XXII ASSEMBLEA MaNGO MILANO

STANDARD TREATMENTS AND NEW DIRECTIONS IN GYNAECOLOGICAL CANCERS

MILANO June 26th-29th, 2025

Responsabili Scientifici:
NICOLETTA COLOMBO, FRANCESCO RASPAGLIESI

MaNGO

Oncological Hadrontherapy for Complicated Challenges

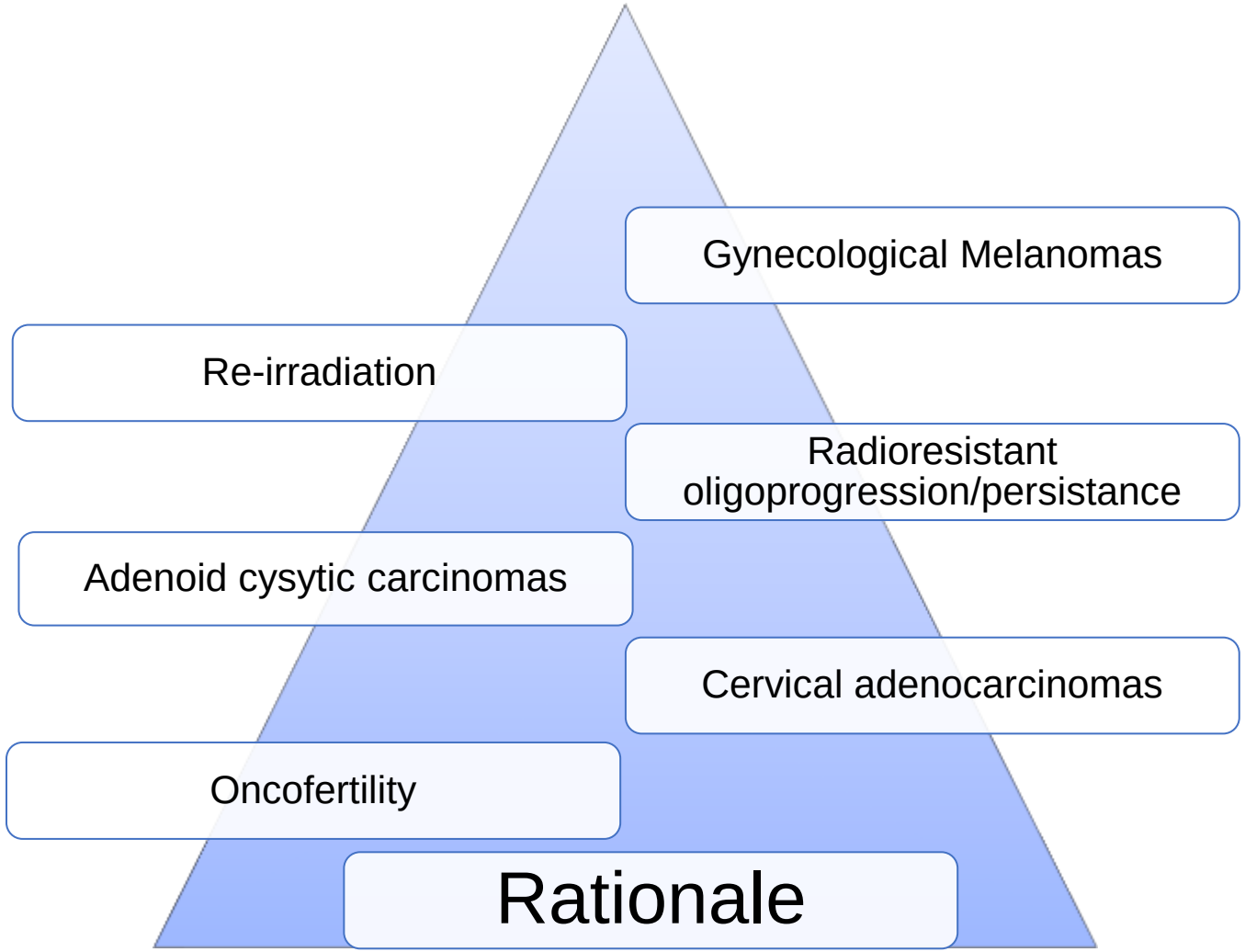
Amelia Barcellini

National Center for Oncological Hadrontherapy
University of Pavia

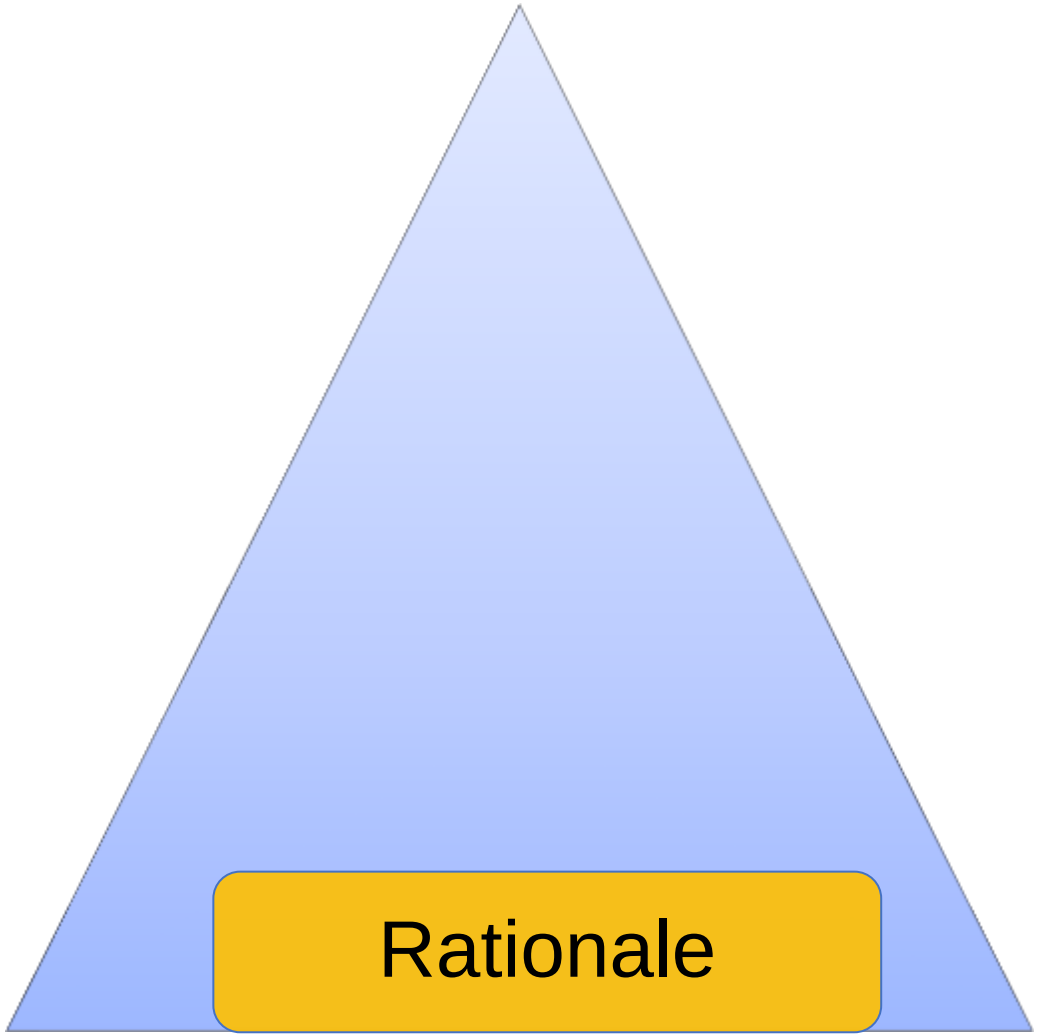
Disclosure

None

Agenda


Gynecological Melanomas
Re-irradiation
Radioresistant oligoprogression/persistance
Adenoid cysytic carcinomas
Cervical adenocarcinomas
Oncofertility
Rationale

Agenda

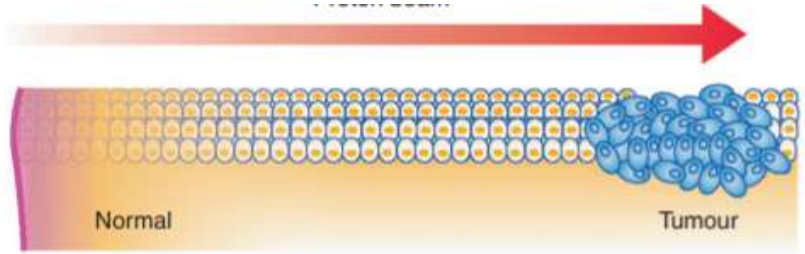


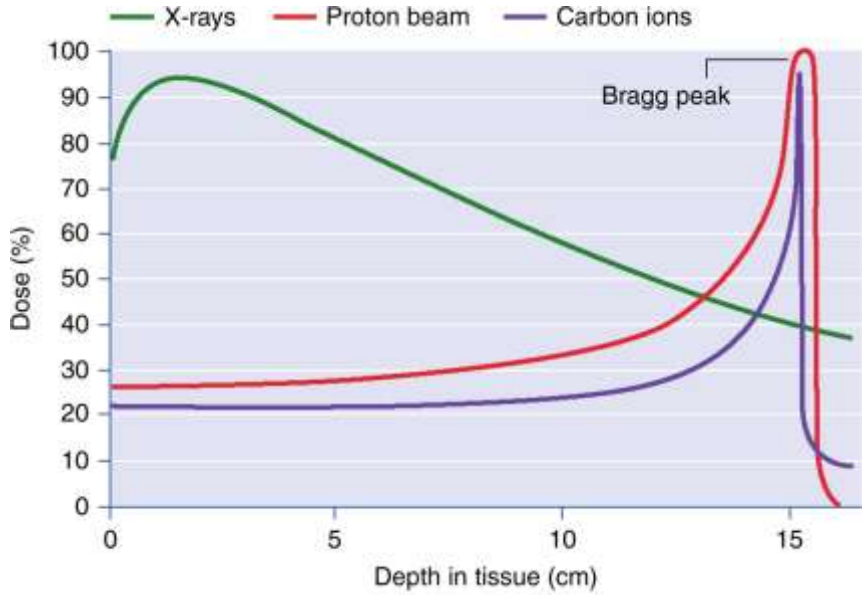
Rationale

- Compared to traditional RT, particle beam RT has dosimetric and radiobiological advantages

- **Dosimetric hallmarks:**

  - ✓ **favourable depth–dose curve:**
    - X-ray energy decreases exponentially with dose
    - Hadrons deposit most of their initial energy close to the end of the range (Bragg peak) within the tumour target



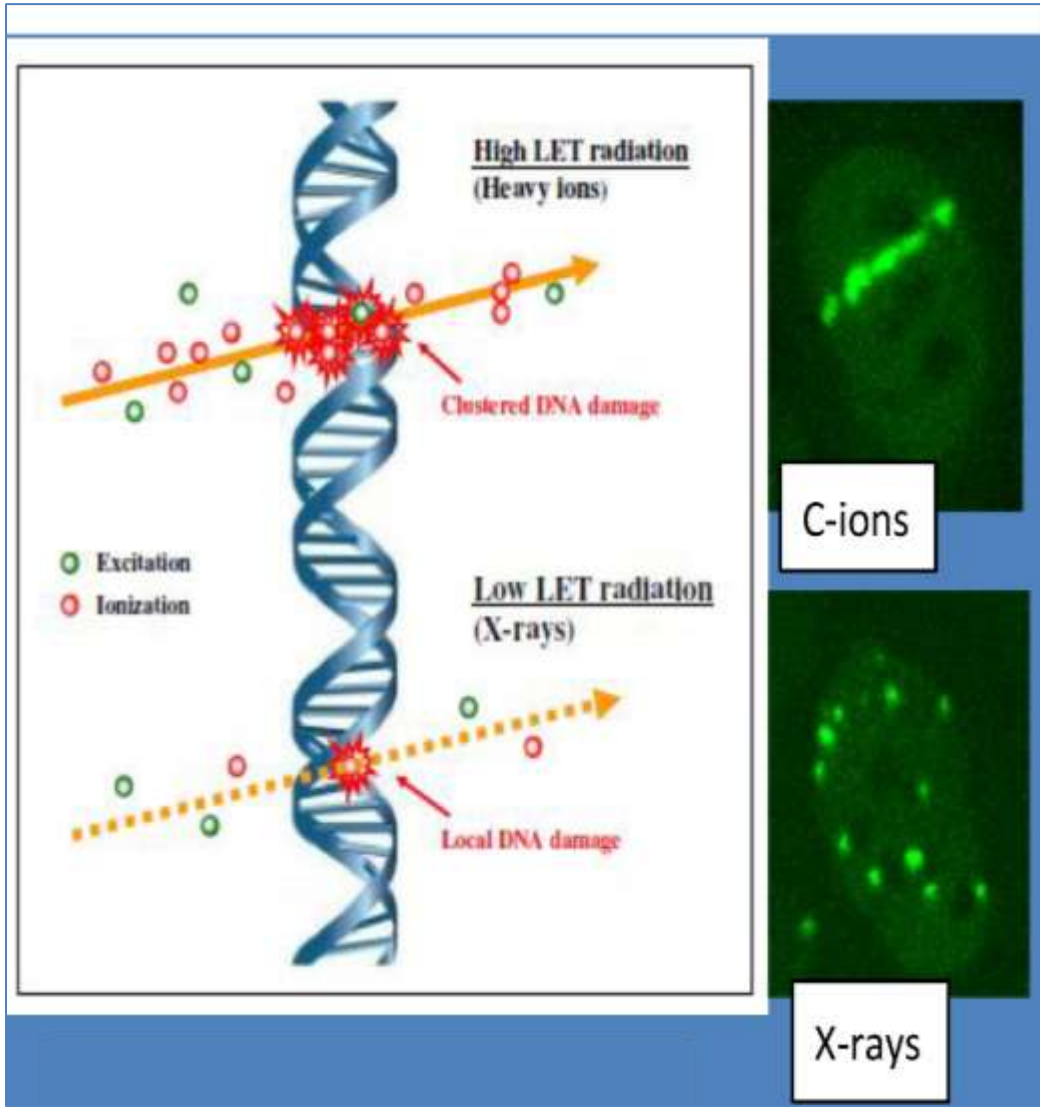


Durante M, Br J Cancer. 2019

Rationale

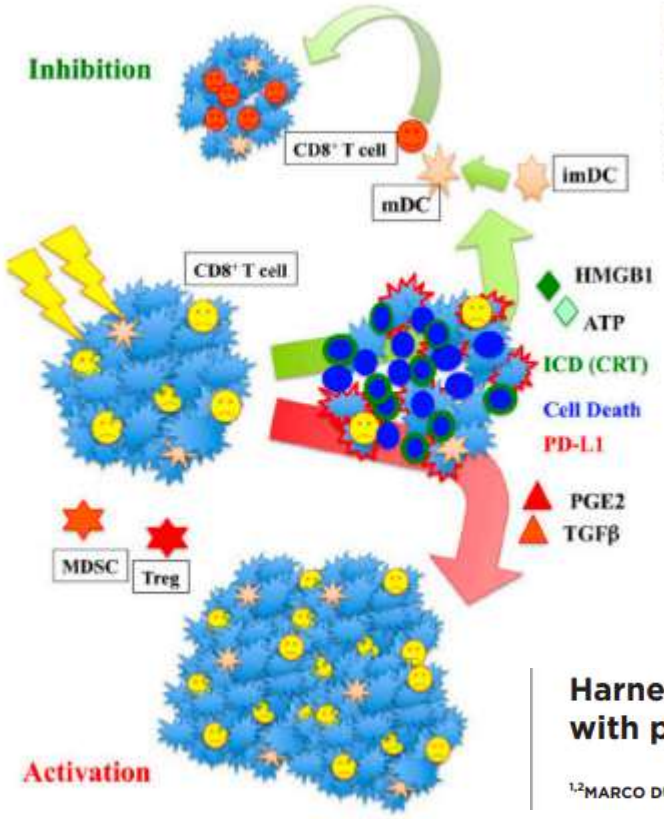
- **Radiobiological advantages**

  - ✓ charged particles have a **higher LET**, which ensures a **higher relative biological effectiveness** than conventional RT
  - ✓ they can mainly induce more serious damage (i.e. **oxidative stress, more DNA double-strand breaks**)
  - ✓ DSBs are the most lethal, as an accumulation of misrepaired or unrepaired DSBs can lead to a **massive loss of genetic information and cell death**
  - ✓ Reduced dependence of fractionation and cell-cycle stage
  - ✓ **Reduced** oxygen enhancement ratio **(OER)** in the tumour



Tinganelli W, Cancers (Basel). 2020; Pawlik TM Int J Radiat Oncol Biol Phys. 2004; Durante M, Br J Cancer. 2019

Rationale



Advances in Radiation Oncology (2022) 7, 100883

advances in radiation oncology

www.advancesradonc.org

Teaching Case

Pembrolizumab After Carbon Ion Radiation Therapy for Alveolar Soft Part Sarcoma Shows a Remarkable Abscopal Effect: A Case Report

Masahiko Okamoto, MD, PhD,[a,b,*] Hiro Sato, MD, PhD,[a,b] Xianshu Gao, MD, PhD,[c] and Tatsuya Ohno, MD, PhD[a,b]

International Journal of Radiation Oncology biology • physics

www.redjournal.org

Biology Contribution

Reduction of Lung Metastases in a Mouse Osteosarcoma Model Treated With Carbon Ions and Immune Checkpoint Inhibitors

Alexander Helm, PhD,* Walter Tinganelli, PhD,* Palma Simoniello, PhD,[†,‡] Fuki Kurosawa, BSc,[†] Claudia Fournier, PhD,* Takashi Shimokawa, PhD,[†] and Marco Durante, PhD[*,†]

Contents lists available at ScienceDirect

Neoplasia

journal homepage: www.elsevier.com/locate/neo

Optimal radiation dose to induce an abscopal effect by combining carbon-ion radiotherapy and anti-CTLA4 antibody

Liqiu Ma[a,b,c,*], Yang Li[b], Yoshimitsu Sakamoto[a], Lin Xie[a], Saaya Suzuki[a], Yukari Yoshida[b], Li Sui[a], Gang Guo[a], Jialing Wen[a], Wangcai Ren[a], Kazuhiro Kakimi[d], Kensuke Osada[a], Akihisa Takahashi[b], Takashi Shimokawa[a,*]

World Journal of Clinical Cases

Bystander effect and abscopal effect in recurrent thymic carcinoma treated with carbon-ion radiation therapy: A case report

Yan-Shan Zhang, Yi-He Zhang, Xiao-Jun Li, Ting-Chao Hu, Wei-Zuo Chen, Xin Pan, Hong-Yu Chai, Yan-Cheng Ye

Advances in Radiation Oncology (2017) 2, 333-338

advances in radiation oncology

www.advancesradonc.org

Harnessing radiation to improve immunotherapy: better with particles?

