



COCIR/DITTA Virtual Event

Working together against cervical cancer

18 March 2021, 14:00 – 16:30 CET

COCIR/DITTA Speaker: Elena Dizendorf, MD, PhD

Manager BrachyAcademy at Elekta





**What innovations coming from industry
are best for tackling cervical cancer?**

Scale-up of radiotherapy for cervical cancer in the era of human papillomavirus vaccination in low-income and middle-income countries: a model-based analysis of need and economic impact

Danielle Rodin, Emily A Burger, Rifat Atun, Michael Barton, Mary Gospodarowicz, Surbhi Grover, Timothy PHanna, David AJaffray, Felicia M Knaul, Yolande Lievens, Eduardo Zubizarreta, Michael Milosevic

Summary

Background Radiotherapy is standard of care for cervical cancer, but major global gaps in access exist, particularly in low-income and middle-income countries. We modelled the health and economic benefits of a 20-year radiotherapy scale-up to estimate the long-term demand for treatment in the context of human papillomavirus (HPV) vaccination.

Lancet Oncol 2019
Published Online
May 28, 2019
<http://dx.doi.org/10.1016/>

	Health parameters			Human capital return on investment		Full income return on investment	
	Patients requiring external-beam radiotherapy	Patients requiring brachytherapy	Life-years gained with radiotherapy scale-up	Nominal model	Efficient model	Nominal model	Efficient model
Base case values							
Low-income countries	1 340 413	1 005 310	2 348 608	-0.4	0.3	0.3	1.8
Lower-middle-income countries	4 892 966	3 669 725	6 188 537	1.6	4.2	4.3	9.7
Upper-middle-income countries	3 120 872	2 340 654	2 861 813	6.1	12.3	14.2	27.7
Total	9 354 251	7 015 689	11 398 958	2.5	6.0	6.5	13.8
Sensitivity analysis: advanced stage distribution							
Low-income countries	1 623 599	1 282 643	3 359 445	0.0	1.1	1.1	3.3
Lower-middle-income countries	5 926 692	4 682 086	9 655 660	3.0	7.0	7.2	15.4
Upper-middle-income countries	3 780 211	2 986 367	4 480 428	8.7	17.3	20.0	38.6
Total	11 330 502	8 951 096	17 495 533	4.0	9.5	9.9	22.1
Sensitivity analysis: integrated radiotherapy and vaccination scale-up							
Low-income countries	1 284 243	963 183	2 041 140	-0.4	-0.1	0.3	0.9
Lower-middle-income countries	4 729 919	3 547 440	5 936 526	1.1	3.2	3.2	7.5
Upper-middle-income countries	3 014 362	2 260 772	2 694 691	5.6	11.4	13.4	25.87
Total	9 028 525	6 771 394	10 672 357	2.2	5.1	5.6	11.7

Return on investment is a ratio defined as the net present value (itself defined as the economic return on investment minus the cost of investment) divided by the cost of investment, all in US\$.

Table 3: Population health and economic effects of scaling up radiotherapy capacity for cervical cancer treatment, 2015–35

