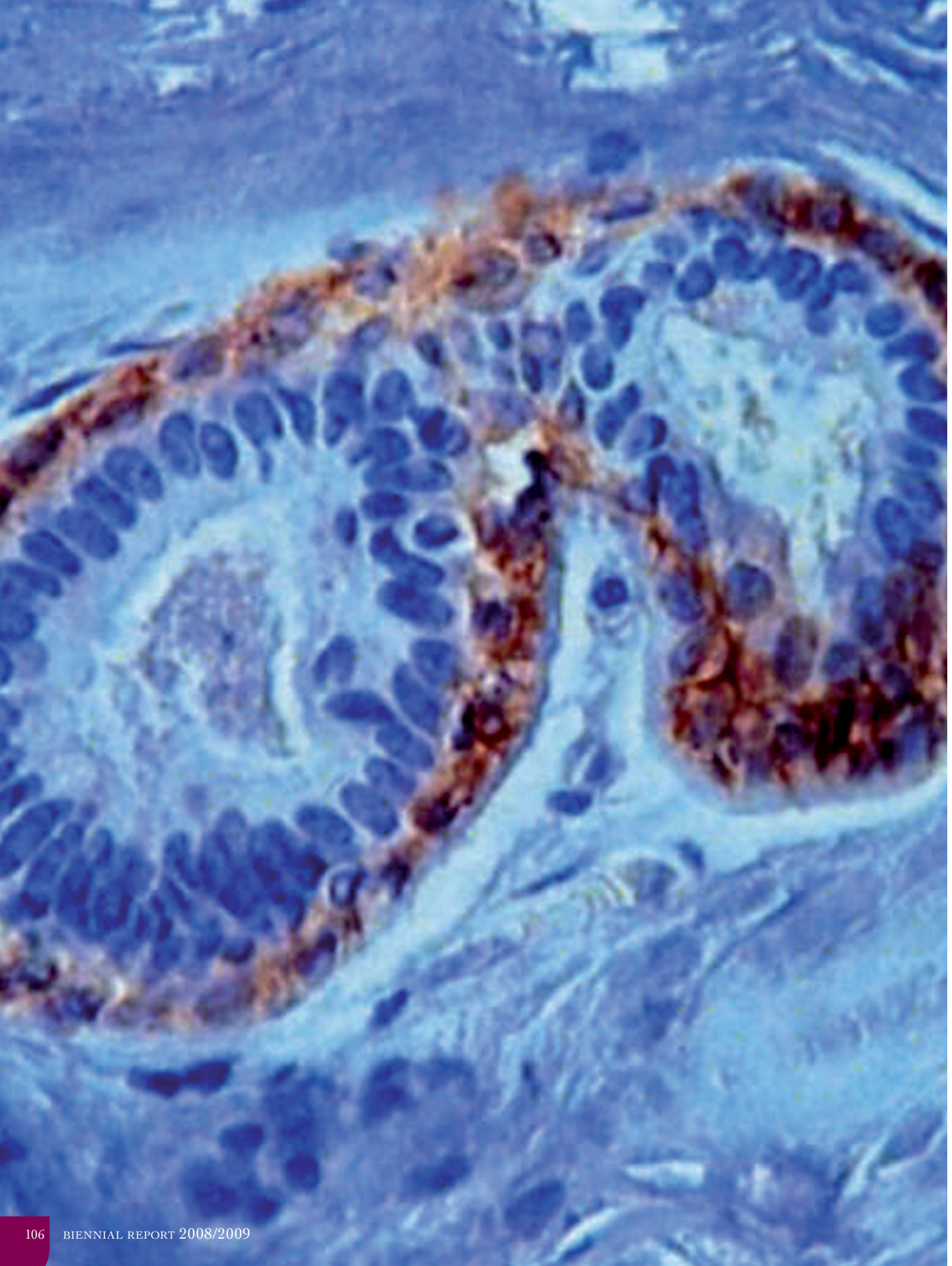


SECTION OF EARLY DETECTION & PREVENTION (EDP)

Section Head
Dr Rengaswamy Sankaranarayanan

THE SECTION OF EARLY DETECTION AND PREVENTION COMPRISES THREE GROUPS: THE PREVENTION GROUP (PRE), THE QUALITY ASSURANCE GROUP (QAS) AND THE SCREENING GROUP (SCR).

The Section seeks to provide evidence as to which primary and secondary prevention interventions are appropriate, effective and cost-effective in lowering the global burden of breast, cervical, oral, colorectal, skin and prostate cancers. This approach includes studying the means to implement integrated and quality-assured interventions in routine settings in different parts of the world. These research topics are in tune with the overall mission of the Agency in that they aim to reduce cancer burden by prevention.



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EXPOSURE TO ULTRAVIOLET RADIATION (UV) AND SKIN CANCER

The Prevention Group has international expertise on skin cancer and ultraviolet radiation, and regularly publishes on these topics. PRE staff are active members of international societies on skin cancer such as Euroskin and the EORTC Melanoma Group.

The main project in this domain in 2008–2009 is the Quantification of Sun Exposure in Europe and its Effects on Health (the Eurosun Project), a three-year project designed to monitor ultraviolet exposure in the European union and its effects on the incidence of skin cancers and cataracts. Meteorological satellite data will be used to calculate exposure to various UV wavelengths for European populations; these data will be used to produce an atlas of UV exposure in Europe, which will contain maps similar to the one displayed in Figure 1. These data will also serve to predict the global EU burden of UV-related diseases in the future. Concurrent with this project is a similar one, limited to France, funded by AFSSET (Agence Française de Sécurité Sanitaire de l'Environnement et du Travail, Paris).

The Prevention Group has a broad agenda on indoor tanning issues, and participated in the 2009 IARC Monographs Volume 100-D meeting on radiation that classified this exposure as a Group I carcinogen. Ongoing collaborations with the WHO aim to translate into public health terms the most recent scientific evidence on the deleterious effects of exposure to artificial UV radiation.

VITAMIN D AND CANCER

An international IARC Working Group was established in 2007–2008 to investigate the current status of knowledge about the potential cause-effect relationship between an individual's vitamin D status and cancer and to determine if any anti-cancer benefit may be gained from increasing vitamin D status. Systematic reviews were undertaken, with meta-

analyses, and the results are available in a downloadable report:

http://www.iarc.fr/en/content/download/10701/74064/file/Report_VitD.pdf

In brief, increasing vitamin D status was associated with a reduced risk of colorectal cancer, and not of breast or prostate cancer. Other studies show no evidence for an association with ovarian or pancreatic cancer. Randomised trials testing vitamin D supplements did not show a protective effect against colorectal cancer, but our meta-analysis published in 2007 showed a reduction in all-cause mortality associated with taking these supplements (*Autier and Gandini, 2007). The key issue now is to sort out whether vitamin D status is simply a marker or is causally associated with cancer and other chronic diseases.

