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PALAZZO DEI CONGRESSI

Radioterapia Oncologica: l'evoluzione al servizio dei pazienti

# REIRRADIAZIONE: REQUISITI MINIMI RICHIESTI

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Associazione Italiana
Radioterapia e Oncologia clinica

No conflict of interest

# Parameters reported?

PubMed®

3,156 results

- OS
- LC
- QoL
- Toxicity
- Follow up

- Dose 1° RT
- Dose sum
- PTV overlap
- OARs constraints
- DVH PTV,OARs

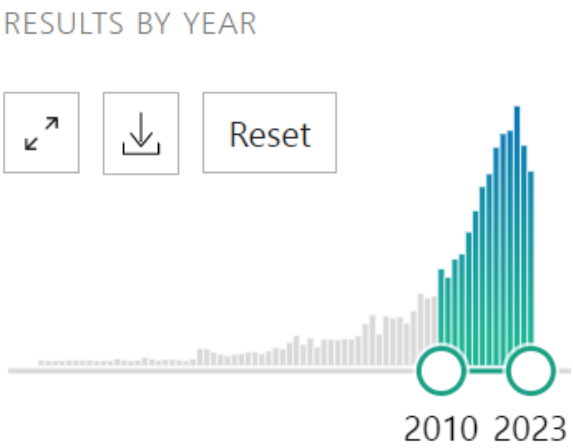

Table 1: Selected recent (> 2010) prospective studies from supplementary data 1

| Name / Date | Type of study | Organ | No. of patients | Technique | Median time before reRT | Outcomes | Late toxicity (patients) |
|---|---|---|---|---|---|---|---|
| Garg 2011 | Single-institution, prospective, phase I/II | Bone (Spine) | 59 | SBRT | 12.8 – 19.8 months | LRC: 1 yr, 76%<br>OS: 1 yr, 76% | 2 ≥ grade 3 (lumbar plexopathy) |
| Møller 2017 | Single-institution, prospective, phase I (*NCT02025231*) | Brain (GBM) | 31 | SBRT | > 6 months | Median PFS: 2.8 m.<br>Median OS: 7 m. | 3 ≥ grade 3 (radionecrosis) |
| Shi 2018 (41) | Multi-institution, prospective, phase III (RTOG 0525) | Brain (GBM) | 88 (24 reRT alone) | Various (IMRT, SBRT, BT) | nr | Median OS: 8.2 m. | nr |
| Kauer-Dorner 2012 | Single-institution, prospective, phase I | Breast | 39 | BT | ~ 11 years | LRC: 5yr. 93%<br>OS: 5 y. 87% | 20 grade 1–2, 4 ≥ grade 3 (fibrosis and pain) |
| Arthur 2020 | Multi-institution, prospective, phase II (NRG oncology RTOG 1014) | Breast | 58 | 3D-CRT | 13.4 years | LRC: 5 yr, 95%<br>OS; 5 yr. 95% | 4 ≥ grade 3 (fibrosis, breast atrophy) |
| Fernandes 2016 | Single-institution, prospective, phase I | Gut (Esophagus) | 14 | PT | 32 months | OS: 1y. 70.7% | 2 ≥ grade 3 (esophageal ulceration) |
| Chen 2011 | Single-institution, prospective, phase I | Head and Neck | 21 | IMRT | 14 months | LRC: 1 yr. 72%, 2 yr. 65%<br>OS: 1 yr. 65%, 2 yr. 40% | 3, grade nr (trismus and brachial plexopathy) |
| Vargo 2015 | Single-institution, prospective, phase I (*NCT 01104922*) | Head and Neck | 50 | SBRT (with cetuximab) | 18 months | LRC: 1yr. 37%<br>OS: 1 yr. 40% | 5 ≥ grade 3 (dysphagia aerodigestive fistulas) |
| Chao 2017 | Multi-institution, prospective, phase II (*NCT01126476*) | Lung | 57 | PT | 19 months | OS: 1yr. 59%<br>PFS: 1 yr. 58% | 24 ≥ grade 3 (5 deaths) |
| Crook 2019 | Multi-institution, prospective, phase II (NRG Oncology/RTOG-0526) | Pelvis (prostate) | 92 | BT | 85 months | nr | 6 ≥ grade 3 (rectal bleed, retention, frequency) |

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- Universal terminology
- Assessment of Re-RT
- Improving reporting quality

…"re-irradiation is a new course of radiotherapy, either to a previously irradiated volume (irrespective of concerns of toxicity) or where the cumulative dose raises concerns of toxicity".

