
# WORKSHOP

## La re-irradiazione in ginecologia oncologica

## *Perché si?*

AZIENDA OSPEDALIERO - UNIVERSITARIA
Città della Salute e della Scienza di Torino

***Sergio Gribaudo***
***Presidio Ospedaliero S. ANNA***

# Paradigma (Paradogma)

RT pregressa ⇒ CH

CH pregressa ⇒ RT

ma la realtà....

# Morbidity After Pelvic Exenteration for Gynecological Malignancies A Retrospective Multicentric Study of 230 Patients

The median age was 55 years. The tumor site was the cervix in 177 patients, the endometrium in 28 patients, the vulva in 16 patients, and the vagina in 9 patients. Sixty-eight anterior, 31 posterior, and 131 total PEs were performed in 116 women together with hysterectomy. A total of 82.6% of the patients required blood transfusion. The mean operative time was 446 (95-970) minutes, and the median hospitalization was 24 (7-210) days. We noted a major complication rate of 21.3% (n=49). We registered 7 perioperative deaths (3%) calculated within 30 days. The operation was performed within clear margins in 166 patients (72.2%). ***The overall mortality rate depending on tumor site, at the end of the study was 75%for vulvar cancer, 57.6%for cervical cancer, 55.6%for vaginal cancer, and 53.6% for endometrial cancer.***

Although an important effort for surgeons and for patients, PE remains a therapeutic option with an acceptable complication rate and postoperative mortality. A strict selection of patients is mandatory to reach adequate surgical and oncologic outcomes

***Chiantera V, Rossi M, De Iaco P, Koehler C, Marnitz S, Fagotti A, Fanfani F, Parazzini F, Schiavina R, Scambia G, Schneider A, Vercellino GF***

***Int J Gynecol Cancer 24: 156-164; 2014***

# Overall survival after pelvic exenteration for gynecologic malignancy☆,☆☆

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160 patients with gynecologic malignancy underwent pelvic exenteration.
Five year recurrence free survival (RFS) was 33%. In multivariate analysis:

- Positive margins (p = .040)
- Positive nodes (p = .001)
- Lymphovascular space invasion (LVSI, p =.003)

retained a significant impact on RFS.
Five-year OS was 40%. In multivariate analysis:

- Positive nodes (p = .001)
- LVSI (p = .001)

retained a significant impact on OS.

***Survival outcomes have not significantly improved despite improvements in technique and patient selection. Multiple non-modifiable factors at the time of exenteration are associated with poor survival.***

# Re-irradiazione

- Il tasso complessivo di recidive dopo radioterapia esclusiva (RTE & BT) ± CT nel cervico carcinoma (Stadio ≥ IB2) si attesta intorno al 30%; le altre patologie ginecologiche sottoposte a RT pelvica, rappresentano una minima percentuale
- Il ritrattamento con RT a fasci esterni e/o BT può essere preso in considerazione in casi selezionati e/o nelle pazienti non candidate a chirurgia di salvataggio
- Le tecniche di re-irradiazione sono estremamente personalizzate e le dosi sono limitate dalla tolleranza dei tessuti sani precedentemente compresi nel campo di irradiazione

# Re-irradiazione

- Nella valutazione di un ritrattamento è indispensabile ricostruire i parametri dosimetrici del precedente trattamento per ogni singolo organo che deve essere re-irradiato
- Analizzare i dati relativi alle tecniche utilizzate nel trattamento primario, energia del fascio, volumi irradiati, dose totale e dose di RTE e BT, calcolare le dosi BED e $EQD_2$
- Considerare l'intervallo di tempo trascorso (la maggior parte delle recidive, 89%, si manifesta entro i 2 anni dal trattamento primario)

# Re-irradiazione

- Intestino tenue dose ≥ 15 Gy su un volume <120 cc, con contornamento delle anse intestinali
  - Contornamento dello spazio peritoneale dose >45 Gy su un volume < 195
- Il volume di retto che riceve una dose ≥ 60Gy è costantemente associato con un rischio di tossicità rettale ≥G2 od a sanguinamento rettale
- Criteri RTOG per la vescica
  - Volume ≤ al 15% dose> 80 Gy
  - Volume ≤ al 25% dose> 75 Gy
  - Volume ≤ al 35% dose> 70 Gy
  - Volume ≤ al 50% dose> 65 Gy

*Int J Radiation Oncology Biol Phys, Vol. 76, No. 3, Supplement 2010*

# Re-irradiazione

Per ogni paziente sottoposto a nuova irradiazione, in particolare in quelli re-irradiati con intento radicale, sarebbe ideale conoscere l'effetto radiobiologico della radioterapia iniziale, al fine di determinare la dose di re-irradiazione da utilizzare.

Il modello lineare-quadratico è uno strumento molto utile per stabilire le schedule di dose di re-irradiazione nelle quali la risposta alla irradiazione, dei tessuti sani o del tumore, è caratterizzata da un solo parametro, il rapporto α/β. La dose biologica (BED) iniziale è calcolata utilizzando il  modello lineare quadratico

$$BED: nd\ (1+d/[\alpha/\beta])$$

***n=numero di frazioni, d= dose/frazione [Gy]***

***il rapporto α/β indica la capacità dei tessuti di riparare il danno***

# Re-irradiazione

- Scenari clinici
  - Recidiva o persistenza di malattia in un'area precedentemente irradiata con intento curativo o adiuvante
  - Ripresa sintomatologica in area precedentemente trattata con radioterapia palliativa

# Re-irradiazione – Dati storici

- Il trattamento è abitualmente costituito dall'associazione BT – EBRT, quest'ultima maggiormente utilizzata per le recidive estese o che coinvolgono la vulva, i linfonodi inguinali
- Il controllo a lungo termine è possibile in un 35% di pazienti altamente selezionate, ma quasi il 50% sviluppa gravi complicanze, necrosi, fistole, od ostruzione intestinale
- Nelle pazienti debilitate con un basso performance status, si può utilizzare una singola frazione di 10 Gy, con buona risposta palliativa, gravata da importanti complicanze nel 25% dei casi
- La singola frazione può essere utilizzata in caso di mancato controllo del dolore, e in pazienti con aspettativa di vita di poche settimane o con gravi comorbidità

# Outcome of recurrent cervical carcinoma following definitive irradiation

## Sommers GM, Grigsby PW, Perez CA et al.

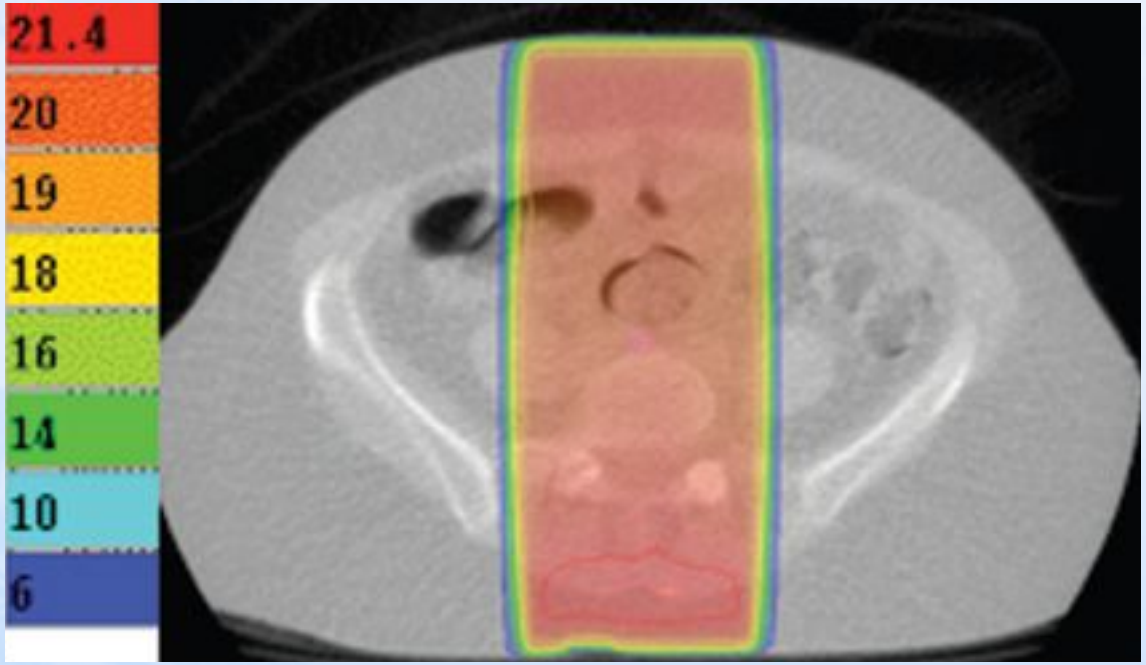
- Retrospective analysis of 376 patients with recurrent cervical carcinoma, following definitive radiation therapy to 1054 patients with stage IB-IVA carcinoma of the uterine cervix treated at the Radiation Oncology Center, Mallinckrodt Institute of Radiology, from January 1959 through December 1982
- The therapy after failure was surgery, irradiation, irradiation plus surgery, or chemotherapy
- There appeared to be no major difference in survival after recurrence by type of treatment or initial stage. The overall survival at 5 years for all untreated patients was 1%
- The median survival was evaluated as a function of time to failure after initial treatment. Patients who developed disease more than 36 months after initial treatment had a median survival of 22.5 months. The median survival was 12.1, 7.6, 9.4, and 9.1 months for those failing less than 6, 6-12, 13-24, and 25-36 months after initial treatment
- Severe treatment complications occurred in 3.6% (5/140)

