



# MODERN RADIATION ONCOLOGY. INNOVATION IN PERSONALIZED ONCOLOGY: BACK TO THE FUTURE

33RD EDITION

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Fondazione Policlinico Universitario Agostino Gemelli IRCCS  
Università Cattolica del Sacro Cuore

ART  
Advanced Radiation  
Therapy



# ***COURSE AIM LECTURE***

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LUCA INDOVINA**

**Fondazione Policlinico Universitario A. Gemelli IRCCS  
Rome-Italy**



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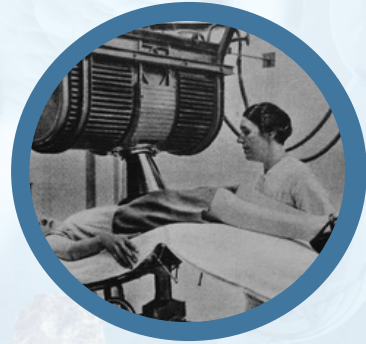


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# PAST



## ● 1895 First steps

The history of radiotherapy can be reconstructed from the first experiments immediately after the discovery of X-rays (1895), when radiation was shown to cause skin burns.

## ● 1905-1915

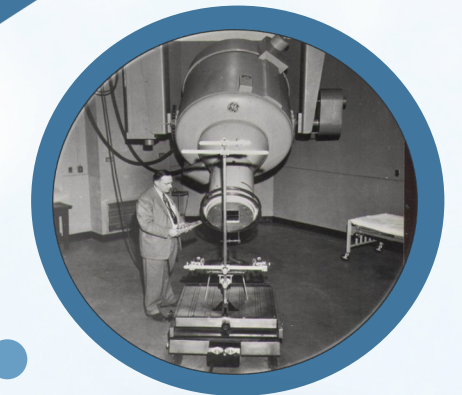
### Later developments and the use of radium

Further experiments with radiotherapy began, but progress was much slower than with X-rays because of the high cost of radium and the difficulty of obtaining it.

## ● 1915-1935

### Commercialism, quackery and the end of an era

Marketing refers to activities a company undertakes to promote the buying or selling of a product or service.



## ● 1935-1953 Development of new curative techniques

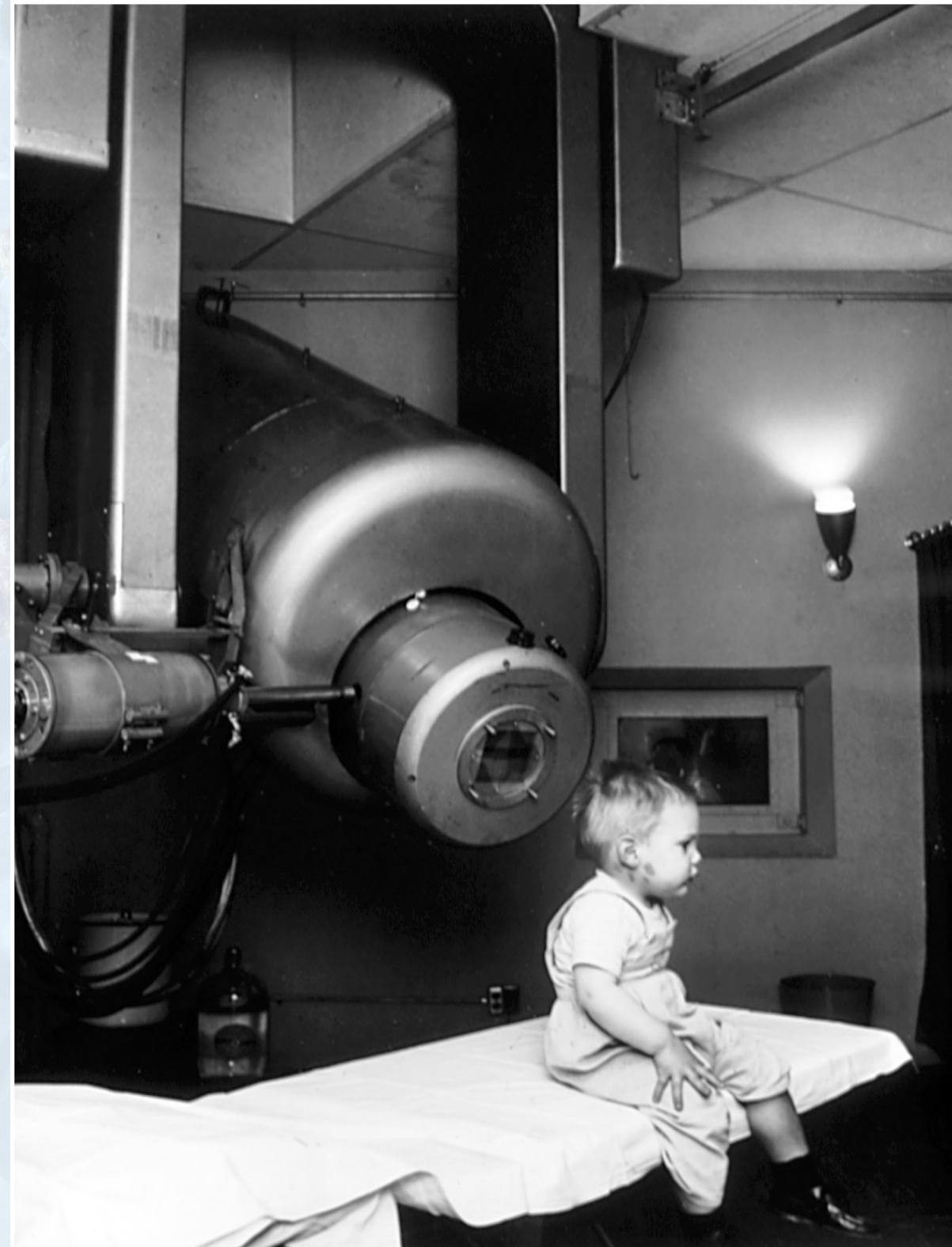
It was during these years that two fundamental fields began to be separated: radiology and radiotherapy. The experimental approach and empiricism that had been the hallmark of the first applications of radiation was now a thing of the past.

