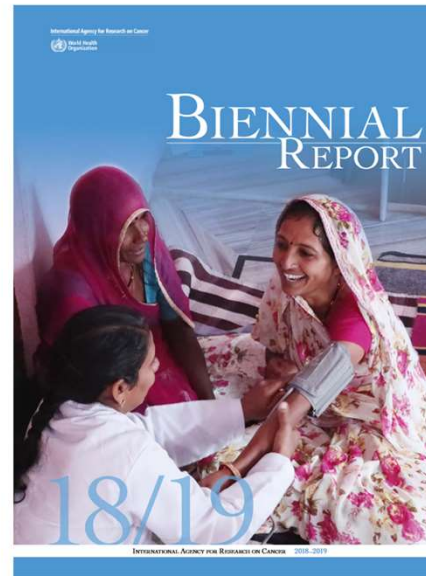


The IARC Biennial Report 2018-2019 (see [Document GC/62/2](#)) provides an overview of the full range of IARC's scientific achievements in the biennium. The present slides showcase a selection of the Agency's research over the last biennium.

IARC Biennial report 2018-2019

<http://publications.iarc.fr/Book-And-Report-Series/Iarc-Biennial-Reports/IARC-Biennial-Report-2018-2019>

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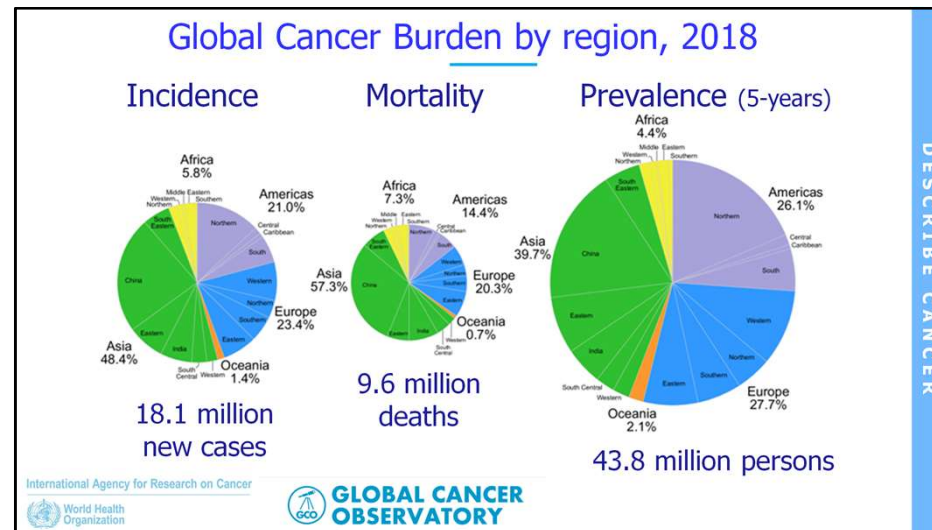
The IARC biennial report 2018-2019 is available on IARC website. The link to download the PDF version of the report is as following:

<http://publications.iarc.fr/Book-And-Report-Series/Iarc-Biennial-Reports/IARC-Biennial-Report-2018-2019>

Outline

- Describe the occurrence of cancer
- Understand the causes of cancer
- Evaluate and implement cancer prevention and control strategies
- Summary

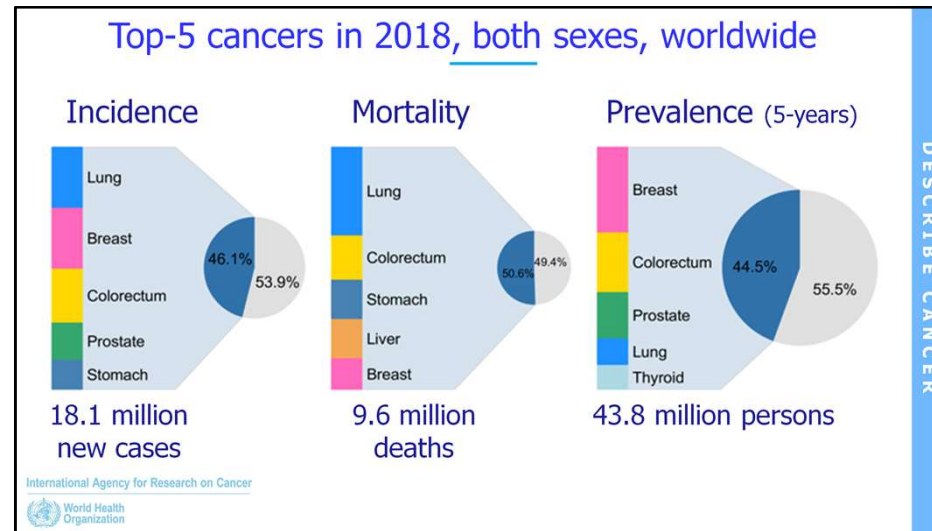
The selected scientific highlights are presented according to the three core research areas embedded within the IARC Project Tree structure: **describe the occurrence of cancer, understand the causes of cancer, and evaluate and implement cancer prevention and control strategies.**



IARC's estimates of cancer incidence and mortality on the Global Cancer Observatory (GCO) (<http://gco.iarc.fr>) have been updated to 2018 and a new module compiling local estimates of cancer survival has been added to the website.

Cancer Today includes GLOBOCAN estimates of national incidence, mortality, and prevalence in 185 countries for 2018, derived using data from registries worldwide. This figure indicates the international variations in the cancer magnitude across 20 World regions (Bray et al, CA Cancer J Clin 2018; Ferlay et al, Int J Cancer 2019). **In 2018, 18.1 million new cancer cases were diagnosed around the world, and 9.6 million people died from the disease, while 43.8 million persons lived with cancer.**

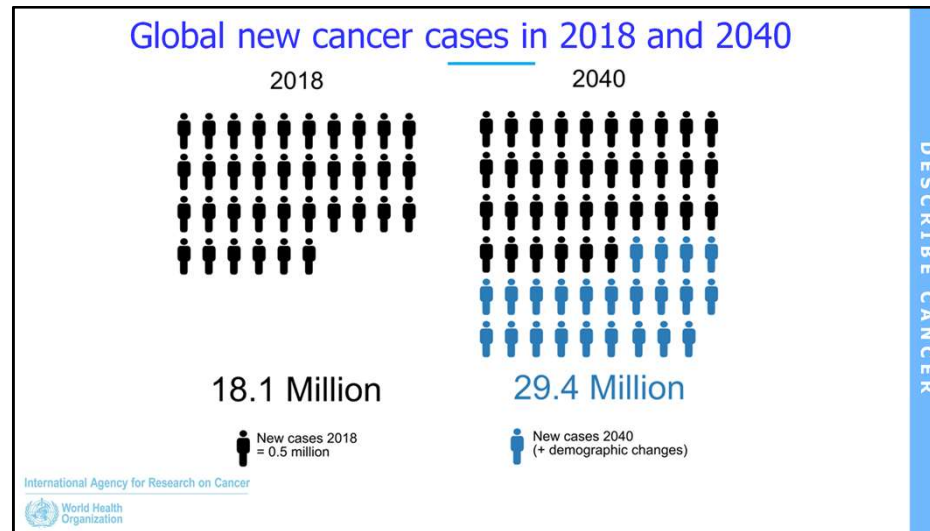
Most cases and deaths occurred in Eastern Asia with its vast population. Northern America ranks second in terms of number of new cases but fourth in terms of cancer deaths after South-Central Asia and Eastern Europe. Almost a quarter of the new cases and one fifth of the deaths occurred in the four European regions, despite containing only 9% of the global population.