***Gynecol Oncol 35 (2): 150-5; 1989***

Perché si?

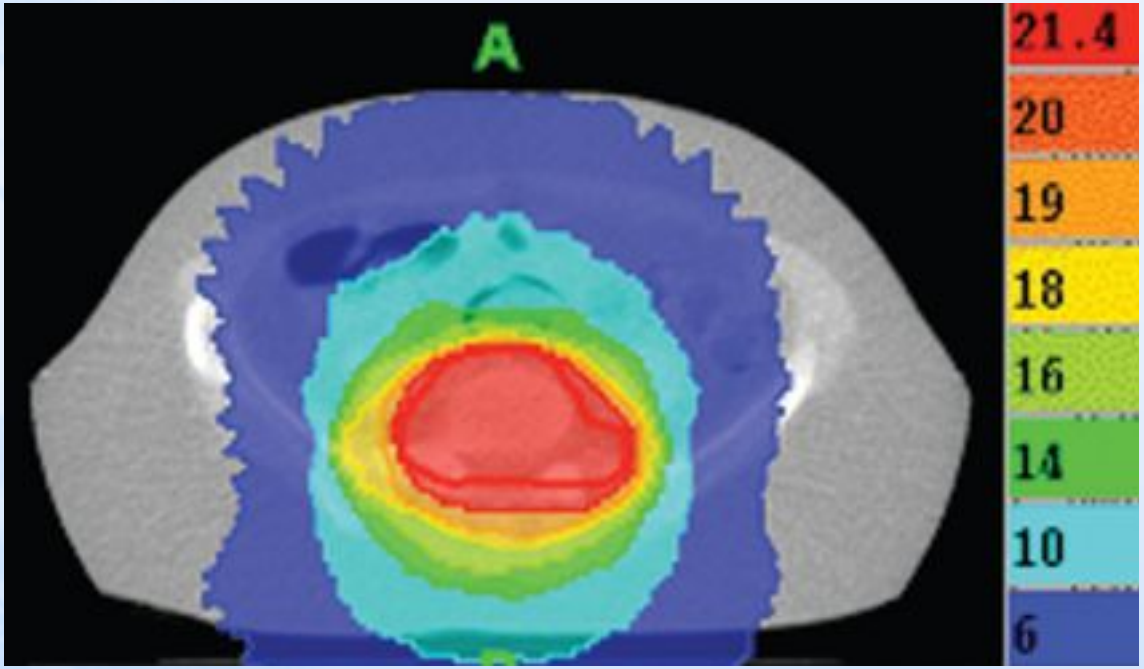
# LE NUOVE TECNOLOGIE

# Re-irradiazione




***Trattamento di una recidiva pre-sacrale con campi AP-PA***

# Re-irradiazione




Trattamento della medesima recidiva pre-sacrale con
***Image-Guided Intensity-Modulated Radiation Therapy (IG-IMRT)***,
significativa riduzione della regione delle alte dosi e degli hotspot

## Incertezze nei PdC e nella erogazione del trattamento radiante

### GTV

- Inter- & intra-observer variability of target volume definition
- Sensitivity and specificity of imaging modality

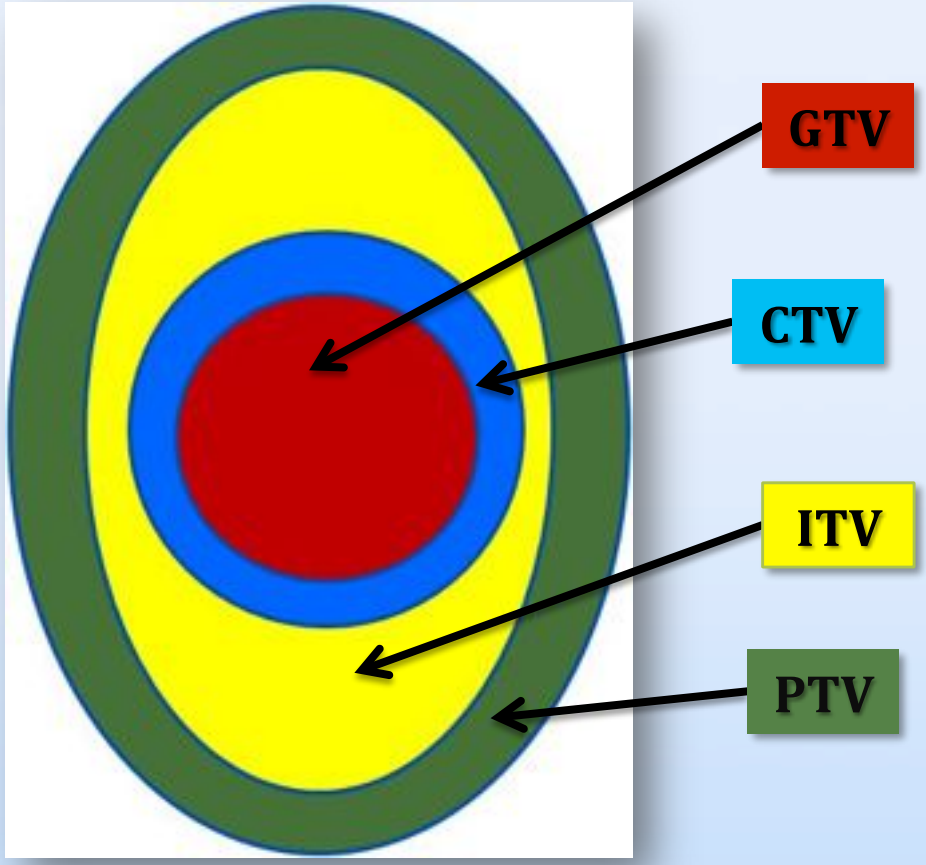
### PTV – intra-fractional

- Patient motion
- Target motion due to:
  - Breathing
  - Heart beat
  - Changes of the filling of hollow organs

### PTV – inter-fractional

- Patient set-up:
  - Rigid set-up errors
  - Non-rigid set-up errors
- Shift of the target position due to:
  - Changes of the filling of hollow organs
  - Changes of the breathing pattern
  - Complex changes of the patients' anatomy (e.g., atelectasis, effusions…)
- GTV regression/progression
- Weight loss of the patient

