to quantify the effect of inadequate financial resources on the outcome of patients with breast cancer who have visited our center.

Materials and Methods: Retrospective and prospective data collection was done for all the patients who visited the breast cancer clinic of Global Cancer Institute, Bangalore, between January 2012 and August 2013. Affordability for treatment is decided during the first patient visit. If patients had financial resources of about Rupees 400,000 this was deemed to be sufficient for appropriate multidisciplinary treatment. The usual sources of funding are self-funding, health insurance and for some patients, funding via various Government and employer-funded schemes.

Events were defined as death and relapse.

Results: Out of the 182 patients who visited our clinic in this time period, 119 were diagnosed to have breast cancer. There were 118 (99.2%) female patients and 1 (0.8%) male patient. The median age was 51 years (range 17−84 years). 57 (47.9%) did not have adequate funding for treatment.

Patients who did not have adequate funding for treatment were similar to those who had adequate funds for treatment except that, a greater number of non-affording patients had extensive intraductal component (5.26% vs. 1.61%, $p = 0.028$) as well as perinodal spread (33.3% vs. 17.74%, $p = 0.004$).

A greater number of patients who had limited funding received ⩽6 cycles of FAC (5-FU, adriamycin and cyclophosphamide) (57.7% vs. 17.6%, $p = 0.000$) as opposed to 8 cycles of epirubicin cyclophosphamide/adriamycin cyclophosphamide with docetaxel/paclitaxel (7.7% vs. 47.1%, $p = 0.000$), which were given to those who had adequate funding for appropriate treatment.

Among the non-affording and affording patients, the 2-year overall survival was 91.7±8% vs 93.9±4.2% ($p = 0.5$), the 2-year event-free survival was 28.9±21.7% vs 94.3±3.9% ($p = 0.049$) and the 2-year relapse-free survival was 32.2±23.9% vs. 97.4±2.6% ($p = 0.024$), respectively.

Conclusion: Economic disparity has a statistically significant decrease in the relapse-free and event-free survival in patients with breast cancer in South India. Availability of adequate financial resources might improve the outcomes of the treatment of these patients.

No conflicts of interest

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Breast cancer in South-Eastern European countries: Rising incidence and decreasing mortality at young and middle age

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Background: Most South-Eastern European countries share common political, socio-economic and demographic changes i.e. increased longevity, low but rising age at childbirth, decreased fertility rates, adoption of some 'western' life style patterns e.g. increasing alcohol and tobacco use among younger women, and rapid diffusion of mammography in the context of screening.

From a previous study, in the scope of EUROCOURSE (http://www.eurocourse.org/), breast cancer incidence and mortality trends for 1999–2008 appeared to vary: increasing incidence in most of them and a steady fall in breast cancer mortality, not yet convincing in Serbia and Bulgaria. Analysis of trends by age groups may unravel variations by age groups and address more specific issues.

Materials and Methods: We analyzed data from 11 cancer registries, situated mostly in South-Eastern European countries, but also in west-Turkey, Malta and Cyprus. Age-standardized (world standard) and truncated age-standardized incidence and mortality rates for the period 2000–2010 (or for the most complete recent period) by year and by age groups were calculated, based on corresponding regional or national cancer registries, some of them only recently started. Average annual percent change of rates was estimated using joinpoint regression.

Results: Annual incidence was generally increasing statistically significant by 1 to 3% (all ages), by 2 to 4% (15−39 years), 4 to 5% (40−49), 1 to 4% (50−69) and 1 to even 6% (at 70+). Mortality was decreasing statistically significant by −2 to −4% (all ages), −5% (15−44, for Bulgaria), −3 to −5% (45−54, for Czech Republic and Serbia), −2 to −4% (55−74, for Slovenia, Romania/Cluj and Czech Republic), −3% (75+, for Czech Republic), annually. Mortality was increasing statistically significant by 2% above age 55 in Serbia and by 5% for 75+ in Cyprus, annually.

Conclusions: The observed variations of incidence trends by countries and age groups reflect the influence of risk factors, as well as level of early diagnostic activities (screening), especially for 50+ age groups. Effects of organized or opportunistic screening for this age group − increasing incidence and decreasing mortality, was seen for Czech Republic, Romania/Cluj and Slovenia. The favorable trend for decreasing mortality in other age groups was probably due to better staging and improved therapy, but still there were worrying trends for increasing mortality in 55+ age groups in Serbia and Cyprus. These results may serve to health professionals and policy makers concerning breast cancer control in the corresponding countries.