[1,2]MARCO DURANTE, PhD and [3]SILVIA FORMENTI, MD

Teaching Case

Abscopal effect in recurrent colorectal cancer treated with carbon-ion radiation therapy: 2 case reports

Daniel K. Ebner BS [a,b], Tadashi Kamada MD, PhD [a], Shigeru Yamada MD, PhD [a,*]

Rationale

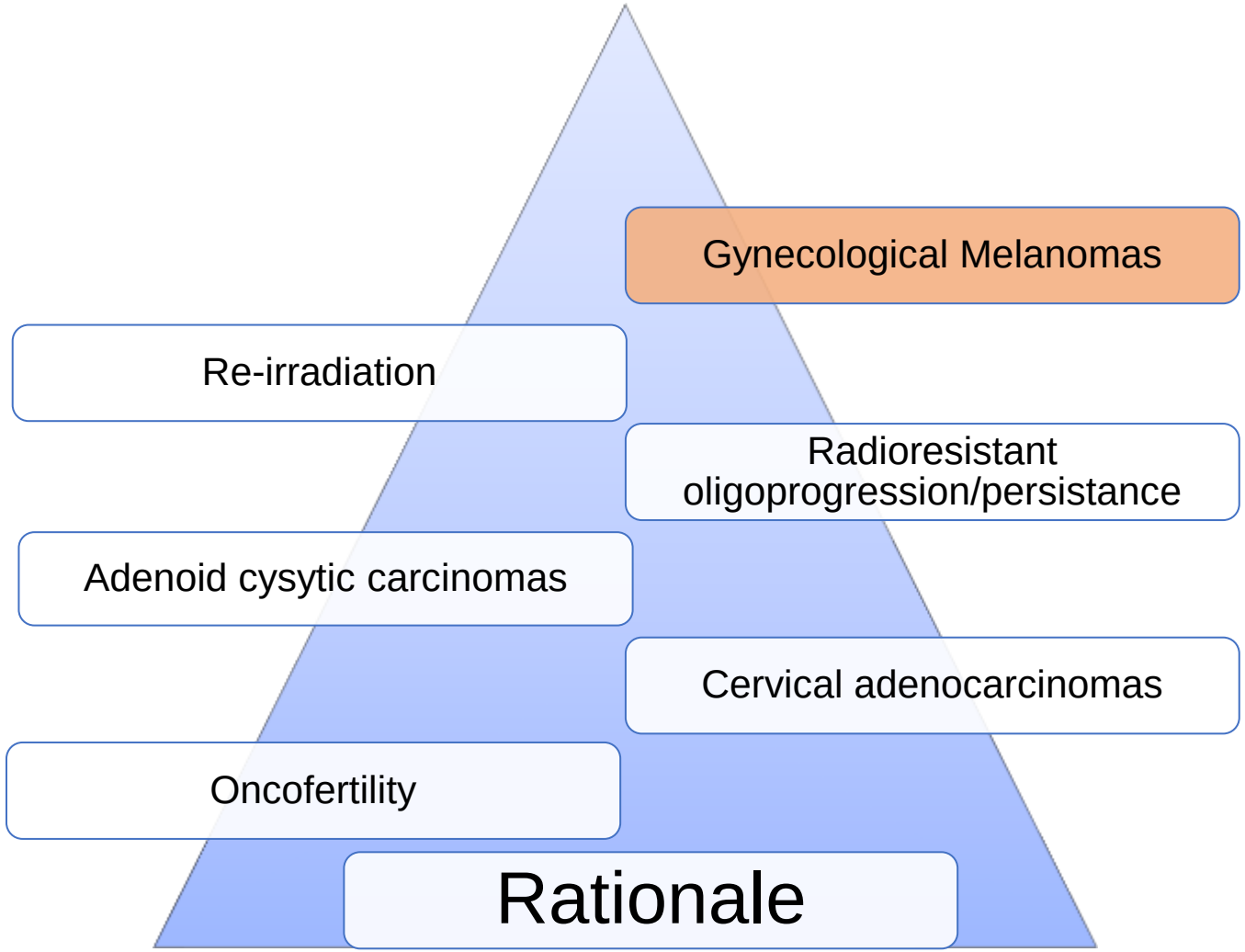
- **Normal tissue** sparing, **higher dose to tumor**
- Effectiveness to **hypoxic** and **radioresistent** tumors
- Ability to **reverse tumor immune desertification** and resistance

suitable for

- tumors close to radiation-sensitive organs (bowel, spinal cord, brain…)
- local recurrences after photon beam radiotherapy
- slow-growing tumors
- oxygen-poor tumors
- “cold” tumors

Tinganelli W, Cancers (Basel). 2020; Pawlik TM Int J Radiat Oncol Biol Phys. 2004; Durante M, Br J Cancer. 2019

Agenda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Gynecological Melanomas


Contents lists available at ScienceDirect

Gynecologic Oncology

journal homepage: www.elsevier.com/locate/ygyno

Review Article

Melanoma of the lower genital tract: Prognostic factors and treatment modalities

Angiolo Gadducci [a,*], Silvestro Carinelli [b], Maria Elena Guerrieri [a], Giovanni Damiano Aletti [c]

[a] Department of Clinical and Experimental Medicine, Division of Gynecology and Obstetrics, University of Pisa, Pisa, Italy
[b] Division of Pathology and Laboratory Medicine, European Institute of Oncology, Milan, Italy
[c] Department of Gynecologic Surgery, European Institute of Oncology, University of Milan, Milan, Italy

- **Vulva:** 2.4-10% of all vulvar cancers
  3-7% of all melanomas in women
  Incidence: 0.48-1.4/1000.000 women
  5-year OS: 37–50%

- **Vagina:** <3% of all vaginal cancers
  0.4-0.8% of all melanomas in women
  Approximately 500 cases reported in the literature
  5-year OS : 13–32%

- **Cervix:** extremely rare
  approximately **80 cases reported in the literature**
  5-year OS: approximately 10%

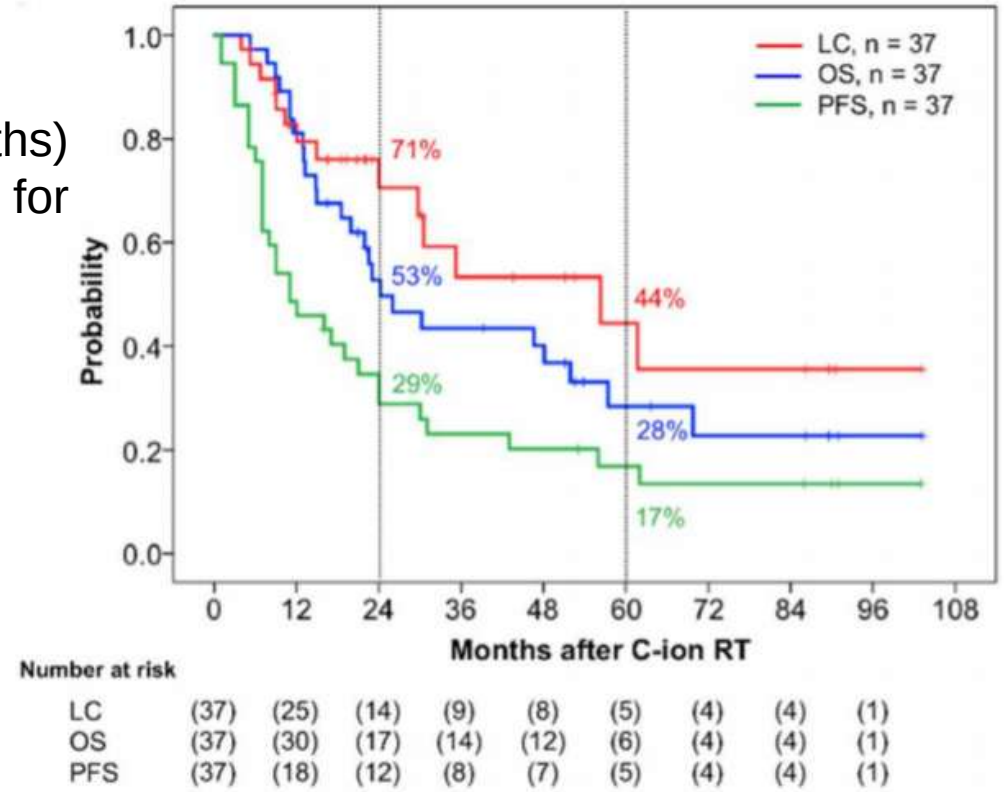
- Management based on data concerning gyn cancers & cutaneous melanoma
- **Surgery** is the treatment of choice (early stages) →surgical challenges (proximity of bladder, anus rectum)
- **CIRT** is a promising alternative

Gadducci A, Gyn Oncol

Gynecological Melanomas

- Retrospective analysis of **37 patients**
- Median follow-up periods: **23 months** (range: 5–103 months) for all patients and 53 months (range: 16–103 months) for survivors
- **2-y LC** 71%

Acute Toxicity	CTCAE v.4 Scoring				
	Grade 0	Grade 1	Grade 2	Grade 3	Grade 4–5
Dermatitis/mucositis	2	18	14	3	0
Genitourinary toxicity	28	9	0	0	0
Lower gastrointestinal toxicity	17	14	6	0	0
Late toxicity	**RTOG/EORTC Scoring**				
	Grade 0	Grade 1	Grade 2	Grade 3	Grade 4–5
Dermatitis/mucositis	28	9	0	0	0
Genitourinary toxicity	30	3	4	0	0
Lower gastrointestinal toxicity	29	5	3	0	0

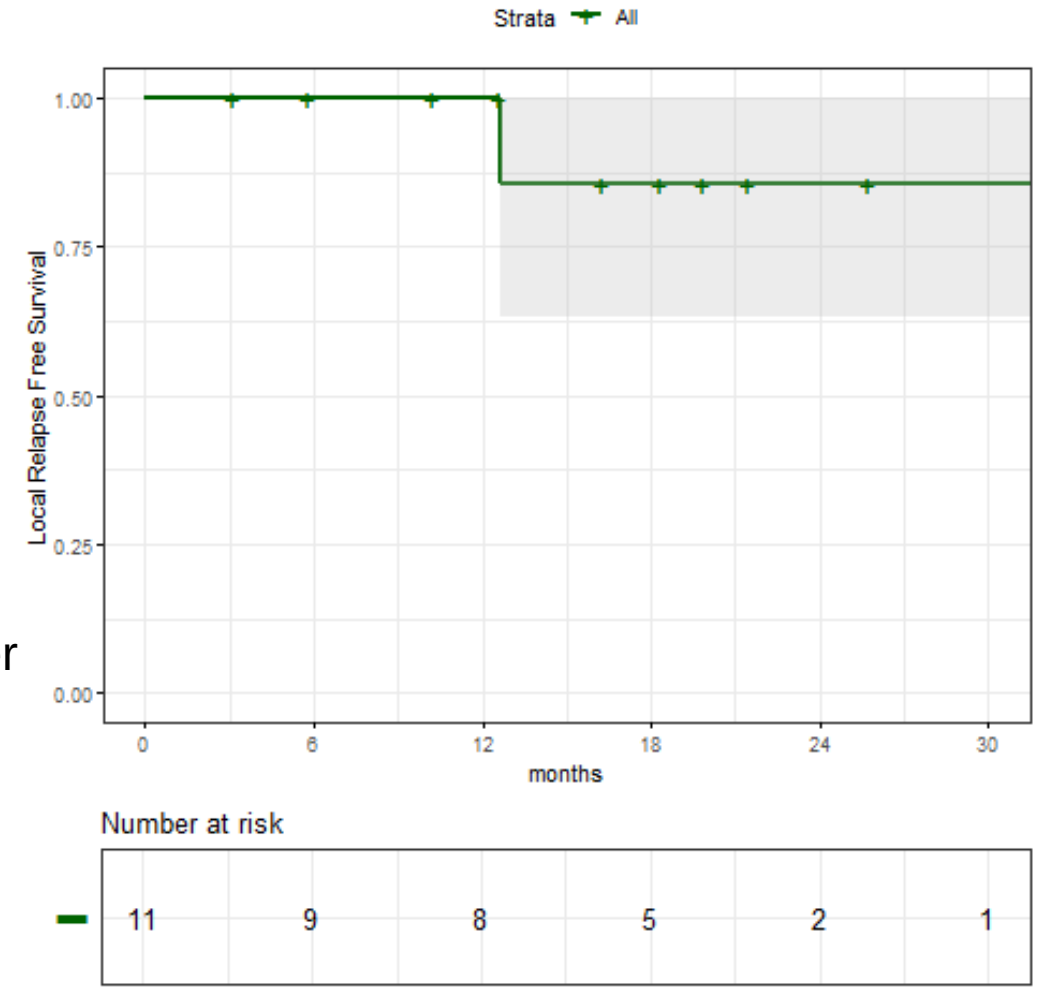


Murata et al., Cancers (Basel). 2019

Gynecological Melanomas

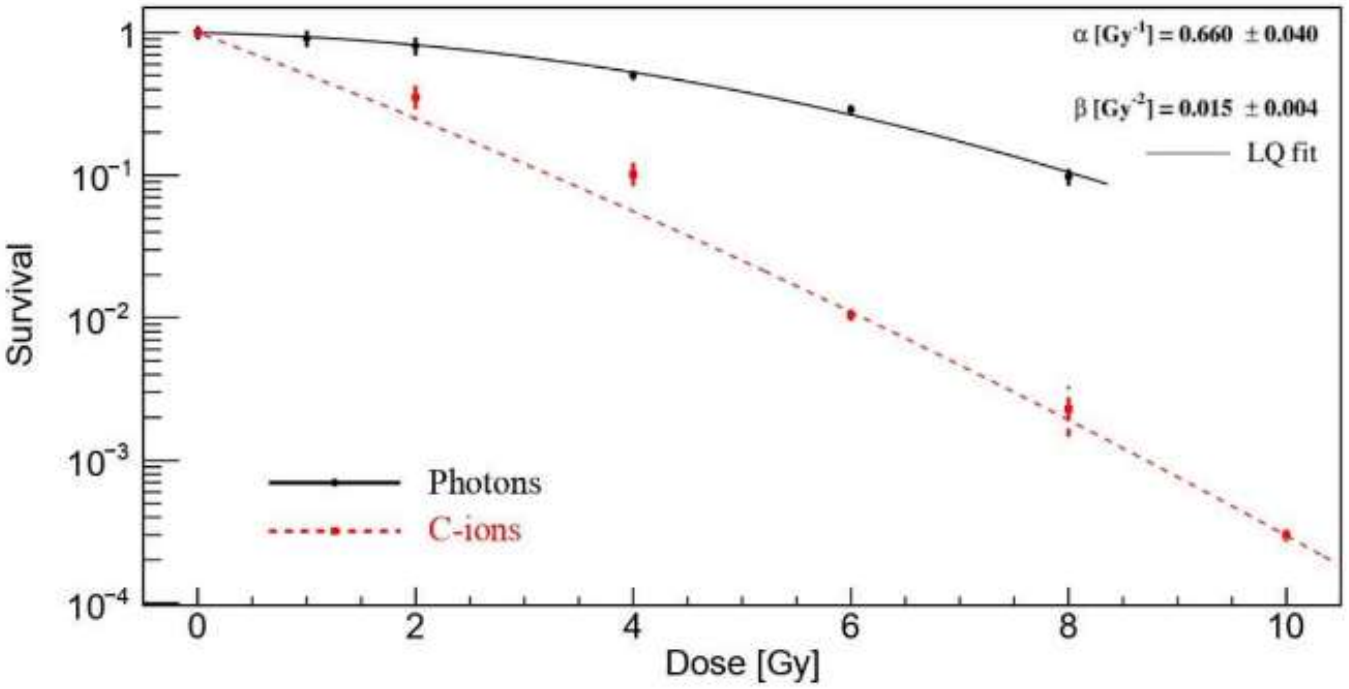
- Retrospective analysis of 11 patients
- Total dose 68.8 GyRBE
- Median follow-up 18 months (IQR: 8.7, 20.3)