ICRU 62



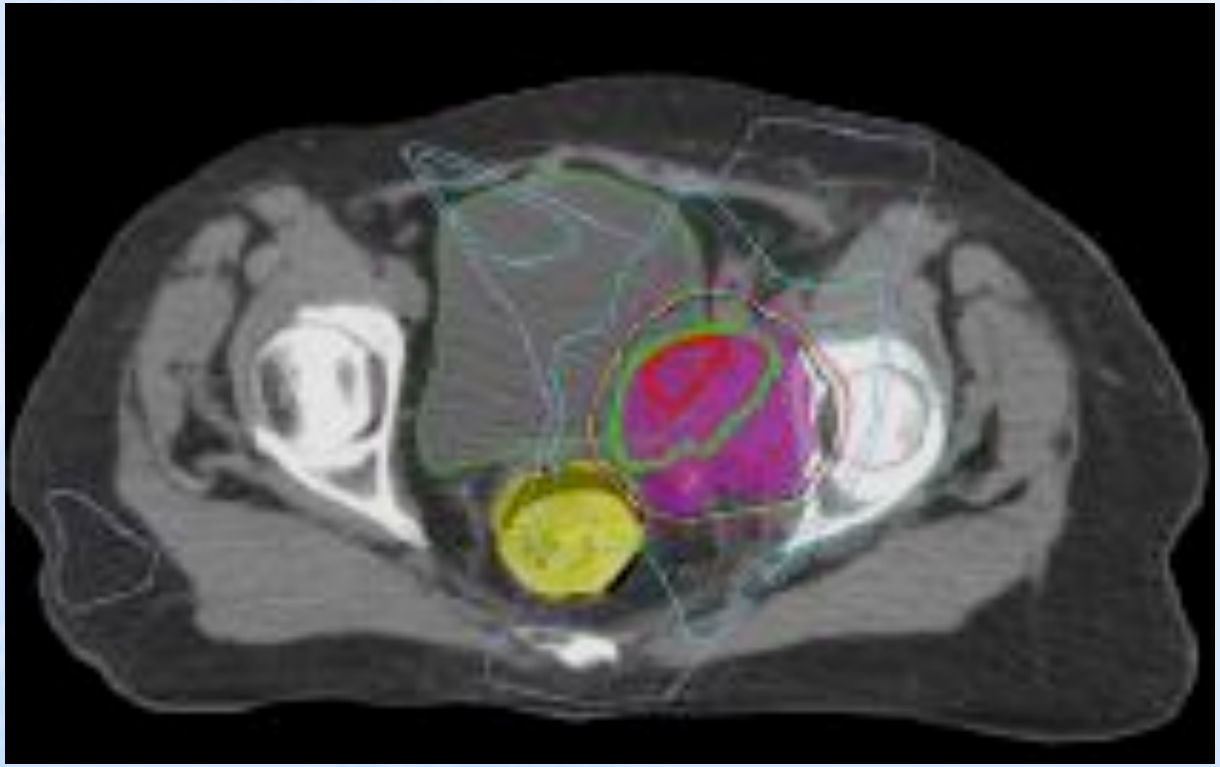
# Tecnologie Image-guided

| | Tecnica | Dose | Informazioni 3D | Contrasto Tessuti Molli | Imaging in real time & Treatment Position | | Pros | Cons |
|---|---|---|---|---|---|---|---|---|
| EPID | MV LINAC | | Limitate | Molto basso | Possibile | Si | Real Time imaging | Alta dose fuori T Contrasto Basso |
| Stereoscopic k V X-ray | Due sorgenti di RX e pannelli | Bassa | Limitate | Basso | Possibile | Si | | Marker per tessuti molli |
| In-room CT scanner | CT associata CT mobile | Media | Complete | Ottimo | No | No | Volume imaging | Movimento pz lettino |
| kV Cone-beam CT | Ortogonale al fascio di terapia | Media | Complete | Buono | No | Si | Volume imaging | Worse imaging |
| MV Cone-beam CT & helical MV CT | Uso del fascio di terapia e EPID Tomotherapy™ | Alta | Complete | Accettabile | No | Si | Volume imaging | Tessuti molli ↓ Alte dosi |
| Ultrasound | B-mode acquisition & targeting | Nulla | Buone | Accettabile | No | Si | No dose | Operatore dipendente T disloc |
| Active Electromagnetic markers | Impianto di marcatori EM (Calypso) | Nulla | Limitate | Nessuno | Si | Si | Real time informati on | Marker, no informazio ni anatomia |
| Surface scanner | Laser o video scanner | Nulla | Solo superficie | Nessuno | Si | Si | Real time imaging | ↓ Correlazio ne superf-T |

# Re-irradiazione

- *Hasselle MD, Rose BS, Kochanski JD et al. Clinical outcomes of **intensity-modulated pelvic radiation therapy** for carcinoma of the cervix. Int J Radiat Oncol Biol Phys 80 (5):1436-45; 2011*
- *Mundt AJ, Lujan AE, Rotmensch J et al. **Intensity modulated whole pelvic radiotherapy** in women with gynecologic malignancies. Int J Radiat Oncol Biol Phys 52:1330–1337; 2002*
- *Portelance L, Chao KS, Grigsby PW et al. **Intensity modulated radiation therapy (IMRT)** reduces small bowel, rectum, and bladder doses in patients with cervical cancer receiving pelvic and para-aortic irradiation. Int J Radiat Oncol Biol Phys 51:261–266; 2001*

# Re-irradiazione



**IMRT planning – axial CT slice**
**CTV (rosa), Retto (giallo)**
**Isodose 105% (linea rossa) & Isodose100% (linea verde)**

*Morgia M et al. in Re-Irradiation: New Frontiers, Nieder C & Langendijk JA Editors 2011*

# Re-irradiazione

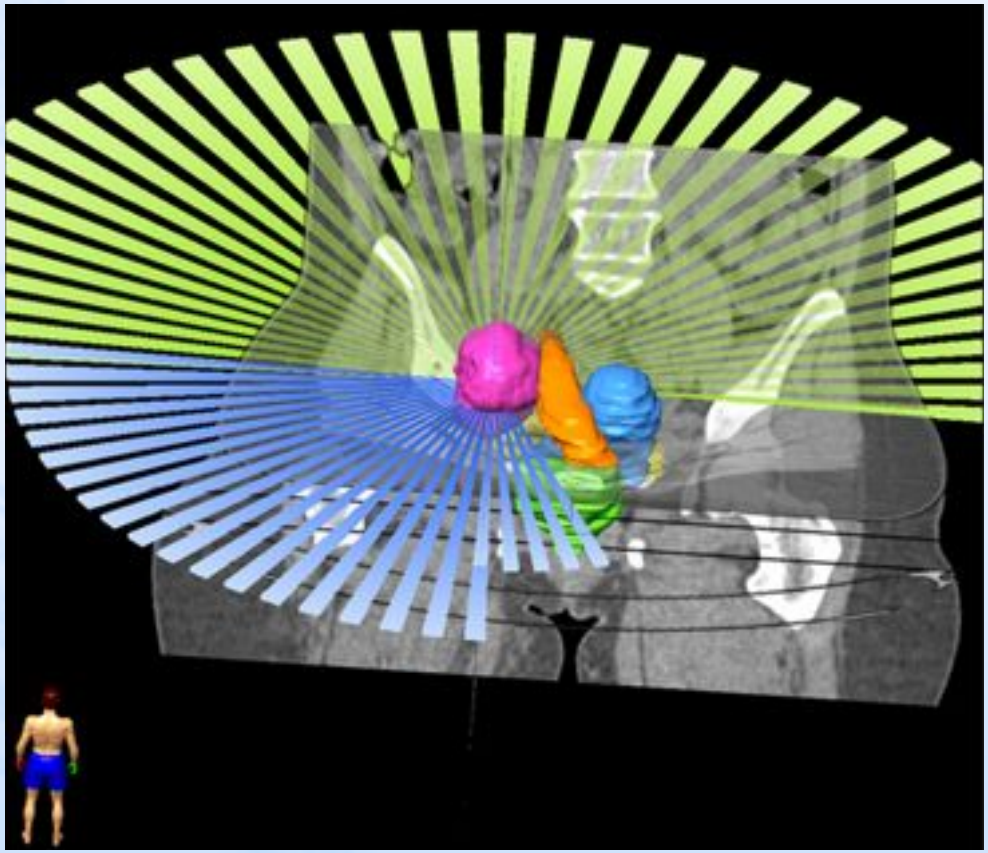
**Recidive loco-regionali isolate e di piccolo volume**

- Le indicazioni alla chirurgia spesso sono limitate dalla estensione della recidiva alla parete pelvica; la prossimità a  strutture nervose, vasi iliaci , fanno aumentare il rischio di complicanze post-operatorie dovute alla fibrosi dei tessuti precedentemente irradiati
- La gestione di queste recidive spesso si basa su una chemioterapia palliativa, la cui efficacia è limitata dalla vascolarizzazione locale alterata dalla radioterapia