EUROCADET PROJECT (www.eurocadet.org)

The objective of this project is to estimate the effect of the successful implementation of prevention strategies on the incidence of cancer. Data were gathered in 30 European countries on key exogenous determinants of cancer: smoking, alcohol consumption, overweight and obesity, physical activity, use of post-menopause hormonal treatment, and fruit and vegetable consumption. The future burden of cancer incidence in Europe was also calculated. These exposure data and incidence prediction will serve as a basis for developing scenarios of public health interventions and their likely impact on the cancer burden in Europe.

EVALUATION OF IMPACT OF SCREENING ACTIVITIES ON CANCER MORTALITY

In mid-2007 the Prevention Group began conducting evaluations of the impact of screening activities on the incidence of advanced cancer at diagnosis. Normally, if screening works and is widespread, the incidence of advanced cancer should

decrease. Such a decrease is independent of the effects of treatments and can provide information on the contribution of screening to changes in mortality. If this concept is largely accepted by the scientific community so far, it has only been correctly ascertained for cervical cancer screening. The Group hopes to have finished its evaluation of breast cancer screening by the end of 2009, and the first articles are already published or in press (*Autier *et al.*, 2009). This first article shows that in randomised trials on mammography screening, the decreases in breast cancer mortality were preceded by similar decreases in the incidence of advanced breast cancer. The next cancer we will examine is colorectal cancer.

TYROL STUDY ON PROSTATE CANCER

Prostate cancer screening activities have existed for the past 20 years in Tyrol, Austria. A large database has been put together by the Department for Urology at Innsbruck Medical University (Innsbruck, Austria) collecting the full pre-clinical and clinical history of men who were tested for prostate cancer. Analysis of this data will provide invaluable information on the natural course of this cancer.

METHODOLOGICAL ISSUES

The Prevention Group has developed methodological expertise in the area of meta-analysis, mainly for observational studies, for which little guidance is available in the specialised literature. This has allowed us to produce original meta-analytic work for vitamin D and cancer and for mobile phones and cancer. These studies will be published as articles or reports in late 2009 and in 2010.

The Group is also involved in the methodological issues inherent in what exactly is meant by “cancer incidence” when a cancer can be screen-detected. The first result of this work was an article on the limitations of using cancer survival data in public health (*Autier *et al.*, 2007).

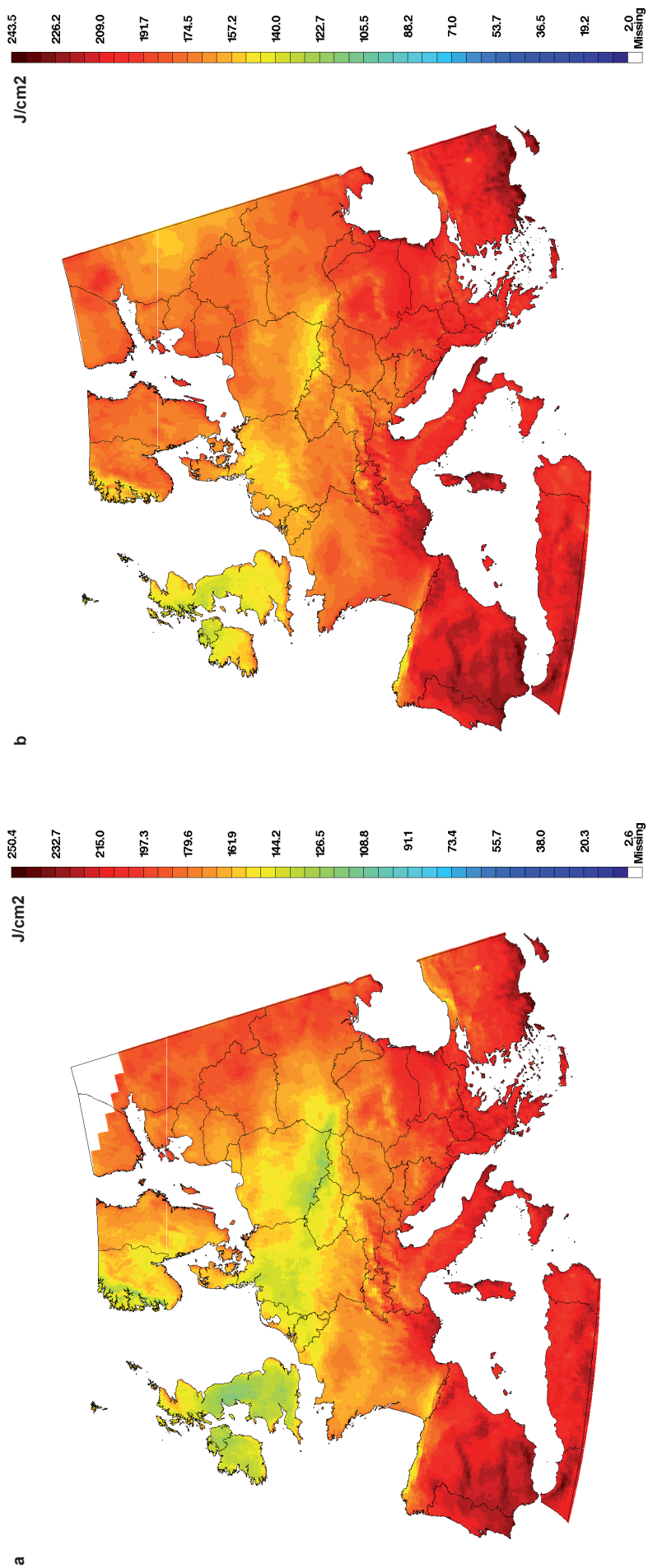


Figure 1. Daily mean of total UV irradiation averaged over 5-year periods in Europe during the month of June for the period 1998–2002 (a) and for the period 2003–2007 (b)

The ECO is an IARC-hosted website designed to present the number of cases and deaths by cancer in European countries in a user-friendly manner (<http://eu-cancer.iarc.fr>). The ECO site, launched on 5 May 2009, was developed by Philippe Autier (PRE group) and Jacques Ferlay (DEP group). Data presented on the site are those made publicly available by cancer registries and by national statistics agencies. The data on cancer cases are derived from data used for volumes I to VIII of the IARC Cancer Incidence in Five Continents Series. Data on mortality by cancer are derived from World Health Organization (WHO) data.