D I S C O V E R Y





● Modern ERA 1953



Historical image showing Gordon Isaacs, the first patient treated for [retinoblastoma](#) with linear accelerator radiation therapy (in this case an electron beam), in **1957**, in the **U.S.** Other patients had been treated by linac for other diseases since **1953 in the UK.**

Gordon's right eye was removed on January 11, 1957 because cancer had spread there. His left eye, however, had only a **localized tumor** that prompted [Henry Kaplan](#) to treat it with the **electron beam.**

The patient survived into adulthood with **normal vision in his left eye.**



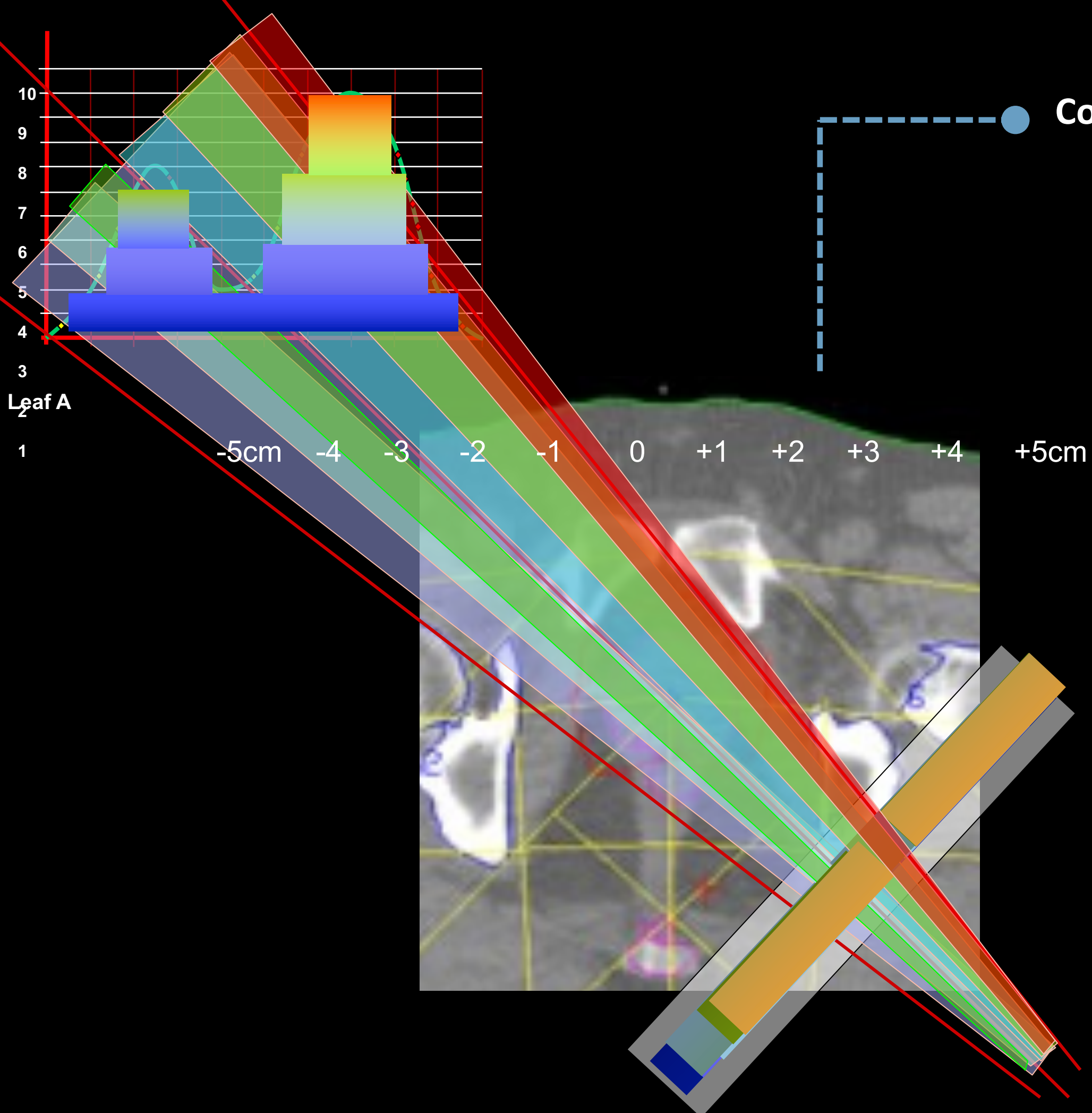
## INNOVATION IN PERSONALIZED ONCOLOGY: BACK TO THE FUTURE