# Re-irradiazione

| Series | Pts | Prev RT | Dose & Frs | LC | Toxicity |
|---|---|---|---|---|---|
| Monge et al. 1993—Maximal surgical resection followed by intraoperative RT (IORT) | 26 | 14 | 40–46 Gy in conventional fractionation | LC 34% | Late toxicity up to 40% (chronic pain) |
| Mahe et al. 1996 Surgery + IORT ± EBRT | 70 | 54 | 18 Gy (range 10–30Gy) at the 90% isodose | LC 21% | Grade 2–3 toxicity 27% of patients, and included complications of the procedure |
| Hockel et al. 1996—Combined operative and radiotherapeutic treatment procedure (CORT) for pelvic sidewall recurrences | 48 | 48 | 48–54 Gy in 6 Gy HDR frs twice a week (Ir192) | Overall LC 68% | 5 years severe complication rate 33% (life threatening toxicity/requiring surgery) |
| Tran et al. 2007—Surgery with positive margins + IORT | 36 | 23 | 11.52 Gy mean IORT dose(range 6–17.5 Gy) | 5 years LC 44% | >G2 toxicity 27.8% |

# Re-irradiazione



Re-irradiazione stereotassica per una recidiva linfonodale iliaca esterna di un carcinoma della cervice dopo chemio-radioterapia concomitante seguita da BT utero-vaginale

***Mazeron R, Fumagalli I – Cancer/Radiothérapie 18 (2014) 325–331***

# Re-irradiazione stereotassica nei tumori pelvici

| AUTORI | Tumore primitivo N° | Dose I trattamento | Dose Re-irradiazione | FU Mesi | CL % | OS % | Tox G3-4 |
|---|---|---|---|---|---|---|---|
| Dewas et al 2011 | Canale anale **6**<br>Retto **4**<br>Cervice **4**<br>Endometrio **1**<br>Vescica **1** | 45 Gy (20–96) | 6 x 6 Gy<br>3 settimane | 10.6 | 51.4% | 46% | No |
| Deonato et al 2009 | Cervice **3**<br>Endometrio **2**<br>Ovaio **1** | 50,2 Gy (37,5–65) | 5 x 4–6 Gy | 17.5 | 81.8% | 50% | No |
| Abusaris et al 2012 | Vari | 31-83 Gy | 2–6 x 6–20 Gy | 15 | 53% | 37% | No |
| Kunos et al 2009 | Ginecologici | 32-62 Gy | 3 x 5–8 Gy | 7.5 | 100% | 80% | No |
| Jereczek-Fossa et al 2009 | Prostata **15**<br>Anastomosi **4**<br>LFN **8** | NR | 5 x 6 Gy | 16.9 | - | NR | No |
| Defoe et al 2011 | Retto Recidive Pre-sacrali | 50,4 Gy (20-81) | 3 x 12 Gy<br>1 x 12–18 Gy | 16.5 | 68.2% | 78.8% | No |

***Mazeron R, Fumagalli I – Cancer/Radiothérapie 18 (2014) 325–331***

# Robotic image-guided reirradiation of lateral pelvic recurrences: preliminary results

Dewas S, Bibault JE, Mirabel X, Nickers P, Castelain B, Lacornerie T, Jarraya H & Lartigau E

The first-line treatment of a pelvic recurrence in a previously irradiated area is surgery. Unfortunately, few patients are deemed operable, often due to the location of the recurrence, usually too close to the iliac vessels, or the associated surgical morbidity. The objective of this study is to test the viability of robotic image-guided radiotherapy as an alternative treatment in inoperable cases.

Sixteen patients previously treated with radiotherapy were re-irradiated with CyberKnife® for lateral pelvic lesions. Recurrences of primary rectal cancer (4 pts), anal canal (6), uterine cervix cancer (4), endometrial cancer (1), and bladder carcinoma (1) were treated. The median dose of the previous treatment was 45 Gy ($EqD_2$ range: 20 to 96 Gy). A total dose of 36 Gy in six fractions was delivered with the CyberKnife over three weeks. The responses were evaluated according to RECIST criteria.

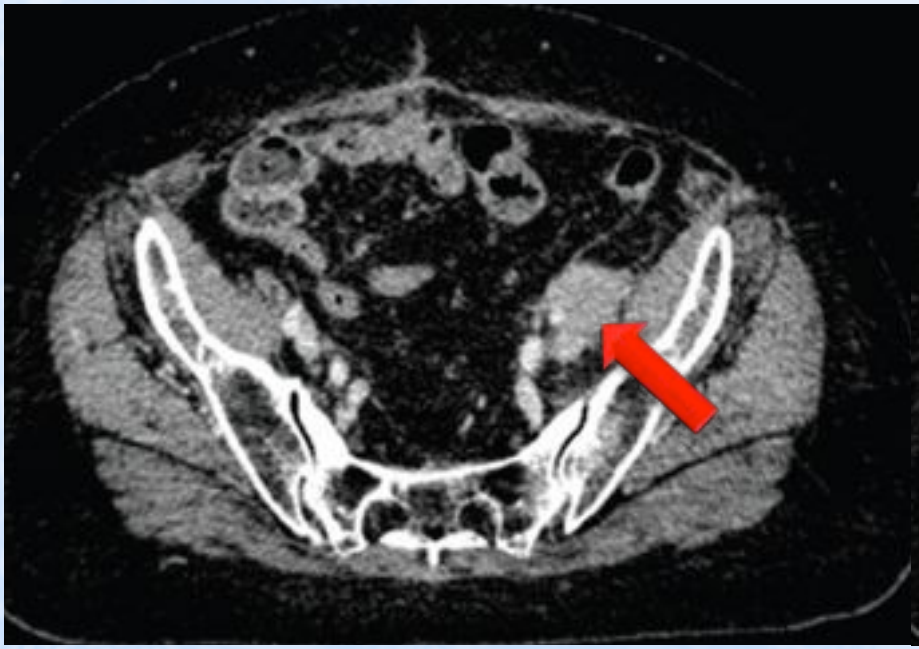
Median follow-up was 10.6 months (1.9 to 20.5). The actuarial local control rate was 51.4% at one year. Median disease-free survival was 8.3 months after CyberKnife treatment. The actuarial one-year survival rate was 46%. Acute tolerance was limited to digestive grade 1 and 2 toxicities.

Robotic stereotactic radiotherapy can offer a short and well-tolerated treatment for lateral pelvic recurrences in previously irradiated areas in patients otherwise not treatable. Efficacy and toxicity need to be evaluated over the long term, but initial results are encouraging.

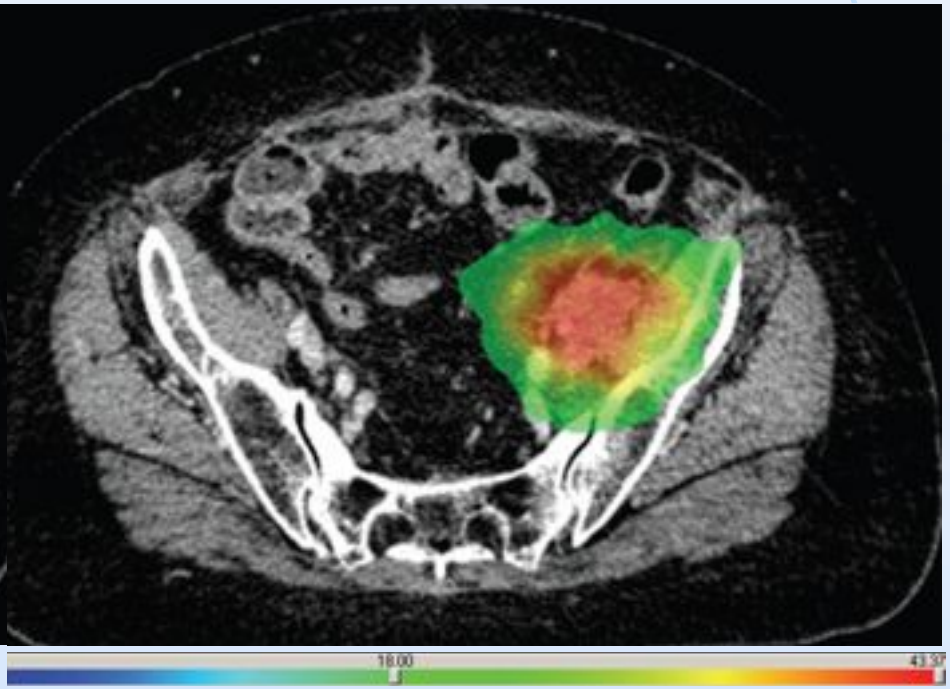
*Radiation Oncology 6: 77; 2011*

# Robotic image-guided reirradiation of lateral pelvic recurrences: preliminary results

Dewas S, Bibault JE, Mirabel X, Nickers P, Castelain B, Lacornerie T, Jarraya H & Lartigau E



**Cervix cancer recurrence near the left iliac vessels**



**Prescription to the 80% isodose line covering 95% of the PTV**

*Radiation Oncology 6: 77; 2011*

# Re -Irradiation with Interstitial Implant for Recurrent Pelvic Malignancies

Puthawala AA, Nisar Syed AM, FRCS (Lon & Edin), Fleming PA, DiSaia PJ

Forty patients with a diagnosis of recurrent pelvic malignancy from various primary sites with no clinical evidence of distant metastasis were re-irradiated with interstitial implant. Removable after-loading $^{192}Ir$ sources or permanent $^{125}I$ seeds or a combination of both were used. Twenty-six of these patients received interstitial implant at the time of exploratory laparatomy.