This figure shows the top 5 cancer types for estimated cases and deaths worldwide for men and women combined (from Globocan 2018).

For both sexes combined, **lung cancer** is the most commonly diagnosed cancer (11.6% of the total cases) and **the leading cause of cancer death** (18.4% of the total cancer deaths), closely followed by female **breast cancer** (11.6%), **colorectal cancer** (10.2%), **prostate cancer** (7.1%) and **stomach cancer** (5.7%) for incidence and **colorectal cancer** (9.2%), **stomach cancer** (8.2%), and **liver** cancer (8.2%) for mortality. Breast cancer is the most prevalent cancer, followed by colorectal and prostate cancers.

The most common cancer types vary among countries, with certain cancers much more common in countries at the lower end of the human development index (HDI) than in high-HDI countries.

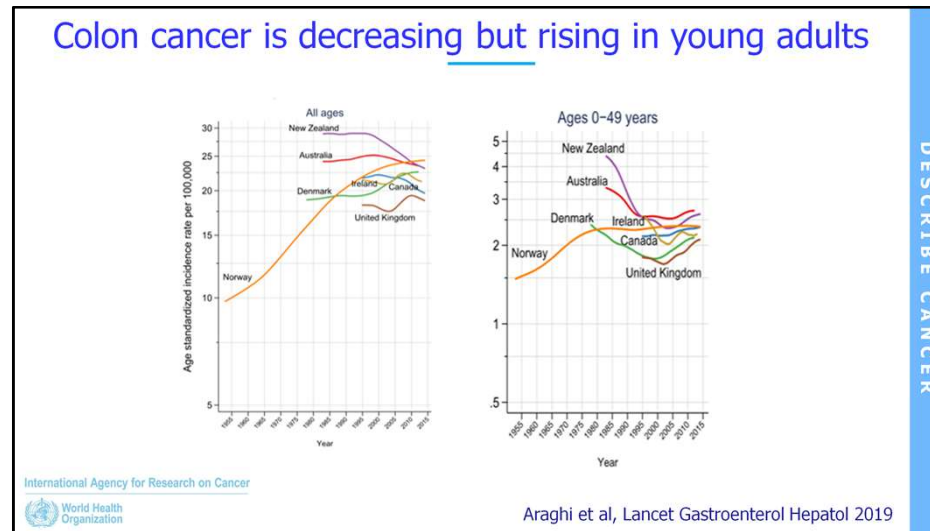


Cancer Tomorrow uses current estimates alongside demographic projections to 2040 to predict the future burden worldwide.

By 2040, the 2018 figures are expected to nearly double, with the greatest increase observed in low- and middle-income countries (**LMICs**), where more than two thirds of the world's cancers will occur.

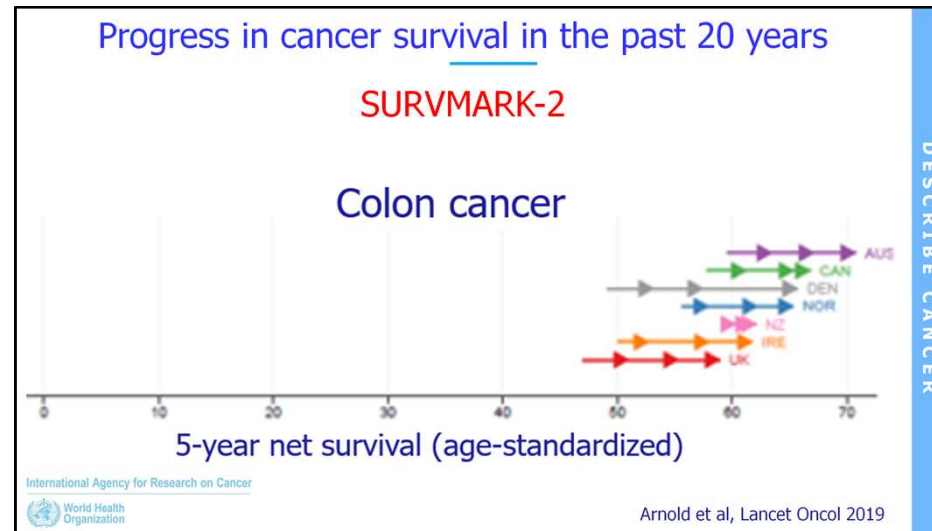
The currently high cancer incidence rates high-income countries have been strongly affected by the acquisition of environmental and lifestyle risk factors that accompanied socioeconomic growth in the second half of the last century. The very same factors are now operating in many LMICs undergoing rapid socioeconomic transition. We expect to see a major upsurge in the (still low to intermediate) cancer incidence and mortality rates in LMICs over the next decades, which coupled with population aging and growth, would translate to a scale of individuals diagnosed with, living and dying from cancer unparalleled in history. On account of resource constraints and organizational limitations, prevention strategies need to be prioritized in LMICs (Vaccarella and Bray, Int J Cancer 2020).

Colon cancer is decreasing but rising in young adults



Using data from the population-based cancer registries in 7 high income countries (New Zealand, Australia, Denmark, Ireland, Canada, UK and Norway) with similar health care system, long-term trends of colon and also rectal cancer by age groups were analysed.

IARC observations reported that incidence of colon and rectal has been decreasing in many countries (particularly highly developed countries). Yet among the youngest age group (less than 50 years), increasing trends have been seen as you can see from this figure. These findings highlight the need to monitor and target interventions among young adults.



SURVMARK-2 is part of the International Cancer Benchmarking Partnership which is a unique and innovative collaboration of clinicians, policy-makers, researchers, and cancer data experts. It aims to measure international differences in cancer survival, and crucially, to identify the factors that might be driving these differences.

In this first major publication from the project (Arnold et al, Lancet Oncol 2019), IARC reported **cancer-specific survival improvements for seven cancer types (oesophagus, stomach, colon, rectum, pancreas, lung, ovary)**, as illustrated in this slide for colon cancer in seven high income countries (Australia, Canada, Denmark, Norway, New Zealand, Ireland, UK, **many of them are participating states**). These findings also highlight the extent to which international disparities persist.

Global Initiative for Cancer Registration (GICR)

Launch of the Pacific Islands Hub: Global registry support

- Completes the implementation of 6 IARC Regional Hubs
- Will be hosted in Fiji via the WHO Pacific Islands Office in partnership with the Pacific Community, Australia and New Zealand



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DESCRIBE CANCER

The IARC Regional Hub for the Pacific Islands has been implemented. This is the sixth, and final Hub.

The Hub is located within the WHO Western Pacific Regional Office Division of Pacific Technical Support (WPRO DPS) in Suva, Fiji.

IARC is establishing a **Hub Advisory Committee** which will provide inputs on cancer control initiatives relevant to the GICR in the region and globally.

Global Initiative for Cancer Registration (GICR)

**Mutual Capacity Building:
GICRNet**

- Programme to co-develop new educational resources with local experts serving as regional trainers
- Standardized training material produced for in-person courses to be converted to e-learning tools





DESCRIBE CANCER





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The principal aim of the Global Initiative for Cancer Registry Development, GICR, is to develop capacity in cancer registration, incorporating expertise from each region. GICRNet, is a network of regional trainers who are not only asked to deliver training courses, but are invited to co-develop new educational resources.

GICRNet trainers act as mentors in exchange programmes and assist with supporting peers in their region through the development of best practice portal and mechanisms to follow up on specific issues.