No conflicts of interest

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Primary breast cancer and women over 75 years: How stringently should treatment protocols be applied?

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Background: In recent years, it has often been observed that old age is associated with less aggressive treatment of primary breast cancer (PBC), regardless of the stage. Relying on our material, we investigate whether our therapeutic approach in women >75 years was 'strictly' adhering to protocols.

Material and Methods: We examined, retrospectively, the records of 134 women over 75 years of age relating to cases of primary breast cancer, operated in our Department, in the period 2009–2011. The average age was 77.4 years (75−89 years).

In our study, we seek data regarding to the epidemiological features of our patients, as well as the histo-pathological and immune-histochemical findings of their surgically removed tumors. Also, the type of surgical technique performed and the adjuvant treatment that our patients received, are analyzed and compared to international guidelines.

Results: In the age group of women over 75 years with PBC, there seems to be a positive correlation between age and less aggressive biological tumor characteristics, including hormonal receptors positive expression, the grade of the tumor, the c-erbB2 negative expression etc. Also, as far as the whole therapeutic treatment is concerned, it seems that in the majority of women under 80 years, international protocols were followed to the letter, while for the majority of the group of patients above 80 years, more conservative treatment was followed.

Conclusions: In women above 75 years, the less aggressive characteristics of PBC, allow for more conservative treatment of these women, without changing life expectancy or morbidity, especially in the age group above 80 years.

No conflicts of interest

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Patterns of relapse and survival among BRCA positive breast cancer patients in Cyprus

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Background: *BRCA1* and *BRCA2* are the two major breast cancer susceptibility genes. Approximately 25−50% of hereditary breast cancer cases can be explained by mutations in these two highly penetrant genes. *BRCA1*-associated breast cancers are often triple negative, with high mitotic count and high histological grade, characteristics associated with poor prognosis. *BRCA2*-associated breast cancers are also of higher histological grade than sporadic breast cancers although the difference is less pronounced as compared with *BRCA1*-associated cancers. The clinical course of patients with breast cancer who live in Cyprus and harbor *BRCA1/2* mutations has never been examined collectively before. The aim of this study was to examine the patterns of relapse as well as the survival of breast cancer patients with BRCA mutations living in Cyprus.

Materials and Methods: A total of 50 breast cancer patients that were tested positive for the *BRCA1* or *BRCA2* genes and were treated and followed-up at the Bank of Cyprus Oncology Center were included in this study. So far in Cyprus, 60 patients with breast cancer were found positive for the BRCA1/2 genes, hence our current analysis covered a large proportion of this group of patients. A retrospective review of medical records was conducted in order to determine clinical characteristics and follow-up data including BRCA mutation status, patterns of relapse and event free survival.

Results: Out of the 50 *BRCA1/2* carriers included in this study, 18 developed a relapse whereas the remaining 32 remain disease-free. Among the 18 relapses, 4 were new ovarian cancers, 5 patients developed metastatic disease and 9 patients had either a contralateral or ipsilateral breast cancer. A trend was noted towards a more favorable outcome for *BRCA2* mutationcarriers compared to *BRCA1* mutation carriers with fewer relapses (31% vs. 55%) as well as a longer time to first relapse. Only 5 women (10%) died of the disease while only another 5 (10%) are currently treated with metastatic disease. Overall, 80% of the breast cancer BRCA mutation carriers included in our study are well, alive and disease free

despite their advanced disease and their unfavorable histological type. It is noted that all patients included in our study lived for at least 5 years following their diagnoses.

Conclusions: Despite the small number of patients included in our study, our results confirm that *BRCA1* carriers have worse disease-free survival rates compared with *BRCA2* mutation carriers. It appears that overall survival and disease-free survival rates among women with *BRCA1/2* mutations are higher than anticipated according to their stage and grade.