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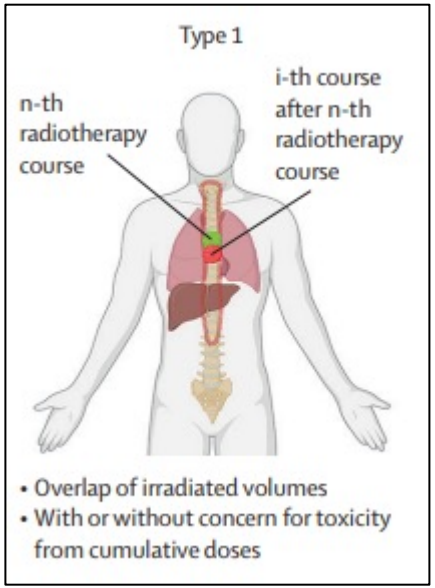
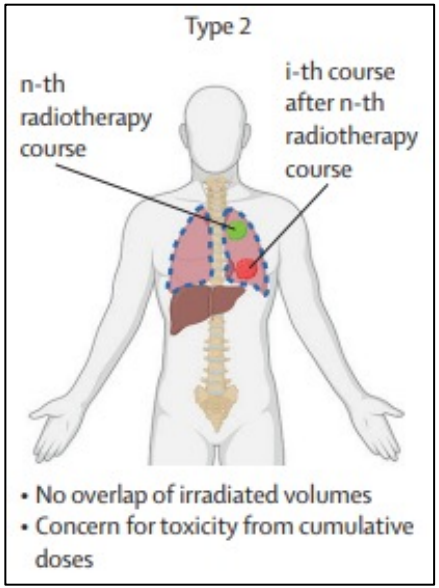
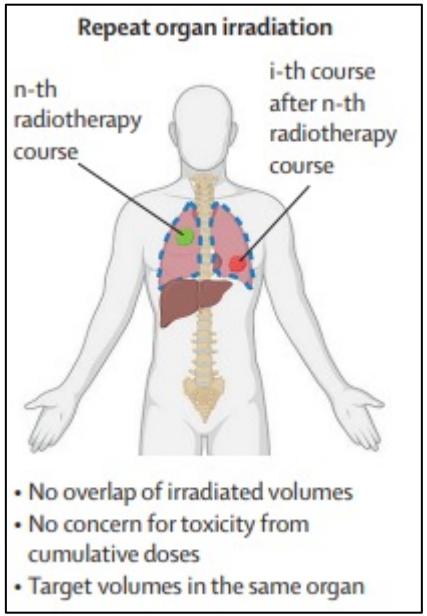
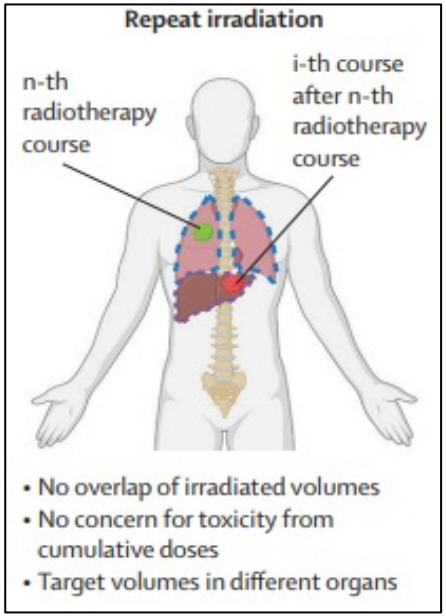