In the past year, two courses were delivered. One on data quality (Dec 2019), and one on data analyses, bringing the total number of GICRNet Master classes to four, providing approximately 100 regional trainers across all six Hubs.



Registration of childhood cancer: Challenges and opportunities

Objectives

- Review the registration standards and needs
- Explore use and usefulness of cancer registry data
- Identify socio-political requirements for efficient registration of childhood cancer

Expected output

- Efficient population-based childhood cancer registration
- Improved availability and quality of population-based data
- Capacity-building for monitoring and evaluating progress towards **the increase of survival to 60%**, the aim of the **WHO Global Initiative for Childhood Cancer**

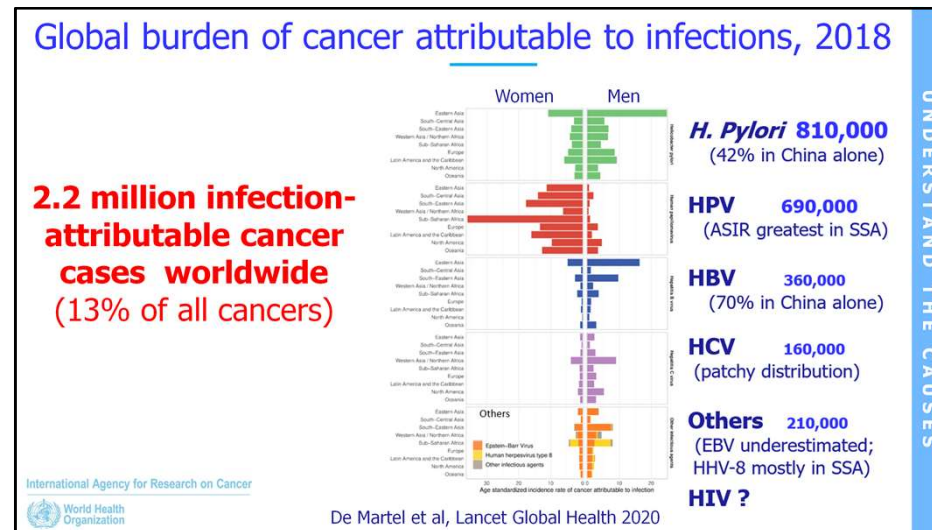
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 World Health Organization

DESCRIBE CANCER

In October 2019, a dedicated workshop on registration of childhood cancer in LMICs was held at IARC hosting more than 100 participants from 50 countries. The lack of population-based data in many LMICs impedes childhood cancer planning and treatment. In this context, IARC is expanding the GICR programme to support the development of national childhood cancer registration in several LMICs.

These IARC's activities are fully aligned with the WHO Global Initiative for Childhood Cancer (GICC) and the unprecedented efforts to raise awareness of the impact of childhood cancer worldwide. Specifically, there is a need to reduce the marked disparities in childhood cancer survival observed between low- and high-income settings.

The output of the workshop will be developed into policy recommendations, in collaboration with WHO.

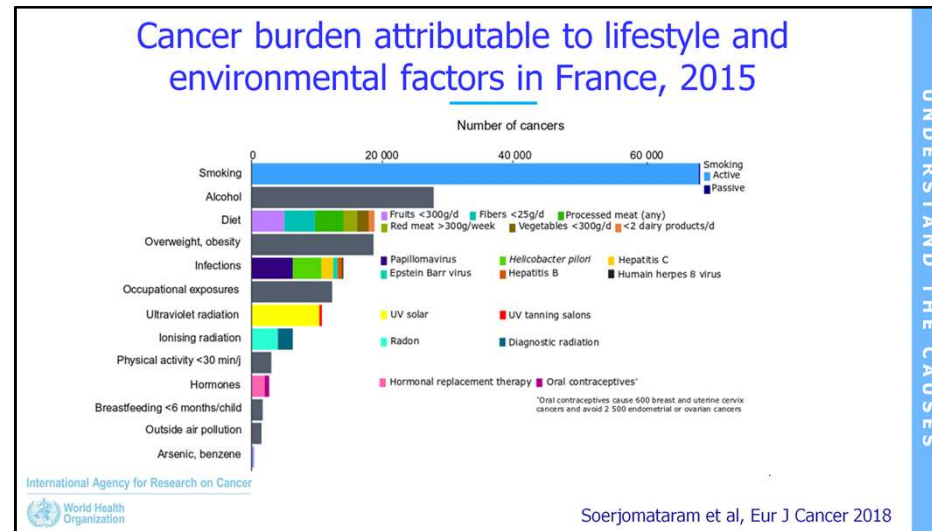


Infectious pathogens are important and modifiable causes of cancer. The aim of this study was to improve estimates of the global and regional burden of infection-attributable cancers to inform research priorities and facilitate prevention efforts.

IARC research, based on GLOBOCAN 2018, found an estimated **2.2 million infection-attributable cancer cases diagnosed worldwide in 2018**. The figure shows that primary causes were *Helicobacter pylori* (810 000 cases), **human papillomavirus** (690 000 cases), **hepatitis B virus** (360 000 cases) and **hepatitis C virus** (160 000 cases).

Infection-attributable cancer cases were **highest** in eastern Asia (37.9 cases per 100 000 person-years) and sub-Saharan Africa (33.1), and lowest in northern Europe (13.6) and western Asia (13.8). China accounted for a third of worldwide cancer cases attributable to infection, driven by *H pylori* and hepatitis B virus infection.

These findings highlight the crucial need for resources directed towards cancer prevention programmes that target infection, particularly in high-risk populations. Such interventions ly reduce the increasing cancer burden and associated mortality.

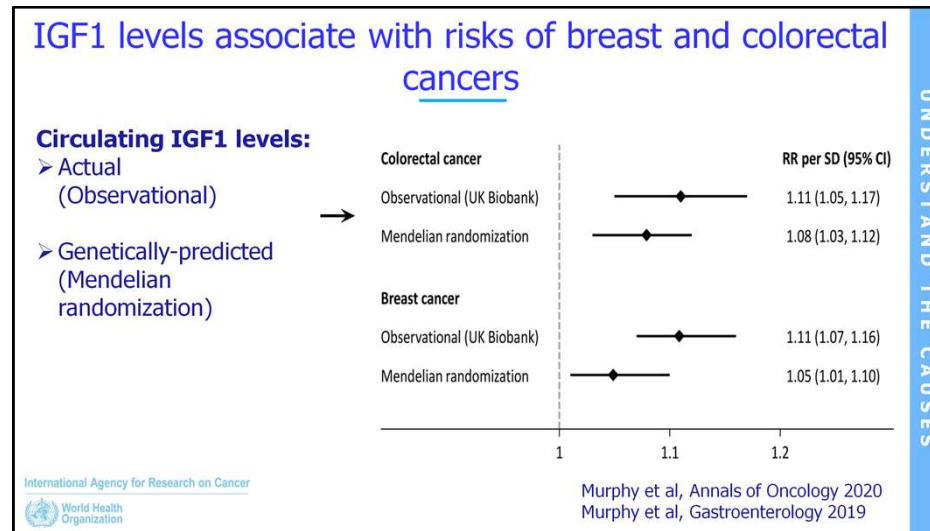


The contribution of lifestyle and environmental risk factors to cancer incidence have been estimated in France in 2015, comparing these with other high-income countries.

Prevalences of, and relative risks for tobacco smoking, alcohol consumption, inadequate diet, overweight and obesity, physical inactivity, exogenous hormones, suboptimal breastfeeding, infectious agents, ionising radiation, air pollution, ultraviolet exposure, occupational exposures, arsenic in drinking water and indoor benzene were obtained to estimate the population attributable fraction (PAF) and the number of attributable cancers.