No conflicts of interest

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Age effect on treatment decision for adjuvant chemotherapy in women with ER-positive early breast cancer: Analysis of the basic data of the POCHARBI trial, an observational study conducted by the Hellenic Society of Breast Surgeons

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Background: POCHARBI is an observational clinical trial conducted in 10 breast units, members of the Hellenic Society of Breast Surgeons in Athens − Greece, aiming to assess the combined impact of chemotherapy (CT) and Aromatase Inhibitors (AIs) on bone mineral density in post-menopausal, ER-positive early breast cancer patients. Study accrual was closed in December 2012 and primary results are expected next year. Analysis of the baseline data gave us the opportunity to observe factors influencing the decision for adjuvant chemotherapy in an ER-positive Early Breast Cancer patients' population in a 'real life' clinical setting.

Material and Methods: This was a 12 month, multicenter, observational study of women in postmenopausal status, with ER-positive early breast cancer, treated with an AI either as first line therapy or as maintenance therapy after initial treatment with anthracycline- and/or taxane-based CT. Lumbar spine (LS) and total hip (HP) bone mineral density (BMD) were measured before and after CT and at the end of a follow up period of 12 months after AI initiation. Ethical approval was obtained prior to study initiation (NCT01298362).

Results: A total number of 290 patients included in the study: 124 patients in the CT+HT arm and 166 patients in the HT arm. Mean age in the CT+HT group was 61.2(10.2) and in HT group 66.2(9.2) years. Tumor stage (TNM) and Grade were, as expected, the major decision making factors for treating women with CT. However, post-hoc analysis indicated also, that patient's age was an additional factor which influences physicians' decision to use chemotherapy. Patients' group of 40−60 years old received significantly more CT than the 60−70+ years group (Table 1).

Conclusions: Post hoc analysis on the baseline characteristics of the population of this study indicated that Age is an independent factor, which influences physicians in Greece, to decide on using adjuvant chemotherapy in post-menopausal patients with ER-positive, early breast cancer. Despite international guidelines, elderly patients receive less chemotherapy than younger ones with the same treatment characteristics.

Table 1. Modeling likelihood of receiving the combined therapy (CT)

Factor	Odds ratio	95% Wald confidence limits for the odds ratio	P-value
Age			0.0002
40−60 vs 70+	9.254	3.224–26.563	<0.0001
60−70 vs 70+	4.521	1.687–12.117	0.0027
Grade 3 vs 1−2	3.036	1.243–7.417	0.0148
Stage TNM II vs I	21.835	9.301–51.264	<0.0001

Conflict of interest: Corporate-sponsored research: AstraZeneca

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Differences in common risk factors for breast cancer molecular subtypes

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Background: Breast cancer is characterized by its molecular and clinical heterogeneity. The current study focuses on assessing how risk factors relate to molecular subtypes.

Patients and Methods: A total of 507 female patients with breast cancer who have been followed up at NCI and Nasser institute during the period from July 2012 till February 2013 were included and categorized into 5 molecular subtypes by immunohistochemistry. Case–case odds ratios comparing risk factors across tumor subtypes using the luminal A tumors as the reference group were estimated.

Results: Three hundred and twenty one patients had luminal A, 73 had luminal B, 66 had Her2-overexpressing, 30 had basal like and 17 had unclassified breast cancers. We observed significant differences in biological subtypes for the distribution of residence ($p \leqslant 0.001$), age at diagnosis ($P = 0.016$), number of full term births ($P = 0.028$) and history of contraception use ($p = 0.026$). The age of $\leqslant$35 years was found to be a risk factor for unclassified tumors (OR: 5.16, 95% CI: 1.68–15.85; $P = 0.008$ compared with luminal A), similar to Luminal B and HER2 expressing cases ($p = 0.087$ and 0.045 compared with Luminal A respectively). Rural residents were more likely to be unclassified cases (OR: 7.97, 95% CI: 2.53–25.07; $P \leqslant 0.001$ compared with luminal A). Nulliparous women had an increased risk of unclassified tumors (OR: 5.22, 95% CI: 1.53–17.83 $p = 0.008$ compared with Luminal A), while women who had $\geqslant$2 children were found to be at high risk for Luminal B (OR: 3.241, 95% CI: 1.48–7.09; $P = 0.003$ compared to Luminal A). Premenopausal patients were associated with increased risk of unclassified breast cancer (OR: 3.43, 95% CI: 1.28–9.24; $p = 0.015$ compared with Luminal A) whereas, no significant difference were found for other subtypes. Patients with history of combined estrogen and progesterone contraception use were associated with a significant increased risk of unclassified tumors (OR: 0.1, 95% CI: 0.02–0.54; $p = 0.004$) while no protective association was seen against other biological subtypes. We observed that compared with the predominant luminal A tumors, association with age at menarche, education, age at first full term birth, family history of breast cancer and BMI showed no significant difference with biological subtypes.