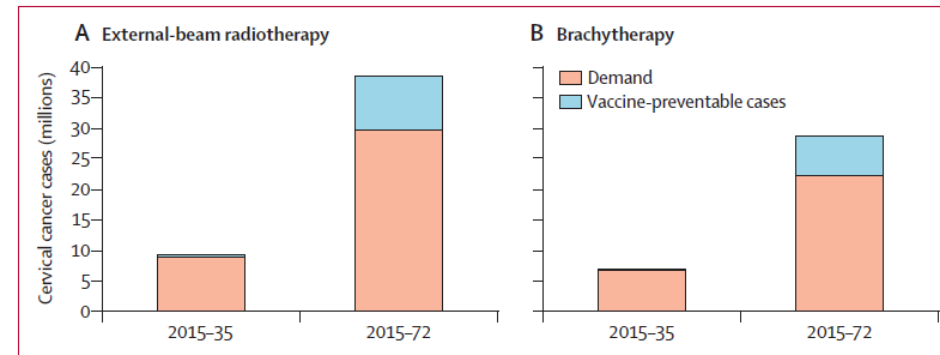
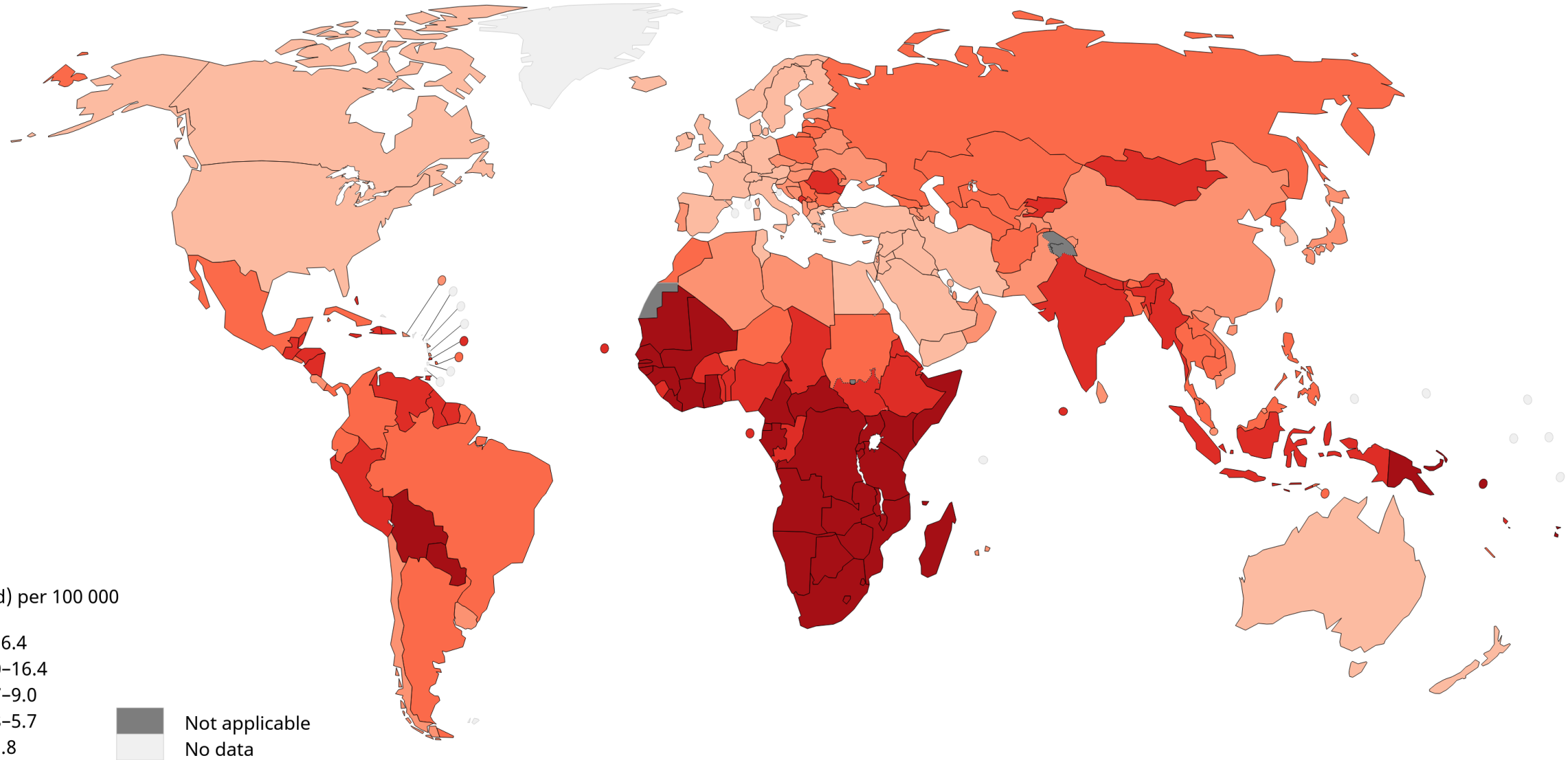


Figure 4: Effect of universal human papillomavirus vaccination strategy on demand for external-beam radiotherapy and brachytherapy in low-income and middle-income countries

By 2072 HPV vaccination is estimated to reduce cervical cancer by 22.9%, however 38.8M women would require EBRT and 28.8M women would require brachytherapy.

After 20 years with an HPV vaccination program in place, 9.0M women would require EBRT and 6.8M women would require brachytherapy.

Estimated age-standardized mortality rates (World) in 2020, cervix uteri, all ages



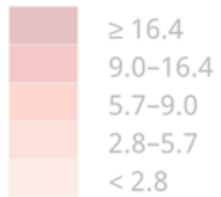
All rights reserved. The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the World Health Organization / International Agency for Research on Cancer concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted and dashed lines on maps represent approximate borderlines for which there may not yet be full agreement.

Data source: GLOBOCAN 2020
Graph production: IARC
(<http://gco.iarc.fr/today>)
World Health Organization

Estimated age-standardized mortality rates (World) in 2020, cervix uteri, all ages



ASR (World) per 100 000



Not applicable
No data

All rights reserved. The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the World Health Organization / International Agency for Research on Cancer concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted and dashed lines on maps represent approximate borderlines for which there may not yet be full agreement.

Data source: GLOBOCAN 2020
Graph production: IARC
(<http://gco.iarc.fr/today>)
World Health Organization



Expanding global access to radiotherapy



Rifat Atun, David A Jaffray, Michael B Barton, Freddie Bray, Michael Baumann, Bhadransain Vikram, Timothy P Hanna, Felicia M Knaul, Yolande Lievens, Tracey Y M Lui, Michael Milosevic, Brian O'Sullivan, Danielle L Rodin, Eduardo Rosenblatt, Jacob Van Dyk, Mei Ling Yap, Eduardo Zubizarreta, Mary Gospodarowicz

Radiotherapy is a critical and inseparable component of comprehensive cancer treatment and care. For many of the most common cancers in low-income and middle-income countries, radiotherapy is essential for effective

Lancet Oncol 2015; 16: 1153-86
See Comment pages 1143-52

- The cost of scaling up radiotherapy in the nominal model in 2015–35 is **US\$184 billion** across all LMICs. In the efficiency model the costs were lower: **\$96.8 billion**.
- Scale-up of radiotherapy capacity in 2015–35 from current levels could lead to saving of **26.9 million life-years** in LMICs.
- The economic benefits of investment in radiotherapy are very substantial: using the nominal cost a net benefit of **\$278.1 billion**, using the efficiency model a net benefit of **\$365.4 billion**.