In 2015, 41% (or 142,000 new cancer cases of 346,000) of all new cancers diagnosed in France could be attributed to the aforementioned risk factors. Smoking (PAF: 20%), alcohol consumption (PAF: 8%), dietary factors (PAF: 5%) and excess weight (PAF: 5%) were the most important factors. Infections and occupational exposures each contributed to an additional 4% of the cancer cases in 2015.

Reducing smoking and alcohol consumption and the adoption of healthier diet and body weight remain important targets to reduce the increasing number of new cancer cases in France in the decades to follow.



Insulin-like growth factor 1 (**IGF1**) has been linked to the development of breast and colorectal cancer in experimental studies, but previous epidemiological evidence is mixed and it is unknown if the associations are causal.

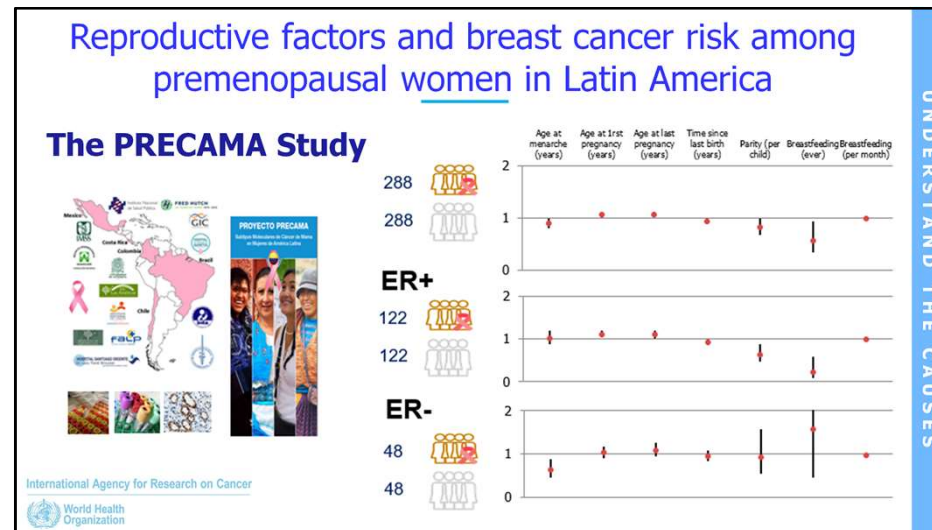
IARC conducted complementary observational and Mendelian randomization analyses to examine the potential causal role of circulating IGF-1 in breast and colorectal cancer development.

Observational studies included 397,380 **participants from the UK Biobank all with serum IGF1 measures** (among them 2665 incident colorectal cancer and 4360 incident breast cancer cases were recorded during follow-up period).

Mendelian randomization examined potential causal associations between **IGF1 associated genetic variants** with breast cancer (using data from 122,977 breast cancer cases and 105,974 controls) and colorectal cancer (using data from 52,865 colorectal cancer cases and 46,287 controls).

In summary, IARC findings **found consistent positive associations for the observational and Mendelian randomization analyses** for both breast and colorectal cancer.

These results provide the strongest evidence to date for a causal role of the IGF-pathway in breast and colorectal tumorigenesis, and suggest that altering IGF1 levels through diet/lifestyle or pharmacological means may be an effective strategy in the primary prevention of these cancers.

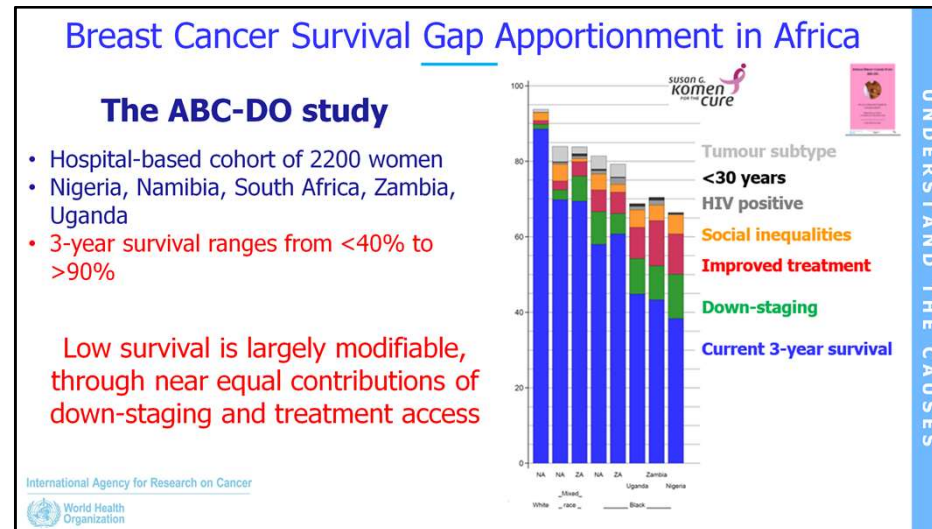


Etiological differences among breast cancer subtypes have not been clearly established, especially among young women in Latin America. IARC reached a milestone in its multicentre case-control study on breast cancer among premenopausal women carried out in Latin America, the PRECAMA Study.

This IARC research study examined the relationship between **reproductive factors** and breast cancer subtypes among **288 breast cancer** cases (20-45 years) and population-based matched controls in **four Latin American countries (Map: Costa Rica, Columbia, Brazil, Chili)**.

Older age at first full-term pregnancy (FFTP) (per year), and **older age at last pregnancy** were associated with a **higher risk** of **estrogen receptor positive (ER+) tumors** (n = 122). **Parity, time since last birth, and history of breastfeeding** were **inversely associated with the risk of ER+ tumors**. **Older age at menarche and longer duration of breastfeeding** (were inversely associated with **estrogen receptor negative (ER-) tumors** (n = 48).

Reproductive factors may be differentially associated with breast cancer subtypes in young Latin American women.




The **African Breast Cancer - Disparities in Outcomes (ABC-DO)** study is a African, multi-country study of factors that affect breast cancer outcomes for patients at public hospitals across different sub-Saharan African settings (Nigeria, Namibia, South Africa, Zambia, Uganda).

The ABC-DO **on breast cancer survival is a 5-country hospital-based cohort of 2200 African women.** It has the advantage of being rich in clinico-epidemiological data, and few losses to follow-up are reported.


The figure shows that **lower survival** is associated with HIV+, hormone-receptor positive tumours and young age, but these characteristics have limited contribution to low survival. However, **low survival is largely modifiable**, through near equal contributions of down staging and treatment access. Strategies to improve breast cancer education and awareness in women and the health system should be intensified.