Conclusion: Results from this study have shown that luminal A and unclassified tumors seem to have distinct sets of risk factors, suggesting etiologic, in addition to clinical, heterogeneity.

No conflicts of interest

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Barriers to uptake of breast cancer screening in Western Kenya

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Introduction: In October-November 2012 we conducted clinical breast cancer screening open to both men and women in three sites in western Kenya. One week before the events, posters, community meetings and word of mouth through community health workers publicized the screening events. Although there were substantial turnouts, we wanted to explore community-level perceptions of barriers to screening uptake to plan future events.

Methods: After screening, we surveyed community members (18 years and older) who did not attend the breast cancer screening events in the targeted communities. A recruitment questionnaire was used to identify the target group. Both structured and open-ended questions were used to collect data at the household level. Descriptive and content analyses were performed.

Results: A total of 733 community members were surveyed (63% women, median age 33 years, IQR = 26−43). Women and men respondents did not differ significantly in their responses. 55% of respondents had heard about the breast cancer screening but did not attend. There were no significant socio-demographic or socio-economic differences between those who knew about the screening and those who did not. Similarly, there were no significant differences in perceived barriers to screening including; potential embarrassment (3%), fear of outcome (4%), and negative influence of significant others (5%). A higher percent of those who had heard about this particular screening event reported knowing about breast cancer screening services in general (45% vs. 25%, $p = 0.001$). Only 8.0% of those who heard and 6.0% of those who had not heard

of the screening event had previously undergone breast cancer screening (p = 0.20). Among those who had heard of the screening, the reasons for not attending included personal factors such as a busy schedule (41.0%), perceived low personal risk (4.2%), and lack of transport (4.2%). Health facility factors such as late announcement (14.4%) and long queues (8.7%) were also reported. Majority (94.7%) of respondents preferred that future communication about breast cancer screening be done through the local or national radio stations.

Conclusion: More than half of community residents who did not attend screening had heard about the event. Barriers to breast cancer screening uptake were associated with personal schedules and inadequate communication about the screening event particulars. Future events will add local radio station early announcements.

No conflicts of interest

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Quality of life among breast cancer patients undergoing treatment in national cancer centres in Nepal

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Background: Breast cancer is in ever-increasing trend in Nepal and it has been forecasted to rise further. With the advancement of the treatment approaches, the chances of survival are also improving in Nepal. Nevertheless, to get a diagnosis of cancer, usually in the later stage or when it has spread to more than one quadrant of breast as usually a case in Nepal comes with emotional crisis. The priority here is now in achieving longer survival. Survivorship here refers to process of living with cancer or living after the diagnosis of cancer. In such situation, patient has to go through aggressive treatment. Getting a diagnosis of breast cancer and to go through aggressive treatment has a dramatic effect on patient's physical, psychological, social and financial aspects of life and that eventually impact on patient's quality of life. Thus; a cross-sectional survey was conducted to study the level of quality of life and to identify the factors associated with quality of life among breast cancer patients undergoing treatment in national cancer centers in Nepal.

Methodology: One hundred breast cancer patients were selected purposively and interviewed using structured questionnaire. European Organization of Research and Treatment of Cancer (EORTC) C-30 and EORTC BR-23 were used to assess quality of life and modified Medical Outcome Study − Social Support survey was used to assess social support. Only multi-item scales of EORTC C-30 and BR-23 have been analyzed for the relationship. Independent sample T-tests and ANOVA were used to analyze the differences in mean scores.

Results: The score of global health status/quality of life (GHS/GQoL) is marginally above average (mean = 52.8). The worst performed scales in C-30 are emotional and social functions while best performed scales are physical and role function. In BR-23, most of the patients fall in problematic group in sexual function and sexual enjoyment function. Almost 90% of them had financial difficulty. Symptom scales do not demonstrate much problem.