# Re-irradiation

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# Repeat Irradiation

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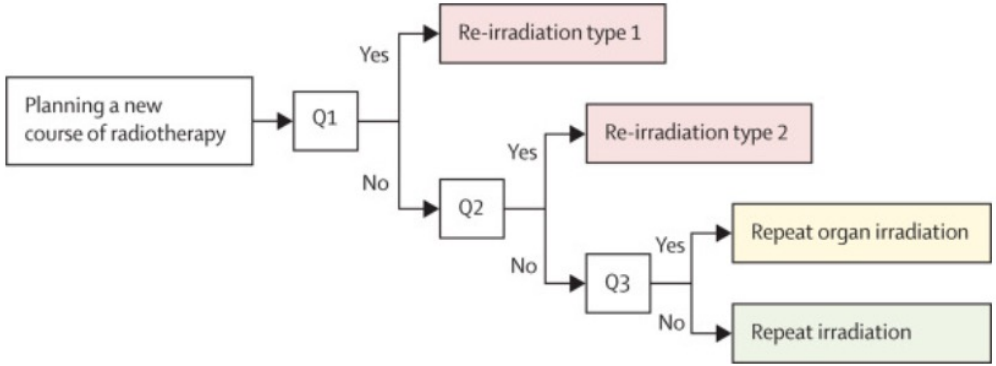


Q1=is there a geometrical overlap of the irradiated volumes?

Q2=is there a concern for toxicity from the cumulative doses?

Q3=are the target volumes of current and previous radiotherapy located in the same organ?

**Patient characteristics**

*Required*

- General information (eg, age, sex)
- Performance status (eg, Eastern Cooperative Oncology Group or Karnofsky performance status)
- Organ function

*Recommended*

- Lifestyle factors (eg, drinking and smoking habits)
- Comorbidities
- Charlson Comorbidity Index

**Tumour characteristics**

*Required*

- Primary tumour histology
- Site and location
- Local recurrence versus metastases versus new primary
- In-field versus marginal versus out-of-field recurrence
- Retreatment target volume size
- TNM stage

*Recommended*

- European Society for Radiotherapy and Oncology and European Organisation for Research and Treatment of Cancer stage of oligometastatic disease (if applicable)

*Optional*

- Union for International Cancer Control stage or similar classification

**Previous and current oncological treatments**

*Required*

- Current systemic therapies
- Previous surgical interventions
- Planned surgical interventions
- Toxicities and impairments from previous medical treatments

*Recommended*

- Previous systemic therapies

**Previous radiotherapy information**

*Required*

- Number of previous courses
- Standardised reporting of toxicity (eg, common terminology criteria of adverse events)
- Time interval since previous courses
- Persistent toxicity of previous courses scored according to the most recent common terminology criteria of adverse events
- Dose prescription and fractionation
- Radiotherapy modality and delivery technique

**Indication to perform retreatment**

*Required*

- Treatment approach: re-irradiation, repeat organ irradiation, or repeat irradiation
- Treatment intent: palliative, curative, or local ablative
- Treatment goal: local control, symptom relief or prevention, or prolonging survival

**Treatment planning**

*Required*

- Dose prescription and fractionation
- Imaging method for target and organs at risk delineation
- Target and organs at risk definition guideline or protocol
- Dose constraints of organs at risk
- Radiotherapy modality and delivery technique

*Recommended*

- Biological recalculation of accumulated dose
- Dose calculation algorithm
- Prioritisation of planning objectives

**Assessment of cumulative doses**

*Required*

- Image registration technique
- Dose summation method (three-dimensional or point doses, physical or biological)
- Radiobiological considerations (such as α/β or tissue recovery)
- Organs at risk cumulative doses