### Modern ERA 1980s

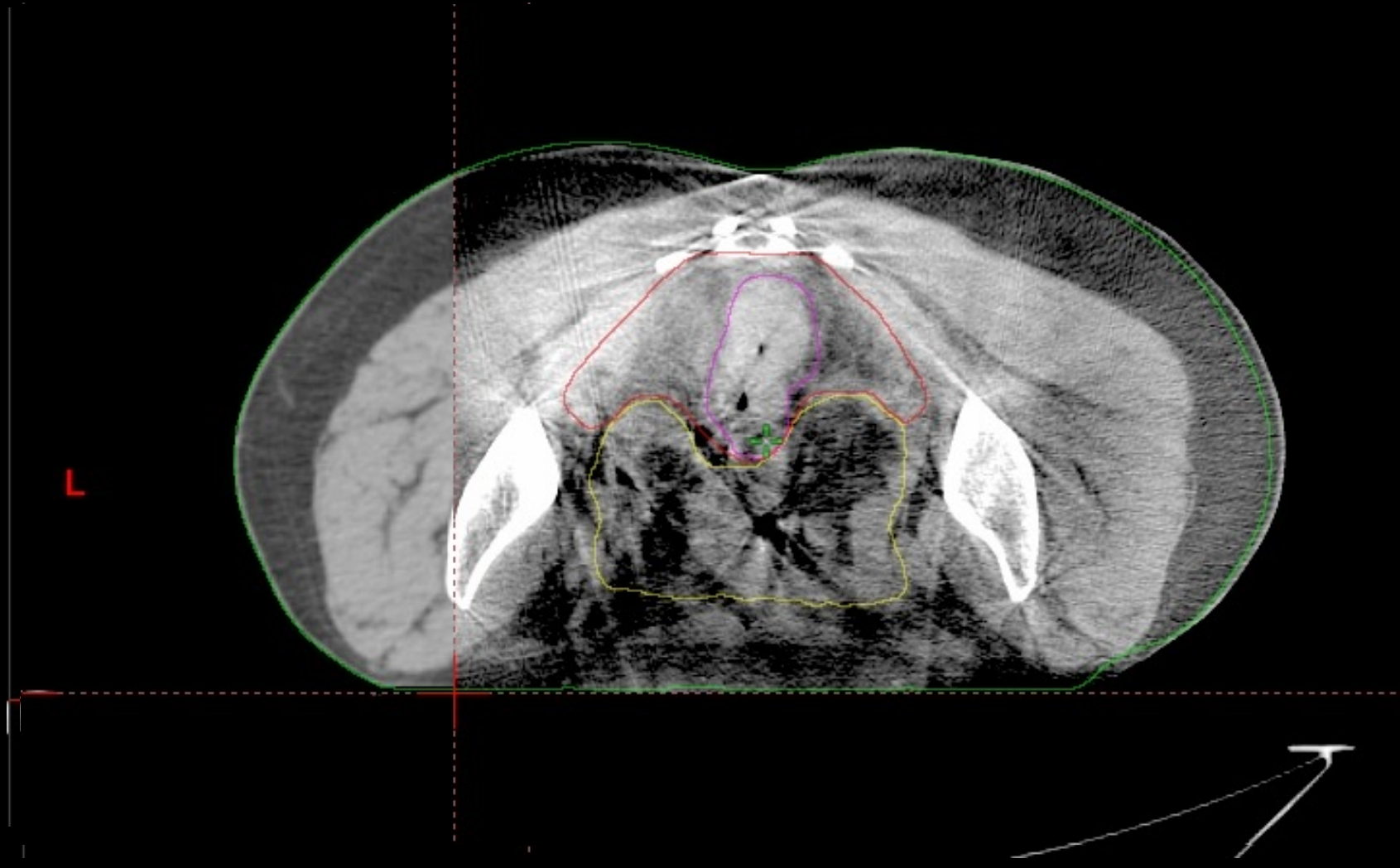


For now, let's take a trip down memory lane and explore how CT has changed over the last 50 years.

- In the **early 1900s** an Italian radiologist named Alessandro Vallebona invented tomography
- In **1971** the first patient brain CT was performed in Wimbledon, England
- A new generation CT scanner was developed in **2008** that could take images of movements (hearts beating)
- The FDA launched their Initiative to Reduce **Unnecessary Radiation Exposure from Medical Imaging in 2010**

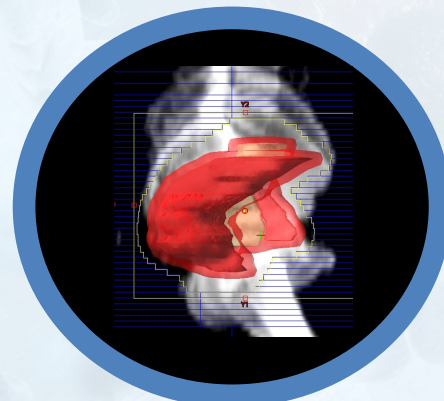


● Contemporary ERA

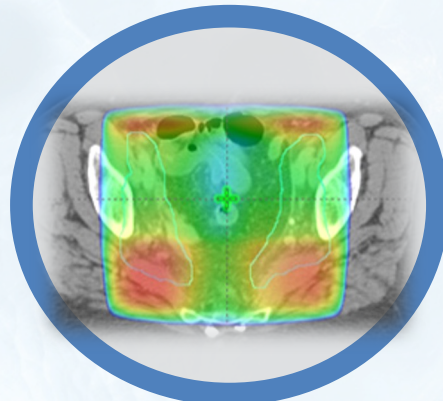


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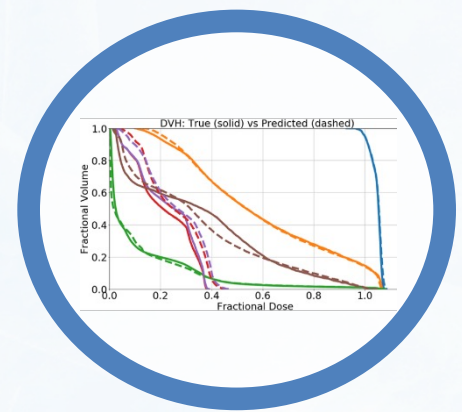
# INNOVATION IN PERSONALIZED ONCOLOGY: BACK TO THE FUTURE



● Delineation & 3D Reconstruction



● Dose Distribution



● Dose Volume Histogram

# STANDARDIZATION

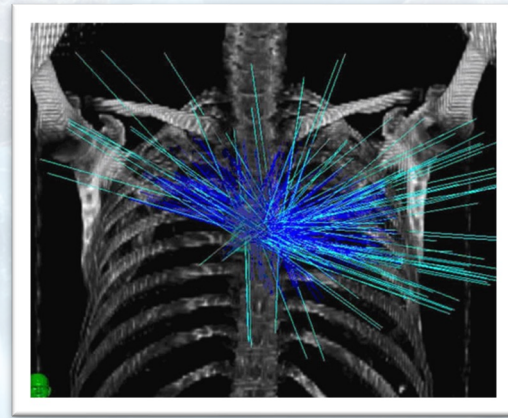
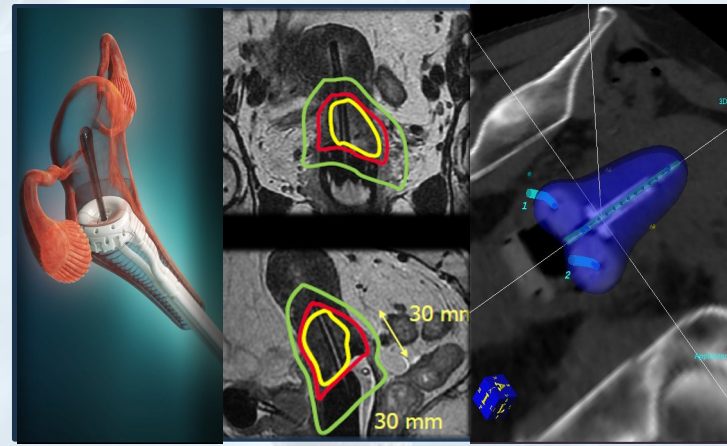
DATE: 09-11 OCTOBER 2023