Older, educated, housewives, patients with family monthly income of >10,000 per month, patients who had undergone Breast conserving surgery/lumpectomy, patients in stage I breast cancer, who have been diagnosed for less than six months and patients with good social support are found to have good GHS/GQoL. Of all the influencing factors, social support was established to have strong statistical association with most of the functional scales: GHS/GQoL (0.003), emotional function (<0.001), cognitive function (0.020), social function (<0.001) and body image function (0.011). While, body image is significantly associated with most of the influencing factors: family monthly income (0.003), type of treatment (<0.001), type of surgery (<0.001), stage of cancer (0.017) and social support (0.011).

Conclusion: Strategies to improve social support of the patients undergoing treatment should be given priority and financial difficulty faced by the breast cancer patients should be well addressed from a policy making level.

No conflicts of interest

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Validation study of a breast cancer risk assessment programme for Korean women

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Background: The Gail Model is the gold standard of breast cancer risk assessment tool but it over-estimates the breast cancer risk in Asians. We validated a Korean breast cancer risk assessment program which was developed using Korean data by employing the same method that was used for Gail model.

Materials and Methods: Because of the rapid increase in breast cancer in Korea, we modified the program using recent data of the incidence and mortality rates for Korean breast cancer. We used the data from the screening of patients that was done from January 1999 to July 2004 for validation. The breast cancer event was confirmed by matching the social security number with the data of Korean Breast Cancer Registration Program. The reliability of the program was validated by the Expected-to-Observed (E/O) ratio. The discriminatory power was evaluated by the receiver operating characteristics curve analysis.

Results: The Korean breast cancer risk assessment program was modified and posted at http://brca.surgery.kr.pe/. Among 40,229 patients who were included for the validation, 161 patients were confirmed to have breast cancer within 5 years of the screening. Overall, 137.48 cancers were expected in the same period. The E/O ratio was 0.85 (95% confidence interval = 0.73–1.00). There was a tendency of under-estimation associated with the screening years of 1999 and 2004, the age group of 29 years or less and 60 years or more, breast feeding, no family history, no history of test (biopsy, cytology, screening mammography, and sonography) and age of the first deliver less than or 24 years old. In the discriminatory power, the area under curve of the program was 0.56 (95% confidence interval = 0.51–0.60, p = 0.011).

Conclusions: The Korean breast cancer risk assessment program under-estimated the risk of breast cancer and showed moderate discriminatory power. Despite these limitations, this study will be helpful for the risk assessment of Korean breast cancer.

No conflicts of interest

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Association of symptoms and breast cancer in the population screening for cancer

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Background: In Finland, organized national screening program for breast cancer is based on mammography and clinical examination of possible symptoms. The purpose of the study was to assess the association of symptoms in screening visits with the detection of breast cancer.

Materials and Methods: A cross-sectional study was performed among women aged 50 to 69 years who had breast cancer screening during the period 2006–2010. A total of 1.2 million screening visits were performed and symptoms (lump, retraction, scar, secretion and mole) reported by women and radiographer for every visit. 6445 women were diagnosed with breast cancer. Breast cancer risk was calculated for each symptom using the odds ratios (OR) at 95% confidence intervals (CI) in logistic regression model.

Results: Women reporting lump had an increased odd of breast cancer in both self- (OR 7.23, CI 6.45–8.11) and radiographer-reported findings (OR 6.74, CI 6.12–7.41). Retraction had a 3-fold risk and other symptoms showed little increase of breast cancer risk. The OR was 11.4, CI 4.63–28.1, for radiographer reported co-exposure to lump, retraction and scar. The clinical sensitivity of the symptoms in detecting breast cancer was low, however, ranges 0.7−14.7%.

Conclusion: Our findings reinforce the importance of fully evaluating the symptoms as a predictor of breast cancer. This study was done in a setting where the size of breast tumors is usually rather small. Still, the findings may have relevance also for such countries, which plan to develop clinical

breast examination as an alternative to mammography screening in breast cancer control.

No conflicts of interest

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Outcomes of adherence to the standards for breast cancer treatment in Bulgaria

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Background: Adherence to the standards for breast cancer (BC) treatment reduces the risk of recurrence, decreases mortality and increases survival of the patients. Therefore, it is regularly evaluated by the responsible institutions.