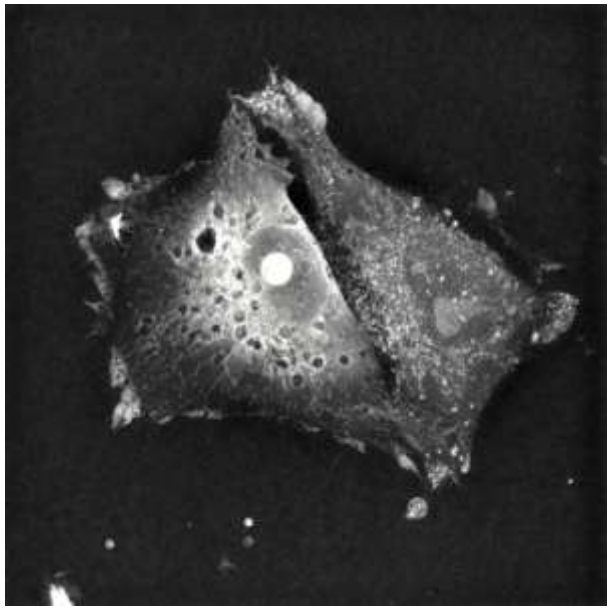
- ORR :82%
- CB of 100 %
- **1-y and 2-y LC were 100% and 86%**
- Patients with an age >60 years seemed to experience a better LC (p = 0.014)

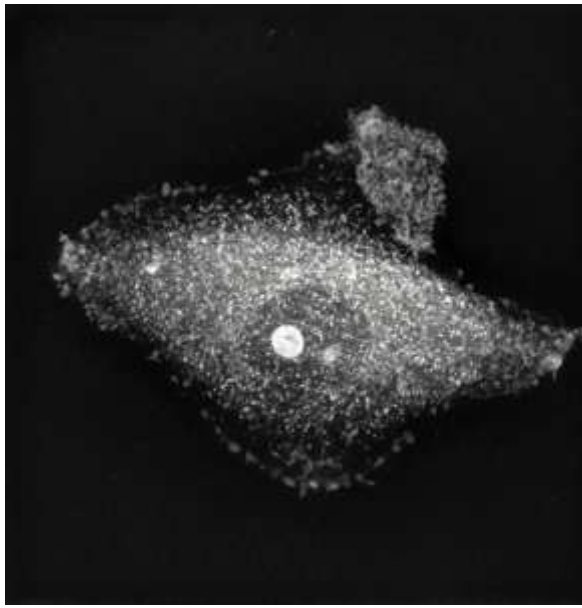


Barcellini et al., Cancers (Basel). 2024

Gynecological Melanomas







Courtesy by Dr Charalampopoulou

Gynecological Melanomas

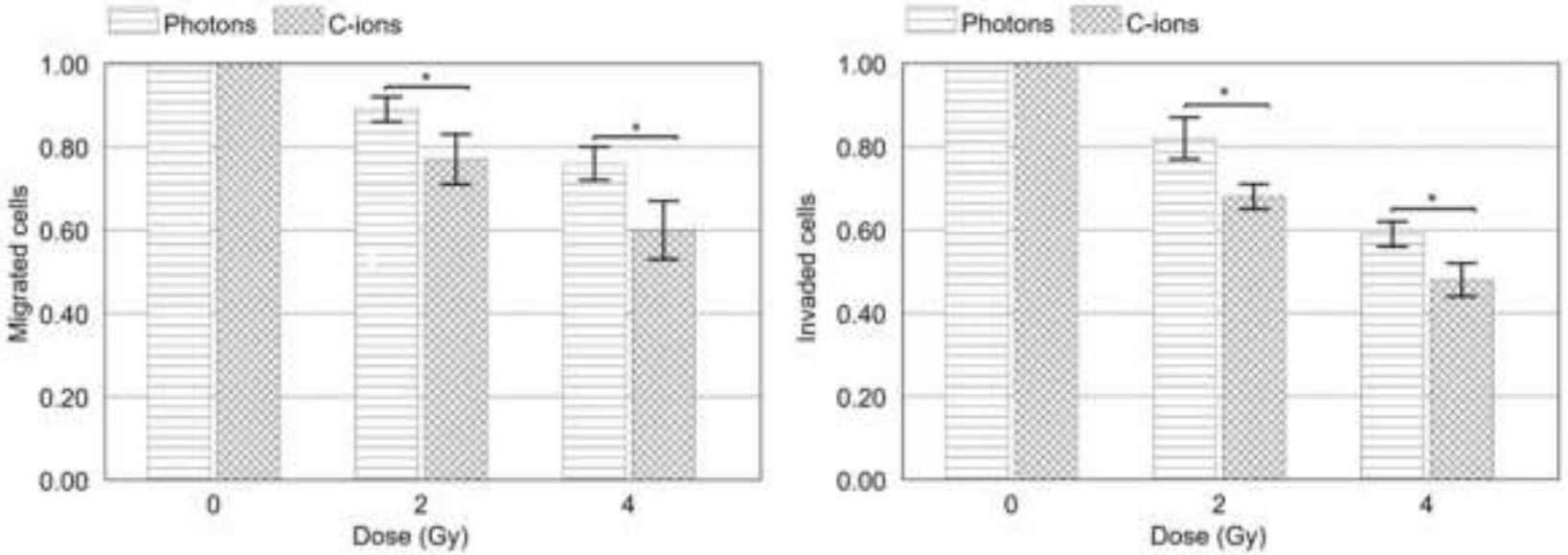
Contents lists available at ScienceDirect

International Journal of Particle Therapy

journal homepage: www.sciencedirect.com/journal/ijpt

Vaginal Mucosal Melanoma Cell Activation in Response to Photon or Carbon Ion Irradiation

Alexandra Charalampopoulou (MsC)[1,2,*], Amelia Barcellini (MD)[3,4], Margarita Bistika (MsC)[5], Giovanni Battista Ivaldi (MD)[6], Sara Lillo (MD)[3], Giuseppe Magro (PhD)[7], Ester Orlandi (MD)[3,8], Marco Giuseppe Pullia (PhD)[9], Sara Ronchi (MD)[3], Paola Tabarelli De Fatis (MSc)[10], Angelica Facoetti (PhD)[1]



Charalampopoulou et al., IJPT 2024

Gynecological Melanomas

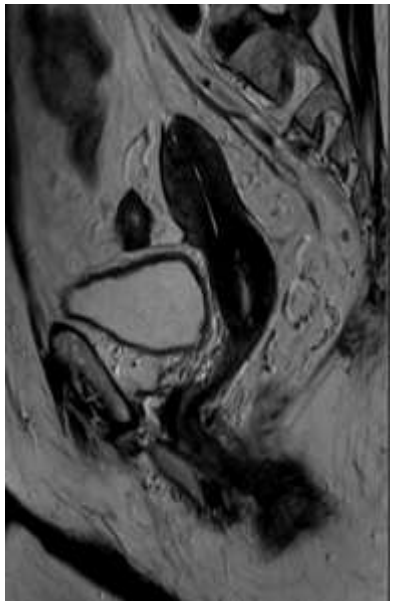
NIH National Library of Medicine
ClinicalTrials.gov

RECRUITING

Carbon Ion Radiation Therapy in the Treatment of Mucous Melanomas of the Female Lower Genital Tract (CYCLE)

ClinicalTrials.gov ID NCT05478876
Sponsor CNAO National Center of Oncological Hadrontherapy
Information provided by CNAO National Center of Oncological Hadrontherapy (Responsible Party)
Last Update Posted 2022-07-26

Study Design	Monocentric, prospective phase II study
Patients	Unresectable
Treatment	68.8 GyRBE in 16 fractions, 4 fractions per week
Endpoints	**The primary endpoint** of the study is to estimate **2-year PFS** in patients diagnosed with mucosal melanoma of the lower genital tract, treated with carbon ion radiation therapy. **Secondary endpoints:** •Overall survival (OS) •Toxicity according to Common Terminology Criteria for Adverse Events (CTCAE version 5.0) •Objective response rate (ORR) according to RECIST •Evaluation of the association between the clinical-radiological response at 6 weeks and the late response (> 6 months) •Quality of life.

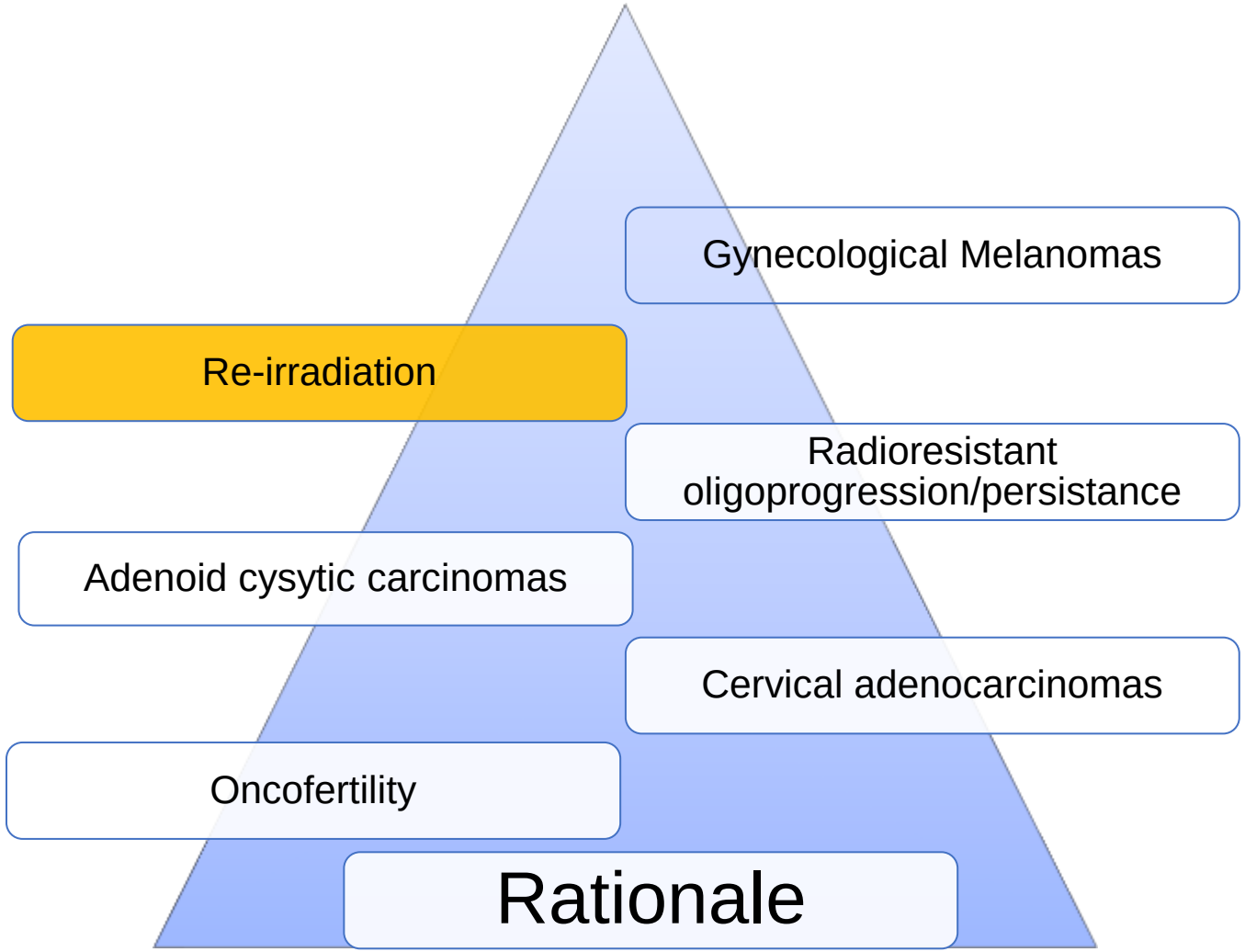


Preliminary data

- **LC=** 100%
- **Late Toxicity:** no G≥ 3

ClinicalTrialGov NCT05478876

Agenda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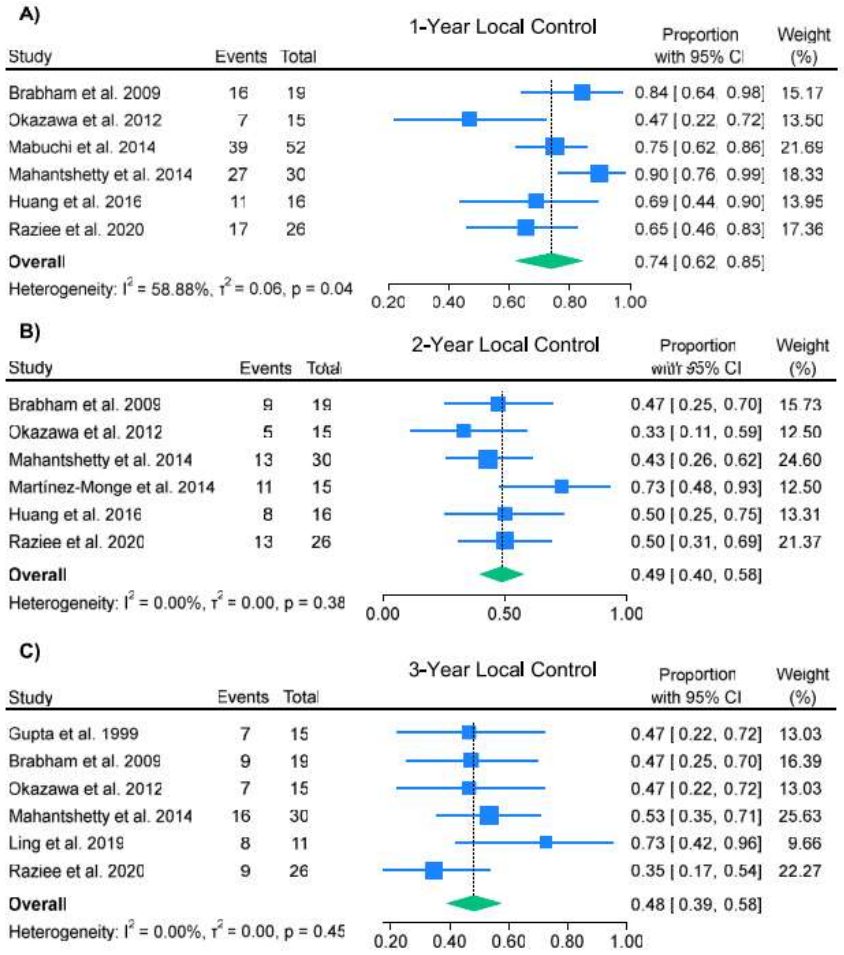
Re-irradiation



- 522 patients

Local Control:

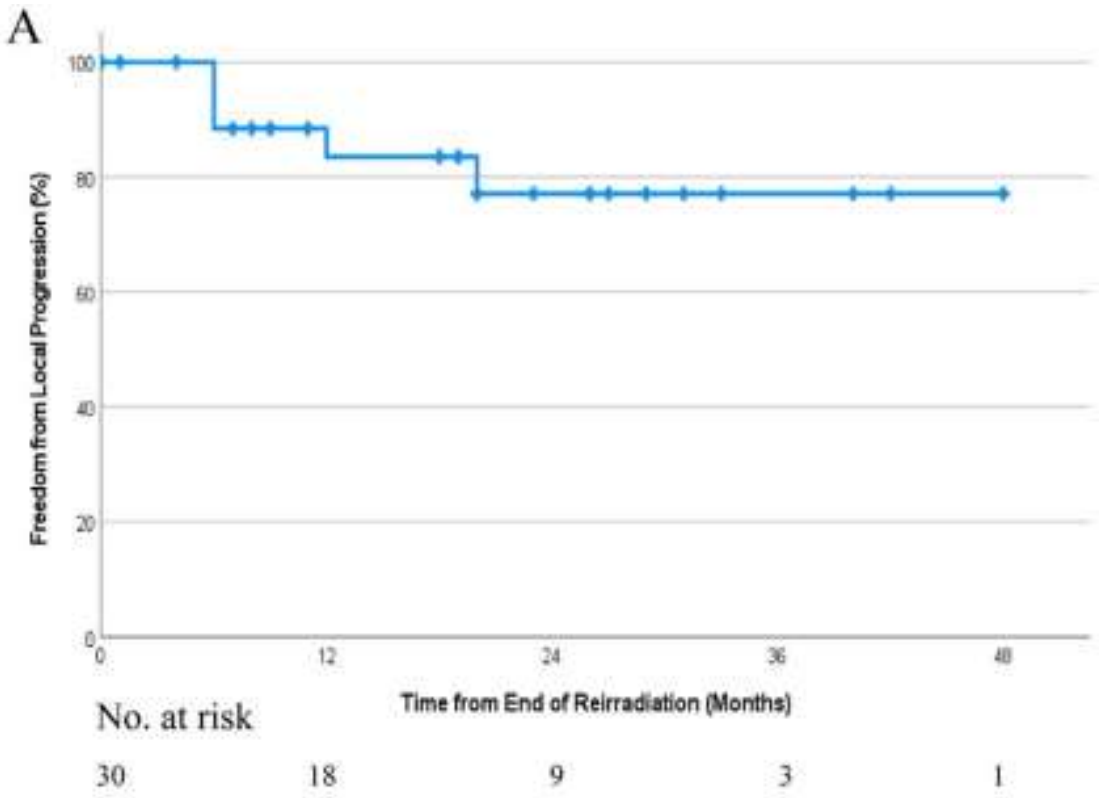
- ✓ 1y= 74% (95% CI, 62- 75)
- ✓ 2y=49% (95% CI, 40- 58)
- ✓ 3y=48% (95% CI, 39 -58)

G3-G4 Toxicity Rate:

- ✓ BT: 26%
- ✓ SBRT + Chemo: 20%
- ✓ SBRT alone: <10%

Critelli, Pezzulla et al Gyn Oncol. 2023

Re-irradiation



- Retrospective series of **29 cases treated with PBT** → 49.2 GyE (range, 30-61.6 GyE; IQR, 11 GyE)
- Unresectable recurrence at the edge of the previously irradiated field
- With a median follow-up of 23 months, **1-year local control was 83.5%**

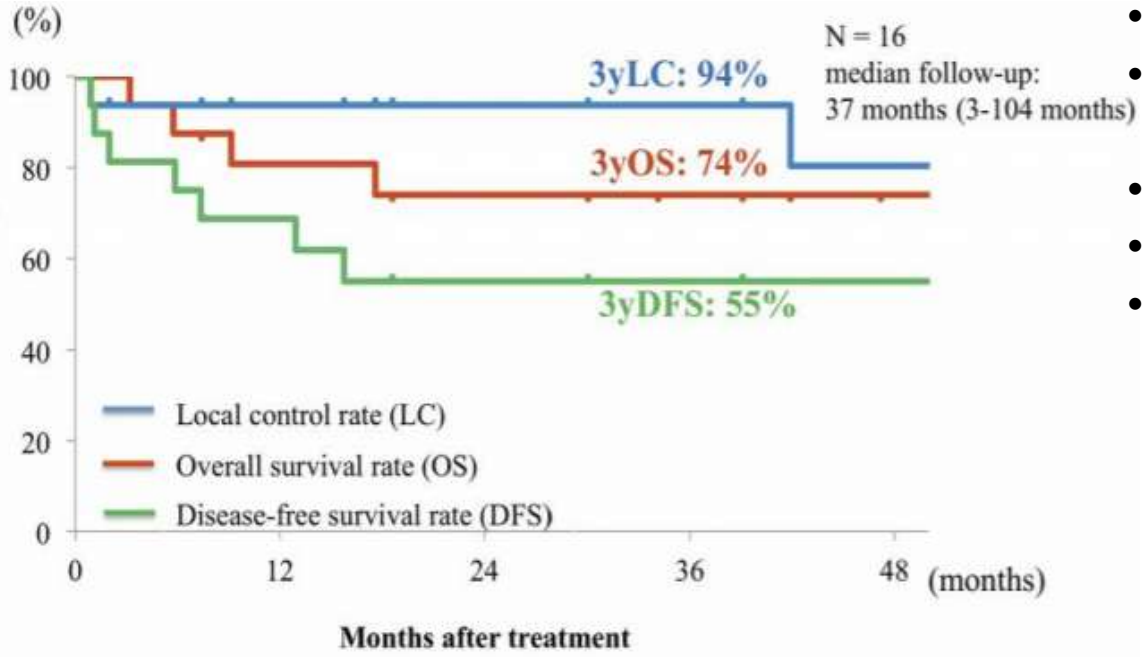
Table 4 **Acute and late toxicities graded by Common Terminology Criteria for Adverse Events, version 5.0**

	Acute toxicities		Late toxicities	
	Grade 2, no. (%)	Grade 3, no. (%)	Grade 2, no. (%)	Grade 3, no. (%)
Genitourinary	1 (3)	0	2 (7)	0
Gastrointestinal	2 (7)	1 (3)	3 (10)	1 (3)
Hematologic	2 (7)	2 (7)	0	0
Skin	5 (17)	1 (3)	0	2 (7)

There were no acute or late grade 4 or 5 toxicities. Acute toxicity: during treatment or within 3 months; late toxicity: after 3 months.

Pollock et al Adv Radiat Oncol. 2023

Re-irradiation



- Retrospective series of **16 cases**
- **Unresectable** recurrence at the edge of the previously irradiated field
- Median age 57 years (range=35-79 years)
- Median **tumor size was 27 mm** (range=14-80 mm)
- Total dose range: **48-57.6 GyE**

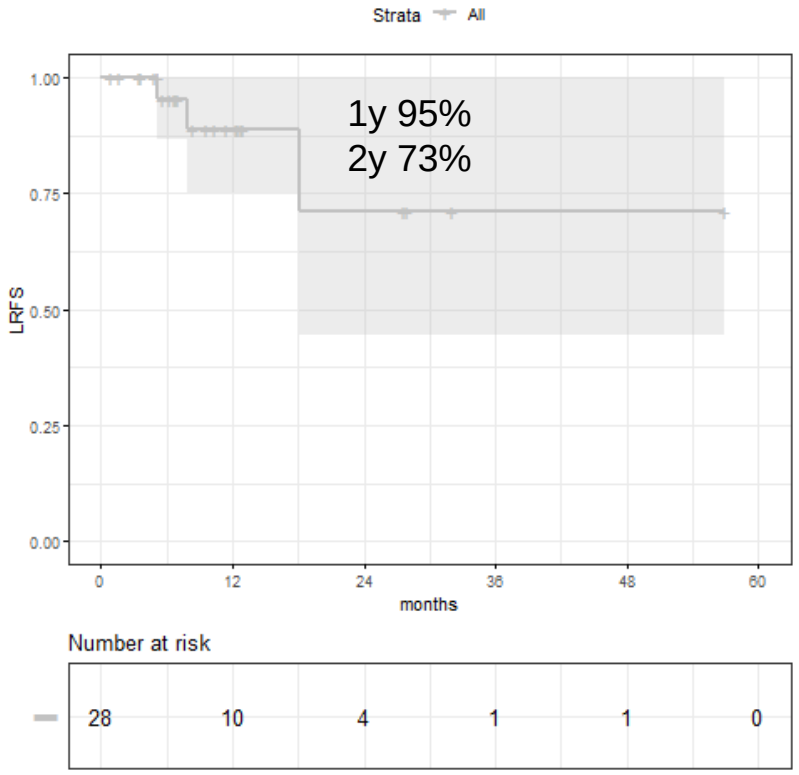
Organs involved	G0	G1	G2	G3	G4
Gastrointestinal tract	14	2	0	0	0
Urinary tract	15	1	0	0	0
Leg edema	15	0	1	0	0
Lower extremity nerve	14	2	0	0	0

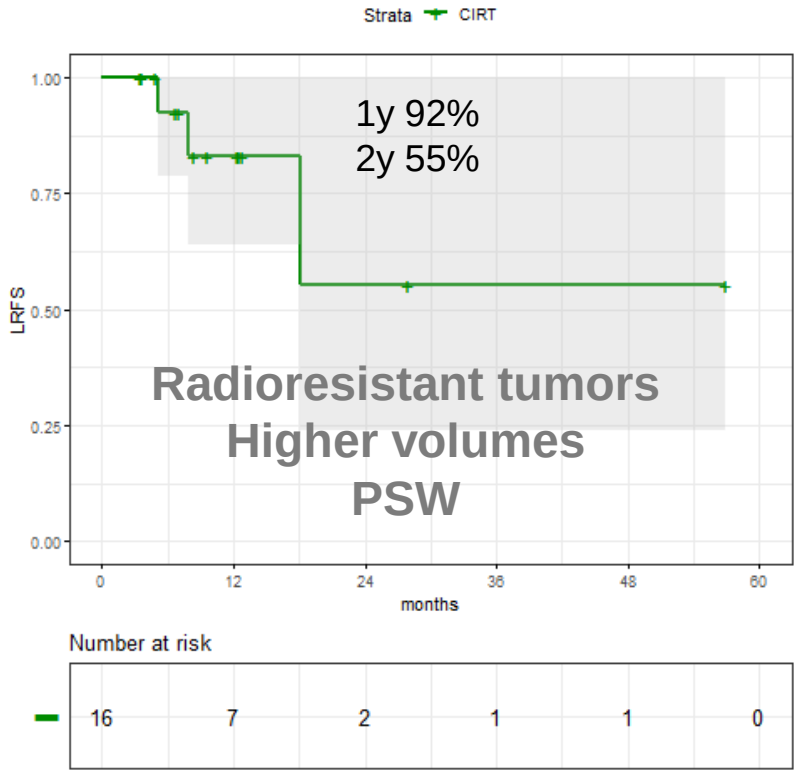
RTOG/EORTC, Radiation Therapy Oncology Group/European Organization for Research and Treatment of Cancer.

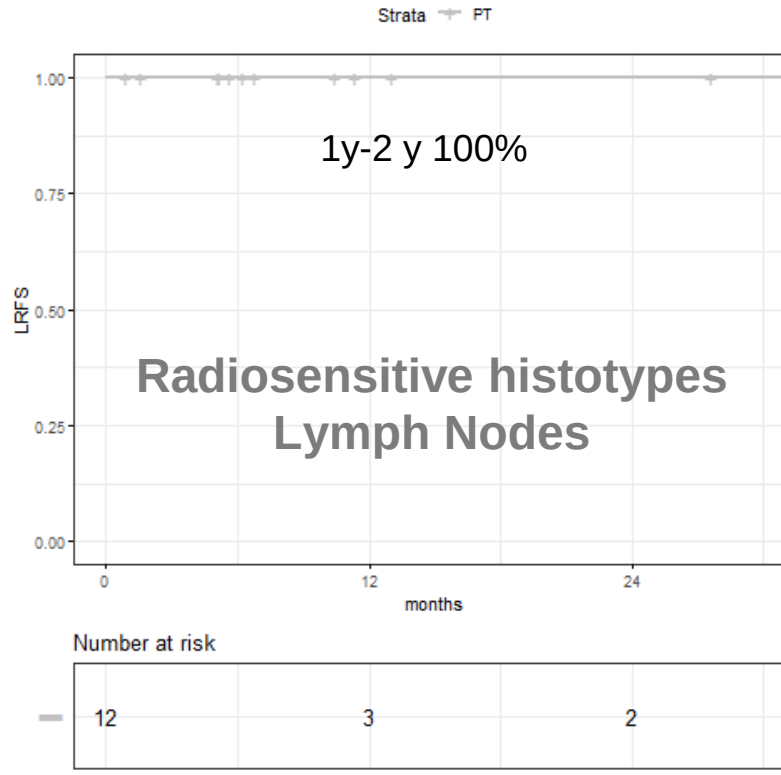
Shiba et al Anticancer Research 2017

Re-irradiation

- ✓ **Critelli, Pezzulla et al Gyn Oncol. 2023** → 1y= 74%; 2y=49%
- ✓ **Pollock et al Adv Radiat Oncol. 2023** → 1y= 83,5%
- ✓ **Shiba et al Anticancer Research 2017** → 1y= 94%



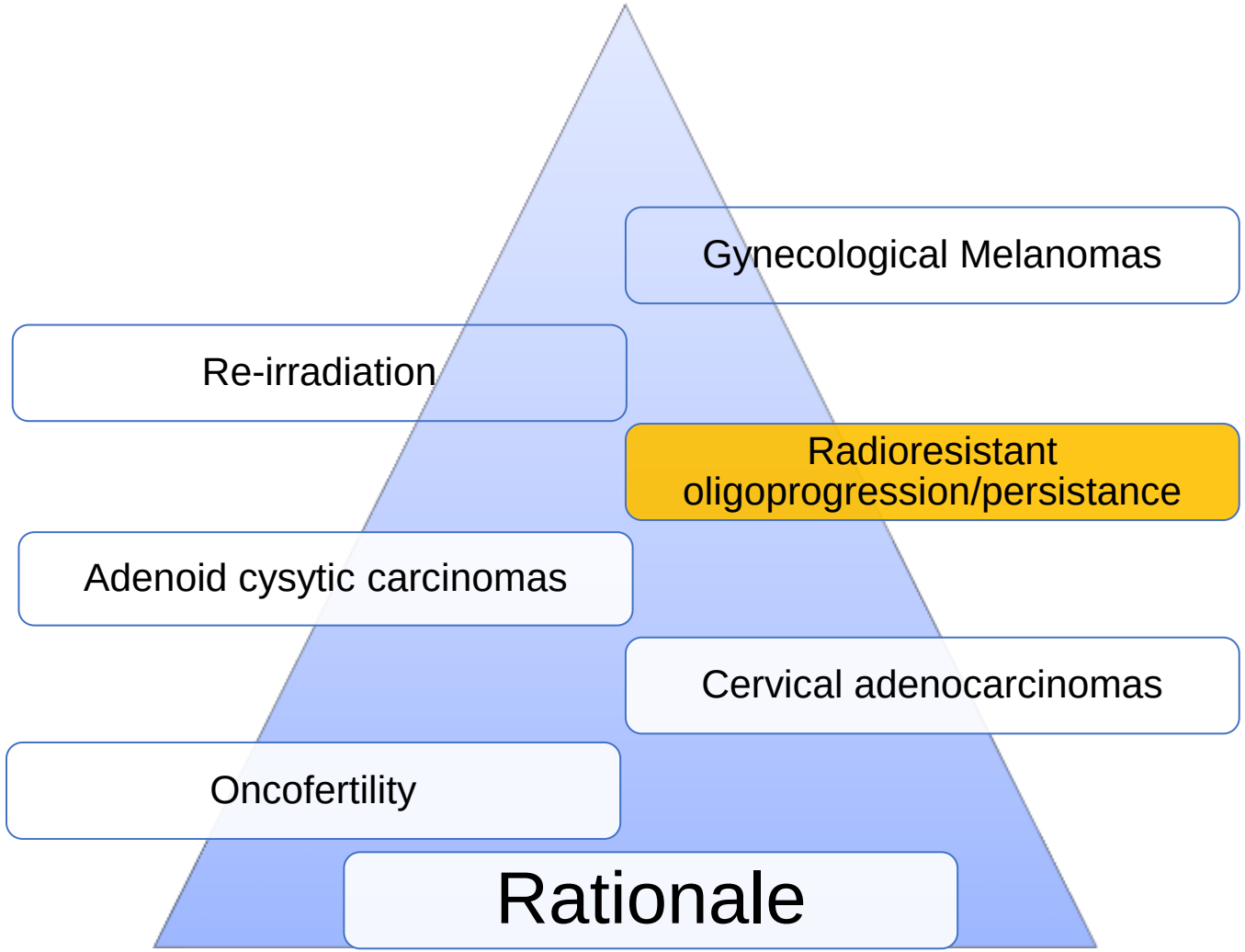




No G> 3 AEs

Barcellini et al, presented @ESTRO 2025 and under review

Agenda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Oligoprogressive / Oligorecurrent