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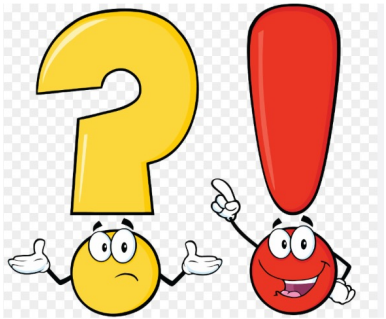
| | | | |
|---|---|---|---|
| Availability of previous treatment plans for dose reconstruction and estimation | (12) If high-dose re-irradiation is considered, access to full information on previous treatments, including imaging, treatment plans, and dose distributions is strongly recommended for assessing cumulative dose summation | 2 | 76% (13/17) |
| Cumulative dose assessment | (15) If the previous dose distribution is available electronically, an overlay of dose distributions in 3D is mandatory | 2 | 88% (15/17) |
| Cumulative dose assessment | (14) If the previous dose distribution is not available in electronic format, but can be reconstructed from simulation fields or portal images, conservative approximation is reasonable for computer calculated 3D dose summation | 2 | 94% (16/17) |



# Considerations and recommendations for re-irradiation in clinical practice

…when to consider CAREFULLY reRT

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| | |
|---|---|
| Performance status | (4) A stable performance status of ECOG ≤2 is recommended for patients who are considered for high-dose re-irradiation |
| Estimated survival based on tumour and comorbidities | (5) High-dose re-irradiation in curative intent is not recommended if estimated survival is <6 months |
| Persistent toxicity from previous irradiation courses | (6) Re-irradiation should be critically discussed in case of persistent grade 3 or greater radiation-induced toxicity, also taking the patient's risk acceptance into account |
| Time interval since last irradiation | (7) High-dose re-irradiation in curative intent within 6 months of previous irradiation should be carefully weighed against the benefit from the initial radiotherapy and the estimated risk of toxicity |
| Tumour response to previous irradiation | (8) High-dose re-irradiation in curative intent should not be prescribed if the best response was progressive disease |

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…toxicity & recovery considerations

| | |
|---|---|
| Patient's risk acceptance if established dose constraints for organs at risk are exceeded | (2) For patients with short life expectancy, re-irradiation for symptom control might be considered without concerns for irreversible toxicity, despite excessive cumulative doses |
| Serial *vs* parallel organs | (11) When assessing the risk for toxicity from cumulative doses, maximum doses need to be considered for serial organs (eg, the spinal cord), whereas the irradiated volume is relevant for parallel organs (eg, the lung or liver) |
| Tolerance and recovery | (20) Tissue-dependent recovery or dose discount (ie, the amount of the previously given dose that is assumed to be recovered and can be substracted for further cumulative dose calculations) are subject to ongoing research and therefore a reliable recommendation on their use is not possible, except for CNS and spinal cord |

Prognostic scores helping the decision making

## Salvage Radiosurgery for Selected Patients with Recurrent Malignant Gliomas

Miguel Martínez-Carrillo,[1] **Isabel Tovar-Martín**,[1] Mercedes Zurita-Herrera,[1] Rosario Del Moral-Ávila,[1] Rosario Guerrero-Tejada,[1] Enrique Saura-Rojas,[2] Juan Luis Osorio-Ceballos,[3] Juan Pedro Arrebola-Moreno,[1] and José Expósito-Hernández[1]

## Generation and validation of a prognostic score to predict outcome after re-irradiation of recurrent glioma

STEPHANIE E. COMBS[1], LUTZ EDLER[2], RENATE RAUSCH[2], THOMAS WELZEL[1], WOLFGANG WICK[3] & JÜRGEN DEBUS[1]

## Retreatment of Recurrent or Second Primary **Head** and **Neck** Cancer After Prior Radiation: Executive Summary of the American Radium Society Appropriate Use Criteria.

**Ward MC**, Koyfman SA, Bakst RL, Margalit DN, Beadle BM, Beitler JJ, Chang SS, Cooper JS, Galloway TJ, Ridge JA, Robbins JR, Sacco AG, Tsai CJ, Yom SS, Siddiqui F.

Clinical challenges:
⇒ Patient selection
⇒ Risk/benefit balance
⇒ Multidisciplinary staff meeting

Technical challenges:
⇒ Radiation technique selection
⇒ Target volume definition
⇒ Maximal protection of healthy tissues

*«Primum non nocere"*