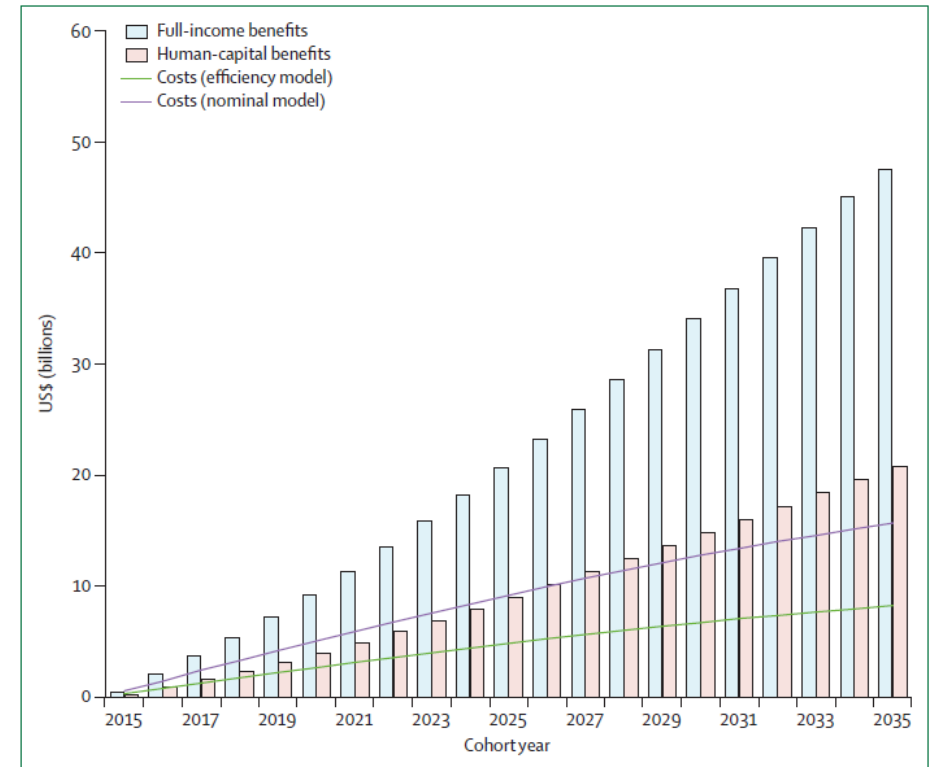


Figure 11: Cost and benefits of investments to scale up radiotherapy services in low-income and middle-income countries, 2015–35

The WHO Global strategy to accelerate the elimination of cervical cancer as a public health problem

6.6 Strategic actions to achieve 90% treatment and care for cervical cancer cases

Improve access to radiotherapy and chemotherapy

Most patients with cervical cancers in low- and middle-income countries present at stages that require radiation, so sustainable capacity for curative radiation therapy (external beam and brachytherapy) is critical.

8.2 Multisectoral collaboration

...to work closely with women, communities, civil society, young people, the media, the private sector, development partners, health professionals' associations, patients' groups and other stakeholders to achieve cervical cancer targets.