Cancer incidence patterns in AGRICOH cohorts




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AGRICOH: A Consortium of Agricultural
Cohort Studies




[ABOUT AGRICOH](#) [OBJECTIVES](#) [PARTICIPATING COHORTS](#) [MEETINGS](#) [PUBLICATIONS](#) [CONTACT](#) [MEMBER LOGIN](#)



Overall cancer incidence was **lower in agricultural cohorts** than in the general population

Higher risks were observed for certain cancer types, such as **melanoma of skin and prostate cancer**



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<http://agricoh.iarc.fr/>

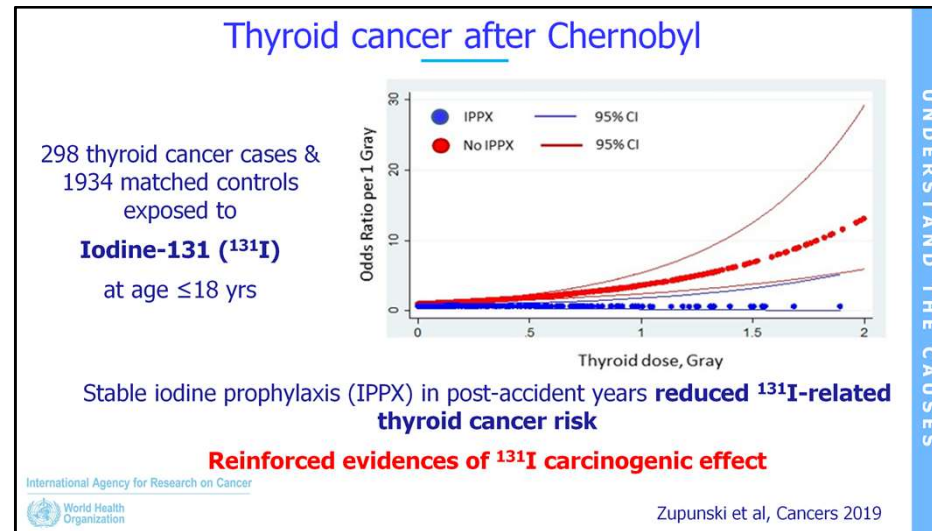
UNDERSTAND THE CAUSES

In a pooled analysis from the AGRICOH consortium of three large cohorts of agricultural workers totalling more than 300 000 farmers, IARC investigated the relationship of a wide range of agricultural exposures and health outcomes including cancer.

Agricultural work may involve involuntary exposure to pesticides, engine exhaust, metal fumes, solvent vapours, dust, and sunlight that may be associated with cancer risks.

Overall the standardized incidence ratio (SIR) **was consistently lower than one**. As speculated in the previous studies, the lower rates of cancer are likely due to healthy worker effect **from less tobacco use, higher physical activity or other reasons**.

Preliminary results also showed some excesses for certain cancer types such as melanoma of skin in females and prostate cancer in males. Detailed analyses are currently underway. There are also analyses planned to examine the associations between specific agricultural exposures such as pesticides and risks of breast cancer, prostate cancer, and other cancers within AGRICOH.



More than 30 years after the Chernobyl accident, there are remaining gaps in the knowledge about mechanisms of radiation-related cancers, including what factors could interact with exposure to **iodine-131 (I-131)**.

To identify host and environmental factors that modify radiation-related risk of thyroid cancers after childhood exposure to iodine-131, IARC studied the impact of **iodine deficiency**, post-accident iodine prophylaxis, and other selected host risk factors on **Iodine-131-related thyroid cancer risk after childhood exposure**. The study included 298 thyroid cancer cases and 1,934 matched controls from the most contaminated regions of Belarus and the Russian Federation.

IARC research showed (Figure) that **exposed individuals who received stable iodine supplementation in the years after the accident had a significantly lower I-131-related risk of thyroid cancer**. These findings are important for thyroid cancer prevention, and for further improvement of medical surveillance in the populations affected by the accident.

Asbest Chrysotile Cohort Study The Russian Federation

- **35,837 workers**, whereof 37% women
- Follow-up completed and data “frozen” in 2019
- Data Analysis Plan on <http://asbest-study.iarc.fr/>
- Exposure and Outcome data only linked after completion of cleaning and discussion of descriptive tables
- Results will be presented only when accepted for publication in peer-reviewed scientific journals

International Agency for Research on Cancer





UNDERSTAND THE CAUSES

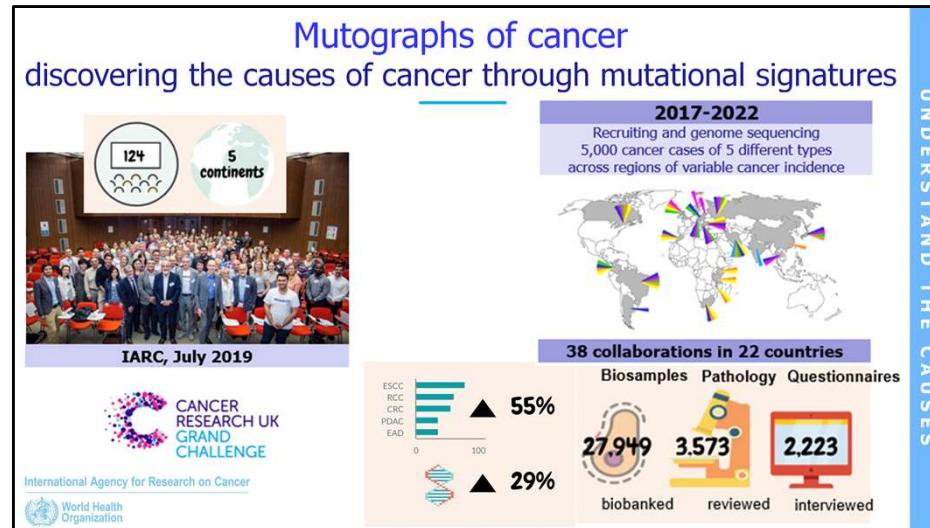
IARC reached a milestone in its occupational cohort study of workers exposed to chrysotile in mines and processing facilities in Asbest, Russian Federation. The **Asbest Chrysotile Cohort Study** was launched in 2012 and includes 35 837 individuals. The large number of women (37%) is among the unique features of this large cohort with detailed exposure data and it is the first of its kind in the Russian Federation.

The large number of women, with similar exposure levels as the men but lower smoking prevalence, is among the unique features of this large cohort with detailed exposure data and the first of its kind in the Russian Federation.

The follow-up was completed in October 2019, resulting in 52% alive, 36% deceased, and 12% censored at last date known to be alive in the oblast mainly as a result of migration. Mortality was coded by a IARC staff member (experienced physician from Russia) based on the original text from the official death certificates. The data files were fingerprinted by IARC IT team on 25/10/2019.

A Data Analysis Plan was developed by the study team, and discussed with the Scientific Advisory Board, and was finally posted on the project’s website on 11 December 2019.

The study team has produced an internal cohort report including hundreds of descriptive tables, to fully understand the data, and before risk analyses have started. The discussion of descriptive tables is ongoing so that risk analyses can start soon.



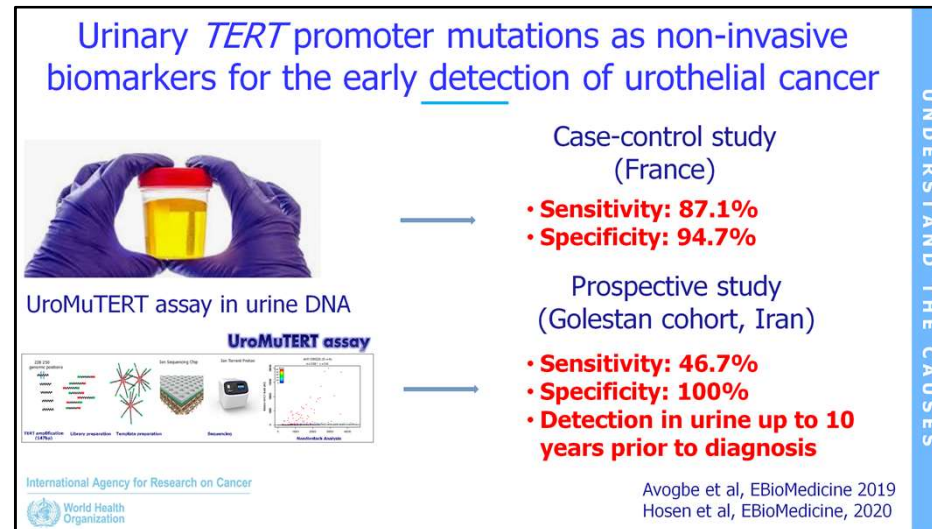
A major initiative of IARC, understanding the causes of cancer through Studies of Mutational Signatures – Mutographs, launched in 2017, was aimed to understand the causes of cancer by generating mutational signature profiles based on whole-genome sequence data. The study results from a major Cancer Research UK (CRUK) Grand Challenge grant, one of the world’s most ambitious cancer research awards.