Materials and Methods: This retrospective, population-based study aims to evaluate the outcomes of adherence to the introduced in 2009 Standard (S2009) for BC treatment in Bulgaria. Inclusion criteria were: women with primary BC, diagnosed during the period 2009–2011, with no evidence of other malignancies, surgically treated and registered in the Bulgarian National Cancer Registry (BNCR). A random sample of 1505 cases was selected from BNCR database and additional information for them was provided by the regional cancer registries who extracted the necessary data from the medical files of the patients. The variables were coded following the agreed standards and guidelines for cancer registration in Europe. Topography and morphology are according to ICD10. Stage is according to TNM6. There are 4 types of hospitals for BC surgery: National Hospital of Oncology (NHO), University Hospitals (UH), Regional oncology centers (ROC) and General hospitals (GH). All patients were followed up until 01.01.2013 or date of death. Seven aspects of S2009 were evaluated, concerning diagnosis and treatment of BC. Statistical methods used are: descriptive statistics, Life Table method for survival analysis and Cox regression model for estimation of hazard ratios (HR).

Results: The overall adherence to S2009 was 69.2% and varied by age group (58.3%-80.0%), place of residence (59.1%-74.3%) and type of hospital for surgery (71.2%-80.1%, only 3 of the aspects concerning surgery were evaluated). After adjustment for age, stage and place of residence, statistically significant higher HRs were observed for patients, surgically treated at UH (HR = 1.95) and GH (HR = 1.85), compared to the NHO, selected as a reference. There was a similar pattern of 3-year survival rates and the degree of adherence to S2009, by place of residence and type of hospital for surgery − higher survival was observed in subgroups with higher adherence to S2009. These findings suggested the existence of relation between adherence to S2009 and patients survival, which needs to be investigated further.

Conclusion: There is a necessity for constant monitoring of the adherence to breast cancer standards in Bulgaria in order to ensure better survival and reduce inequalities among patient subgroups.

No conflicts of interest

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Breast cancer in early twenties and pregnancy impair prognosis

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Background: Breast cancer is the most common female malignancy. Nevertheless, diagnosis at the age of early 20s is extremely uncommon and the disease is infrequent during pregnancy. When a young or pregnant woman presents with a breast mass, there is reduced awareness about breast cancer diagnosis although there is evidence of a more aggressive nature of the disease. Since experience is limited, early diagnosis and proper management of these cases appears challenging. This is a retrospective and matched case study that aims to evaluate very young age and pregnancy as independent prognostic factors.

Patients and Methods: The study population comprises all invasive breast cancer cases diagnosed and treated in two academic breast centers at Athens University, Athens, Greece during the time period 1991–2012. We investigated whether patients 25 years old and younger (n = 28) exhibited worse prognosis when compared to older premenopausal cases (n = 685). We also compared survival among 39 pregnant and 39 non-pregnant patients adjusted for stage, age, and year of diagnosis.

Results: Very young cases presented at a more advanced stage (p = 0.012), bigger tumor size (p = 0.030), higher grade (p = 0.018) and worse nodal status (p = 0.009). They experienced poorer overall survival and relapse-free survival (RFS) than their matched older counterparts even when adjusted for stage, ER status, grade and year of diagnosis (HR = 4.30, 95% CI: 1.09–17.03 f and HR = 8.28, 95% CI: 2.24–30.60, respectively).

Pregnancy associated Breast Cancer [PABC] cases survived less when compared to non-pregnant patients (5-year survival rate 30.7% and 48.7%, respectively, p < 0.0001). Also, PABC cases exhibited shorter RFS (p < 0.0001). The poor results persisted in multivariate analysis when adjusted for stage, estrogen receptor status, grade and age at diagnosis.

Conclusions: Breast cancer diagnosis in women 25 and younger is correlated with worse prognosis independently of other risk factors. Also, pregnancy represents an independent factor that implies rapid relapse and reduced overall survival. Larger studies are needed to further substantiate our present findings and to elucidate methods for early detection and treatment of an aggressive disease in these sensitive populations. Increased awareness is of extremely importance.

No conflicts of interest

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Increased risk of subsequent invasive breast cancer after in situ breast carcinoma: Analysis using a nationwide population-based registry data

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Background: The incidence of breast carcinoma in situ (BCIS) in 2010 was 10 per 1,000,000 women in Bulgaria. Although rare, it has been increasing by 2% annually during the last 10 years due to the opportunistic screening among women. Previous studies reported a twofold to sevenfold increased risk of breast cancer after the diagnosis of BCIS, representing a cumulative 10-year risk of about 7% among the patients. In this study we sought to estimate the risk of subsequent invasive (including contralateral) breast cancer after in situ breast carcinoma in the Bulgarian female population.