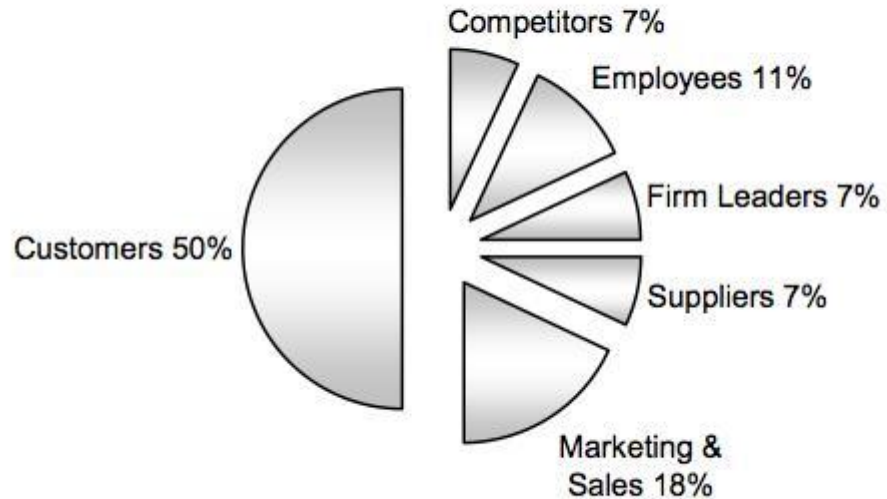




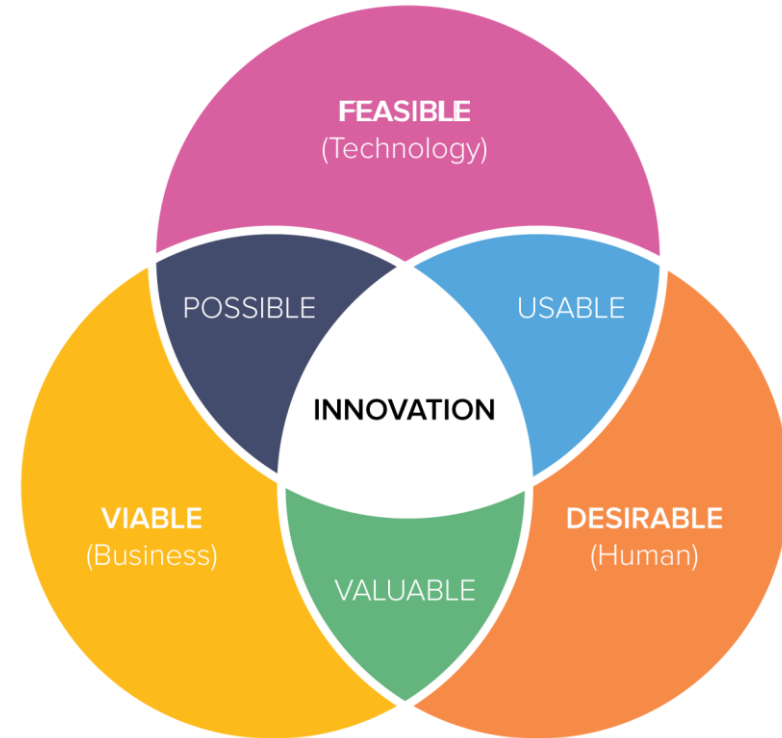
1. Improve access to radiotherapy

Where does innovation come from?

"What are the most important sources for innovative ideas?"



Source: Incremental Innovation



Source: UX Design

Brachytherapy improves patient outcomes

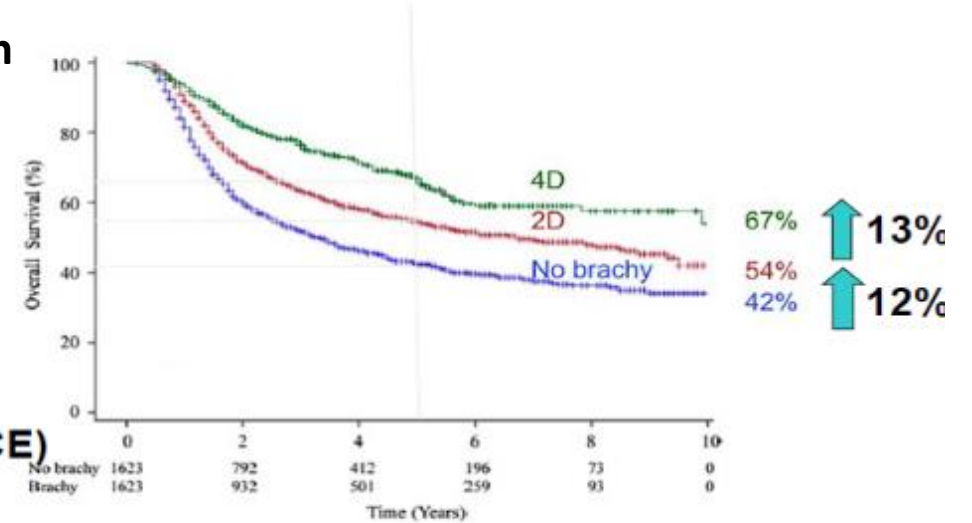


More patients with cervical cancer survive when IGABT is used

Overall Survival locally advanced cervical cancer:
the impact of brachytherapy

**Total
25pp increase in
Overall Survival**

**from
„no brachy“
(Han)
to
„4D brachy“
(RetroEMBRACE)**



Han et al, Int J Radiation Oncol Biol Phys 2013; 87:111-119.
Sturdza et al, Radiother Oncol., 2016;120:428-433.

EMBRACE I results – role of EBRT and BT

Image guided intensity modulated External beam radiotherapy and MRI based adaptive BRachytherapy in locally advanced Cervical cancer

2008-2015 prospective study (N=1341) from 42 centers:

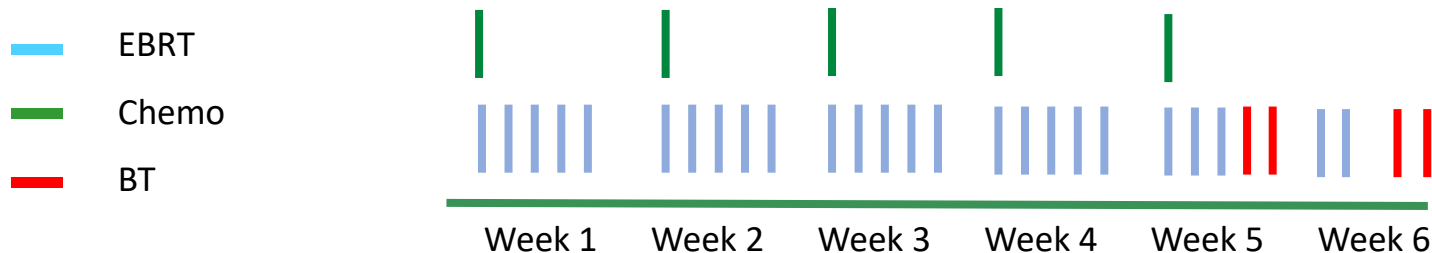
CT- or PET/CT- based EBRT

Concomitant Chemo

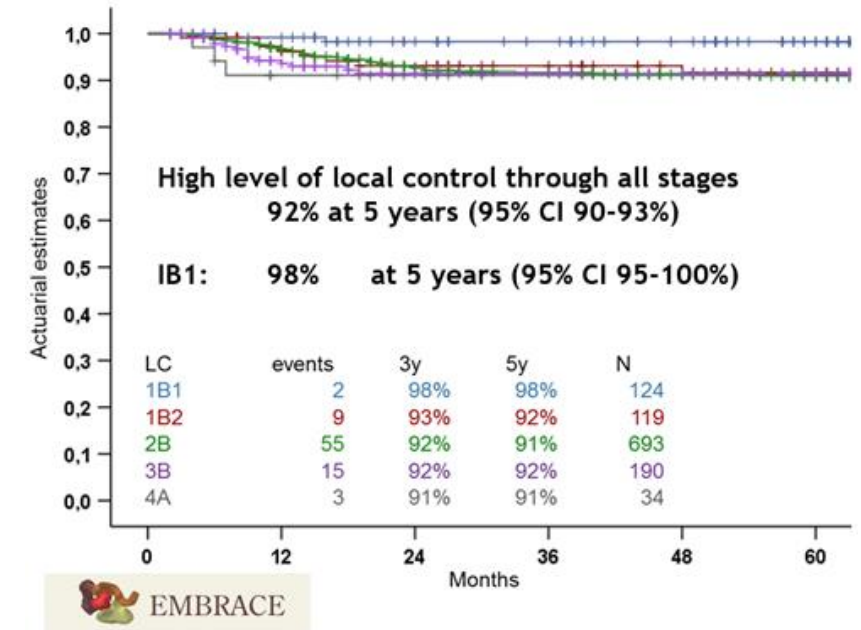
MR-based Brachy

- 5-year local control of 92%, pelvic control of 87%, disease free survival of 68%, overall survival 74%
- Grade 3-5 GU and GI morbidity of 6.5% and 7.5% respectively
- Median total overall treatment time 46 days

Pötter et al. Abstract #240 ESTRO2020



Local control and FIGO₂₀₀₉ stage EMBRACE I (KM estimates)





Ongoing EMBRACE II study – role of EBRT and BT

EMBRACE II intends benchmarking excellent local, nodal, distant control and survival rates, morbidity and Quality of Life outcome.

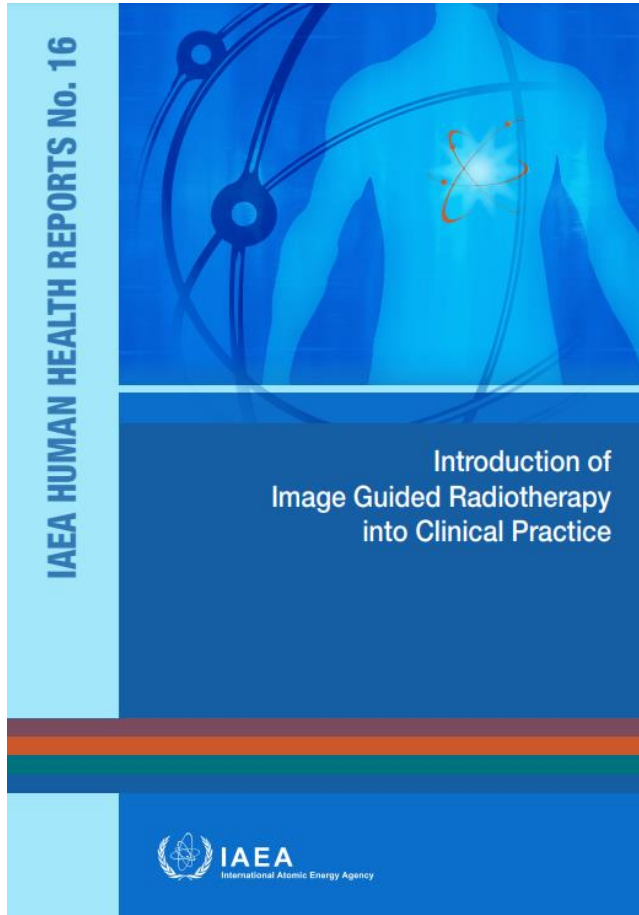
The most advanced radiation techniques currently available for cervix cancer treatment will be applied.