Figure 2. European Cancer Observatory website. <http://eu-cancer.iarc.fr>

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- The University of Innsbruck, Austria
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PUBLICATIONS

- Autier P (2009). Sunscreen abuse for intentional sun exposure. *Br J Dermatol*;161(Suppl. 3):28-33 [Early online publication].
- Autier P. Two views of science and the real world. RE: Observational Research, Randomised Trials, and Two Views of Medical Science by Vandenbroucke JP *PLoS Medicine* Vol. 5, No. 3, e67 doi:10.1371/journal.pmed.0050067.
- Autier P, Ait Ouakrim D (2008). Numbers of mammography equipments in thirty countries where significant mammography screening exists. *Br J Cancer*;99:1185-90.
- Autier P, Boyle P (2008). Artificial ultraviolet sources and skin cancers : rationale for restricting access to sunbed use before 18 years of age. *Nat Clin Pract Oncol*;5(4):178-179.
- *Autier P, *Boniol M, Héry C, Masuyer E, Ferlay J (2007). Cancer survival statistics should be viewed with caution. *Lancet Oncol*;8:1050-2.
- *Autier P, *Héry C, Haukka J, *Boniol B, Byrnes G (2009). Advanced breast cancer and breast cancer mortality in randomized controlled trials on mammography screening. *J clin Oncol* (in press).
- Bartsch G, Horninger W, Klocker H, Pelzer A, Bektic J, Oberaigner W, Schennach H, Schäfer G, Frauscher F, Boniol M, Severi G, Robertson C, Boyle P; Tyrol Prostate Cancer Screening Group (2008). Tyrol Prostate Cancer Demonstration Project: early detection, treatment, outcome, incidence and mortality. *BJU Int*;101(7):809-16.
- Berthiller J, Straif K, Boniol M, Voirin N, Benhaïm-Luzon V, Ayoub WB, Dari I, Laouamri S, Hamdi-Cherif M, Bartal M, Ayed FB, Sasco AJ (2008). Cannabis smoking and risk of lung cancer in men: a pooled analysis of three studies in Maghreb. *J Thorac Oncol*;3(12):1398-403.
- Boffetta P, Tubiana M, Hill C, Boniol M, Aurengo A, Masse R, Valleron AJ, Monier R, de Thé G, Boyle P, Autier P (2008). The causes of cancer in France. *Ann Oncol*;20:550-5.
- Boniol M, Chignol MC, Doré JF (2008). Sun protection among skin cancer-treated patients. *J Eur Acad Dermatol Venereol*;22(5):646-7
- Boniol M, Dore JF, Autier P (2008). Changing the labelling of Sunscreen, Will We Transform Sun Avoiders into Sunscreen Users? *J Invest Dermatol*;128(2):481-482.
- Boniol M, Verriest JP, Pedoux R, Doré JF (2008). Proportion of skin surface area of children and young adults from 2 to 18 years old. *J Invest Dermatol*;128(2):461-4
- Boyle P, Boffetta P, Autier P (2008). Diet, nutrition and cancer: public, media and scientific confusion. *Ann Oncol*;19(10):1665-7.
- Braeckman J, Autier P, Garbar C, Marichal MP, Soviany C, Nir R, Nir D, Michielsen D, Bleiberg H, Egevad L, Emberton M (2008). The accuracy of transrectal ultrasonography supplemented with computer-aided ultrasonography for detecting small prostate cancers. *Br J Urology Int*;101(3):293-8.
- Caini S, Gandini S, Sera F, Raimondi S, Fargnoli MC, Boniol M, Armstrong BK (2009). Meta-analysis of risk factors for cutaneous melanoma according to anatomical site and clinico-pathological variant. *Eur J Cancer* [Early online publication].
- Cantwell MM, Murray LJ, Catney D, Donnelly D, Autier P, Boniol M, Fox C, Middleton RJ, Dolan OM, Gavin AT (2009). Second primary cancers in patients with skin cancer: A population-based study in Northern Ireland. *Br J Cancer*;45(13):2360-6.
- Coordination and report writing of the report on Vitamin D and Cancer, IARC Working Group Report No. 5, International Agency for Research on Cancer, Lyon, 2008 (available at www.iarc.fr, search for "vitamin D").
- Degrave E, Meeusen B, Grivegnée AR, Boniol M, Autier P (2009). Causes of death among Belgian professional military radar operators: a 37-year retrospective cohort study. *Int J Cancer*;124(4):945-51.
- Gandini S, Botteri E, Iodice S, Boniol M, Lowenfels AB, Maisonneuve P, Boyle P (2008). Tobacco smoking and cancer: a meta-analysis. *Int J Cancer*;122(1):155-64.
- Gibson LJ, Héry C, Mitton N, Gines-Bautista A, Parkin DM, Ngelangel C, Pisani P (2009). Risk factors for breast cancer among Filipino women in Manila. *Int J Cancer* [Early online publication]
- Hery C, Ferlay J, Boniol M, Autier P (2008). Quantification of changes in breast cancer incidence and mortality since 1990 in 35 countries with Caucasian-majority populations. *Annals of Oncology*;19:1187-94.
- Hery C, Ferlay J, Boniol M, Autier P (2008). Changes in breast cancer incidence and mortality in middle-aged and elderly women in 28 countries with Caucasian majority populations. *Annals of Oncology*;19:1009-18.
- Montella A, Gavin A, Middleton R, Autier P, Boniol M (2009). Cutaneous melanoma mortality starting to change: A study of trends in Northern Ireland. *Eur J Cancer* (in press).

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THE OBJECTIVE OF SCREENING GROUP PROJECTS IS TO GUIDE THE DEVELOPMENT OF EVIDENCE-BASED PUBLIC HEALTH POLICIES IN IMPLEMENTING CANCER SCREENING AND EARLY DIAGNOSIS IN A RANGE OF HEALTHCARE SETTINGS, PARTICULARLY IN LOW- AND MEDIUM-RESOURCE COUNTRIES, LEADING TO RATIONAL UTILISATION OF HEALTHCARE RESOURCES AND TO IMPROVING QUALITY OF LIFE. TO MEET THIS REQUIREMENT, OUR STUDIES ADDRESS THE ACCURACY, REPRODUCIBILITY, EFFICACY, BENEFITS, HARMFUL EFFECTS AND COST-EFFECTIVENESS OF DIFFERENT SCREENING INTERVENTIONS FOR BREAST, CERVICAL, ORAL AND OTHER CANCERS, AND DEVELOPMENT OF QUALITY ASSURANCE STANDARDS FOR SCREENING IN DIFFERENT SETTINGS, IN COLLABORATION WITH NATIONAL INSTITUTIONS IN DIFFERENT COUNTRIES.