A complete local control of implanted pelvic tumors was achieved in 27 of the 40 patients (67%). Thirteen of the 40 patients (33%) remained alive and disease-free to a minimum follow-up period of two years.

Serious complications such as soft tissue necrosis and fistulae occurred in 15% of the patients.

*Cancer 50: 2810-2814, 1982*

# Reirradiation Using High-Dose-Rate Interstitial Brachytherapy for Locally Recurrent Cervical Cancer A Single Institutional Experience

The records of 52 consecutive women with central pelvic recurrence who were salvaged with HDR-ISBT-based reirradiation were retrospectively reviewed. Data regarding the primary disease, follow-up findings, recurrence, the treatment outcome, and toxicities were collected. Multivariate analysis was performed using the Cox proportional hazards regression model to identify predictors of the response to HDR-ISBT. Survival rate was calculated using the Kaplan-Meier method and compared using the log-rank test.

A total of 52 patients who had been treated with HDR-ISBT-based reirradiation.

**The local control rate was 76.9% (40/52), and the median post-recurrence survival period was 32 months.**

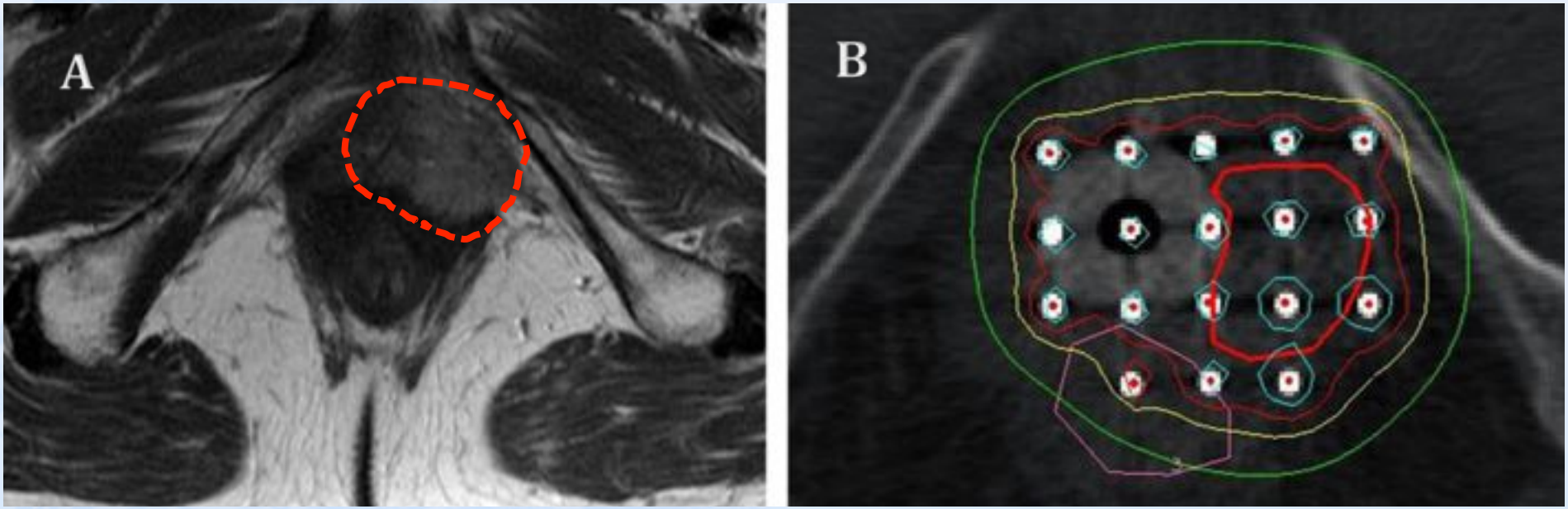
**Grade 3 or 4 late toxicities were observed in 13 patients (25%).**

Multivariate analysis revealed that **tumor size and the treatment-free interval** were significant **poor prognostic factors** of post-recurrence survival. In a comparison between the patients who were salvaged with HDR-ISBT-based reirradiation (ISBT group) and those who were treated with palliative therapy alone (palliative group), we found that among the patients who displayed 0 or 1 poor prognostic factors, the patients in the ISBT group survived significantly longer than those in the palliative group. In contrast, similar survival rates were seen in both groups among the patients with 2 or more poor prognostic factors.

Reirradiation using HDR-ISBT is effective and feasible in patients with recurrent cervical cancer. Our 2-clinical variable prognostic model might enable physicians to identify patients who would not derive clinical benefit from HDR-ISBT and offer them the opportunity to receive other types of treatment.

***Mabuchi S et al. Int J Gynecol Cancer 2014; 24: 141-148***

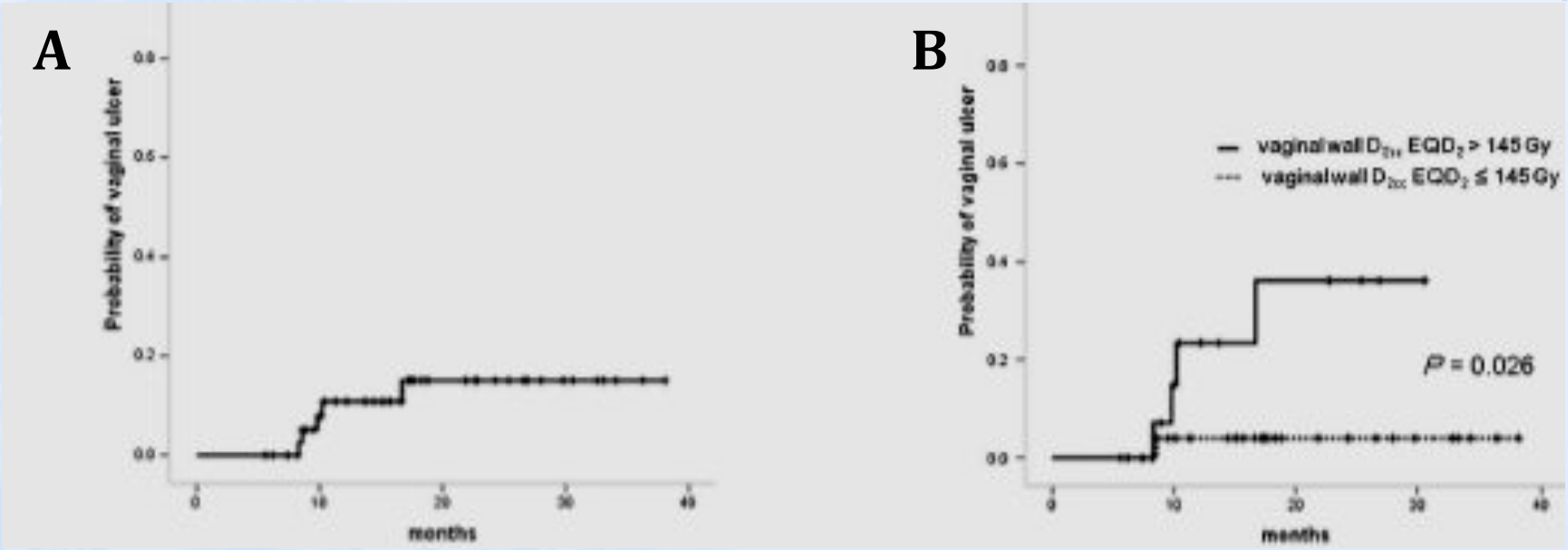
# Reirradiation Using High-Dose-Rate Interstitial Brachytherapy for Locally Recurrent Cervical Cancer A Single Institutional Experience




