cancer. Cumulative risks for each group were calculated using Kaplan-Meier estimates, censoring for contralateral cancer or death. Adjustment for other factors such as adjuvant treatments or individual risk factors for some cancer locations was not performed in this study. The risk of occurrence of SNBM was calculated using: [1-S(t)] where S(t) formula is the survival, using Kaplan-Meyer method. These cumulative risks were stratified by RT and groups were compared by the log-rank test.
Results: At 10.5 years median follow-up [0.2–24 yrs], there was a significant difference in the incidence of sarcomas and lung cancers between the group who received RT and the group who did not. The cumulative risks of different cancers in no RT group vs. RT group were as follows:

Cumulative risks of second malignancies at 10 years of follow-up

SNBM	No radiotherapy (No. pts = 3,234) 230	Radiotherapy (No. pts = 16,705) 1113	p*
Head and neck	0.03%±0.03	0.12%±0.03	0.15
Lung	0.18%±0.09	0.41%±0.07	0.02
Gastro-Intestinal (GI)	1.53%±0.26	1.06%±0.11	0.12
Ovarian	0.26%±0.11	0.56%±0.08	0.08
Gynaecological	0.71%±0.19	0.89%±0.09	0.28
Genito-Urinary (GU)	0.25%±0.10	0.21%±0.05	0.87
Others	0.13%±0.07	0.17%±0.04	0.87
Sarcoma	0.00%±0.00	0.26%±0.05	0.02
Malignant melanoma	0.20%±0.09	0.29%±0.06	0.41
Lymphomas	0.26%±0.11	0.26%±0.05	0.78
Leukaemia	0.29%±0.11	0.34%±0.06	0.95
Thyroid	0.16%±0.09	0.14%±0.04	0.65
All	4.00%±0.41	4.60%±0.22	0.06

*log-rank test

Conclusion: This study showed that adjuvant radiotherapy increased the rate of sarcomas and lung cancers, whereas it did not increase the rate of other malignancies. At a median follow-up of ten years, this study showed that radiotherapy did not increase the risk of other types of cancers, as for example thyroid cancer, malignant melanoma, GI or GU cancers. The risk of hematological malignancies was not increased either. Long-term follow-up is needed for this population of patients to exclude other late complications.

549 ORAL

Familial risk of colon and rectal cancer in Iceland. Different etiologic factors for colon cancer and rectal cancer

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Aim: The aim of the present study was to characterise the familial risk of colon or rectal cancer in Iceland.
Method: The standardized incidence ratio (SIR) was used to estimate the risk among relatives of colorectal cancer index cases diagnosed in Iceland over a 46 year period (1955–2000). All data was retrieved from population based registries (The Icelandic Cancer Registry and a Genealogic database from The Genetical Commity of the University of Iceland).
Result: In all 2770 colorectal cancer patients had 23,272 first degree relatives. Among the first degree relatives there was an increased risk of colon cancer (SIR 1.47, 95% confidence interval [CI]: 1.34–1.62) and rectal cancer (SIR 1.24, 95%CI: 1.04–1.47). Among the 17119 first degree relatives of colon cancer patients there was an increased risk among siblings of both colon cancer (SIR 2.03, 95%CI: 1.76–2.33) and rectal cancer (SIR 1.56, 95%CI: 1.19–2.02). If the colon cancer patients were 60 years or younger the risk of colon cancer in first degree relatives was: SIR 3.14, 95%CI: 2.27–4.23. The risk of colon cancer and rectal cancer was not increased among parents and offspring. The risk was equally distributed among men and women. Among the 6767 first degree relatives to rectal cancer patients there was an increased risk among siblings of colon cancer (SIR 1.61, 95%CI: 1.23–2.06) and of rectal cancer (SIR 1.75, 95%CI: 1.13–2.58). If the rectal cancer patients were 60 years or younger the risk of rectal cancer in first degree relatives was: SIR 2.43, 95%CI: 0.89–5.29. The risk of colon cancer was increased for brothers to rectal cancer patients (SIR 1.79, 95%CI: 1.22–2.53) and for sisters (SIR 1.45, 95%CI: 0.98–2.07) however, the risk of rectal cancer was only increased among brothers (SIR 2.46, 95%CI: 1.46–3.89) to rectal cancer patients but not among the sisters (SIR 1.0 95%CI: 0.40–2.06).
Conclusion: Family history of colon cancer is supported as a risk factor for the disease. Family history has different association with colon cancer and rectal cancer giving evidence to different etiologic factors for colon cancer and for rectal cancer. Siblings to colorectal cancer patients diagnosed in Iceland when 60 years or younger should be offered screening for colorectal cancer.