Materials and Methods: Data were obtained from the national population-based cancer registry (BNCR), covering 3.9 million female inhabitants in 2010. BCIS patients were followed-up until the date of death, date of subsequent breast cancer diagnosis or end of the study (31.12.2012), whichever occurred first. Only patients with $\geqslant$1 year of follow-up were analyzed. We calculated standardized incidence ratio (SIR) to measure the relative risk of developing subsequent breast cancer by comparing the incidence of second breast cancer among patients with a diagnosis of BCIS to the incidence of breast cancer in the general population. We also calculated the absolute excess risk (AER) examining the excess incidence of second breast cancer per 10,000 women. Furthermore, the cumulative risk of developing second breast cancer, which is the proportion of patients alive at time t who can be expected to develop a second breast cancer, was calculated using the life table method.

Results: Among 271 patients diagnosed with BCIS during the period 2002–2011 (average age 55.1 years), 8 (2.9%) developed a second breast cancer. BCIS patients exhibited threefold increased risk of second breast cancer (SIR: 3.5, 95% CI: 1.8−6.9). An excess of 40 patients with second breast cancer for every 10,000 BCIS patients was observed. The cumulative 10-year risk of developing second breast cancer was 7% ($\pm$3%).

Conclusion: The results for Bulgarian patients are similar to previous studies and confirm the substantially increased breast cancer risk among patients with previous BCIS. This suggests the need of active surveillance of women diagnosed with breast carcinoma in situ in order to early detect and improve survival.

No conflicts of interest

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Breast cancer and population health in Morocco

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Background: Breast cancer is the most common cancer and the leading cause of cancer death among women in Northern Africa, with an estimated

27,993 new cancer cases and 14,564 deaths from cancer in 2008, the most recent year for which international estimates are available (GLOBOCAN 2008). The aim of this study is to determine the frequency and the epidemiological characteristics of breast cancer in Morocco.

Material and Methods: This is a retrospective analysis of breast cancer cases, diagnosed and treated at Al Azhar Oncology Center in Rabat between 1994 and 2004.

Results: There were 1710 cases diagnosed with breast cancer at Al Azhar Oncology Center, 97.5% in women and 2.5% in men, giving a female-male ratio of around 39 and accounting for 24% of all new cancer cases reported during 1994–2004. The average age at diagnosis was 47±10 years. The risk of developing breast cancer is strongly related to age with 8.2% of new breast cancer cases diagnosed in people younger than 35 years, 85.2% in those aged 35−64 years and 6.7% in those aged 65 years and over. Nearly a quarter of these cases were treated with breast-conserving surgery. Of these, 37.2% were detected at stage I, 45.5% at stage II, 15.1% at stage III and 2.1% at stage IV. Among all detected cases, 2% were diagnosed with metastatic disease and 12.2% died during the study period.

Conclusions: Breast cancer continues to be a major public health problem. Early detection in order to improve breast cancer outcome and survival remains the cornerstone of breast cancer control.

No conflicts of interest

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The perceptions of Israeli women with breast cancer of the Breast Cancer Nurse

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Introduction: The role of the Breast Care Nurse Specialist (BCN) has been developing in the last decades in some Western countries, mainly the UK, Australia, US and Israel. This newly recognized position encompasses within it the involvement of nurses as patient advocates, looking at issues such as breaking bad news and receiving the diagnosis, the participation of women in the decision-making regarding their care and navigating the women within the complex and ever demanding health care system. In this new paradigm of care, it is the woman and her significant others who are in the center, and the role of the Breast Care Nurse Specialist is of a counselor, information provider and supporter, who makes sure the woman understands the complex and sophisticated options of care. The purpose of this research is, therefore, to examine the impact that Breast Care Nurses have on Israeli women who are diagnosed with breast cancer.

Patients and Methods: About 300 women with non-metastatic breast cancer (At seven institutions) were given two questionnaires – a demographic questionnaire developed for this study, and the Ipswitch Patient Questionnaire, comprised of 21 questions, each divided to sub-questions. The questionnaire is focused on the following aspects of nurse's care: information about the role, coordination of care, provision of information, psychological and mental support, practical support and referral to other health care professionals.