Contents lists available at ScienceDirect

Clinical and Translational Radiation Oncology

journal homepage: www.sciencedirect.com/journal/clinical-and-translational-radiation-oncology

Original Research Article

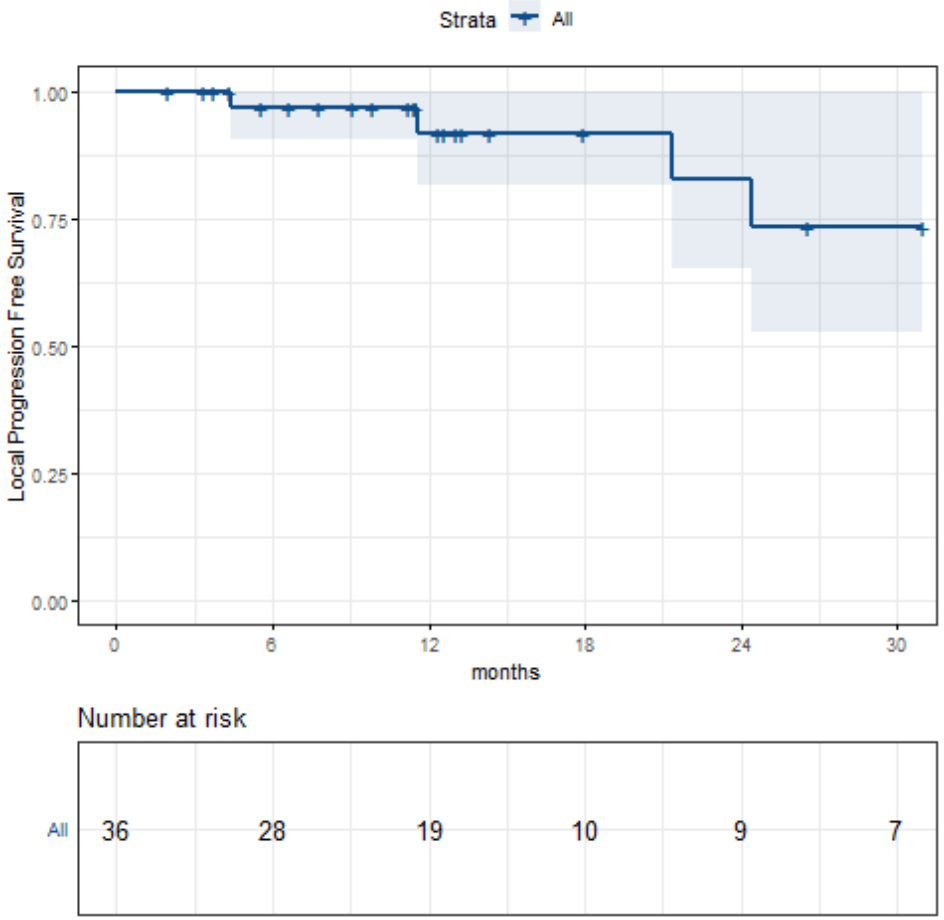
The first real-world study on the role of carbon ion radiotherapy for oligo-metastatic, persistent, or recurrent (MPR) ovarian/fallopian tube cancer

Amelia Barcellini [a,b,1,*], Kazutoshi Murata [c,1], Giulia Fontana [d], Alessandro Vai [e], Chiara Cassani [f,g], Fabio Landoni [h], Laura Deborah Locati [a,i], Francesco Raspagliesi [j], Simona Secondino [k], Mattia Pecorilla [l], Shigeru Yamada [c], Noriyuki Okonogi [c,m,2], Ester Orlandi [f,b,2]

- **26 women** (58% Asian and 42% Caucasian), for a total of **36 lesions**, underwent CIRT for RR-OSC
- 21 patients were radiotherapy naïve, while **5 patients** received CIRT for **re-irradiation**
- Median total dose of **52.8 GyE (range:39-64 GyE)**

Barcellini & Murata, CTRO 2024

Oligoprogressive / Oligorecurrent



After a median follow-up of **13 months (**6-193 months)

- 1- year LC:**92%** (95% CI: 82%- 100%)
- 2- year LC:**83%** (95% CI: 65%-100%)

Macchia G et al . Oncologist. 2020
2-y LC 81.9%

- 17 lesions (**47%,** 95% CI: 31%-64%) achieved CR **within 1 year**
- **OR rate was 97%** (95% CI: 92%-100%).

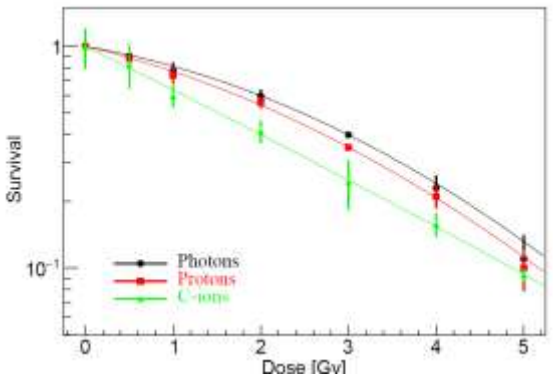
Macchia G et al . Oncologist. 2020
OR rate: 89%

Barcellini & Murata, CTRO 2024

Oligoprogressive / Oligorecurrent

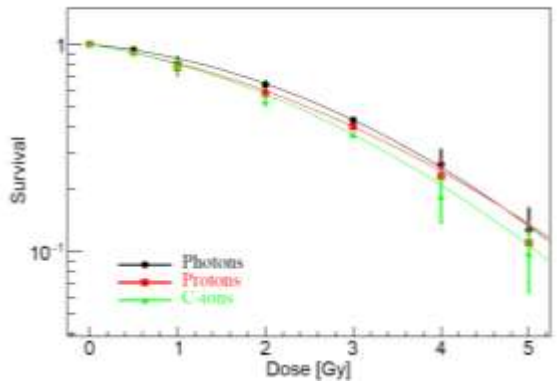
- **Clonogenic Survival**

OVSAHO



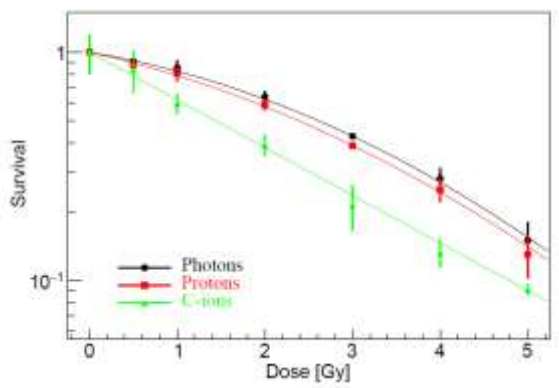
BRCA2 mutated

OVCAR8



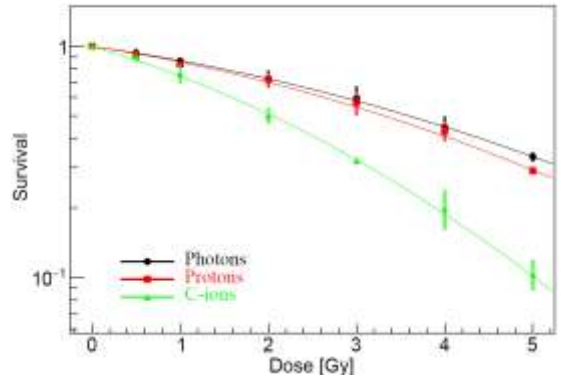
Methilation BRCA1

COV362



BRCA1 mutated

OVCAR3



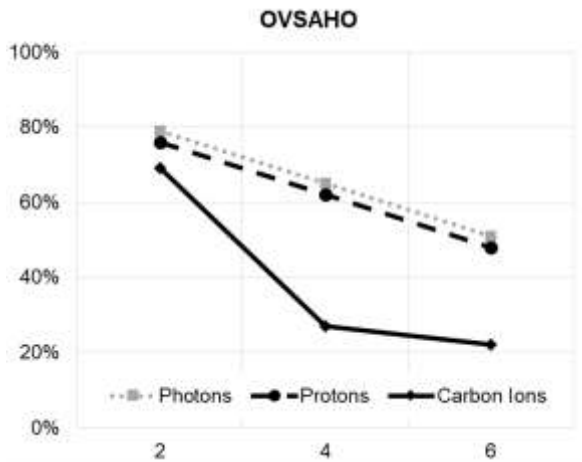
BRCA WT

Barcellini A. et al. –International Journal of Radiation Biology *in press*

Oligoprogressive / Oligorecurrent

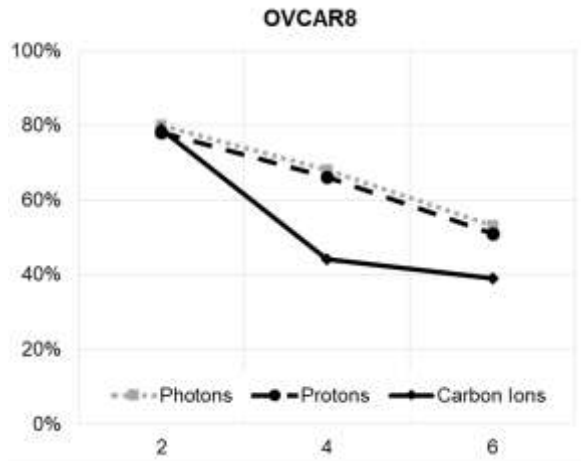
Metastatic processes 1) invasion assay

OVSAHO



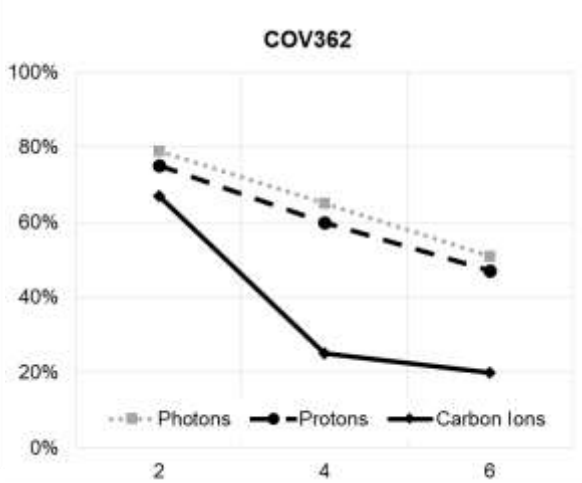
BRCA2 mutated

OVCAR8



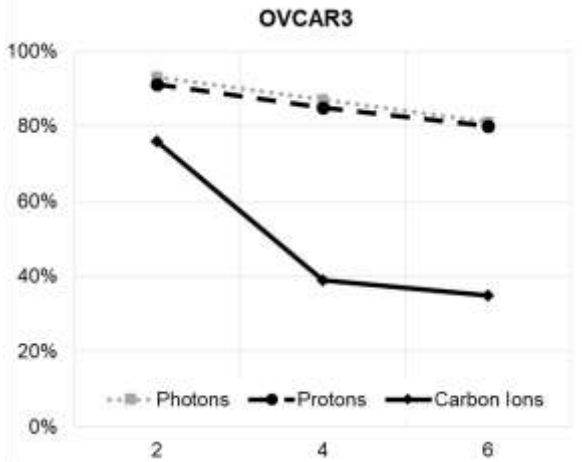
Methilation BRCA1

COV362



BRCA1 mutated

OVCAR3

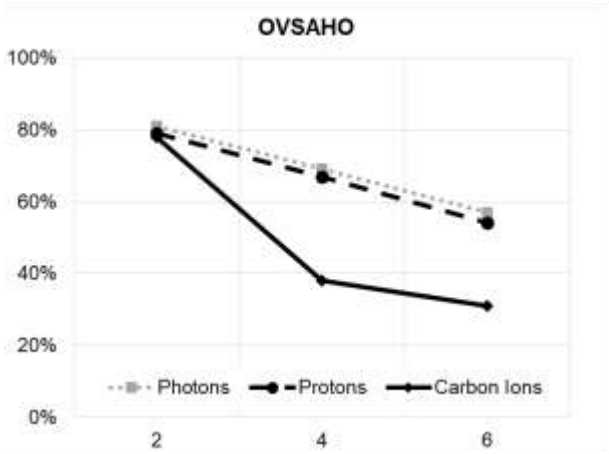


BRCA WT

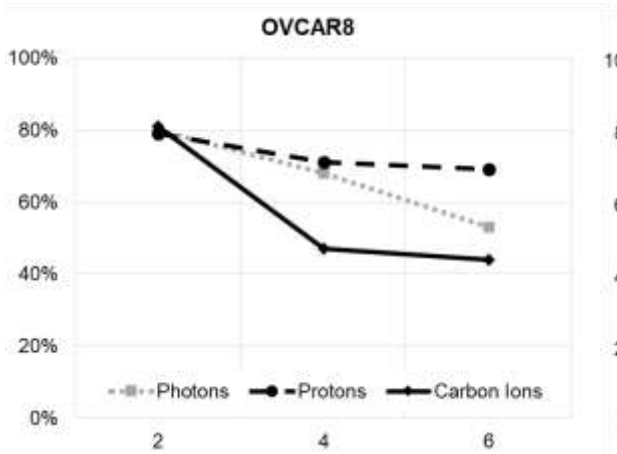
Barcellini A. et al. –International Journal of Radiation Biology *in press*