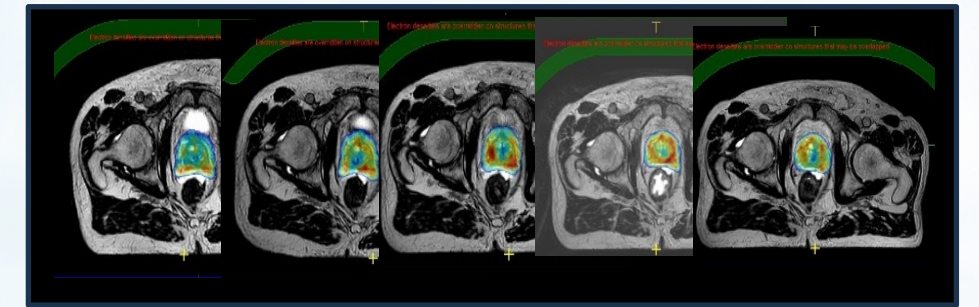
# INNOVATION IN PERSONALIZED ONCOLOGY: BACK TO THE FUTURE

INTERVENTIONAL RT

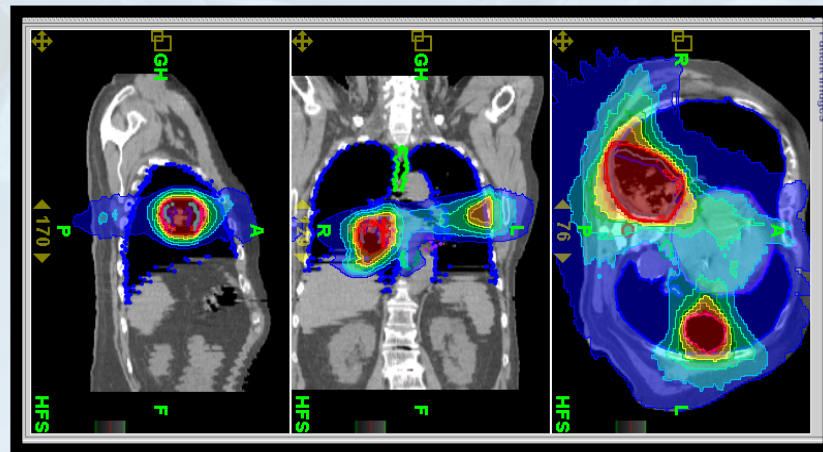


TRACKING RT

MR ADAPTIVE



P — R — E — C — I — S — I — O — N



Volumetric Arc Therapy



MR GATED



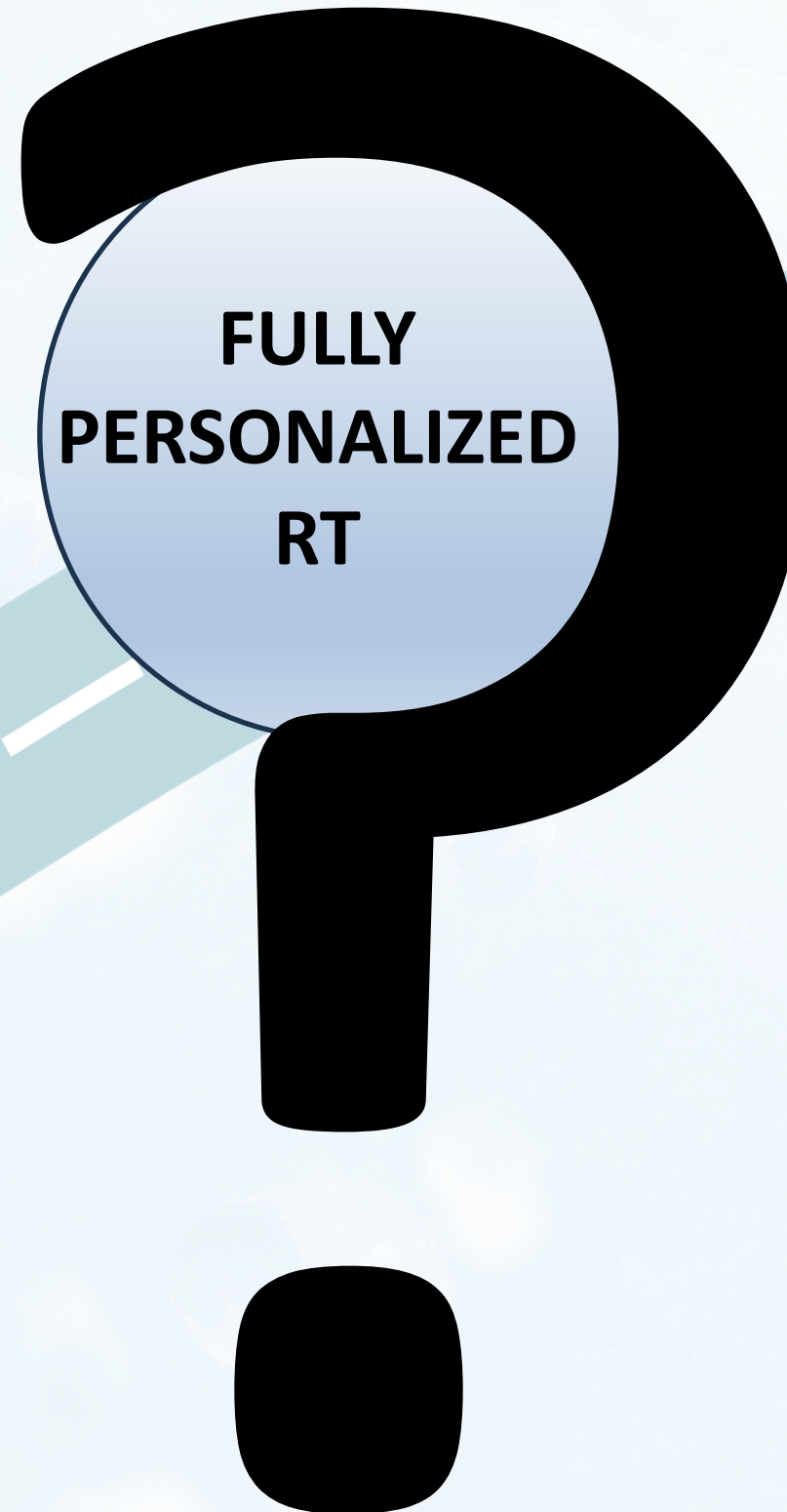




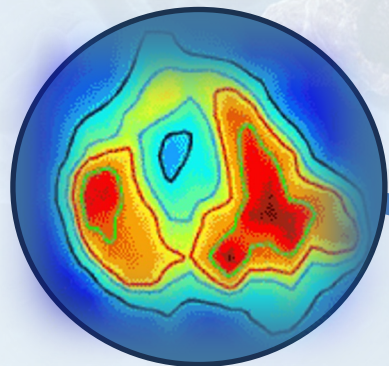