The Objective of the project is to recruit and genome sequence **5,000 cancer cases from 5 continents** to unravel cancer causes through the study of aetiological imprints carved into cancer genomes. The Recruitment is based on 38 active collaborations in 22 countries.

The project is now half way:

- ✓ **55% of recruitment is completed** (3,597 cases of 6,600 targeted to reach 5,000 eligible cases);
- ✓ **29% of cases were sent for sequencing** (1,528 pairs of germline and tumour DNA);
- ✓ 27,949 biosamples received (IARC biobank entries);
- ✓ 3,573 pathology reviews provided (panel of pathologists headed by Behnoush Abedi-Ardekani from IARC);
- ✓ 2,223 questionnaires from prospectively recruited cases filled out (clinical and epidemiological data entered online via REDCap web platform).

A flagship meeting was hosted by IARC in July 2019 bringing together over 100 key international stakeholders from the mutational signatures field.



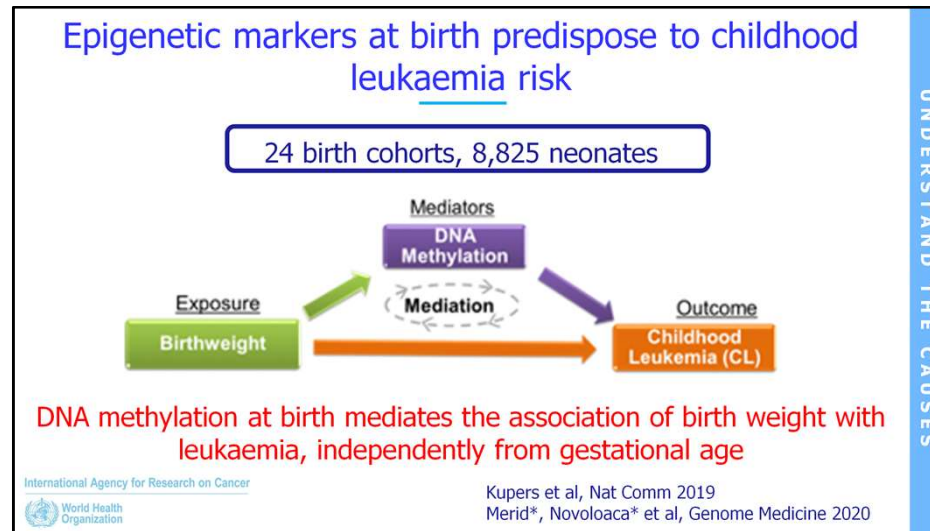
Recurrent mutations in the promoter of the telomerase reverse transcriptase (*TERT*) gene detected in tumours and cells shed into urine of urothelial cancer patients are putative biomarkers for urothelial cancer detection and monitoring. However, the possibility of detecting these mutations in cell-free circulating DNA in blood and urine, or DNA from urinary exfoliated cells with a single-gene sensitive assay had never been tested in a case-control setting.

IARC research developed a new assay (UroMuTERT) for the detection of low-abundance *TERT* promoter mutations, and tested it in different biological matrices (urine, blood, tumours for the cases) in different settings (case-control study in France; prospective study in the Golestan cohort, Iran).

IARC research showed that these mutations detected in urinary DNA by this simple assay (UroMuTERT) have excellent sensitivity (87.1%) and specificity (94.7%) for the detection of all forms of urothelial cancer of the bladder in a French series (DIAGURO), significantly outperforming that of urine cytology,

Further, in a case-control study nested within a longitudinal population-based prospective cohort of 50,000 Iranian individuals (Golestan cohort), IARC findings indicated that these mutations can be detected in urine samples up to 10 years prior to diagnosis of bladder cancer, and were absent among controls.

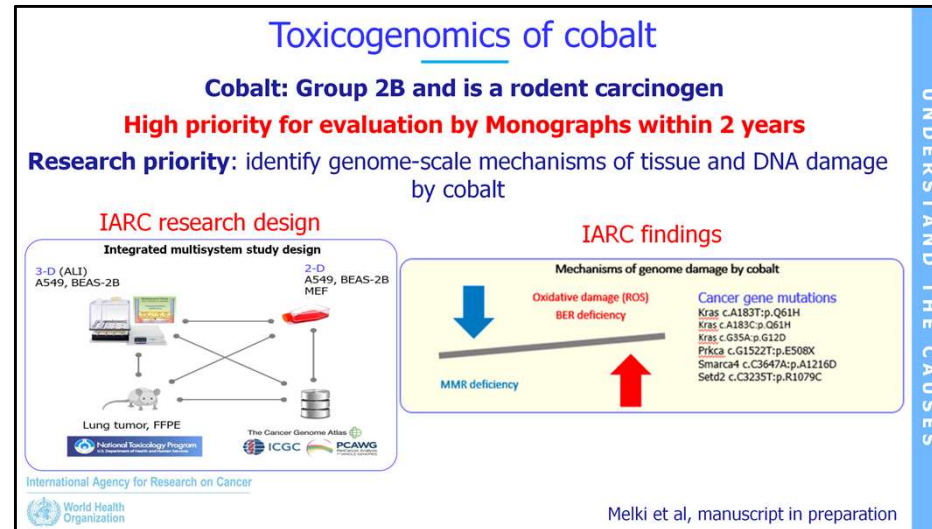
Further studies should validate this finding and assess their clinical utility in other longitudinal cohorts. This novel urine-based DNA assay could be effective for the early detection of urothelial cancer.



These IARC's activities are fully aligned with the WHO Global Initiative for Childhood Cancer (GICC). **In a IARC large epidemiological study conducted on 8,825 neonates in 24 birth cohorts**, IARC research indicated that:

- DNA methylation alterations at birth predispose to childhood leukemia risk (manuscript in preparation).
- As summarized in the figure, DNA methylation at birth mediates the association of birth weight with leukemia, independently of gestational age.

This large study allowed to identify blood epigenetic markers associated with birthweight which could predict future childhood and adolescent cancers and serve as a basis for prevention strategies.



Cobalt is in Group 2B and is a rodent carcinogen. In vitro, cobalt treatment proves highly cytotoxic, genotoxic, and induces reactive oxygen species (ROS).

Human exposure to cobalt is occupational (ore mining; cobalt-containing products; electronic), environmental (food; water; industrial areas) and failed surgical implants. IARC research investigated the **mechanistic role of cobalt exposure in carcinogenesis**, as it is considered as a high priority for evaluation by the IARC Monographs within 2 years, given the changing patterns of human exposure and new mechanistic data.

Figure (left) shows the multi-system IARC research study design to address genome-wide DNA damage effects of cobalt in experimental models. This model integrates two- (2-D) and three-dimensional (3-D) mouse and human cell culture exposure systems (mouse lung tumours induced by chronic inhalation of cobalt metal particulate aerosol).