Oligoprogressive / Oligorecurrent

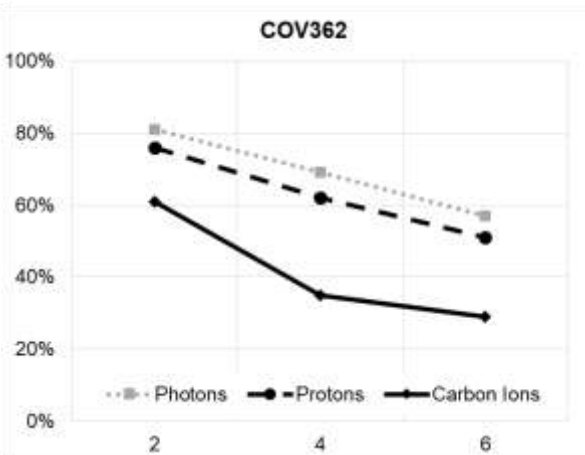
Metastatic processes 1) migration assay



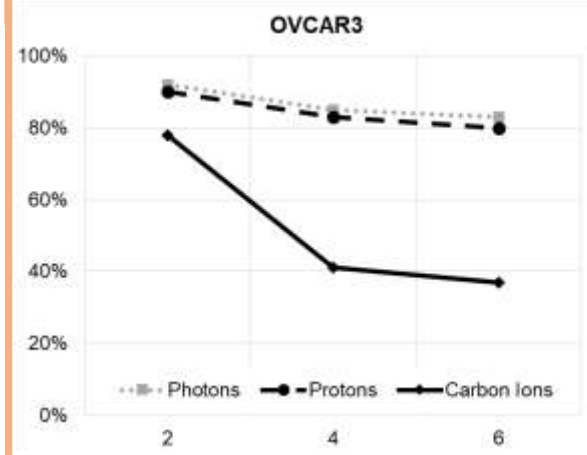
BRCA2 mutated



Methilation BRCA1



BRCA1 mutated



BRCA WT

Barcellini A. et al. –International Journal of Radiation Biology *in press*

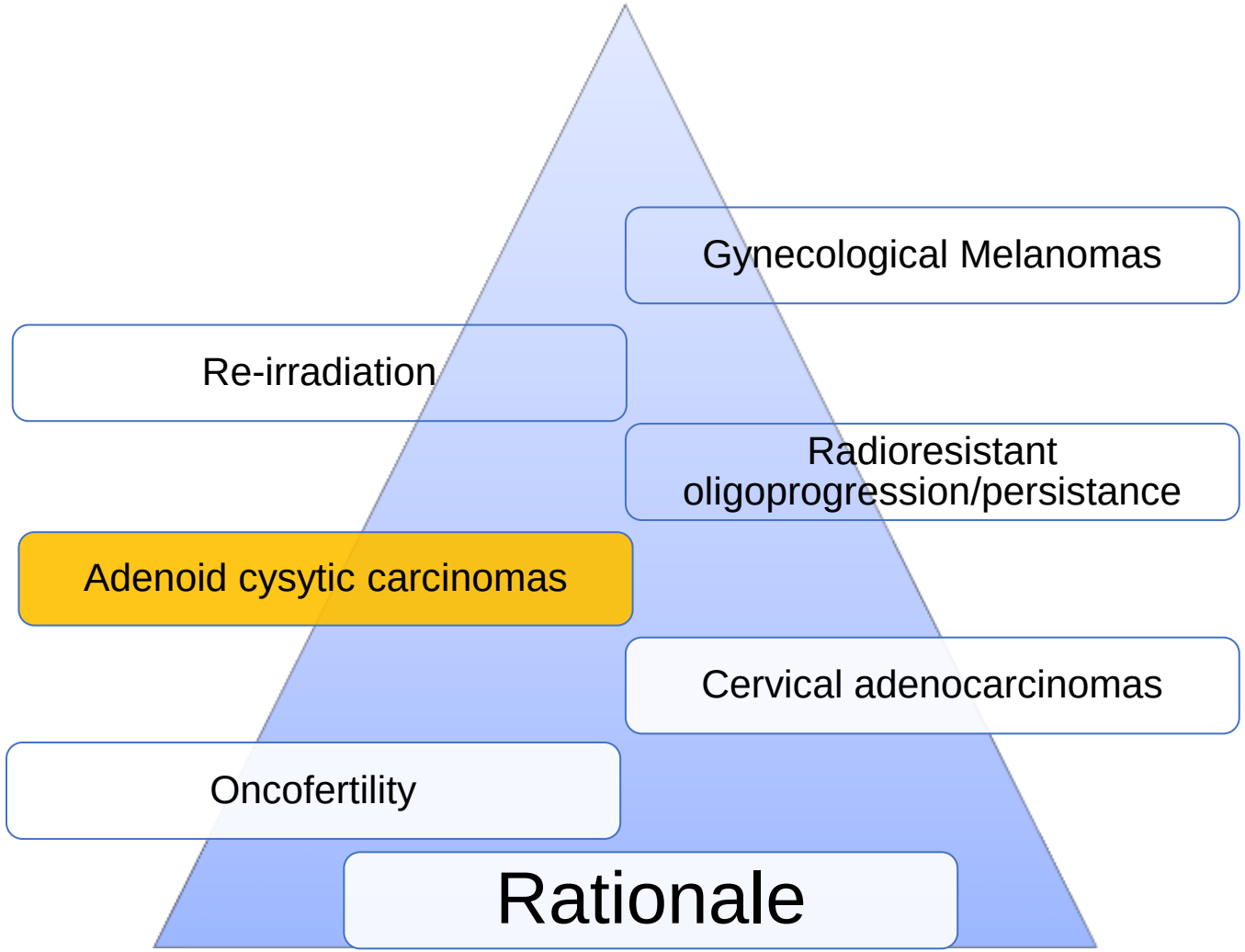
Oligoprogressive / Oligorecurrent

Study Design	Monocentric, prospective phase II study
Patients	Oligo-recurrent, persistent, progressive gynaecological tumours **with the exclusion of squamous/adenosquamous histologies**
Treatment	48-52.8 GyRBE in 12 fractions, 4 fractions per week (LEM or MKM)
Endpoints	**First endpoints** • achievement of complete response **(CR) PER LESION BASIS!** **Secondary endpoints:** • Objective response rate • 12 and 24 months- actuarial LC, PFS and OS • Toxicity (CTCAE version 5.0) • Symptoms control and QoL

Inclusion Criteria

- Patients ≥ 18 years of age and Karnofsky Index ≥ 70
- Histological or radiological diagnosis of oligo-recurrent, persistent, progressive gynaecological tumours **with the exclusion of squamous/adenosquamous histologies**
- oligo recurrent, oligometastatic and oligopersitent gynaecological in an otherwise well-controlled disease status (**Up to five synchronous lesions**, **any site of disease)**
- Exclusion of salvage surgery or other local therapies in a **multidisciplinary tumour board**
- Patients **previously treated with photon beam RT or hadrontherapy can be enrolled**.
- Possibility to perform surgery to space the intestinal loops, **in case of close distance between the intestinal tract** and tumour.
- **If needed,** spacer in biocompatible material (i.e. silicon, goretex) or anatomical material (i.e. omentum, muscle patch), non-absorbable.
- DICOM images of the previous treatment plan availability **in case of re-irradiation**
- Written informed consent
- Patients ability to understand the characteristics and consequences of the clinical trial

Agenda


Gynecological Melanomas
Re-irradiation
Radioresistant oligoprogression/persistance
Adenoid cysytic carcinomas
Cervical adenocarcinomas
Oncofertility
Rationale

Gynecological ACCs

ACC adverse characteristics	Molecular determinants	Biological rationale of CIRT
Tumor antigenicity	Low TMB	↗ tumor immunogenicity
Immunosurveillance escape	↗ PD-L2 and HLA-G expression ↘ ICAM-1 expression	↗ ICAM1
Immunotolerant microenvironment	↘ CD1a and CD83 infiltrate ↘ MDSC and M2 macrophage infiltrate T-cell exclusion phenotype	↗ DC ↘ M2 and MDSC ↗ proinflamattory cytokines ↗ CD8, ± NK
Hypoxia	↗ HIF1a expression VEGFA-mediated vascular mimicry	low OER ↘ tumorigenesis and angiogenesis
Stemness	↗ HSP27 expression ↗ Brachyury expression VEGF A, Nodal, Lefty, Oct-4, Pac6, Rex1, Nanog	Anti-tumor response on radioresistant tumor cell lines
Autophagy	ATG3, 4A, 5, PIK3R4, MAP1LC3B	
Perineural invasion	BNDF/TrkB; CCLR/CCR5; NGF/TrkA	↘ migration, invasion, adhesion ↘ cell mobility ↘ integrin expression
Tumoral heterogeneity	Biphasic tumor: ductal and myoepithelial components Molecular heterogeneity within/between primary tumors and metastatic disease	Anti-tumor response ± independent on tumoral heterogeneity

The rationale to use CIRT for ACC management is based on immunological, molecular, and pathological considerations, despite the fact that no in vitro *or preclinical study have specifically evaluated CIRT irradiation on ACC cell lines; CD, cluster of differentiation; DC, dendritic cell; HIF1a, hypoxia-inducible factor 1a; ICAM-1, intercellular adhesion molecule 1; MDSC, myeloid-derived suppressor cell; NK, natural killer cell; OER, oxygen enhancement ratio; TMB, tumor mutational burden; VEGF, vascular-endothelial growth factor.*

Loap et al, Front Onc 2021

Gynecological ACCs

Oncology

Oncology
DOI: 10.1159/000506485

Adenoid Cystic Carcinoma of Bartholin's Gland: What Is the Best Approach?

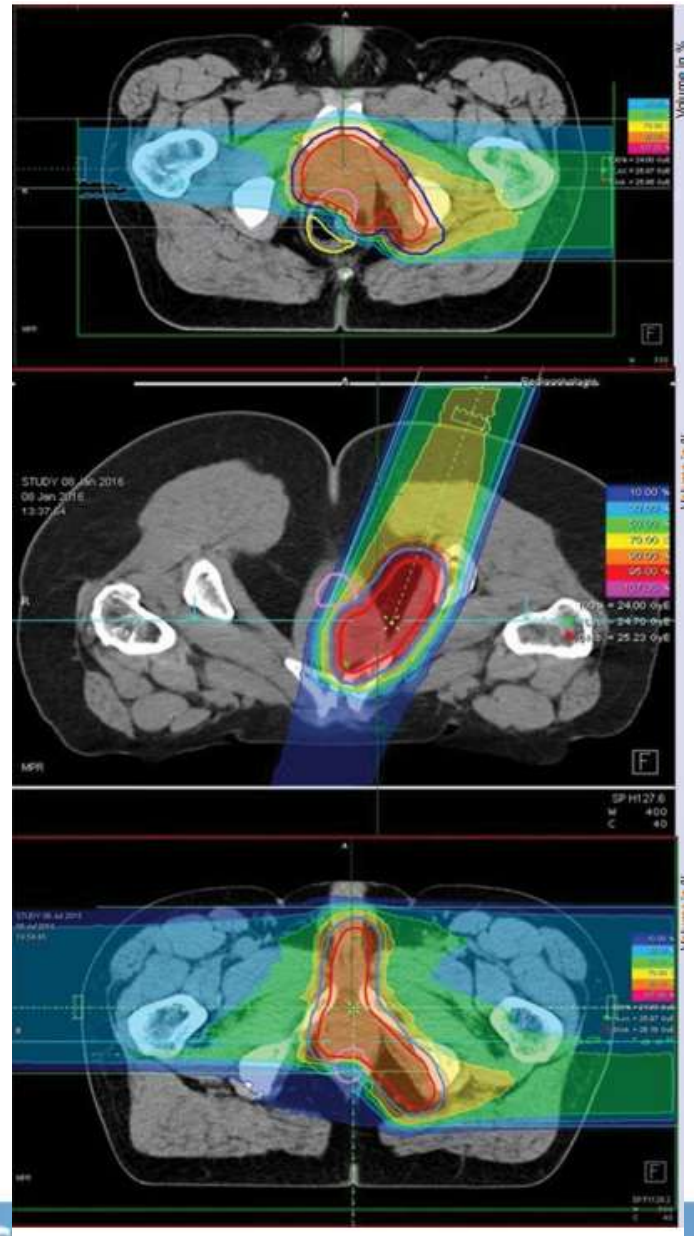
Amelia Barcellini[a] Angiolo Gadducci[b] Concetta Laliscia[c] Sara Imparato[a]
Viviana Vitolo[a] Lorenzo Preda[a, d] Francesca Valvo[a]

Cancer Management and Research

Dovepress

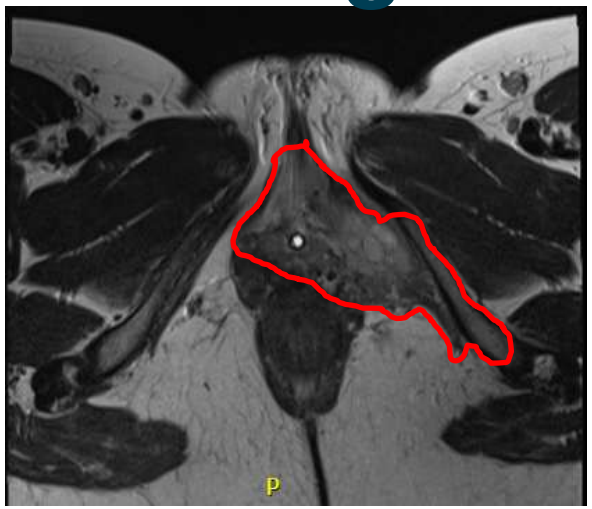
CASE SERIES

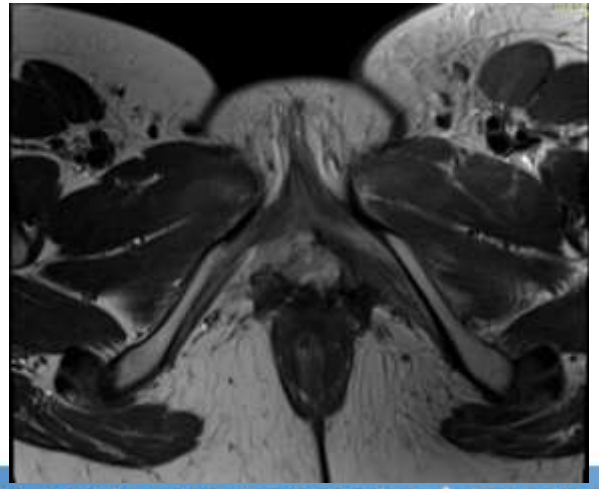
Bimodality treatment of patients with pelvic adenoid cystic carcinoma with photon intensity-modulated radiotherapy plus carbon ion boost: a case series