2016-... prospective study, 51 centers, accrual ends in 2021, >1000 patients so far

What is new:

- Systemic utilization of IMRT with simultaneously integrated nodal boosting
- Daily systemic utilization of IGRT
- Increased use of IC/IS brachytherapy
- Targets for planning and limits for prescribed dose for EBRT and Brachy
- Combination with the highest standard concomitant chemotherapy
- Further reduction of overall treatment time

Equipment requirements for EBRT

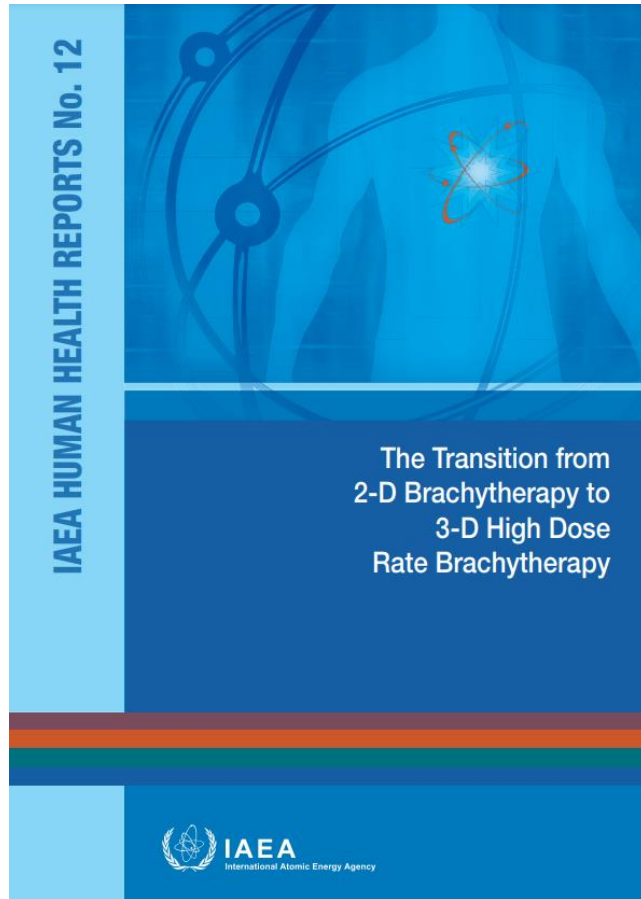


→ **Imaging:** CT with 4D capability

→ **Treatment planning:** 3D-CRT, IMRT, off-line or on-line IGRT, peer review for plan evaluation, dose reporting ICRU 50, 62 and 83

→ **Treatment delivery:** Linac with MLC, volumetric imaging capability, motion management

Equipment requirements for brachytherapy



- ➔ **Applicators:** CT/MR compatible, treat multiple tumor stages (IC/IS)
- ➔ **Imaging:** CT/MR imaging solutions
- ➔ **Treatment planning:** applicator visualization using multiplanar reconstruction, plan optimization based on CTV and OAR volumes, dose reporting ICRU and GEC-ESTRO
- ➔ **Treatment delivery:** afterloader with dose check or in-vivo dosimetry during the treatment, refine detector technology

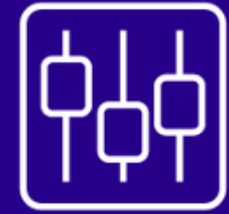
Radiation therapy - six innovation themes



System integration



Access to RT



Adaptive combined therapy



Treatment certainty



Patient experience



Workflow efficiency

Increasing adoption of 3D IGABT by education

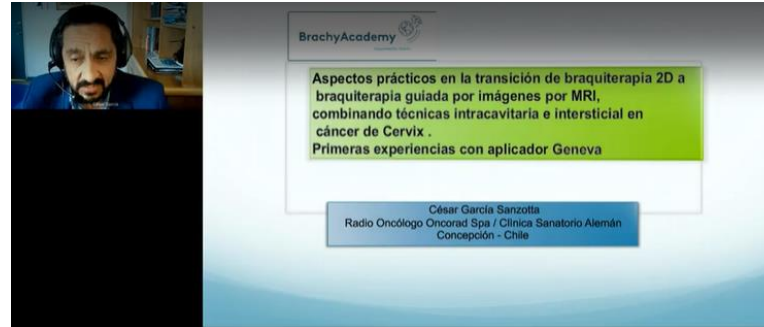
- 26 clinical workshops at the AKH, Vienna, Austria supported by BrachyAcademy (Elekta)
- 8 clinical workshops in Aarhus University, Denmark supported by Varian



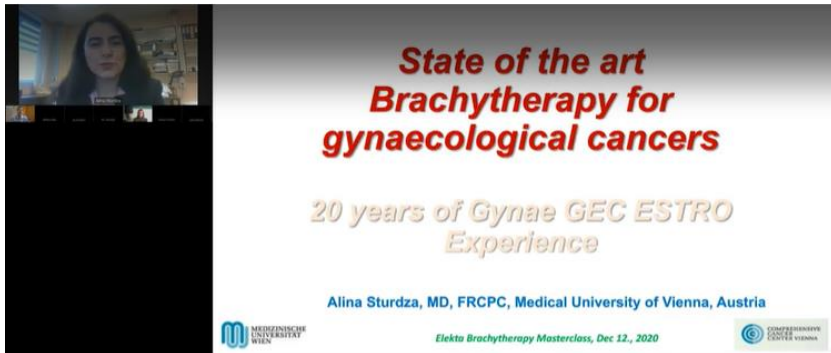
Educational webinars on Cervical Brachytherapy for LMICs