As summarized in the picture (right), the whole-genome sequencing of cobalt-exposed mouse tumors, human and mouse cell lines allowed the identification of **key mutational signatures**, significantly enriched for patterns of oxidative damage and repair deficiency,

Thus, cobalt likely exerts its carcinogenic effects by **induction of oxidative damage** and **genome instability via DNA repair defects, while affecting key cancer genes by critical mutations**.

These results provide a basis for future molecular epidemiological studies exploring the link between cobalt exposure and human cancers, further justified by the high-priority recommendation of cobalt and cobalt compounds for evaluation by IARC Monographs Priorities Group

The Monographs: Scientific and Strategic Planning

2019 Accomplishments High-Impact Evaluations and Publications

- Advisory Group on Priorities (including summary article and full report)
- Meeting 124 (June 2019): **Night shift work**
Classified as **Probably Carcinogenic to Humans (Group 2A)**
Published in *The Lancet Oncology*
- Meeting 125 (November 2019): **Some Industrial Chemical Intermediates and Solvents**
Glycidyl methacrylate, chemical used in dental sealants, classified as **Probably Carcinogenic to Humans (Group 2A)**
Published in *The Lancet Oncology*
- Published Preamble, peer-reviewed article in JNCI and full report
- Published four Monographs (volumes 117, 119, 121 and 122), eliminating backlog
- Published IARC Scientific Publication *Tumour Site Concordance and Mechanisms of Carcinogenesis*

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EVALUATE AND IMPLEMENT

The IARC Monographs evaluation produces the *IARC Monographs on the Identification of Carcinogenic Hazards to Humans*. The *IARC Monographs* are fundamental to the Agency's mission of evaluating and identifying the preventable causes of human cancer. Since the inception of the *Monographs* programme in 1971, more than 1000 agents have been evaluated for carcinogenicity. This international, interdisciplinary endeavour provides an authoritative reference for researchers, health authorities, and the public. Health agencies worldwide rely on the *Monographs* for the scientific support of actions to control exposures and prevent cancer.




The IARC Monographs Group organized five Working Group meetings during the last biennium. The agents evaluated included several that had been recommended as priorities for evaluation.

This slide summarizes **high-impact evaluations (night shift work, some industrial chemical intermediates and solvents) and publications conducted in 2019.**

The results of the recent *IARC Monographs* evaluation of the carcinogenicity of night shift work have now been published in *The Lancet Oncology*. **Night shift work has been classified as Probably Carcinogenic to Humans (Group 2A).** The results of the recent *IARC Monographs* evaluation of the carcinogenicity of some industrial Chemical Intermediates and Solvents have been published in *The Lancet Oncology*. **Glycidyl methacrylate, chemical used in dental sealants, has been classified as Probably Carcinogenic to Humans (Group 2A).**

IARC Handbooks (HB)

- **Advisory group to Recommend an update to the Working Procedures**
 - ✓ Preamble for Primary Prevention & Screening
 - ✓ Report of the Advisory Committee meeting
- **HB16 – Absence of excess body fatness**
- **HB17 – Colorectal cancer screening** (meeting in Nov. 2017)
- **HB18 – Cervical cancer screening**
 - ✓ Mainly funded by Medical Research Council, UK
 - ✓ **Strong collaboration with WHO**

EVALUATE AND IMPLEMENT

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This slide gives a summary of the work and related publications from the Handbooks Group **in 2019**.

- **HandBooks 16**. Absence of excess body fatness: **the Publication is on-line and in print.**
- **HandBook 17**: Colorectal cancer screening: **the Publication is on-line and in print.**
- **HandBook18**: Cervical cancer **screening is based on a strong collaboration with WHO:**

The IARC Handbooks Group is lead coordinator for 2 PICO recommendations (PICO is a mnemonic used in evidence based practice. P = practice, patient, problem or populations; I = Intervention; C = comparison, control or comparator; O = outcomes) IARC HB is Member of the WHO Secretariat in the Screen&treat Guideline, while WHO staff acts as Secretariat in the HandBooks meetings.

WHO Classification of tumours

WHO Classification of Tumours • 5th Edition
Digestive System Tumours

2.0. Tumours of the oesophagus: Introduction

The major oesophageal cancer and oesophageal adenocarcinoma is a highly aggressive malignancy that is the eighth leading cause of cancer death worldwide. It is a major cause of cancer-related mortality in the developed world, and its incidence is increasing in the developing world. The WHO Classification of Tumours of the Digestive System, 5th Edition, provides a systematic and comprehensive classification of the oesophageal tumours, including the oesophageal adenocarcinoma, squamous cell carcinoma, and the oesophageal neuroendocrine tumours. The classification is based on the histological and molecular features of the tumours, and it provides a systematic and comprehensive classification of the oesophageal tumours.

2.1.2.2. Oesophageal squamous dysplasia

Definition Oesophageal squamous dysplasia is a precancerous condition of the oesophagus, characterized by the presence of abnormal squamous epithelial cells in the oesophageal mucosa. It is a precursor of oesophageal squamous cell carcinoma. The classification is based on the histological and molecular features of the dysplasia, and it provides a systematic and comprehensive classification of the oesophageal squamous dysplasia.

WHO Classification of Tumours • 5th Edition
Breast Tumours

International Agency for Research on Cancer
World Health Organization


EVALUATE AND IMPLEMENT

WHO Classification of tumours Group has produced the first two volumes in the 5th Edition with a systematic layout, and improved illustrations. Epidemiology is now written by epidemiologists! These volumes are available on IARC web pages. Two more are coming soon. This is a Success story.

Cervical cancer vaccination

Multicentre randomized trial in India

- 17,604 unmarried girls aged 10-18 years were vaccinated with either **3 doses** ($N=4348$), **2 doses** ($N=4979$) or **1 dose** ($N=4950$).
- The cohorts in India are followed up yearly **for last 10 years**.



Efficacy of a single dose of Quadrivalent HPV Vaccine against persistent HPV 16/18 infections

The study outcomes were shared with the WHO Strategic Advisory Group of experts

Supported by the Bill & Melinda Gates Foundation

Sankaranarayanan et al, Vaccine 2018

International Agency for Research on Cancer
World Health Organization

EVALUATE AND IMPLEMENT

Efforts are being made to scale up human papillomavirus (HPV) vaccination for adolescent girls in India. Human papillomavirus (HPV) vaccination is a major strategy for preventing cervical and other ano-genital cancers. Worldwide HPV vaccination introduction and coverage will be facilitated if a **single dose of vaccine** is as effective as two or three doses or demonstrates significant protective effect compared to 'no vaccination'.

IARC coordinated the following study and set up the following design (as summarized in the slide):

Unmarried girls aged 10-18 years were vaccinated with either 3 doses ($N=4348$), 2 doses ($N=4979$) or 1 dose ($N=4950$) between September 2009 and April 2010.

The cohorts in India are followed up yearly for last 10 years.

Cervical samples are collected 18 months after marriage for the first time and yearly thereafter for 4 consecutive years.

Cervical samples are tested for 21 HPV genotypes with Luminex PCR-based assay.

A cohort of age-matched unvaccinated married women ($N=1480$) was recruited in 2012 and 4 annual cervical cells are collected from them for HPV genotyping.


Vaccinated and unvaccinated participants are screened with Hybrid Capture 2 HPV test starting at 25 years of age.

An additional unvaccinated age-matched cohort ($N=3500$) was recruited in 2017/18 and they were also screened with HPV test.