Results: The stay results emphasised the general positive attittue and perceptions that women had towards all aspects of the role of the BCN as were assessed. Detailed results and descriptions of the women's views as analysed will be further presented.

Conclusions: This study was an attempt to provide a national multi-centric study evaluating the role of the BCNs in Israel. This complex, demanding and multidimensional role has been examined and evaluated in various relevant domains. These results emphasized the importance of the role and its contribution to women with breast cancer and their dear ones. Further studies need to look at the impact of the role on the health care system and and other colleagues and also at different cultures.

No conflicts of interest

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Does a six week end of treatment programme make a positive difference for patients diagnosed with breast cancer?

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A private enterprise, Mind, Body and Vitality 365 (MBV365) and a District General Hospital Breast Unit have produced a 6 week programme to explore the needs of breast cancer patients following treatment to allow provision of information and support to help patients address the lifestyle changes required as a result of the effects of treatment regimes or their choice to make life changes, an area of care also identified as a need by The Cancer Reform Strategy and Macmillan Cancer Support (2008).

The programme was advertised and 12 patients self referred to the pilot programme, 10 completed. The four aspects of the programme are Mind, Nutrition, Exercise and Muscoskeletal. The programme was led by an expert for each subject area and a Breast Care Specialist Nurse attended each week to ensure the MBV365 team were supported and specific breast cancer issues could be addressed. The programme is supported by local fundraising.

Each patient was required to complete a needs questionnaire to personalise the weekly programme content, a pre evaluation and post evaluation questionnaire to aid evaluation. The patients were also encouraged to have a body analysis at week 1 and repeated at week 6. The patients were provided with diary sheets to allow them to keep a food diary and were asked to identify mood changes/energy levels to assess if there are certain food groups having an impact on these factors. The group were encouraged to participate in an exercise session during the exercise week and perform arm and shoulder movements during the muscoskeletal week. Regular physical exercise and arm/back/shoulder exercises were promoted throughout the programme with encouragement to continue after week 6.

The needs evaluation showed that the majority of the group had areas of concern; energy, exercise, lack of control, endurance, and muscoskeletal issues. The pre course and post course data showed an improvement in many of these areas at the end of the course. The body analysis demonstrated an improvement over the course. The total for the group showed body fat decreased by 15.2%, Visceral fat 4% and Muscle increased by 11.4%. During the muscoskeletal week the patients were unable to perform some of the specific arm/shoulder movements but this improved by the end of the programme.

The programme had positive verbal feedback which has also been endorsed via the pre and post body analysis test results and the patient questionaires. This programme has confirmed that patients do benefit from a 6 week programme which incorporates the four key areas of Mind, Nutrition, Exercise and Muscoskeletal. In addition the course has demonstrated that the NHS and private enterprise can work together to provide patients with a programme to meet their needs. An on line support forum has been developed to encourage continuation of the programme content at the end of the 6 week course.

No conflicts of interest

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Breast cancer-related lymphedema after neoadjuvant chemotherapy, surgery and radiotherapy

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Background: The risk for lymphedema (LE) after neoadjuvant chemotherapy (NCT) is little known in breast cancer patients. This study was conducted to investigate LE after NCT, surgery and radiotherapy.

Materials and Methods: A total of 313 patients with clinically node-positive breast cancer who underwent NCT followed by surgery with axillary lymph node (ALN) dissection from 2004 to 2009 were retrospectively analyzed. All patients received breast and supraclavicular radiation therapy (SCRT). The determination of LE was based on both objective and subjective methods as part of a prospective database.

Results: At a median follow-up of 5.6 years (range, 3.0−9.1 years), 132 patients had developed LE: 88 (28%) were grade 1; 42 (13%), grade 2; and two (1%), grade 3. The overall 5-year cumulative incidence of LE was 42%. LE first occurred within 6 months after surgery in 62%; 1 year, in 77%; 2 years, in 91%; and 3 years, in 96%. In multivariate analysis, age [hazard ratio (HR), 1.66; $p < 0.01$] and the number of dissected ALNs (HR, 1.68; $p < 0.01$) were independent risk factors for LE. Patients with both of these risk factors showed a significantly higher 5-year cumulative incidence of LE compared with patients with no or one risk factor (61% and 37%,