550 ORAL

Population based mammography screening results in substantial savings in treatment costs by reducing the number of breast cancer deaths

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Background: The aim of the study was to assess the effect of population based mammography on treatment costs for fatal breast cancer.
Material and methods: Population based mammography screening for women aged 40–74 years in the city of Turku, Finland was launched in 1987. The current study included 556 invasive breast cancers diagnosed among women aged 40–74 years between 1987 and 1993: 427 in the screening group (which included screen-detected and interval cancers) and 129 in the non-screening group (which included breast cancers detected before initial screening and those detected in patients who chose not to undergo screening). The treatment costs due to breast cancer for each patient at the different hospitals, in a hospice, and at a cancer clinic of the Cancer Society were followed up for eight years from diagnosis or until death, whichever occurred first.
Results: During the 8-year follow-up, 82% of patients survived in the screening group and 66% in the non-screening group, while 12% versus 25% died of breast cancer and 6% versus 9% died of other causes, respectively. In the screening group, the mean treatment costs were Euros 27,803 (95%CI: 23,175–32,431) for patients with fatal breast cancer versus Euros 8,915 (CI: 8,350–9,480) for the survivors ($p < 0.001$). In the non-screening group, they were Euros 23,800 (CI: 19,033–28,566) versus Euros 11,583 (CI: 10,258–12,909) ($p < 0.001$), respectively. Among the 81 patients who died of breast cancer there was no statistically significant difference in the mean costs per patient between screened and unscreened women ($p = 0.245$). As a result of fatal breast cancer occurring more often among unscreened than screened women, 29% of the total treatment costs in the screening group were used for the treatment of fatal breast cancer, compared to 41% in the non-screening group. On the basis of breast cancer death rates and mean costs per patient, it was estimated that without a screening programme the treatment costs of 2.1 million Euros for fatal breast cancer would have been 0.9–1.1 million Euros higher during the study period. Thus, approximately 29–33% of these costs were saved through mammography screening.
Conclusions: The treatment costs associated with fatal breast cancer are high. Early detection of breast cancer by population based mammography screening results in substantial savings in treatment costs by reducing the number of breast cancer deaths.

551 ORAL

Prevalence of abnormal Pap smears among young adult women participating in human papillomavirus (HPV) L1 virus-like particle (VLP)-vaccine clinical trials

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Background: HPV infection by oncogenic types is a necessary cause of cervical cancer and infection by non-oncogenic types causes anogenital warts and some low-grade cervical lesions. A quadrivalent vaccine against HPV types 6, 11, 16, and 18 (GARDASIL™) is currently in development. The baseline characteristics of this large Phase III study population are described here.
Methods: Two parallel pivotal clinical trials of GARDASIL™ enrolled women from Europe (50.6%), Latin America (30.6%), North America (14.7%) and the Asia-Pacific region (4.2%). Participants were to be either

using or seeking contraception and were to have no more than 4 lifetime sexual partners. The baseline prevalence of Pap smear abnormalities was evaluated.
Results: 17926 women, ages 15 to 26 years (median 20 years), were randomized to participate in the trials. 69.5% (n = 12463) were white, 13% (n = 2538) Hispanic, 3.9% (n = 706) black, and 3.5% (n = 629) Asian. 4825 (26.9%) were current smokers and 1347 (7.5%) were former smokers. Six percent (803) were virgins; among non-virgins the median number of previous partners was 2 and most (n = 11779, 69.9%) had no new partners in the 6 months prior to study baseline. Chlamydia trachomatis infection was found at baseline examination in 746 women (4.2%); Neisseria gonorrheae infection in 58 (0.3%). Only 74 (0.4%) reported a prior HPV infection. A total of 17404 satisfactory Pap smears were obtained at baseline, the results of which are shown in the table. All Pap smears were read at a central laboratory.

Day 1 Pap smear results

	N (%)
Negative for SIL	15433 (88.7)
SIL present	1971 (11.3)
LSIL	1012 (5.8)
HSIL	108 (0.6)
ASC-US	789 (4.5)
ASC-H	54 (0.3)
Atypical glandular cells	8 (0.04)

Conclusions: In this multi-ethnic, geographically diverse population of young adult women, abnormalities were identified in more than one in ten Pap smears. These findings underscore the potential value of an effective HPV vaccine, given the established association of HPV with cervical lesions, especially of higher grade.

552 ORAL

Cervical cancer in sub-Saharan Africa: a pattern of care study by the international atomic energy agency