HDR-ISBT-based re-irradiation for locally recurrent cervical cancer.
**A** T2-weighted MRI image of a locally recurrent cervical tumor (∅ 25 mm)
**B** Isodose distribution created by CT-based planning

*Mabuchi S et al. Int J Gynecol Cancer 2014; 24: 141-148*

# Cumulative incidence of vaginal ulcer




**A** Cumulative incidence of vaginal ulcer

**B** Cumulative incidence of vaginal ulcer stratified by vaginal wall $D_{2cc}$ 145 Gy in $EQD_2$

***The DVH parameters for vagina are essential for treatment planning and optimization in image based HDR-ISBT in gynecological malignancies. Vaginal wall $D_{2cc}$ in $EQD_2$ should be monitored and be kept under 145 Gy in order to avoid vaginal ulcer. Also in patients with prior pelvic irradiation, vaginal wall dose including the prior radiation dose should be kept lower than 145 Gy***

***Murakami N et al. Radiation Oncology 9: 31, 2014***

Contents lists available at ScienceDirect

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journal homepage: www.thegreenjournal.com

Re-irradiation

# Second re-irradiation: Efficacy, dose and toxicity in patients who received three courses of radiotherapy with overlapping fields

Huda Abusaris*, Pascal R.M. Storchi, Rene P. Brandwijk, Joost J. Nuyttens

*Department of Radiation Oncology, Erasmus MC–Daniel den Hoed Cancer Center, Rotterdam, The Netherlands*

To explore the outcome, cumulative dose and toxicity in 23 patients after a third radiation treatment, with a partial or complete overlap of the previous two irradiated regions.

The dose summation of the three radiation plans was made by the planning system. For patients treated with cyberknife or brachytherapy dose summation was done by dose point calculations. Efficacy and toxicity was scored by looking at the reduction of tumor, pain and bleeding.

Symptomatic response was observed in 81% and 73% of the patients after, respectively, the third and second radiation. The median cumulative maximum dose to the tumor and its regions was 133 $Gy_3$ (range: 82–496 $Gy_3$). The median corrected cumulative dose for the rectum, bowel and bladder resulted in 91 $Gy_3$, 73 $Gy_3$ and 79 $Gy_3$, respectively. Grade 3 acute skin toxicity was only seen in the third radiation course.

***The constraints of 100 $Gy_3$ for rectum, 90 $Gy_3$ for bowel and 110 $Gy_3$ for bladder are safe and can be used as guidelines in the decision for re-irradiation.*** Symptomatic relieve was seen in 81% of the patients with low grade 3 and no grade 4 acute and late toxicity.

***Radiotherapy and Oncology 99, 235–239; 2011***

# Radiation schedules

| Schedules | Site treated | First radiation | | Second radiation | | Third radiation | |
|---|---|---|---|---|---|---|---|
| | | Total dose (Gy) | Dose per fraction (Gy) | Total dose (Gy) | Dose per fraction (Gy) | Total dose (Gy) | Dose per fraction (Gy) |
| 1 | Pelvis | 46 | 2 | 33* | 1.5 | 32 | 4 |
| 2 | | | | | | | |
| 3 | Pelvis | 44.65 | 2.35 | 30 | 2 | 18† | 6 |
| 4 | | | | | | | |
| 5 | Pelvis | 44.65 + 16 | 2.35 + 2 | 32 | 4 | 24† | 8 |
| 6 | Pelvis | 54 | 1.8 | 32 | 4 | 20 | 4 |
| 7 | | | | | | | |
| 8 | Pelvis | 25 | 5 | 15 | 3 | 32 | 4 |
| 9 | Pelvis | 50 | 2 | 30 | 2 | 16† | 8 |
| 10 | Pelvis | 44.65 + 16 | 2.35 + 2 | 45 | 3 | 20 | 4 |
| 11 | | | | | | | |
| 12 | Pelvis | 47 | 2.35 | 20 | 2 | 32 | 4 |
| 13 | | | | | | | |
| 14 | Pelvis | 44.65 | 2.35 | 18† | 6 | 32 | 4 |
| 15 | Pelvis | 44.65 | 2.35 | 42† | 7 | 24 | 4 |
| 16 | | | | | | | |
| 17 | Pelvis | 52 | 2 | 32 | 4 | 20 | 4 |
| 18 | Pelvis | 50 | 2 | 32 | 4 | 16† | 8 |
| 19 | | | | | | | |
| 20 | | | | | | | |
| 21 | Pelvis | 60 | 2 | 20 | 4 | 8† | 8 |
| 22 | | | | | | | |
| 23 | Pelvis | 20 | 5 | 40 | 4 | 16† | 8 |

*Radiotherapy and Oncology 99, 235–239; 2011*

# Cumulative dose ($EQD_2$) given to the organs at risk after three radiation courses with dose reduction due to tissue repair

| Organs at risk | Median | Min | Max | No. of patients |
|---|---|---|---|---|
| Bladder | 79 | 50 | 118 | 13 |
| Bowel | 73 | 49 | 108 | 10 |
| Rectum | 91 | 68 | 156 | 8 |
| Sacral nerves/cauda equina | 65 | 47 | 117 | 9 |

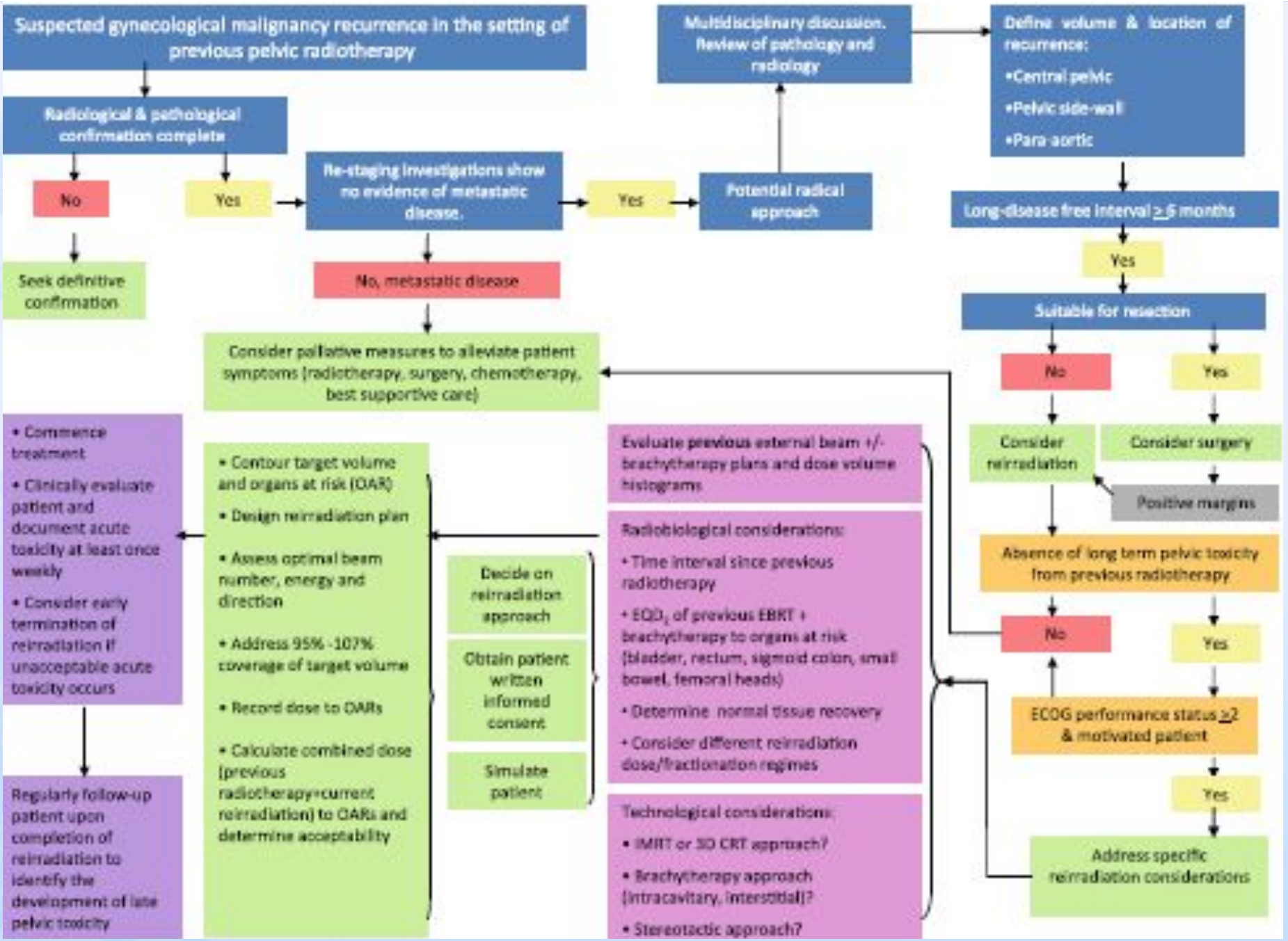
## Toxicity

After three radiation courses, there were no patients with grade 4 acute toxicity. Four percent of the patients experienced acute grade 3 pain and 7% of the patients acute grade 3 dysuria. None of the patients experienced grade 4 late toxicity after the three radiation courses. Grade 3 late skin toxicity was experienced in 4% of the patients.