I. CERVICAL CANCER SCREENING

Cluster-randomised controlled trial on the effectiveness of a single round of HPV testing, cytology testing or visual inspection with acetic acid in Osmanabad

The efficacy and cost-effectiveness of a single round of screening using HPV testing or cervical cytology or visual inspection with acetic acid (VIA) in preventing cervical cancer cases and deaths as compared to a control group receiving routine care plus health education on cervical cancer prevention is being assessed in a cluster randomized trial in the Osmanabad district, India (*Sankaranarayanan, Nene *et al.*, 2009). Screen-positive women had colposcopy and directed biopsies. Women with CIN were treated with cryotherapy by nurses, or loop excision by doctors. About 79% of the eligible women in the different groups were screened. About 60% of the patients in the HPV and cytology groups and 42% in the VIA group were diagnosed in stage I, as compared to 28% in the control group. There was a significant 53% reduction in the incidence rate of stage II or worse stages of invasive cervical cancer, and a significant 48% reduction in cervical cancer mortality in the HPV group as compared to the control group (Table 1). The significant reduction in the incidence of advanced cancers and cervical cancer

deaths associated with HPV testing is quite likely to be due to the fact that HPV testing detects more precancerous lesions, with a high potential for malignant transformation, as compared to VIA or cytology, and that HPV testing is more sensitive than the other two tests for true premalignant lesions, resulting in fewer subsequent cancers diagnosed among the HPV-negative women.

Cryotherapy and loop electrosurgical excision procedure for treatment of cervical precancerous lesions

The effectiveness, safety and acceptability of treatment of cervical intraepithelial neoplasia (CIN) using cryotherapy provided by midwives and using loop electrosurgical excision procedure (LEEP) by new trained physicians were assessed in three studies in rural India (Table 2) (*Nene *et al.*, 2008; *Rema *et al.*, 2008; *Sankaranarayanan, Keshkar *et al.*, 2009). We reported 94% cure rates for CIN by cryotherapy and 87%–94% rates for LEEP. Similar results are observed in developed countries. Minor side effects and complications were reported in less than 10% of women; these treatments are judged to be effective, safe and acceptable to women.

Table 1. Incidence rates of stage II or worse and mortality rate in the cervical cancer screening trial in Osmanabad District, India

Variable	HPV testing	Cytology	VIA	Control
Incidence of stage II or worse cervical cancer (N)	39	58	86	82
Rate per 100 000 person-years	14.9	23.8	21.7	34.6
Hazard ratio (95% CI)	0.49 (0.33–0.72)	0.78 (0.52–1.17)	1.09 (0.76–1.58)	1.00
Deaths from cervical cancer (N)	34	54	56	64
Rate per 100 000 person-years	13.0	22.1	21.7	27.0
Hazard ratio (95% CI)	0.53 (0.33–0.86)	0.91 (0.63–1.30)	0.90 (0.63–1.28)	1.00

HPV: Human papillomavirus; VIA: visual inspection with acetic acid; CI: confidence interval

Table 2. Follow-up details of histologically-proven CIN treated with cryotherapy of LEEP in 3 different studies in India

	Study author (treatment offered)		
	Nene et al., 2008 (Cryotherapy)	Rema et al., 2008 (LEEP)	Sankaranarayanan, Keshkar et al., 2009
Number treated	728	311	634
Number followed up (%)	574 (78.8)	283 (91.0)	489 (77.1)
Number disease-free (%)	538 (93.7)	248 (87.6)	459 (93.9)
Number with minor side effects and complications (%)	40 (5.5)	39 (12.5)	39 (6.2)

LEEP: loop electrosurgical excision procedure

The Screening Technologies to Advance Rapid Testing (START) project for cervical cancer prevention

The START project for cervical cancer prevention aims to develop, evaluate and make available affordable and accurate biochemical tests for the early detection of CIN in public health and clinical practice in developing countries. This project is in collaboration with the Nargis Dutt Memorial Cancer Hospital (NDMCH), Barshi and the Tata Memorial Centre (TMC), Mumbai, contributing to the development, validation and future commercial availability of the new test formats. From September 2005 to August 2007 we screened 10 593 women and collected 35 900 cervical and vaginal samples for test development

and validation. A total of 407 biopsy specimens pertaining to all CIN cases and invasive cancer, as well as a sample of normal cases, were brought to Lyon for HPV genotyping and p16 immunostaining. We are currently analysing the data and investigating why the performance of fast HPV test in the Indian START component was inconsistent with that in China. In addition, results from HPV genotyping and p16 immunostaining will be used to reinforce the validity of histology diagnosis of CIN in our study.

Multicentre HPV vaccine project

This is a major randomised clinical trial in collaboration with 8 centres in India (Tata Memorial Centre, Mumbai; Nargis Dutt Memorial Cancer Hospital, Barshi;

Jehangir Clinical Development Centre, Pune; Christian Fellowship Community Health Centre, Ambillikai; Gujarat Cancer Research Institute, Ahmedabad; All India Institute of Medical Sciences, New Delhi; MNJ Cancer Institute, Hyderabad and Cancer Foundation of India, Kolkata) to generate scientific evidence on the clinical efficacy of two-dose HPV vaccination as compared the current standard three-dose to prevent persistent HPV infection and cervical neoplasia in order to guide public health policies for planning and implementing wide-scale, sustained HPV vaccination delivery to pre- and early adolescent girls. This study will involve around 20 000 girls aged 10–18 years, and is funded by the Bill & Melinda Gates Foundation. The study protocol received clearance from the Ethics committees

of IARC and our Indian collaborative centres, and from the Ministry of Health and the Drugs Controller General of India, and the vaccination process is underway.

Training

The Group conducted six training courses in cervical cancer screening and prevention (1 in China, 2 in India, 1 in Tanzania, 1 in Gabon, and 1 in Morocco), training around 100 doctors and nurses from Asian and African countries. The group also published digital training manuals for cervical screening and treatment of CIN. Our collaborative cervical cancer prevention training schools in India, Angola, Guinea, Tanzania, Brazil and Peru are active in training human resources in their respective regions.