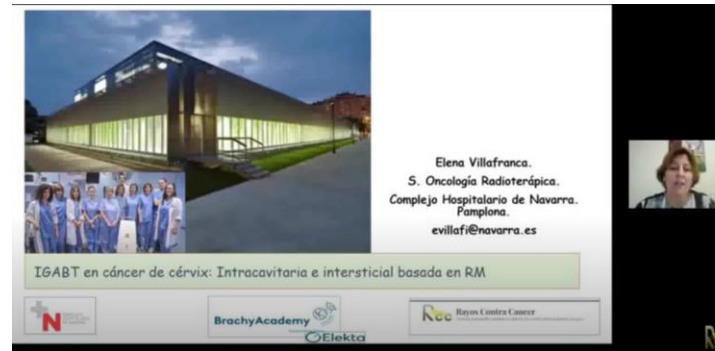
“Restructuring gynecological brachytherapy during the COVID-19 pandemic”, October 2020



“Braquiterapia de Cérvix: La Transición de 2D a Braquiterapia guiada por Imágenes. Primeras experiencias con aplicador Geneva”, December 2020



“GYN brachytherapy masterclass: transition from intracavitary to advanced interstitial”, December 2020



“IGABT in intracavitary/interstitial cervical cancer”, ENG and ESP, December 2020

COMMITMENT TO GLOBAL HEALTH EDUCATION

Many thanks for your contribution as educators in the inaugural Rayos Contra Cancer “Coloquios en Braquiterapia” activity: expanding knowledge on Brachytherapy in Latin America with over 2,000 attendees over 17 sessions

FROM
MAY 7TH - DECEMBER 17TH
2020

Also thanks to BrachyAcademy for its support on special sessions in Liver and GYN Brachytherapy

Partnership with:



i.Treatsafely – educational portal for RT

i.treatsafely
PRACTICAL LEARNING FOR RT PROFESSIONALS

Videos Documents Processes QA/Safety Your Library About Us Login Create Account

Search

cervical


Use your equipment list to return search results that are most relevant to you (?)

Please [login](#) or [sign up](#) to start watching videos!

Search Results


1 - 5 of 6 videos found

[Previous](#) 1 2 [Next](#)

 **GYN HDR - Contouring**
Summary: This video demonstrates how to contour a tandem and ovoid cervical brachytherapy case.
Posted: 2015-04-08 By: C. Yashar, MD
Views: 378, Rating: 15 @ / 3 @ / 1 @, Length: 16:41
Available in English

This video is also part of a [Clinical Process Series](#)

[Search for related documents](#)

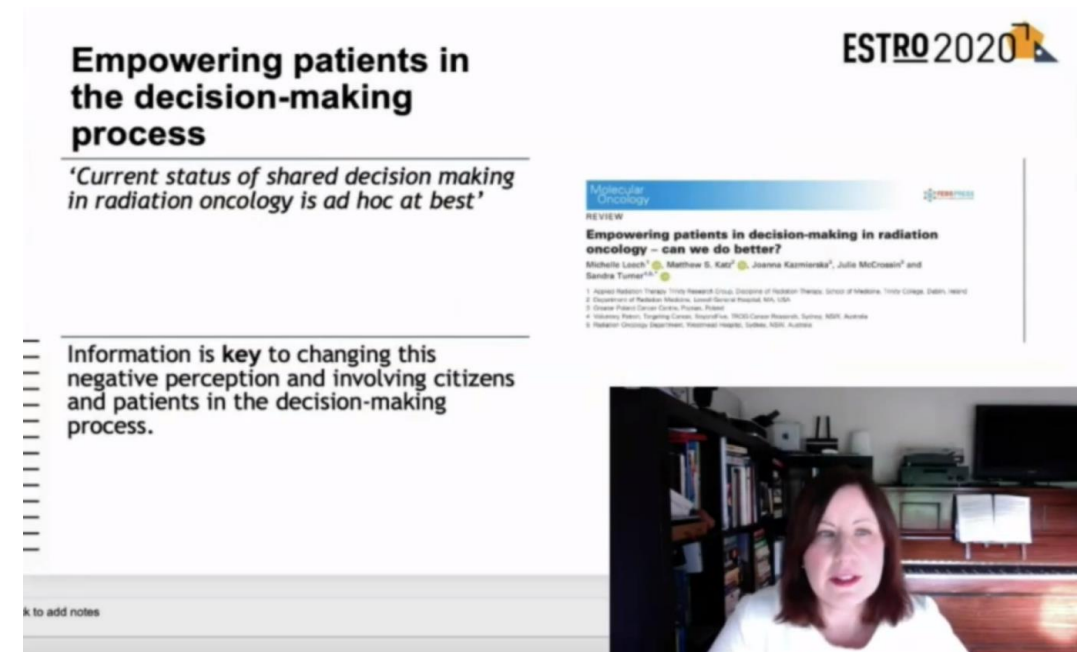
 **GYN HDR - Digitization and planning**
Summary: This video demonstrates how to digitize tandem and ovoid applicators and plan the treatment.
Posted: 2015-04-08 By: Dan Scanderbeg, PhD
Views: 136, Rating: 9 @ / 1 @ / 1 @, Length: 24:15
Available in English