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Introduction: Cervical cancer and HIV/AIDS are both very common in sub-Saharan African countries. In order to assess the prevalence of HIV infection in cervical cancer patients treated with radiotherapy and its impact on treatment outcome, the IAEA conducted a study (CRP E 3–30–20) in Uganda, Namibia, Tanzania and Zimbabwe. The main objectives of the study were: 1) to examine the prevalence of HIV infection among patients with invasive cervical cancer and 2) to assess the effects of pelvic irradiation on their survival.
Patients and methods: Between 3/2000 and 12/2001, one hundred and forty-seven unselected patients with biopsy-proven squamous-cell carcinoma of the uterine cervix that were referred for radiotherapy were tested for HIV using the ELISA test. Haemoglobin levels and CD4 counts were also determined. Teletherapy and brachytherapy were delivered according to the local protocols. No concomitant chemotherapy or anti-retroviral therapy were administered. There were 43 patients from Uganda, 40 from Zimbabwe, 40 from Tanzania and 24 from Namibia. The distribution by FIGO stages was: IB/IIA 2%, IIB 27%, IIIA 7%, IIIB 64%. Survival analysis was performed by log-rank test. Multivariate analysis was performed by Cox proportional hazards regression model considering age, dose of radiation and ELISA test results, stratified by country.
Results: Twenty seven of the 147 patients (18.4%) tested positive for HIV. The median age of the HIV negative patients was 50 years (range 28–80) and it was 39 years (range 25–57) for the HIV positive patients. The mean pre-treatment haemoglobin level was 10.8 g/dL (range: 2.6–16.1), 10.9 g/dL for HIV negative and 10.4 g/dL for HIV positive patients ($p = 0.23$).
The mean baseline CD4 count for all 147 patients was 772 cells/mm3 (range: 48–2356). It was 884 (48–2356) for HIV negative and 280 (58–484) for HIV positive patients. A decrease in CD4 counts was noted 6 weeks after the start of radiotherapy ("mean decrease" for the HIV negative = −485, mean decrease for the HIV positive = −118).
Three months later, the CD4 counts had partially recovered ("mean decrease" for HIV negative = −317, "mean decrease" for the HIV positive = +6). One-hundred and twenty of the 147 patients (82%) received radiotherapy as planned, while in the rest either the teletherapy or the brachytherapy component was not done. Seventeen patients (11.6%) did not receive a boost dose following EBRT to the whole pelvis. Among the 130 patients receiving a boost, it was delivered either by brachytherapy (75%) or a small volume external beam field (25%).
The total teletherapy dose was significantly different among the four countries, being the lowest in Zimbabwe (mean 22.4 Gy, range 0–50) and highest in Namibia and Uganda (mean 50 Gy, range 50–50) $p = 0.0001$. A machine breakdown in Zimbabwe resulted in 10 registered patients not receiving any radiotherapy whatsoever (4 HIV positive and 6 HIV negative) while 11 received only brachytherapy. Thus, 21/40 Zimbabwean patients had major protocol violations.
The median follow-up for all patients was 71 days (range: 2–609). Median survival was 407 days for HIV positive patients and exceeds this for the HIV negative. The 20 HIV positive patients receiving full course radiotherapy had a median survival of 489 days while the 7 HIV positive patients who did not receive a full course had a median survival of 92 days. On univariate analysis there was a significant survival advantage for patients receiving higher teletherapy doses (0–22 Gy versus 22–48 Gy versus 50 Gy, $p < 0.001$). The FIGO stage did not influence survival ($p = 0.40$). On univariate analysis, HIV negative patients survived longer than HIV positive ($p = 0.011$) but multivariate analysis showed that only the total teletherapy dose was significant for survival ($p < 0.001$).
Conclusions: The data from these four countries with limited resources showed that adequate radiotherapy was more significant for the patient's survival during the first year than her HIV status. No detrimental effect was observed from administering radiotherapy to HIV positive patients, notwithstanding the temporary depression of CD4 counts that recovered after a few months.

Poster presentations (Wed, 2 Nov)
Epidemiology, prevention and public health

553 POSTER

Increasing incidence trends of cervical cancer in young women in Tianjin, China 1981–2000

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Background: To describe trends in the incidence rates of primary cervical cancer in a geographically defined Chinese population. To compare incidence trends of cervical cancer in young with older women.
Methods: Primary cervical cancer cases (N = 2,2224) were diagnosed between 1981 and 2000 and identified by the Tianjin Cancer Registry. Age-adjusted and age-specific incidence rates were examined. Poisson regression was employed to assess the incidence rate trends. All statistical analyses were conducted using SAS 8.0.
Results: Crude and age-adjusted incidence rates in the study period were: 6.4/100,000 and 3.8/100,000, respectively. There were remarkable declining trends in incidence rates. The crude and age-adjusted incidence rates declined from 13.8/100,00 and 10.3/100.000 in 1981 to 3.3/100,000 and 2.0/100,000 in 2000. However, the changes in incidence rates were not consistent across age groups. In general, those aged 40 and older had contributed the most observed incidence decline. Contrary to the incidence patterns in people aged 40 and older, incidence rates in those aged 20–39 years and younger increased during the study period. While the results from Poisson regression analyses suggest overall significant trends of declining incidence rates in cervical cancer, there seemed to be a small upward tail toward the end of the study period.
Conclusion: The findings also indicated two worrisome aspects. First, the incidence rates seemed to increase in younger women; second, there seemed to be a rebound in incidence rates toward the end of the study period. The findings highlight the importance of targeted education toward high-risk population and shed light toward setting up more efficient screening strategies.

554 POSTER

Low levels of radiation as the factor of cancer risk at the liquidators of the Chernobyl accident consequences

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Introduction: Increase of the frequency of malignant diseases which could be radiation-induced in group of liquidators of the Chernobyl accident