2. ORAL CANCER SCREENING

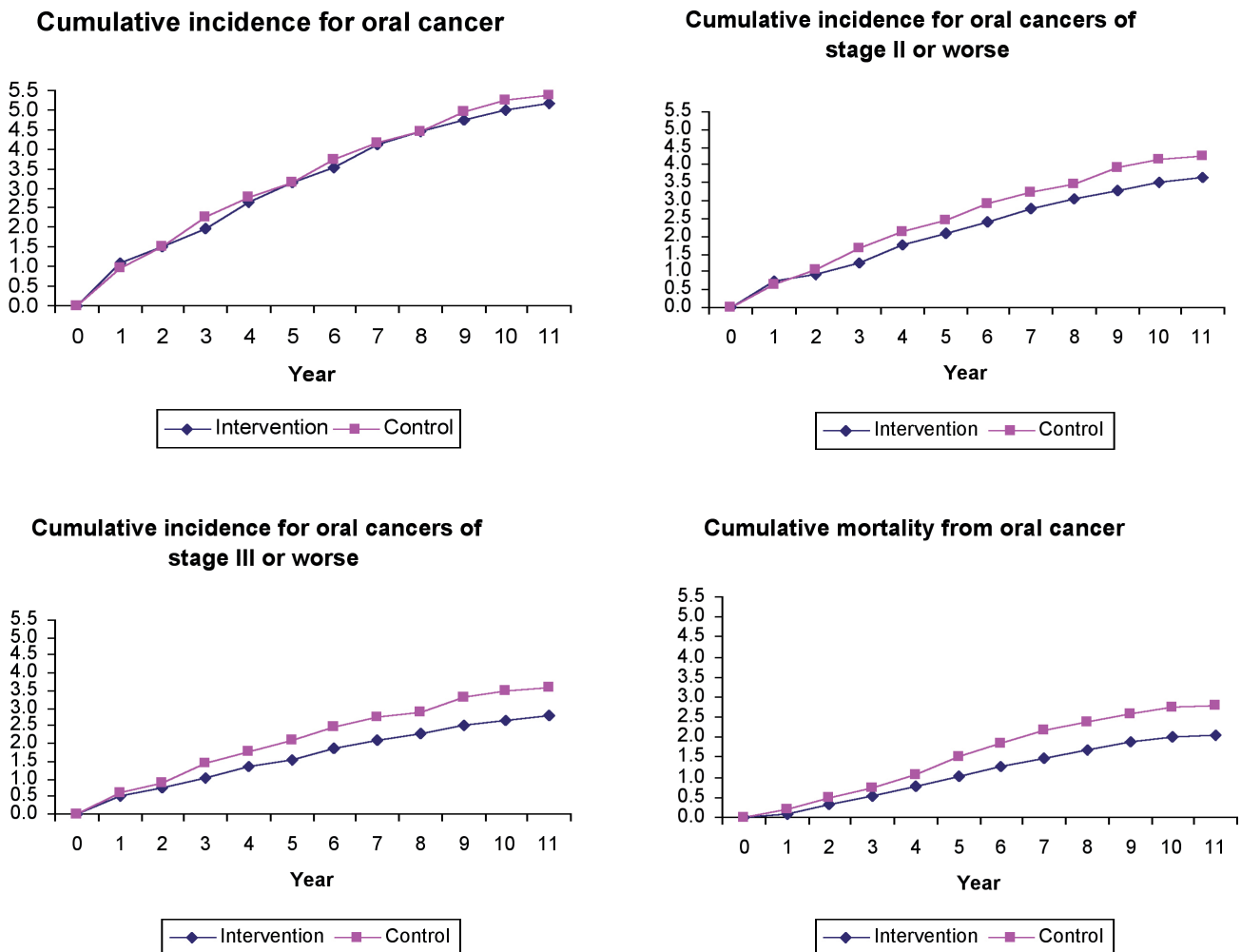
Following a 34% reduction in oral cancer mortality among tobacco and/or alcohol users observed in a randomised controlled screening trial involving 200 000 subjects in Trivandrum district, Kerala, India, we have now completed a single round of oral screening for the 100 000 control subjects, as part of our ethical obligation (*Sankaranarayanan *et al.*, 2005). A similar trend in reduction of cancer burden is still being observed after 13 years of follow-up. Figure 1 shows similar cumulative cancer incidence during follow-up between the intervention and the control groups. However, the difference between the two groups increased with increasing cancer stage and with mortality. A study of the cost-effectiveness of oral cancer screening reported that the most cost-effective

approach was to focus on tobacco and/or alcohol users (*Subramanian *et al.*, 2009). A clinical reference chart and web-based atlas to help in the detection of oral precancerous lesions and early diagnosis of oral cancer has been developed and will be validated.

3. BREAST CANCER SCREENING

A cluster-randomised controlled trial was initiated in Kerala, India in collaboration with the Regional Cancer Centre (RCC), Trivandrum, India, to evaluate the effectiveness of a comprehensive intervention consisting of health education, opportunities for clinical early diagnosis and the provision of readily accessible diagnosis and treatment services in the clinical early detection and improved outcome of breast cancer. Around 56 000 women have been

Figure 1. Cumulative incidence and mortality rate curves of oral cancer in the Trivandrum Oral Cancer Study



recruited in the intervention arm to receive health education and clinical breast examination (CBE) by trained health workers, and 59 000 in the control arm to receive the currently existing health care in the region and health education on early detection and prevention of cervical cancer. Among the eligible women in the intervention arm, 90% received CBEs, of whom 6% were found to have abnormal breast symptoms and were referred for further investigations by physicians. Half of these women complied with the referral. During the first round, 74 breast cancer cases have been diagnosed in the intervention group (15% at stage I) and 61 in the control group (8% at stage I).

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The Bill & Melinda Gates Foundation, Seattle, USA
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The SCR Group is grateful to the following for their collaboration in its projects:

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PUBLICATIONS

- Anttila A, von Karsa L, Aasmaa A, Fender M, Patrick J, Rebolj M, Nicula F, Vass L, Valerianova Z, Voti L, Sauvaget C, Ronco G (2009). Cervical cancer screening policies and coverage in Europe. *Eur J Cancer* (in press).
- Arbyn M, Sankaranarayanan R, Muwonge R, Keita N, Dolo A, Mbalawa CG, Nouhou H, Sakande B, Wesley R, Somanathan T, Sharma A, Shastri S, Basu P (2008). Pooled analysis of the accuracy of five cervical cancer screening tests assessed in eleven studies in Africa and India. *Int J Cancer*;123(1):153-160.
- Arrossi S, Ramos S, Paolino M, Sankaranarayanan R (2008). Social inequality in Pap smear coverage: identifying under-users of cervical cancer screening in Argentina. *Reprod Health Matters*;16(32):50-58.
- Bhatla N, Gulati A, Mathur SR, Rani S, Anand K, Muwonge R, Sankaranarayanan R (2009). Evaluation of cervical screening in rural North India. *Int J Gynaecol Obstet*; 105(2):145-149.
- Cancela Mde C, Ramadas K, Fayette JM, Thomas G, Muwonge R, Chapuis F, Thara S, Sankaranarayanan R, Sauvaget C (2009). Alcohol intake and oral cavity cancer risk among men in a prospective study in Kerala, India. *Community Dent Oral Epidemiol*; 37(4):342-349.
- Classen M, Lambert R (2008). International Digestive Cancer Alliance. Colorectal cancer screening in Europe--a survey of the International Digestive Cancer Alliance between November 2004 and March 2007. *Z Gastroenterol* ;46 (Suppl 1):S23-24.
- Cuzick J, Arbyn M, Sankaranarayanan R, Tsu V, Ronco G, Mayrand MH, Dillner J, Meijer CJ (2008). Overview of human papillomavirus-based and other novel options for cervical cancer screening in developed and developing countries. *Vaccine*;26(Suppl 10):K29-41.
- Garland SM, Cuzick J, Domingo EJ, Goldie SJ, Kim YT, Konno R, Parkin DM, Qiao YL, Sankaranarayanan R, Stern PL, Tay SK, Bosch FX (2008). Recommendations for cervical cancer prevention in Asia Pacific. *Vaccine*;26(Suppl 12): M89-98.
- Gheit T, Vaccarella S, Schmitt M, Pawlita M, Franceschi S, Sankaranarayanan R, Sylla BS, Tommasino M, Gangane N (2009). Prevalence of human papillomavirus types in cervical and oral cancers in central India. *Vaccine*;27(5):636-639.
- Kudo S, Lambert R (2008). Gastrointestinal endoscopy. Preface. *Gastrointest Endosc*;68(Suppl 4):S1.
- Kudo S, Lambert R, Allen JI, Fujii H, Fujii T, Kashida H, Matsuda T, Mori M, Saito H, Shimoda T, Tanaka S, Watanabe H, Sung JJ, Feld AD, Inadomi JM, O'Brien MJ, Lieberman DA, Ransohoff DF, Soetikno RM, Triadafilopoulos G, Zauber A, Teixeira CR, Rey JF, Jaramillo E, Rubio CA, Van Gossum A, Jung M, Vieth M, Jass JR, Hurlstone PD (2008). Nonpolypoid neoplastic lesions of the colorectal mucosa. *Gastrointest Endosc*;68(Suppl 4):S3-47.
- Lambert R (2008). Upper gastrointestinal tumours. *Endoscopy*;40(2):131-135.
- Lambert R (2009). Upper gastrointestinal tumors. *Endoscopy*;41(1):46-50.
- Lambert R (2008). Balancing the benefits and risks of esophageal stenting in the palliation of malignant dysphagia. *J Support Oncol*;6(6):275-276.
- Lambert R (2009). Colonoscopy: Maximizing detection and characterization. *Gastroenterol Clin Biol*;33:737-746.
- Lambert R, Franceschi S (2008). IDCS columns in World Gastroenterology News Series. *Editors Endoscopy*;13(2):15-17.

- Lambert R, Sauvaget C, Sankaranarayanan R (2009). Mass screening for colorectal cancer is not justified in most developing countries. *Int J Cancer*;125(2):253-256.
- Muwonge R, Mbalawa CG, Keita N, Dolo A, Nouhou H, Nacoulma M, Malanda JN, Koulibaly M, Bayo S, Sankaranarayanan R; IARC Multicentre Study Group on Cervical Cancer Early Detection (2009). Performance of colposcopy in five sub-Saharan African countries. *BJOG*;116(6):829-837.
- Muwonge R, Ramadas K, Sankila R, Thara S, Thomas G, Vinoda J, Sankaranarayanan R (2008). Role of tobacco smoking, chewing and alcohol drinking in the risk of oral cancer in Trivandrum, India: a nested case-control design using incident cancer cases. *Oral Oncol*;44(5):446-454.
- Nene BM, Hiremath PS, Kane S, *Fayette JM, Shastri SS, *Sankaranarayanan R (2008). Effectiveness, safety, and acceptability of cryotherapy by midwives for cervical intraepithelial neoplasia in Maharashtra, India. *Int J Gynaecol Obstet*;103(3): 232-236.
- Ramadas K, Arrossi S, Thara S, Thomas G, Jissa V, Fayette JM, Mathew B, Sankaranarayanan R (2008). Which socio-demographic factors are associated with participation in oral cancer screening in the developing world? Results from a population-based screening project in India. *Cancer Detect Prev*;32(2):109-115.
- Rema P, Suchetha S, Thara S, *Fayette JM, Wesley R, *Sankaranarayanan R (2008). Effectiveness and safety of loop electrosurgical excision procedure in a low-resource setting. *Int J Gynaecol Obstet*;103(2):105-110.
- Rey JF, Lambert R (2009). Second look colonoscopy: indication and requirements. *Dig Endosc*;21 (Suppl 1):S47-49.
- Rey JF, Tanakata S, Lambert R, Tajiri H (2009). Evaluation of the clinical outcomes associated with EXERA II and LUCERA endoscopes. *Dig Endosc*;21(Suppl 1):S113-120.
- Sankaranarayanan R (2008). Commentary: Cancer incidence among Asian Indians in India and abroad. *Int J Epidemiol*;37(1):160-161.
- Sankaranarayanan R (2009). HPV vaccination: the promise & problems. *IJMR* (in press).
- Sankaranarayanan R, Bhatla N, Gravitt PE, Basu P, Esmey PO, Ashrafunnessa KS, Ariyaratne Y, Shah A, Nene BM (2008). Human papillomavirus infection and cervical cancer prevention in India, Bangladesh, Sri Lanka and Nepal. *Vaccine*;26(Suppl 12):M43-52.
- Sankaranarayanan R, Ferlay J (2009). Worldwide burden of gynaecological cancer. In: Preedy, VR and Watson RR (eds). *Handbook of Disease Burdens and Quality of Life Measures*. (in press).
- *Sankaranarayanan R, Keshkar V, Kothari A, Kane S, *Fayette JM, Shastri S (2009). Effectiveness and safety of loop electrosurgical excision procedure for cervical neoplasia in rural India. *Int J Gynaecol Obstet*;104(2):95-99.
- Sankaranarayanan R, Nene BM, Shastri SS (2009). A single-round of HPV testing reduces advanced cervical cancers and deaths by half. *HPV Today Newsletter*;19:4-5.
- *Sankaranarayanan R, Nene BM, Shastri SS, Jayant K, *Muwonge R, Budukh AM, Hingmire S, Malvi SG, Thorat R, Kothari A, Chinoy R, Kelkar R, Kane S, Desai S, Keskar VR, Rajeshwarkar R, Panse N, Dinshaw KA (2009). HPV screening for cervical cancer in rural India. *N Engl J Med*;360(14):1385-1394.
- Sankaranarayanan R, Sauvaget C (2008). HPV vaccination in the developing world. In: Stern PL, Kitchener HC. eds. *Vaccines for the Prevention of Cervical Cancer*; Oxford University Press. pp. 103-113.
- Sankaranarayanan R, Thara S, Esmey PO, Basu P (2008). Cervical cancer: screening and therapeutic perspectives. *Med Princ Pract*;17(5):351-364.
- Sankaranarayanan R, Thara S, Ngoma T, Naud P (2009). Cervical Cancer Screening in the developing world. In: Finkel, M. (eds). *Perspectives in Public Health: Challenges for the 21st century* (in press).
- Sauvaget C (2009). Body mass index and mortality in India. *Handbook of Anthropometry: physical measures of human form in health and disease*. (in press).
- Sauvaget C, Ramadas K, Fayette JM, Thomas G, Thara S, Sankaranarayanan R (2009). Completed suicide in Kerala: rates and determinants. *Nat Med J India* (in press).
- Sauvaget C, Ramadas K, Thara S, Thomas G, Sankaranarayanan R (2008). Tobacco chewing in India. *Int J Epidemiol*;37(6):1242-1245.
- Sauvaget C, Ramadas K, Thomas G, Vinoda J, Thara S, Sankaranarayanan R (2008). Body mass index, weight change and mortality risk in a prospective study in India. *Int J Epidemiol*;37(5):990-1004.
- Sauvaget C, Ramadas K, Thomas G, Thara S, Sankaranarayanan R (2009). Prognosis criteria of casual systolic and diastolic blood pressure values in a prospective study in India. *J Epidemiol Community Health* (in press).
- Subramanian S, *Sankaranarayanan R, Bapat B, Somanathan T, Thomas G, Mathew B, Vinoda J, Ramadas K (2009). Cost-effectiveness of oral cancer screening: results from a cluster randomized controlled trial in India. *Bull World Health Organ*;87(3):200-206.
- Swaminathan R, Selvakumaran R, Vinodha J, Ferlay J, Sauvaget C, Esmey PO, Shanta V, Sankaranarayanan R (2009). Education and cancer incidence in a rural population in south India. *Cancer Epidemiol*;33(2):89-93.