# WHAT ABOUT THE FUTURE?



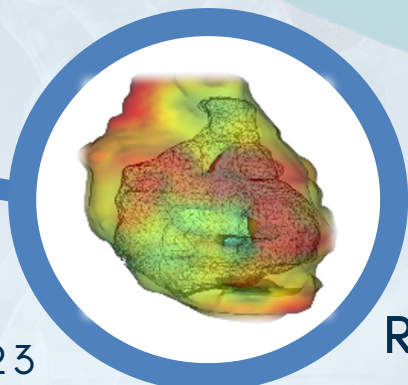
2023-20XX  
ARTIFICIAL INTELLIGENCE



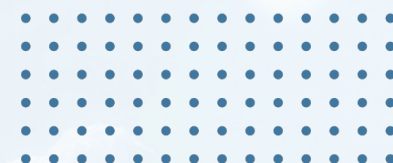
FULLY  
PERSONALIZED  
RT



Biological Target Volume



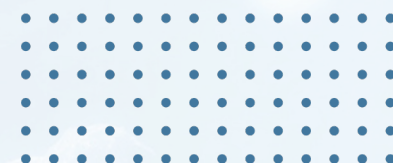
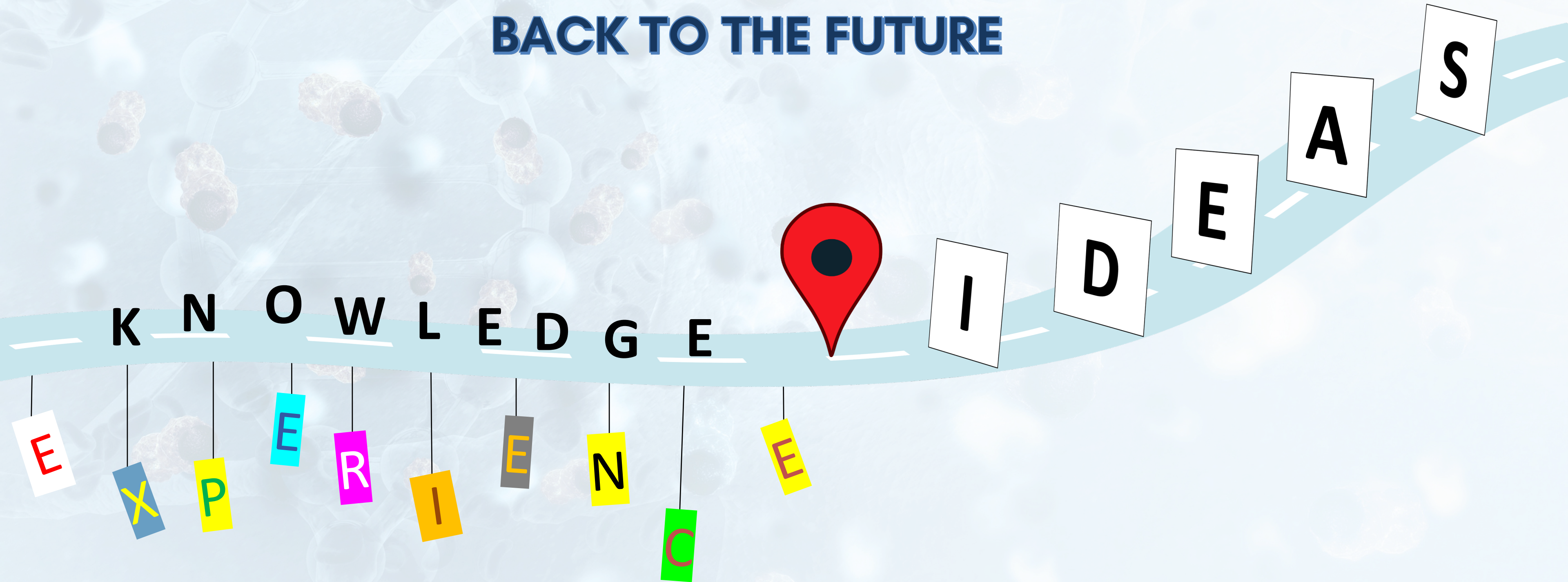
RADIOMICS





FULLY ADAPTED RT?