2. Multisectoral collaboration

“...if by 2035, every cancer patient who needs radiation therapy had access to it, almost one million more lives would be saved every year worldwide. Every radiation oncology professional has ... to contribute to making this happen. Debunking myths about radiation therapy, particularly its safety and efficacy, explaining in plain terms and with simple visual aids the process of radiation therapy and really listening to what patients fear about radiation therapy are ways that all radiation oncology professionals can contribute to this goal, regardless of location and resources”.

Michelle Leech, Trinity College, Dublin (Ireland)
ESTRO 2020 Award Lecture



Empowering patients in the decision-making process

'Current status of shared decision making in radiation oncology is ad hoc at best'

ESTRO 2020

REVIEW


Empowering patients in decision-making in radiation oncology – can we do better?

Michelle Leech¹, Matthew S. Katz², Joanna Kazianka³, Julia McCosker⁴ and Sandra Turner^{5*}

1. Applied Radiation Therapy, Trinity Research Group, Division of Radiation Therapy, School of Medicine, Trinity College, Dublin, Ireland
2. Department of Radiation Medicine, Loyola University Medical Center, USA
3. Ovarian Patient Care Centre, Poznan, Poland
4. Radiation Therapy, Trinity College, Waterford, 2020 Cancer Research, Trinity 2020, Australia
5. Radiation Therapy Department, Queensland Health, Toowoomba, Toowoomba, Australia

Information is key to changing this negative perception and involving citizens and patients in the decision-making process.

Click to add notes



Free online course for patients: **An Introduction to Radiation Oncology: From Diagnosis to Survivorship:** <https://www.mooc-list.com/course/introduction-radiation-oncology-diagnosis-survivorship-futurelearn>

Presidential Symposium at ASTRO 2020

The Global Clinic: Radiation Oncology in the 21st Century

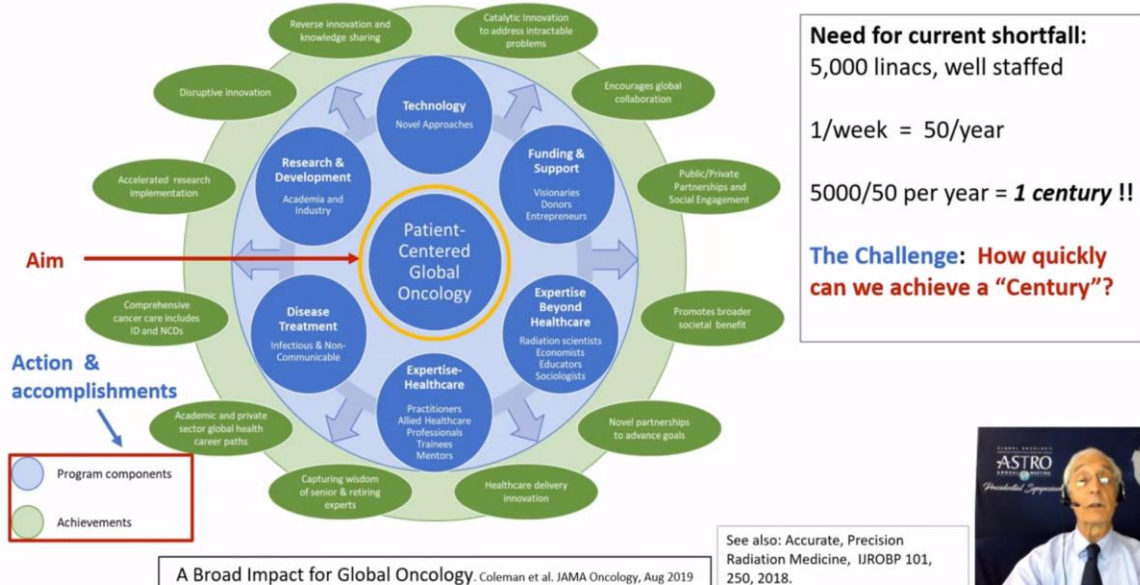


Dr. C. Norman Coleman, NCI, ECIC:

The challenge: how quickly we can achieve a “Century”? The approach should be not evolutionary but revolutionary: flexibility, rapid decision-making, creativity, funding opportunities, visionary governance, ready partnerships, work with non-profits, tax exempt, grants/awards.

Is what we are now doing enough?
Or is this a complex system that needs a new approach?

Hint: no.
Hint: yes



“If you want to go fast, go alone. If you want to go far, go together”

African proverb