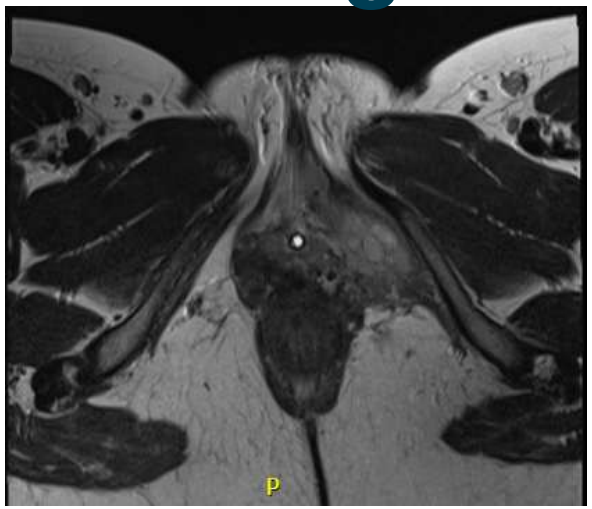
Bernhardt D, Cancer Manag Res 2018

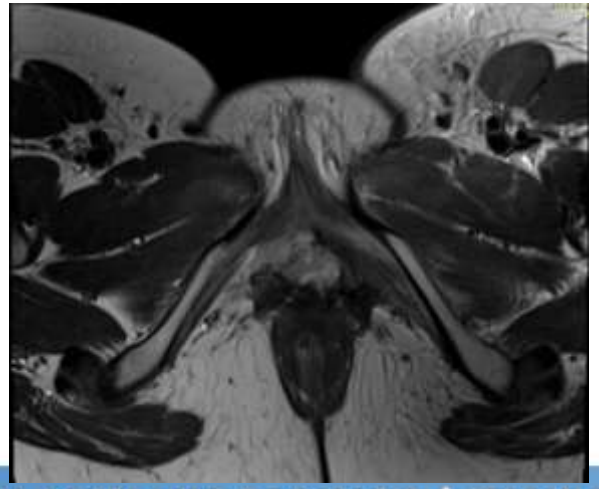
Gynecological ACCs

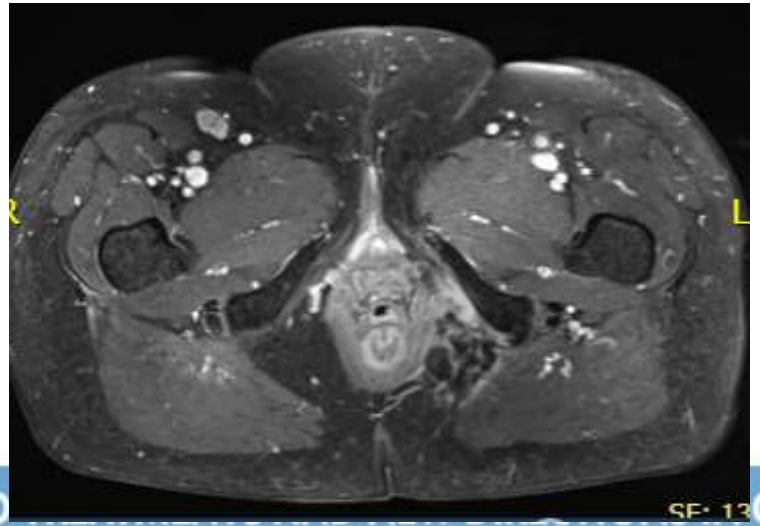




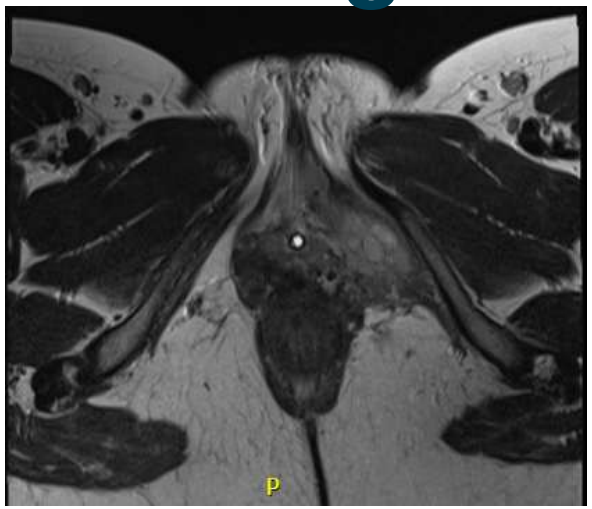
Gynecological ACCs

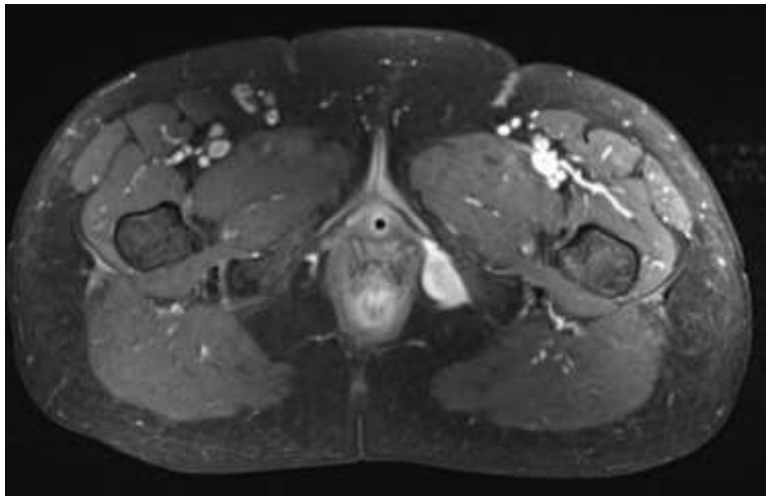


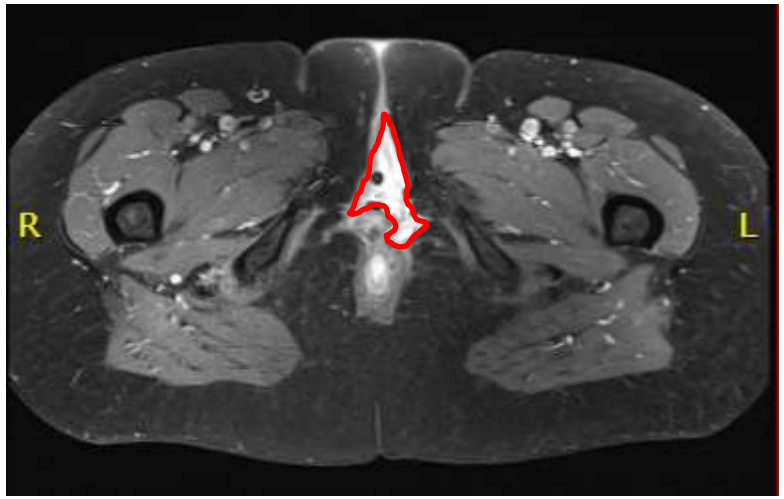


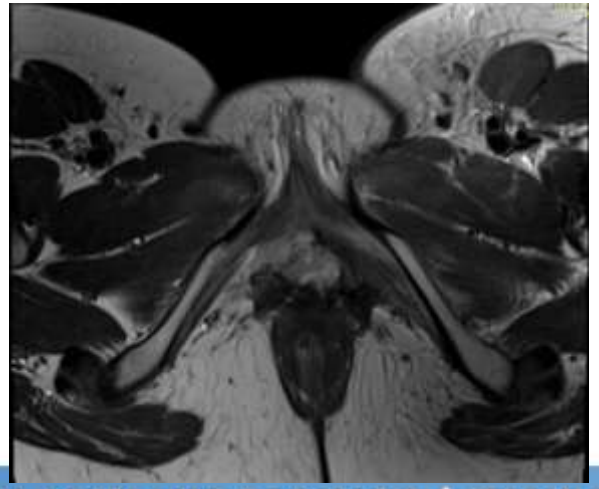


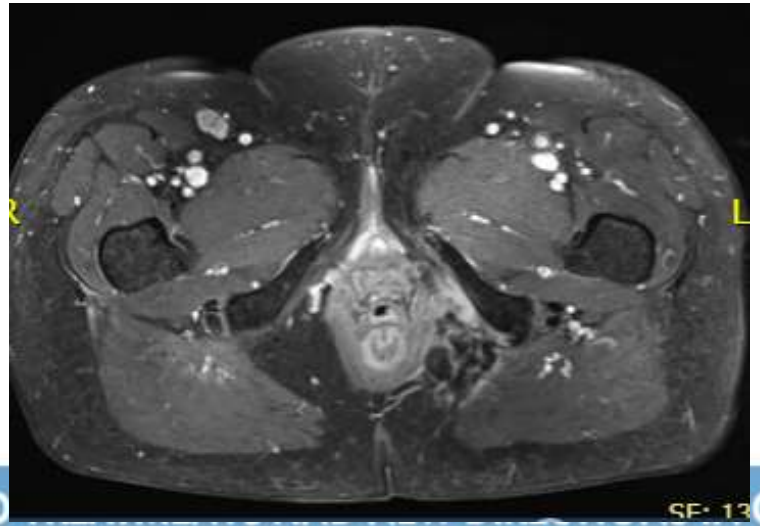
Gynecological ACCs

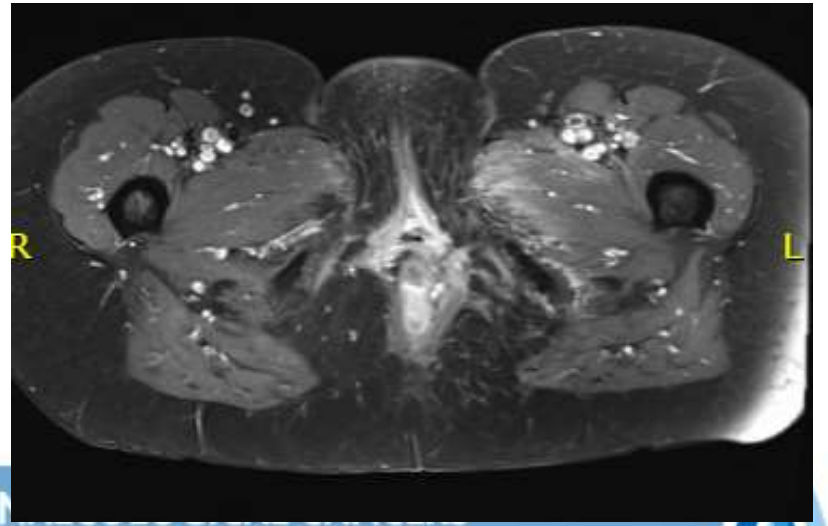




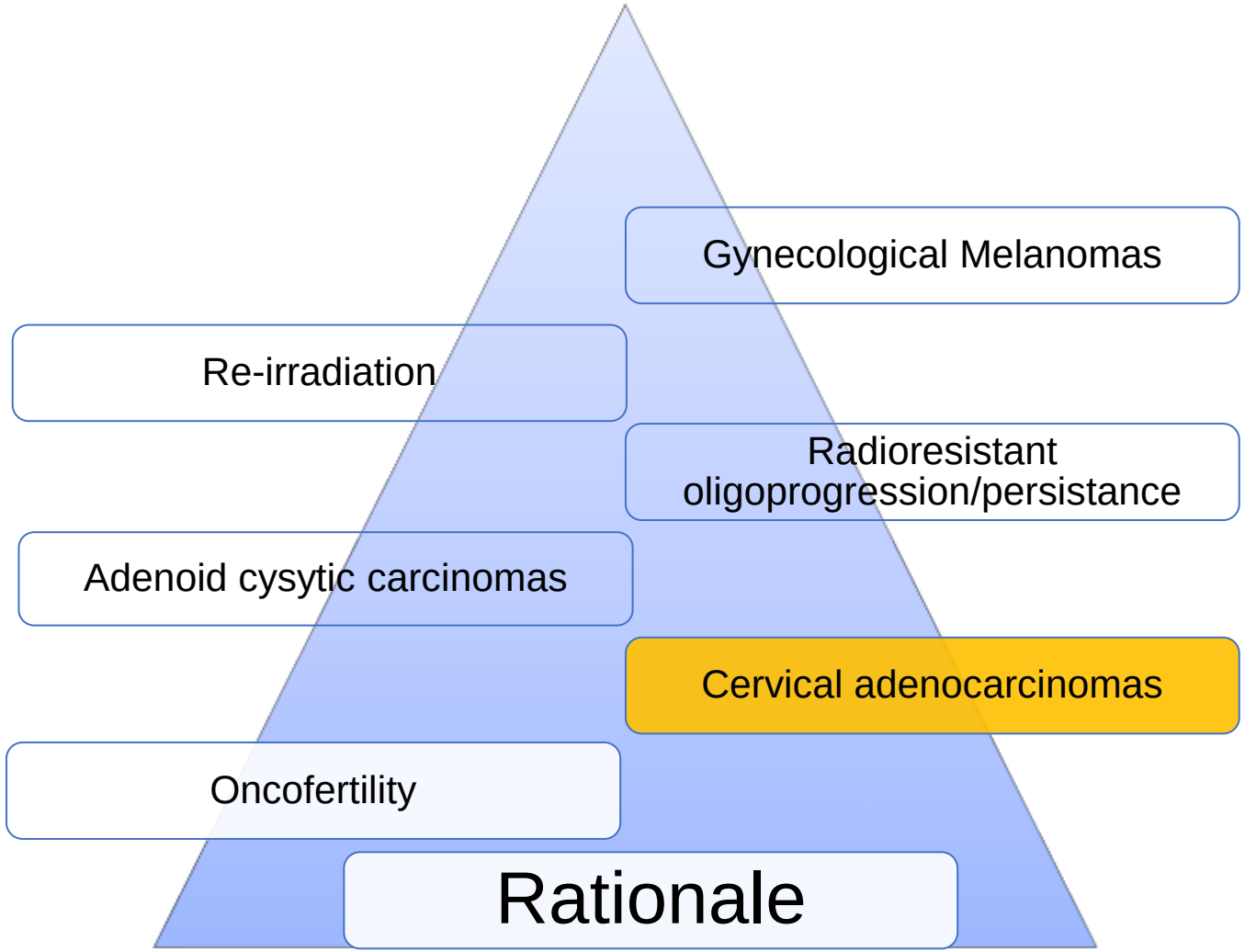








Agenda


Gynecological Melanomas
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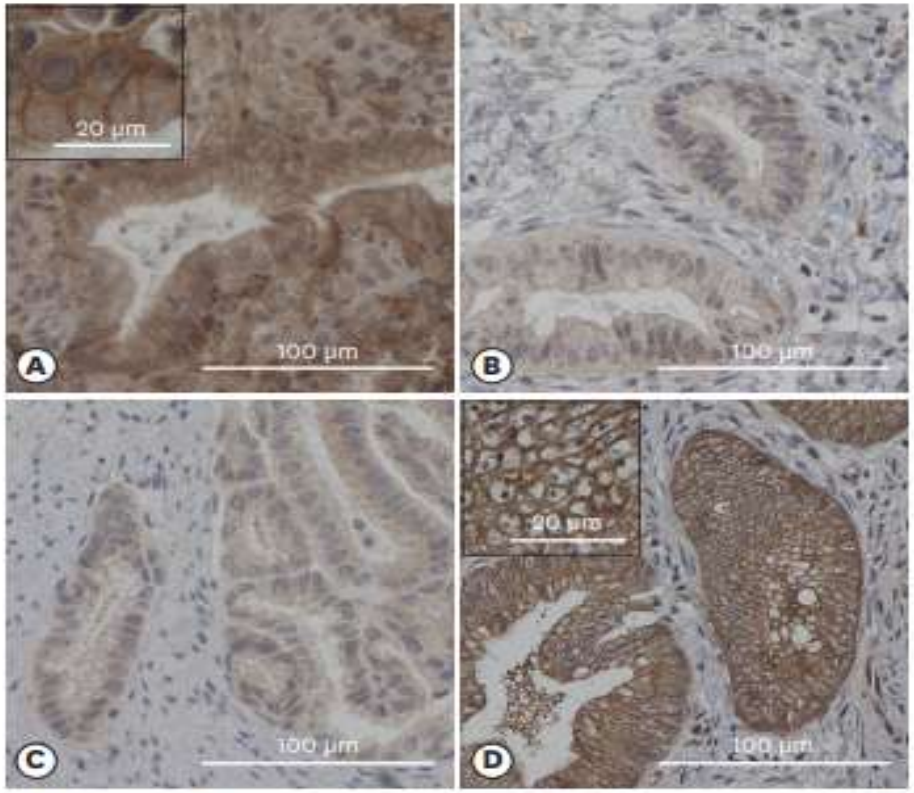
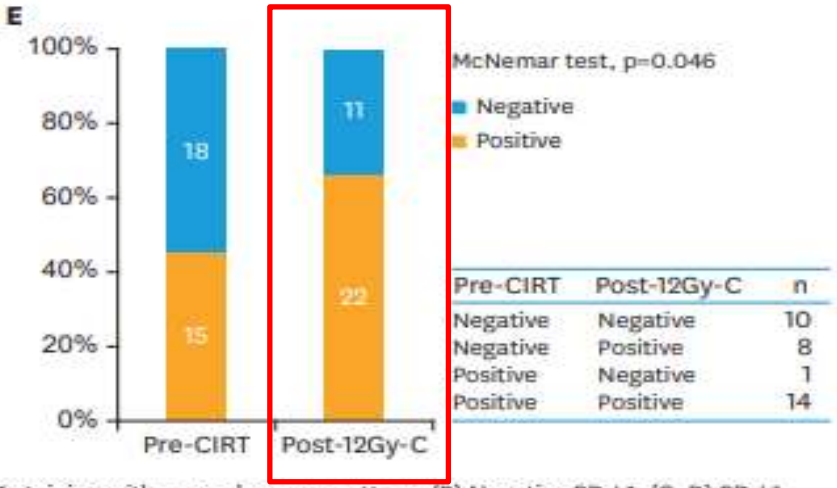
Rationale

Cervical Adenocarcinomas



The specimens were collected at **least 4 weeks before CIRT** and **after 12 GyE (4 fractions)** 1 week after starting CIRT

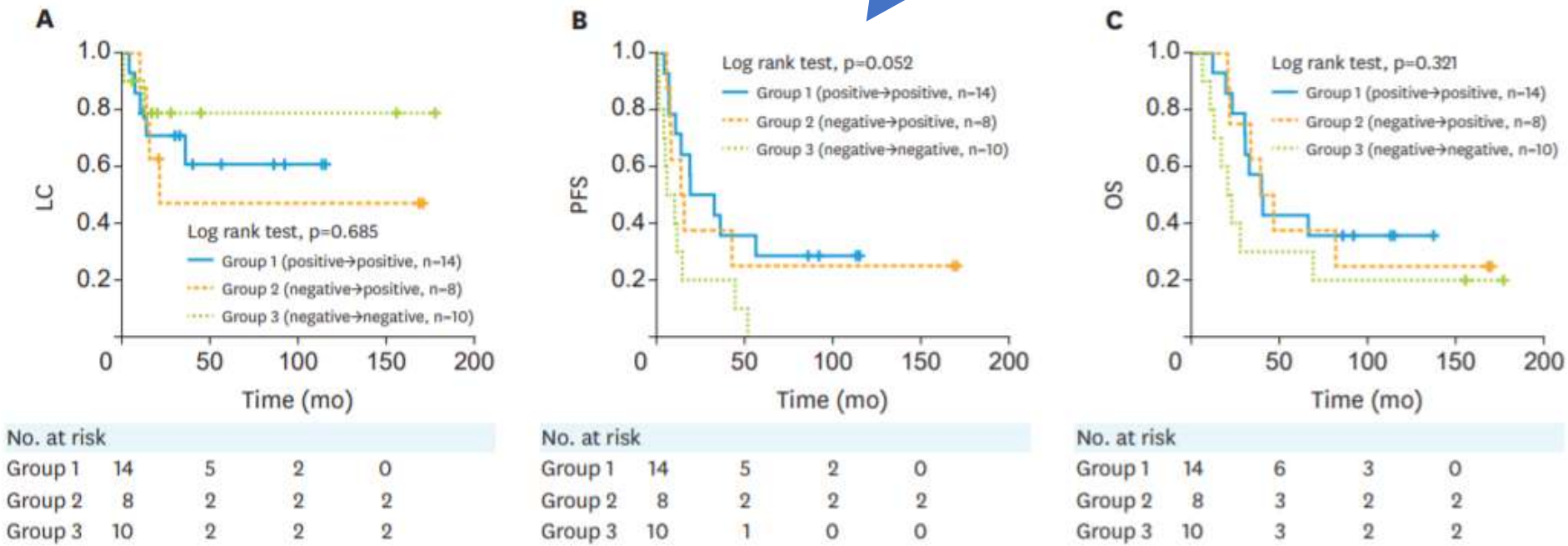


Pre-CIRT	Post-12Gy-C	n
Negative	Negative	10
Negative	Positive	8
Positive	Negative	1
Positive	Positive	14

Fig. 2. PD-L1 staining and changes in PD-L1 status pre-CIRT and post-12Gy-C. (A) PD-L1 staining with a membranous pattern. (B) Negative PD-L1. (C, D) PD-L1 staining of specimens from the same patient before CIRT (C) and after 12 Gy of CIRT (D). The inset at a higher magnification. (E) Change in PD-L1 status pre-CIRT and post-12Gy-C.
CIRT, carbon-ion radiotherapy; PD-L1, programmed cell death-ligand 1.