# BACK TO THE FUTURE





# Modern Radiation Oncology. Innovation in personalised oncology: back to the future

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Scientific Coordinators *M.A. Gambacorta, V. Valentini, L. Indovina*  
Honorary Presidents *C.A. Perez<sup>†</sup>, N. Cellini*

## Monday 9

### **HISTORY OF IMAGING IN RADIATION ONCOLOGY**

*V. Grégoire*

### **EDUCATION AND INNOVATION**

*J. Ericksen*

## Thursday 10

### **IMMUNOTHERAPY & RADIOTHERAPY**

*P. Lambin*

**NOT TO BE MISSED**

### **PREDICTING PATIENTS OUTCOMES FROM EBM AND DIGITAL TWIN**

*A. Dekker*

### **MANAGEMENT OF THE INNOVATION: THE MEDICAL PHYSICIST POINT OF VIEW**

*D. Verellen*

## Wednesday 11

### **UNCONVENTIONAL FRACTIONATION**

*J. Bourhis (25')*

### **HUMANISTIC GUIDED RT**

*V. Valentini*



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## Monday 9

### **SESSION 1: BACK TO THE FUTURE: LOCAL TREATMENTS**

Chairs: *R. Pacelli, F. Deodato*

### **SESSION 2: BACK TO THE FUTURE: SYSTEMIC TREATMENTS**

Chairs: *L. Livi, R.M. D'Angelillo*

# Basic Knowledge

## Thursday 10

### **SESSION 3: IMAGING AND AI**

Chairs: *S. Pergolizzi, M.F. Osti*

### **SESSION 4: BACK TO THE FUTURE: PATHOLOGY**

Chairs *M. Mangoni, M. Buglione di Monale e Bastia*



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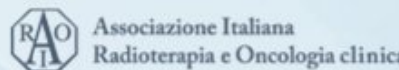
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## Thursday 10

### **SESSION 5: BACK TO THE FUTURE: HEAD AND NECK CANCER**

Chairs: A. Fiorentino, G. Minniti

### **SESSION 6: BACK TO THE FUTURE: NSCLC CANCER**

Chairs: D. Genovesi, S. Ramella

### **SESSION 7: BACK TO THE FUTURE: PELVIS PROSTATE, RECTUM, CERVIX**

Chairs: G. Macchia, S. Arcangeli

# Real life

## Wednesday 11

### **SESSION 8: BACK TO THE FUTURE: BREAST CANCER**

Chairs: C. Aristei, G. Mantello

### **SESSION 9: BACK TO THE FUTURE: HOLISTIC APPROACH**

Chairs: D. Chieffo, P. Cornacchione



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# Practical Sessions

**Monday 9**

15.45-17.30

***Laboratories for complex problem-solving in radiotherapy***

## **Lab 1: Interventional RT " AULA BRASCA**

Chair: *L. Tagliaferri*

Presenters: *A. Vavassori, L. Vicenzi*

Discussants: *V. Lancellotta, B. Fionda, E. Placidi, P. Cornacchione, G. Kovacs G.C. Mattiucci*

## **Lab 2: CT-guided RT " AULA FORUM**

Chair: *N. Dinapoli*

Presenters: *S. Ramella, R.M. D'Angelillo, D. Genovesi*

Discussants: *M. Massaccesi, S. Manfrida, G. Stimato, D. Cusumano, C. Votta F. Miccichè*

## **Lab 3: MR-guided RT " AULA RATTI**

Chair : *L. Boldrini*

Presenters: *F. Alongi, P. Gentile*

Discussants: *G. Chiloiro, L. Placidi, A. Romano, F. Catucci, M.V. Antonelli<sup>o</sup>*

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# MRO.ART

MODERN RADIATION ONCOLOGY.  
INNOVATION IN PERSONALISED ONCOLOGY:  
BACK TO THE FUTURE



## SPONSORED LECTURES

9/10/2023

10:00-10:30 am

*MR guided radiotherapy in the A3i era: the MRIdian paradigm shift*  
RADIUS - Luca Boldrini (25')  
♀ Aula Vito - Coffee break

01:15-02:15 pm

*1.5 T MR guided adaptive radiation therapy: mono-institutional experience of 900 patients*  
ELEKTA - Filippo Alongi (25')  
♀ Aula Vito - Lunch

10/10/2023

08:30-09:00 am

*New interventional oncology opportunities for the management of chronic pain in long-term surviving cancer patients: new generation implanted devices*  
BOSTON SCIENTIFIC - Nicola Montano (25')  
♀ Aula Vito

01:00-02:00 pm

*Gammapod breast radiosurgery: technology and clinical data*  
TEMA SINERGIE - Chiara Reverberi (25')  
♀ Aula Vito - Lunch

11/10/2023

11:30-12:15 am

*Advanced imaging and interoperability in a radiation oncology workflow*  
GE HEALTHCARE - Sylvain Reuze (25')  
♀ Aula 402 - Brunch