*Radiotherapy and Oncology 99, 235–239; 2011*

# Re-irradiazione

- Le recidive isolate nei linfonodi lombo-aortici, variano tra il 2 e il 12% delle recidive di cervico carcinoma. Se la regione lombo-aortica è già stata precedentemente irradiata si possono utilizzare, per la terapia di salvataggio, IMRT o le altre tecniche di precisione summenzionate. I tassi di sopravvivenza si attestano intorno al 30%, in studi recenti sono stati riportati tassi di sopravvivenza a 5 anni vicini all'80% con l'utilizzo di radio-chemioterapia concomitante (cDDP-5-FU o cisplatino settimanale).

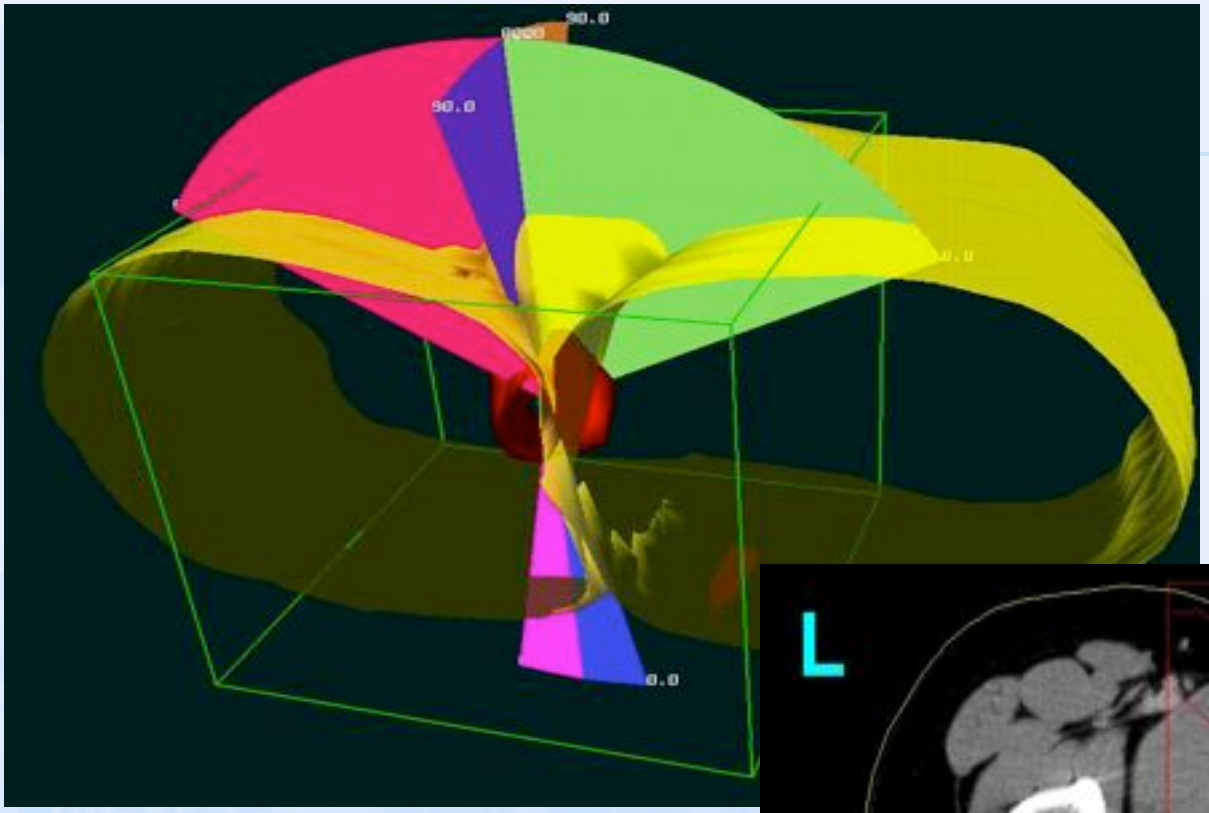


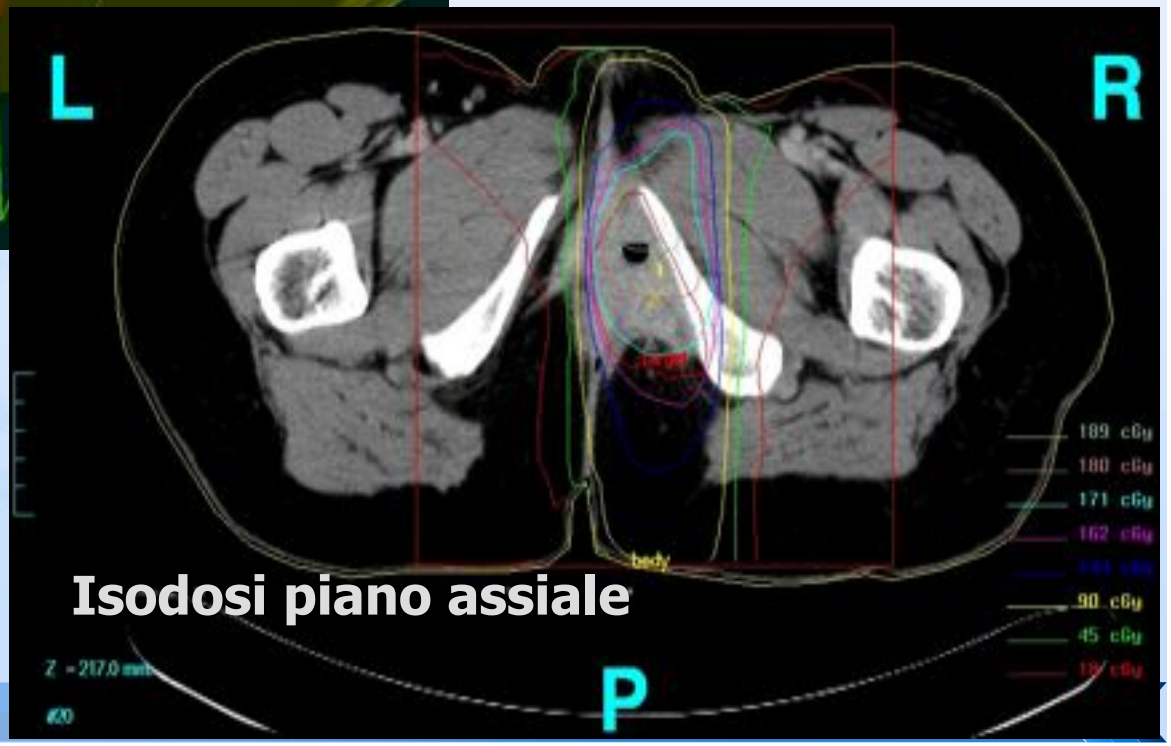

*Morgia M et al. in Re-Irradiation: New Frontiers, Nieder C & Langendijk JA Editors 2011*