OTHER SCREENING REFERENCE CITED

*Sankaranarayanan R, Ramadas K, Thomas G, *Muwonge R, Thara S, Mathew B, Rajan B and for the Trivandrum Oral Cancer Screening Study Group (2005). Effect of screening on oral cancer mortality in Kerala, India: a cluster-randomised controlled trial. *Lancet*;365(9475):1927-1933

QUALITY ASSURANCE GROUP (QAS)

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CANCER SCREENING AIMS TO REDUCE THE BURDEN OF DISEASE BY DETECTING AND TREATING CANCER, OR IN SOME CASES PRECANCEROUS LESIONS, BEFORE INDIVIDUALS SEEK TREATMENT DUE TO SELF-DETECTED SIGNS OR SYMPTOMS. FOR A NUMBER OF CANCER SITES, PARTICULARLY BREAST, CERVICAL AND COLORECTAL CANCER, WHICH ACCOUNT FOR APPROXIMATELY ONE OF FOUR CANCER DEATHS WORLDWIDE, POPULATION-BASED SCREENING IS CURRENTLY A COMPONENT OF CANCER CONTROL IMPLEMENTED IN MANY HIGH-RESOURCE COUNTRIES. EFFORTS ARE UNDERWAY TO DEVELOP SCREENING STRATEGIES APPROPRIATE TO MEDIUM- AND LOW-RESOURCE COUNTRIES.

The vast majority of the people invited to attend population-based screening programmes have low to medium risk of developing a target cancer. The screening process has to be optimised for individuals to adequately benefit from early detection and to avoid the potentially detrimental effects of unnecessary further examinations or treatment. Therefore, comprehensive quality assurance, encompassing all aspects of the process of cancer screening is of paramount importance (Perry et al. 2009; European Commission 2008; Arbyn et al., in press).

The screening process comprises complex activities extending from invitation of the eligible population to performance of a screening test, assessment of detected abnormalities and, if necessary, treatment. Even in countries with relatively small target populations, quality-assured introduction of nationwide screening programmes may take 10 years or more due to the need for feasibility testing and planning, piloting and quality-assured rollout of services across the regions served by a programme. International collaboration has therefore become a key factor for successful application and further development of the standards and procedures required to maintain the

effectiveness and the cost-effectiveness of cancer screening programmes.

Achieving and maintaining high quality at every step in the screening process requires an integrated, population-based approach to programme implementation. The population-based approach is essential in order to adequately monitor, evaluate and continuously improve performance, and in order to give all eligible people an equal chance of benefiting from screening. Nationwide implementation of population-based screening programmes of appropriate quality generally makes services performing to high standards accessible to the entire population, not just those persons eligible to attend screening. Large numbers of professionals undertake further specialisation and training in order to meet the screening quality standards. Consequently, these nationwide efforts also contribute to widespread improvement in the diagnosis and management of cancers that are detected outside of screening programmes. Implementation of cancer screening programmes of appropriate quality therefore has the additional potential to improve the entire range of cancer care.



Figure 1

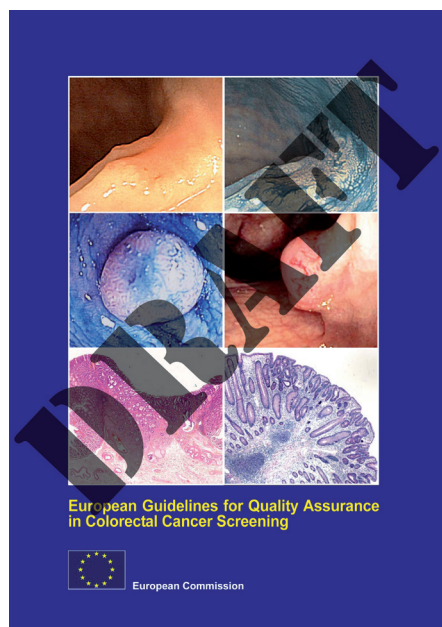


Figure 2

During the current biennium, the limited resources of the QAS group have been concentrated on further development and updating of European guidelines for quality assurance in breast, cervical and colorectal cancer screening (Figs. 1 and 2) and documentation of screening programme implementation in Europe (Fig. 3).¹(Karsa et al. 2008; Anttila et al. 2009).¹ Due to the wide span of activities and the multidisciplinary scope of quality assurance guidelines for cancer screening, collaboration with experts from several IARC groups and the WHO are ongoing. The current status of cancer screening programmes reflects the substantial experience gained in Europe: 70 breast, cervical or colorectal cancer screening programmes, 50 of which follow the population-based approach, had been implemented in the

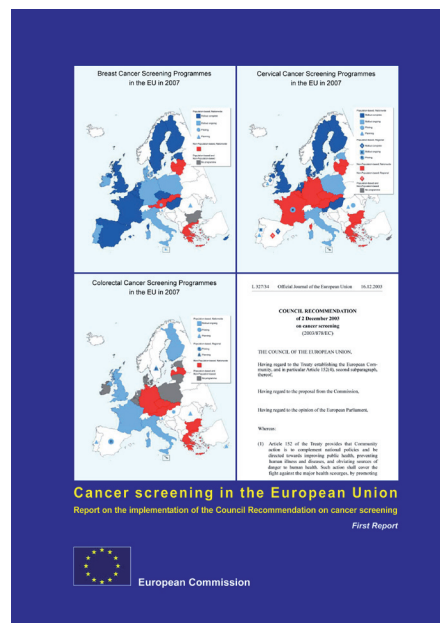


Figure 3

¹ These activities have been co-financed by the EU Health Programme through the projects: *European Cancer Network (ECN)*, grant no. 2004309, *European Network for Information on Cancer (EUNICE)* grant no. 2004114, *Development of Guidelines for Quality Assurance of Colorectal Cancer Screening*, grant no. 2005317, and *European Cooperation for development and implementation of Cancer screening and prevention Guidelines (ECCG-ECN)*, grant no. 2006322.