In this multicentre randomized trial in India involving 17 064 females vaccinated at 10–18 years with one, two, or three doses of quadrivalent HPV vaccine, IARC demonstrated that a single dose of quadrivalent vaccine was as protective as two or three doses against persistent HPV 16/18 infections. The study outcomes were shared with the WHO Strategic Advisory Group of Experts.

Following the call from the WHO Director General in 2018, a Draft Strategy for the elimination of cervical cancer as a public health problem will be put for the World Health Assembly's approval in May 2020. IARC studies support the WHO initiative on the elimination of cervical cancer.

Treatment of cervical precancers



- Efficacy of thermal ablation in 'screen & treat' setting
- **High efficacy of thermal ablation** in the treatment of high-grade cervical precancers (success: 93.8%)

The results provided key evidence supporting the WHO recommendation (2019) for thermal ablation to treat cervical precancers

IARC technically supported the development of a new handheld, battery operated thermal ablator

International Agency for Research on Cancer
World Health Organization

Supported by US National Institutes of Health

EVALUATE AND IMPLEMENT

IARC research supported the development and evaluation of a **new battery-powered portable thermal ablator** to treat cervical precancers.

The success rate of treating cervical precancers with the new device in a screen-and-treat setting in Zambia was similar to that of standard cryotherapy. This new device that avoids many of the practical disadvantages of cryotherapy, is preferred by health care providers, and produces minimal complications or discomfort.

A recent trial coordinated by IARC also demonstrated **the high efficacy of thermal ablation** in the treatment of high-grade cervical precancers (success, 93.8%).

These results provide **key evidence to support the WHO recommendation for thermal ablation to treat cervical precancers.**

Cancer Screening in five continents

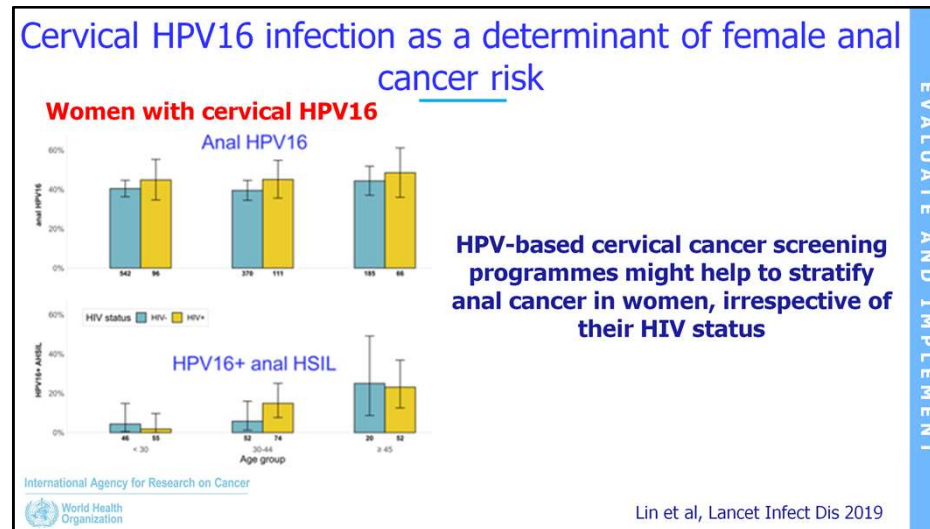
EVALUATE AND IMPLEMENT

EU data available on CanScreen5 for breast, cervical and colorectal programmes

<https://canscreen5.iarc.fr>
 ✉ canscreen5@iarc.fr
 #CanScreen5

The CANSCREEN5 website is a global repository on cancer screening programmes. It aims to uniformly collect, analyse, store, and disseminate information on the characteristics and performance of cancer screening in different countries.

A web-based open access platform was launched to facilitate access to and interpretation of data from the screening programmes, and to enable the individual programmes to compare their performance over time.



Cervical cancer screening might contribute to the prevention of anal cancer in women. The aim of this IARC study was to investigate if routine cervical cancer screening in women with cervical HPV16 predict anal HPV16 infection (top figure), anal high-grade squamous intraepithelial lesions (HSIL) (bottom figure) and, hence, anal cancer. For this study was centrally reanalysed individual-level data from 13 427 women with paired cervical and anal samples from 36 studies.

This study showed that women with cervical HPV16 infection are at highest risk of anal HPV16, anal HSIL, or HPV16-positive anal HSIL. HPV-based cervical screening programmes might help to stratify anal cancer in women, irrespective of their HIV status.

Clinical implication: HPV-based cervical screening programmes might help to stratify anal cancer in women, irrespective of their HIV status.

Cancer Prevention Europe: a shared mission

Cancer prevention Europe

- Research into **optimising implementation of known preventive interventions** (implementation research); "return on investment"
- **Dissemination and research translation** to inform policy and practice (advocacy); including **European Code against Cancer**
- **Innovation** in identifying risk factors and novel targets for prevention
- **Coordinated approach** and added value among European countries
- **11 Core members (Steering Group):**



- **1 full member:** 
- **3 Affiliate members:**



EVALUATE AND IMPLEMENT

Cancer Prevention Europe (CPE) is a **collaborative network** which originated from the recognition that cancer prevention in Europe is fragmented and lacks an overall coordinated strategy.

CPE was created as a consortium of a 10 leading European research institutions [IARC chairing the network and hosting its Secretariat] **committed to prioritising cancer prevention.**

CPE's MISSION is to **reduce morbidity and mortality from cancer in European populations through prevention and earlier detection of the disease.**

This will be accomplished through

- **fostering research** into optimising the implementation of known preventive strategies,
- **dissemination of established best practices** in prevention in order to see innovative research translated into effective cancer prevention guidelines and policies nationally and internationally,
- **and research into the identification of novel targets for prevention**, including risk identification.

CPE **complements European platforms on treatment and translational research such as Cancer Core Europe**, to increase visibility of the need of primary and secondary prevention to reduce the cancer burden and the respective allocation of needed resources

CPE has taken over some responsibility for the sustainability of the European Code against Cancer

Partners:

IARC,
 Danish Cancer Society, Copenhagen, Denmark;
 European Institute of Oncology, Milan, Italy;
 German Cancer Research Centre, Heidelberg, Germany;
 Imperial College London, London, UK;

Karolinska Institute, Stockholm, Sweden;
 Maastricht University, Maastricht, The Netherlands;
 UK Therapeutic Cancer Prevention Network, Leicester, UK;
 and Cancer Research UK, London, UK;
 World Cancer Research Fund International, London, UK/
 Wereld Kanker Onderzoek Fonds, Amsterdam, The Netherlands

IARC – an Agency in the right place at the right time

- **Growing problem:** 18.1 million new cases per year in 2018 predicted to rise to 29.6 million by 2040
- Greatest increases in low- and middle-income countries
- Research on **cancer prevention is essential**, but neglected
- Collaboration is increasingly required to address research questions
- Independence of judgement is increasingly valued

International Agency for Research on Cancer
 World Health Organization

SUMMARY

In summary, **IARC is an Agency in the right place at the right time!**

Cancer burden is already high but it will become a major public health problem in the near future. IARC's focus on cancer prevention in low and middle income countries through international collaboration is increasingly relevant. And finally our status as a UN Agency brings a recognized independence that is increasingly valued.

The Biennial Report 2018-2019 relates the daily commitment of IARC staff, and highlights a very productive biennium, which could not have been achieved without our outstanding network of collaborators around the world.

THANK YOU

To download the IARC Biennial report 2018-2019:

<http://publications.iarc.fr/Book-And-Report-Series/Iarc-Biennial-Reports/IARC-Biennial-Report-2018-2019>

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