Iijima et al. J Gynecol Oncol. 2020

Cervical Adenocarcinomas



Patients with **positive post-12Gy-C PD-L1** expression had a **longer PFS** than those with negative PD-L1 expression

LC and OS between the 2 groups showed no significant difference

Iijima et al. J Gynecol Oncol. 2020

Cervical Adenocarcinomas

INTERNATIONAL JOURNAL OF RADIATION ONCOLOGY · BIOLOGY · PHYSICS
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CLINICAL INVESTIGATION

Carbon-Ion Radiation Therapy for Adenocarcinoma of the Uterine Cervix: Clinical Outcomes of a Multicenter Prospective Registry-Based Study in Japan (2016-2020)

Kazutoshi Murata, MD, PhD,* Noriyuki Okonogi, MD, PhD,*,† Ken Ando, MD, PhD,‡ Keisuke Tsuchida, MD, PhD,‡ Kaori Fukunishi, MD,‡ Daisuke Irie, MD, PhD,‡ Yoshiaki Ohyama, MD, PhD,¶ Masaru Wakatsuki, MD, PhD,* Munetaka Takekuma, MD, PhD,§ Shingo Kato, MD, PhD,∥,** and Tatsuya Ohno, MD, PhD‡

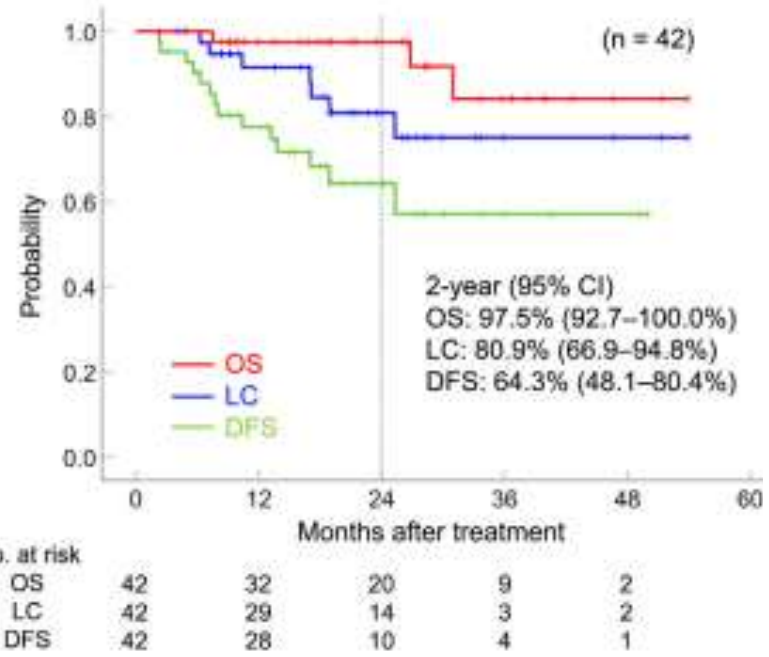


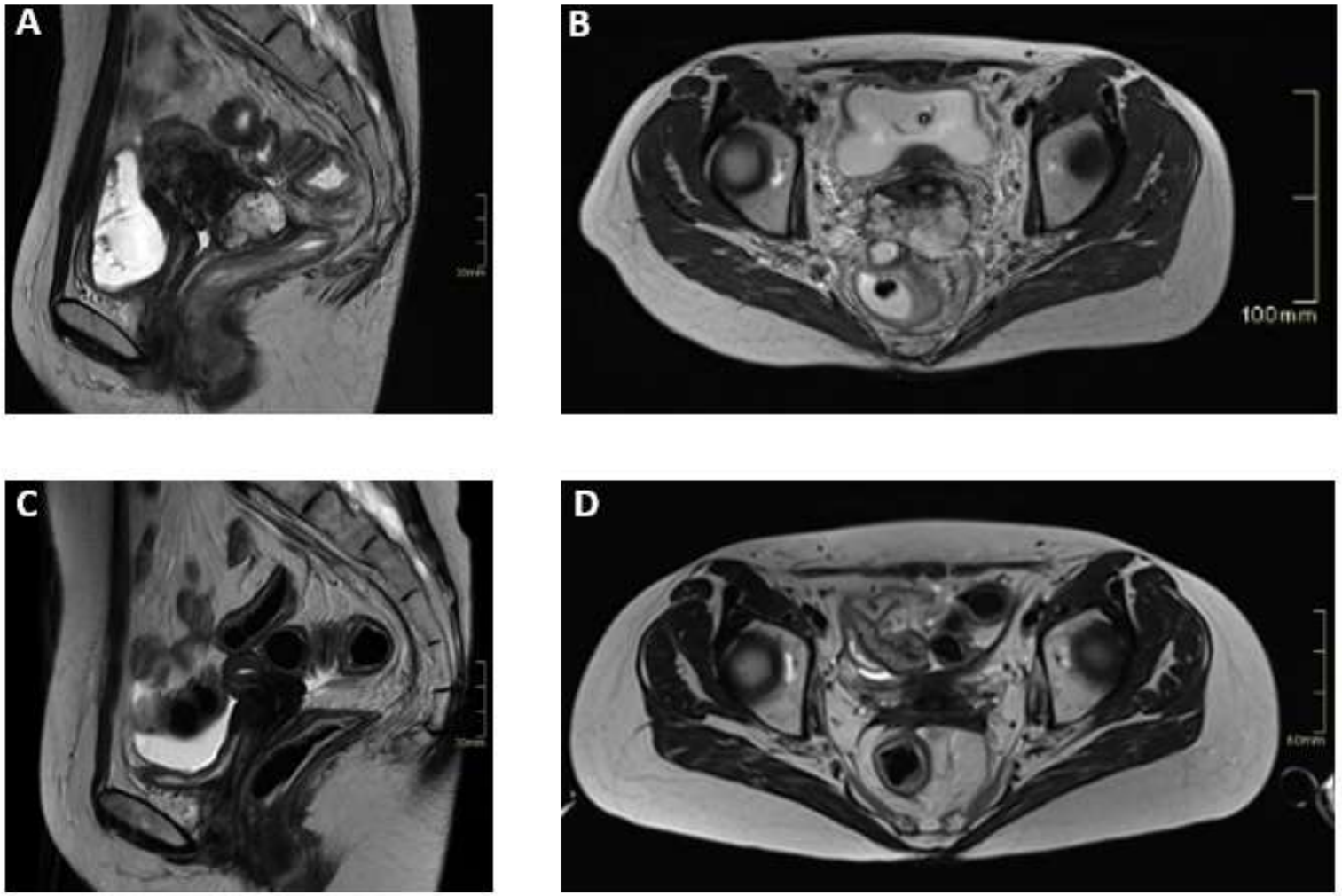
Table 4 Comparison of outcomes of radiation therapy for adenocarcinoma of the cervix or adenosquamous carcinoma of the uterine cervix

Author (y) [ref]	No. of patients	Median follow-up (mo)	Study design	Stage distribution stage I-II/III-IV	Treatment	2-y OS (%)	5-y OS (%)	Late toxicity ≥ grade 3 (%)
Rose et al[5] (2014)	182	N/A	Retrospective, multi-institutional	75%/25%	CCRT	58	45	N/A
Chen et al[6] (2014)	35	59	Retrospective, multi-institutional	74%/26%	CCRT	73	41	22
Huang et al[14] (2011)	148	90	Retrospective, single-institutional	79%/21%	CCRT	68	47	6
Niibe et al[15] (2010)	61	N/A	Retrospective, multi-institutional	0%/100%*	CCRT	41	20	13 (including grade 2)
Yin et al[22] (2018)	30	40	Retrospective, single-institutional	67%/33%	CCRT	63	46	3
Miyasaka et al[23] (2020)	71	37	Retrospective, multi-institutional	51%/49%	CCRT, IGBT+	70	50	N/A
Wakatsuki et al[13] (2014)	58	38	Prospective, single-institutional	34%/66%	CIRT alone	66	38	2
Okonogi et al[16] (2018)	31	30	Prospective, single-institutional	65%/35%	Chemo-CIRT	88	N/A	6
Okonogi et al[19] (2021)	55	68	Retrospective, multi-institutional	67%/33%	Chemo-CIRT	89	71	8
This study	42	24	Prospective, multi-institutional	62%/38%	Chemo-CIRT	98	N/A	7

Abbreviations: CCRT = concurrent chemoradiation therapy; CIRT = carbon-ion radiation therapy; IGBT = image-guided brachytherapy; N/A = not available; No. = number; OS = overall survival.
* All cases in stage IIIB.

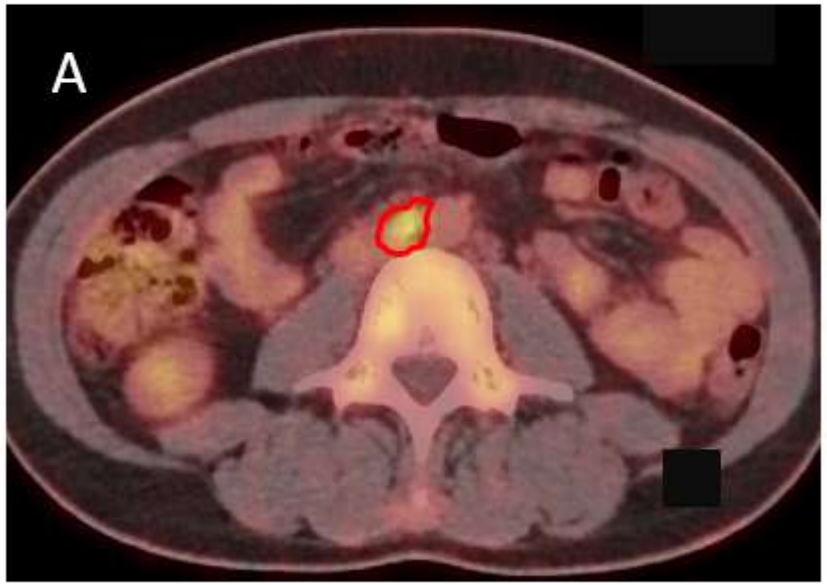
Murata et al Int J Radiat Oncol Biol Phys. 2025.

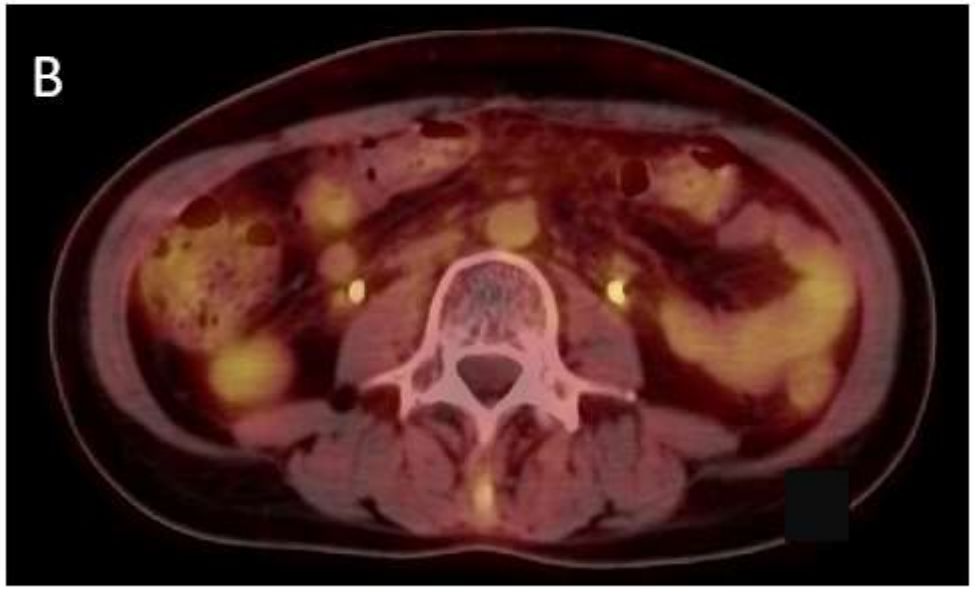
Cervical Adenocarcinomas



Barcellini et al under review

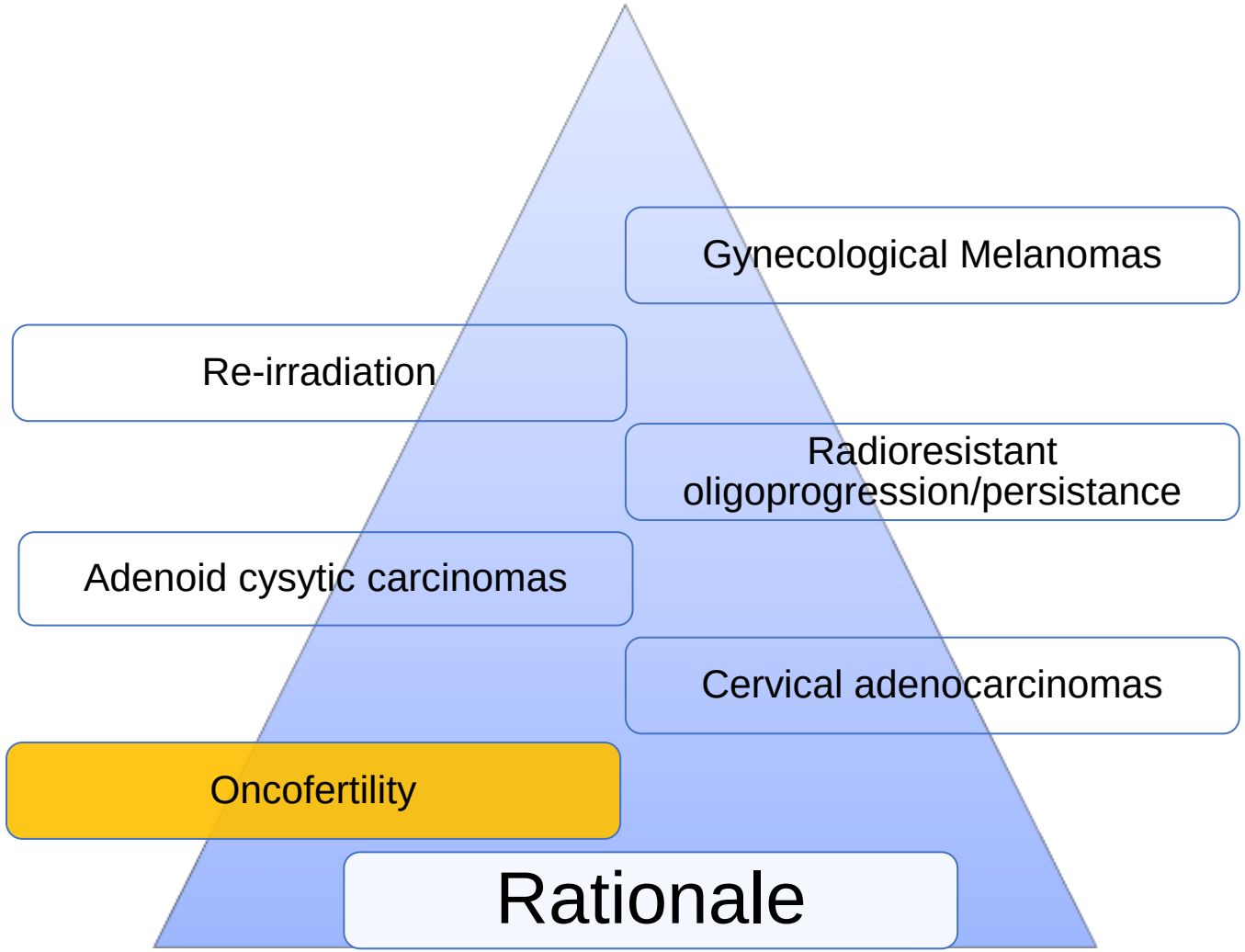
Cervical Adenocarcinomas





Barcellini et al under review

Agenda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Original Research Article

TJ Tumori Journal

Is motherhood still possible after pelvic carbon ion radiotherapy? A promising combined fertility-preservation approach

Tumori Journal
1–7

DOI: 10.1177/03008916231218794
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Amelia Barcellini[1,2*], Chiara Cassani[3,4*], Ester Orlandi[1,3], Rossella E. Nappi[3,5], Federica Broglia[6], Maria Paola Delmonte[6], Silvia Molinelli[7], Alessandro Vai[7], Viviana Vitolo[1], Alessandro Gronchi[8], Gioacchino D'Ambrosio[9], Lorenzo Cobianchi[3,10,11§] and Maria Rosaria Fiore[1§]

Barcellini & Cassani et Tumori Journal. 2024.

Conclusions

- Hadrontherapy appears to be a safe, effective and feasible treatment method, which has shown **advantages over photon therapy**
- **Preclinical studies** are crucial
- RCTs (maybe for ROC?) are unrealistic →the development **of clinical registries** might help to elucidate current uncertainties
- National and International **multidisciplinary cooperation** is of utmost importance to make a step forward

Thank you for your kind attention!

“True progress is when the advantages of new technology are available for all”

H. Ford