# Frazionamenti

| Location of recurrence | Radical dose/fractionation schedules (highly conformal techniques) | Palliative - high dose palliative dose/ fractionation schedules |
|---|---|---|
| **Pelvic side-wall recurrence** | **EBRT**<br>**50 Gy/25 fx**<br>**45 Gy/25 fx**<br>**40 Gy/20 fx** | **EBRT**<br>**40 Gy/20 fx**<br>**25–30 Gy/10–15 fx** |
| **Vaginal-vault recurrence** | **EBRT + brachytherapy**<br>**50 Gy/25 fx**<br>**40 Gy/20 fx**<br>**+ brachy to total dose 65–75 Gy** | **EBRT**<br>**40 Gy/20 fx**<br>**30 Gy/20 fx** |
| | **EBRT alone**<br>**45 Gy/25 fx**<br>**40 Gy/20 fx** | **Brachytherapy alone**<br>**20–25 Gy HDR/3 fx** |
| | **Brachytherapy alone**<br>**35–50 Gy LDR over 4–6 days**<br>**20–25 Gy HDR/4–5 fx BID over 2–2.5 days** | |

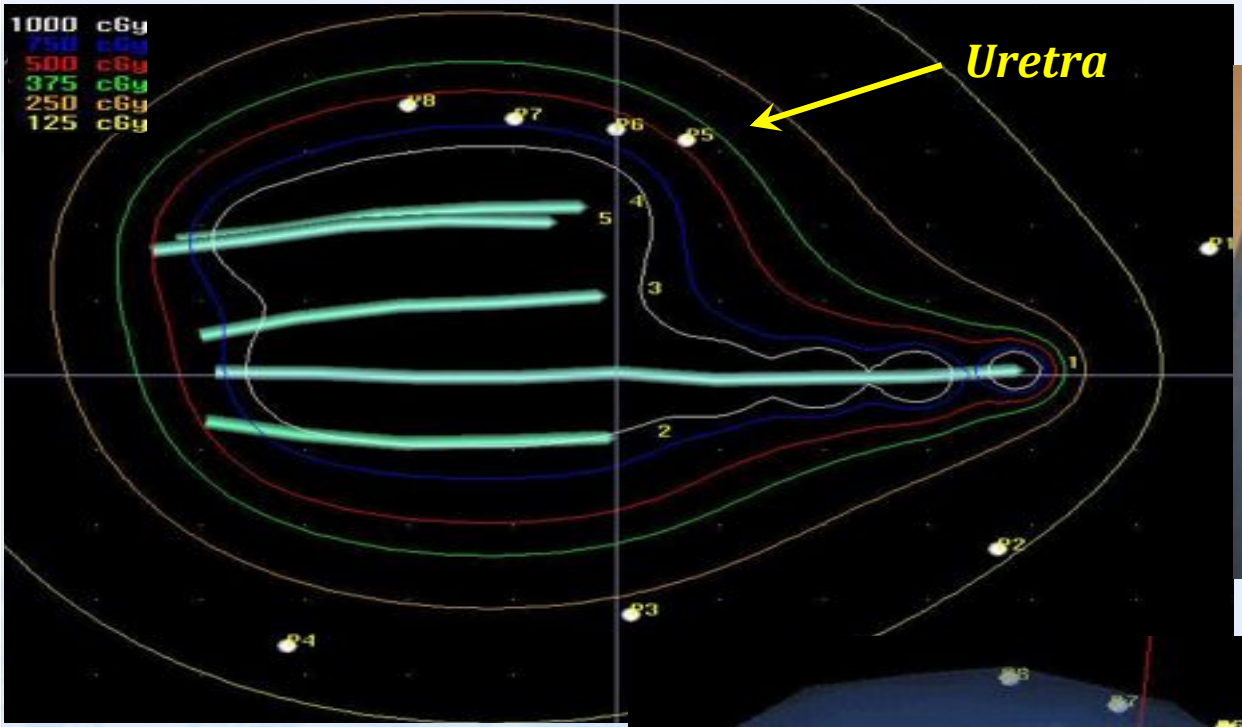
# *μDMLC 6 archi*

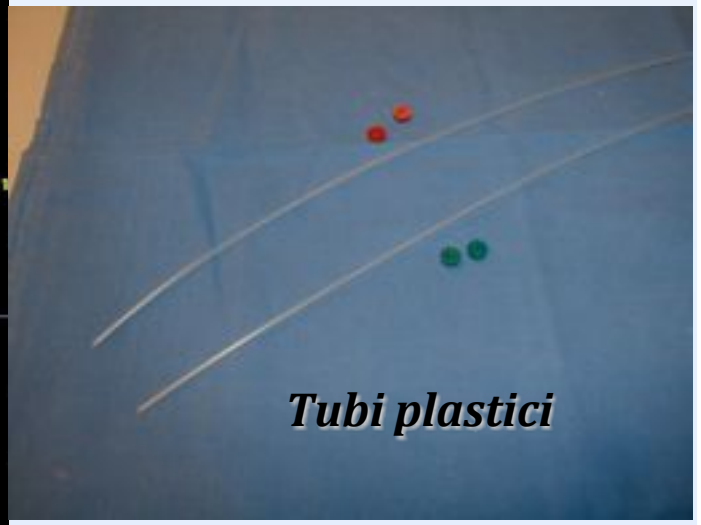


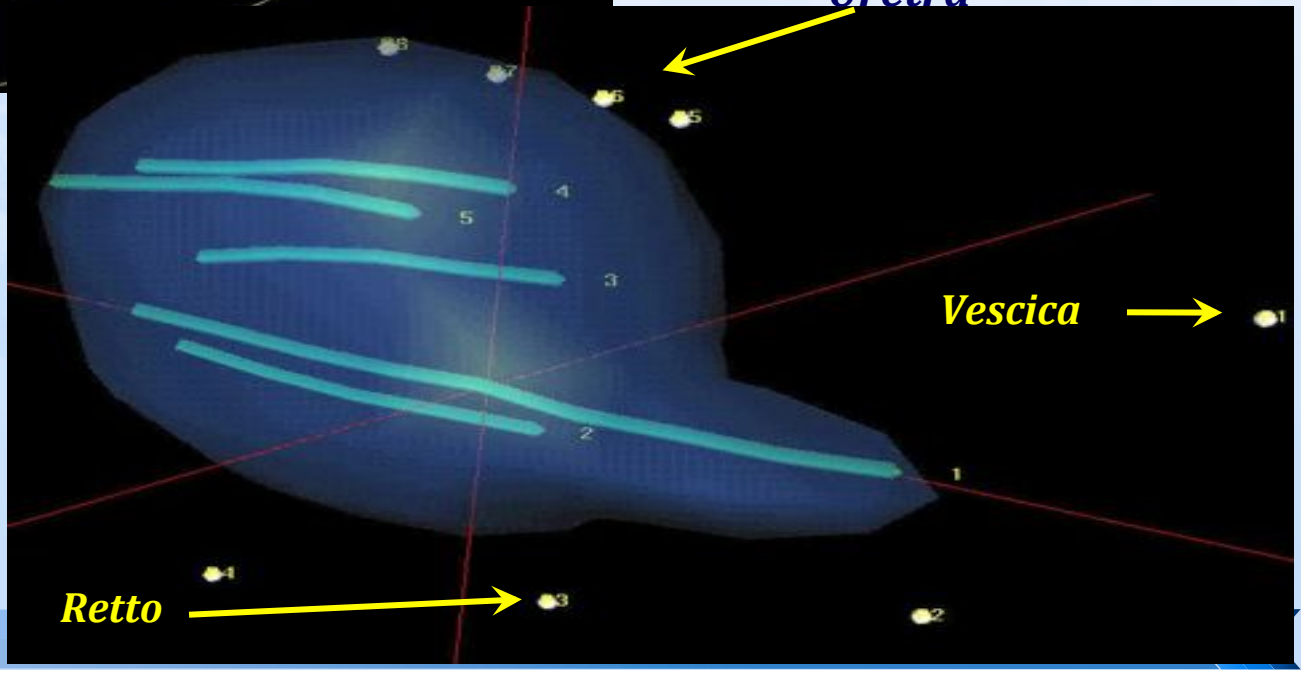




Isodosi piano assiale

# *Cilindro e impianto interstiziale sottouretrale*



# Conclusioni…

- Si può re-irradiare … Si
- Accurata selezione delle pazienti
- Riduzione dei volumi di trattamento
- Bisogna irradiare bene prima … Si!!
- Si sono ridotte le tossicità con le Nuove Tecnologie … Si
- Morbilità e mortalità inferiori alla chirurgia exenterativa, con iniziale miglioramento della PFS