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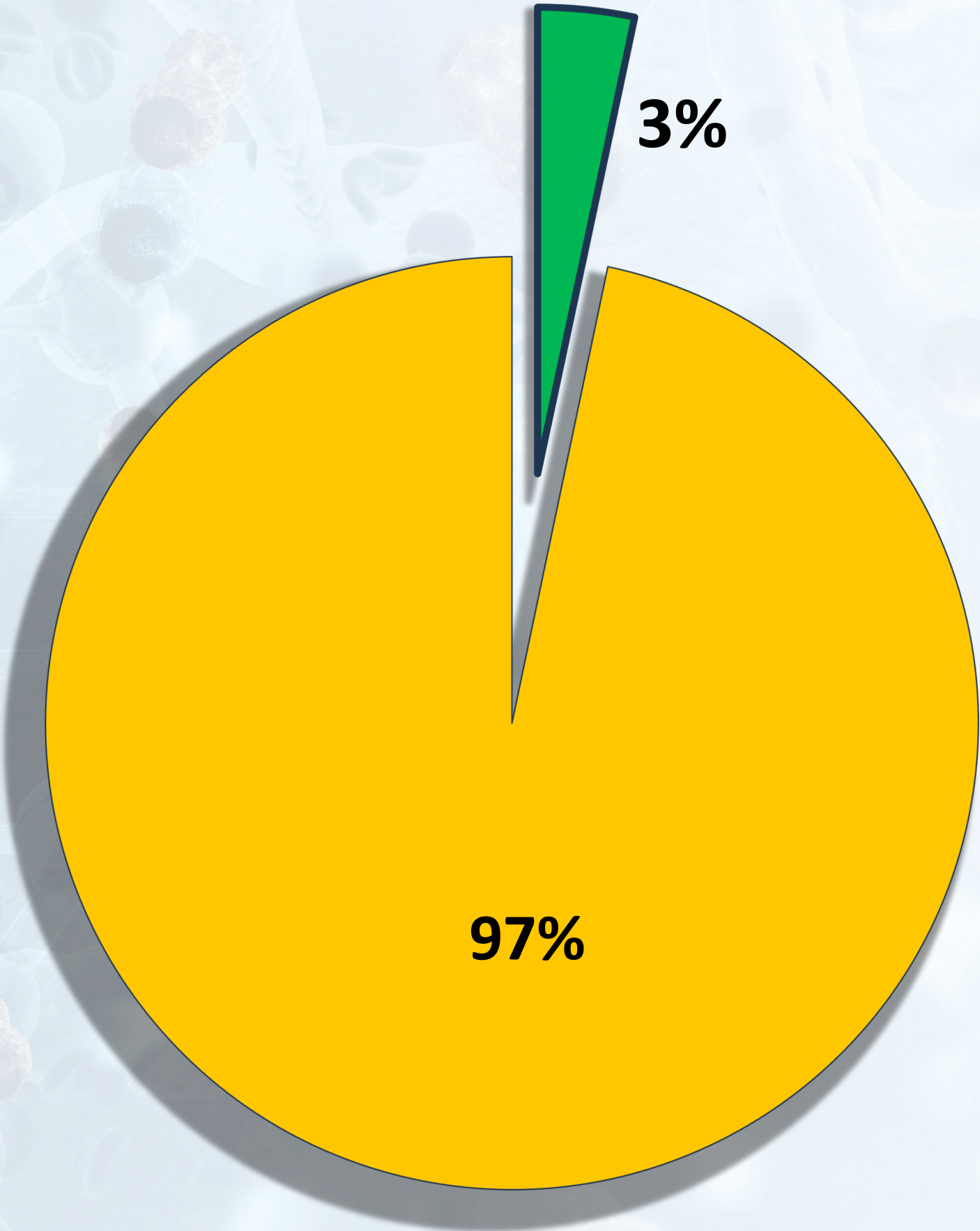


ART



- NO CME
- Different Rooms
- Breakfast & Lunch time

91 attendees

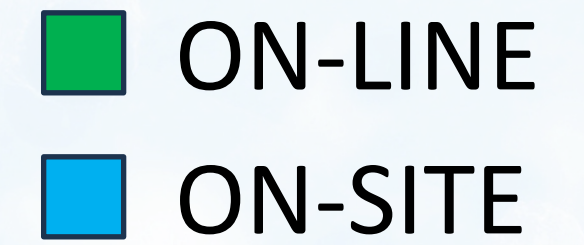
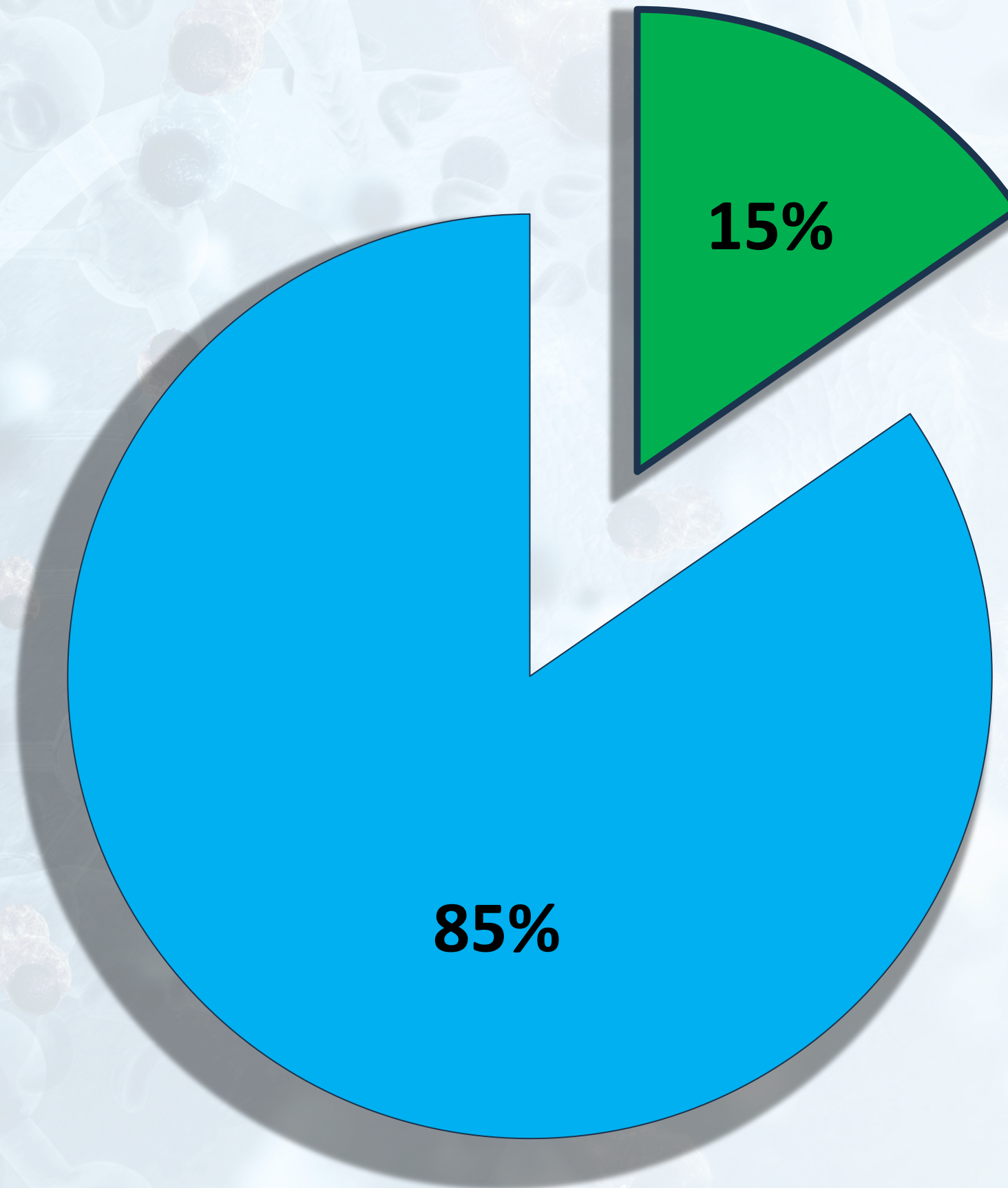