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EU by the end of 2007. At current levels, over 500 million screening tests will be performed in publicly mandated cancer screening programmes in the EU over the next 10 years. Due to the expansion of the current programmes, this volume is likely to double in the foreseeable future. Europe therefore offers a unique opportunity to deal with the challenges of implementation of population-based cancer screening programmes on a scale that is not likely to be encountered in other regions of the world until ten or more years from now. Colleagues from around the world have therefore been invited to collaborate with European experts in the efforts of the QAS group to further develop and to facilitate implementation

of quality assurance guidelines for population-based programmes for cancer screening.

A truly integrated approach to quality assurance in implementation of secondary prevention should be based on comprehensive efforts to control cancer and other chronic disease. During the current biennium, an increasing amount of attention has been devoted to expanding the evidence base to improve implementation of primary prevention strategies that are complementary to cancer screening. These include, for example, vaccination against human papilloma virus infection to prevent cervical cancer, as well as strategies to

effectively promote a healthy lifestyle by lowering risk factors such as smoking or lack of exercise. These activities have been co-financed through grants from the EU Health Programme to update cervical cancer screening and prevention guidelines and to update the European Code Against Cancer.² The EU project to develop guidelines on HPV vaccination will provide an important source of evidence and expertise for recently initiated efforts of the WHO, the French National Cancer Institute and IARC to collaborate in updating and expanding previous WHO guidelines on cervical cancer control.

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REFERENCES

Anttila A, Karsa L v, Aasmaa A, Fender M, Patnick J, Rebolj M, Nicula F, Vass L, Valerianova Z, Voti L, Sauvaget C, Ronco G (2009). Cervical cancer screening policies and coverage in Europe. *Eur J Cancer* 45(15): 2649-2658.

Arbyn M, Anttila A, Jordan J, Ronco G, Schenck U, Segnan N, Wiener H, Herbert A, von Karsa L (in press). European Guidelines for Quality Assurance in Cervical Cancer Screening. Second Edition - Summary Document. *Ann Oncol* 0314-R1.

European Commission (2008). European Guidelines for Quality Assurance in Cervical Cancer Screening – second edition. Arbyn M, Anttila A, Jordan J, Schenck U, Ronco G, Segnan N, Wiener H, Herbert A, Daniel J, von Karsa L (eds). Office for Official Publications of the European Communities, Luxembourg.

<http://bookshop.europa.eu/eubookshop/publicationDetails.action?pubuid=547021>

Karsa L v, Anttila A, Ronco G, Ponti A, Malila N, Arbyn M, Segnan N, Castillo-Beltran M, Boniol M, Ferlay J, Hery C, Sauvaget C, Voti L, Autier P (2008). Cancer screening in the European Union, Report on the implementation of the Council Recommendation on cancer screening – First Report. European Communities (publ.), Luxembourg. http://ec.europa.eu/health/ph_determinants/genetics/documents/cancer_screening.pdf

Perry N, Broeders M, de Wolf C, Tornberg S, Holland R, von Karsa L (2009). European guidelines for quality assurance in breast cancer screening and diagnosis. Fourth edition-summary document. *Ann Oncol* 19(4): 614-22. <http://annonc.oxfordjournals.org/cgi/content/abstract/mdm481?>

PUBLICATIONS

JOURNAL ARTICLES

Anttila A, Karsa L v, Aasmaa A, Fender M, Patnick J, Rebolj M, Nicula F, Vass L, Valerianova Z, Voti L, Sauvaget C, Ronco G. Cervical cancer screening policies and coverage in Europe. *Eur J Cancer* 2009 45(15): 2649-2658

Arbyn M, Anttila A, Jordan J, Ronco G, Schenck U, Segnan N, Wiener H, Herbert A, von Karsa L (in press). European Guidelines for Quality Assurance in Cervical Cancer Screening. Second Edition - Summary Document. *Ann Oncol* 0314-R1.

Grce M, Davies P, Arbyn M, Anttila A, Grubisic G, Kardum-Skelin I, Herbert A, Jordan J, von Karsa L (2008). Report on the 2007 International workshop on Human papillomaviruses and consensus recommendations for cervical cancer prevention. *Cent Eur J Public Health*, 16 (1): 38-40.

Perry N, Broeders M, de Wolf C, Tornberg S, Holland R, von Karsa L. European guidelines for quality assurance in breast cancer screening and diagnosis. Fourth edition-summary document. *Ann Oncol* 2009 19(4): 614-22

<http://annonc.oxfordjournals.org/cgi/content/abstract/mdm481?>

BOOKS

European Commission (2008) European Guidelines for Quality Assurance in Cervical Cancer Screening – second edition. Arbyn M, Anttila A, Jordan J, Schenck U, Ronco G, Segnan N, Wiener H, Herbert A, Daniel J, von Karsa L (eds). Office for Official Publications of the European Communities, Luxembourg.

<http://bookshop.europa.eu/eubookshop/publicationDetails.action?pubuid=547021>

Karsa L v, Anttila A, Ronco G, Ponti A, Malila N, Arbyn M, Segnan N, Castillo-Beltran M, Boniol M, Ferlay J, Hery C, Sauvaget C, Voti L, Autier P (2008). Cancer screening in the European Union, Report on the implementation of the Council Recommendation on cancer screening – First Report. European Communities (publ.), Luxembourg.

http://ec.europa.eu/health/ph_determinants/genetics/documents/cancer_screening.pdf

BOOK CHAPTERS

Ronco G, von Karsa L, Anttila A (2008). Chapter 7. Key performance indicators. In: European guidelines for quality assurance on cervical cancer screening - Second edition (Arbyn M, Anttila A, Jordan J et al., eds). Office for Official Publications of the European Communities; Luxembourg.

Arbyn M, von Karsa L (2008). Chapter 1. Introduction, In: European Guidelines for Quality Assurance in Cervical Cancer Screening – Second edition (Arbyn M, Anttila A, Jordan J et al., eds). Office for Official Publications of the European Communities; Luxembourg.