-  FOREIGNERS
-  ITALIANS

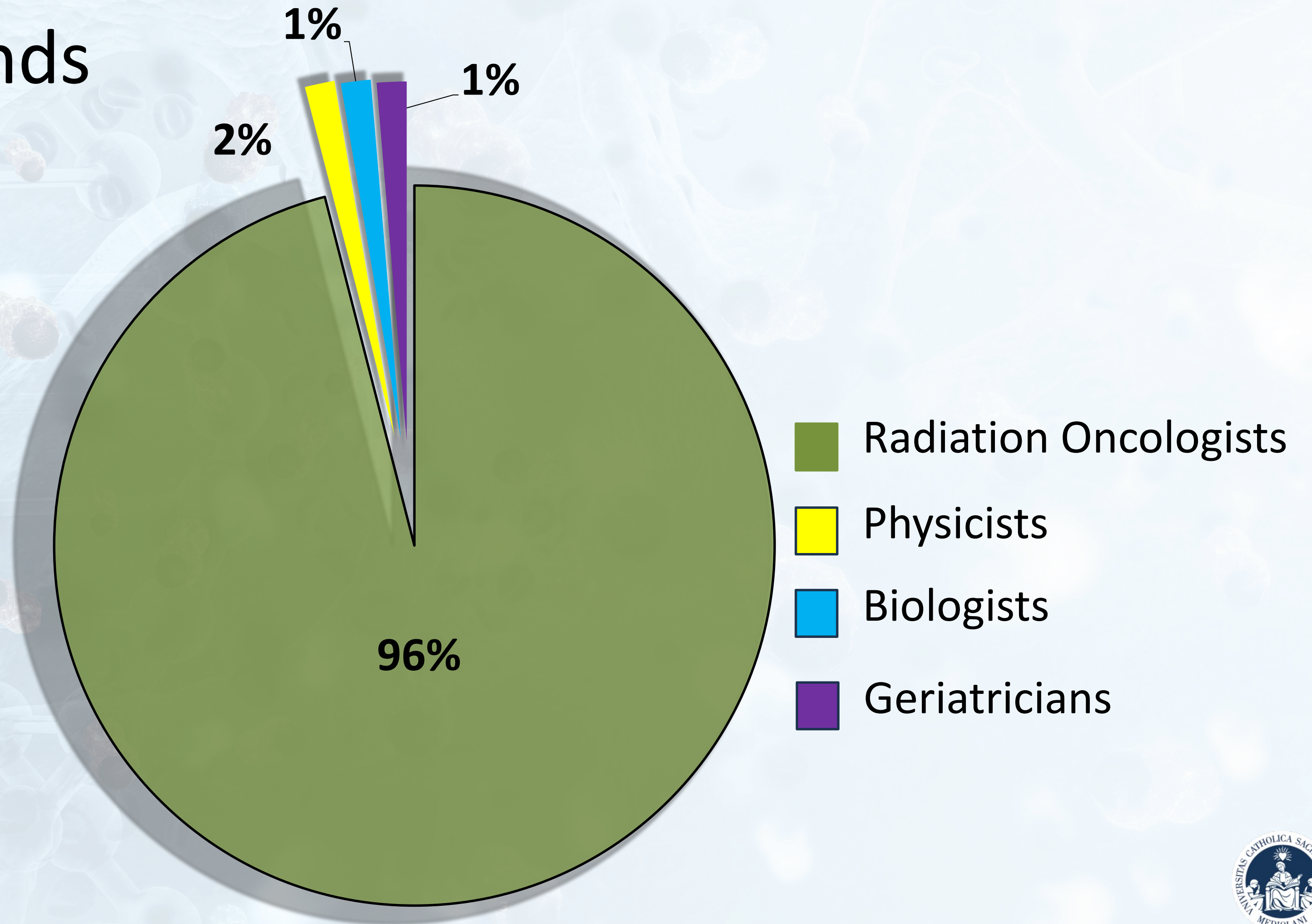




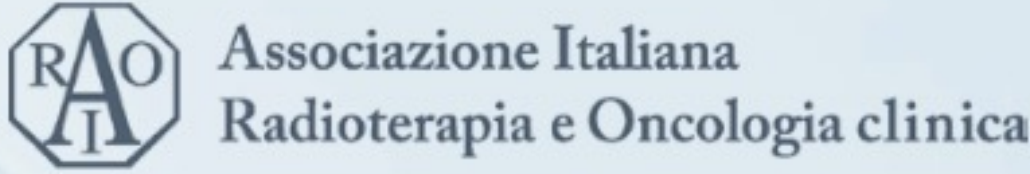
# mode of participation



# backgrounds



# acknowledgements



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FULLY ADAPTED RT?

# ***OPENING LECTURE***

Chairs: *A.G. Morganti, M.E. Rosetto*

## ***Cycles in Radiation Therapy innovations***

*J. Overgaard*

DATE: 09-11 OCTOBER 2023

